

BALLUFF

sensors worldwide

BTL6-A/C/E/G500-M ----- -PF-S115

User's Guide



english

www.balluff.com

| | | |
|-----------|--|-----------|
| 1 | Notes to the user | 5 |
| 1.1 | Validity | 5 |
| 1.2 | Symbols and conventions | 5 |
| 1.3 | Scope of delivery | 5 |
| 1.4 | Approvals and markings | 5 |
| 2 | Safety | 6 |
| 2.1 | Intended use | 6 |
| 2.2 | General safety notes for the position measuring system | 6 |
| 2.3 | Explanation of the warnings | 6 |
| 2.4 | Disposal | 6 |
| 3 | Construction and function | 7 |
| 3.1 | Construction | 7 |
| 3.2 | Function | 7 |
| 3.3 | LED display | 7 |
| 4 | Installation and connection | 8 |
| 4.1 | Installing the transducer | 8 |
| 4.2 | Captive magnets | 8 |
| 4.3 | Floating magnets | 9 |
| 4.4 | Electrical connection | 10 |
| 4.5 | Shielding and cable routing | 10 |
| 5 | Startup | 11 |
| 5.1 | Starting up the system | 11 |
| 5.2 | Operating notes | 11 |
| 6 | Calibration procedure | 12 |
| 6.1 | Programming inputs | 12 |
| 6.2 | Calibration procedure notes | 12 |
| 6.3 | Calibration procedure overview | 13 |
| 6.3.1 | Teach-in | 13 |
| 6.3.2 | Inverting | 13 |
| 6.3.3 | Reset | 13 |
| 7 | Teach-in | 14 |
| 8 | Inverting | 15 |
| 9 | Resetting all values (reset) | 16 |
| 10 | Technical data | 17 |
| 10.1 | Accuracy | 17 |
| 10.2 | Ambient conditions | 17 |
| 10.3 | Supply voltage (external) | 17 |
| 10.4 | Output | 17 |
| 10.5 | Input | 17 |
| 10.6 | Dimensions, weights | 17 |

| | | |
|-----------|----------------------------|-----------|
| 11 | Accessories | 18 |
| 11.1 | Captive magnets | 18 |
| 11.2 | BTL2-GS10-____-A joint rod | 18 |
| 11.3 | Floating magnets | 18 |
| 11.4 | Connector | 19 |
| 11.5 | Adjusting box | 19 |
| 12 | Type code breakdown | 20 |
| 13 | Appendix | 21 |
| 13.1 | Converting units of length | 21 |
| 13.2 | Part label | 21 |

1 Notes to the user

1.1 Validity

This guide describes the construction, function and setup options for the BTL6 Micropulse Transducer with analog interface. It applies to types

BTL6-A/C/E/G500-M _____ -PF-S115 (see Ordering code on page 20).

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

1.2 Symbols and conventions

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

- Action instruction 1

Action sequences are numbered consecutively:

1. Action instruction 1
2. Action instruction 2

i Note, tip

This symbol indicates general notes.

a (b)

These symbols indicate the programming inputs.



Symbols of this type indicate the LED display.

1.3 Scope of delivery

- BTL6 transducer
- Mounting clamps with insulating sleeves and screws
- Condensed guide

i

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

1.4 Approvals and markings



UL approval
File no.
E227256

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 transducer 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 |

i

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

2

Safety

2.1 Intended use

The BTL6 Micropulse Transducer, together with a machine controller (e.g. PLC), comprises a position measuring system. It is intended to be installed into a machine or system. 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 transducer or non-approved use are not permitted and will result in the loss of warranty and liability claims against the manufacturer.

2.2 General safety notes for the position measuring system

Installation and **startup** may only be performed by trained specialists with basic electrical knowledge.

Qualified personnel are those who can recognize possible hazards and institute the appropriate safety measures due to their professional training, knowledge, and experience as well as their understanding of the relevant conditions pertaining to the work to be done.

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 position measuring system will not result in hazards to persons or equipment.

If defects and unresolvable faults occur in the transducer, it should be taken out of service and secured against unauthorized use.

2.3 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 |
|---|
| Hazard type and source Consequences if not complied with ► Measures to avoid hazards |

The individual signal words mean:

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

2.4 Disposal

- Observe the national regulations for disposal.

