

# BALLUFF

**BTL7-A/C/E/G501-M \_\_\_\_\_ -P-S32/S115/KA \_\_**

User's Guide



english

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# BTL7-A/C/E/G501-M \_ \_ \_ \_ -P-S32/S115/KA \_ \_

## Magnetostrictive Linear Position Sensor – Profile Style

### 1

#### Notes to the user

#### 1.1 Validity

This guide describes the construction, function and setup options for the BTL magnetostrictive linear position sensor with analog interface. It applies to types

**BTL7-A/C/E/G501-M \_ \_ \_ \_ -P-S32/S115/KA \_ \_** (see Type code on page 22).

The guide is intended for qualified technical personnel. Read this guide before installing and operating the BTL.

#### 1.2 Symbols and conventions

Individual **handling instructions** are indicated by a preceding triangle.

- ▶ Handling instruction 1

**Handling sequences** are numbered consecutively:

1. Handling instruction 1
2. Handling instruction 2



#### Note, tip

This symbol indicates general notes.



Symbols of this type indicate the LED displays.

#### 1.3 Scope of delivery

- BTL
- Mounting clamps with insulating sleeves and screws
- Condensed guide



The magnets are available in various models and must be ordered separately.

#### 1.4 Approvals and markings



#### US Patent 5 923 164

The US patent was awarded in connection with this product.



The CE Mark verifies that our products meet the requirements of the current EMC Directive.

The BTL meets the requirements of the following product standard:

- EN 61326-2-3 (noise immunity and emission)

Emission tests:

- RF emission  
EN 55011

Noise immunity tests:

- Static electricity (ESD)  
EN 61000-4-2 Severity level 3
- Electromagnetic fields (RFI)  
EN 61000-4-3 Severity level 3
- Electrical fast transients (burst)  
EN 61000-4-4 Severity level 3
- Surge  
EN 61000-4-5 Severity level 2
- Conducted interference induced by  
high-frequency fields  
EN 61000-4-6 Severity level 3
- Magnetic fields  
EN 61000-4-8 Severity level 4



More detailed information on the guidelines, approvals, and standards is included in the declaration of conformity.

## 2

### Safety

#### 2.1 Intended use

The BTL magnetostrictive linear position sensor, together with a machine controller (e.g. PLC), comprises a position measuring system. It is intended to be installed into a machine or system and used in the industrial sector. Flawless function in accordance with the specifications in the technical data is ensured only when using original Balluff accessories. Use of any other components will void the warranty.

Opening the BTL or non-approved use are not permitted and will result in the loss of warranty and liability claims against the manufacturer.

#### 2.2 Reasonably foreseeable misuse

The products are not intended for the following applications and areas and may not be used there:

- in safety related applications where personal safety depends on functioning of the device
- in explosion hazard areas
- in the food sector

#### 2.3 General safety notes

**Installation** and **startup** may only be performed by qualified personnel with basic electrical knowledge.

**Qualified personnel** are persons whose technical training, knowledge and experience as well as knowledge of the relevant regulations allows them to assess the work assigned to them, recognize possible hazards and take appropriate safety measures.

The **operator** is responsible for ensuring that local safety regulations are observed.

In particular, the operator must take steps to ensure that a defect in the BTL will not result in hazards to persons or equipment.

If defects and unresolvable faults occur in the BTL, take it out of service and secure against unauthorized use.


#### 2.4 Explanation of the warnings

Always observe the warnings in these instructions and the measures described to avoid hazards.

The warnings used here contain various signal words and are structured as follows:

SIGNAL WORD
<b>Hazard type and source</b> Consequences if not complied with ► Measures to avoid hazards

The individual signal words mean:

<b>NOTICE!</b> Identifies a hazard that could <b>damage or destroy the product.</b>
 <b>DANGER</b> The general warning symbol in conjunction with the signal word DANGER identifies a hazard which, if not avoided, will certainly result <b>in death or serious injury.</b>

#### 2.5 Disposal

- Observe the national regulations for disposal.

