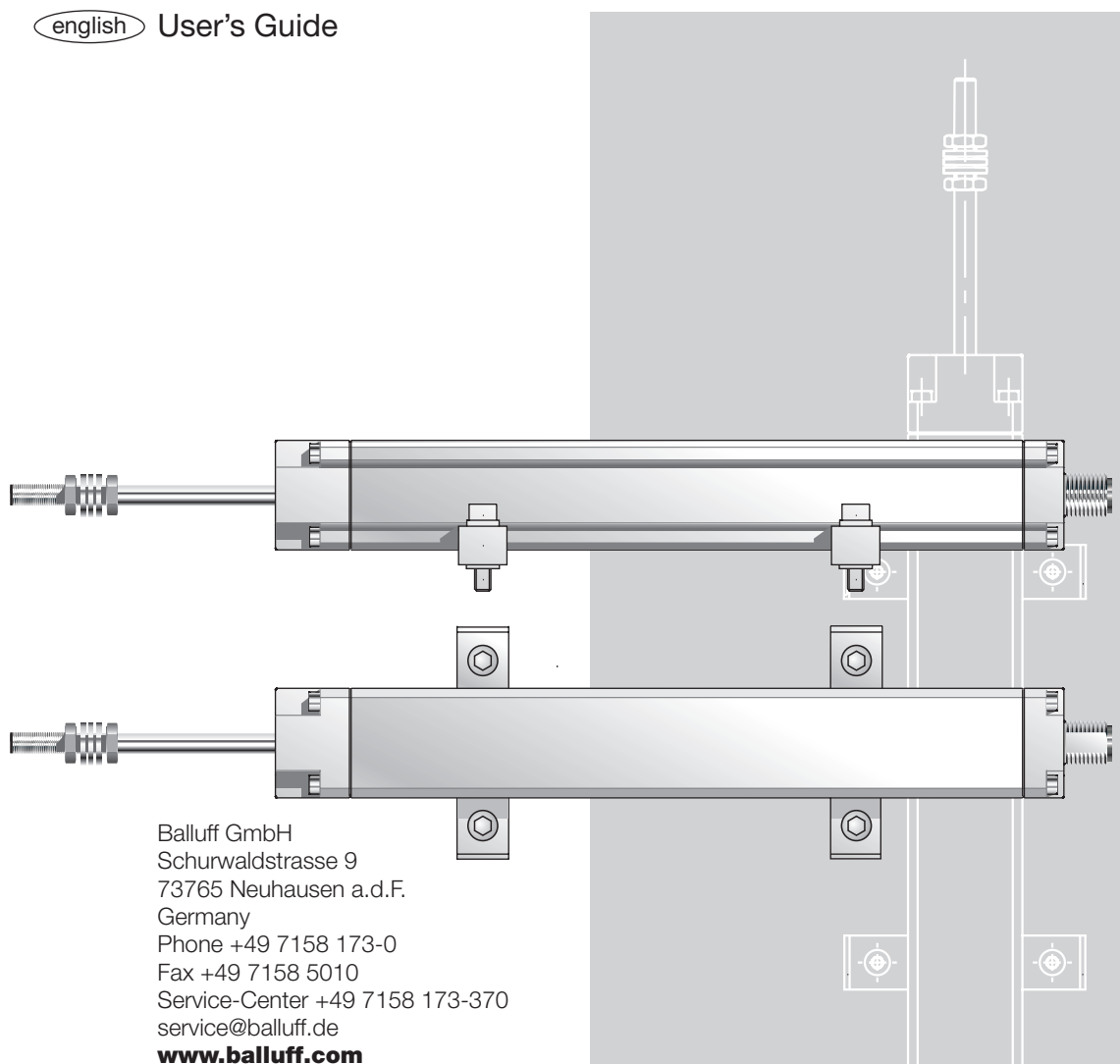


BIW1-A/C/E/G310-M\_ \_ \_ \_-P1-S115

english User's Guide



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**1 Safety Advisory**

Read this manual before installing and operating the BIW Transducer.

