

# Micropulse Transducers

## Profile PF

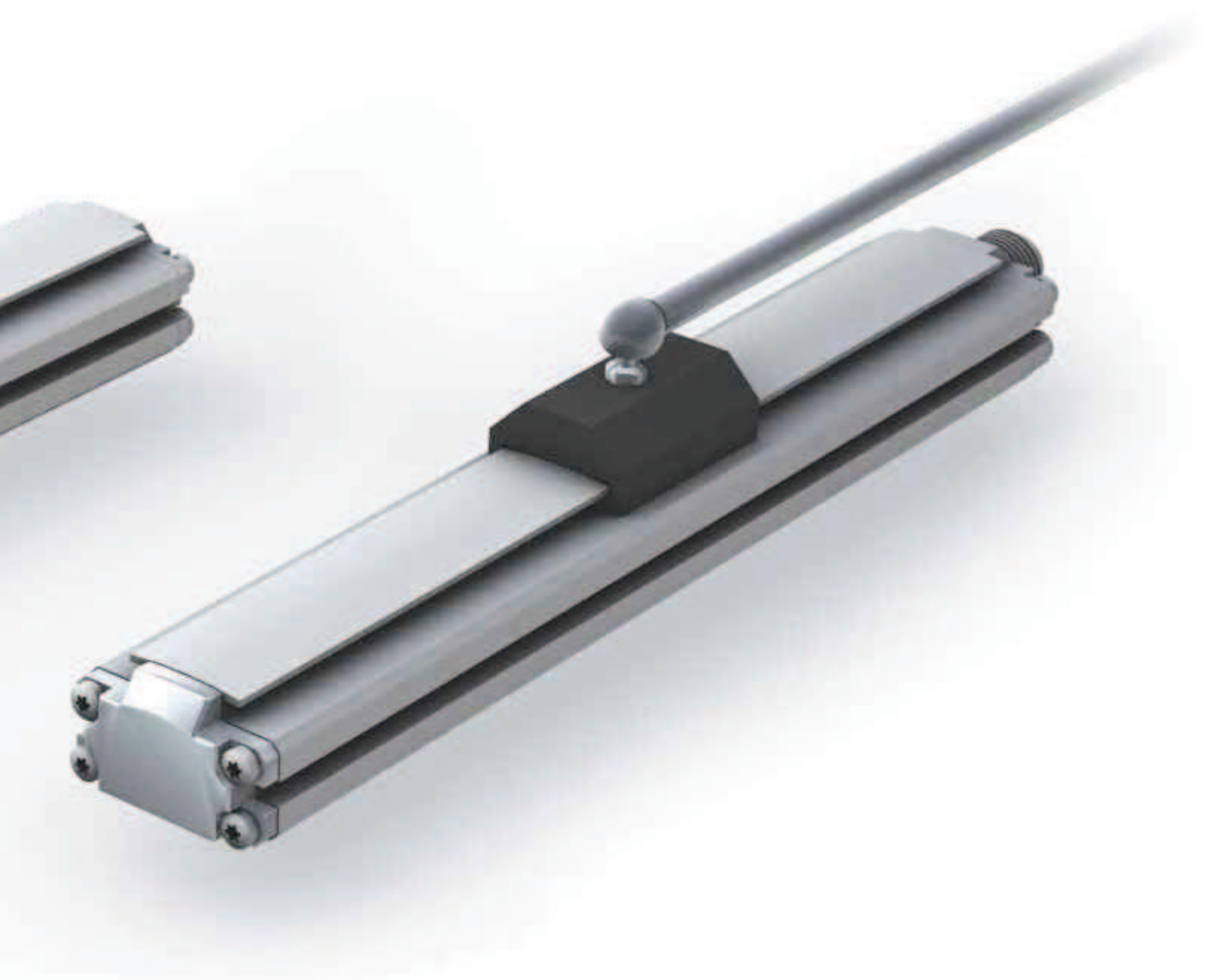
- Flat design, fits in every niche
- Easy to install
- Characteristic curve setting with LED support for quick commissioning
- High degree of protection, IP 67 standard
- Up to 15 mm distance between magnet and system – truly contactless
- Floating and captive ball joint arm magnets
- Available with the entire series of analog signals



**PF**

General data	104
Analog interface	106
IO-Link V1.1	108
Floating magnet	110
Captive magnet	112

**MICROPULSE<sup>®</sup>**



The structural design, high degree of protection and simple installation of Balluff Micropulse Transducers in a profiled housing makes them an excellent alternative to linear transducers, e.g. potentiometers, glass rulers and LVDTs. The linear sensing element is protected inside an extruded aluminum profile.

