

BTL7 Rod Series

General data

Shock and vibration resistant

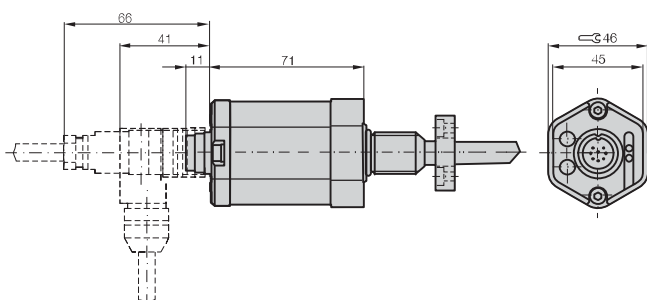
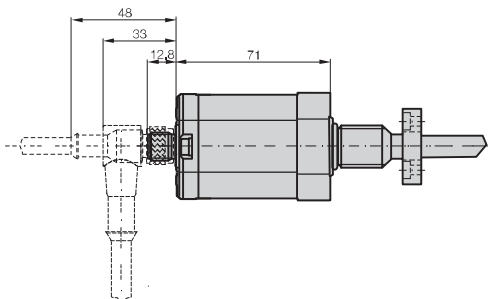
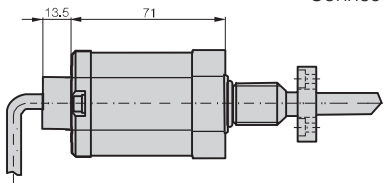
Pressure rated to 600 bar, High repeatability, Non-contacting, rugged

The BTL Micropulse transducer is a robust position feedback system for measuring ranges between 25 and 7620 mm as well as use under extreme ambient conditions.

The actual waveguide is protected inside a high-pressure resistant stainless steel tube. The system is ideal for use in hydraulic cylinders for position feedback or as a level monitor with aggressive media in the food and chemical industries.

Series	BTL7 rod
Shock load	150 g/6 ms as per IEC 60068-2-27
Vibration	20 g, 10...2000 Hz as per IEC 60068-2-6
Polarity reversal protected	yes
Overvoltage protection	Transzorb protection diodes
Dielectric strength	500 V AC (GND to housing)
Degree of protection as per IEC 60529	IP 68 with cable outlet, IP 67 with BKS-S... connector attached
Housing material	Anodized aluminum/1.4571 stainless steel outer tube, 1.3952 stainless steel cast flange
Mounting	Housing B thread M18x1.5, housing Z 3/4"-16UNF
Pressure rating with 10.2 mm outer tube	600 bar installed in hydraulic cylinder
Pressure rating with 8 mm outer tube	250 bar installed in hydraulic cylinder
Connection type	Connector or integral cable
EMC testing:	
RF emission	EN 55016-2-3 Group 1, Class A and B
Static electricity (ESD)	IEC 61000-4-2 Severity Level 3
Electromagnetic fields (RFI)	IEC 61000-4-3 Severity Level 3
Fast transients (BURST)	IEC 61000-4-4 Severity Level 3
Surge voltage	IEC 61000-4-5 Severity Level 2
Conducted interference induced by high-frequency fields	IEC 61000-4-6 Severity Level 3
Magnetic fields	IEC 61000-4-8 Severity Level 4
Standard nominal strokes [mm] with 8 mm outer tube is the max. nominal stroke 1016 mm	0025, 0050, 0075, 0100, 0125, 0150, 0175, 0200, 0225, 0250, 0275, 0300, 0325, 0350, 0375, 0400, 0425, 0450, 0475, 0500, 0550, 0600, 0650, 0700, 0750, 0800, 0850, 0900, 0950, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2250, 2500, 2750, 3000, 3250, 3500, 3750, 3850, 4000, 4250, 4500, 4750, 5000, 5250, 5500, 5750, 6000, 6250, 6500, 6750, 7000, 7250, 7500, 7600, 7620 or in 5 mm increments (depending on interface) on request