**1.1 Proper application**

The BIW transducer is intended to be installed in a machine or system. Together with a controller (PLC) or a processor it comprises a position measuring system and may only be used for this purpose.

Unauthorized modifications and non-permitted usage will result in the loss of warranty and liability claims.

**1.2 Qualified personnel**

This guide is intended for specialized personnel who will perform the installation and setup of the system.

**1.3 Use and inspection**

The relevant safety regulations must be followed when using the transducer system. In particular, steps must be taken to ensure that should the transducer system become defective no hazards to persons or

property can result. This includes the installation of additional safety limit switches, emergency shutoff switches and maintaining the permissible ambient conditions.

**1.4 Scope**

This guide applies to the model BIW1-A/C/E/G transducer.

An overview of the various models can be found in section 6 Versions (indicated on product label) on page 6.

**Note:** For special versions, which are indicated by an -SA\_ \_ \_ designation in the part number, other technical data may apply (affecting calibration, wiring, dimensions etc.).

**2 Function and Characteristics**

**2.1 Characteristics**

BIW transducers feature:

- High resolution and repeatability
- Immunity to shock, vibration and RF fields
- Absolute output signal rising or falling (selectable)
- Guided sensor element
- 32 kHz sampling rate
- Potential-free

The oscillator circuit is excited via the sender/sensor element at a sampling rate of 32 kHz, couples a signal into the receiver sensor element at the momentary position. The position value is immediately available on the output and is an absolute signal.

**2.2 Function**

The BIW transducer contains a sender/receiver sensor element and an oscillator circuit, sealed in an aluminum extruded housing. The oscillator is attached to a rod which in turn is attached to the moving member of the machine whose position is to be determined.

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## Micropulse Linear Transducer in Profile Housing

### 3 Installation

#### 3.1 Transducer installation

Any orientation is permitted. Mount the transducer on a level surface of the machine using the mounting brackets. Observe the recommended spacing of the mounting brackets.

1. Align transducer with sliding rod.
2. Tighten mounting screws to a maximum of 2 Nm.

*Ensure that no strong electrical fields are present in the immediate vicinity of the transducer.*

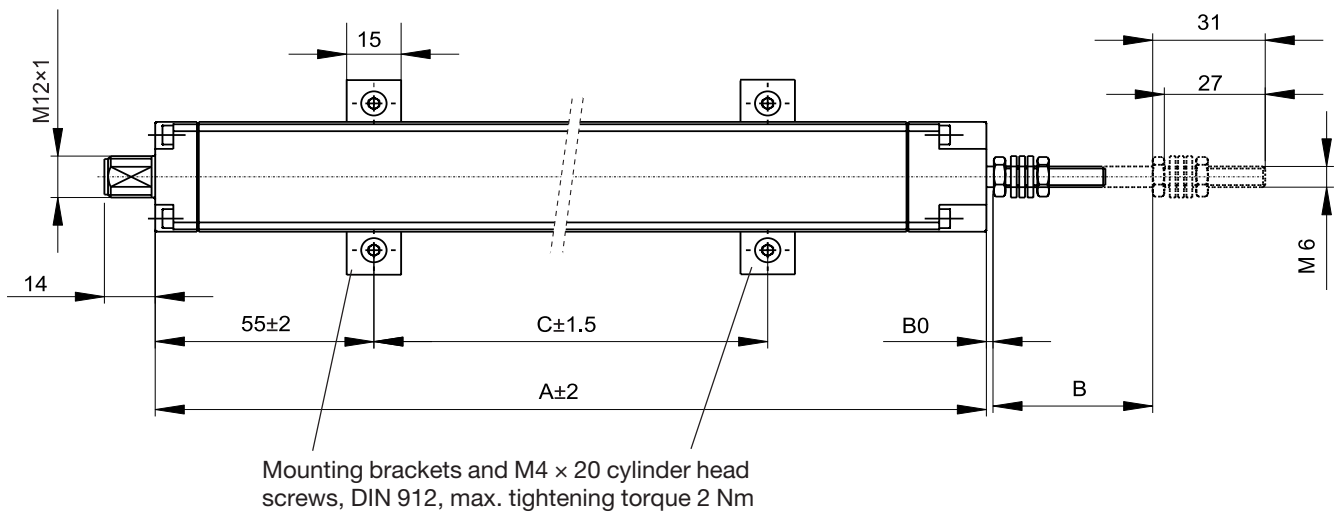
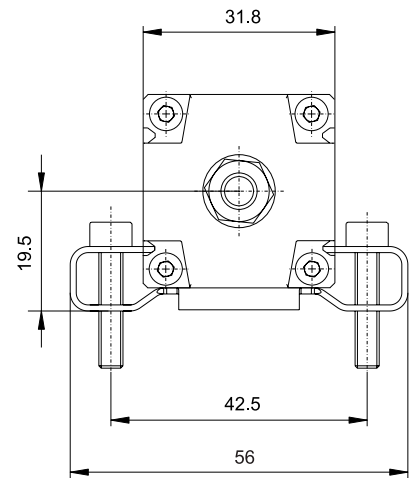


