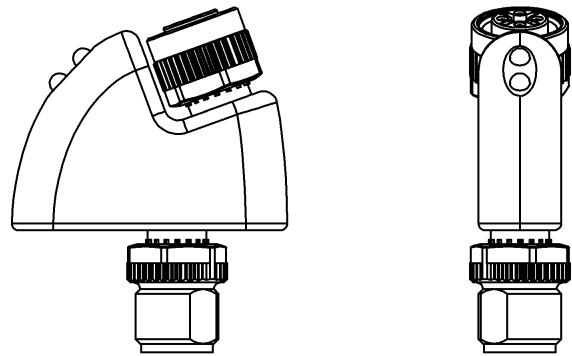




## BNI IOL-716-000-K023 User's Guide



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## 1 Notes

- 1.1. Structure of the guide** The guide is organized so that the sections build on one another. Section 2: Basic safety information.  
.....
- 1.2. Typographical conventions** The following typographical conventions are used in this guide.
- Enumerations** Enumerations are shown in list form with bullet points:
- Entry 1
  - Entry 2
- Actions** Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.
- Action instruction 1
  - ↪ Action result
  - Action instruction 2
- Syntax** Numbers:  
Decimal numbers are shown without additional indicators (e.g. 123),  
Hexadecimal numbers are shown with the additional indicator hex (e.g. 00hex).
- Cross references** Cross references indicate where additional information on the topic can be found.
- 
- 1.3. Symbols**
-  **Note**  
This symbol indicates general notes.
- 
-  **Attention!**  
This symbol indicates a security notice which must be observed.
- 
- 1.4. Abbreviations**
- |      |                               |
|------|-------------------------------|
| BNI  | Balluff Network Interface     |
| DPP  | Direct parameter page         |
| IOL  | IO-Link                       |
| EMC  | Electromagnetic compatibility |
| FE   | Function ground               |
| SPDU | Service Protocol Data Unit    |
- 1.5. Deviating views** Product views and illustrations in this user's guide may differ from the actual product. They are intended only as illustrative material.

### 2.1. Intended use

This guide describes the Balluff Network Interface BNI IOL-716-000-K023 for the application as peripheral output module to connect PT100 sensors. Hereby it is about an IO-Link device which communicates by means of IO-Link protocol with the superordinate IO-Link master assembly.

### 2.2. Installation and startup



#### Attention!

Installation and startup are to be performed only by trained specialists. Qualified personnel are persons who are familiar with the installation and operation of the product, and who fulfill the qualifications required for this activity. Any damage resulting from unauthorized manipulation or improper use voids the manufacturer's guarantee and warranty. The Operator is responsible for ensuring that applicable safety and accident prevention regulations are complied with.

### 2.3. General safety notes

#### Commissioning and inspection

Before commissioning, carefully read the operating manual.

The system must not be used in applications in which the safety of persons is dependent on the function of the device.

#### Authorized Personnel

Installation and commissioning may only be performed by trained specialist personnel.

#### Intended use

Warranty and liability claims against the manufacturer are rendered void by:

- Unauthorized tampering
- Improper use
- Use, installation or handling contrary to the instructions provided in this operating manual

#### Obligations of the Operating Company

The device is a piece of equipment from EMC Class A. Such equipment may generate RF noise. The operator must take appropriate precautionary measures. The device may only be used with an approved power supply. Only approved cables may be used.

#### Malfunctions

In the event of defects and device malfunctions that cannot be rectified, the device must be taken out of operation and protected against unauthorized use.

Intended use is ensured only when the housing is fully installed.

### 2.4. Resistance to aggressive substances



#### Attention!

The BNI modules generally have a good chemical and oil resistance. When used in aggressive media (eg chemicals, oils, lubricants and coolants each in high concentration (ie, low water content)) must be checked prior application-related material compatibility. In the event of failure or damage to the BNI modules due to such aggressive media are no claims for defects.

### Hazardous voltage



#### Attention!

Disconnect all power before servicing equipment.