3

Construction and function

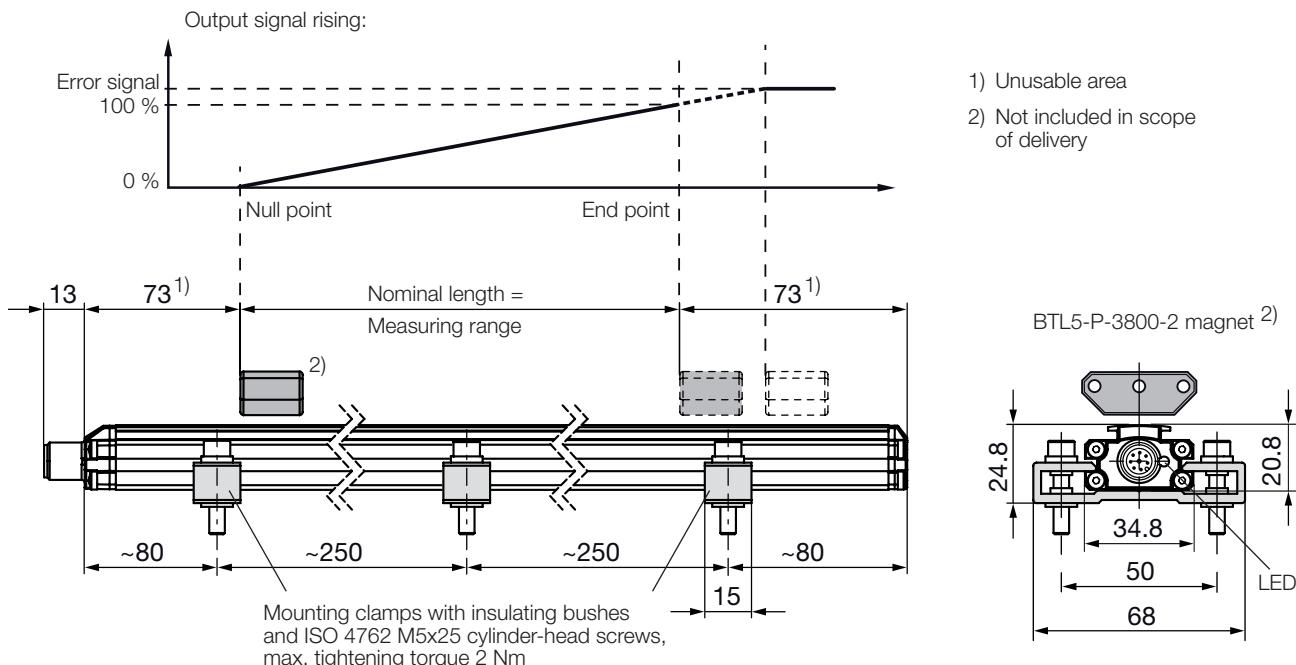


Fig. 3-1: BTL6... transducer, construction

3.1 Construction

Electrical connection: The electrical connection is made via a connector (see ordering code on page 20).

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 transducer to the application, the following nominal lengths are available:

| Nominal length | Grading |
|----------------|---------|
| 50...4572 mm | 5 mm |

3.2 Function

The BTL6 transducer 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 speed.

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 output with a rising gradient.

3.3 LED display



In normal operation the LED indicates the operating states of the transducer.

| LED | Operating state |
|-------|---|
| Green | Normal function Magnet is within the limits. |
| Red | Error No magnet or magnet outside the limits. |

4

Installation and connection

4.1 Installing the transducer

NOTICE!

Improper installation

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

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

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



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

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

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



The micropulse transducer in profile housing is suitable both for floating, i.e. non-contacting magnets (see Figures 4-3 to 4-7) and for captive magnets (see Figures 4-1 and 4-2).

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).

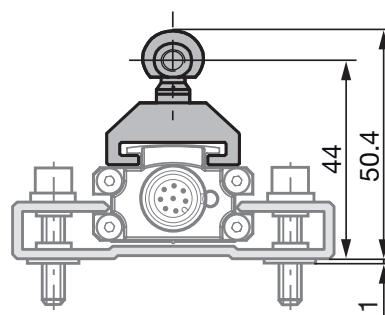


Fig. 4-1: Dimensions and distances with BTL5-F-2814-1S magnet

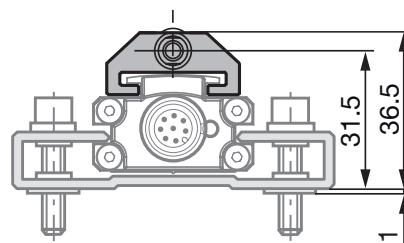


Fig. 4-2: Dimensions and distances with BTL5-T-2814-1S magnet

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 transducer.
- Ensure that the distance A between parts made of magnetizable material and the magnet is at least 10 mm (see Figures 4-3 to 4-7).
- Maintain the following values for distance B between the magnet and transducer and for center offset C (see Figures 4-3 to 4-7):

| Type of magnet | Distance B ¹⁾ | 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 ²⁾ | ± 5 mm |
| BTL6-A-3801-2 | 4...8 mm ²⁾ | ± 5 mm |

¹⁾ The selected distance must stay constant over the entire measuring length.

²⁾ For optimum measurement results, a distance B of 6 to 8 mm is recommended.

