

## EAM360R-S - Analog

Solid shaft with synchro flange

Magnetic single- or multiturn encoders

### Overview

- Encoder single- or multiturn / Analog
- E1 compliant design
- High protection up to IP 67
- High resistance to shock and vibrations
- Protection against corrosion CX (C5-M)
- Wire cross section 0.5 mm<sup>2</sup>
- Teach input for adjustment of measuring range
- Applicable up to PLd (ISO 13849)



### Technical data

#### Technical data - electrical ratings

|                               |  |
|-------------------------------|--|
| Voltage supply                | 8...30 VDC<br>14...30 VDC  |
| Reverse polarity protection   | Yes  |
| Consumption typ.              | 20 mA (24 VDC, w/o load)   |
| Initializing time             | ≤ 170 ms after power on  |
| Response time                 | < 1 ms   |
| Interface                     | Analog 0...10 V / 0.5...4.5 V / 4...20 mA /<br>Resolution: 12 bit  |
| Function                      | Multiturn<br>Singleturn  |
| Teach range                   | 5° ...359.9° (singleturn)<br>5° ...32767 turns (multiturn)   |
| Absolute accuracy             | ±0.15 ° (+20 ±15 °C)<br>±0.25 ° (-40...+85 °C) sensor  |
| Accuracy analog output        | ±0.5 % of whole measuring range (-<br>40...+85 °C)   |
| Sensing method                | Magnetic   |
| Interference immunity         | EN 61000-6-2<br>ISO 11452-2:2004* / -5:2002*<br>ISO 7637-2:2004*<br>ISO 10605:2008 + Amd 1:2014 (CD ±8<br>kV / AD ±15 kV)<br>* Severity level according to ECE R10<br>(Rev. 4) |
| Emitted interference          | EN 61000-6-4<br>CISPR 25:2008 (30...1000 MHz)<br>ISO 7637-2:2004*<br>* Severity level according to ECE R10<br>(Rev. 4)   |
| MTTF <sub>d</sub> (ISO 13849) | High (>100 years)<br>Use in safety functions exclusively based<br>on Application Note and MTTF <sub>d</sub> reliability<br>prediction (request separately).                    |

#### Technical data - electrical ratings

|                         |  |
|-------------------------|--|
| Programmable parameters | Measuring range teachable                  |
| Diagnostic function     | DATAVALID                                  |
| Factory setting         | 360° and 10 revolutions (other on request) |
| Approval                | UL approval / E217823                      |

#### Technical data - mechanical design

|                       |  |
|-----------------------|--|
| Size (flange)         | ø36 mm   |
| Shaft type            | ø10 x 16 mm, solid shaft with flat   |
| Flange                | Synchro flange   |
| Protection EN 60529   | IP 67 (with shaft seal)  |
| Operating speed       | ≤6000 rpm  |
| Starting torque       | ≤2.5 Ncm (+20 °C, IP 67)   |
| Moment of inertia     | 15.38 gcm <sup>2</sup>   |
| Admitted shaft load   | ≤40 N axial<br>≤80 N radial  |
| Material              | Housing: steel, powder-coated<br>Flange: aluminium<br>Shaft: stainless steel               |
| Corrosion protection  | IEC 60068-2-52 Salt mist<br>for ambient conditions CX (C5-M) accord-<br>ing to ISO 12944-2 |
| Operating temperature | -40...+85 °C (see general information)   |
| Relative humidity     | 95 %   |
| Resistance            | EN 60068-2-6<br>Vibration 30 g, 10-2000 Hz<br>EN 60068-2-27<br>Shock 500 g, 1 ms           |
| Weight approx.        | 170 g  |
| Connection            | Flange connector M12, 5-pin<br>Cable 2 m   |

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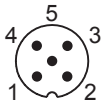
### General information

Self-heating interrelated to speed, protection, attachment method and ambient conditions as well electronics and supply voltage must be considered for precise thermal dimensioning. Self-heating is supposed to approximate 8 K (IP 67 protection) per 1000 rpm. Operating the encoder close to the maximum limits requires measuring the real prevailing temperature at the encoder flange. For the current output (version C4), a load  $>470\ \Omega$  must be selected when supplied with 24 VDC in order to minimize the self-heating of the encoder and not to exceed the maximum operating temperature. For cable lengths  $>2\text{ m}$ , a current output (version C4) is to be preferred due to the voltage drop in order to avoid effects on the accuracy.

