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
- 0.02 ° accuracy in multiple turns of the desired number
- For Analog output : 16 bit,
  For CANopen output : single turn 1…14 bit, multiturn 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

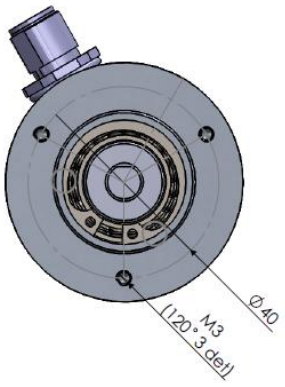
MECHANICAL SPECIFICATIONS

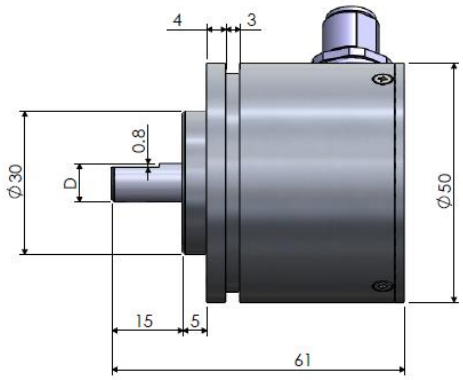
Maximum Speed	3000 rpm
Body Diameter	50 mm
Shaft Diameter	6, 8, 10, 12, 14, 15 or 17 mm
Weight	~170 gr
Protection Class	IP 68
Operating Temp.	-45°C … +85°C
Relative Humudity	%10 … %90
Material	Shaft: Stainless Steel
	Body: Aluminum

Note: The product is mechanically non-stop.

MECHANICAL DIMENSIONS (mm)