Please order separately:
 USB communication box, page 81
 Magnets/floats, from page 96
 Mounting nuts, page 97
 Connectors, page 148/156



Caution!
 Prior to design, installation and startup, please read the instructions in the user guide! www.balluff.com

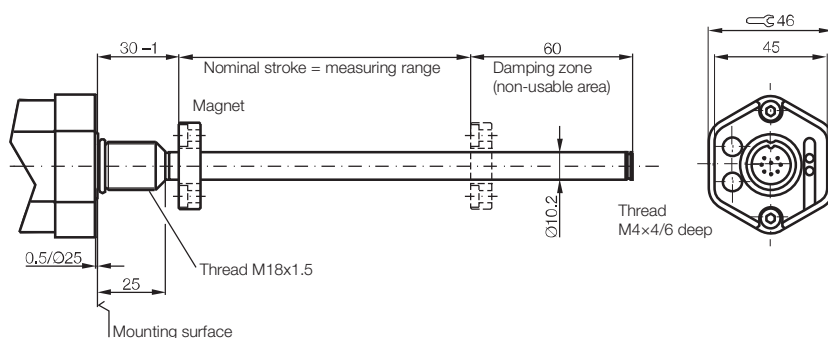
BTL7 Rod Series

General data

Housing B
BTL7-...-B-...

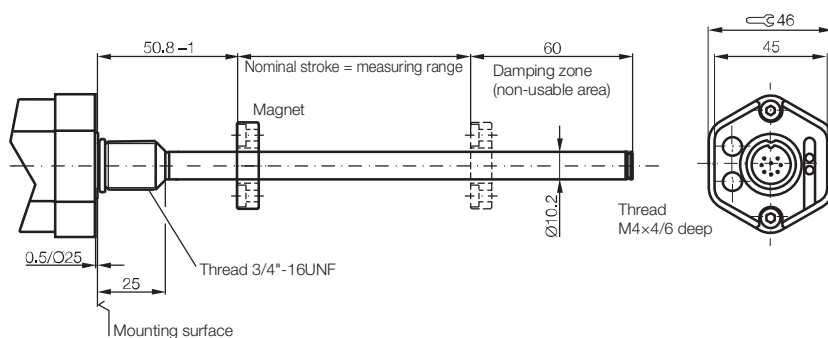
Metric mounting thread M18x1.5

B = Standard housing



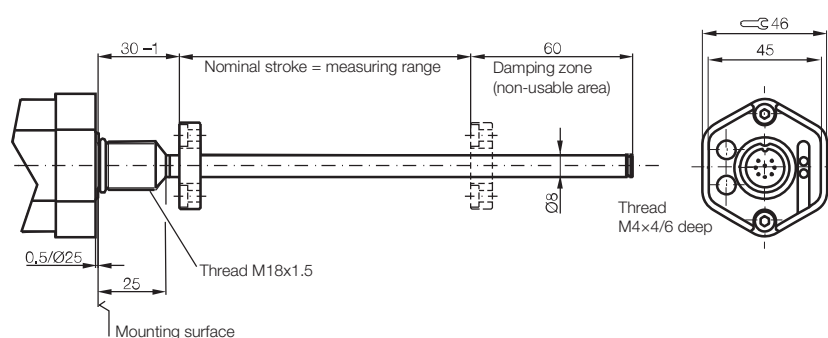
Housing Z
BTL7-...-Z-...

3/4" UNF mounting thread



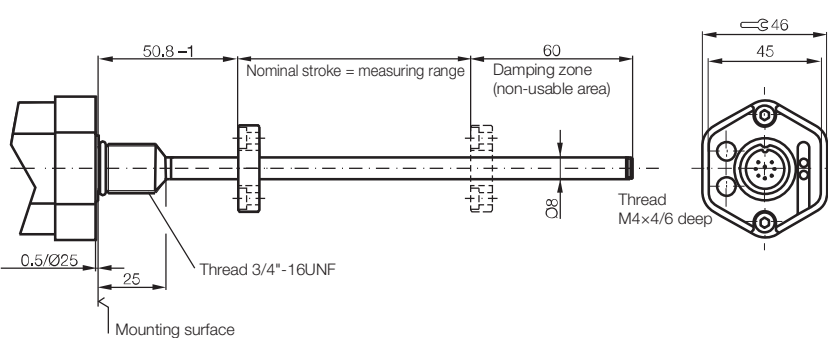
Housing B8
BTL7-...-B8-...

