



## BTL7-abcde-Mnnnn-fg-lm

### BTL7

Magnetostrictive linear position sensor Generation 7

#### a Interface

S = SSI

#### b Operating voltage

5 = 10 ... 30 V

#### c Interface characteristic 1

0 = 24 bits, binary, rising  
1 = 24 bits, gray, rising  
2 = 24 bits, binary, falling  
3 = 24 bits, gray, falling  
6 = 25 bits, binary, rising  
7 = 25 bits, gray, rising  
8 = 25 bits, binary, falling  
9 = 25 bits, gray, falling  
A = 26 bits, binary, rising  
B = 26 bits, gray, rising  
C = 26 bits, binary, falling  
D = 26 bits, gray, falling

#### d Interface characteristic 2

0 = 1  $\mu$ m (configurable / only with c = 1)  
1 = 1  $\mu$ m  
2 = 5  $\mu$ m  
3 = 10  $\mu$ m  
4 = 20  $\mu$ m  
5 = 40  $\mu$ m  
6 = 100  $\mu$ m  
7 = 2  $\mu$ m  
8 = 50  $\mu$ m

#### e Interface characteristic 3

B = Synchronous mode  
- = Asynchronous mode

#### Mnnnn Nominal length (4-position)

M0500 = metric in mm  
(M0025...M1016: with 8 mm rod diameter)  
(M0025...M7620: with 10.2 mm rod diameter)

#### f Form factor

A = Mounting threads M18x1.5, for flat seal  
B = Mounting threads M18x1.5, for O-Ring

#### g Form factor characteristic

8 = Rod diameter 8 mm  
- = Rod diameter 10.2 mm

#### l Connection type

S = Connector  
KA = Cable (PUR)  
FA = Cable (PTFE)

#### m Connection type characteristic 1

for connector:  
32 = M16x0.75 connector with 8 pins  
115 = M12x1 connector with 8 pins  
140 = MS, 10-pin  
147 = M16x0.75 connector with 7 pins

for cable (length in meters):  
02, 05, 10, 15, 20, 30, 50, 100

# Magnetostrictive Sensors BTL7 -A/B- Series - SSI

# BALLUFF

## Basic features

|                                   |                                                                 |
|-----------------------------------|-----------------------------------------------------------------|
| Approval/Conformity               | I = S, KA: CE + UKCA + cULus + WEEE<br>I = FA: CE + UKCA + WEEE |
| Magnets, number (factory setting) | 1                                                               |
| Magnets, number max.              | cd ≠ 10: 1<br>cd = 10: 2                                        |

## Display/Operation

|             |                                                                                                                 |
|-------------|-----------------------------------------------------------------------------------------------------------------|
| Error value | cd = 10: all bits = 0<br>d = 1: all bits = 0<br>d = 7: all bits = 0<br>otherwise: only bits 2 <sup>21</sup> = 1 |
|-------------|-----------------------------------------------------------------------------------------------------------------|

## Electrical connection

|                             |                       |
|-----------------------------|-----------------------|
| Polarity reversal protected | Ub up to 36 V         |
| Short-circuit protection    | to GND and to 36 V DC |

## Electrical data

|                                      |                                                            |
|--------------------------------------|------------------------------------------------------------|
| Current consumption max. at 24 V DC  | 120 mA                                                     |
| Inrush current                       | nnnn < 1525: ≤ 500 mA/10 ms<br>nnnn ≥ 1525: ≤ 500 mA/25 ms |
| Operating voltage Ub                 | 10...30 VDC                                                |
| Output signal adjustable             | cd ≠ 10: no<br>cd = 10: with software tool                 |
| Overvoltage protection               | Ub up to 36 V                                              |
| Switch-on delay max.                 | nnnn < 1525: 100 ms<br>nnnn ≥ 1525: 500 ms                 |
| Voltage-proof up to (GND to housing) | 500 V DC                                                   |