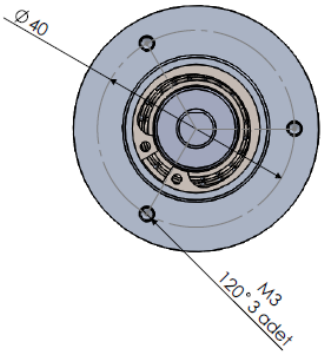
M12 CONNECTOR FROM SIDE

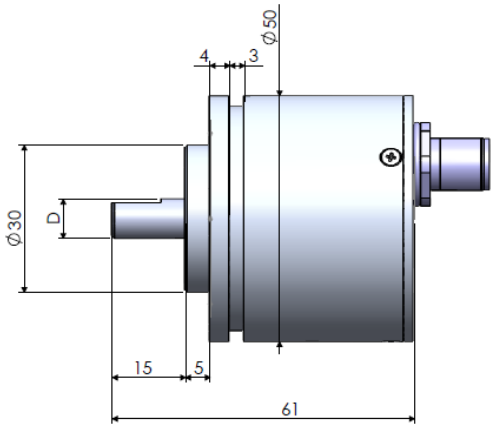




ØD	6	8	10	12	14	15	17

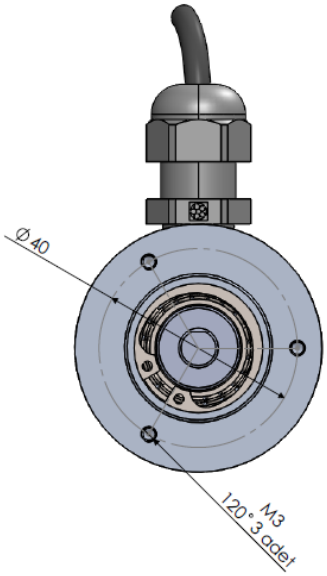
M12 CONNECTOR FROM BACKSIDE

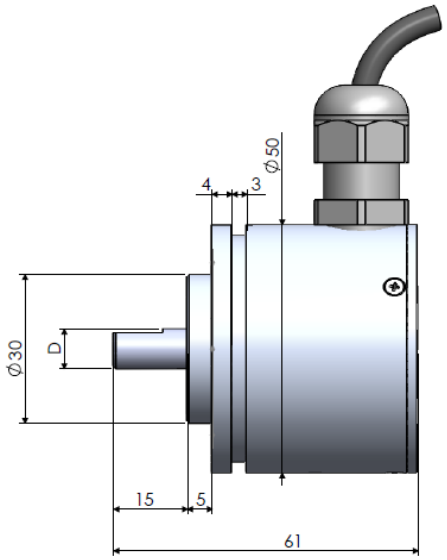




ØD	6	8	10	12	14	15	17

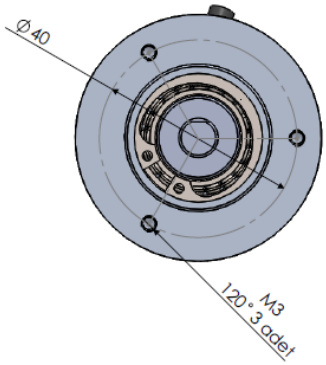
CABLE FROM SIDE

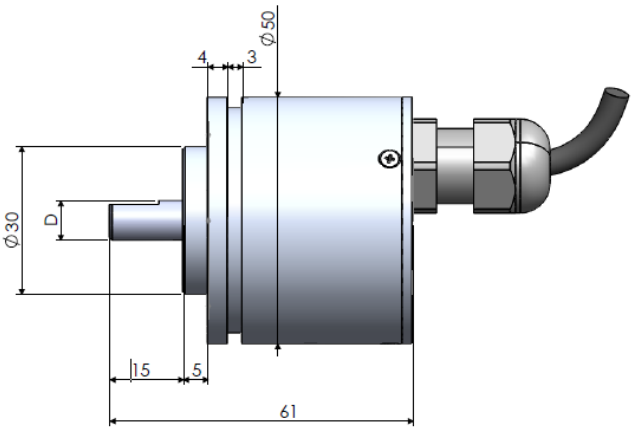




ØD	6	8	10	12	14	15	17

CABLE FROM BACKSIDE





ØD	6	8	10	12	14	15	17

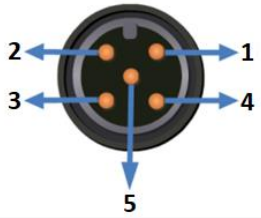
ANALOG VERSION

Electrical Specifications

Working Principle	Hall Effect
Measuring Range	2…2^{17} 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°
Repeatability	0,1°
Angular Resolution	16 Bit
Response Frequency	500 Hz
Electrical Interface	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
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^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

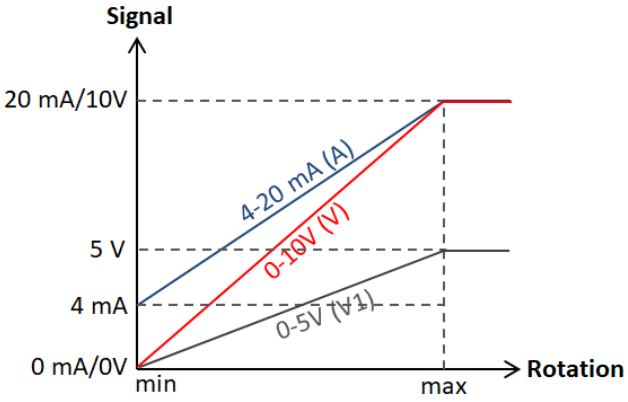


RESET: With the reset function you can set the desired location to 0. The reset terminal and GND are short-circuited for about 5 seconds and then disconnected. The sensor then accepts the current position as zero.

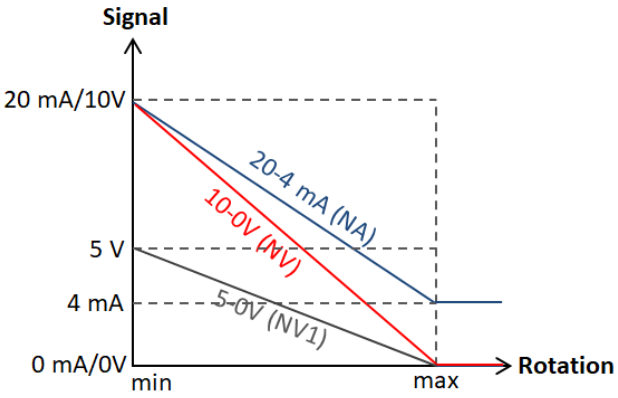
DIRECTION CHANGE: You can change the angle increase direction with the direction change function. The direction changing terminal and GND are short-circuited for about 5 seconds and then disconnected.Thus, the sensor reverses the angle direction (CW is CCW and CCW is CW).

