Micropulse Transducers

Rod

Rod housings are mainly used in hydraulic drive applications. When installed in the pressure section of the hydraulic cylinder, the displacement sensor requires the same pressure rating as the actual hydraulic cylinder. In practice, the sensor must be able to withstand pressures up to 1000 bar. The electronics are integrated in an aluminum or stainless steel housing and the waveguide in a pressure-resistant tube made from nonmagnetic stainless steel that is sealed off at the front end with a welded plug. An O-ring in the flange at the opposite end seals off the high-pressure section. An encoder ring with magnets slides over the tube or rod with internal waveguide to mark the position prior to detection.

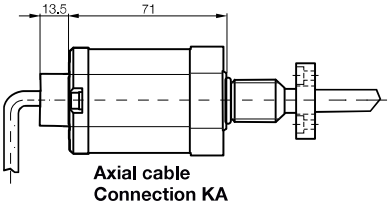
MICROPULSE®

"Long" up to 7620 mm

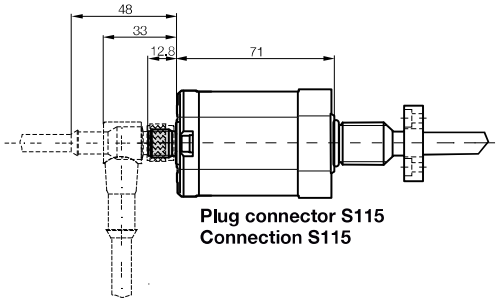
Pressure-resistant to 600 bar, high reproducibility, contactless, robust
The Micropulse Transducer BTL is a robust position measuring system for measuring ranges between 25 and 7620 mm under extreme ambient conditions. The actual measurement section is protected inside a high-pressure resistant stainless 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	**Rod BTL7**
Shock load	150 g/6 ms as per EN 60068-2-27
Vibration	20 g, 10...2000 Hz per EN 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 screwed-on plug connector BKS-S...
Housing material	Anodized aluminum/1.4571 stainless steel protective tube, 1.3952 stainless steel cast flange
Fastener	Style B thread M18×1.5, style Z 3/4"-16 UNF
Pressure rating	
with 10.2 mm protective tube	600 bar with installation in hydraulic cylinder
with 8 mm protective tube	250 bar installed in hydraulic cylinder
Connection	Plug connector or cable connection
EMC testing	
Radio interference emission	EN 55016-2-3 (industrial and residential area)
Static electricity (ESD)	EN 61000-4-2 Severity level 3
Electromagnetic fields (RFI)	EN 61000-4-3 Severity level 3
Electrical fast transient bursts (BURST)	IEC 61000-4-4 Severity level 3
Surge voltage	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
Standard nominal strokes [mm] with an 8 mm protective tube, the max. rated length is 1016 mm	0025...7620 mm in 1-mm increments

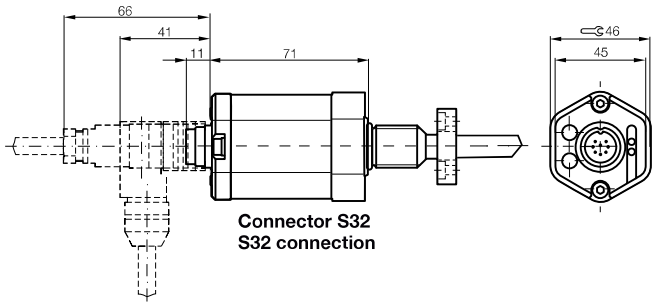
Please order separately:
USB communication box, page 164



Axial cable
Connection KA



Plug connector S115
Connection S115

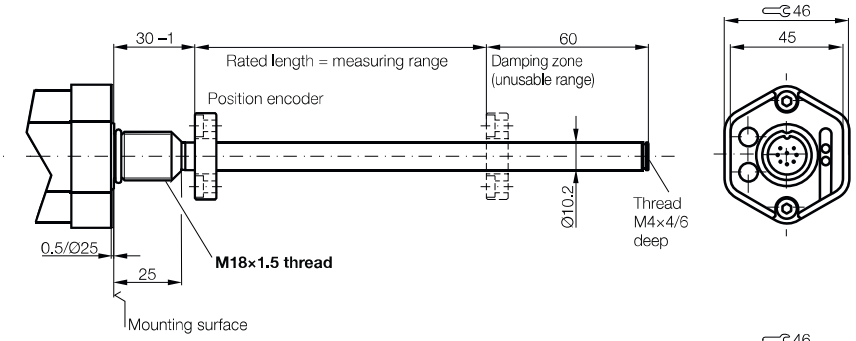


Connector S32
S32 connection

Caution!
Before design, installation and startup please familiarize yourself with the user's guide to be found at www.balluff.com.

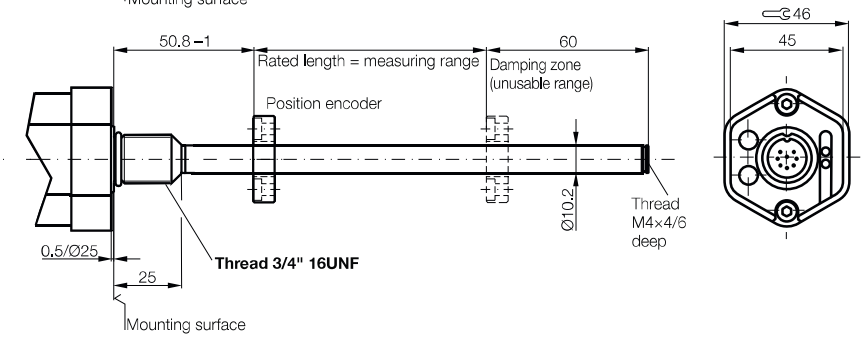
Style B
(standard design)
BTL7_ _ _ _-B-_ _ _ _