Fig. 3-1: Dimensional drawing (BIW1...P1-S115 transducer)

Housing length	$A = \text{Nominal length} + 100 \text{ mm}$
Mechanical zero point	$B0 = 0 + 2 \text{ mm}$
Electrical zero point	$B0 + 5 \text{ mm}$
Electrical stroke = mechanical stroke	$B = \text{Nominal length} + 10 \text{ mm}$
Clamp spacing	
Nominal length $\leq 300 \text{ mm}$	$C = \text{Nominal length} - 20 \text{ mm}$
Nominal length $300 \text{ mm to } \leq 600 \text{ mm}$	$C = \text{Nominal length} - 15 \text{ mm}$
Nominal length $> 600 \text{ mm}$	$C = \text{Nominal length} - 10 \text{ mm}$

Table 3-1: Dimensions

*Available nominal lengths*  
 ➔ section 6.2

#### BIW1-...-M0100-P1-S115

Nominal length 100	$A = 200$
	$B = 110$
	$C = 80$

#### BIW1-...-M0360-P1-S115

Nominal length 360	$A = 460$
	$B = 370$
	$C = 345$

#### BIW1-...-M0750-P1-S115

Nominal length 750	$A = 850$
	$B = 760$
	$C = 740$

Table 3-2: Examples

# BIW1-A/C/E/G310-M \_ \_ \_ -P1-S115

## Micropulse Linear Transducer in Profile Housing

### 4 Wiring


Pin	BIW1-A310...	BIW1-C310...	BIW1-E310...	BIW1-G310...	Cable BKS
<b>Output signal:</b>					
2	0 V	0 V	0 V	0 V	GY gray
5	0...10 V	0...20 mA	4...20 mA	-10...+10 V	GN green
<b>Supply voltage:</b>					
6	GND				BU blue
7	+24 V DC				BN brown
<b>Output slope:</b>					
1	Output slope -				YE yellow
4	Output slope +				RD red
 <i>Reserved leads must remain unconnected.</i>					
3	Reserved				PK pink
8	Reserved				WH white

Table 4-1: Wiring assignment

**Note the following when making electrical connections:**



System and control cabinet must be at the same ground potential.

To ensure the electromagnetic compatibility (EMC) which Balluff warrants with the CE Mark, the following instructions must be strictly followed.

BIW transducer and the processor/control must be connected using shielded cable.

Shielding: Copper filament braided, 85% coverage.

The shield must be tied to the connector housing in the BKS connector (➔ Fig. 4-3); see instructions accompanying the connector.

