

## EAM580-SY - 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
- Resolution max. 32 bit (14 bit ST, 18 bit MT)
- Angular accuracy up to  $\pm 0.15^\circ$
- Additional incremental signals
- 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     | $\pm 0.15^\circ$ ( $+20 \pm 15^\circ\text{C}$ )<br>$\pm 0.25^\circ$ ( $-40 \dots +85^\circ\text{C}$ ) |
| 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                                                                                        |
| Interference immunity | EN 61000-6-2                                                                                          |

#### Technical data - electrical ratings

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

#### Technical data - mechanical design

|                       |                                                                                                          |
|-----------------------|----------------------------------------------------------------------------------------------------------|
| Size (flange)         | $\varnothing 58$ mm                                                                                      |
| Shaft type            | $\varnothing 6 \times 10$ 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 ( $+20^\circ\text{C}$ , IP 65)<br>$\leq 2.5$ Ncm ( $+20^\circ\text{C}$ , 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 | $-40 \dots +85^\circ\text{C}$ (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.        | 250 g                                                                                                    |
| Connection            | Flange connector M12, 8-pin<br>Flange connector M12, 12-pin<br>Flange connector M23, 12-pin<br>Cable 2 m |

### Optional

- Protection against corrosion CX (C5-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 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.

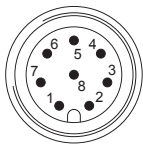
### Terminal assignment

#### Cable / Flange connector M12, 8-pin / w/o incremental 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



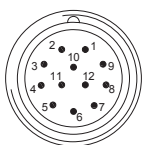
Male, A-coded

#### Cable / Flange connector M12, 12-pin / with incremental 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

### Terminal assignment

#### Flange connector M23, 12-pin / w/o incremental for connection reference -F

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

Screen connected to housing

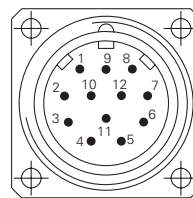
Cable data: 4 x 2 x 0.14 mm<sup>2</sup>, twisted in pairs

#### Flange connector M23, 12-pin / with incremental for connection reference -F

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

Screen connected to housing

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



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Solid shaft with synchro flange

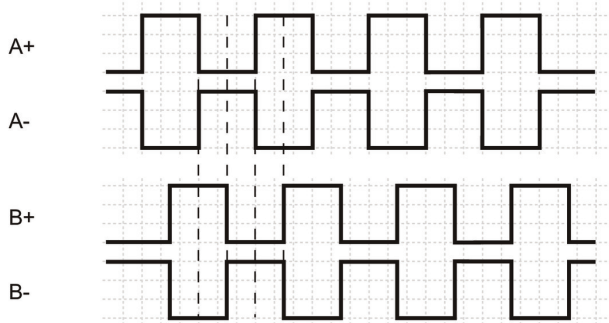
Magnetic single- or multturn encoders 14 bit ST / 18 bit MT

### 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 |

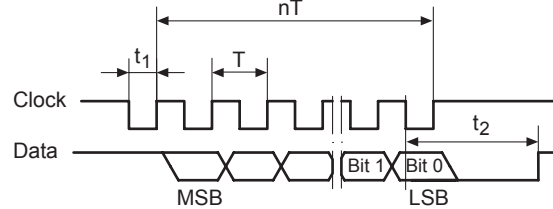
### Push-pull

|                   |                             |
|-------------------|-----------------------------|
| Output level High | $\geq +V_S - 2.2 \text{ V}$ |
| 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.

### Data transfer

#### Output signal



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

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

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

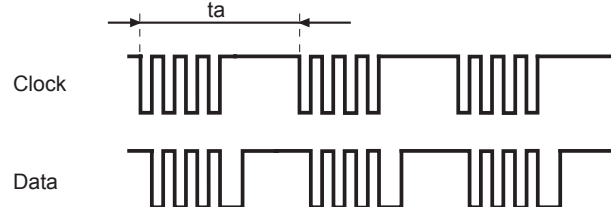
$$f_{\text{max.}} = 2 \text{ MHz}$$

#### Data acquisition time ta

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  $\mu\text{s}$ .