### Terminal assignment

#### Flange connector M12, 5-pin

| Pin | Signals   | Description      |
|-----|-----------|------------------|
| 1   | 0 V       | Supply voltage   |
| 2   | +Vs       | Supply voltage   |
| 3   | Uout/Iout | Analog output    |
| 4   | DV        | DATAVALID output |
| 5   | Teach     | Teach input      |



#### Cable

| Core color | Signals   | Description      |
|------------|-----------|------------------|
| white      | 0 V       | Supply voltage   |
| brown      | +Vs       | Supply voltage   |
| green      | Uout/Iout | Analog output    |
| yellow     | DV        | DATAVALID output |
| grey       | Teach     | Teach input      |

Cable data:  $5 \times 0.5\text{ mm}^2$

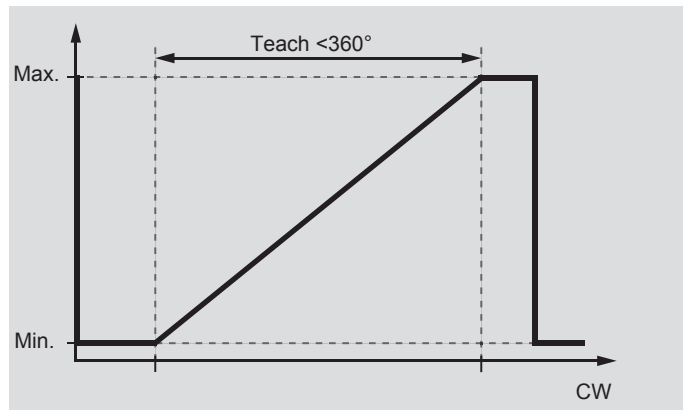
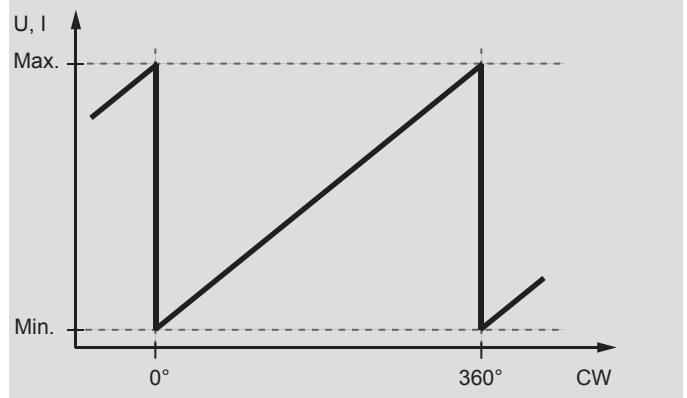
### Terminal significance

|       |  |
|-------|--|
| Iout  | Current output<br>Load: $<500\ \Omega$   |
| Uout  | Voltage output<br>Current output: max. 10 mA<br>Load resistor: $>1\text{ k}\Omega$ between Uout / 0 V<br>(version 0...10 V)<br>$>2\text{ k}\Omega$ (version 0.5...4.5 V)   |
| Teach | Teach in<br>Maximum 0...+Vs<br>Level LOW: $<1\text{ V}$<br>Level HIGH: $>2.1\text{ V}$   |
| DV    | Diagnostic output/Teach output<br>Function normal operation: DATAVALID (Diagnostic output)<br>Type NPN output,<br>Pull-Up $10\text{ k}\Omega$ integrated<br>- No error: HIGH<br>- Error: LOW<br>Function teach process: Teach status |

### Output signals

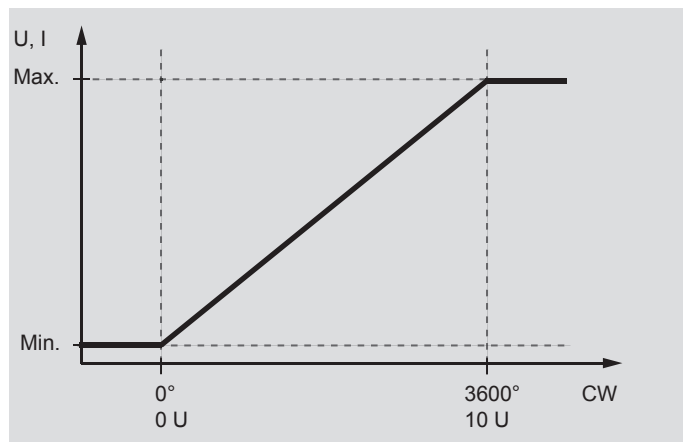
#### Singleturn

Default: CW,  $360^\circ$ , rotating direction and measuring range teachable.



#### Multiturn

Default: CW, 10 turns, rotating direction and measuring range teachable (max. 32767 turns).



Note: The encoder can be mounted at a specific position and set to position 1 by means of factory preset.

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### Teach process

**Activate teach process**

Start teach process within 5 minutes after power on. Set teach input for >5 seconds on HIGH and afterwards on LOW level.

DV/Status output: Oscillates after 5 seconds.

**Position 1**

Get encoder on position intended for min. voltage output / current output.

Set teach input for >0.1 seconds on HIGH.

DV/Status output: Switches to HIGH level for 3 seconds and flashes shortly.

**Position 2**

Get encoder on position intended for max. voltage output / current output.

Set teach input for >0.1 seconds on HIGH.

DV/Status output: Switches to HIGH level for 3 seconds and flashes shortly. If measuring range is exceeded or the limits are too close to each other, the teaching process was not successful and has to be repeated.

**Default**

Set teach input for >15 seconds on HIGH.

