



## BTL7-abcde-Mnnnn-f-i-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

1 = 1 µm  
2 = 5 µm  
3 = 10 µm  
4 = 20 µm  
5 = 40 µm  
6 = 100 µm  
7 = 2 µm  
8 = 50 µm

#### e Interface characteristic 3

B = Synchronous mode  
- = Asynchronous mode

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

M0500 = metric in mm  
(M0025...M2000)

#### f Style

CD = Mounting threads M22x1.5, for O-Ring

#### i Variant

NEX = Ignition class "nA" and "tb"

#### l Connection type

S = Connector  
KA = Cable (PUR)

#### m Connection type characteristic 1

for connector:

32 = M16x0.75 connector with 8 pins

for cable (length in meters):

02, 05, 10, 15, 20, 30, 50, 100

# Magnetostrictive Sensors

## BTL7 -CD-NEX- Series - SSI

# BALLUFF

### 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 $2^{21} = 1$ |
|-------------|----------------------------------------------------------------------------------------------------------|

### 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...60 °C                                |
| Cable temperature, fixed routing    | I = KA: -40 °C ... 90 °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: IP67 with connector<br>I = KA: IP68 |
| Relative humidity                   | ≤ 90 %, non-condensing                     |
| Storage temperature                 | -40...70 °C                                |
| Surface temperature max.            | 135 °C                                     |
| Temperature coefficient typ.        | ≤ 15 ppm/K at 50% of nominal stroke 500mm  |

### Functional safety

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

### General data

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Approval/Conformity               | CE<br>CSA<br>IECEX<br>EAC<br>WEEE                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Ex marking                        | ATEX: II 3 G Ex nA IIC T4 Gc<br>II 2 D Ex tb IIIC T135°C Db IP6x<br>-40°C ≤ Ta ≤ +60°C<br>EAC: 2Ex nA IIC T4 Gc X Ex tb<br>IIIC T135 °C Db X -40 °C ≤ Ta ≤<br>+60 °C<br>IECEX: Ex nA IIC T4 Gc<br>Ex tb IIIC T135°C Db IP6x -40°C<br>≤ Ta ≤ +60°C<br>NEC: NI: Class I, Division 2,<br>Groups ABCD<br>Class II, Division 2, Groups EFG<br>T4<br>CAN: Class I, Zone 2, Ex nA IIC<br>T4<br>Ex tb IIIC T135°C<br>USA: Class I, Zone 2, AEx nA IIC<br>Gc T4<br>AEx tb IIIC Db T135°C -40°C ≤ Ta<br>≤ +60°C |
| Magnets, number (factory setting) | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Magnets, number max.              | cd ≠ 10: 1<br>cd = 10: 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

### Material

|                                      |                                   |
|--------------------------------------|-----------------------------------|
| Cable flame-resistant                | I = KA: IEC 60332-1               |
| Cable jacket, material               | I = KA: PUR                       |
| Cover material                       | Aluminum, Die-cast, nickel plated |
| Housing material                     | Aluminum                          |
| Housing material, surface protection | Anodized                          |
| Material flange                      | HP 160                            |
| Protection tube material             | Stainless steel (1.4571)          |

### Mechanical data

|                                          |                                      |
|------------------------------------------|--------------------------------------|
| Installation length from contact surface | nnnn + 90 mm                         |
| Pressure rating max.                     | 1000 bar                             |
| Pressure rating, note                    | when installed in hydraulic cylinder |
| Speed detectable max.                    | 10 m/s                               |
| Tightening torque max.                   | 290 Nm                               |

