

# PROGRAMMABLE ABSOLUTE ROTARY ENCODER

## "Single Turn Absolute Encoder, Magnetic Measurement"

SAS S 50



### GENERAL FEATURES

- Absolute measurement with magnetic principle
- 50 mm body diameter
- 6 mm or 8 mm shaft diameter
- 14 bit angular resolution
- Analog, CANopen or parallel output option
- Redundant output
- Analogue output signal forms can be selected according to 3 selected points
- High sensitivity
- IP67 Protection class



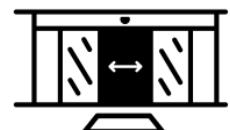
The SAS series encoders operate absolute. In other words, unlike the incremental systems, they do not lose their positions in power outages and continue to measure from where they left off.

The SAS series single turn absolute rotary encoders offer highly flexible solutions in use, with different output signals, shaft diameters and user-adjustable measuring range. The SAS single turn absolute rotary encoder with integrated reference provides high quality feedback. With its IP67 high protection class, it is resistant to harsh environmental conditions.

### APPLICATION AREAS

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

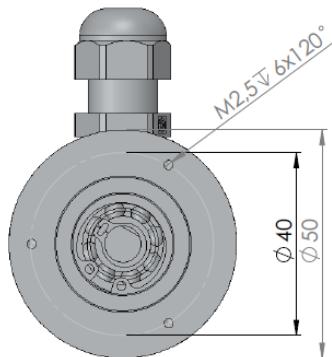


### MECHANICAL SPECIFICATIONS

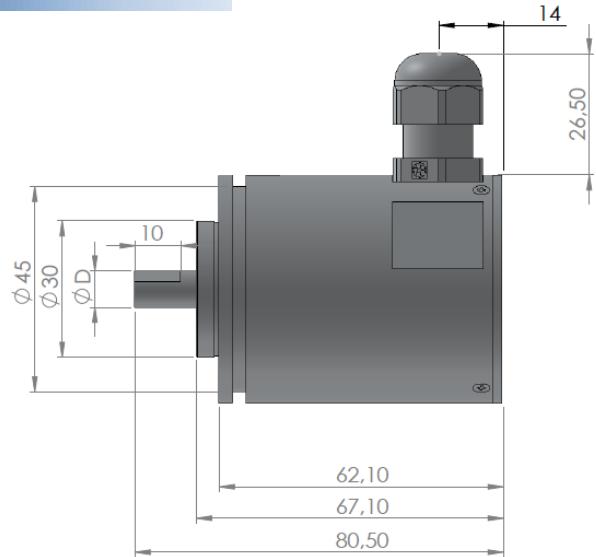
<b>Maximum Speed</b>	3000 rpm
<b>Body Diameter</b>	50 mm
<b>Shaft Diameter</b>	6 mm, 8 mm
<b>Weight</b>	~350 gr
<b>Protection Class</b>	IP 67
<b>Operating Temperature</b>	-20°C ... +85°C
<b>Relative Humidity</b>	%10 ... %90
<b>Material</b>	Shaft: Stainless Steel
	Body: Aluminium

## MECHANICAL DIMENSIONS (mm)

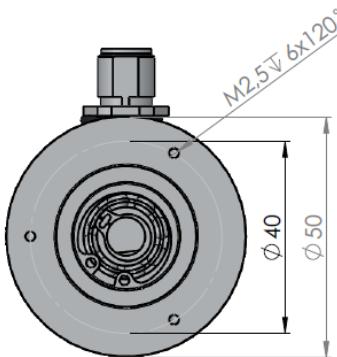
### WITH CABLE (For Analog or Parallel versions)



