



## Model Number

ASM58-K

## Features

- Industrial standard housing Ø58 mm
- 30 Bit multiturn
- Data transfer up to 2 Mbaud
- Optically isolated RS 422 interface
- Recessed hollow shaft
- Zero-set function electrically and by preset key

## Description

This multiturn absolute encoder with modern fast technology transmits a position value corresponding to the shaft setting via the SSI interface (Synchronous Serial Interface). The maximum resolution of the ASM58-K is maximum 65536 steps per revolution at 16384 revolutions.

The devices of the ASM58-K series are equipped with a microcontroller.

The control module sends a clock bundle to the absolute encoder to obtain the position data. The rotary encoder then sends the position data synchronous to the cycles of the control module.

It is possible to select the following items with function inputs

- the counting direction and
- the zero-set function (preset value)

Another feature of this absolute encoder is the built in preset key at the rear housing side. By means of this, the position value can be locally set to zero.

For status and diagnosis indication furthermore it is equipped with 2 LEDs.

The absolute encoder is mounted directly onto the application shaft, without any coupling. Rotation of the absolute encoder is prevented by a torque rest. The electrical connection is made by a 12-pin round plug connector. A version with a 1 m cable connector is also available.

## Technical data

### General specifications

Detection type	photoelectric sampling
Device type	Multiturn absolute encoder

### Functional safety related parameters

MTTF <sub>d</sub>	150 a
Mission Time (T <sub>M</sub> )	20 a
L <sub>10h</sub>	1.9 E+11 at 6000 rpm and 20/40 N axial/radial shaft load
Diagnostic Coverage (DC)	0 %

### Indicators/operating means

LED green	supply voltage/preset key pressed
LED red	internal diagnostic test failed

### Electrical specifications

Operating voltage U <sub>B</sub>	4.5 ... 30 V DC
Power consumption P <sub>0</sub>	≤ 1 W
Linearity	± 2 LSB at 16 Bit, ± 1 LSB at 13 Bit, ± 0,5 LSB at 12 Bit
Output code	Gray code, binary code
Code course (counting direction)	cw descending (clockwise rotation, code course descending)

### Interface

Interface type	SSI
Monoflop time	20 ± 10 µs

### Resolution

Single turn	up to 16 Bit
Multiturn	14 Bit

Overall resolution	up to 30 Bit
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Transfer rate	0.1 ... 2 MBit/s
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Voltage drop	U <sub>B</sub> - 2.5 V
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Standard conformity	RS 422
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### Input 1

Input type	Selection of counting direction (cw/ccw)
Signal voltage	
High	4.5 ... 30 V or open input (cw ascending)
Low	0 ... 1 V (cw descending)
Input current	< 6 mA
Switch-on delay	< 10 ms

### Input 2

Input type	zero-set (PRESET 1)
Signal voltage	
High	4.5 ... 30 V
Low	0 ... 1 V or open input
Input current	< 6 mA
Signal duration	≥ 100 ms
Switch-on delay	< 10 ms after falling input flank

### Connection

Connector	type 9416 (M23), 12-pin, type 9416L (M23), 12-pin
Cable	Ø7 mm, 6 x 2 x 0.14 mm <sup>2</sup> , 1 m

### Standard conformity

Degree of protection	DIN EN 60529, IP65
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	DIN EN 61000-6-4
Noise immunity	DIN EN 61000-6-2
Shock resistance	DIN EN 60068-2-27, 100 g, 6 ms
Vibration resistance	DIN EN 60068-2-6, 20 g, 10 ... 2000 Hz

### Ambient conditions

Operating temperature	-40 ... 85 °C (-40 ... 185 °F)
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)

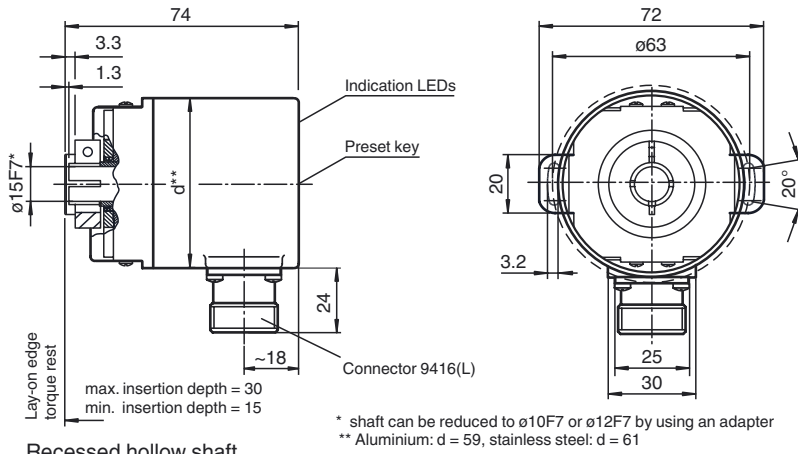
### Mechanical specifications

Material	
Combination 1	housing: powder coated aluminum flange: aluminum shaft: stainless steel
Combination 2 (Inox)	housing: stainless steel flange: stainless steel shaft: stainless steel
Mass	approx. 460 g (combination 1) approx. 800 g (combination 2)
Rotational speed	max. 12000 min <sup>-1</sup>
Moment of inertia	≤ 30 gcm <sup>2</sup>
Starting torque	< 3 Ncm (version without shaft seal)
Shaft load	
Angle offset	± 0.9 °
Axial offset	static: ± 0.3 mm, dynamic: ± 0.1 mm
Radial offset	static: ± 0.5 mm, dynamic: ± 0.2 mm