A passive magnet with no power supply marks the measuring point on the measuring path without making contact. Measuring ranges between 50 and 4572 mm are possible.

- Non-contact measurement of the measuring position
- IP 67, insensitive to contamination
- Wear-free
- Insensitive to shock and vibration
- Absolute output signal
- Max. resolution of 0.005 mm (depending on the electronic evaluation unit)
- Direct signal evaluation or in conjunction with evaluation units for all control and regulating systems



**Caution!**

Please read the instructions in the user's guide before designing, installing, and commissioning! [www.balluff.de](http://www.balluff.de)

## Profile PF

### General data

Series	<b>BTL6 profile PF</b>
Shock load	50 g/6 ms as per IEC 60068-2-27
Vibration	12 g, 10...2000 Hz per EN 60068-2-6
Polarity reversal protected	Yes (up to 36 V)
Overvoltage protected	to 36 V
Dielectric strength	500 VDC (GND to housing)
Degree of protection as per IEC 60529	IP 67 (with IP-67 connector BKS-S... attached)
Housing material	Anodized aluminum
Housing attachment	Compression clamps
Connection	Plug connector
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
Rapid, transient electrical pulses (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]	0050...4572 in 5 mm increments



Micropulse Transducers

Profile P

Profile PF

**General data**

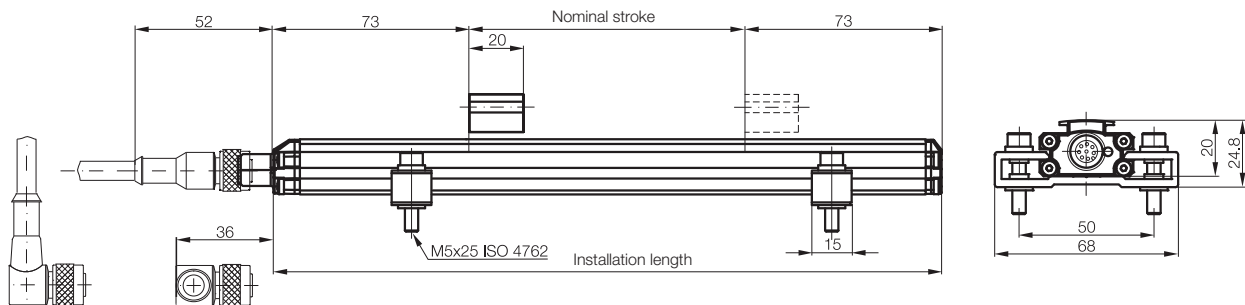
Analog interface

IO-Link V1.1

Floating Magnet

Captive Magnet

#### Transducers with floating magnet and connection S115 with BKS-S115/BKS-S116 connector



Profile AT

Profile BIW

Rod

Rod Compact and Rod AR

Rod EX, T Redundant and CD

Filling Level Sensor SF

Accessories

Basic Information and Definitions

#### Scope of delivery

- Transducer (select your interface from page 106)
- Quick start instructions
- Mounting clamps with insulating sleeves and screws



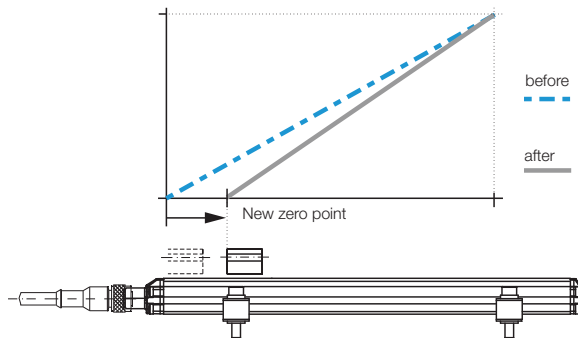
Please order separately:  
Magnets, on page 110  
Plug connectors, page 240

## Output and measuring range setting

The measuring range and the output signal can be adapted to the relevant application requirements via programming inputs. In teach-in mode with inversion or reset function.

