## Model Number

**AHM58-0**

## Features

- **Industrial standard housing Ø58 mm**
- **30 Bit multiturn**
- **Data transfer up to 2 MBaud**
- **Optically isolated RS 422 interface**
- **Zero-set function**
- **Hollow shaft**

## 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 AHM58 is maximum 65536 steps per revolution at 16384 revolutions.

The devices of the AHM58 series are equipped with a microcontroller.

The control module sends a clock bundle to the absolute encoder to obtain 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)

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

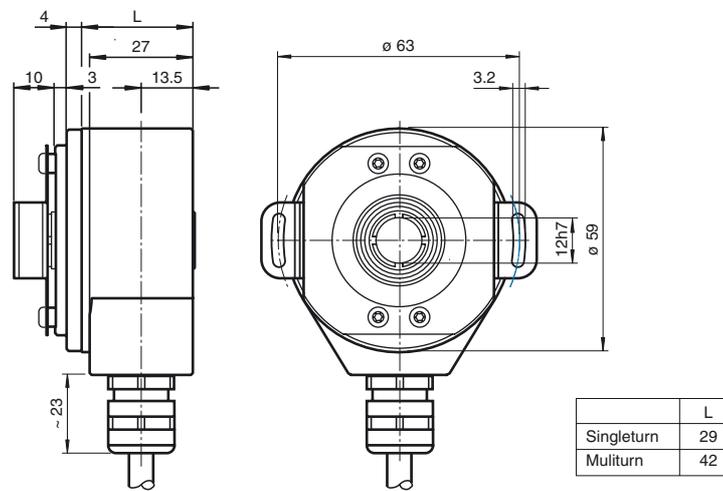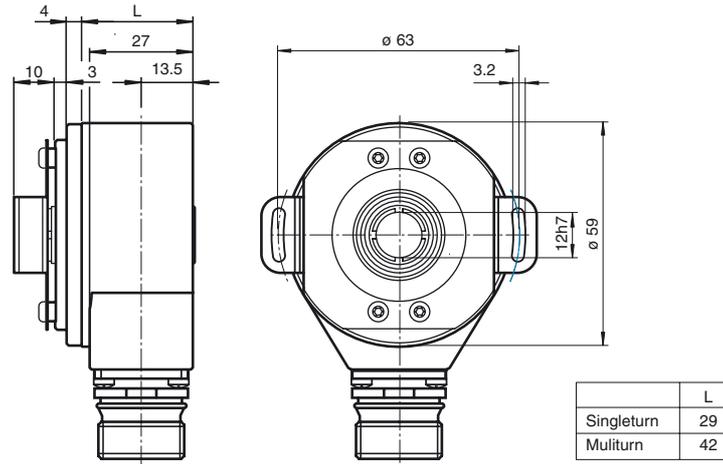| General specifications | |
|---|---|
| Detection type | photoelectric sampling |
| Device type | Multiturn absolute encoder |
| **Electrical specifications** | |
| Operating voltage $U_B$ | 4.5 ... 30 V DC |
| No-load supply current $I_0$ | max. 180 mA |
| Time delay before availability $t_v$ | < 250 ms |
| 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 (cw/ccw) |
| Signal voltage | |
|   High | 4.5 ... 30 V |
|   Low | 0 ... 2 V |
| 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 ... 2 V |
| Input current | < 6 mA |
| Signal duration | ≥ 100 ms |
| Switch-on delay | < 10 ms |
| **Connection** | |
| Connector | type 9416 (M23), 12-pin, type 9416L (M23), 12-pin |
| Cable | Ø7 mm, 6 x 2 x 0.14 mm$^2$, 1 m |
| **Standard conformity** | |
| Degree of protection | 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 $g$, 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: aluminum Flange: aluminum Shaft: stainless steel |
| Mass | approx. 300 g (combination 1) |
| Rotational speed | max. 3000 min$^{-1}$ |
| Moment of inertia | 30 gcm$^2$ |
| Starting torque | < 3 Ncm |
| 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 |

Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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## Dimensions



| | L |
|---|---|
| Singleturn | 29 |
| Muliturn | 42 |



| | L |
|---|---|
| Singleturn | 29 |
| Muliturn | 42 |

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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 |
| | | 1 2 11 3 4 5 〈diagram〉 9 8 10 7 12 6 | 8 7 11 6 5 4 〈diagram〉 9 1 12 2 10 3 | |
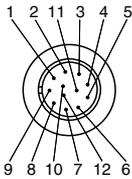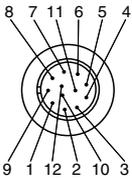
Refer to "General Notes Relating to Pepperl+Fuchs Product Information".