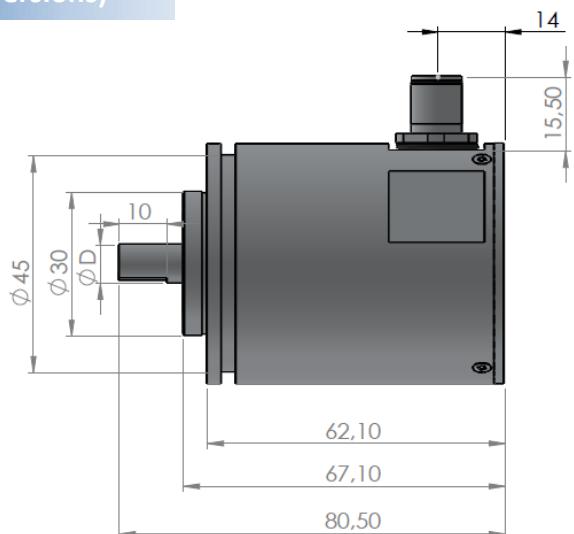
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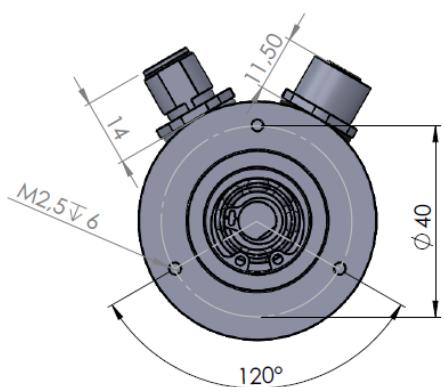
### WITH 1 x M12 CONNECTOR (For Analog versions)



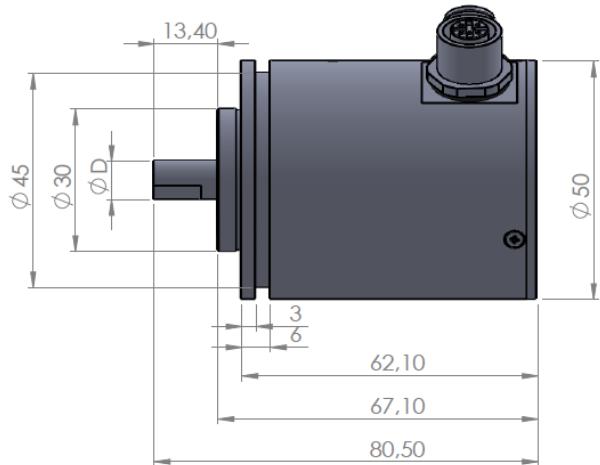
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### WITH 2 x M12 CONNECTOR (For CANopen versions)



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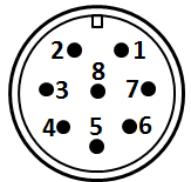


## Electrical Specifications

<b>Working Principle</b>	Hall Effect
<b>Supply Voltage</b>	15 ... 26 VDC
<b>Current Consumption</b>	40 mA
<b>Reverse Polarity Protection</b>	Var
<b>Measuring Range</b>	0° ... 360°
<b>Accuracy</b>	±0,1°
<b>Repeatability</b>	0,1°
<b>Angular Resolution</b>	14 Bit
<b>Response Frequency</b>	333 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>Electrical Connection</b>	8 x 0,14 mm <sup>2</sup> shielded cable or 1 x M12/8 pin male connector
<b>Output Load</b>	For current output model; min 250 Ω For voltage output model; min 1 kΩ

## ELECTRICAL CONNECTION

Signal	Cable	M12 / 8 Pin Male Connector
U+ (+15....+26 VDC)	Red	Pin 1
Output 1: 0.5-4.5 / 0-10VDC / 0-5VDC / 4-20mA	Gray	Pin 2
GND (0V)	Black	Pin 3
Output 2: 0.5-4.5 / 0-10VDC / 0-5VDC / 4-20mA (optional)	White	Pin 4
Direction Change (This end should not be left idle. It should be connected to the supply end after the process is	Pink	Pin 5
Reset (This end should not be left idle. It should be connected to the supply end after the process is	Green	Pin 6
Programming Tips (These ends should not touch each other and should not be connected anywhere)	Yellow, Blue	Pin 7 (N/C)
-	-	Pin 8 (N/C)



**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.

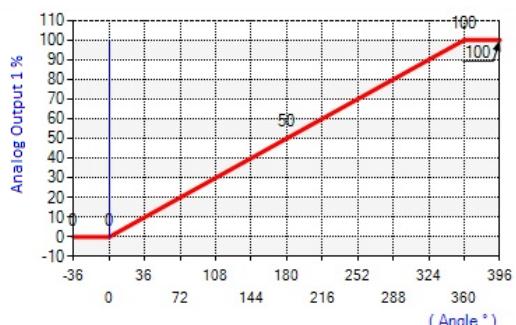
**DIRECTION CHANGE:** You can change the angle increase direction with the direction change function. The direction changing terminal and GND are short-circuited for about 5 seconds and then disconnected. Thus, the sensor reverses the angle direction (CW is CCW and CCW is CW).