### Teach-in

The factory-set zero and end point is replaced by a new zero and end point. The zero and end points can be set independently of each other, and the characteristic slope changes.



Read in new zero point

### Inverting (only with BTL-C/E)

The characteristic of the current output can be inverted by activating the programming inputs. For example, the rising characteristic of the output becomes a falling characteristic. The voltage outputs are not inverted.

### Reset

Restoring the transducer to its factory default settings.

### Calibration box

Calibration boxes with cable sets	
Part number	Cable set
BTL7-A-CB02	Cable connection
BTL7-A-CB02-S115	Connector S115
BTL7-A-CB02-S32	Connector S32

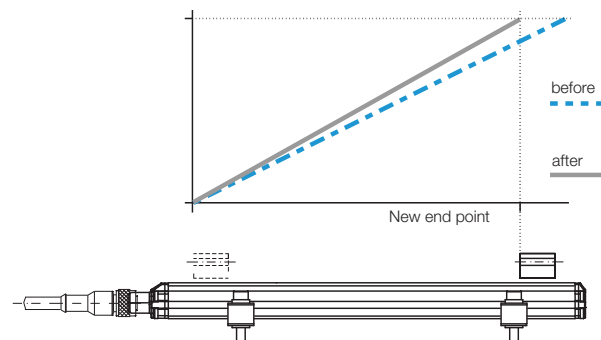
### Micropulse Transducer BTL6 profile PF with Calibration Box BTL7-A-CB02



Electronic evaluation unit  
Supply voltage

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

Series	
Output signal	
Transducer interface	
Customer device interface	
Part number	
Output voltage	
Output current	
Load current	
Max. residual ripple	
Load resistance (recommended)	
System resolution	
Sampling rate	
Max. linearity deviation	
Temperature coefficient	
Supply voltage	
Current consumption	
Operating temperature	
Storage temperature	



Read in new end point

# Profile PF

## Analog interface

Profile PF BTL6	Profile PF BTL6	Profile PF BTL6	Profile PF BTL6
Analog	Analog	Analog	Analog
<b>A</b>	<b>E</b>	<b>C</b>	<b>G</b>
Analog	Analog	Analog	Analog
BTL6-A500-M____-PF-S115	BTL6-E500-M____-PF-S115	BTL6-C500-M____-PF-S115	BTL6-G500-M____-PF-S115
0...10 V	4...20 mA	0.1...20 mA	-10...10 V
Max. 5 mA			Max. 5 mA
≤ 5 mV			≤ 5 mV
≤ 0.35 mV	≤ 500 ohms (500 ohms)	≤ 500 ohms (500 ohms)	≤ 0.35 mV
f <sub>max</sub> = 2 kHz	≤ 0.7 µA	≤ 0.7 µA	f <sub>max</sub> = 2 kHz
±200 µm up to 500 mm nominal stroke	f <sub>max</sub> = 2 kHz	f <sub>max</sub> = 2 kHz	±200 µm up to 500 mm nominal stroke
±0.04% 500... max. nominal stroke	±200 µm up to 500 mm nominal stroke	±200 µm up to 500 mm nominal stroke	±0.04% 500... max. nominal stroke
30 ppm at 500 mm	±0.04% 500... max. nominal stroke	±0.04% 500... max. nominal stroke	30 ppm at 500 mm
10...30 V DC	30 ppm at 500 mm	30 ppm at 500 mm	10...30 V DC
≤ 150 mA	10...30 V DC	10...30 V DC	≤ 150 mA
-25...+70 °C	≤ 150 mA	≤ 150 mA	-25...+70 °C
-40...+100 °C	-25...+70 °C	-25...+70 °C	-40...+100 °C



Micropulse Transducers

Profile P

Profile PF  
General data  
**Analog interface**  
IO-Link V1.1  
Floating Magnet  
Captive Magnet