Tab. 4-1: Distance and offset for magnets (see Figures 4-3 to 4-7)

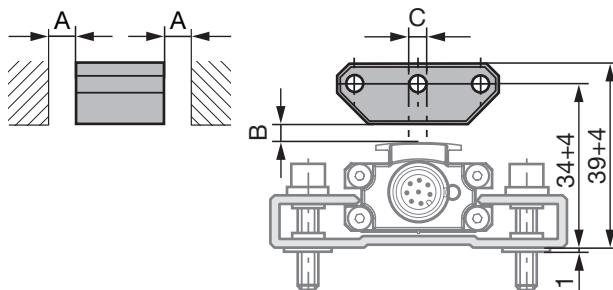


Fig. 4-3: Dimensions and distances with BTL5-P-3800-2 magnet

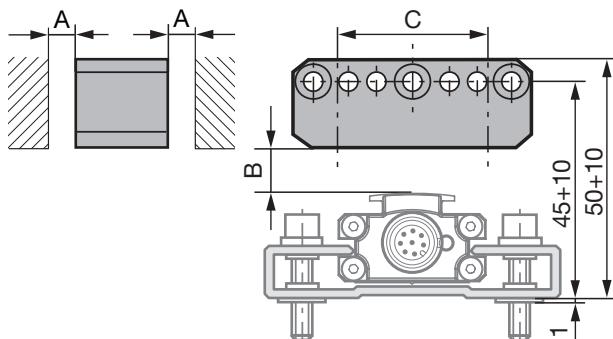


Fig. 4-4: Dimensions and distances with BTL5-P-5500-2 magnet

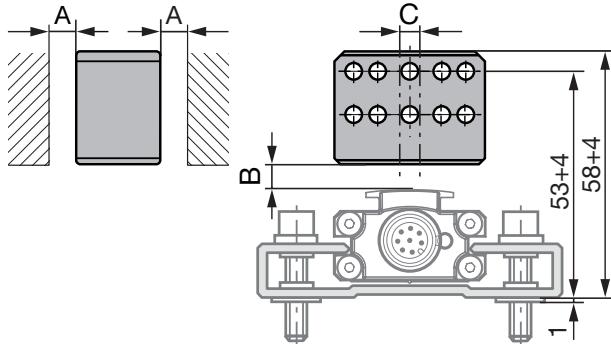


Fig. 4-5: Dimensions and distances with BTL6-A-3800-2 magnet

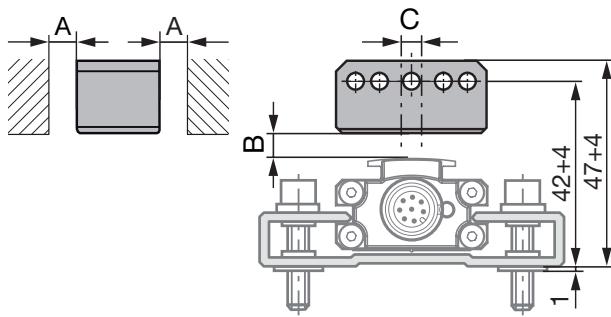


Fig. 4-6: Dimensions and distances with BTL6-A-3801-2 magnet

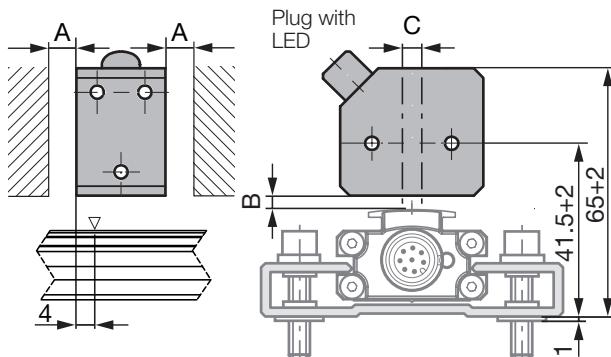


Fig. 4-7: Dimensions and distances with BTL5-P-4500-1 electromagnet (24 V/100 mA)



The measuring range is offset by 4 mm towards the transducer plug (see Figure 4-7).

4

Installation and connection (continued)

4.4 Electrical connection

| Pin | BKS-S115-... BKS-S116-... | -A500 | -G500 | -C500 | -E500 |
|-----|------------------------------|------------------------|------------|-------------|-----------|
| 1 | Yellow | Not used ¹⁾ | | | |
| 2 | Gray | 0 V | | | |
| 3 | Pink | Not used ¹⁾ | | | |
| 4 | Red | La (programming input) | | | |
| 5 | Green | 0...10 V | -10...10 V | 0.1...20 mA | 4...20 mA |
| 6 | Blue | GND ²⁾ | | | |
| 7 | Brown | 10...30 V | | | |
| 8 | White | Lb (programming input) | | | |

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

²⁾ Reference potential for supply voltage and EMC-GND.

Tab. 4-2: Pin assignment of S115 connector

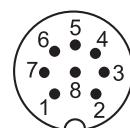


Fig. 4-8: Pin assignment of S115 connector (view of connector pins of transducer)

4.5 Shielding and cable routing



Defined ground!