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

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

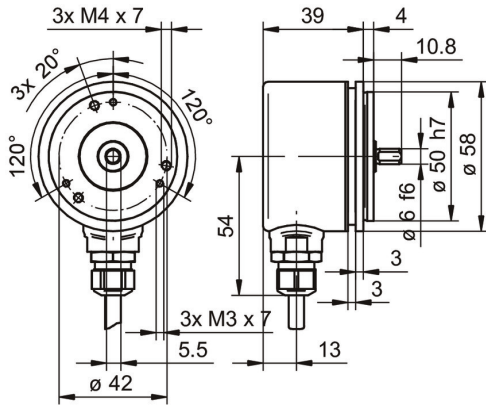


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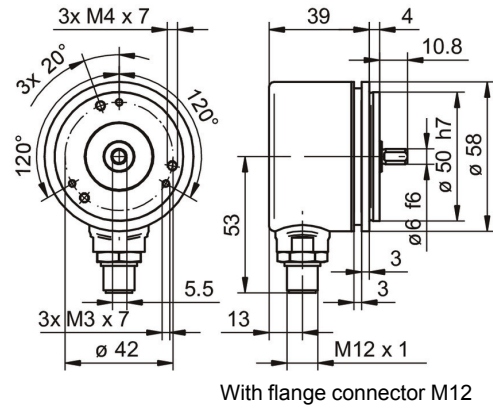
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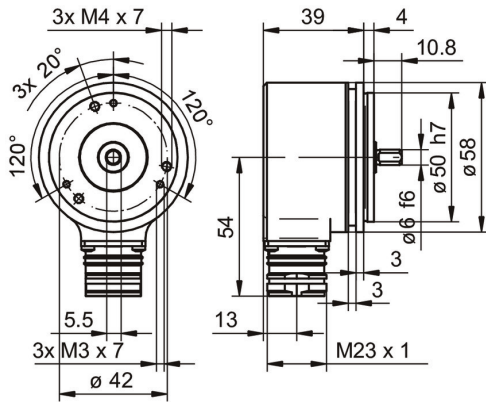
### Dimensions



With cable



With flange connector M12



With flange connector M23

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### Ordering reference

|                                                                                                     |  | EAM580 | - | S | Y | 6 | . | # | # | ## | . | ## | ## | # | . | A  |
|-----------------------------------------------------------------------------------------------------|--|--------|---|---|---|---|---|---|---|----|---|----|----|---|---|----|
| <b>Product</b>                                                                                      |  | EAM580 |   |   |   |   |   |   |   |    |   |    |    |   |   |    |
| <b>Shaft type</b>                                                                                   |  |        |   |   |   |   |   |   |   |    |   |    |    |   |   |    |
| Solid shaft                                                                                         |  |        |   | S |   |   |   |   |   |    |   |    |    |   |   |    |
| <b>Flange (shaft)</b>                                                                               |  |        |   |   |   |   |   |   |   |    |   |    |    |   |   |    |
| Synchro flange, centering collar ø50 x 4 mm,<br>flute ø53 mm, pitch circle diameter ø42 - 3xM3/3xM4 |  |        |   |   | Y |   |   |   |   |    |   |    |    |   |   |    |
| <b>Shaft</b>                                                                                        |  |        |   |   |   |   |   |   |   |    |   |    |    |   |   |    |
| ø6 x 10 mm, with flat                                                                               |  |        |   |   |   | 6 |   |   |   |    |   |    |    |   |   |    |
| <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, M23, 12-pin, male contacts, CCW                                               |  |        |   |   |   |   |   |   |   |    |   |    |    |   |   | F  |
| 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  |

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### Accessories

#### Mounting accessories

|          |                                                           |
|----------|-----------------------------------------------------------|
| 10106004 | Clamp set ø10 mm                                          |
| 11050507 | Bellows coupling (D1=06 / D2=10)                          |
| 11065922 | Coupling CPS25 (L=19, D1=10 / D2=06)                      |
| 11065916 | Coupling CPS25 (L=19, D1=06 / D2=06)                      |
| 10141132 | Spring washer coupling (D1=6 / D2=10)                     |
| 10141131 | Spring washer coupling (D1=6 / D2=6)                      |
| 11069333 | Coupling CPS37 (L=24, D1=06 / D2=06)                      |
| 11069337 | Coupling CPS37 (L=24, D1=10 / D2=06)                      |
| 10117667 | Mounting adaptor                                          |
| 10117668 | Set of eccentric fixings for mounting clamp<br>(10117667) |