Metric
mounting thread M18×1.5



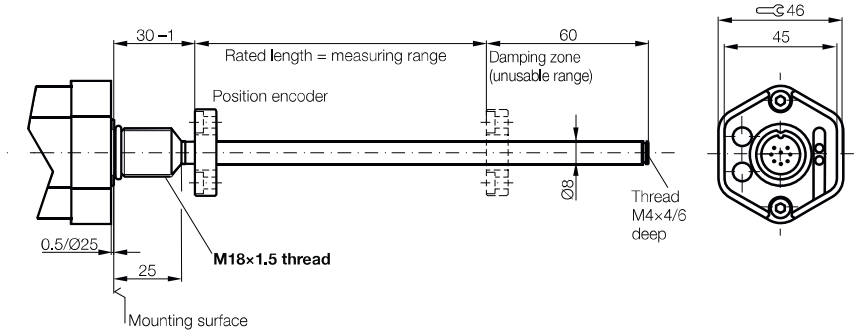
Style Z
BTL7_ _ _ _-Z-_ _ _ _

3/4" UNF mounting thread



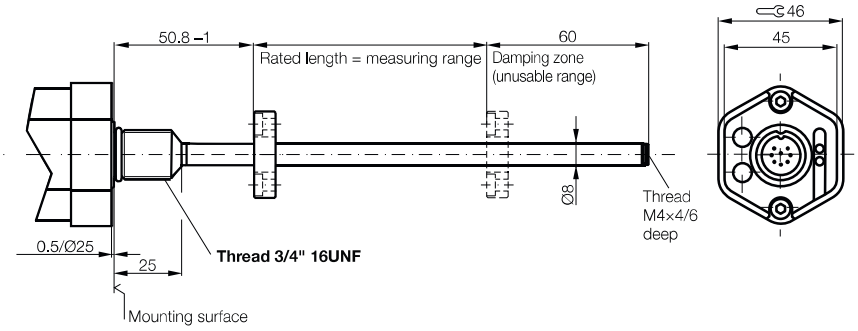
Style B8
BTL7_ _ _ _-B8-_ _ _ _

Metric mounting thread
M18×1.5
8 mm protective tube
Max. 1016 mm rated length



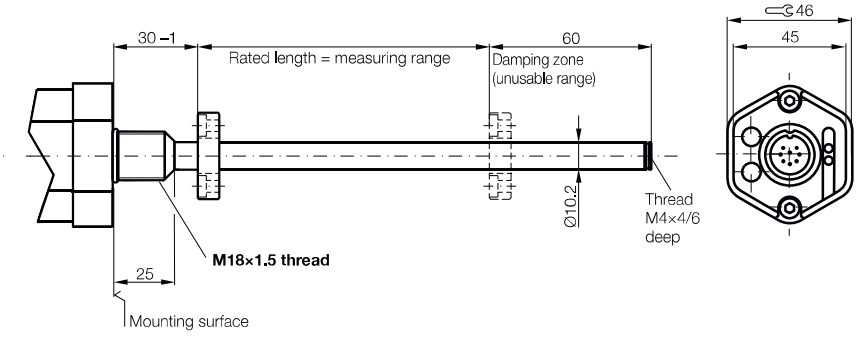
Style Z8
BTL7_ _ _ _-Z8-_ _ _ _

3/4" UNF mounting thread
8 mm protective tube
Max. 1016 mm rated length



Style A
BTL7-_ _ _ _-A-_ _ _ _

Metric mounting thread
M18×1.5
Flange without
0.5/Ø 25 mm mounting surface



Compatible with BTL5

Features of Micropulse BTL7-A/C/E/G...B, Z, A
- Status LEDs for indicating operating status and diagnostics
- Extended application range due to high degree of protection IP 68 (cable version)
- Electronics head can be replaced in the event of service
- Compact housing, saves space
- Error signal, no position encoder 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 using the included calibration device directly on the unit or remotely, see page 158.

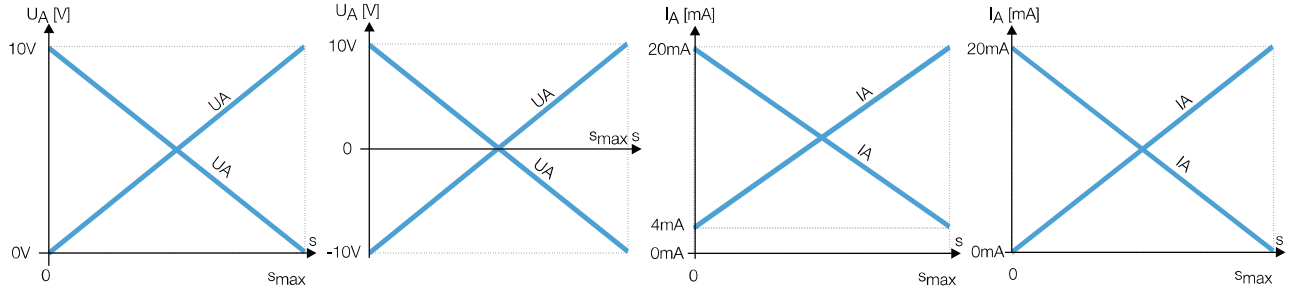
Series	
Output signal	
Transducer interface	
Customer device interface	
Part number	
Output voltage	
Output current	
Load current	
Max. residual ripple	
Load resistance	
System resolution	
Hysteresis	
Repeat accuracy	
Measurement rate, length-dependent	
Max. linearity deviation	
Temperature coefficient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

Please enter code for output signal, rated length, design and connection in the part number.