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

Shielding

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

- Connect transducer and controller using a shielded cable.
Shield: Braided copper shield with minimum 85% coverage.
- Shield is internally connected to connector housing.

Magnetic fields

The position measuring system is a magnetostrictive system.

It is important to maintain adequate distance between the transducer and strong, external magnetic fields.

Cable routing

Do not route the cable between the transducer, controller, and power supply near high voltage cables (inductive stray noise is possible).

Inductive stray noise from AC harmonics (e.g. from phase angle controls) are especially critical and the cable shield offers very little protection against this.

Cable length

Cable length max. 20 m. Longer cables may be used if their construction, shielding and routing prevent noise interference.

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 BTL6 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 transducer, if necessary.



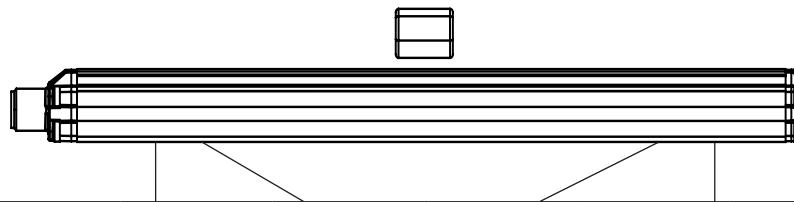
Check for the correct values at the null point and end point, especially after replacing the transducer or after repair by the manufacturer.

5.2 Operating notes

- Check the function of the transducer and all associated components on a regular basis.
- Take the position measuring system out of operation whenever there is a malfunction.
- Secure the system against unauthorized use.

6

Calibration procedure



| Output gradient | Transducer | Unit | Min. value | Null value | End value | Max. value | Error value |
|------------------------------|------------|------|------------|------------|-----------|------------|-------------|
| Rising (factory setting) | BTL6-A... | V | -0.5 | 0 | +10.0 | +10.5 | +10.5 |
| | BTL6-G... | V | -10.5 | -10.0 | +10.0 | +10.5 | +10.5 |
| | BTL6-C... | mA | 0.1 | 0.1 | 20.0 | 20.4 | 20.4 |
| | BTL6-E... | mA | 3.6 | 4.0 | 20.0 | 20.4 | 3.6 |
| Falling (after inverting) | BTL6-A... | V | +10.5 | +10.0 | 0 | -0.5 | +10.5 |
| | BTL6-G... | V | +10.5 | +10.0 | -10.0 | -10.5 | +10.5 |
| | BTL6-C... | mA | 20.4 | 20.0 | 0.1 | 0.1 | 20.4 |
| | BTL6-E... | mA | 20.4 | 20.0 | 4.0 | 3.6 | 3.6 |

Tab. 6-1: Value table for factory settings

6.1 Programming inputs

Programming inputs La and Lb must be used in order to make settings. A programming input at 10 to 30 V corresponds to activation (high active). The Balluff BTL7-A-CB02-S115 adjusting box can be used for this (see Accessories on page 19).



Automatic deactivation!

If no signals are transmitted via the programming inputs for approx. 10 min, programming mode is automatically ended.

Values for null and end point

- Any desired position of the magnet can be used as the null or end point. However, the null and end points may not be reversed.
- The absolute null and end points must lie within the minimum or maximum limits of what can be output (see value table).



The last set values are always saved, regardless of whether the setting was ended using the programming inputs or automatically after 10 min have expired.

6.2 Calibration procedure notes

Prerequisites

- Programming inputs are connected.
- The transducer is connected to the system controller.
- Voltage or current values from the transducer can be read (using a multimeter, the system control or the adjusting box).

Value table for teach-in and inverting



The following examples refer to transducers with 0 to 10 V or 4 to 20 mA output.

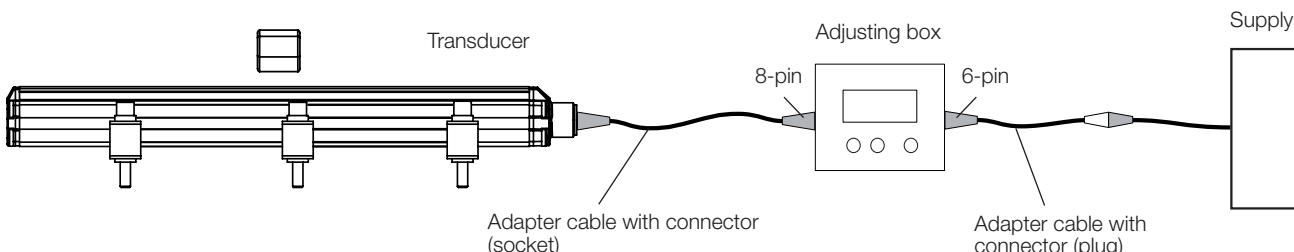


Fig. 6-1: Connecting the BTL7-A-CB02-S115 adjusting box

6

Calibration procedure (continued)

6.3 Calibration procedure overview

6.3.1 Teach-in

The factory set null point and end point is replaced by a new null point and end point. The null point and end point can be set separately, the output gradient changes.

i The detailed procedure for teach-in is described on page 14.

