

# EAM360-S - SSI

Solid shaft with synchro flange

Magnetic single- or multiturn encoders 14 bit ST / 18 bit MT

## Overview

- Encoder single- or multiturn / SSI
- Precise magnetic sensing
- Angular accuracy up to  $\pm 0.15^\circ$
- Resolution max. 32 bit (14 bit ST, 18 bit MT)
- Additional incremental signals
- Clock frequency up to 2 MHz
- High protection up to IP 67
- High resistance to shock and vibrations



## Technical data

### Technical data - electrical ratings

|                       |  |
|-----------------------|--|
| Voltage supply        | 4.5...30 VDC (SSI, SSI + TTL/RS422)<br>5.5...30 VDC (SSI + HTL/Push-pull)          |
| Consumption typ.      | 60 mA (5 VDC, w/o load)<br>20 mA (24 VDC, w/o load)                                |
| Initializing time     | $\leq 170$ ms after power on   |
| Data currency         | Typ. 2 $\mu$ s (cyclic request)  |
| Interface             | SSI<br>SSI + incremental   |
| Function              | Multiturn<br>Singleturn  |
| Operating mode        | Linear feedback shift register (on request)  |
| Steps per revolution  | $\leq 16384 / 14$ bit  |
| Number of revolutions | $\leq 262144 / 18$ bit   |
| Absolute accuracy     | $\pm 0.15^\circ$ (+20 $\pm 15^\circ$ C)<br>$\pm 0.25^\circ$ (-40...+85 $^\circ$ C) |
| Sensing method        | Magnetic   |
| Code                  | Gray or binary   |
| Code sequence         | CW: ascending values with clockwise sense of rotation; looking at flange           |
| Inputs                | SSI clock: Linereceiver RS422<br>Zero setting input<br>Counting direction          |
| Output stages         | SSI data: Linedriver RS422<br>Incremental: linedriver RS422 or push-pull (option)  |
| Incremental output    | 1024, 2048, 4096 ppr (other on request)  |
| Output signals        | A+, A-, B+, B-   |
| Output frequency      | $\leq 350$ kHz   |

### Technical data - electrical ratings

|                       |                        |
|-----------------------|------------------------|
| Interference immunity | EN 61000-6-2           |
| Emitted interference  | EN 61000-6-4           |
| Diagnostic function   | DATAVALID (on request) |
| Approval              | UL approval / E217823  |

### Technical data - mechanical design

|                       |  |
|-----------------------|--|
| Size (flange)         | $\varnothing 36$ mm  |
| Shaft type            | $\varnothing 10 \times 16$ mm, solid shaft with flat                             |
| Flange                | Synchro flange   |
| Protection EN 60529   | IP 65 (without shaft seal)<br>IP 67 (with shaft seal)                            |
| Operating speed       | $\leq 6000$ rpm  |
| Starting torque       | $\leq 2$ Ncm (+20 $^\circ$ C, IP 65)<br>$\leq 2.5$ Ncm (+20 $^\circ$ C, IP 67)   |
| Moment of inertia     | 15.38 gcm <sup>2</sup>   |
| Admitted shaft load   | $\leq 40$ N axial<br>$\leq 80$ N radial  |
| Material              | Housing: steel zinc-coated<br>Flange: aluminium<br>Shaft: stainless steel        |
| Operating temperature | -40...+85 $^\circ$ 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, 8-pin<br>Flange connector M12, 12-pin<br>Cable 2 m         |

## Optional

- Protection against corrosion CX (C5-M)

# EAM360-S - SSI

Solid shaft with synchro flange

Magnetic single- or multiturn encoders 14 bit ST / 18 bit MT

## 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 3 K (IP 65 protection) respectively 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.

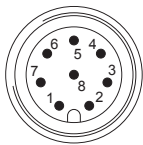
## Terminal assignment

**Cable / Flange connector M12, 8-pin**  
for connection reference -L and -B

| Pin | Core color | Signals | Description               |
|-----|------------|---------|---------------------------|
| 1   | white      | 0 V     | Supply voltage            |
| 2   | brown      | +Vs     | Supply voltage            |
| 3   | green      | Clock+  | Clock signal              |
| 4   | yellow     | Clock-  | Clock signal              |
| 5   | grey       | Data+   | Data signal               |
| 6   | pink       | Data-   | Data signal               |
| 7   | blue       | SET     | Zero setting input        |
| 8   | red        | DIR     | Counting direction input* |

Screen connected to housing

Cable data: 4 x 2 x 0.14 mm<sup>2</sup>, twisted in pairs



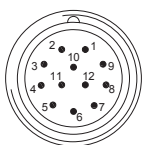
Male, A-coded

**Cable / Flange connector M12, 12-pin**  
for connection reference -L and -K

| Pin | Core color | Signals | Description               |
|-----|------------|---------|---------------------------|
| 1   | brown      | +Vs     | Supply voltage            |
| 2   | blue       | SET     | Zero setting input        |
| 3   | white      | 0 V     | Supply voltage            |
| 4   | green      | Clock+  | Clock signal              |
| 5   | pink       | Data-   | Data signal               |
| 6   | yellow     | Clock-  | Clock signal              |
| 7   | black      | A+      | Incremental signal        |
| 8   | grey       | Data+   | Data signal               |
| 9   | red        | DIR     | Counting direction input* |
| 10  | violet     | A-      | Incremental signal        |
| 11  | grey/pink  | B+      | Incremental signal        |
| 12  | red/blue   | B-      | Incremental signal        |