Scope of delivery
- Transducer
- Calibration device
- Quick start instructions

Please order separately:
Calibration box, see page 164
Position encoders, see page 218
Floats, see page 216
Fastening nut, see page 219
Plug connectors, see page 252

	Rod BTL7	**Rod BTL7**	**Rod BTL7**	**Rod BTL7**
	Analog	Analog	Analog	Analog
	A	**G**	**E**	**C**
	Analog	Analog	Analog	Analog
	BTL7-**A**110-M_ _ _ _-_-_ _ _ _	BTL7-**G**110-M_ _ _ _-_-_ _ _ _	BTL7-**E**1_0-M_ _ _ _-_-_ _ _ _	BTL7-**C**1_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		
	≤ 5 mV_{pp}	≤ 5 mV_{pp}		
			≤ 500 Ω	≤ 500 Ω
	≤ 0.33 mV	≤ 0.33 mV	≤ 0.66 µA	≤ 0.66 µA
	≤ 5 µm	≤ 5 µm	≤ 5 µm	≤ 5 µm
	System resolution/min. 2 µm	System resolution/min. 2 µm	System resolution/min. 2 µm	System resolution/min. 2 µm
	Max. 4 kHz	Max. 4 kHz	Max. 4 kHz	Max. 4 kHz
	±50 µm to ≤ 500 mm rated length	±50 µm to ≤ 500 mm rated length	±50 µm to ≤ 500 mm rated length	±50 µm to ≤ 500 mm rated length
	±0.01% 501...5500 mm rated length	±0.01% 501...5500 mm rated length	±0.01% 501...5500 mm rated length	±0.01% 501...5500 mm rated length
	±0.02% FS > 5500 mm rated length	±0.02% FS > 5500 mm rated length	±0.02% FS > 5500 mm rated length	±0.02% FS > 5500 mm rated length
	≤ 30 ppm/K	≤ 30 ppm/K	≤ 30 ppm/K	≤ 30 ppm/K
	20...28 V DC	20...28 V DC	20...28 V DC	20...28 V DC
	≤ 150 mA	≤ 150 mA	≤ 150 mA	≤ 150 mA
	yes	yes	yes	yes
	yes	yes	yes	yes
	500 V AC (GND to housing)	500 V AC (GND to housing)	500 V AC (GND to housing)	500 V AC (GND to housing)
	–40...+85 °C	–40...+85 °C	–40...+85 °C	–40...+85 °C



Ordering example:

B T L 7 - _ _ _ 0 - M _ _ _ _ - _ - _ _ _ _

Output signal

A	0...10 V and 10...0 V
G	–10...10 V and 10...–10 V
E	4...20 mA or 20...4 mA
C	0...20 mA or 20...0 mA

Operating voltage

1	24 V
5	10-30 V

Characteristic

1	rising and falling (with A and G)
0	rising (at C and E)
7	falling (for C and E)

Standard Rated length [mm]

0025...7620
in 1-mm increments

Design

B Standard M18×1.5
For additional designs, see page 153

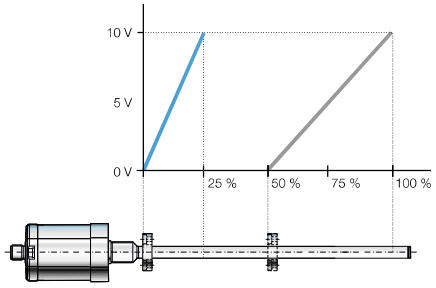
Connection

S32	Connectors
S115	Connectors
KA02	PUR cable 2 m
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.

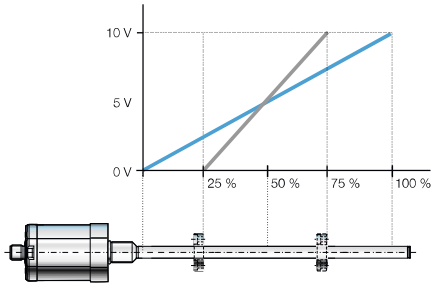
Mode examples:

Double position encoder



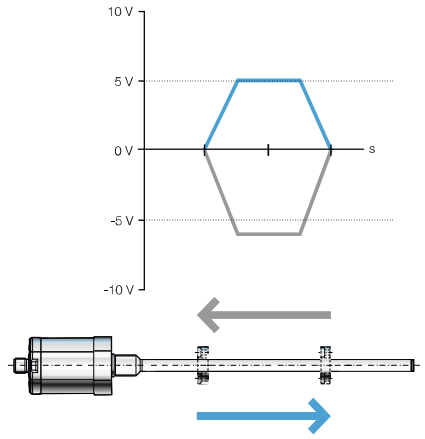
2 encoders, 2 movements, 2 output signals

Differential



Differential signal between 2 position encoders, position and difference possible

Velocity



Velocity output

Series	
Output signal	
Transducer interface	
Position signal interface, customer device	
Part number	
Output signal factory setting	
Output signal can be adjusted via configurable USB	
Load current	
Max. residual ripple	
Load resistance	
System resolution	
Current consumption at 24 V DC	
Hysteresis	
Repeat accuracy	
Measurement rate, length-dependent	
Max. linearity deviation	
Temperature coefficient	
Supply voltage	
Polarity reversal protected	
Overvoltage protection	
Dielectric strength	
Operating temperature	

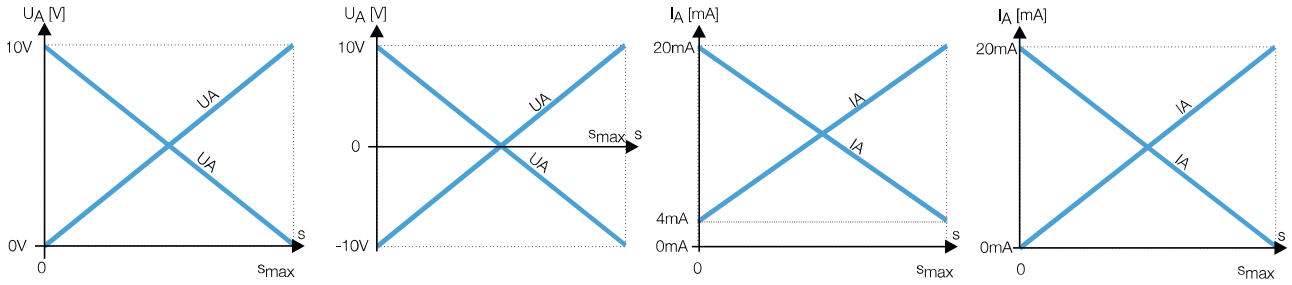
Micropulse⁺ USB configurable BTL7-A/E501
- Simple configuration and adjustment of the start and end point via the USB interface, quick startup
- "Easy Setup" for manual adjustment on-site
- Configurable dual output functions, position and speed
- Increased operating reliability with status LEDs for indicating the operating status and diagnostic information
- Extended application range due to high degree of protection IP 68 (cable version)
- The electronics head can be replaced in the event of service
- Compact housing
- Error signals, no position encoder within measuring range