Steps

- Move magnet to the new null position.
- Read new null point by activating the programming inputs.
⇒ The current end point remains the same.

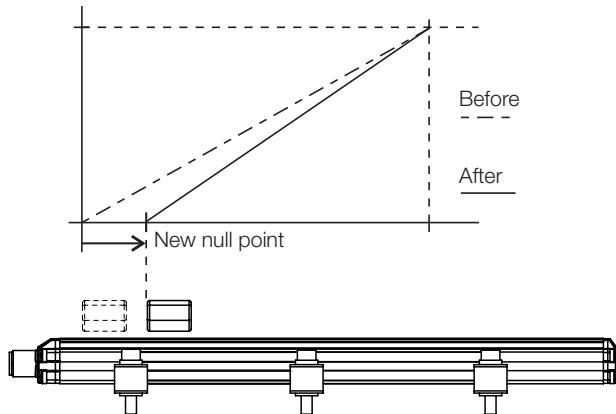


Fig. 6-2: Reading new null point

- Move magnet to the new end position.
- Read new end point by activating the programming inputs.
⇒ The current null point remains the same.

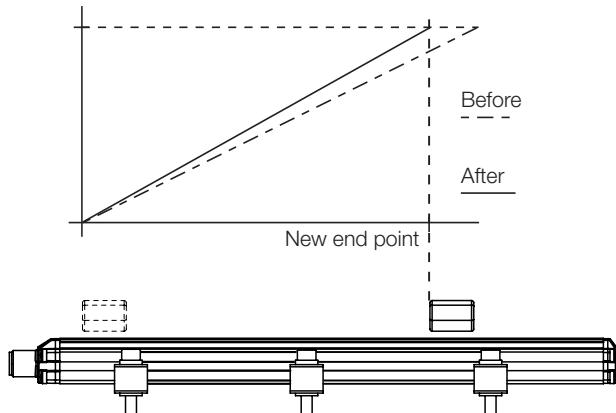


Fig. 6-3: Reading new end point

6.3.2 Inverting

The gradient can be inverted by activating the programming inputs.

During inverting, the output gradient is inverted. For example, a rising output gradient is changed to a falling gradient.

i The detailed procedure for inverting is described on page 15.

6.3.3 Reset

Restoring the transducer to its factory settings.

i The detailed procedure for the reset is described on page 16.

7

Teach-in

NOTICE!

Interference in function

Teach-in while the system is running may result in malfunctions.

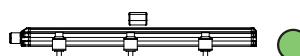
- ▶ Stop the system before performing teach-in.

LED display Displayed values (example)

LED At 0...10 V At 4...20 mA

Initial situation:

- Transducer with magnet within measuring range



5.39 V 9.15 mA

1. Activate teach-in

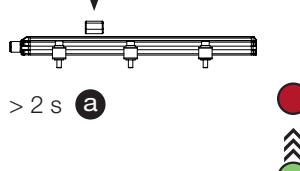
- ▶ Activate **a** for at least 4 s.



5.39 V 9.15 mA

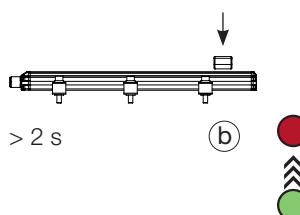
2. Set null point

- ▶ Bring magnet to the new null point.
- ▶ Activate **a** for at least 2 s.



1.04 V 4.82 mA

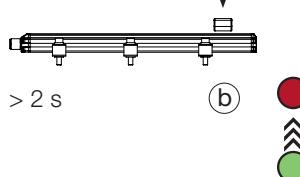
⇒ The new null point is set after activation.



0.00 V 4.00 mA

3. Set end point

- ▶ Bring magnet to the new end point.
- ▶ Activate **b** for at least 2 s.



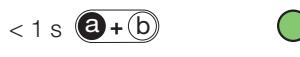
9.89 V 19.13 mA

⇒ The new end point is set after activation.

10.00 V 20.00 mA

4. End teach-in

- ▶ Briefly activate **a** and **b** simultaneously (< 1 s).



⇒ Current position value is displayed.



Any of the individual steps for settings can be selected. The teach-in process can be ended at any time.

LED legend: ● LED green

● LED flashing green

● LED red

8

Inverting

NOTICE!

Interference in function

Inverting while the system is running may result in malfunctions.

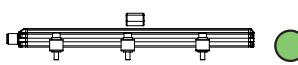
- Stop the system before inverting.

LED display Displayed values (example)

LED At 0...10 V At 4...20 mA

Initial situation:

- Transducer with magnet within measuring range



5.39 V 9.15 mA

1. Activate inverting

- Activate **(b)** for at least 4 s.

> 4 s **(b)**



5.39 V 9.15 mA

2. Invert gradient

- Activate **(a)** and **(b)** simultaneously for at least 4 s.