## Environmental conditions

|                                     |                                                                                                      |
|-------------------------------------|------------------------------------------------------------------------------------------------------|
| Ambient temperature                 | -40...85 °C                                                                                          |
| Cable temperature, fixed routing    | I = KA: -40 °C ... 90 °C<br>I = FA: -40 °C ... 200 °C                                                |
| Cable temperature, flexible routing | I = KA: -5 °C ... 90 °C                                                                              |
| EN 55016-2-3, Radiation             | For industrial and residential use                                                                   |
| EN 60068-2-27, Continuous shock     | 150 g, 2 ms                                                                                          |
| EN 60068-2-27, Shock                | 150 g, 6 ms                                                                                          |
| EN 60068-2-6, Vibration             | 20 g, 10...2000 Hz                                                                                   |
| EN 61000-4-2, ESD                   | Severity Level 3                                                                                     |
| EN 61000-4-3, RFI                   | Severity Level 3                                                                                     |
| EN 61000-4-4, Burst                 | Severity Level 3                                                                                     |
| EN 61000-4-5, Surge                 | Severity Level 2                                                                                     |
| EN 61000-4-6, High-frequency fields | Severity Level 3                                                                                     |
| EN 61000-4-8 Magnetic fields        | Severity Level 4                                                                                     |
| IP rating                           | I = S AND m ≠ 140: IP67 with connector<br>I = S AND m = 140: IP65 with connector<br>I = KA, FA: IP68 |
| Relative humidity                   | ≤ 90 %, non-condensing                                                                               |
| Storage temperature                 | -40...100 °C                                                                                         |
| Temperature coefficient typ.        | ≤ 15 ppm/K at 50% of nominal stroke 500mm                                                            |

## Functional safety

|              |       |
|--------------|-------|
| MTTF (40 °C) | 102 a |
|--------------|-------|

## Interface

|           |     |
|-----------|-----|
| Interface | SSI |
|-----------|-----|

## Material

|                                      |                                    |
|--------------------------------------|------------------------------------|
| Cable flame-resistant                | I = KA, FA: IEC 60332-1            |
| Cable jacket, material               | I = KA: PUR<br>I = FA: PTFE        |
| Cover material                       | Aluminium, Die-cast, nickel plated |
| Housing material                     | Aluminium, Anodized                |
| Housing material, surface protection | Anodized                           |
| Material flange                      | 1.3960 stainless steel             |
| Protection tube material             | 1.4571 stainless steel             |