Screen connected to housing

Cable data: 6 x 2 x 0.14 mm<sup>2</sup>, twisted in pairs



Male, A-coded

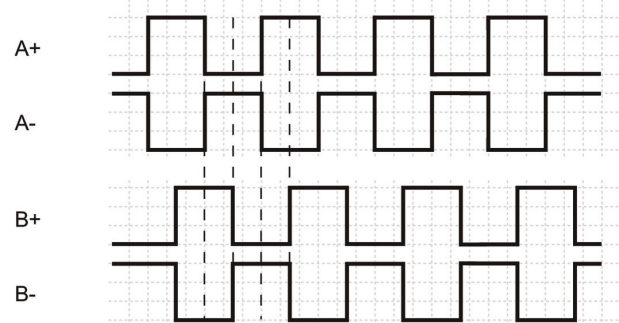
\* Not applicable by option: DATAVALID

## Terminal significance

|     |   |
|-----|---|
| SET | Zero setting.<br>Input for zero setting at any position.<br>The zero setting operation is triggered by a high pulse and has to be in line with the selected direction of rotation (DIR).<br>Impulse duration >100 ms.<br>Connect to 0 V after zero setting for maximum interference immunity. |
| DIR | Counting direction input.<br>The input is standard on high. For maximum interference immunity connect to +Vs respectively 0 V depending on counting direction.<br>CW HIGH - CCW LOW<br>(Version with DATAVALID does not include the counting direction input).                                |

## Output signals

Incremental signals: clockwise rotating direction when looking at flange.



## Trigger level

| Control inputs   | Input circuit |
|------------------|---------------|
| Maximal          | 0...+Vs       |
| Input level Low  | <1 V          |
| Input level High | >2.1 V        |

## RS422

|                   |        |
|-------------------|--------|
| Output level High | >2.3 V |
| Output level Low  | <0.5 V |
| Load              | <20 mA |

## Push-pull

|                   |             |
|-------------------|-------------|
| Output level High | ≥+VS -2.2 V |
| Output level Low  | <0.7 V      |
| Load              | <20 mA      |

Applies to standard cable lengths up to 2 m, for longer cables the voltage drop must be taken into account.

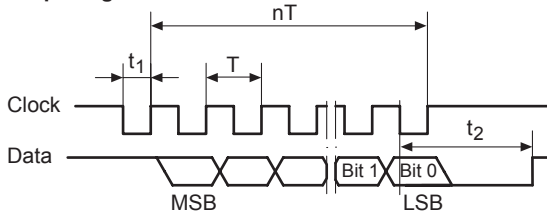
# EAM360-S - SSI

Solid shaft with synchro flange

Magnetic single- or multiturm encoders 14 bit ST / 18 bit MT

## Data transfer

### Output signal



$$T = 0.5 \dots 10 \mu\text{s}$$

$$t_1 = 0.25 \dots 5 \mu\text{s}$$

$$t_2 = 20 \pm 2 \mu\text{s}$$

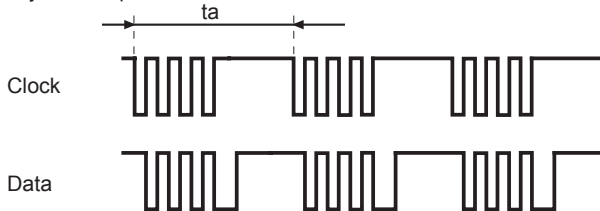
$$f_{\text{max.}} = 2 \text{ MHz}$$

### Data acquisition time $t_a$

Following timing of the SSI Masters is the requirement for a data refresh rate of typ.  $2 \mu\text{s}$ . If this is not fulfilled the data refresh rate is  $< 50 \mu\text{s}$ .

$t_a < 5000 \mu\text{s}$

$t_a \text{ jitter } < \pm 2 \mu\text{s}$





# EAM360-S - SSI

Solid shaft with synchro flange

Magnetic single- or multiturn encoders 14 bit ST / 18 bit MT

## Ordering reference

|                                   | EAM360  | - | S | W | A | . | # | # | ## | . | ## | ## | # | . | A  |
|-----------------------------------|---|---|---|---|---|---|---|---|----|---|----|----|---|---|----|
| <b>Product</b>                    | EAM360  |   |   |   |   |   |   |   |    |   |    |    |   |   |    |
| <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 65   |   |   |   |   |   |   |   |    |   |    |    |   |   | 5  |
|                                   | IP 67   |   |   |   |   |   |   |   |    |   |    |    |   |   | 7  |
| <b>Connection</b>                 | Flange socket radial, M12, 8-pin, male contacts, CCW  |   |   |   |   |   |   |   |    |   |    |    |   |   | B  |
|                                   | Flange socket radial, M12, 12-pin, male contacts, CCW |   |   |   |   |   |   |   |    |   |    |    |   |   | K  |
|                                   | Cable radial, 2 m                                     |   |   |   |   |   |   |   |    |   |    |    |   |   | L  |
| <b>Voltage supply / interface</b> | 4.5...30 VDC, SSI binary                              |   |   |   |   |   |   |   |    |   |    |    |   |   | 4B |
|                                   | 4.5...30 VDC, SSI gray                                |   |   |   |   |   |   |   |    |   |    |    |   |   | 4G |
| <b>Resolution Singleturn</b>      | 10 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 10 |
|                                   | 12 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 12 |
|                                   | 13 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 13 |
|                                   | 14 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 14 |
| <b>Resolution Multiturn</b>       | No option   |   |   |   |   |   |   |   |    |   |    |    |   |   | 00 |
|                                   | 12 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 12 |
|                                   | 13 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 13 |
|                                   | 16 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 16 |
|                                   | 18 Bit  |   |   |   |   |   |   |   |    |   |    |    |   |   | 18 |
| <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  |
| <b>Operating temperature</b>      | -40...+85 °C  |   |   |   |   |   |   |   |    |   |    |    |   |   | A  |

## Accessories

### Mounting accessories

10106004 Clamp set ø10 mm