# BTL7-A/C/E/G501-M \_ \_ \_ \_ -P-S32/S115/KA \_ \_ Magnetostrictive Linear Position Sensor – Profile Style

## 3

### Construction and function

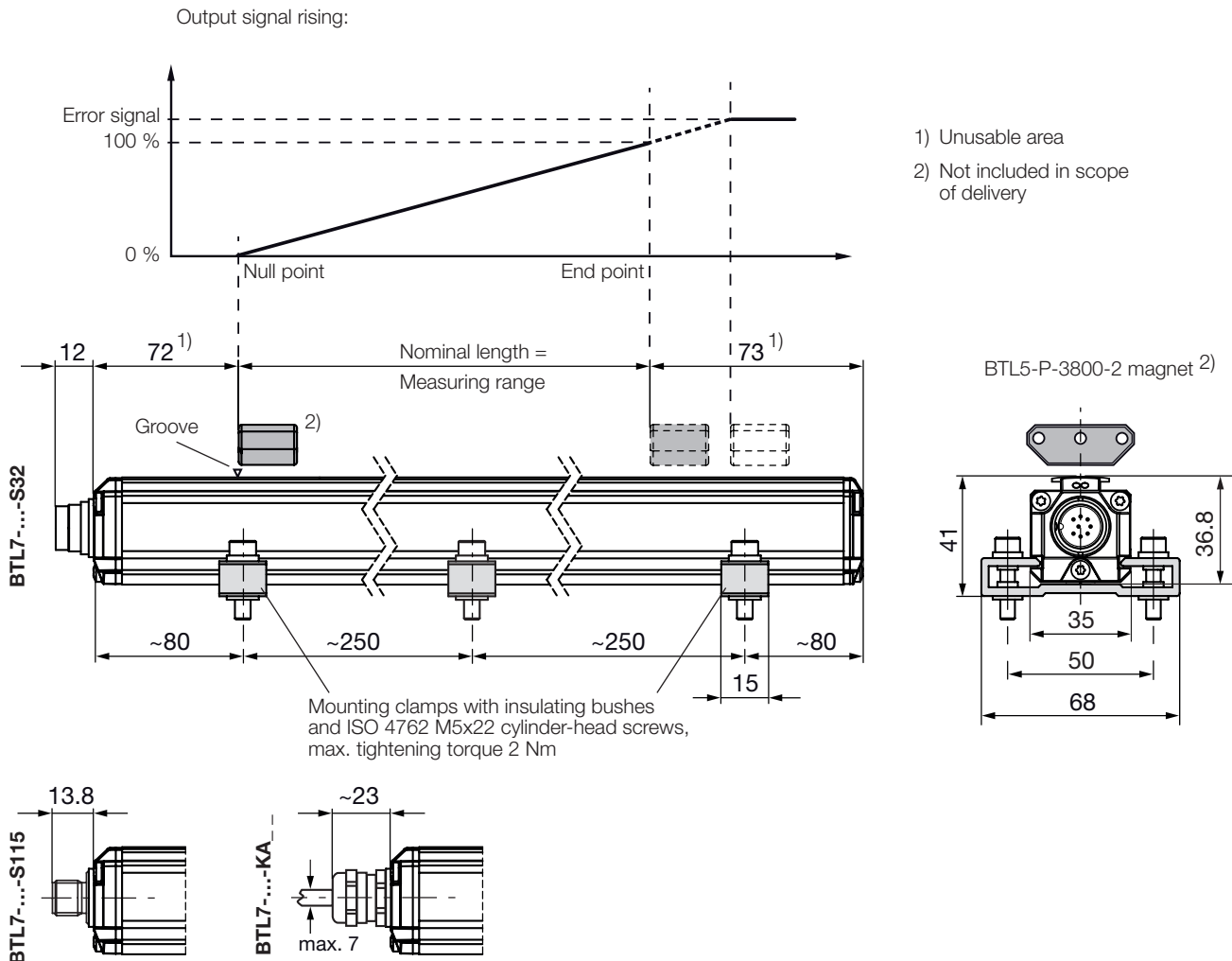


Fig. 3-1: BTL7-..., construction

### 3.1 Construction

**Electrical connection:** The electrical connection is made via a cable or a connector (see Type code on page 22).

**Housing:** Aluminum housing containing the waveguide and processing electronics.

**Magnet:** Defines the position to be measured on the waveguide. Magnets are available in various models and must be ordered separately (see Accessories on page 18).

**Nominal length:** To optimally adapt the BTL to the application, nominal lengths from 50 mm to 7620 mm are available.

**3**

**Construction and function (continued)**

**3.2 Function**

The BTL contains the waveguide which is protected by an aluminum housing. A magnet is moved along the waveguide. This magnet is connected to the system part whose position is to be determined.

The magnet defines the position to be measured on the waveguide.

An internally generated INIT pulse interacts with the magnetic field of the magnet to generate a torsional wave in the waveguide which propagates at ultrasonic velocity.

The component of the torsional wave which arrives at the end of the waveguide is absorbed in the damping zone to prevent reflection. The component of the torsional wave which arrives at the beginning of the waveguide is converted by a coil into an electrical signal. The travel time of the wave is used to calculate the position. Depending on the version, this information is made available as a voltage or current with rising or falling gradient.

The following functions can be selected for the output values:

- Position
- Speed (with or without leading sign)
- Differential position

Two outputs that can be independently assigned are available. Two magnets can be used.

**i** The entire range of functionality can only be configured with the PC software BTL7 Configuration Tool. To do this, the USB communication box must be connected (see Accessories on page 18).

**3.3 LED display**

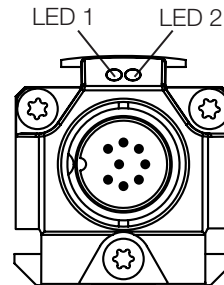


Fig. 3-2: BTL7 LED displays

**i** In normal operation, the LEDs indicate the operating states of the BTL. LED 1 is assigned to output 1 and LED 2 is assigned to output 2.

LED 1/LED 2	Operating state
Green	<b>Normal function</b> Magnet is within the limits.
Red	<b>Error</b> No magnet or magnet outside the limits.
Flashing green	<b>Programming mode</b>



**4**

**Installation and connection**

**4.1 Installing the BTL**

**NOTICE!**

**Improper installation**

Improper installation can compromise the function of the BTL and result in damage.

- ▶ For this reason, ensure that no strong electrical or magnetic fields are present in the immediate vicinity of the BTL.
- ▶ The recommended spacing for the installation must be strictly observed.

Any orientation is permitted. Mount the BTL on a level surface of the machine using the provided mounting clamps and cylinder-head screws. A sufficient number of mounting clamps is supplied.

**i** In order to avoid the development of resonant frequencies from vibration loads, we recommend arranging the mounting clamps at irregular intervals.

The BTL is electrically isolated from the machine with the supplied insulating bushes (see Fig. 3-1).

1. Guide the BTL into the mounting clamps.
2. Attach BTL to the base using mounting screws (tighten screws in the clamps with a max. 2 Nm).
3. Insert magnet (accessories).

**i** The BTL in profile housing is suitable both for floating, i.e. non-contacting magnets (see Fig. 4-4 to Fig. 4-8) and for captive magnets (see Fig. 4-1 to Fig. 4-3).

**4.2 Captive magnets**

The following must be observed when installing the magnet:

- Avoid lateral forces.
- Connect the magnet to the machine member with a joint rod (see Accessories on page 18).

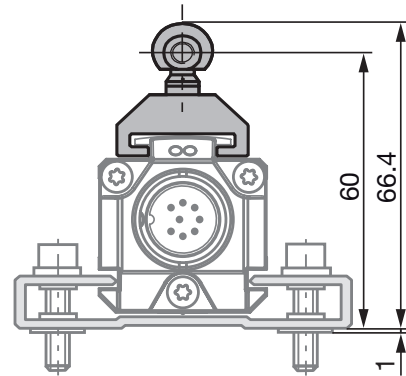


Fig. 4-1: Dimensions and distances with BTL5-F-2814-1S magnet

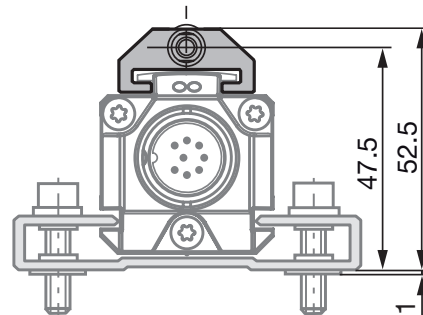


Fig. 4-2: Dimensions and distances with BTL5-T-2814-1S magnet

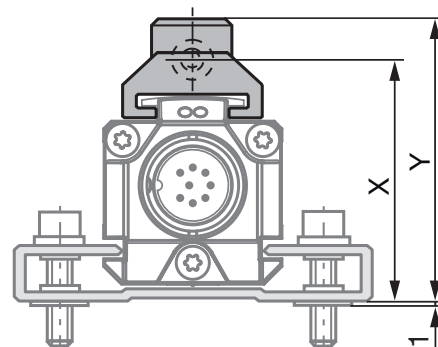


Fig. 4-3: Dimensions and distances with BTL5-M/N-2814-1S magnet

	<b>BTL5-M-2814-1S</b>	<b>BTL5-N-2814-1S</b>
Distance X	48.5 mm	57 mm
Distance Y	51 mm	59.5 mm