## DETERMINATION OF OUTPUT SIGNAL FORM

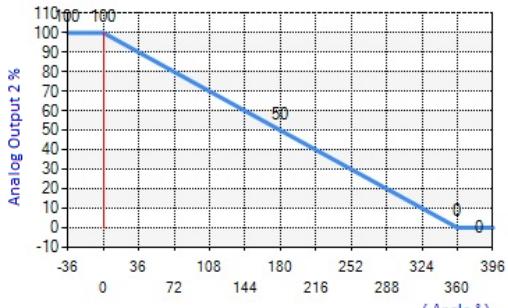
Analog output signal forms can be specified according to request for 3 points as low point, middle point and high point. The requested signal form must be specified at the order stage. Examples of output signal forms are shown below.

**Note:** The diagrams shown below are for illustrative purposes. Scale value can be selected between 0 ° - 360 ° and Output value between 0% and 100%.

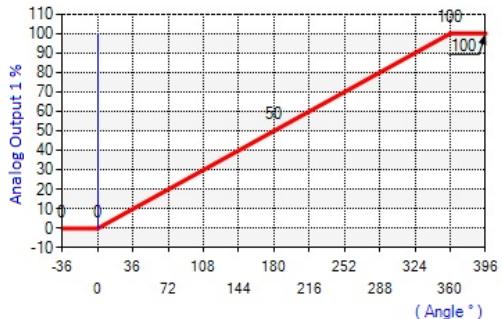
Analog Output 1		
Point	Scale	Output
Low Point	0°	%0
Middle Point	180°	%50
High Point	360°	%100



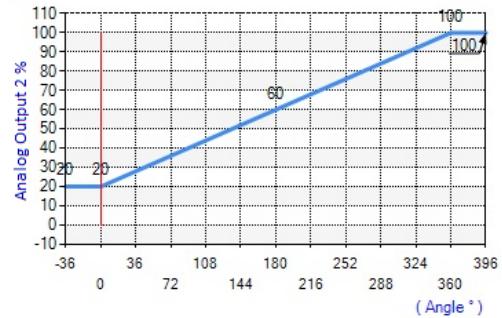
Analog Output 2		
Point	Scale	Output
Low Point	360°	%0
Middle Point	180°	%50
High Point	0°	%100



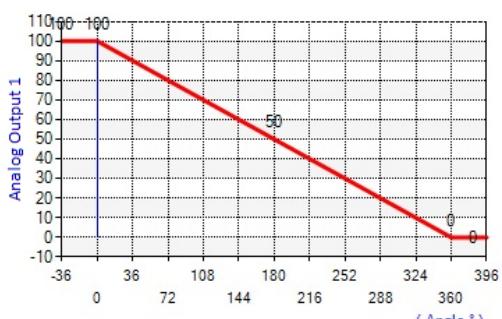
Analog Output 1		
Point	Scale	Output
Low Point	0°	%0
Middle Point	180°	%50
High Point	360°	%100



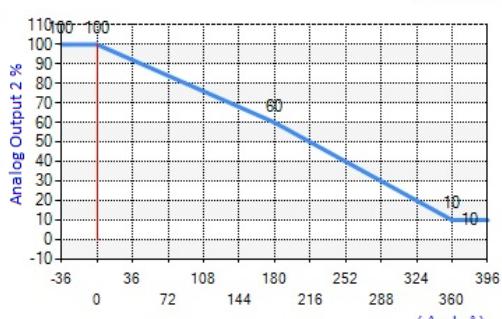
Analog Output 2		
Point	Scale	Output
Low Point	0°	%20
Middle Point	180°	%60
High Point	360°	%100