Please enter code for output signal, rated length, design and connection in the part number.

Scope of delivery
- Transducer
- Calibration device
- Quick start instructions

Please order separately:
USB communication box, see page 159
Position encoders, see page 218
Floats, see page 216
Fastening nut, see page 219
Plug connectors, see page 252

	Rod BTL7	Rod BTL7
	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	
	≤ 5 mV_{pp}	
		≤ 500 Ω
	≤ 0.33 mV	≤ 0.66 µA
	≤ 150 mA	≤ 180 mA
	≤ 5 µm	≤ 5 µm
	System resolution/min. 2 µm	System resolution/min. 2 µm
	Max. 4 kHz	Max. 4 kHz
	±50 µm to ≤ 500 mm rated length	±50 µm to ≤ 500 mm rated length
	±0.01% FS > 500...5500 mm rated length	±0.01% FS > 500...≤ 5500 mm rated length
	±0.02% FS > 5500 mm rated length	±0.02% FS > 5500 mm rated length
	≤ 30 ppm/K	≤ 30 ppm/K
	10...30 V DC	10...30 V DC
	yes	yes
	yes	yes
	500 V AC (GND to housing)	500 V AC (GND to housing)
	–40...+85 °C	–40...+85 °C



Ordering example:

BTL7-_501-M_ _ _ _-_-_ _ _ _

Output signal

A 0...10 V and 10...0 V
E 4...20 mA and 20...4 mA

Standard Rated length [mm]

0025...7620 in 1-mm increments

Design

B Standard M18×1.5
For additional designs, see page 153

Connection

S32	Connectors
S115	Connectors
KA02	PUR cable 2 m
KA05	PUR cable 5 m
KA10	PUR cable 10 m
KA15	PUR cable 15 m

Setting options for the start and end point

	BTL7 Standard	BTL7-A/E501... Micropulse+ USB configurable
1. Calibration device	■	■
Teach-in	■	
Adjusting	■	
Online setting	■	
Easy Setup		■
2. Remote setup, calibration box	■	
3. USB configuration		■

1. Calibration device

100% start and end point calibration
The start and end points of the analog signal can be set to the optimal 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.

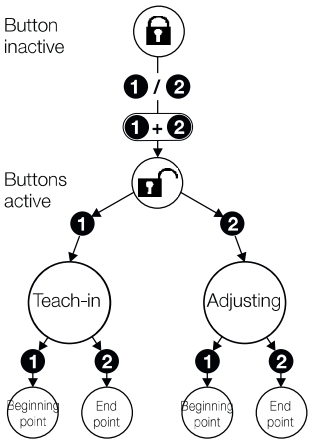
Easy Setup
For BTL7-A/E501 Micropulse+ only. Simple programming mode for adjusting the start and end point of the transducer to the current application in just a few steps. The position encoder is brought into the new position. Confirm by pressing a button. The "Adjust" function allows the new value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

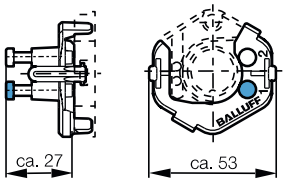
Adjusting
Here you can adjust to a new start and end value. This may be required when you cannot physically move the encoder to the start and/or end point. Move the encoder to the new start and end position, and adjust the displayed value by pressing the button until the desired output values are reached.

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 ±25%.

Teach-in
The beginning and end points set at the factory are to be replaced by the new beginning and end points.
In addition, the position encoder must first be brought into the new beginning position and then into the new end position, and the respective values stored by pressing the button.

Set start and end points using the BTL7-A/EH01 calibration device, included in the scope of delivery.



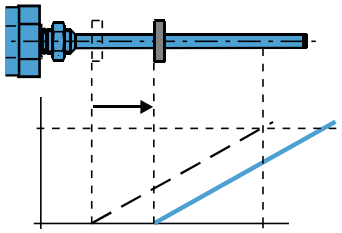


Procedure for teach-in, rising signal

before
after

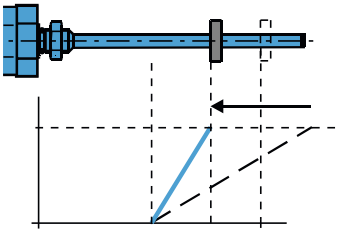
Selecting the calibration procedure BTL7 Standard