Metric mounting thread M18x1.5
8 mm outer tube
max. 1016 mm nominal stroke



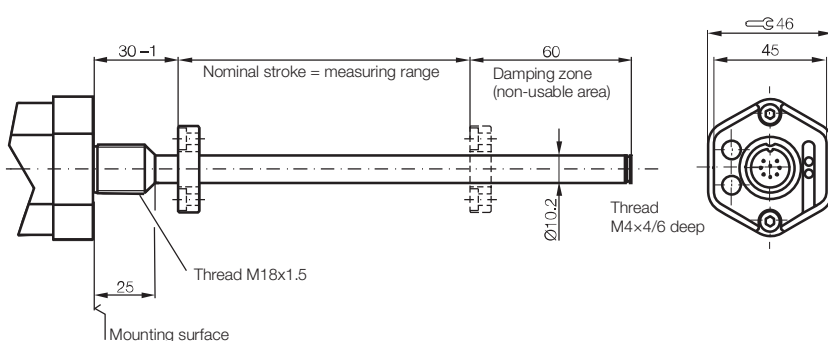
Housing Z8
BTL7-...-Z8-...

3/4" UNF mounting thread
8 mm outer tube
max. 1016 mm nominal stroke



Housing A
BTL7-...-A-...

Metric mounting thread M18x1.5
Flange without 0.5/Ø 25 mm mounting surface



BTL7
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Analog interface
Programming

BTL5
General data
Digital pulse interface
SSI interface
CANopen interface
PROFIBUS-DP interface
Position recognition in the hydraulics
Floats
Magnets
Installation notes

BTL7 Rod Series

Analog interface

Compatible with BTL5

Features of Micropulse BTL7-A/C/E/G...B

- Status LEDs for indicating operating status and diagnostics
- Extended application range with high degree of protection IP 68 (cable version)
- Electronics head can be replaced if needed
- Short housing, saves space
- Error signal, no magnet within measuring range

Flexible measuring range

The start and end point of the measuring range can be adapted to the application. The points are set directly on the unit using the calibration device included or remotely, see page 80.

Series	
Output signal	
Transducer interface	
Input interface	
Part number	
Output voltage	
Output current	
Load current	
max. ripple	
Load resistance	
System resolution	
Hysteresis	
Repeat accuracy	
Sampling rate, length-dependent	
Max. non-linearity	
Temperature coefficient	
Operating voltage	
Current consumption at 24 V DC	
Polarity reversal protected	
Overvoltage protection	
Dielectric strength	
Operating temperature	



■ Please enter the code for the output signal, nominal stroke, housing and connection type in the ordering code.

Preferred models

A110 and E100 interfaces

BTL7-A110-M____-B-S32,

BTL7-E100-M____-B-S32

are available from stock in the nominal lengths highlighted in blue.

■ Included:

- Transducer
- Calibration device
- Short user's guide

Please order separately:

USB communication box, page 81

Magnets/floats, from page 96

Mounting nuts, page 97

Connectors, page 148/156

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BTL7 Rod Series

Analog interface

BTL7 rod	BTL7 rod	BTL7 rod	BTL7 rod
analog	analog	analog	analog
A	G	E	C
analog	analog	analog	analog
BTL7-A110-M	BTL7-G110-M	BTL5-E1_0-M	BTL7-C1_0-M
0...10 V and 10...0 V	-10...10 V and 10...-10 V	4...20 mA or 20...4 mA	0...20 mA or 20...0 mA
max. 5 mA	max. 5 mA		
$\leq 5 \text{ mV}_{ss}$	$\leq 5 \text{ mV}_{ss}$		
$\leq 0.33 \text{ mV}$	$\leq 0.33 \text{ mV}$	$\leq 500 \text{ ohms}$	$\leq 500 \text{ ohms}$
$\leq 5 \text{ }\mu\text{m}$	$\leq 5 \text{ }\mu\text{m}$	$\leq 0.66 \text{ }\mu\text{A}$	$\leq 0.66 \text{ }\mu\text{A}$
System resolution/min. 2 μm	System resolution/min. 2 μm	$\leq 5 \text{ }\mu\text{m}$	$\leq 5 \text{ }\mu\text{m}$
max. 4 kHz	max. 4 kHz	System resolution/min. 2 μm	System resolution/min. 2 μm
$\pm 50 \text{ }\mu\text{m}$ to $\leq 500 \text{ mm}$ nominal stroke	$\pm 50 \text{ }\mu\text{m}$ to $\leq 500 \text{ mm}$ nominal stroke	max. 4 kHz	max. 4 kHz
$\pm 0.01 \text{ \% FS}$ > 5500 mm nominal stroke	$\pm 0.01 \text{ \% FS}$ > 5500 mm nominal stroke	$\pm 50 \text{ }\mu\text{m}$ to $\leq 500 \text{ mm}$ nominal stroke	$\pm 50 \text{ }\mu\text{m}$ to $\leq 500 \text{ mm}$ nominal stroke
$\pm 0.02 \text{ \% FS}$ > 5500 mm nominal stroke	$\pm 0.02 \text{ \% FS}$ > 5500 mm nominal stroke	$\pm 0.01 \text{ \% FS}$ > 5500 mm nominal stroke	$\pm 0.01 \text{ \% FS}$ > 5500 mm nominal stroke
$\leq 30 \text{ ppm/K}$	$\leq 30 \text{ ppm/K}$	$\pm 0.02 \text{ \% FS}$ > 5500 mm nominal stroke	$\pm 0.02 \text{ \% FS}$ > 5500 mm nominal stroke
20...28 V DC	20...28 V DC	$\leq 30 \text{ ppm/K}$	$\leq 30 \text{ ppm/K}$
$\leq 150 \text{ mA}$	$\leq 150 \text{ mA}$	20...28 V DC	20...28 V DC
yes	yes	$\leq 150 \text{ mA}$	$\leq 150 \text{ mA}$
yes	yes	yes	yes
500 V AC (ground to housing)	500 V AC (ground to housing)	yes	yes
-40...+85 °C	-40...+85 °C	500 V AC (ground to housing)	500 V AC (ground to housing)
		-40...+85 °C	-40...+85 °C



BTL7

General data

Analog interface

Programming

BTL5

General data

Digital pulse interface

SSI interface

CANopen interface

PROFIBUS-DP interface

Position recognition in the hydraulics

Floats

Magnets

Installation notes

Installation notes

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Installation notes

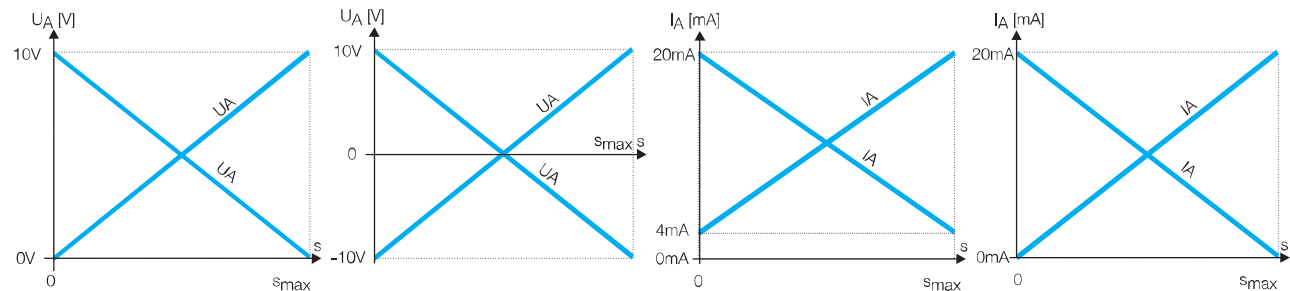
Installation notes

Installation notes

Installation notes

Installation notes

Installation notes



Ordering example:

BTL7- 1 0-M

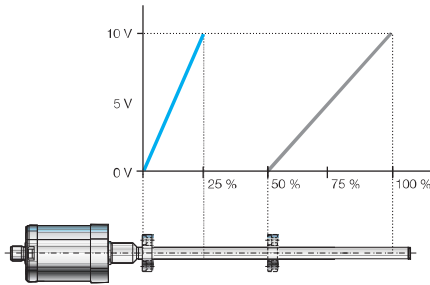
Output signal	Output signal	Standard nominal stroke [mm]	Housing	Connection type
A	1 Rising and falling (with A and G)	0025, 0050, 0075, 0100, 0125, 0150,	B = Standard	S32 Connector
G	1 Rising and falling (with A and G)	0175, 0200, 0225, 0250, 0275, 0300,	M 18x1.5	S115 Connector
E	0 Rising (with C and E)	0325, 0350, 0375, 0400, 0425, 0450,	Other housings on page 75	KA02 PUR cable 2 m
C	7 Falling (with C and E)	0475, 0500, 0550, 0600, 0650, 0700, 0750, 0800, 0850, 0900, 0950, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2250, 2500, 2750, 3000, 3250, 3500, 3750, 3850, 4000, 4250, 4500, 4750, 5000, 5250, 5500, 5750, 6000, 6250, 6500, 6750, 7000, 7250, 7500, 7600, 7620 or in 5 mm increments (depending on interface) on request		KA05 PUR cable 5 m KA10 PUR cable 10 m KA15 PUR cable 15 m

Position and velocity

Two outputs can be assigned any position value and velocity signal using the USB interface.

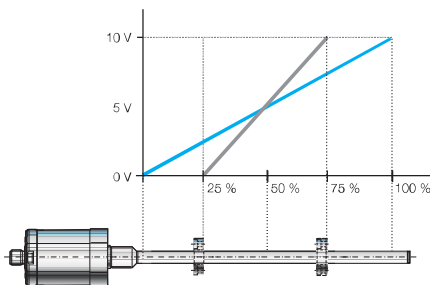
Mode examples:

Double magnet



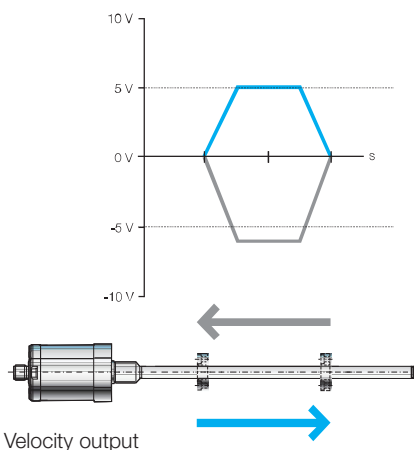
2 magnets, 2 movements, 2 output signals

Differential



Differential signal between
2 magnets, position and difference possible.

Velocity



Velocity output

Series	
Output signal	
Transducer interface	
Position signal input interface	
Part number	
Output signal factory setting	
Output signal adjusted via USB Configurable	
Load current	
max. ripple	
Load resistance	
System resolution	
Current consumption at 24 V DC	
Hysteresis	
Repeat accuracy	
Sampling rate, length-dependent	
Non-linearity, max.	
Temperature coefficient	
Operating voltage	
Polarity reversal protected	
Overvoltage protection	
Dielectric strength	
Operating temperature	

Features of Micropulse® USB-Configurable BTL7-A/E501

- Simple configuration and setting of the start and end point via the USB interface, fast startup
- "Easy Setup" for manual adjustment
- Configurable dual output functions, position and velocity
- Increased operating reliability with status LEDs for indicating the operating status and diagnostic information
- Extended application range with high degree of protection IP 68 (cable version)
- Electronics head can be replaced if needed
- Short housing
- Error signals, no magnet within measuring range

■ Please enter the code for the output signal, nominal stroke, housing and connection type in the ordering code!