Tab. 4-1: Distances with BTL5-M/N-2814-1S magnet

**4 Installation and connection (continued)**

**4.3 Floating magnets**

The following must be observed when installing the magnet:

- To ensure the accuracy of the position measuring system, the magnet is attached to the moving member of the machine using non-magnetizable screws (stainless steel, brass, aluminum).
- The moving member must guide the magnet on a track parallel to the BTL.
- Ensure that the distance A between parts made of magnetizable material and the magnet is at least 10 mm (see Fig. 4-4 to Fig. 4-8).
- Maintain the following values for distance B between the magnet and BTL and for center offset C (see Fig. 4-4 to Fig. 4-8):

Type of magnet	Distance B <sup>1)</sup>	Offset C
BTL5-P-3800-2	0.1...4 mm	± 2 mm
BTL5-P-5500-2	5...15 mm	± 15 mm
BTL5-P-4500-1	0.1...2 mm	± 2 mm
BTL6-A-3800-2	4...8 mm <sup>2)</sup>	± 5 mm
BTL6-A-3801-2	4...8 mm <sup>2)</sup>	± 5 mm

<sup>2)</sup> The selected distance must stay constant over the entire measuring length.

<sup>1)</sup> For optimum measurement results, a distance B of 6 to 8 mm is recommended.

Tab. 4-2: Distance and offset for floating magnets

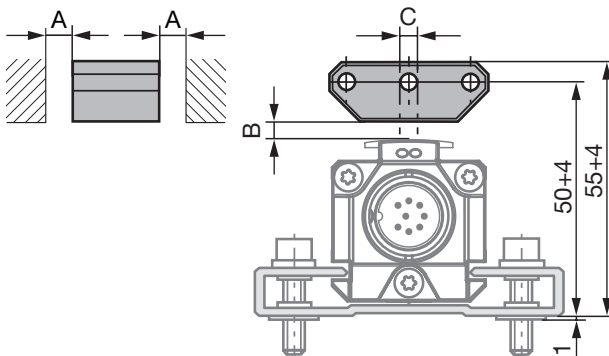


Fig. 4-4: Dimensions and distances with BTL5-P-3800-2 magnet

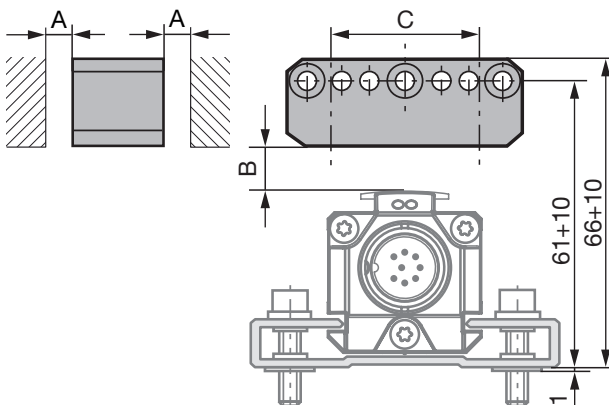


Fig. 4-5: Dimensions and distances with BTL5-P-5500-2 magnet

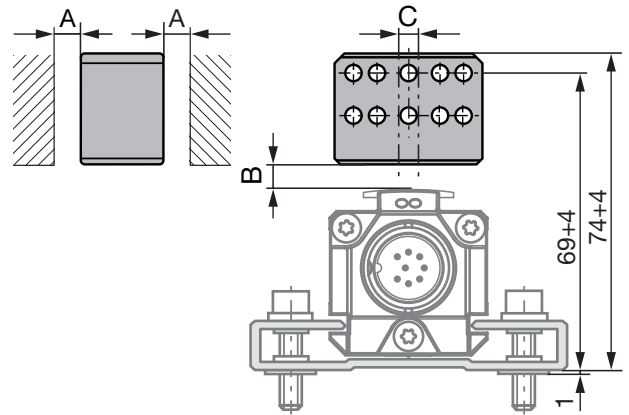


Fig. 4-6: Dimensions and distances with BTL6-A-3800-2 magnet

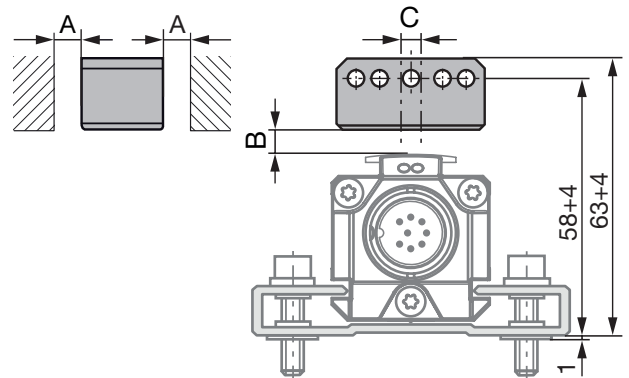


Fig. 4-7: Dimensions and distances with BTL6-A-3801-2 magnet

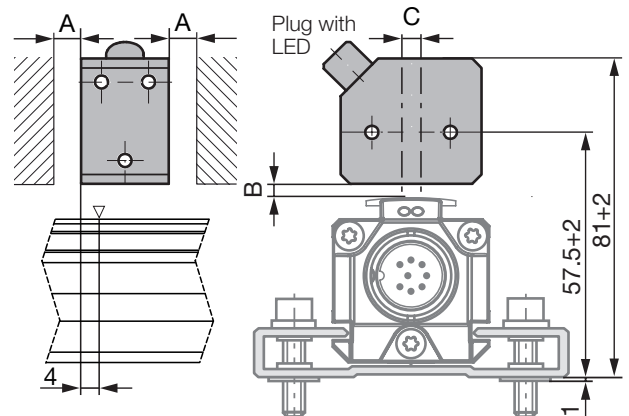


Fig. 4-8: Dimensions and distances with BTL5-P-4500-1 electromagnet (24 V/100 mA)

**i** The measuring range is offset by 4 mm towards the BTL plug (see Fig. 4-8).

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## 4

### Installation and connection (continued)

#### 4.4 Electrical connection

Depending on the model, the electrical connection is made using a cable or a connector.