The cable shield must be grounded on the control side, i.e., connected to the protection ground.

Pin assignments can be found in ➔ Table 4-1. Connections on the controller side may vary according to the controller and configuration used.

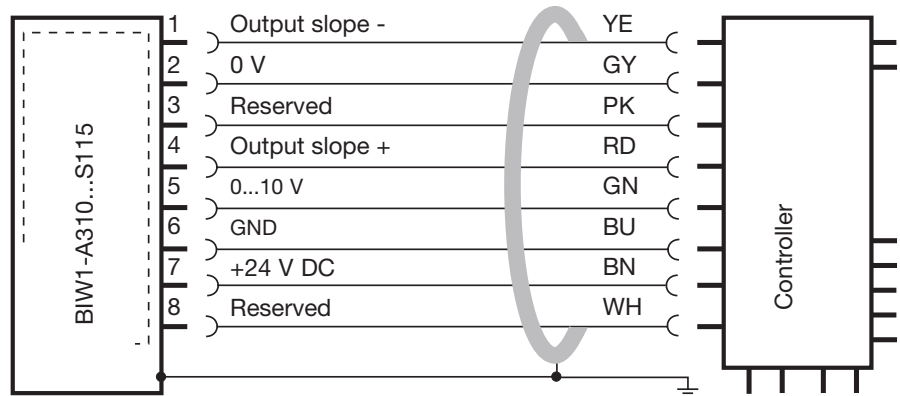


Fig. 4-1: BIW1-A310-M...S115 with controller and BKS-S115-PU05, Connection example

#### Output slope

To have the output voltage rise starting at the zero point, jumper Pin 4 and Pin 1.

To have the output voltage fall starting at the zero point, leave Pin 4 unconnected.

Once the slope has been selected and applied and the slope selection connections removed, reselecting programs the BIW again with the other slope. This means the slope select connection must remain in place so that it stays the same even after the unit is powered off multiple times.

**Note:** The slope selection is not applied until the unit is reset or powered off/on.

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## Micropulse Linear Transducer in Profile Housing

### 4 Wiring (cont.)

When routing the cable between the transducer, controller and power supply, avoid proximity to high voltage lines to prevent noise coupling. Especially critical is inductive noise caused by AC harmonics (e.g. from phase-control devices), against which the cable shield provides only limited protection.

Cable length max.            A/G 25 m  
     C/E 100 m

Ø 6 to 8 mm. Longer lengths may be used if construction, shielding and routing are such that external noise fields will have no effect on signal integrity.

Pin numbering for connector

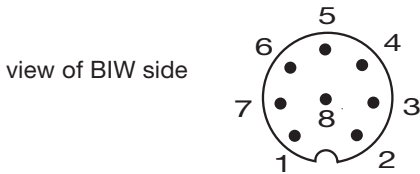


Fig. 4-2: Pin arrangement BKS on BIW

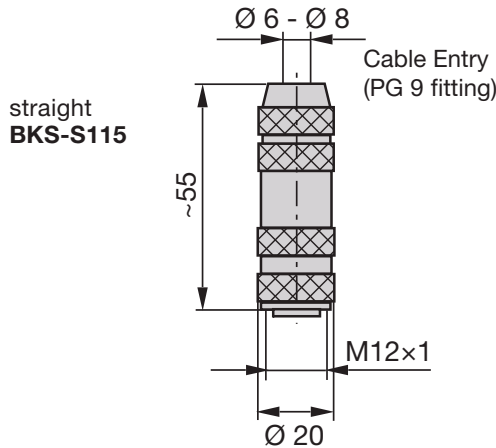
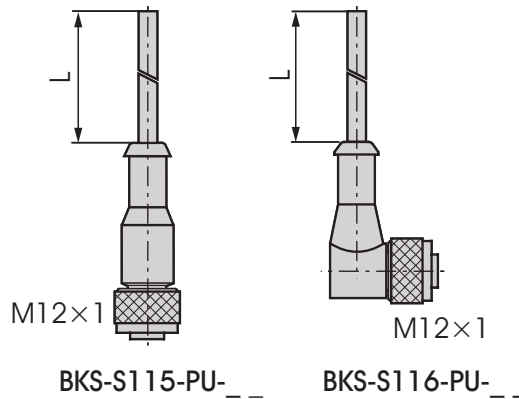