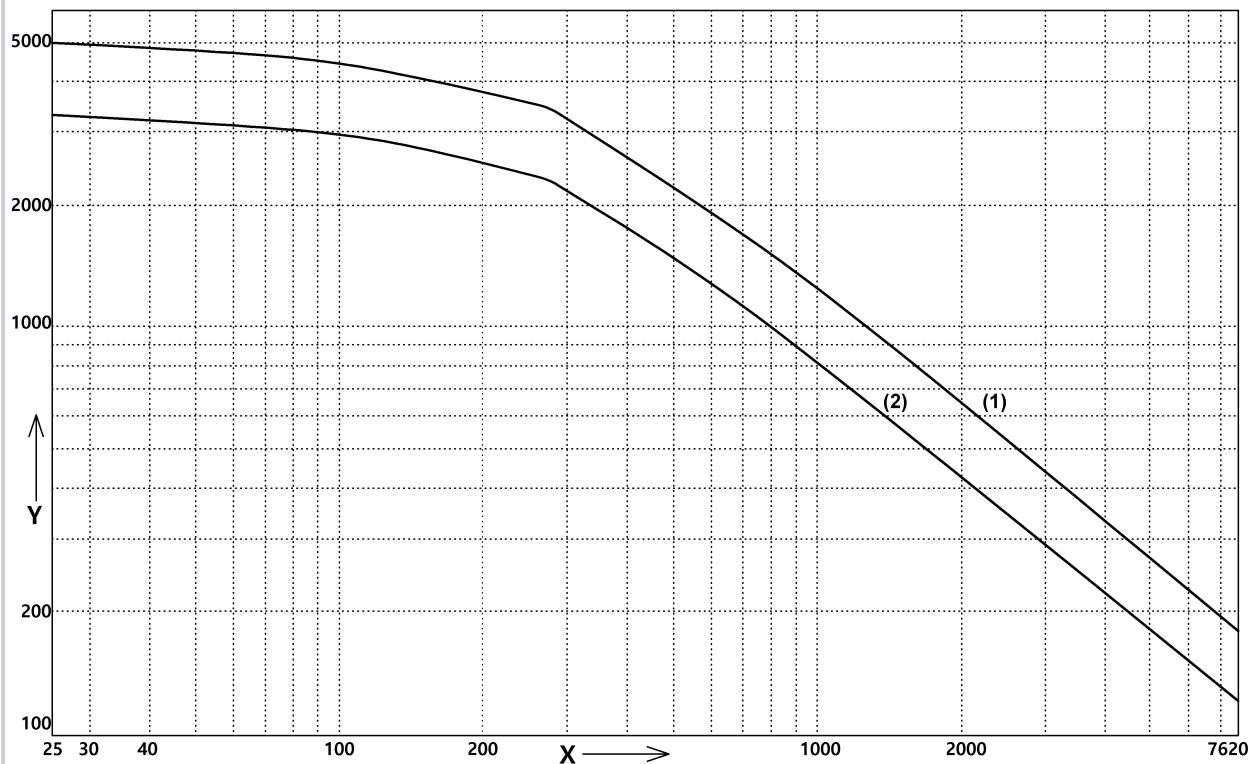
## Mechanical data

|                                          |                                      |
|------------------------------------------|--------------------------------------|
| Installation length from contact surface | nnnn + 90 mm                         |
| Pressure rating max.                     | g ≠ 8: 600 bar<br>g = 8: 250 bar     |
| Pressure rating, note                    | when installed in hydraulic cylinder |
| Speed detectable max.                    | 10 m/s                               |
| Tightening torque max.                   | 100 Nm                               |

## Range/Distance

|                         |                                                                                                                               |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Linearity deviation     | d = 1, 2, 3, 7:<br>nnnn = 50...5500: ± 30µm<br><br>d = 4, 5, 6, 8<br>nnnn = 50...5500: ± 2 LSB<br><br>nnnn > 5500: ± 0.02% FS |
| Measuring length        | 25...7620 mm                                                                                                                  |
| Repeat accuracy         | ≤ ± 5 µm                                                                                                                      |
| Sampling frequency max. | See illustration for measuring frequency                                                                                      |

Characteristic Diagram



fA,min: 62,5 Hz

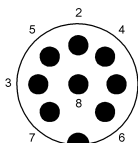
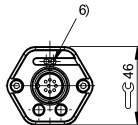
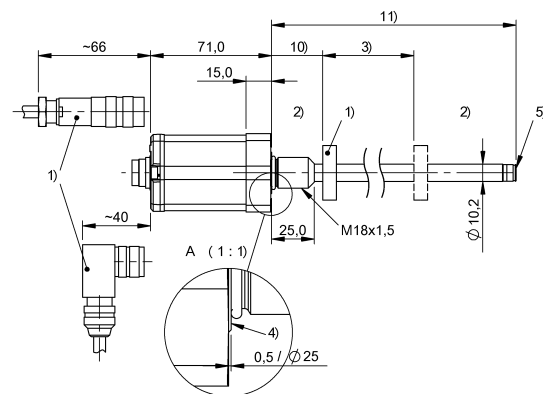
1) 1 magnet

2) 2...16 magnets

x: Nominal length [mm]

y: fA,max Hz

BTL7-S510x-Mxxxx-B-S32



| PIN |                |
|-----|----------------|
| 1   | +Clk           |
| 2   | +Data          |
| 3   | -Clk           |
| 4   | L <sub>a</sub> |
| 5   | -Data          |
| 6   | GND            |
| 7   | 10...30 V DC   |
| 8   | L <sub>b</sub> |