> 4 s **(a + b)**



After activation:

- ⇒ The output gradient is inverted.
- ⇒ Current position value is displayed.
- ⇒ Inverting is deactivated.

5.61 V 14.85 mA

3. Abort inverting

i Inverting can be aborted without any changes being saved after the *Activate inverting* step.

- Briefly activate **(a)** and **(b)** simultaneously (< 1 s).

< 1 s **(a + b)**



- ⇒ Current position value is displayed.

| | | |
|-------------|-----------|--------------------|
| LED legend: | LED green | LED flashing green |
| | LED red | |

9

Resetting all values (reset)

NOTICE!

Interference in function

Resetting the values while the system is running may result in malfunctions.

- Stop the system before performing the reset.

The reset function can be used to restore all the settings to the factory settings. For a reset the magnet may also be located outside the measuring range.

LED display

LED



1. Activate reset

- Simultaneously activate **a** and **b** for at least 4 s.

> 4 s



2. Reset

- Simultaneously activate **a** and **b** for at least 4 s.

> 4 s



After activation:

- ⇒ All values are reset.
- ⇒ Current position value is displayed.
- ⇒ Reset is deactivated.

3. Abort reset



Resetting can be aborted without any changes being saved after the *Activate reset* step.

- Briefly activate **a** and **b** simultaneously (< 1 s).

< 1 s



- ⇒ Current position value is displayed.

LED legend:

LED green



LED flashing green

LED red

10 | Technical data

10.1 Accuracy

The specifications are typical values for BTL6-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, BTL6-A-3800-2, BTL6-A-3801-2, BTL5-F-2814-1S or BTL5-T-2814-1S magnet.

The transducer 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.

| | |
|--|--|
| Resolution BTL6-A/G... | 350 µV $\geq 5 \mu\text{m}$ |
| BTL6-C/E... | 700 nA $\geq 5 \mu\text{m}$ |
| Repeat accuracy | $\leq \pm 0.002 \% \text{ FS}$ $\geq \pm 5 \mu\text{m}$ |
| Sampling rate (dependent on the nominal length) | Max. 2 kHz |
| Non-linearity at Nominal length $\leq 500 \text{ mm}$ | $\pm 200 \mu\text{m}$ |
| Nominal length $> 500 \text{ mm}$ | $\pm 0.04 \% \text{ FS}$ |
| Temperature coefficient ¹⁾ | $\leq 30 \text{ ppm/K}$ |
| Max. detectable speed | 10 m/s |

10.2 Ambient conditions²⁾

| | |
|--|-----------------------|
| Operating temperature | -25°C...+70°C |
| Storage temperature | -40°C...+100°C |
| Relative humidity | < 90%, non-condensing |
| Shock rating | 50 g/6 ms |
| Continuous shock per EN 60068-2-27 ³⁾ | 50 g/2 ms |
| Vibration per EN 60068-2-6 ³⁾ | 12 g, 10...2000 Hz |
| Degree of protection per IEC 60529 (when attached) | IP67 |

10.3 Supply voltage (external)

| | |
|---|-----------------------------------|
| Voltage, stabilized ⁴⁾ | 10...30 V DC |
| Ripple | $\leq 0.5 V_{PP}$ |
| Current draw (at 24 V DC) | $\leq 150 \text{ mA}$ |
| Inrush current | $\leq 3 \text{ A}/0.5 \text{ ms}$ |
| Reverse polarity protection ⁵⁾ | Up to 36 V |
| Oversupply protection | Up to 36 V |
| Dielectric strength (GND to housing) | 500 V DC |

10.4 Output

| | | |
|-----------|-----------------------------------|---|
| BTL6-A... | Output voltage Load current | 0...10 V Max. 5 mA |
| BTL6-C... | Output current Load resistance | 0.1...20 mA $\leq 500 \text{ ohms}$ |
| BTL6-E... | Output current Load resistance | 4...20 mA $\leq 500 \text{ ohms}$ |
| BTL6-G... | Output voltage Load current | -10...10 V Max. 5 mA |
| | Short circuit resistance | Signal cable to 36 V Signal cable to GND |

10.5 Input

| | |
|--------------------------|-----------------------------|
| Programming inputs La/Lb | 10...30 V DC High-active |
| Oversupply protection | Up to 36 V |

10.6 Dimensions, weights

| | |
|----------------------------|----------------|
| Housing height | 20.8 mm |
| Nominal length | 50...4572 mm |
| Weight (depends on length) | Approx. 1 kg/m |
| Housing material | Aluminum |

¹⁾ Nominal length 500 mm, magnet in the middle of the measuring range

²⁾ For : Use in enclosed spaces and up to a height of 2000 m above sea level.

³⁾ Individual specifications as per Balluff factory standard, resonances excluded

⁴⁾ For : The transducer 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.

⁵⁾ A prerequisite is that no current can flow between GND and 0 V in the event of polarity reversal.