The connection or pin assignments for the respective version can be found in Tables 4-3 and 4-4.



Note the information on shielding and cable routing on page 12.

##### 4.4.1 Connector S32/cable connection KA \_ \_

S32 Pin	KA Wire color	BTL7-... interface			
		-A501	-G501	-C501	-E501
1	YE yellow	Not used <sup>1)</sup>		output 1 0...20 mA <sup>2)</sup>   4...20 mA <sup>2)</sup>	
2	GY gray	0 V			
3	PK pink	output 2 10...0 V <sup>2)</sup>   10...-10 V <sup>2)</sup>   20...0 mA <sup>2)</sup>   20...4 mA <sup>2)</sup>			
4	RD red	La (communication line)			
5	GN green	output 1 0...10 V <sup>2)</sup>   -10...10 V <sup>2)</sup>		Not used <sup>1)</sup>	
6	BU blue	GND <sup>3)</sup>			
7	BN brown	10...30 V			
8	WH white	Lb (communication line)			

Tab. 4-3: Connection assignment BTL7-...-S32/KA \_ \_

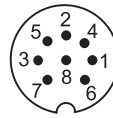


Fig. 4-9: Pin assignment of S32 connector (view of connector pins of BTL)

##### 4.4.2 Connector S115

S115 Pin	BTL7-... interface			
	-A501	-G501	-C501	-E501
1	0 V (pin 3)			
2	0 V (pin 5)			
3	output 2 10...0 V <sup>2)</sup>   10...-10 V <sup>2)</sup>   20...0 mA <sup>2)</sup>   20...4 mA <sup>2)</sup>			
4	La (communication line)			
5	output 1 0...10 V <sup>2)</sup>   -10...10 V <sup>2)</sup>		0...20 mA <sup>2)</sup>   4...20 mA <sup>2)</sup>	
6	GND <sup>3)</sup>			
7	10...30 V			
8	Lb (communication line)			

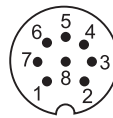


Fig. 4-10: Pin assignment of S115 connector (view of connector pins of BTL)

Tab. 4-4: Connection assignment BTL7-...-S115

<sup>1)</sup> Unassigned leads can be connected to the GND on the controller side but not to the shield.

<sup>2)</sup> Factory setting, can be freely configured with the PC software.

<sup>3)</sup> Reference potential for supply voltage and EMC-GND.

## 4

### Installation and connection (continued)

#### 4.5 Shielding and cable routing



##### **Defined ground!**

The BTL and the control cabinet must be at the same ground potential.

##### **Shielding**

To ensure electromagnetic compatibility (EMC), observe the following:

- Connect the BTL and controller using a shielded cable.  
Shield: Braided copper shield with minimum 85% coverage.
- Connector version: Shield is internally connected to connector housing.
- Cable version: On the BTL side the cable shielding is connected to the housing.

##### **Magnetic fields**

The position measuring system is a magnetostrictive system. Ensure that there is sufficient distance between the BTL and strong, external magnetic fields.

##### **Cable routing**

Kabel zwischen BTL, Steuerung und Stromversorgung nicht in der Nähe von Starkstromleitungen verlegen (induktive Einstreuungen möglich).  
The cable must be routed tension-free.

##### **Bending radius for fixed cable**

The bending radius for a fixed cable must be at least five times the cable diameter.

##### **Cable length**

BTL7-A/G	Max. 30 m <sup>1)</sup>
BTL7-C/E	Max. 100 m <sup>1)</sup>

<sup>1)</sup> Prerequisite: Construction, shielding and routing preclude the effect of any external noise fields.

Tab. 4-5: Cable lengths BTL7

##### **Noise elimination**

To avoid equipotential bonding - a current flow - through the cable shield, please note the following:

- Use insulating bushes
- Put the control cabinet and the system in which the BTL is located to the same ground potential.

## 5

### Startup

#### 5.1 Starting up the system

##### **DANGER**

###### **Uncontrolled system movement**

When starting up, if the position measuring system is part of a closed loop system whose parameters have not yet been set, the system may perform uncontrolled movements. This could result in personal injury and equipment damage.

- ▶ Persons must keep away from the system's hazardous zones.
- ▶ Startup must be performed only by trained technical personnel.
- ▶ Observe the safety instructions of the equipment or system manufacturer.

1. Check connections for tightness and correct polarity. Replace damaged connections.
2. Turn on the system.
3. Check measured values and adjustable parameters and readjust the BTL if necessary.



Check for the correct values at the null point and end point, especially after replacing the BTL or after repair by the manufacturer.

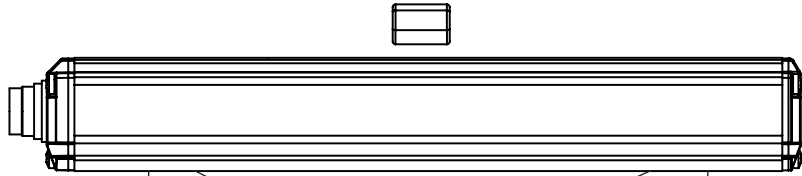
#### 5.2 Operating notes

- Regularly check function of the BTL and all associated components.
- Take the BTL out of operation whenever there is a malfunction.
- Secure the system against unauthorized use.

**6**

**Configuration with the BTL7 Configuration Tool**

**6.1 Value table for factory setting**



Output gradient	BTL	Unit	Min. value	Null value	End value	Max. value	Error value
Rising (output 1)	BTL7-A...	V	-0,5	0	+10,0	+10,5	+10,5
	BTL7-G...	V	-10,5	-10,0	+10,0	+10,5	+10,5
	BTL7-C...	mA	0	0	20,0	20,4	20,4
	BTL7-E...	mA	3,6	4,0	20,0	20,4	3,6
Falling (output 2)	BTL7-A...	V	+10,5	+10,0	0	-0,5	-0,5
	BTL7-G...	V	+10,5	+10,0	-10,0	-10,5	-10,5
	BTL7-C...	mA	20,4	20,0	0	0	20,4
	BTL7-E...	mA	20,4	20,0	4,0	3,6	3,6

Tab. 6-1: Value table for factory settings

**NOTICE!**

**Interference in function**

Configuration with the BTL7 Configuration Tool while the system is running may result in malfunctions.