1. Move the position encoder into the new zero position.



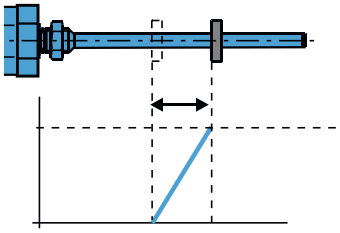
Take over new zero value

2. Move the position encoder into the new end position.



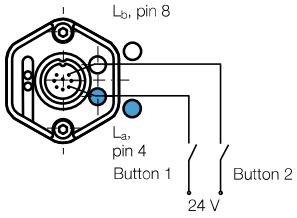
Take over new end value

3. Newly set measurement path

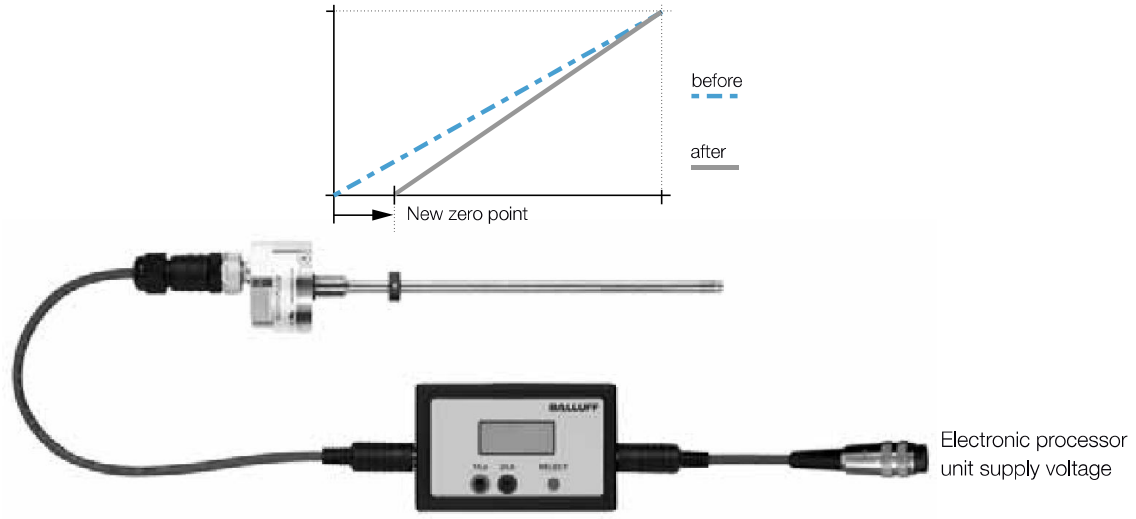


2. Remote setup

Setting the start and end points 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 L_a and button 2, gray, to input L_b.



Remote setting of the start and end points using calibration box
With the Calibration Box BTL-A-CB02, the characteristic of the position measuring system can be easily and quickly adapted to the requirements of the hydraulic cylinder and the application. With simple plug & play, without PC, laptop or extensive software downloads, the measuring range as well as the slope of the output characteristic are set. The setting option saves storage and setup costs, since one Micropulse BTL7 can fulfill different requirements that, in the past, required several systems.



Set the output characteristic with the calibration box. Zero and end points, measuring range, rising and falling characteristic

Calibration box with cable set	
Part number	**Cable set**
BTL7-A-CB02	Cable connection
BTL7-A-CB02-S115	Plug connector S115
BTL7-A-CB02-S32	Connector S32

3. USB configuration

Start, end value setting and configuration via USB
The Micropulse Configuration Tool software allows the quick and easy configuration of Balluff transducers of type BTL7-A/E501... on a PC.
The most important features are:
- Online display of the current position of the encoder
- Graphical support for setting the functions and characteristics
- Display of information about the connected transducer
- Selectable number formats and units for display
- Reset to factory settings possible
- Calibration device can be disabled
- Demo mode without having a transducer connected

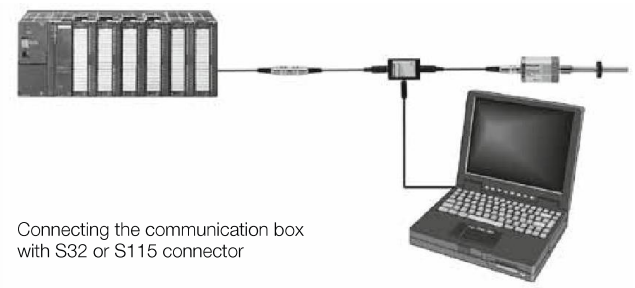
Connecting the USB communication box
For model BTL7-A/E501-M...-S32/S115 transducers, the communication box can be switched between the transducer and the controller. The communication box is connected to the PC using a USB cable.

USB communication box	
Part number	**with cable sets**
BTL7-A-CB01-USB-S32	Connector S32
BTL7-A-CB01-USB-S115	Plug connector S115
BTL7-A-CB01-USB-KA	Cable connection

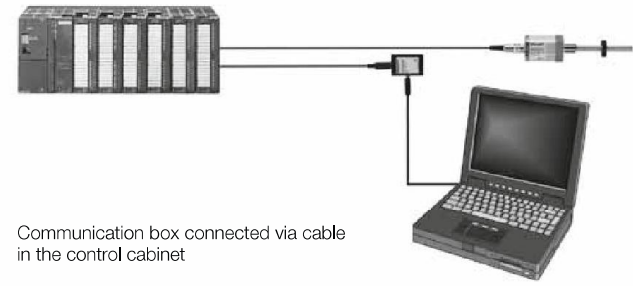
Scope of delivery
- USB communication box
- Cable set
- Quick start instructions

The PC software and the corresponding manual are available on the Internet at **www.balluff.com/downloads-btl7**

System requirements
- Standard PC
- Operating system: Windows 2000/XP/Vista/7
- Screen resolution at least 1024 × 768 pixels
- 10 MB available hard disk space
- Install Java Runtime Environment (JRE) Version 1.4.2 or higher **http://java.com/getjava**
- USB port

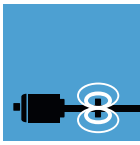


Connecting the communication box with S32 or S115 connector



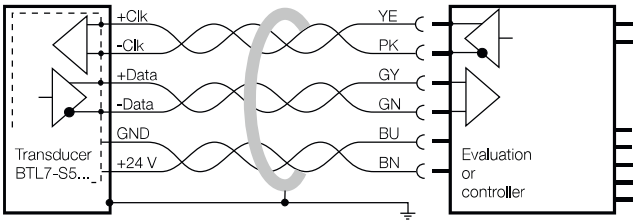
Communication box connected via cable in the control cabinet

Caution!
Before design, installation and startup please familiarize yourself with the user's guide to be found at www.balluff.com.



outstanding linear and synchronous performance

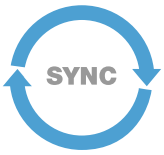
SSI interface Micropulse standard for asynchronous operation
BTL7-S5_ _-M_ _ _ _-B-_ _ _ _
The synchronous serial data transmission is suitable for controllers from different manufacturers.
Reliable signal transmission, even with cable lengths of up to 400 m between the controller and the BTL transducer, is assured by interference-free RS485/422 differential drivers and receivers.
Any interference signals are effectively suppressed.