Sample Output Signal Graphic

Output Signal (V, V1, A, V3)



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



Order Code

Model	Body Diameter	Supply Voltage	Signal Increasing Direction	Cable or Connector Direction	Flange Type
	050 : 50 mm	**PP** : 15…26 VDC	**CW** : Clockwise **CCW** : Counter clockwise	**Y** : From side **A** : From backside	**C**: Clamping

MAH	–	X	–	XXX	–	XX	–	XXX	–	XXX	–	X	–	XXX	–	XXX	–	X	–	X

Shaft Type	Turn Number	Output Signal	Electrical Connection	Shaft Diameter
S : Shaft	The desired number of turns between 2 and 2^{17} can be selected	**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	**1.5M :** 1.5 m cable **S13M :** M12 / 5 pin male socket *Optional others	**6 :** 6 mm **8 :** 8 mm **10:** 10 mm **12:** 12 mm **14:** 14 mm **15:** 15 mm **17:** 17 mm

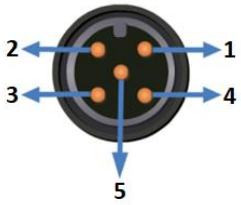
ANALOG VERSION, PROGRAMMABLE

Electrical Specifications

Working Principle	Hall Effect
Measuring Range	2…2^{17} 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°
Repeatability	0,1°
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 mm² shielded cable

Electrical Connection

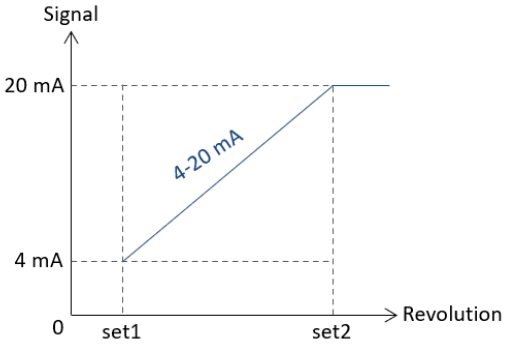
Signal	Cable	M12 / 5 pin male connector
V+ (15…26 VDC)	Red	Pin 1
Analog output	Yellow	Pin 2
GND	Black	Pin 3
N/C	Green	Pin 4
SPAN/ZERO	Pink	Pin 5

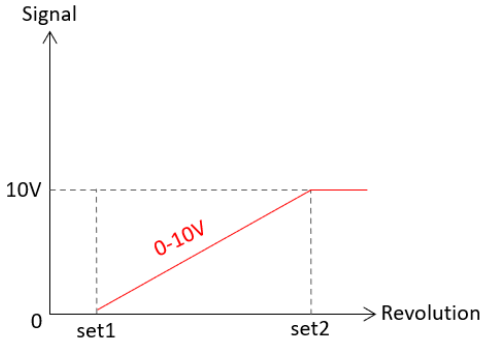


SETTING THE MEASUREMENT RANGE

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^{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

Programming Feature
PL: Programmable

CANOPEN VERSION

Electrical Specifications

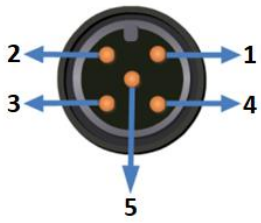
Working Principle	Hall Effect
Measuring Range	2…2^{17} turns
Supply Voltage	8 … 32 VDC
Current Consumption	≤60 mA
Reverse Polarity Protection	Yes
Short-circuit Protection	Yes (only supply)
Accuracy	±0,5°
Repeatability	0,1°
Response Frequency	500 Hz
Resolution	1…14 bits can be selected in singleturn. 1…31 bit can be selected in multiturn. singleturn + multiturn <= 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

MAH – X – XXX – XX – XX – X – XX – XXX – X – XX – X

Shaft Type
S : Shaft

Body Diameter
050 : 50 mm

Turn Number
14 / 17
*14: Number of bits in 1 turn
17: Number of turn (2^{17})

Supply Voltage
PP : 8…32 VDC

Output Signal
C : CANopen

Signal Increasing Direction
CW : Clockwise
CCW : Counter clockwise

Electrical Connection
S13M : M12 5 pin male connector

Connector Direction
Y : From side
A : From backside

Shaft Diameter
6 : 6 mm
8 : 8 mm
10: 10 mm
12: 12 mm
14: 14 mm
15: 15 mm
17: 17 mm

Flange Type
C : Clamping