Profile AT

Profile BIW

Rod

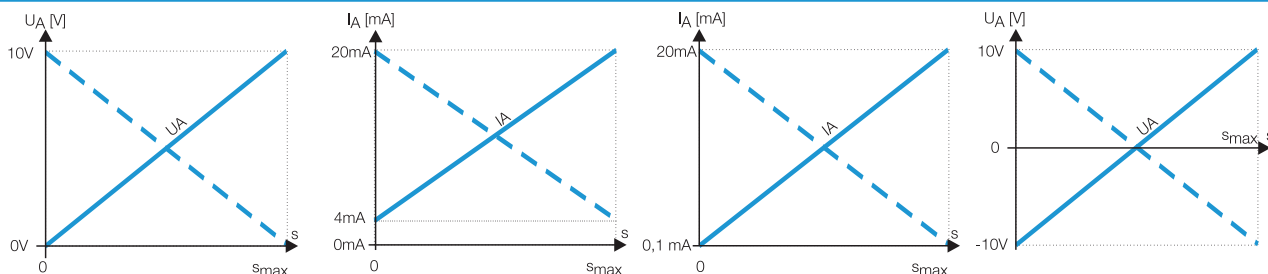
Rod Compact  
and Rod AR

Rod EX,  
T Redundant  
and CD

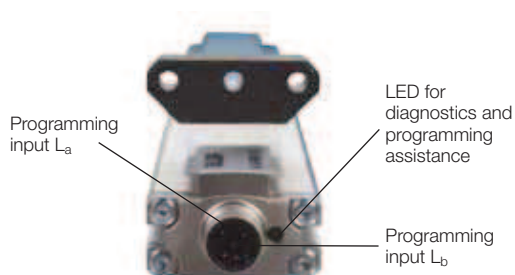
Filling Level  
Sensor SF

Accessories

Basic  
Information and  
Definitions



----- Output signal can be inverted via programming inputs.



Please enter code for output signal and nominal stroke in the part number.

### Scope of delivery

- Transducer
- Mounting clamps with insulating sleeves and screws
- Quick start instructions

Please order separately:  
Magnets, on page 110  
Plug connectors, page 232

### Ordering example:

BTL6- 500-M \_\_\_\_ -PF-S115

Output signal

Standard  
nominal stroke [mm]

A 0...10 V  
E 4...20 mA  
C 0.1...20 mA  
G -10...10 V

0050...4572 in 5 mm increments

### Contactless position measurement technology with IO-Link

The Micropulse PF IO-Link is an absolute and non-contact position measuring system that continuously provides measurements in  $\mu\text{m}$  in the 1-ms cycle. These measured values are directly transferred digitally via IO-Link.

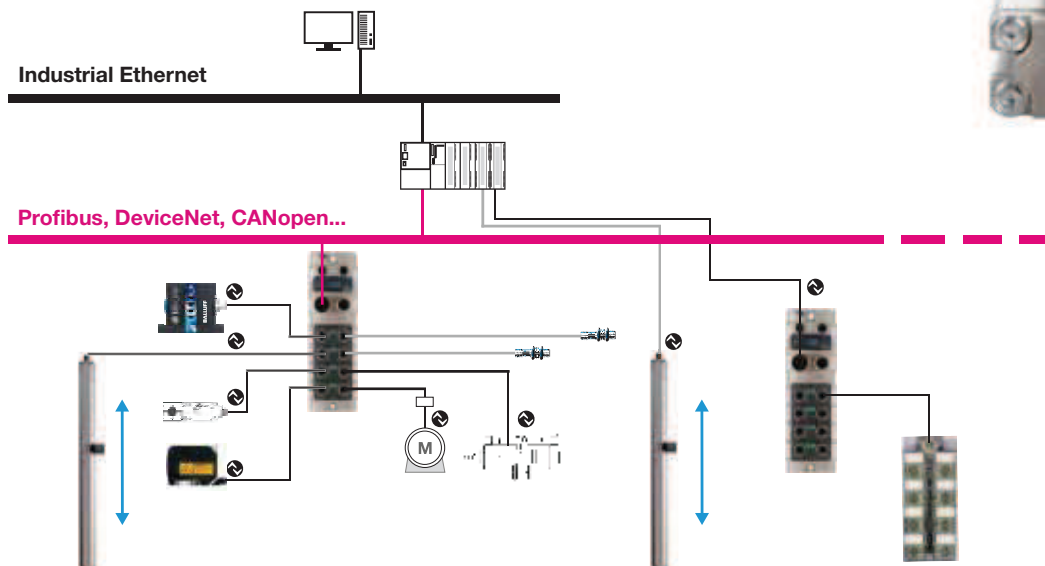
IO-Link is a point-to-point connection within any number of networks. An IO-Link system consists of an IO-Link device such as a sensor or actuator, an IO-Link master and the wiring. The IO-Link master is either an integrated/modular IP20 module for central operation in the control cabinet or as a remote I/O module in IP 65/67 form of protection for hard usage directly in the field. Master modules are available with all current field bus protocols. The Micropulse PF IO-Link device is coupled to the master via a maximum 20 m long standard sensor/actuator line. The Micropulse PF IO-Link works with the communication speed COM3 (230kB), which achieves a process data cycle of 1 ms with a 1.1 master. Data transmission between the master and the device utilizes three-conductor physics well-known in the world of standard sensor/actuators. A standard UART protocol is used. The exact nature of the data packets defines the IO-Link protocol. Via IO-Link, the user interface can be mapped based on an IODD (IO Device Description) in the engineering system. Due to the continuous flow of information, all data are centrally and consistently saved, so that a configuration is possible and reproducible at any time.

