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

Functional safety related parameters	
$MTTF_d$	150 a
Mission Time (T_M)	20 a
L_{10h}	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_B	10 ... 30 V DC
Power consumption P_0	≤ 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
Transfer rate	0.1 ... 2 MBit/s
Voltage drop	U_B - 2.5 V
Standard conformity	RS 422
Input 1	
Input type	Selection of counting direction (V/R)
Signal voltage	
High	4.5 ... 30 V or open input (cw ascending)
Low	0 ... 1 V (cw descending)
Input current	< 6 mA
Signal duration	≥ 10 ms
Switch-on delay	< 0.001 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	≥ 10 ms
Switch-on delay	< 100 ms after falling input flank
Connection	
Connector	type 9416, 12-pin, type 9416L, 12-pin
Cable	Ø7 mm, 6 x 2 x 0.14 mm^2, 1 m
Standard conformity	
Protection degree	DIN EN 60529, IP65
Climatic testing	DIN EN 60068-2-3, no moisture condensation
Emitted interference	EN 61000-6-4:2007
Noise immunity	EN 61000-6-2:2005
Shock resistance	DIN EN 60068-2-27, 100 *g*, 3 ms
Vibration resistance	DIN EN 60068-2-6, 10 *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 aluminium flange: aluminium 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^{-1}
Moment of inertia	≤ 30 gcm^2
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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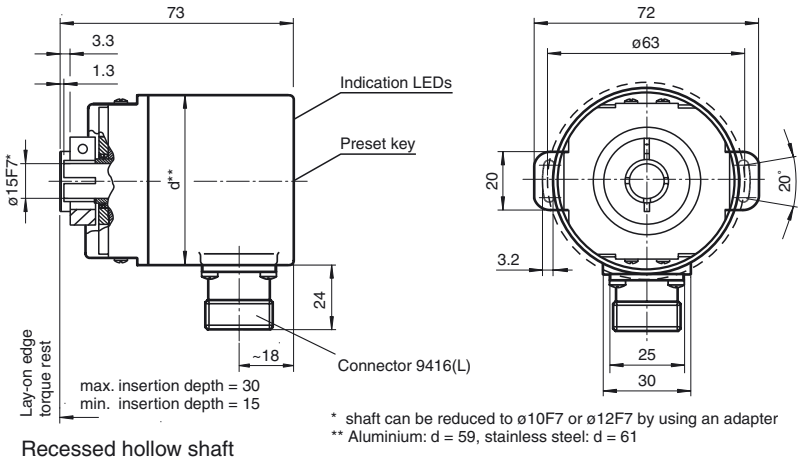
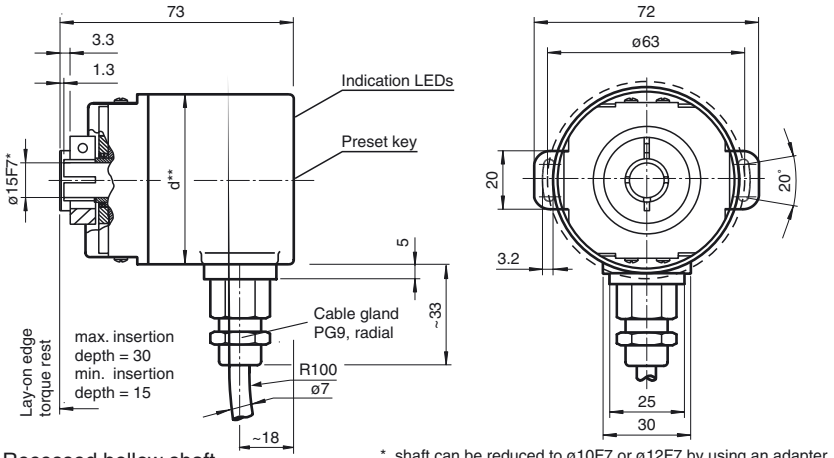
Dimensions



* shaft can be reduced to ø10F7 or ø12F7 by using an adapter
** Aluminium: d = 59, stainless steel: d = 61

Recessed hollow shaft



* shaft can be reduced to ø10F7 or ø12F7 by using an adapter
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Recessed hollow shaft

Accessories

9416

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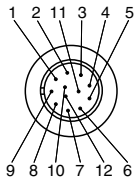
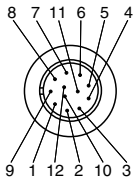
Electrical connection