1) not included in scope of delivery

2) Non-usable area

3) Nominal length = Measuring length

4) Mounting surface

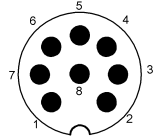
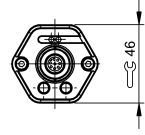
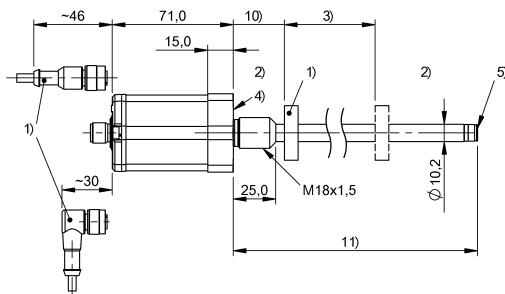
5) Internal threads M4x4/6 deep

6) LED function indicator

10) Null point

11) Installation length

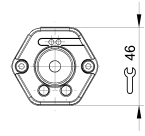
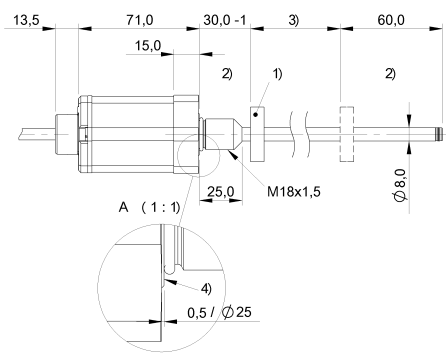
BTL7-S5xxx-Mxxx-A-S115



| PIN |              |
|-----|--------------|
| 1   | +Clk         |
| 2   | +Data        |
| 3   | -Clk         |
| 4   | NC           |
| 5   | -Data        |
| 6   | GND          |
| 7   | 10...30 V DC |
| 8   | NC           |

- 1) not included in scope of delivery
- 2) Non-usable area
- 3) Nominal length = Measuring length
- 4) Mounting surface
- 5) Internal threads M4x4/6 deep
- 10) Null point
- 11) Installation length

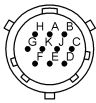
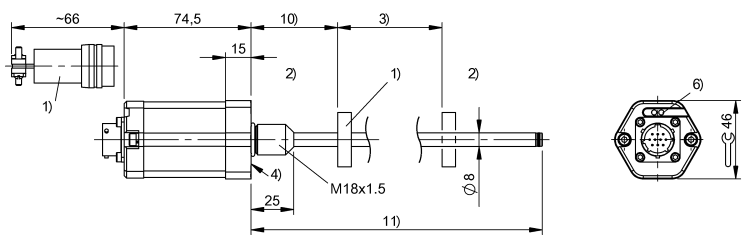
BTL7-S5xxx-Mxxx-B8-KAxx



| PIN |              |
|-----|--------------|
| YE  | +Clk         |
| GY  | +Data        |
| PK  | -Clk         |
| RD  | NC           |
| GN  | -Data        |
| BU  | GND          |
| BN  | 10...30 V DC |
| WH  | NC           |

- 1) not included in scope of delivery
- 2) Non-usable area
- 3) Nominal length = Measuring length
- 4) Mounting surface

BTL7-S5xxx-Mxxxx-A8-S140



| PIN |              |
|-----|--------------|
| A   | +Data        |
| B   | +Clk         |
| C   | -Clk         |
| D   | 10...30 V DC |
| E   | NC           |
| F   | GND          |
| G   | NC           |
| H   | NC           |
| J   | -Data        |
| K   | NC           |

- 1) not included in scope of delivery
- 2) Non-usable area
- 3) Nominal length = Measuring length
- 4) Mounting surface
- 5) Internal threads M4x4/6 deep
- 6) LED function indicator
- 10) Null point
- 11) Installation length