- Stop the system before configuration.

**6.2 BTL7 Configuration Tool**

The BTL can be quickly and easily configured on the PC using the PC software BTL7 Configuration Tool.

The most important features include:

- Online display of the current position of the magnet
- Graphical support for setting the functions and curves
- Display of information on the connected BTL
- Selectable number formats and units for display
- Resetting to factory settings is possible
- Demo mode without a connected BTL



The PC software and associated manual can be found in the Internet under [www.balluff.com](http://www.balluff.com).

**6.3 Connecting the USB communication box**

For a BTL with connector the communication box must be inserted between the BTL and the controller. The communication box is connected to the PC via a USB cable.

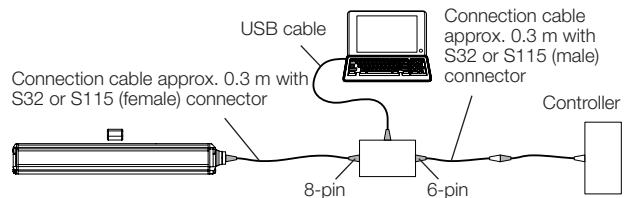


Fig. 6-1: Connecting the communication box with a connector

For a BTL with cable connection the communication lines La, Lb and GND are connected to the USB communication box.

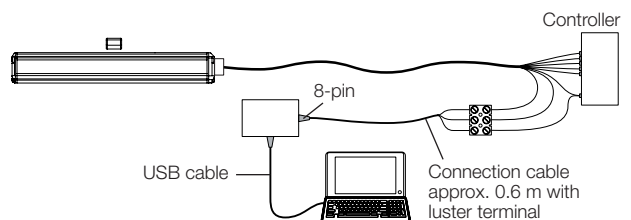


Fig. 6-2: Connecting the communication box with a cable connection



When reading or writing data via the Configuration Tool, both LEDs flash green.

## 6

### Configuration with the BTL7 Configuration Tool (continued)

#### 6.4 Configuration options

##### Prerequisites

- USB communication box connected to the BTL and PC.
- Software correctly installed.
- BTL connected to the power supply.
- Magnet on BTL.

##### Magnets and outputs

- Number of magnets can be selected:
  - 1 magnet (factory setting)
  - 2 magnets
  - Flexible Magnet Mode (FMM)
- Two outputs can be assigned independently

The number of magnets can be fixed or flexible:

- **Fixed setting**  
If one magnet is set, a second magnet will be ignored.  
If two magnets are set, there must be two magnets on the BTL. If there is only one, the error value is issued on all outputs. A third magnet will be ignored.
- **Flexible Magnet Mode (FMM)**  
In Flexible Magnet Mode, the number of magnets is flexible, allowing them to be changed during operation.  
If there are two magnets on the BTL, the respective output function is issued via the outputs.  
If there is only one magnet on the BTL, its output function is always issued via output 1. Since there is no second magnet, output 2 issues the error value.  
Changing the number of magnets during operation can cause the assignment of outputs and their values to be swapped.

##### Output functions

- **Position:** position in the measuring range.
- **Speed:** speed of the magnet. The sign indicates the direction of movement. Movement from the null point to the end point is output with a positive sign. Movement from the end point to the null point is output with a negative sign. Max. detectable speed range of –10 to +10 m/s.
- **Speed (no sign):** speed of the magnet. The direction of movement cannot be read. Max. detectable speed range of 0 to 10 m/s.
- **Differential position:** Distance between two magnets. Selection is only possible if two magnets have been selected.

##### Freely configurable characteristic curve

- Null and end points can be read (teach-in) or specified with the mouse.
- The distance between the null point and end point must be at least 4 mm.
- The characteristic curve can be inverted or copied from the other output.
- The limits can be adjusted to the measuring range.
- The error value can be set in accordance with the limits.

##### Boundary conditions for two magnets

- Two magnets can only be selected from a nominal length  $\geq 90$  mm.
- The distance between two magnets must be  $\geq 65$  mm.

### DANGER

#### Uncontrolled system movement

When starting up, if the position measuring system is part of a closed loop system whose parameters have not yet been set, the system may perform uncontrolled movements. This could result in personal injury and equipment damage.

- ▶ The system must be taken out of operation before configuration.
- ▶ The BTLs may only be connected to the communication box for configuration.
- ▶ The communication box must be removed after configuration.

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## 7

### Technical data

#### 7.1 Accuracy

The specifications are typical values for BTL7-A/C/E/G... at 24 V DC and room temperature, with a nominal length of 500 mm in conjunction with the BTL5-P-3800-2, BTL5-P-4500-1, BTL5-P-5500-2<sup>1)</sup>, BTL6-A-3800-2<sup>1)</sup>, BTL6-A-3801-2<sup>1)</sup>, BTL5-F-2814-1S, BTL5-T-2814-1S, BTL5-M-2814-1S or BTL5-N-2814-1S magnet. The BTL is fully operational immediately, with full accuracy after warm-up.

**i** For special versions, other technical data may apply. Special versions are indicated by the suffix -SA on the part label.