Preferred models

A501 and E501 interfaces

BTL7-A501-M____-B-S32,

BTL7-E501-M____-B-S32

are available from stock in the nominal lengths highlighted in blue.

■ Included:

- Transducer
- Calibration device
- Short user's guide

Please order separately:

USB communication box, page 81

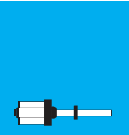
Magnets/floats, from page 96

Mounting nuts, page 97

Connectors, page 156

Caution!

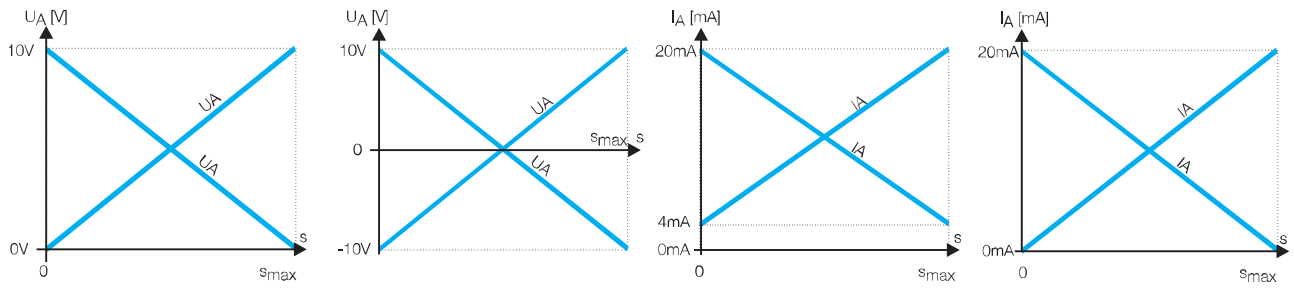
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BTL5
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BTL7 rod	BTL7 rod
analog	analog
A	E
analog	analog
BTL7-A501-M	BTL7-E501-M
0...10 V and 10...0 V	4...20 mA and 20...4 mA
-10...10 V and 10...-10 V	0...20 mA and 20...0 mA
max. 5 mA	
$\leq 5 \text{ mV}_{ss}$	
	$\leq 500 \text{ ohms}$
$\leq 0.33 \text{ mV}$	$\leq 0.66 \mu\text{A}$
$\leq 150 \text{ mA}$	$\leq 180 \text{ mA}$
$\leq 5 \mu\text{m}$	$\leq 5 \mu\text{m}$
System resolution/min. 2 μm	System resolution/min. 2 μm
max. 4 kHz	max. 4 kHz
$\pm 50 \mu\text{m}$ to $\leq 500 \text{ mm}$ nominal stroke	$\pm 50 \mu\text{m}$ to $\leq 500 \text{ mm}$ nominal stroke
$\pm 0.01 \%$ FS > 500... $\leq 5500 \text{ mm}$ nominal stroke	$\pm 0.01 \%$ FS > 500... $\leq 5500 \text{ mm}$ nominal stroke
$\pm 0.02 \%$ FS > 5500 mm nominal stroke	$\pm 0.02 \%$ FS > 5500 mm nominal stroke
$\leq 30 \text{ ppm/K}$	$\leq 30 \text{ ppm/K}$
10...30 V DC	10...30 V DC
yes	yes
yes	yes
500 V AC (ground to housing)	500 V AC (ground to housing)
-40...+85 °C	-40...+85 °C



Ordering example:

BTL7- 501-M

Output signal	Standard nominal stroke [mm]	Housing	Connection type
A Voltage	0025, 0050, 0075, 0100, 0125, 0150,	B = Standard	S32 Connector
E Current	0175, 0200, 0225, 0250, 0275, 0300,	M18x1.5	S115 Connector
	0325, 0350, 0375, 0400, 0425, 0450,	Other housings on	KA02 PUR cable 2 m
	0475, 0500, 0550, 0600, 0650, 0700,	page 75	KA05 PUR cable 5 m
	0750, 0800, 0850, 0900, 0950, 1000,		KA10 PUR cable 10 m
	1100, 1200, 1300, 1400, 1500, 1600,		KA15 PUR cable 15 m
	1700, 1800, 1900, 2000, 2250, 2500,		KA15 PUR cable 15 m
	2750, 3000, 3250, 3500, 3750, 3850,		
	4000, 4250, 4500, 4750, 5000, 5250,		
	5500, 5750, 6000, 6250, 6500, 6750,		
	7000, 7250, 7500, 7600, 7620 or in 5		
	mm increments (depending on interface)		
	on request		

Setting options for the start and end point

	BTL7 Standard	BTL7-A/E501... Micropulse ⁺ USB-Configurable
1. Calibration device	■	■
– Teach-in	■	
– Adjustment	■	
– Online setting	■	
– Easy Setup		■
2. Remote setup	■	
3. USB-Configure		■

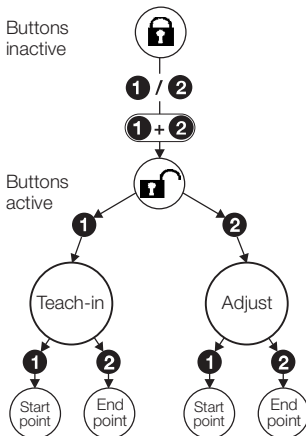
1. Calibration device

100 % start and end point calibration

Start and end point of the analog signal can be set to the desired position at the touch of a button. Depending on the application, "teach-in" or "adjust" mode is used, selectable by pressing a button combination. Two-color LED indicators assist the procedure.

"Easy Setup"

For BTL7-A/E501, Micropulse⁺ only. Simple programming mode for adjusting the start and end point of the transducer to the current application in just a few steps. The magnet is brought to the new position. Confirm by pressing a button. The "Adjust" function allows the new value to be fine-tuned for a stationary magnet. No error value is output during the setup procedure.



Selecting the calibration procedure BTL7 Standard

Teach-in

Used for changing the factory default start and end point to a new start and end point.

First the magnet must be brought to the new start point and then to the new end position, and the respective values stored by pressing the button.

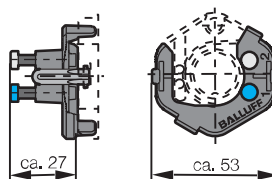
Adjust

Here you can adjust to a new start and end value. This may be required when you cannot physically move the magnet to the standard start and/or end point. Move the magnet to the new start and end position, and adjust the displayed value by pressing the button until the desired output values are reached.

Online setting

This programming function allows you to set the start and end point while in run mode, such as in a closed loop configuration. No error value is output during the setup procedure. The calibration range is limited to $\pm 25\%$.

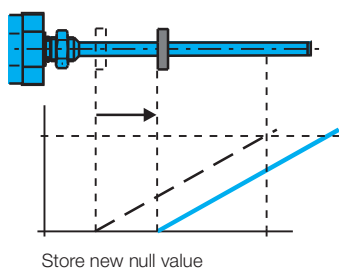
Setting start and end point using the calibration device BTL7-A/E501



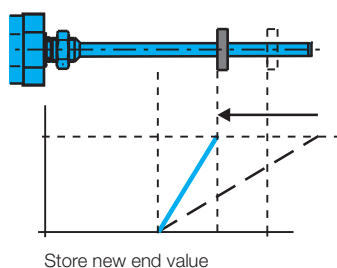
Procedure for teach-in, rising signal



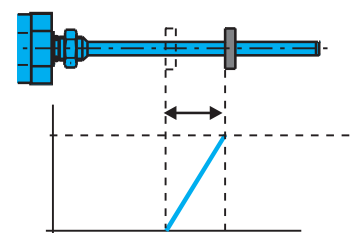
1. Place magnet in new null position.