- Simple configuration, time-saving installation and startup
- OTF, automatic configuration in running operation (on the fly)
- Continuous monitoring and diagnostics
- High transfer rate, quick process data cycle
- Cost-effective wiring with standard M12 cable plug connector
- Simple control integration via standard IO-Link modules
- For use in rough industrial environments, with IP-67 IO-Link master modules from Balluff
- Process data 32 bit signed integer
- Output resolution 1  $\mu\text{m}/\text{digit}$
- Diagnostics + error value recognition

### Additional information

About IO-Link: [www.io-link.com](http://www.io-link.com)

You can find the compact IO-Link product line in the **Industrial Networking and Connectivity** catalog.



Series	<b>Profile PF BTL6</b>
Output signal	IO-Link V1.1
Transducer interface	U110
Part number	BTL6-U110-M_ _ _ -PF-S4
System resolution	5 µm
Repeat accuracy	≤ 30 µm
Sampling rate	f <sub>STANDARD</sub> = 1 kHz (< 1300 mm)
Linearity deviation	≤ ±200 µm up to 500 mm nominal stroke ±0.04 %
Supply voltage	18...30 V DC
Current consumption	≤ 150 mA
Polarity reversal protected	yes
Operating temperature	-25...+70 °C
Storage temperature	-40...+100 °C
Mode	COM 3
Transmission rate	230.4 kbaud
Process data cycle	1 ms
Process data	Position value in µm
Parameters	Measuring range, zero point
Diagnostics	Magnet in the measuring range, below, above, no magnet



Micropulse  
Transducers

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General data  
Analog interface  
**IO-Link V1.1**  
Floating Magnet  
Captive Magnet

Profile AT

Profile BIW

Rod

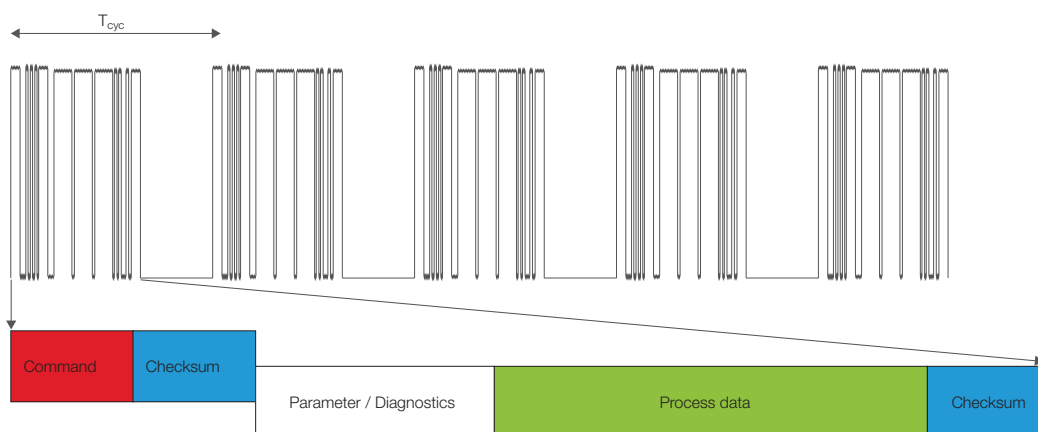
Rod Compact  
and Rod AR

Rod EX,  
T Redundant  
and CD

Filling Level  
Sensor SF

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Basic  
Information and  
Definitions



Please enter the code for the nominal stroke in the part number.