BTL7-S5... with evaluation/controller, connection example

SSI interface Micropulse Plus for asynchronous operation
BTL7-S510-M_ _ _ _-B-_ _ _ _
Functions, interface parameters and measuring range can be set via an integrated USB interface.

SSI interface Micropulse Standard for synchronous operation
BTL7-S5_ _B-M_ _ _ _-B-_ _ _ _
Micropulse Transducers with synchronized SSI interface are well suited for dynamic control applications. Data acquisition in the transducer is synchronized using the external clock of the controller, allowing an optimum speed calculation to be performed in the regulator/controller.
Prerequisite for this synchronous method of transducer operation is time stability of the clock signal.
The **maximum scan rate f_A**, with which a new, current value is available on each sampling, can be approximated from the table to the right. An exact diagram can be found in the current user's guide.



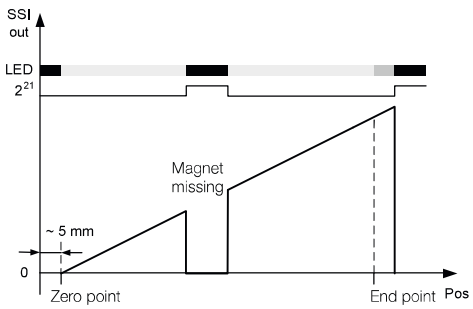
Rated length range						Scan rate
25 mm	<	Rated length	≤	150 mm	:	4050 Hz
150 mm	<	Rated length	≤	300 mm	:	3250 Hz
300 mm	<	Rated length	≤	500 mm	:	2200 Hz
500 mm	<	Rated length	≤	1000 mm	:	1200 Hz
1000 mm	<	Rated length	≤	2000 mm	:	650 Hz
2000 mm	<	Rated length	≤	7620 mm	:	170 Hz

SSI interface Micropulse Plus for synchronous operation
BTL7-S510B-M_ _ _ _-B-_ _ _ _
Via an integrated USB interface, functions,
Functions, interface parameters and measuring range can be set via an integrated USB interface.

The clock frequency depends on the cable length.

Cable length	Clock frequency
< 20 m	< 1000 kHz
< 50 m	< 600 kHz
< 100 m	< 330 kHz
< 200 m	< 180 kHz
< 400 m	< 90 kHz

Behavior of LED 1 and the error value over the entire range

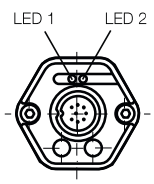


Behavior of LED 1 and error value BTL 5 µm

LED 1	
Green	**Normal function** The position encoder is within the limits
Red	**Error** No position encoder, or position encoder is outside the limits

LED 2	
Green	**Synchronous operation** Internal measurement is synchronous with SSI query
Off	**Asynchronous operation** Internal measurement is asynchronous with SSI query
Flashing green	**Programming mode** Only with BTL7-S510(B)-…

LED indicator

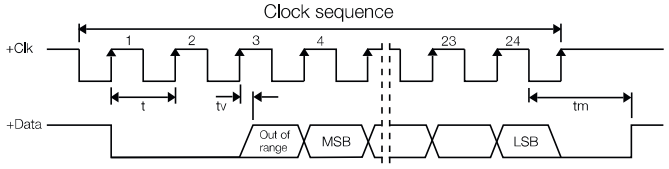


Series	**Rod BTL7**
Output signal	Synchronous-serial
Transducer interface	**S**
Customer device interface	Synchronous-serial
Part number - Standard asynchronous	BTL7-S5_ _-M_ _ _ _-_-_ _ _ _
Part number - Plus asynchronous	BTL7-S510-M_ _ _ _-_-_ _ _ _
Part number - Standard synchronous	BTL7-S5_ _**B**-M_ _ _ _-_-_ _ _ _
Part number - Plus synchronous	BTL7-S510**B**-M_ _ _ _-_-_ _ _ _
System resolution depending on model (LSB)	1, 2, 5, 10, 20, 40, 50 or 100 µm
Repeat accuracy	≤ 11 µm, typical ±2 µm
Hysteresis	≤ 7 µm
Max. linearity deviation	±30 µm with 5 and 10 µm resolution or ≤ ±2 LSB
Temperature coefficient, typical	≤ 15 ppm/K
Supply voltage, stabilized	10...30 V DC
Current consumption	≤ 120 mA
Operating temperature	–40...+85 °C
Storage temperature	–40...+100 °C

Scope of delivery
- Transducer
- Quick start instructions

Please enter code for coding, system resolution, rated length, design and connection in the part number.