BTL6-A/C/E/G500-M ____ -PF-S115

Micropulse Transducer in a Flat Profile Housing

11 Accessories

11.1 Captive magnets

BTL5-F-2814-1S

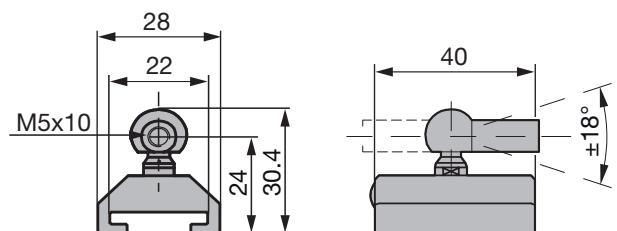


Fig. 11-1: Installation dimensions of BTL5-F-2814-1S magnet

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

BTL5-T-2814-1S

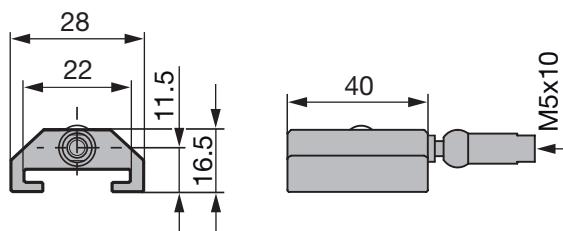


Fig. 11-2: Installation dimensions of BTL5-T-2814-1S magnet

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

11.2 BTL2-GS10-____-A joint rod

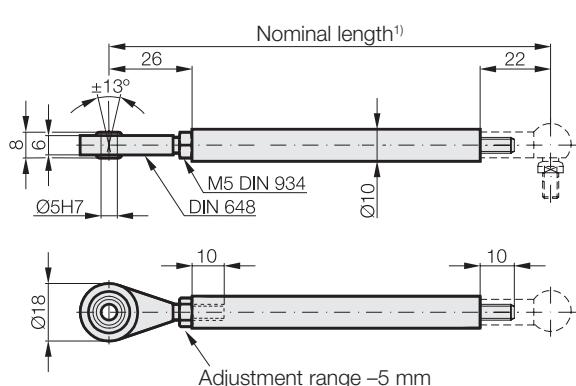


Fig. 11-3: BTL2-GS10-____-A joint rod

Weight: Approx. 150 g/m
Material: Aluminum

1) State the nominal length when ordering

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

11.3 Floating magnets

BTL5-P-3800-2

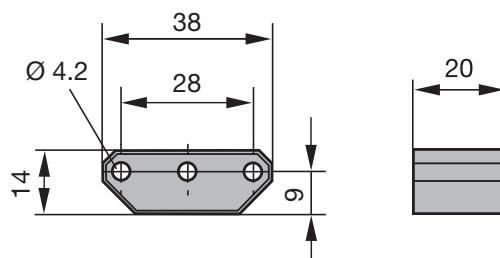


Fig. 11-4: Installation dimensions of BTL5-P-3800-2 magnet

Weight: Approx. 12 g
Housing: Plastic

BTL5-P-5500-2

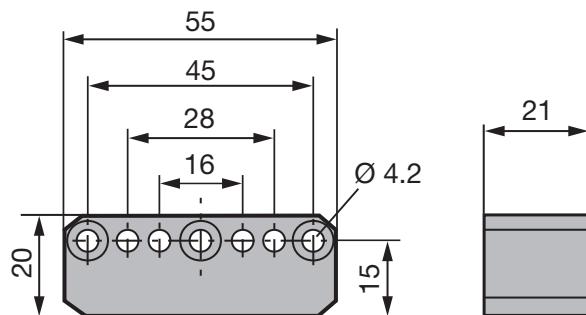


Fig. 11-5: Installation dimensions of BTL5-P-5500-2 magnet

Weight: Approx. 40 g
Housing: Plastic

BTL6-A-3800-2

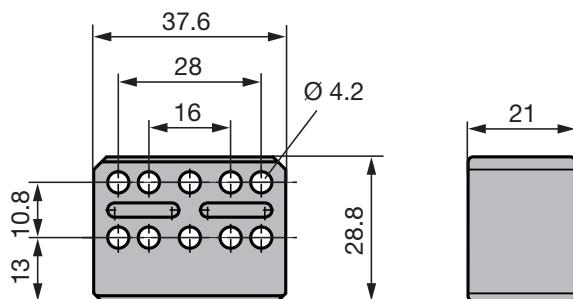


Fig. 11-6: Installation dimensions of BTL6-A-3800-2 magnet

Weight: Approx. 30 g
Housing: Plastic

BTL6-A/C/E/G500-M _____ -PF-S115

Micropulse Transducer in a Flat Profile Housing

11 Accessories (continued)

BTL6-A-3801-2

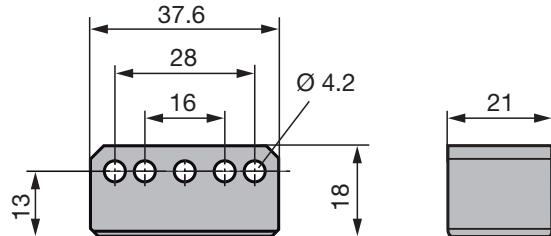


Fig. 11-7: Installation dimensions of BTL6-A-3801-2 magnet

Weight: Approx. 25 g
Housing: Plastic

BTL5-P-4500-1

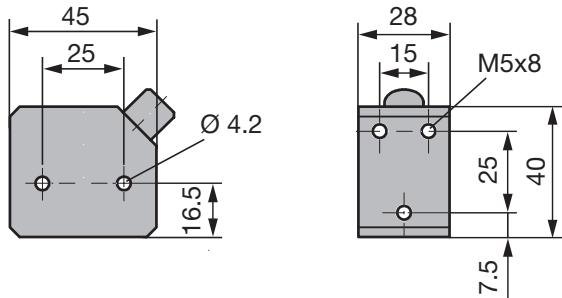


Fig. 11-8: Installation dimensions of BTL5-P-4500-1 magnet

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

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

11.4 Connector



For information on pin assignment, see Table 4-2 on page 10.

BKS-S115-PU-__

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

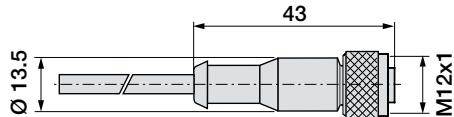


Fig. 11-9: Connector type BKS-S115-PU-__

BKS-S116-PU-__

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