#### Scope of delivery

- Transducer
- Mounting clamps with insulating sleeves and screws
- Quick start instructions

Please order separately:

Magnet, page 110

See separate catalog for plug connectors:

**Industrial networking and connectivity**

#### Ordering example:

**BTL6-U110-M\_ \_ \_ -PF-S4**

**Standard  
nominal stroke [mm]**

0050...4572 mm in 5 mm increments

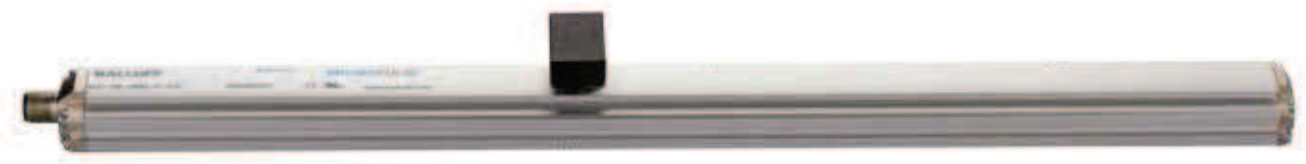
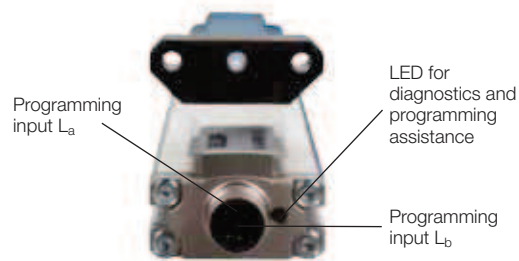
## Profile PF Floating magnet

# non-contact Distance up to 15 mm

Balluff magnets are available in captive or free designs. Transducers with captive magnets guarantee the highest resolution and reproducibility.

The BTL5-P-4500-1 magnet is an electromagnet and requires an operating voltage of 24 V, which can be turned on and off for selective activation. This allows multiplex operation with multiple magnets on a single transducer.

Description	
for Series	
Version	
<b>Ordering code</b>	
Part number	
Housing material	
Weight	
Magnet travel speed	
Supply voltage	
Current consumption	
Operating temperature/Storage temperature range	
Scope of delivery	
Accessories (please order separately)	



### Caution!

Please read the instructions in the user's guide before designing, installing, and commissioning! [www.balluff.de](http://www.balluff.de)

Length			Number of mounting clamp pairs
	to		
	to	250 mm	1
251	to	750 mm	2
751	to	1250 mm	3
1251	to	1750 mm	4
1751	to	2250 mm	5
2251	to	2750 mm	6
2751	to	3250 mm	7
3251	to	3750 mm	8
3751	to	4250 mm	9
	more than	4251 mm	10

Mounting clamps with insulating sleeves and screws included in the scope of delivery of the transducer.

Replacement:  
BTL6-A-MF07-A-PF/M5 1 pair of brackets and screws,  
Ordering code: **BAM01N3**



# Profile PF

## Floating magnet

Magnet	Magnet	Magnet
Profile PF BTL	Profile PF BTL	Profile PF BTL
Floating	Floating	Floating
<b>BAM014M</b>	<b>BAM014T</b>	<b>BAM014P</b>
BTL5-P-3800-2	BTL5-P-5500-2	BTL5-P-4500-1
Plastic	Plastic	Plastic
approx. 12 g	approx. 40 g	Approx. 90 g
any	any	any
		24 V DC
		100 mA
-40...+85 °C	-40...+85 °C	-40...+60 °C
Magnet	Magnet	Magnet
2 fastening screws DIN 84 M4x35-A2 with washers and nuts		
		Connector, straight* BCC M415-0000-1A-014-PS0434
		Connector, angle* BCC M425-0000-1A-014-PS0434