Repeat accuracy	
Voltage, typical	±10 µm
Current, typical	±5 µm
Sampling rate	
With one magnet:	
Dependent on the nominal length	250 µs <sup>2)</sup> ...5.7 ms
At nominal length = 500 mm	500 µs
With two magnets:	
Dependent on the nominal length	375 µs <sup>2)</sup> ...8.55 ms
At nominal length = 500 mm	750 µs
Non-linearity with a constant distance between the magnet and profile:	
Nominal length ≤ 500 mm	±50 µm
Nominal length > 500 to ≤ 5500 mm	±0.01 % FS
Nominal length > 5500 mm	±0.02 % FS
Temperature coefficient <sup>3)</sup>	≤ 30 ppm/K
Min. detectable speed	3 mm/s
Max. detectable speed	10 m/s

#### 7.2 Ambient conditions<sup>4)</sup>

Ambient temperature	-40...+85°C
Ambient temperature for UL (only BTL7...-KA...)	≤ +80°C
Storage temperature	-40...+100°C
Relative humidity	≤ 90%, non-condensing
Shock rating	150 g/6 ms
Continuous shock per EN 60068-2-27 <sup>5)</sup> , <sup>6)</sup>	150 g/2 ms
Vibration per EN 60068-2-6 <sup>5)</sup> , <sup>6)</sup>	20 g, 10...2000 Hz
Degree of protection per IEC 60529	
Connector S32/S115 (when attached)	IP67
Cable	IP68 <sup>5)</sup>

#### 7.3 Supply voltage (external)

Voltage, stabilized <sup>7)</sup>	10...30 V DC
Ripple	≤ 0.5 V <sub>SS</sub>
Current draw (at 24 V DC)	
BTL7-A/G501-...	≤ 150 mA
BTL7-C/E501-...	≤ 180 mA
Inrush current	≤ 500 mA
Reverse polarity protection <sup>8)</sup>	Up to 36 V (supply to GND)
Overvoltage protection	Up to 36 V
Dielectric strength (GND to housing)	500 V AC

#### 7.4 Output

BTL7-A501	
Output voltage	
Max. configuration <sup>9)</sup>	-10...10 V / 10...-10 V
Factory setting	0...10 V / 10...0 V
Load current	≤ 5 mA
BTL7-G501	
Output voltage	
Max. configuration <sup>9)</sup>	-10...10 V / 10...-10 V
Factory setting	-10...10 V / 10...-10 V
Load current	≤ 5 mA
BTL7-C501	
Output current	
Max. configuration <sup>9)</sup>	0...20 mA / 20...0 mA
Factory setting	0...20 mA / 20...0 mA
Load resistance	≤ 500 Ω
BTL7-E501	
Output current	
Max. configuration <sup>9)</sup>	0...20 mA / 20...0 mA
Factory setting	4...20 mA / 20...4 mA
Load resistance	≤ 500 Ω
Short circuit resistance	Signal cable to 36 V Signal cable to GND

<sup>1)</sup> In the position range from 0 to 20 mm, the specified linearity limit may be exceeded by ±100 µm.

<sup>2)</sup> Only position output. For speed output, next-higher measured value rate (500 µs or 750 µs).

<sup>3)</sup> Nominal length 500 mm, magnet in the middle of the measuring range

<sup>4)</sup> For UL: Use in enclosed spaces and up to a height of 2000 m above sea level.

<sup>5)</sup> Individual specifications as per Balluff factory standard

<sup>6)</sup> Resonant frequencies excluded

<sup>7)</sup> For UL: The BTL must be externally connected via a limited-energy circuit as defined in UL 61010-1, a low-power source as defined in UL 60950-1, or a class 2 power supply as defined in UL 1310 or UL 1585.

<sup>8)</sup> A prerequisite is that no current can flow between GND and 0 V in the event of polarity reversal.

<sup>9)</sup> Only with PC software (BTL7 Configuration Tool)



## 7

### Technical data (continued)

#### 7.5 Communication lines La, Lb

Short circuit resistance            Signal cable to GND

#### 7.6 Dimensions, weights

Housing height                    36.8 mm  
Nominal length                    50...7620 mm  
Weight (depends on length)        Approx. 1.4 kg/m  
Housing material                    Aluminum

#### **BTL7-...-KA \_ \_**

Cable material                    PUR  
    cULus 20549  
    80 °C, 300 V,  
    internal wiring  
Cable temperature                -40°C...+90°C  
Cable diameter                    Max. 7 mm  
Permissible bending radius  
  Fixed routing                    ≥ 35 mm  
  Moved                            ≥ 105 mm

# BTL7-A/C/E/G501-M \_\_\_\_\_ -P-S32/S115/KA \_\_\_\_\_ Magnetostrictive Linear Position Sensor – Profile Style

## 8

### Accessories

#### 8.1 Captive magnets

##### BTL5-M/N-2814-1S

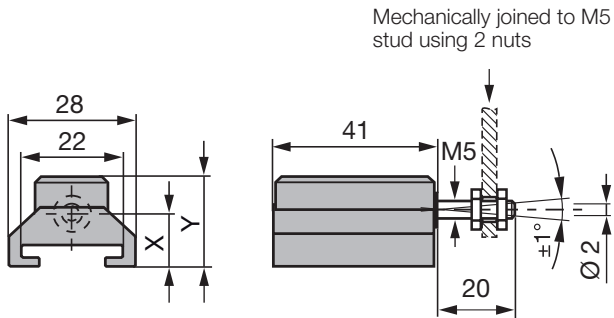


Fig. 8-1: Installation dimensions of BTL5-M/N-2814-1S magnet

	<b>BTL5-M-2814-1S</b>	<b>BTL5-N-2814-1S</b>
Distance X	12.5 mm	15 mm
Distance Y	21 mm	23.5 mm
Weight:	Approx. 32 g	Approx. 35 g
Housing:	Aluminum	Aluminum
Slide surface:	Plastic	Plastic