Fig. 4-3: Connector (optional)

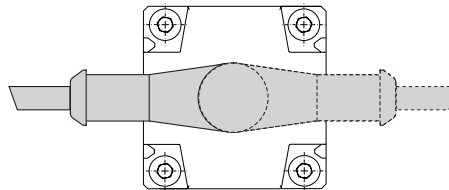


Fig. 4-4: Outgoing cable BKS-S116-PU- \_ \_

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## Micropulse Linear Transducer in Profile Housing

### 5 Startup

#### 5.1 Check connections

Although the connections are polarity reversal protected, components can be damaged by improper connections and overvoltage. Before you apply power, check the connections carefully.

#### 5.2 Turning on the system

Note that the system may execute uncontrolled movements when first turned on or when the transducer is part of a closed-loop system whose parameters have not yet been set. Therefore make sure that no hazards could result from these situations.

#### 5.3 Check output values

After replacing or repairing a transducer, it is advisable to verify the values for the start and end position of the sliding rod in manual mode.

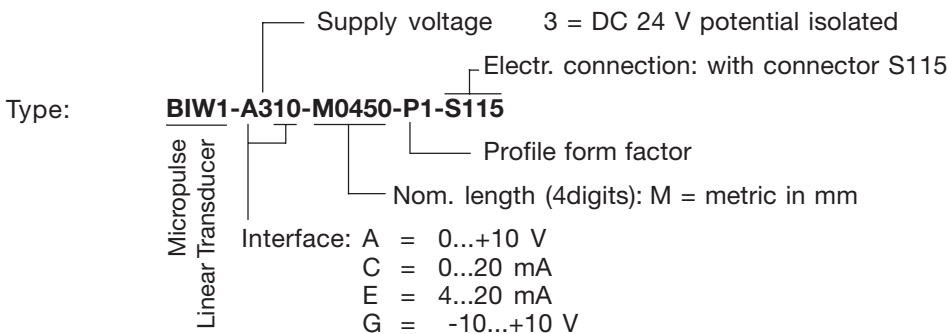
#### 5.4 Check functionality

The functionality of the transducer system and all its associated components should be regularly checked and recorded.

#### 5.5 Fault conditions

When there is evidence that the transducer system is not operating properly, it should be taken out of service and guarded against unauthorized use.

### 6 Versions (indicated on part label)



Ordering code: **BIW\_ \_ \_ \_**

#### 6.1 Included in shipment

Transducer with condensed guide and 2 mounting brackets.

#### 6.2 Available lengths

The following nominal stroke lengths are available:  
 0075, 0100, 0130, 0150, 0175, 0225, 260, 0300, 0360, 0375, 0400, 0450, 0500, 0600, 0650, 0750

Other stroke lengths on request.

#### 6.3 Accessories (optional)

Connectors Fig. 4-3  
 straight: BKS-S115-PU- \_ \_  
 right angle: BKS-S116-PU- \_ \_

# BIW1-A/C/E/G310-M \_ \_ \_ -P1-S115

## Micropulse Linear Transducer in Profile Housing

### 7 Technical Data

The following are typical values at DC 24 V and room temperature. Fully operational after power-up, with full accuracy after warm-up.