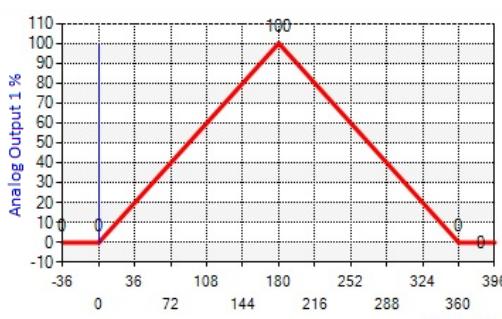
Analog Output 1		
Point	Scale	Output
Low Point	0°	%100
Middle Point	180°	%50
High Point	360°	%0



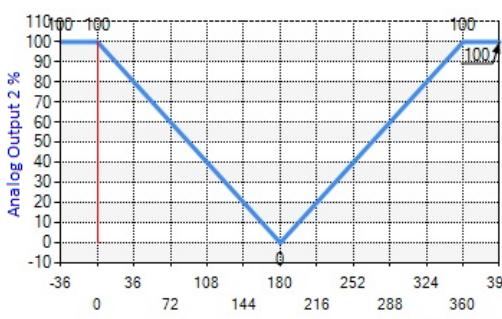
Analog Output 2		
Point	Scale	Output
Low Point	0°	%100
Middle Point	180°	%60
High Point	360°	%10



Analog Output 1		
Point	Scale	Output
Low Point	0°	%0
Middle Point	180°	%100
High Point	360°	%0



Analog Output 2		
Point	Scale	Output
Low Point	0°	%100
Middle Point	180°	%0
High Point	360°	%100



## ORDER CODE FOR ANALOG VERSIONS

Model	Body Diameter		Output Signal 2 (Optional) <sup>(1)</sup>		Reference Point <sup>(2)</sup>		Electrical Connection <sup>(3)</sup>		Cable Direction Y : From side									
	50	: 50 mm	No code	: Output 2 is not used	S	: Start	1.5M	: 1.5m cable										
SAS	-	X	-	XX	-	XXX	-	XXX	-	X	-	XXX	-	XXX	-	X	-	X
Shaft Type			Output Signal 2 <sup>(1)</sup>		Angle Value		Angle Increasing Direction		Shaft Diameter									
S : Shaft			V : 0-10 VDC		The desired value between 0 ° and 360 ° can be selected		CW : Clockwise		6 : 6mm									
			V1 : 0-5 VDC				CCW : Counter clockwise		8 : 8mm									
			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) The direction of the output signals can be changed optionally. In the coding, when 'N' is placed at the beginning of the normal signal, it refers to the opposite. For example; in case of **V**: 0-10 VDC, then **NV**: 10-0 VDC  
The Output 2 is optional. If not requested, the code part is left blank.

(2) Reference point; refers to the selection of one of the starting, middle, or end points used for the scale of the analog outputs.

(3) Optionally different cable lengths or connectors can be requested.

## CANOPEN VERSION

### Electrical Specifications

Working Principle	Hall Effect
Supply Voltage	12 ... 30 VDC
Current Consumption	40 mA
Reverse Polarity Protection	Yes
Measuring Range	0° ... 360°
Accuracy	±0,1°
Repeatability	0,1°
Angular Resolution	14 Bit
Response Frequency	333 Hz
Electrical Interface	CANopen
Electrical Connection	6x0,34 mm <sup>2</sup> twisted shielded cable or 2xM12/5 pin connector

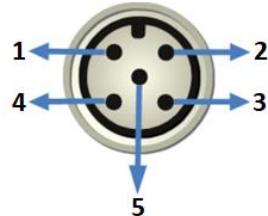
### CANopen Specifications

Communication Profile	CiA 301
Device Type	CANopen, CiA DS406
Node ID	Between 1 and 127, configurable via 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 Check	Heartbeat, Emergency Message
PDO	3 Tx PDO
PDO Modes	Event/Time triggered, Synch/Asynch
SDO	1 server
Position data	Object Dictionary 0x6020
Terminating Resistor	Optional

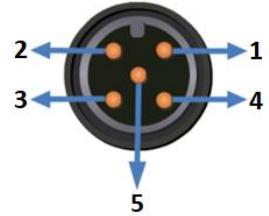
## ELECTRICAL CONNECTION

Signal	Cable	M12 Connector
CAN SHIELD	Shield	Pin 1
V+ (12...30 VDC)	Red	Pin 2
GND (0V)	Black	Pin 3
CAN H	Yellow	Pin 4
CAN L	Green	Pin 5

M12 5 PIN FEMALECONN.