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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 |
| S: | Special bit |
| MSB: | Most significant bit |
| LSB: | Least significant bit |

| | |
|---|---|
| T = 1/f: | Duration of period of clock signal $\leq$ 1 MHz |
| $T_m$: | Monoflop time 10 µs ... 30 µs |
| $T_p$: | Clock pause $\geq$ monoflop time ($T_p \geq T_m$) |
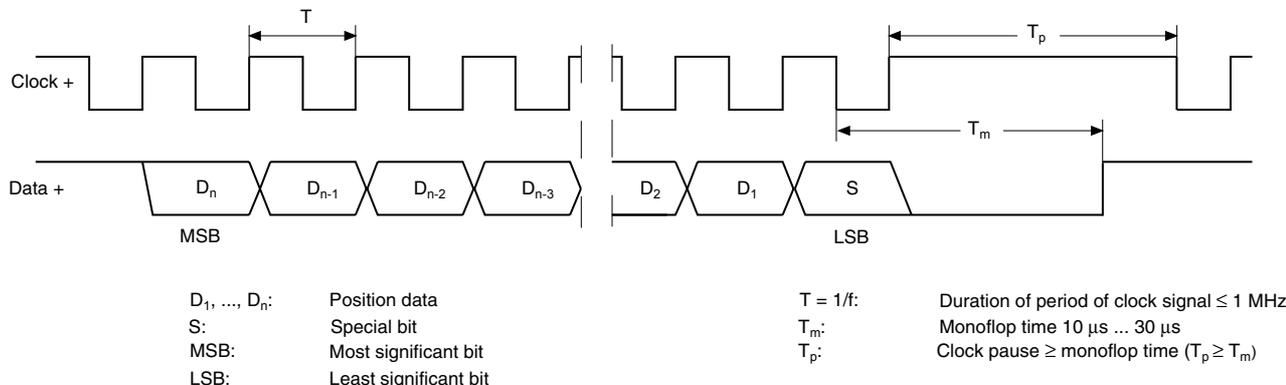
### SSI output format Standard

- 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.

### Block diagram



Rotary encoder                          Interface electronics
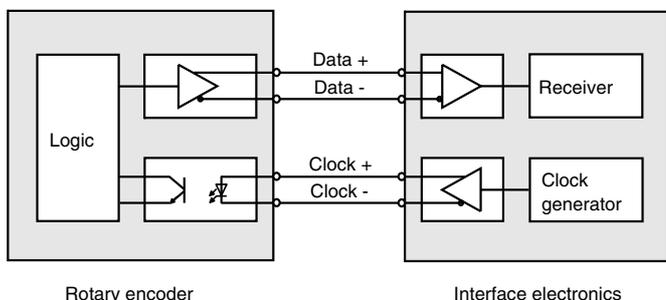
### Line length

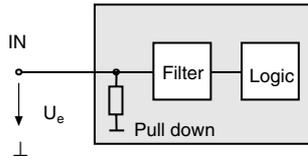| Line length in m | Baudrate in kHz |
|---|---|
| < 50 | < 400 |
| < 100 | < 300 |
| < 200 | < 200 |
| < 400 | < 100 |

## Inputs

The selection of the counting direction input (V/R) is activated with 0-level. The zero-set input (PRESET 1) is activated with 1-level.
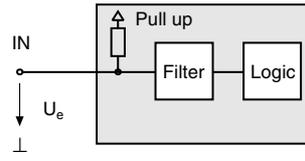
zero-set input (PRESET 1)



Input for selection of counting direction (V/R)

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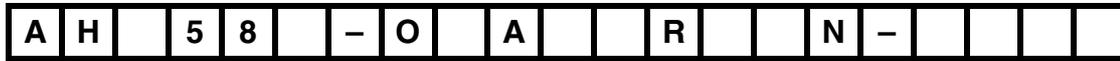
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## Accessories

| 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

| A | H | | 5 | 8 | | – | O | | A | | R | | N | – | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Number of bits singleturn**
**12** 4096 (standard)
**13** 8192
**16** 65536

**Number of bits multiturn**
00 for singleturn-encoders
12 4096 (standard)
14 16384

**Output code**
**B** Binary
**G** Gray

**Option**
**H** Hardware encoder
**0** Zero set function

**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**
**OAA** Hollow shaft with Ø10 mm
**OBA** Hollow shaft with Ø12 mm

**Housing material**
**N** Aluminium

**Principle of operation**
**S** Singleturn
**M** Multiturn

**Wellenausführung**
**H** Hollow shaft

**Data format**
**A** SSI (Synchronous Serial Interface)

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