Clock sequence



Order example BTL7-S standard:

BTL7-S5_ _ -M_ _ _ _-_-_ _ _ _ for asynchronous operation
BTL7-S5_ _B-M_ _ _ _-_-_ _ _ _ for synchronous operation

Coding

0	Binary code rising (24-bit)
1	Gray code rising (24-bit)
6	Binary code rising (25-bit)
7	Gray code rising (25-bit)
A	Binary code rising (26-bit)
B	Gray code rising (26-bit)

System resolution

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

Standard rated length [mm]

0025...7620 mm
in 1 mm increments

Design

B Standard M18×1.5
For additional designs, see page 153

Connection

S32	Connectors
S115	Connectors
KA02	PUR cable 2 m
KA05	PUR cable 5 m
KA10	PUR cable 10 m
KA15	PUR cable 15 m

Order example BTL7-S Plus:

BTL7-S510 -M_ _ _ _-_-_ _ _ _ for asynchronous operation
BTL7-S510B-M_ _ _ _-_-_ _ _ _ for synchronous operation

Standard rated length [mm]

0025...7620 mm
in 1-mm increments on request

Design

B Standard M18×1.5
For additional designs, see page 153

Connection

S32	Connectors
S115	Connectors
KA02	PUR cable 2 m
KA05	PUR cable 5 m
KA10	PUR cable 10 m
KA15	PUR cable 15 m

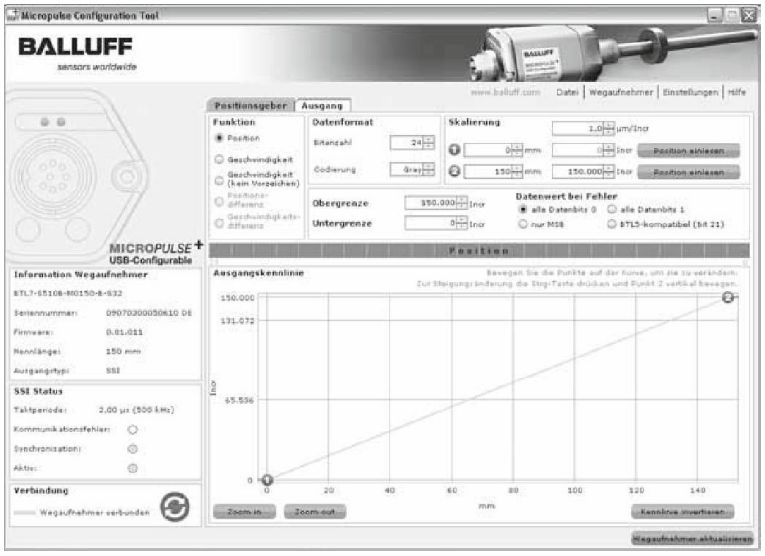
Micropulse Plus BTL7-S510_-… with USB interface
Configuration via USB
The BTL7-S510_-… transducers can be configured quickly and easily on a PC.
The most important features are:
- Online display of the current position of the encoder
- Graphical support for setting the functions and characteristics
- Display of information via the connected transducer (model, serial number, firmware version, nominal length, SSI output signal)
- Selectable number formats and units for display
- Reset to factory settings possible
- Demo mode without having a transducer connected

System requirements
- Standard PC
- Operating system: Windows 2000/XP/Vista/7
- Screen resolution at least 1024 × 768 pixels
- 10 MB available hard disk space
- Install Java Runtime Environment (JRE) Version 1.4.2 or higher **http://java.com/getjava**
- USB port

Configuration options of the position measuring system BTL7-S510_-…
- Number of position encoder 1 or 2
- Position
- Velocity
- **Differential position**
- Speed difference

Interface configuration
- Start/end point
- Rising/falling signal
- Error value
- Data format
- Code
- Resolution

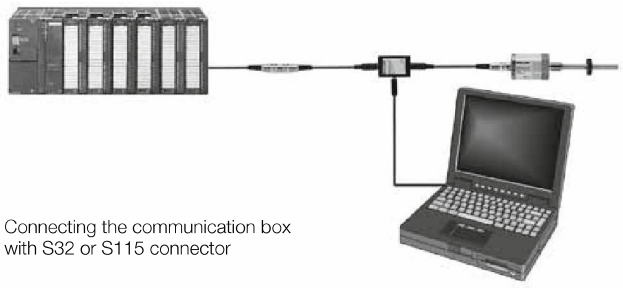
The PC software and the corresponding manual are available on the Internet at **www.balluff.com/downloads-btl7**



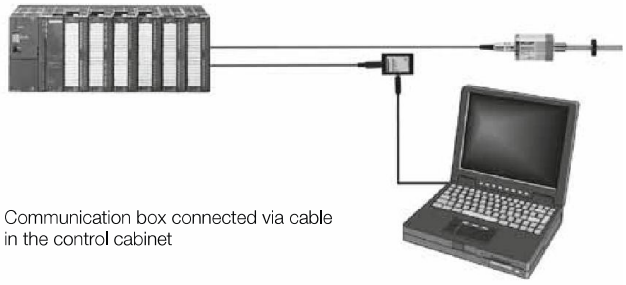
Connecting the USB communication box
With the BTL7-S510-M... transducers, the communication box can be connected between the transducer and controller. The communication box is connected to the PC using a USB cable.

USB communication box with cable set	
Part number	**Cable set**
BTL7-A-CB01-USB-S32	Connector S32
BTL7-A-CB01-USB-S115	Plug connector S115
BTL7-A-CB01-USB-KA	Cable connection

Scope of delivery
- USB communication box
- Cable set
- Quick start instructions



Connecting the communication box with S32 or S115 connector



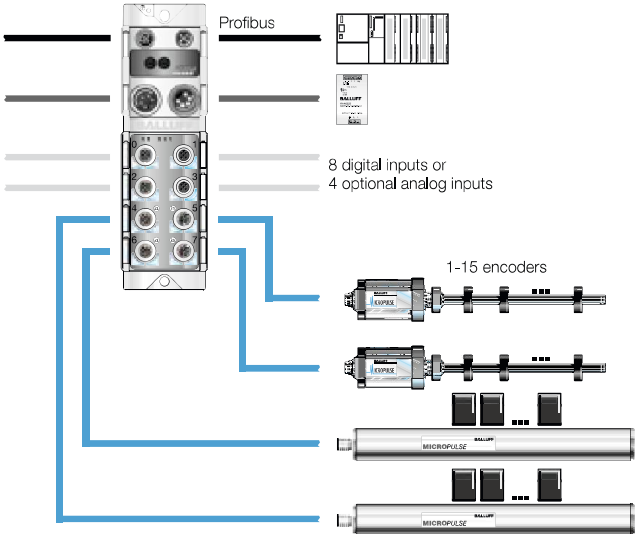
Communication box connected via cable in the control cabinet