M12 5 PIN MALECONN.



## ORDER CODE FOR CANOPEN VERSIONS

Model	Body Diameter	Supply Voltage	Angle Increasing Direction	Connector Direction	Flange Type
SAS	50 : 50 mm	PP : 12...30VDC	CW : Clockwise CCW : Counter clockwise	Y : From side	C: Clamping
- X - XX - XX - XX - X - XXX - XXX - X - X - X - X	Resolution	Output Signal	Electrical Connection	Shaft Diameter	
Shaft Type S : Shaft	Max 14 bit	C : CANopen	S13FM: M12 5 pin male + M12 5 pin female connector	6 : 6 mm 8 : 8 mm	

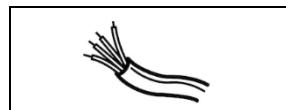
\*Please contact us for non-standard product requests.

## PARALLEL VERSION

### Electrical Specifications

<b>Supply Voltage</b>	5 ... 30 VDC
<b>Current Consumption</b>	≤60 mA
<b>Protection</b>	Reverse & over voltage Output short circuit
<b>Code</b>	Binary, Gray or BCD
<b>Resolution (per turn)</b>	Up to 14 bit (1...16384 pulse)
<b>Accuracy</b>	±0,1°
<b>Measuring Principle</b>	Magnetic
<b>Inputs</b>	Preset (Zero Setting) Changing direction (CW / CCW)
<b>Output Signals</b>	Push-Pull, PNP Open Collector, NPN Open Collector
<b>Output Logic</b>	Positive Logic (Active High) Negative Logic (Active Low)
<b>Response Frequency</b>	333 kHz
<b>Output Capacity</b>	20 mA/channel
<b>Electrical Connection</b>	18 x 0,22 mm <sup>2</sup> shielded cable

### ELECTRICAL CONNECTION



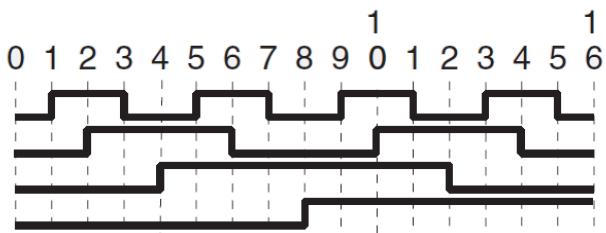
Cable Color	Function	Maximum Resolution	
Red	+V		
Black	0V (GND)		
Yellow	Reset		
Yellow/Brown	Changing Direction	Gray / Binary	BCD
Pink	Bit 0	2	2
Pink/Brown	Bit 1	4	4
Green	Bit 2	8	8
Green/White	Bit 3	16	10
Blue	Bit 4	32	20
Purple	Bit 5	64	40
Grey	Bit 6	128	80
Pink/Grey	Bit 7	256	100
Brown	Bit 8	512	200
Green/Brown	Bit 9	1024	400
White	Bit 10	2048	800
Black/White	Bit 11	4096	1000
Yellow/White	Bit 12	8192	2000
Red/Blue	Bit 13	16384	4000

**RESET:** With the reset function you can set the desired location to 0. The reset end is shorted and released with GND. The sensor accepts the position where it is located after two seconds.

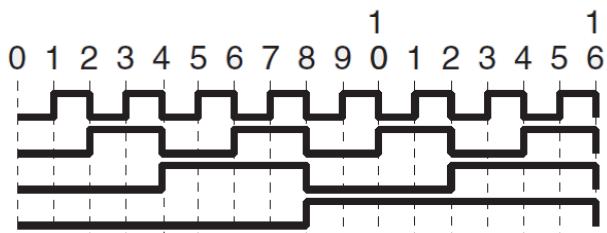
**DIRECTION CHANGE:** You can change the direction increase direction with the direction change function. The direction switch is shorted and released with GND. After two seconds, the sensor reverses the angle direction (CW is CCW and CCW is CW).