Micropulse Transducers

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Profile PF  
General data  
Analog interface  
IO Link V1.1

**Floating Magnet**  
Captive Magnet

Profile AT

Profile BIW

Rod

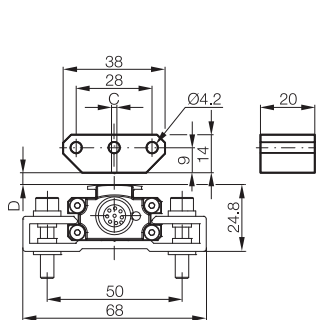
Rod Compact  
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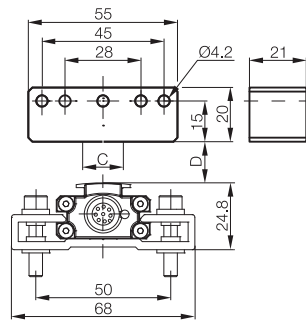
Filling Level  
Sensor SF

Accessories

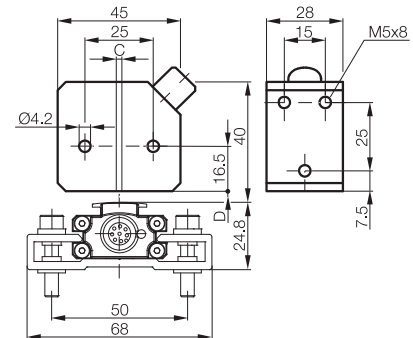
Basic  
Information and  
Definitions



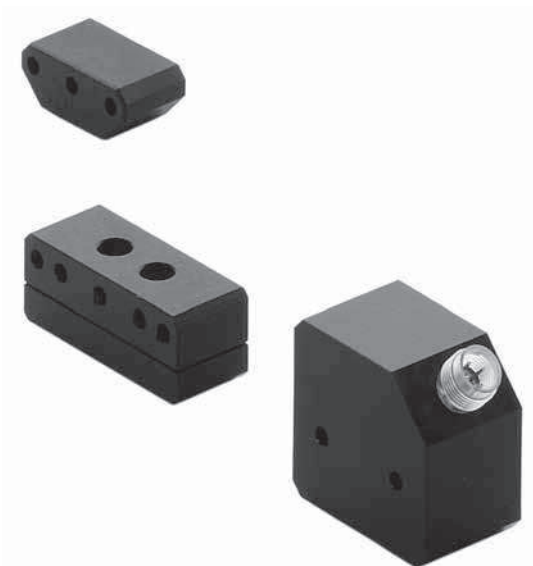
Lateral offset:  
 $C = \pm 2 \text{ mm}$   
Distance of magnet:  
 $D = 0.1 \dots 4 \text{ mm}$



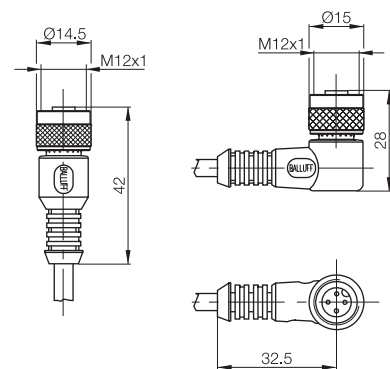
Lateral offset:  
 $C = \pm 15 \text{ mm}$   
Distance of magnet:  
 $D = 5 \dots 15 \text{ mm}$



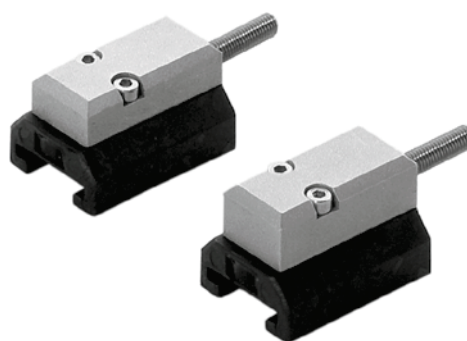
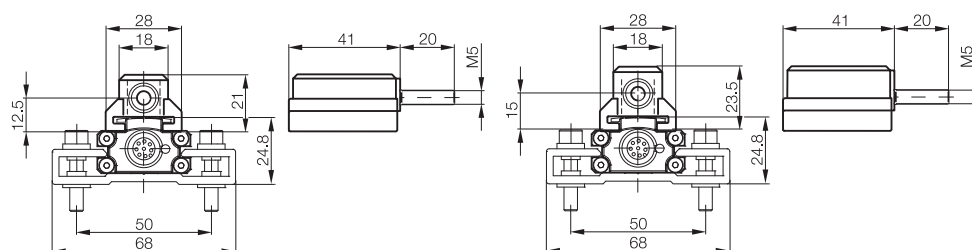
Lateral offset:  
 $C = \pm 2 \text{ mm}$   
Distance of magnet:  
 $D = 0.1 \dots 2 \text{ mm}$