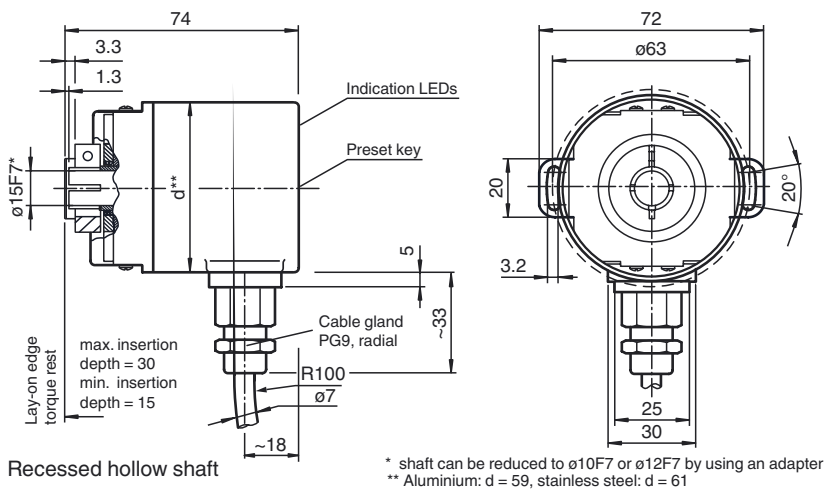
### Approvals and certificates

UL approval	cULus Listed, General Purpose, Class 2 Power Source
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Dimensions

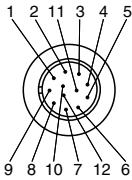
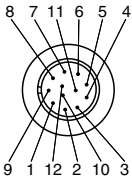


Recessed hollow shaft



Recessed hollow shaft

## Electrical connection

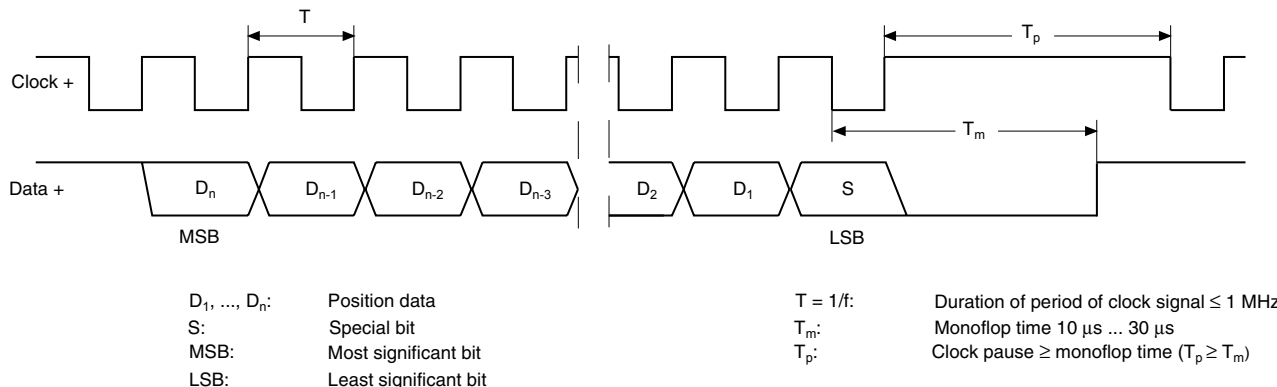
Signal	Cable Ø7 mm, 12-core	Connector 9416, 12-pin	Connector 9416L, 12-pin	Explanation
GND (encoder)	White	1	1	Power supply
U <sub>b</sub> (encoder)	Brown	2	8	Power supply
Clock (+)	Green	3	3	Positive cycle line
Clock (-)	Yellow	4	11	Negative cycle line
Data (+)	Grey	5	2	Positive transmission data
Data (-)	Pink	6	10	Negative transmission data
Reserved	Black	7	12	Not wired, reserved
V/R	Red	8	5	Input for selection of counting direction
PRESET 1	Blue	9	9	zero-setting input
Reserved	Violet	10	4	Not wired, reserved
Reserved	Grey/Pink	11	6	Not wired, reserved
Reserved	Red/Blue	12	7	Not wired, reserved
				

**Description**

The Synchronous Serial Interface was specially developed for transferring the output data of an absolute encoder to a control device. The control module sends a clock bundle and the absolute encoder responds with the position value.