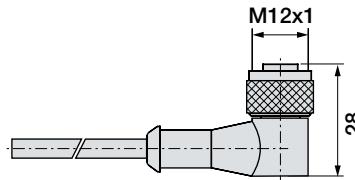


Fig. 11-10: Connector type BKS-S116-PU-__

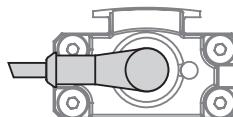


Fig. 11-11: Connector type BKS-S116-PU-__, outlet

11.5 Adjusting box

BTL7-A-CB02-S115

Scope of delivery:

- Adjusting box
- 2 adapter cables, each approx. 0.3 m
- Condensed guide

BTL6-A/C/E/G500-M _____ -PF-S115
Micropulse Transducer in a Flat Profile Housing

12

Type code breakdown

BTL6 - A 5 00 - M0500 - PF - S115

Micropulse transducer

Interface:

- A = Analog interface, voltage output 0...10 V
- G = Analog interface, voltage output -10...10 V
- C = Analog interface, current output 0.1...20 mA
- E = Analog interface, current output 4...20 mA

Supply voltage:

5 = 10...30 V DC

Output gradient:

00 = Rising (factory setting)

Nominal stroke (4-digit):

M0500 = Metric specification in mm, nominal length 500 mm

Construction:

PF = flat profile housing

Electrical connection:

S115 = 8-pin, M12 plug

13 Appendix

13.1 Converting units of length

1 mm = 0.0393700787 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 |

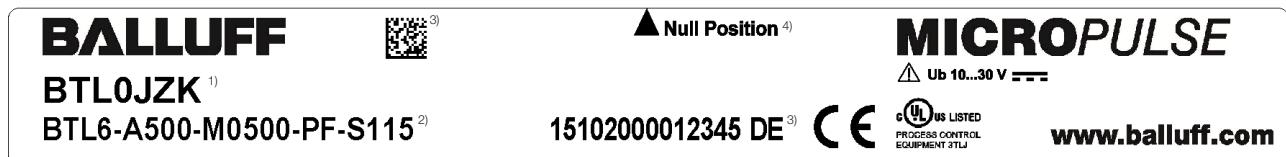
Tab. 13-1: Conversion table mm to inches

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. 13-2: Conversion table inches to mm

13.2 Part label



¹⁾ Ordering code

²⁾ Type

³⁾ Serial number

⁴⁾ Null mark

Fig. 13-1: BTL6 part label



| Headquarters | Global Service Center | US Service Center | CN Service Center |
|--|--|---|--|
| Germany Balluff GmbH Schurwaldstrasse 9 73765 Neuhausen a.d.F. Phone + 49 7158 173-0 Fax +49 7158 5010 balluff@balluff.de | Germany Balluff GmbH Schurwaldstrasse 9 73765 Neuhausen a.d.F. Phone +49 7158 173-370 Fax +49 7158 173-691 service@balluff.de | USA Balluff Inc. 8125 Holton Drive Florence, KY 41042 Phone (859) 727-2200 Toll-free 1-800-543-8390 Fax (859) 727-4823 technicalsupport@balluff.com | China Balluff (Shanghai) trading Co., Ltd. Room 1006, Pujian Rd. 145. Shanghai, 200127, P.R. China Phone +86 (21) 5089 9970 Fax +86 (21) 5089 9975 service@balluff.com.cn |