Non-linearity	$\pm 0.02\%$
Resolution	
A310	5 $\mu\text{m}$ o. 0,15mV
G310	5 $\mu\text{m}$ o. 0,21mV
C/E310	5 $\mu\text{m}$ o. 0,35 $\mu\text{A}$

Hysteresis	1*resolution
Repeatability	2*resolution
Supply voltage sensitivity	
$U_a/U_b$	$< 0.1 \text{ mV/V}$
Warm-up phase	$< 5 \text{ min}$
Temperature coefficient	$< 20\text{ppm/K}$
Shock loading	100 g/6 ms
per EN 60068-2-27 <sup>1</sup>	
Continuous shock	100 g/2 ms
per EN 60068-2-29 <sup>1</sup>	
Vibration	12 g, 10 to 2000 Hz
per EN 60068-2-6 <sup>1</sup>	

<sup>1</sup> Individual specifications as per Balluff factory standard

Enclosure rating  
per IEC 60529 IP54

#### 7.1 Supply voltage



(external from Limited Energy Circuit as defined in IEC 61010 or Low Power Source IEC 60950 or Class 2 power supply as defined in NEC or CEC)

Supply Voltage $U_b$	24 V $\pm 6$ V
Current draw	$< 80 \text{ mA}$
typical	
Inrush	$< 3 \text{ A}$
Polarity reversal protection	built-in
Oversvoltage protection	
Transzorb diodes	
Electric strength	500 V DC

#### 7.2 Outputs

Output voltage $U_a$ :	
BIW1-A310-...	0...10 V
BIW1-G310-...	-10...+10 V
Output noise	$< 5 \text{ mV}$
Output current	$< 6 \text{ mA}$
Output current $I_a$ :	
BIW1-C310-...	0...20 mA
BIW1-E310-...	4...20 mA
Output noise	$< 10 \mu\text{A}$
Load resistance	$\leq 500 \text{ Ohm}$
Sampling rate typ.	32 kHz
	(30...33 kHz)
Short circuit protection	built-in
Cable length	A/G $< 25 \text{ m}$
	C/E $< 100 \text{ m}$

#### 7.3 Dimensions, weights, ambient conditions

Nominal length	$\leq 775 \text{ mm}$
Dimensions	→ page 3
Weight	approx. 1.0 kg/m
Housing	Aluminium
Housing attachment	
Mounting brackets and screws	
max. tightening torque	2 Nm
Operating temp.	$-20 \text{ }^\circ\text{C}$ to $+85 \text{ }^\circ\text{C}$
Storage temp.	$-40 \text{ }^\circ\text{C}$ to $+100 \text{ }^\circ\text{C}$
Operating force on rod	
Horizontal	$< 10 \text{ N}$
Vertical	$< 10 \text{ N}$

The following patents have been granted in connection with this product:

**US 2003/0206007 A1;**  
**DE 102 19 678 C1**



UL approval  
File no.  
E227256



The CE Mark verifies that our products meet the requirements of EU Directive

2004/108/EC (EMC Directive)

and the EMC Law. Testing in our EMC Laboratory, which is accredited by DATech for Testing Electromagnetic Compatibility, has confirmed that Balluff products meet the EMC requirements of the following Generic Standards:

EN 61000-6-1 (noise immunity)  
EN 61000-6-2 (noise immunity)  
EN 61000-6-3 (emission)  
EN 61000-6-4 (emission)

and the following product standard:  
EN 61326-2-3

Emission tests:

RF Emission  
EN 55016-2-3 (industrial and residential area)

Noise immunity tests:

Static electricity (ESD)

EN 61000-4-2 Severity level 3

Electromagnetic fields (RFI)

EN 61000-4-3 Severity level 3

Fast transients (Burst)

EN 61000-4-4 Severity level 3

Surge

EN 61000-4-5 Severity level 2

Line-induced noise induced by high-frequency fields

EN 61000-4-6 Severity level 3

Magnetic fields

EN 61000-4-8 Severity level 4

No. 837 922 - 726 E • 03.111450 • Edition 1004; specifications subject to changes. • Replaces edition 0908.