Thus only 4 lines are required for the clock and data, no matter what the resolution of the rotary encoder is. The RS 422 interface is optically isolated from the power supply.

**SSI signal course Standard**



**SSI output format Standard**

- At idle status signal lines "Data +" and "Clock +" are at high level (5 V).
- The first time the clock signal switches from high to low, the data transfer in which the current information (position data (D<sub>n</sub>) and special bit (S)) is stored in the encoder is introduced.
- The highest order bit (MSB) is applied to the serial data output of the encoder with the first rising pulse edge.
- The next successive lower order bit is transferred with each following rising pulse edge.
- After the lowest order bit (LSB) has been transferred the data line switches to low until the monoflop time T<sub>m</sub> has expired.
- No subsequent data transfer can be started until the data line switches to high again or the time for the clock pause T<sub>p</sub> has expired.
- After the clock sequence is complete, the monoflop time T<sub>m</sub> is triggered with the last falling pulse edge.
- The monoflop time T<sub>m</sub> determines the lowest transmission frequency.

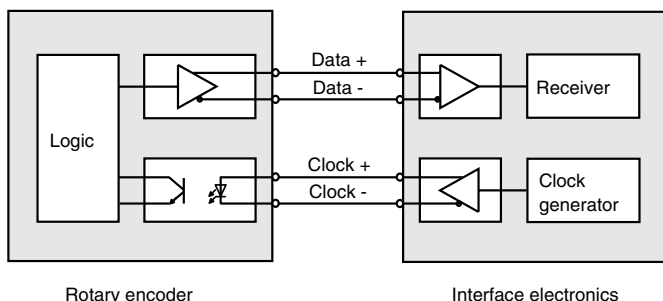
**SSI output format ring slide operation (multiple transmission)**

- In ring slide operation, multiple transmission of the same data word over the SSI interface makes it possible to offer the possibility of detecting transmission errors.
- In multiple transmission, 25 bits are transferred per data word in standard format.
- If the clock change is not interrupted after the last falling pulse edge, ring slide operation automatically becomes active. This means that the information that was stored at the time of the first clock change is generated again.
- After the first transmission, the 26<sup>th</sup> pulse controls data repetition. If the 26<sup>th</sup> pulse follows after an amount of time greater than the monoflop time T<sub>m</sub>, a new current data word will be transmitted with the following pulses.



If the pulse line is exchanged, the data word is generated offset. Ring slide operation is possible up to max. 13 bits.

**Block diagram**



**Line length**

Line length in m	Baudrate in kHz
< 50	< 400
< 100	< 300
< 200	< 200
< 400	< 100

**Inputs**

Input for selection of counting direction (V/R)

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Level	counting direction by cw revolution (with view onto the shaft)	Input counting direction (V/R) 
High (input open or connected to +UB)	ascending	
Low (Input connected to GND)	descending	

Zero-set input (Preset)

Level	Funktion	Zero-set input (Preset) 
Low (input open or connected to GND)	Output position value	
High (Input connected to +UB or $U_e > 4,5\text{ V}$ )	Activation with falling edge (min. 100 ms)	

Indicators/operation means

Preset key	Manually zero setting of the position value.	
LED green	<ul style="list-style-type: none"> <li>Lights up with supplied encoder</li> <li>Goes off while preset key is pressed</li> </ul>	
LED red	Alarm/error indication <ul style="list-style-type: none"> <li>pre-fault indication (data output ist continued)</li> <li>internal memory error (all data bits are set to high level permanently)</li> </ul>	

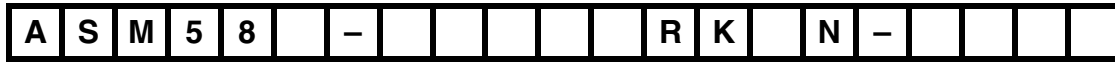
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Accessories

Accessories	Name/defining feature	Order code
Connectors	Cable socket	9416
	Cable socket	9416L

For additional information on the accessories, please see the "Accessories" section.

Order code



Number of bits singleturn

12 4096 (standard)

13 8192

16 65536

Number of bits multiturn

12 4096 (standard)

14 16384

Output code

B Binary

G Gray

Option 1

K with preset key

Exit position

R Radial

Connection type

K1 Cable Ø7 mm, 6 x 2 x 0.14 mm<sup>2</sup>, 1 m

AA Plug connector type 9416, 12-pin

AB Plug connector type 9416L, 12-pin

Shaft dimension/flange version

F1A Recessed hollow shaft Ø10 mm x 30 mm

F2A Recessed hollow shaft Ø12 mm x 30 mm

F3A Recessed hollow shaft Ø15 mm x 30 mm

Housing material

N Aluminium, powder coated

I Inox\*

W Aluminium, powder coated with shaft seal

Principle of operation

M Multiturn

Shaft version

S Recessed hollow shaft

Data format

A SSI (Synchronous Serial Interface)

\*Housing material I only available with plug connector types.