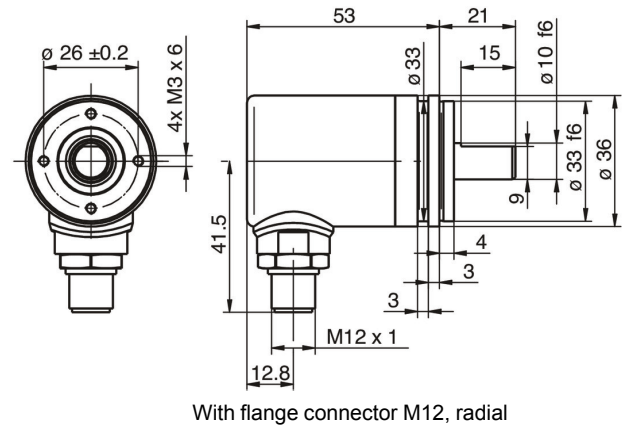
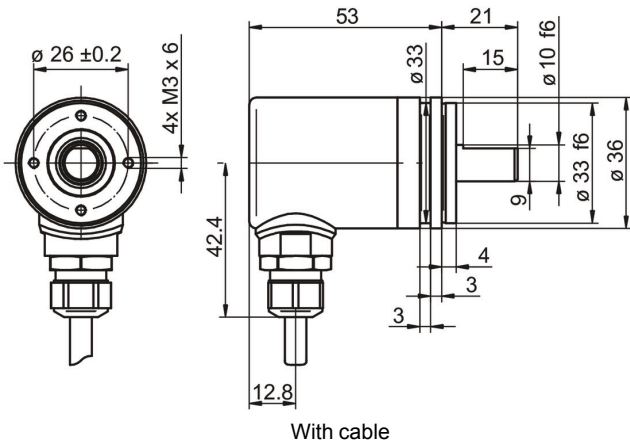
DV/Status output: Oscillates after 5 seconds.

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## Dimensions



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### Ordering reference

|                                   |  |          |          |          |          |          |          |           |          |             |          |          |          |          |
|-----------------------------------|--|----------|----------|----------|----------|----------|----------|-----------|----------|-------------|----------|----------|----------|----------|
|                                   | <b>EAM360R</b>   | <b>-</b> | <b>S</b> | <b>W</b> | <b>A</b> | <b>7</b> | <b>#</b> | <b>##</b> | <b>.</b> | <b>####</b> | <b>#</b> | <b>.</b> | <b>1</b> | <b>A</b> |
| <b>Product</b>                    | EAM360R  |          |          |          |          |          |          |           |          |             |          |          |          |          |
| <b>Shaft type</b>                 | Solid shaft  |          | S        |          |          |          |          |           |          |             |          |          |          |          |
| <b>Flange (shaft)</b>             | Synchro flange, ø33 mm, M3                               |          |          | W        |          |          |          |           |          |             |          |          |          |          |
| <b>Shaft</b>                      | ø10 x 16 mm, with flat                                   |          |          |          | A        |          |          |           |          |             |          |          |          |          |
| <b>Protection class</b>           | IP 67  |          |          |          |          | 7        |          |           |          |             |          |          |          |          |
| <b>Connection</b>                 | Cable radial, 2 m  |          |          |          |          |          | L        |           |          |             |          |          |          |          |
|                                   | Flange socket radial, M12, 5-pin, male contacts, A-coded |          |          |          |          |          | N        |           |          |             |          |          |          |          |
| <b>Voltage supply / interface</b> | 14...30 VDC, current output 4...20 mA                    |          |          |          |          |          |          | C4        |          |             |          |          |          |          |
|                                   | 14...30 VDC, voltage output 0...+10 V                    |          |          |          |          |          |          | V1        |          |             |          |          |          |          |
|                                   | 8...30 VDC, voltage output 0.5...+4.5 V                  |          |          |          |          |          |          | V3        |          |             |          |          |          |          |
| <b>Measuring range</b>            | 0...360°   |          |          |          |          |          |          |           |          | A360        |          |          |          |          |
|                                   | 0...3600°  |          |          |          |          |          |          |           |          | A36A        |          |          |          |          |
| <b>Resolution supplement</b>      | No option  |          |          |          |          |          |          |           |          |             |          |          | 0        |          |
|                                   | 4096 ppr TTL (RS422), 4 channels                         |          |          |          |          |          |          |           |          |             |          |          | H        |          |
|                                   | 2048 ppr TTL (RS422), 4 channels                         |          |          |          |          |          |          |           |          |             |          |          | 8        |          |
|                                   | 1024 ppr TTL (RS422), 4 channels                         |          |          |          |          |          |          |           |          |             |          |          | 5        |          |
|                                   | HTL/push-pull ppr see option                             |          |          |          |          |          |          |           |          |             |          |          | P        |          |
|                                   | TTL (RS422) ppr see option                               |          |          |          |          |          |          |           |          |             |          |          | R        |          |
| <b>Output characteristics</b>     | One-channel, rising CW                                   |          |          |          |          |          |          |           |          |             |          |          | 1        |          |
| <b>Operating temperature</b>      | -40...+85 °C   |          |          |          |          |          |          |           |          |             |          |          |          | A        |