##### BTL5-F-2814-1S

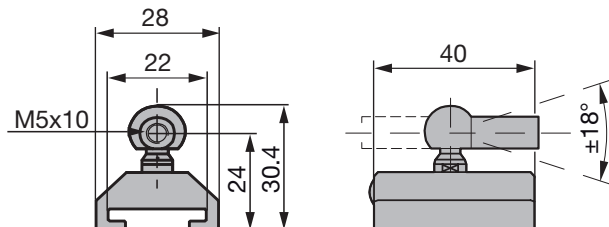


Fig. 8-2: Installation dimensions of BTL5-F-2814-1S magnet

Weight:	Approx. 28 g
Housing:	Aluminum
Slide surface:	Plastic

##### BTL5-T-2814-1S

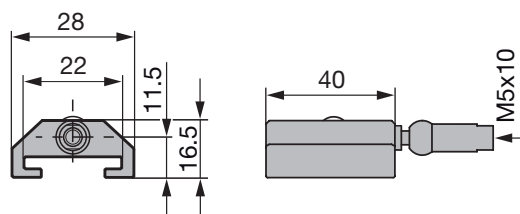


Fig. 8-3: Installation dimensions of BTL5-T-2814-1S magnet

Weight:	Approx. 28 g
Housing:	Aluminum
Slide surface:	Plastic

#### 8.2 BTL2-GS10- \_\_\_\_\_ -A joint rod

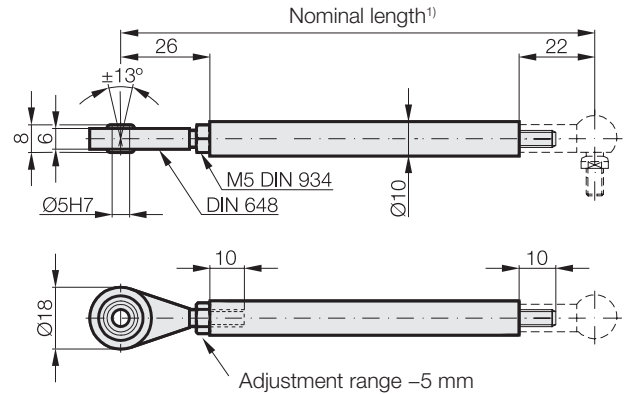


Fig. 8-4: BTL2-GS10- \_\_\_\_\_ -A joint rod

Weight: Approx. 150 g/m  
Material: Aluminum

<sup>1)</sup> State the nominal length when ordering

Example: BTL2-GS10-**0100**-A (nominal length = 100 mm)

**8.3 Floating magnets**

**BTL5-P-3800-2**

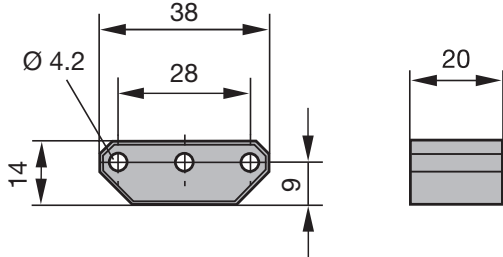


Fig. 8-5: Installation dimensions of BTL5-P-3800-2 magnet

Weight:                    Approx. 12 g  
 Housing:                 Plastic

**BTL5-P-5500-2**

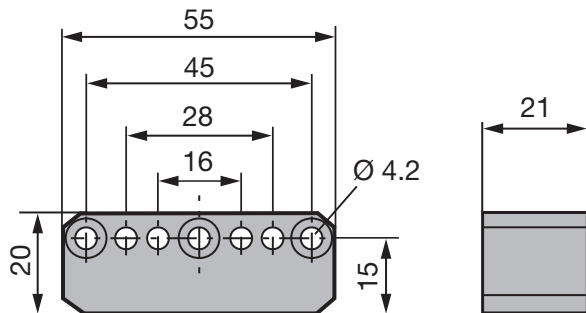


Fig. 8-6: Installation dimensions of BTL5-P-5500-2 magnet

Weight:                    Approx. 40 g  
 Housing:                 Plastic

**BTL6-A-3800-2**

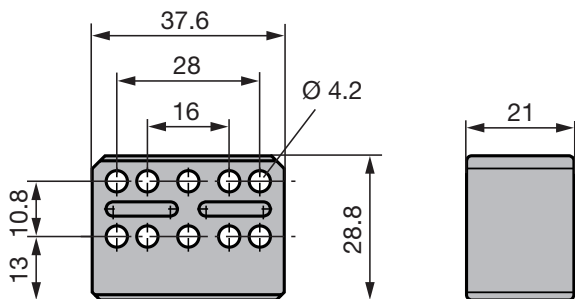


Fig. 8-7: Installation dimensions of BTL6-A-3800-2 magnet

Weight:                    Approx. 30 g  
 Housing:                 Plastic

**BTL6-A-3801-2**

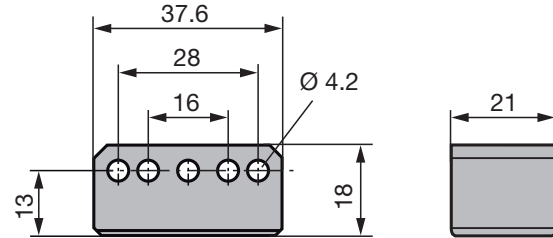


Fig. 8-8: Installation dimensions of BTL6-A-3801-2 magnet

Weight:                    Approx. 25 g  
 Housing:                 Plastic

**BTL5-P-4500-1**

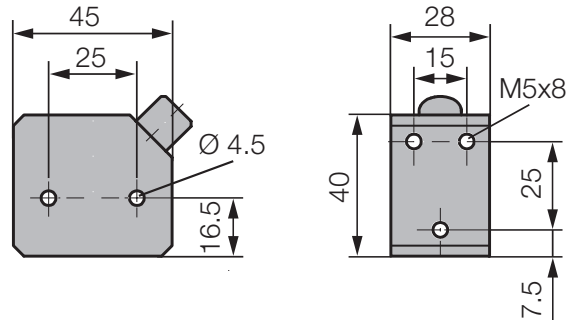


Fig. 8-9: Installation dimensions of BTL5-P-4500-1 magnet

Weight:                    Approx. 90 g  
 Housing:                 Plastic  
 Operating temperature:     -40...+60°C

Special advantage of the BTL5-P-4500-1 magnet:  
 Several magnets on the same BTL can be separately  
 switched on and off electrically (actuation  
 with a PLC signal).

**8.4 Connector type S32**

**8.4.1 Freely configurable**

**BKS-S 32M-00**

Order code: BCC00TT

Straight connector, M16 per IEC 130-9, 8-pin

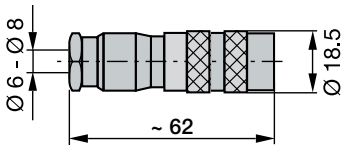


Fig. 8-10: Connector BKS-S32 M-00

**BKS-S 33M-00**

Order code: BCC00UP

Angled connector, M16 per IEC 130-9, 8-pin

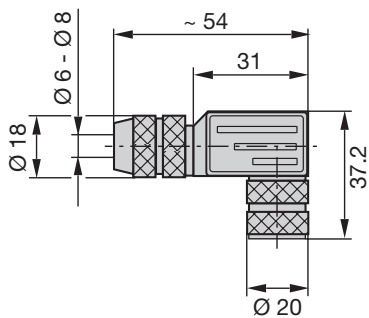


Fig. 8-11: Connector BKS S 33M-00

**8.4.2 Preassembled**

Straight connector, molded, M16, 8-pin

Various cable lengths can be ordered, e.g.