Caution!
Before design, installation and startup please familiarize yourself with the user's guide to be found at www.balluff.com.

cost-effective and synchronous performance

Profibus BNI modules are an elegant, cost-effective solution from Balluff.
The modules have a robust metal housing that was designed for use in harsh industrial environments and is capable of withstanding powerful mechanical loads. The modules have four independent ports for Micropulse Transducers BTL with P511. A maximum of 16 encoders can be used per BTL port. The maximum rated length here is 7500 mm. Depending on the version, four additional ports with digital or analog sensors can be assigned. You can achieve maximum functionality and cost efficiency for fieldbus integration by combining Micropulse Transducers BTL with Profibus modules P111.

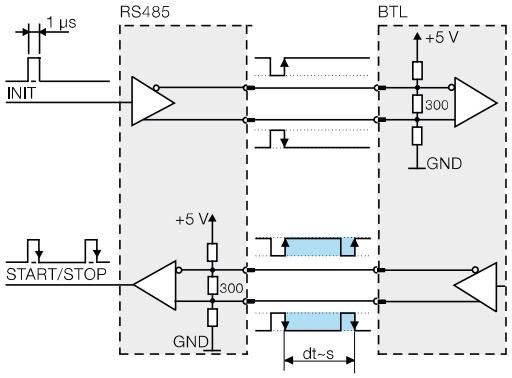
For more information, see page 268



The maximum number of position encoders per BTL is 16; however altogether, it is 60 per module.

P511 interface – Cost savings using DPI/IP for start-up and installation
DPI/IP is a protocol for direct data exchange between a controller and transducer. The signal lines are used to send additional information such as manufacturer, measuring length and waveguide gradient. This allows start-up or replacement of a transducer without having to make manual changes to the controller parameters.

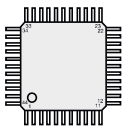
Features
- Bi-directional communication
- Position measurement system controller using Init and start/stop signals
- Integrated diagnostic functions
- Plug and Play
- Automatic configuration – shorter downtimes
- Transmission of sensor type, measuring length, specific parameters
- Measurement length up to 7,620 mm



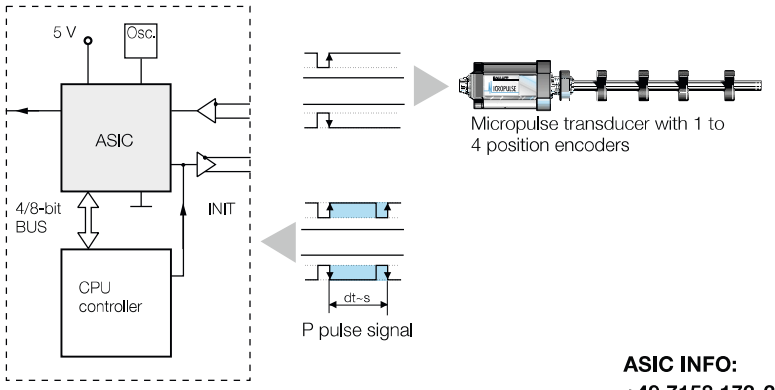
Block diagram of P interface

Highly accurate digitalizations of the P511 pulse signal
Companies developing their own electronic control and processor units can create a highly accurate P interface cost-effectively and with minimum effort using the Balluff digitizing chip. The digitizing chip was developed as a high-resolution, configurable ASIC for Micropulse transducers with P pulse interface.

Benefits
- High position resolution: the actual 1 µm resolution of the BTL position measurement system is supported by the 133 ps resolution of the chip (at low clock frequency 2 or 20 MHz).
- Position data from 4 position encoders can be processed simultaneously
- 4/8-bit processor interface



Digitizing chip 44QFP

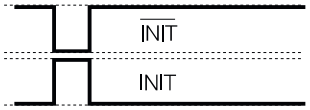


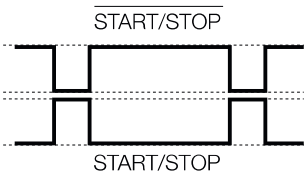
Controller or electronic processor unit

ASIC INFO:
+49 7158 173-370

Series	**Rod BTL7**
Transducer interface	Pulse **P511**
Customer device interface	Pulse **P511**
Part number	BTL7-**P**511-M_ _ _ _-_-_ _ _ _
System resolution	processing-dependent
Repeat accuracy	typ. ±2.5 µm
Hysteresis	≤ ±7 µm
Linearity deviation	±50 µm up to 500 mm rated length typ. ±0.01% 501...5500 mm rated length typ. ±0.02 % 5500...7620 mm rated length
Ultrasonic speed (standardized)	2850 m/s
Gradient (standardized)	8.9122807 µs/inch
Supply voltage	10...30 V
Current consumption at 24 V	120 mA
Operating temperature	–40...+85 °C
Storage temperature	–40...+100 °C

The rising and falling edges can be evaluated.





Please enter code for rated length, design and connection in the part number.

Scope of delivery
- Transducer
- Quick start instructions

Please order separately:
Position encoders, see page 218
Floats, see page 216
Fastening nut, see page 219
Plug connectors, see page 252

Ordering example:

BTL7-P511-M_ _ _ _-_-_ _ _ _

Standard Rated length [mm]
0025...7620 mm
in 1-mm increments

Design
B Standard M18×1.5
For additional designs, see page 153

Connection

S32	Connectors
S115	Connectors
KA02	PUR cable 2 m
KA05	PUR cable 5 m
KA10	PUR cable 10 m
KA15	PUR cable 15 m