2. Place magnet at new end position.



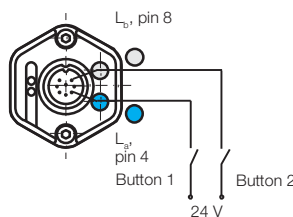
3. Newly set measurement distance



2. Remote setup aid

Remote setting of the start and end point using programming inputs

If the transducer is located in an inaccessible place or a hazardous area, the start and end point can be adjusted remotely. Teach-in, adjustment and online setting are identical to programming with the calibration device. Button 1 blue corresponds to programming input La and button 2 gray to input Lb.



3. USB-Configure

Start, end value setting and configuration via USB

The Micropulse Configuration Tool allows the quick and easy configuration of Balluff transducers type BTL7-A/E501... on a PC. The most significant features include:

- Online display of the current position of the magnet
- Graphical assistance for setting the functions and characteristic curves
- Display of information about the connected transducer
- Selectable number formats and units for display
- Factory reset possible
- Calibration device can be disabled
- Demo mode without having a transducer connected

Connecting the USB communication box

For model BTL7-A/E501-M...-S32/S115 transducers, the communication box can be installed between the transducer and the controller. The communication box is connected to the PC using a USB cable.

USB communication box

BTL7-A-CB01-USB-S32,

for BTL7-A/E501... with S32 connector

BTL7-A-CB01-USB-S115,

for BTL7-A/E501... with S115 connector

BTL7-A-CB01-USB-KA,

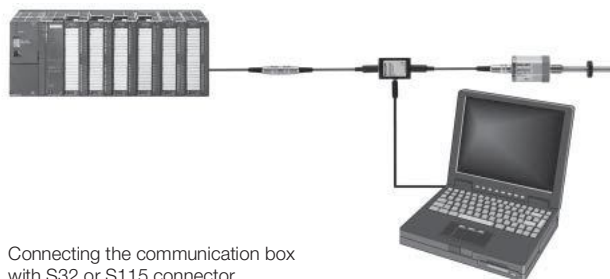
for BTL7-A/E501... with cable connection

Included:

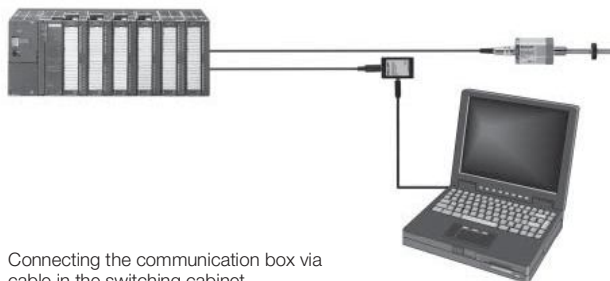
- USB communication box
- Cable set
- Short user's guide

System requirements:

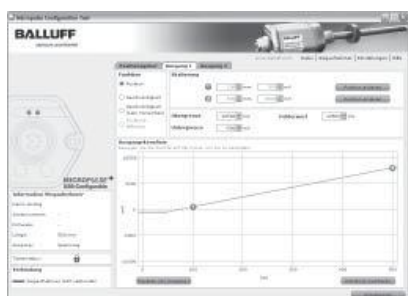
- Standard PC
- Windows 2000/XP/Vista
- Screen resolution at least 1024 × 768 pixels
- 10 MB available hard disk space
- Java Runtime Environment (JRE) version 1.4.2 or higher
<http://java.sun.com/getjava>
- USB port



Connecting the communication box with S32 or S115 connector



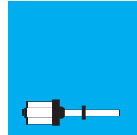
Connecting the communication box via cable in the switching cabinet



The PC software and associated manual can be downloaded from the Internet at www.balluff.com/downloads-bt7

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