### Output/Interface

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

Magnetostrictive Sensors  
BTL7 -CD-NEX- Series - SSI



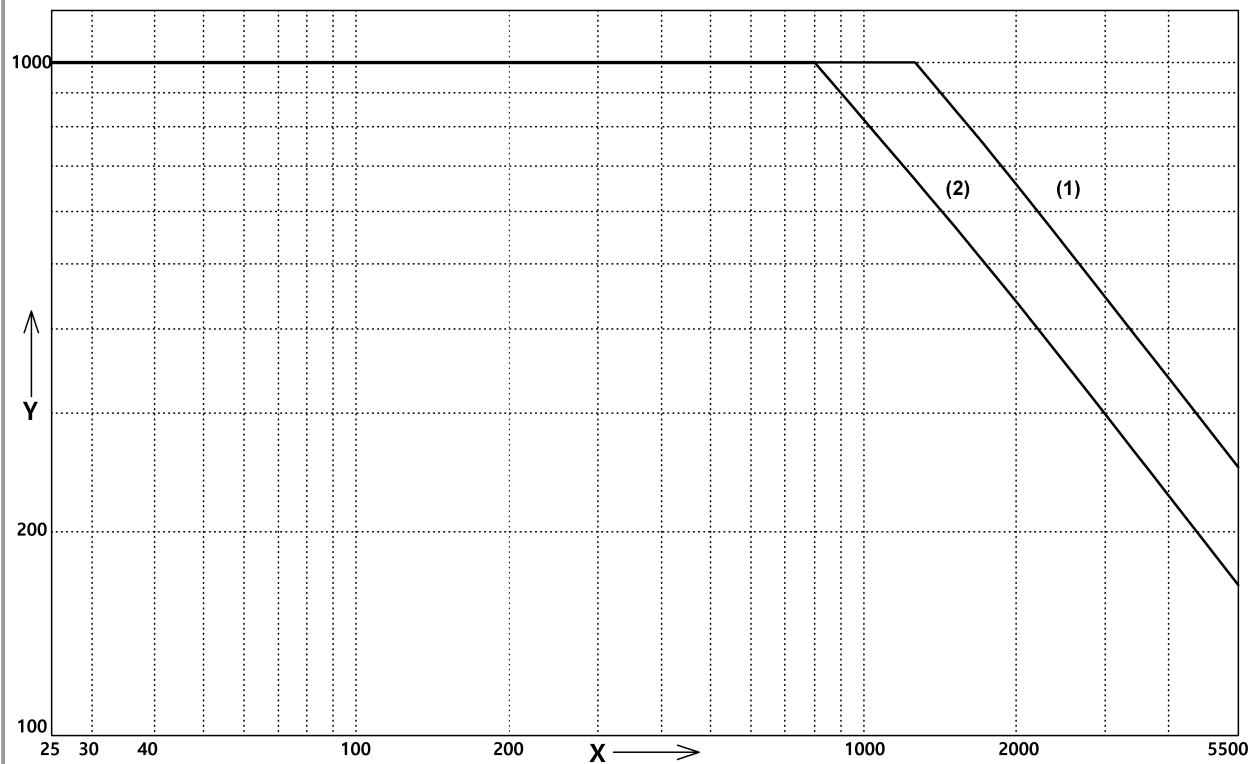
Range/Distance

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|                     |                                                                           |
|---------------------|---------------------------------------------------------------------------|
| Linearity deviation | d = 1, 2, 3, 7: $\pm 30\mu\text{m}$<br>d = 4, 5, 6, 8: $\pm 2\text{ LSB}$ |
|---------------------|---------------------------------------------------------------------------|

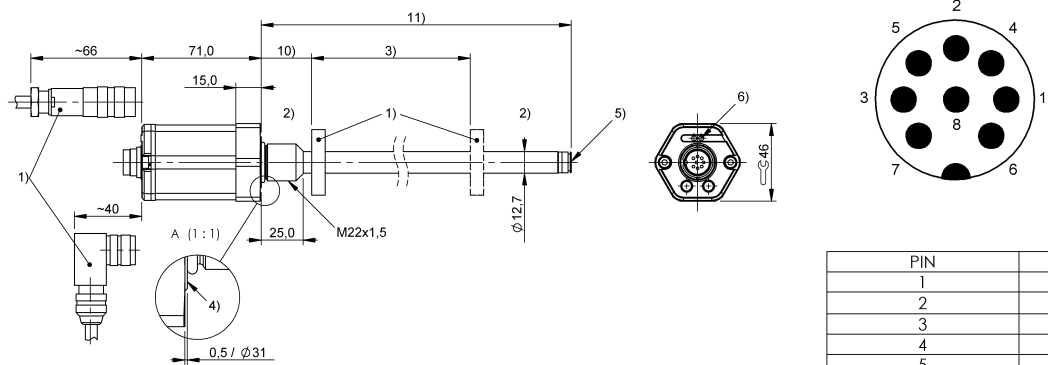
|                         |                                          |
|-------------------------|------------------------------------------|
| Measuring length        | 25...2000 mm                             |
| Repeat accuracy         | $\leq \pm 5\ \mu\text{m}$                |
| Sampling frequency 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

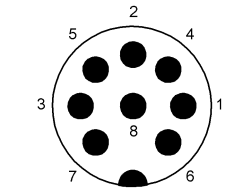
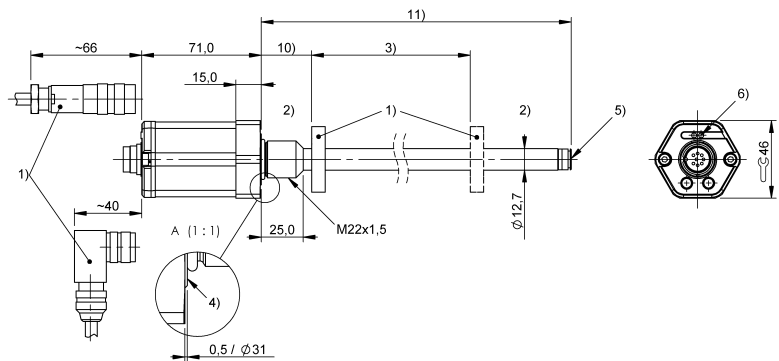
BTL7-S510x-Mxxxx-CD-NEX-S32



- 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

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

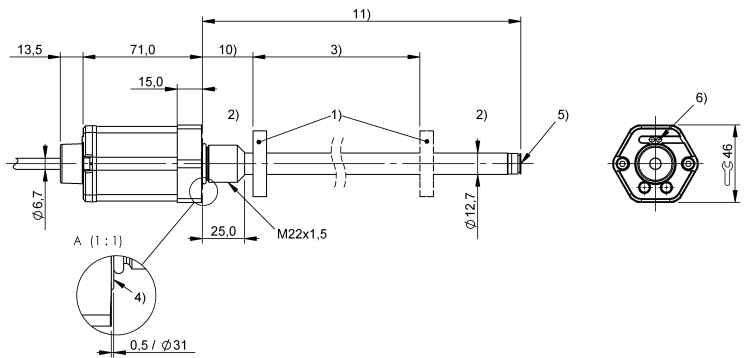
BTL7-S5xxx-Mxxxx-CD-NEX-S32



| 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
- 6) LED function indicator
- 10) Null point
- 11) Installation length

BTL7-S5xxx-Mxxxx-CD-NEX-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
- 5) Internal threads M4x4/6 deep
- 6) LED function indicator
- 10) Null point
- 11) Installation length