Signal	Cable Ø7 mm, 12-core	Connector 9416, 12-pin	Connector 9416L, 12-pin	Explanation
GND (encoder)	White	1	1	Power supply
U_b (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	Blue	7	12	Not wired, reserved
V/R	Red	8	5	Input for selection of counting direction
PRESET 1	Black	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
				

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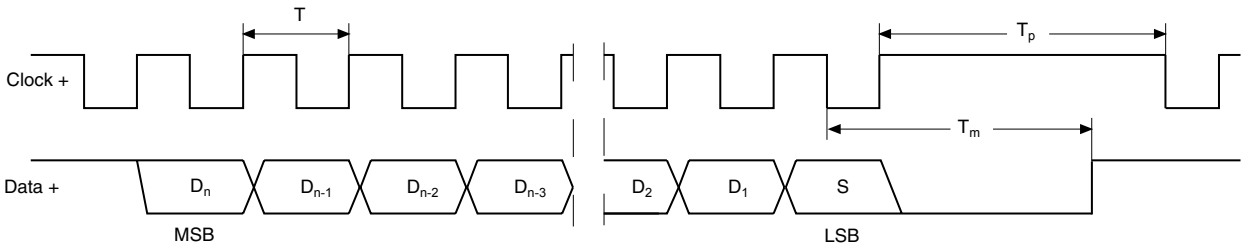
Description

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



$D_1, ..., D_n$:	Position data	T = 1/f:	Duration of period of clock signal ≤ 1 MHz
S:	Special bit	T_m:	Monoflop time 10 µs ... 30 µs
MSB:	Most significant bit	T_p:	Clock pause ≥ monoflop time ($T_p \geq T_m$)
LSB:	Least significant bit		

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_n) 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_m 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_p has expired.
- After the clock sequence is complete, the monoflop time T_m is triggered with the last falling pulse edge.
- The monoflop time T_m 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 26th pulse controls data repetition. If the 26th pulse follows after an amount of time greater than the monoflop time T_m, 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.

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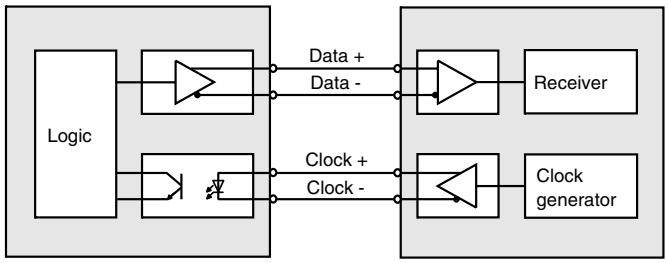
Block diagram



Line length

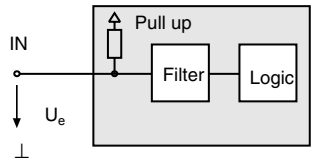
Line length in m	Baudrate in kHz
< 50	< 400
< 100	< 300
< 200	< 200
< 400	< 100

Inputs

Input for selection of counting direction (V/R)

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

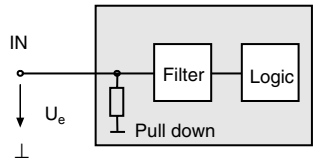
Input counting direction (V/R)



Zero-set input (Preset)

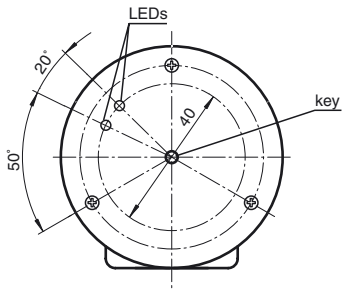
Level	Funktion
Low (input open or connected to GND)	Output position value
High (Input connected to $+U_B$ or U_e > 4,5 V)	Activation with falling edge (min. 100 ms)

Zero-set input (Preset)



Indicators/operation means

Preset key	Manually zero setting of the position value.
LED green	• Lights up with supplied encoder • Goes off while preset key is pressed
LED red	Alarm/error indication • pre-fault indication (data output ist continued) • internal memory error (all data bits are set to high level permanently)



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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.

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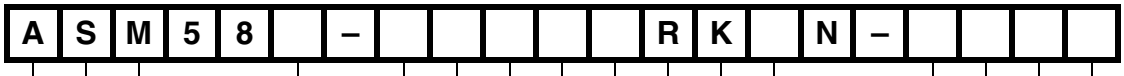
Order code



Number of bits singleturn
12 4096 (standard)
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 mm², 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.

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