\* Please include the cable length code  
in the part number.  
010 = 2 m, 050 = 5 m, 100 = 10 m



Description		<b>Magnet</b>		<b>Magnet</b>	
for Series		Profile PF BTL		Profile PF BTL	
Version		Captive		Captive	
<b>Ordering code</b>		<b>BAM014K</b>		<b>BAM014L</b>	
Part number		BTL5-M-2814-1S		BTL5-N-2814-1S	
Material	Housing	Anodized aluminum		Anodized aluminum	
	Sliding surface	Plastic		Plastic	
Weight		Approx. 32 g		Approx. 35 g	
Magnet travel speed		any		any	
Operating temperature/Storage temperature range		-40...+85 °C		-40...+85 °C	



## Caution!

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Length			Number of mounting clamp pairs
	to	250 mm	1
251	to	750 mm	2
751	to	1250 mm	3
1251	to	1750 mm	4
1751	to	2250 mm	5
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2751	to	3250 mm	7
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3751	to	4250 mm	9
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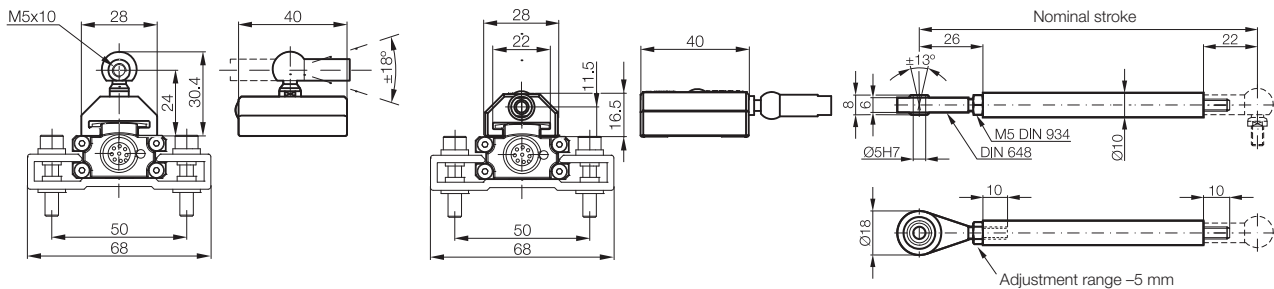
Mounting clamps with insulating sleeves and screws included in the scope of delivery of the transducer.

Replacement:  
BTL6-A-MF07-A-PF/M5 1  
pair of brackets and screws,  
Ordering code: **BAM01N3**



# Profile PF Captive magnet

Magnet	Magnet	Control arm
Profile PF BTL	Profile PF BTL	Profile PF BTL
Captive	Captive	Captive
<b>BAM014H</b>	<b>BAM01FC</b>	
BTL5-F-2814-1S	BTL5-T-2814-1S	BTL2-GS10-____-A
Anodized aluminum	Anodized aluminum	Aluminum
Plastic	Plastic	
approx. 28 g	approx. 28 g	approx. 150 g/mg
any	any	
-40...+85 °C	-40...+85 °C	



Please enter the code for the nominal stroke in the part number.

## Ordering example:

**BTL2-GS10-\_\_\_\_-A**

### Standard nominal stroke [mm]

0075	0100	0125
0150	0200	0250
0350	0400	0450
0500	0600	0800
1000	1500	2000



### Swivel eye

Material number 714619

When using captured magnets with ball joint and control arm, transverse forces do not impinge on the transducer system.



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