**BCC S518-0000-1Y-133-PS0825-050**

(Order code: BCC0L21): Cable length 5 m

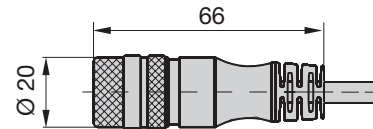


Fig. 8-12: Connector type S32 (preassembled)

Angled connector, molded, M16, 8-pin

Various cable lengths can be ordered, e.g.

**BCC S528-0000-1Y-133-PS0825-050**

(Ordering code: BCC0L2A): Cable length 5 m

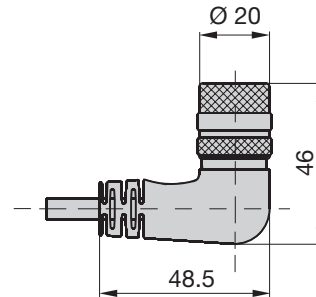


Fig. 8-13: Connector type S32 (preassembled)

Pin	Color
1	YE yellow
2	GY gray
3	PK pink
4	RD red
5	GN green
6	BU blue
7	BN brown
8	WH white

Tab. 8-1: S32 (preassembled) pin assignment

# BTL7-A/C/E/G501-M \_ \_ \_ \_ -P-S32/S115/KA \_ \_ Magnetostrictive Linear Position Sensor – Profile Style

## 8

### Accessories (continued)

#### 8.5 Connector type S115, preassembled

##### BKS-S115-PU- \_ \_

Straight connector, molded-on cable, M12, 8-pin  
Various cable lengths can be ordered, e.g.  
BKS-S115-PU-05 (Order code: BCC00YF): Cable length 5 m

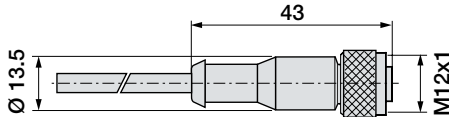


Fig. 8-14: Connector BKS-S115-PU- \_ \_

##### BKS-S116-PU- \_ \_

Angled connector, molded-on cable, M12, 8-pin  
Various cable lengths can be ordered, e.g.  
BKS-S116-PU-05 (Order code: BCC00YW): Cable length 5 m

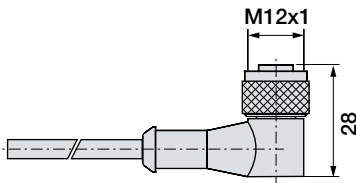


Fig. 8-15: Connector BKS-S116-PU- \_ \_

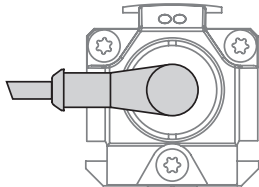


Fig. 8-16: Connector BKS-S116-PU- \_ \_ outlet

Pin	Color
1	YE yellow
2	GY gray
3	PK pink
4	RD red
5	GN green
6	BU blue
7	BN brown
8	WH white

Tab. 8-2: BKS-S115/S116-PU- \_ \_ pin assignment

#### 8.6 USB communication box

##### BTL7-A-CB01-USB-S32

For BTL7-A/C/E/G501-... with S32 connector.  
Scope of delivery: USB communication box, USB cable,  
2 adapter cables each approx. 0.3 m, condensed guide.

##### BTL7-A-CB01-USB-S115

For BTL7-A/C/E/G501-... with S115 connector.  
Scope of delivery: USB communication box, USB cable,  
2 adapter cables each approx. 0.3 m, condensed guide.

##### BTL7-A-CB01-USB-KA

For BTL7-A/C/E/G501-... with cable connection  
Scope of delivery: USB communication box, USB cable,  
1 adapter cable approx. 0.6 m, condensed guide.

**BTL7-A/C/E/G501-M \_ \_ \_ \_ -P-S32/S115/KA \_ \_**  
**Magnetostrictive Linear Position Sensor – Profile Style**

9

Type code

**BTL7 - A 5 01 - M0500 - P - S32**

Interface: \_\_\_\_\_

- A = Analog interface, voltage output 0...10 V / 10...0 V (factory setting)
- G = Analog interface, voltage output 10...10 V / 10...-10 V (factory setting)
- C = Analog interface, current output 0...20 mA / 20...0 mA (factory setting)
- E = Analog interface, current output 4...20 mA / 20...4 mA (factory setting)

Supply voltage: \_\_\_\_\_

5 = 10...30 V DC

Output gradient: \_\_\_\_\_

01 = 2 outputs, configurable

Nominal stroke (4-digit): \_\_\_\_\_

M0500 = Metric specification in mm, nominal length 500 mm (M0050...M7620)

Construction: \_\_\_\_\_

P = profile housing

Electrical connection: \_\_\_\_\_

- S32 = 8-pin, M16 plug per IEC 130-9
- S115 = 8-pin, M12 plug
- KA05 = Cable, 5 m (PUR)

## 10 Appendix

### 10.1 Converting units of length

1 mm = inch

mm	inches
1	0.03937008
2	0.07874016
3	0.11811024
4	0.15748031
5	0.19685039
6	0.23622047
7	0.27559055
8	0.31496063
9	0.35433071
10	0.393700787

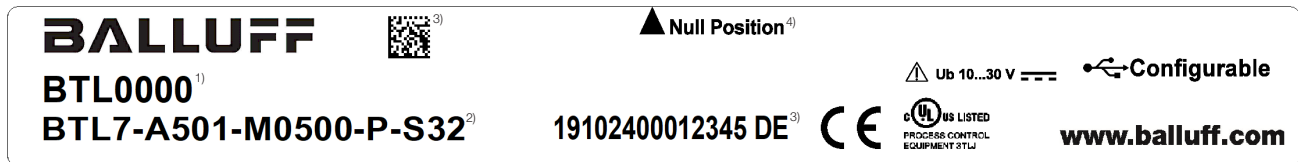
Tab. 10-1: Conversion table mm to inches

1 inch = 25.4 mm

inches	mm
1	25.4
2	50.8
3	76.2
4	101.6
5	127
6	152.4
7	177.8
8	203.2
9	228.6
10	254

Tab. 10-2: Conversion table inches to mm

### 10.2 Part label



- <sup>1)</sup> Order code
- <sup>2)</sup> Type
- <sup>3)</sup> Serial number
- <sup>4)</sup> Null mark

Fig. 10-1: BTL7 part label (example)