## CODE EXAMPLES

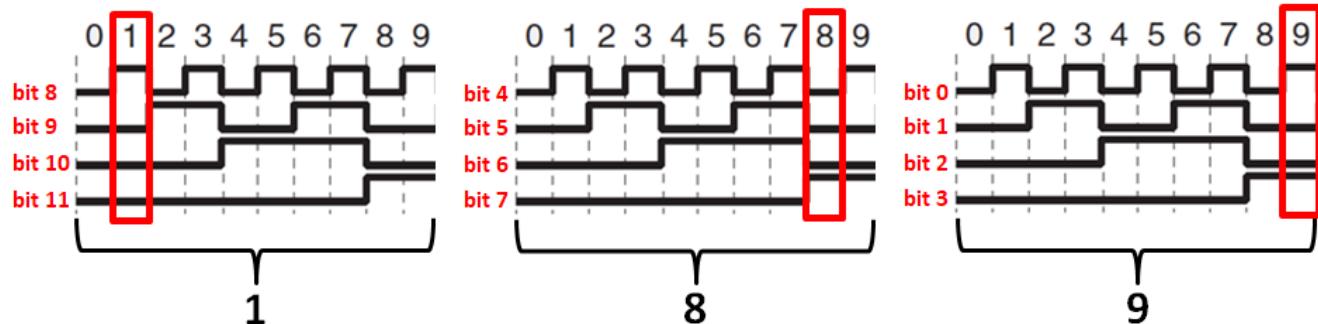
### GRAY CODE



### BINARY CODE



### BCD CODE

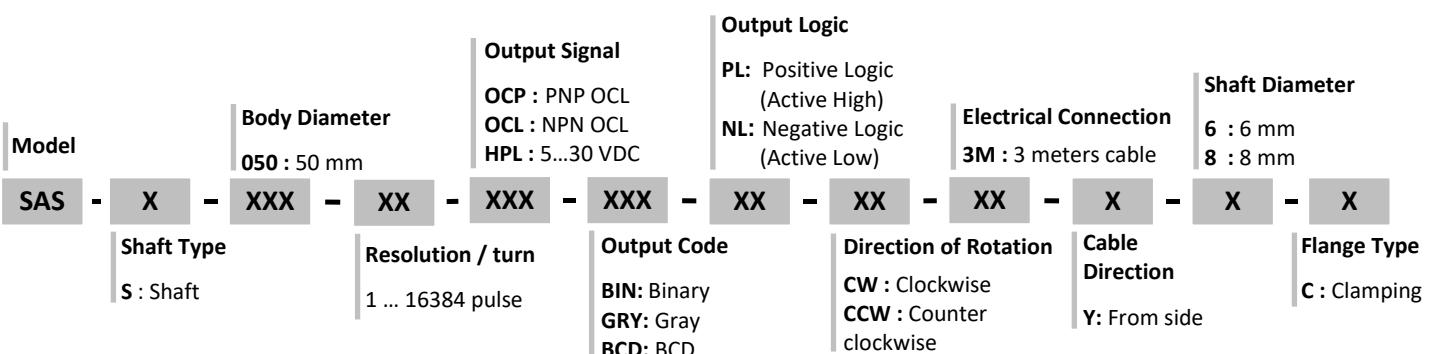


### BCD Code (Binary-Coded Decimal Code)

For example; to convert the decimal 189 to BCD code:

Number	189	0 0 0 1	1 0 0 0	1 0 0 1
Bit		↑↑↑↑	↑↑↑↑	↑↑↑↑
Weight		8 4 2 1	8 4 2 1	8 4 2 1
Digit		hundreds	tens	units

## ORDER CODE FOR PARALLEL VERSIONS



\*Please contact us for non-standard product requests.

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Gebze OSB, 800. Sokak, No:814 Gebze/KOCAELİ/TÜRKİYE



Tel: +90 262 673 76 00



[www.ateksensor.com](http://www.ateksensor.com)



[info@ateksensor.com](mailto:info@ateksensor.com)