#### Note

In the interest of product improvement, the Balluff GmbH reserves the right to change the specifications of the product and the contents of this manual at any time without notice.

## 3 Getting started

### 3.1. Connection overview

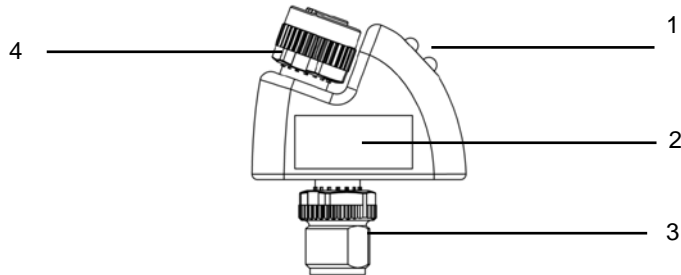


Figure 3-1: BNI IOL-...-K023

- 1 Status LED: Supply, Communication
- 2 Label
- 3 IO-Link interface
- 4 Analogue input, PT100

### 3.2. Mechanical connection

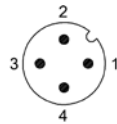
To avoid long, shielded analogue cables, the BNI IOL-716-000-K023 modules should be attached to the PT100 sensor, threaded in with M12 male. No further mechanical attachment is required.

### 3.3. Electrical connection

The BNI IOL-716-000-K023 module requires no separate supply voltage connection. Power is provided through the IO-Link interface by the superordinate IO-Link Master Assembly.

### 3.4. IO-Link interface

IO-Link (M12, A-coded, male)



Pin	Signal
1	Supply voltage, +24V
2	-
3	GND, reference potential
4	C/Q, IO-Link Data transmission channel

#### Connecting the module

- Connect the BNI IOL-716-000-K023 either to an IO-Link Master directly or to a PT100 sensor.
- Connect the male plugs unconnected by using cables.



#### Note

A standard 3 wire sensor cable is used for connection to the host IO-Link master.



#### Note

A shielded 4 wire sensor cable is used for connection to the analog actuator.

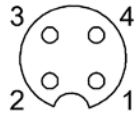
### 3 Getting started

#### Module versions

Module versions	Analogue port
BNI IOL-716-000-K023	PT100 input

#### 3.5. Sensor interface

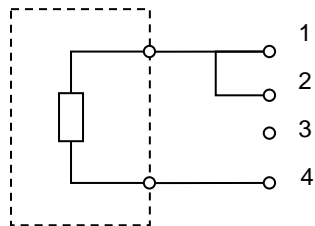
Analogue input port (M12, A-coded, female)



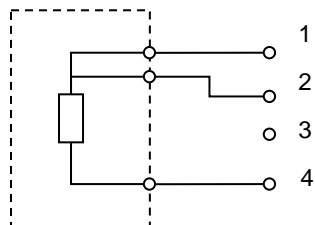
Pin	Signal	Cabling
1	Current Sink /Reference In	Connect PT100/1
2	Current Source2/Analog In-	Connect PT100/1
3	-	-
4	Current Source1/Analog In+	Connect PT100/2

PT100

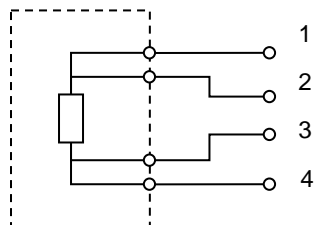
BNI IOL-716-000-K023  
Sensor interface



2-wire



3-wire



4-wire

4 IO-Link interface

4.1. IO-Link data

BNI IOL-716-000-K023

Data transmission rate	COM2 (38,4 kBaud)
Frame type	1
Minimal cycle time	3 ms
Process data cycles	12 ms, at minimal cycle time
Prozess data length	2 bytes input

4.2. Process data / input data

BNI IOL-716-000-K023

Byte 0								Byte 1							
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
MSB	Temperature value												LSB	-	-

$$\text{Temperature [}^\circ\text{C]} = \text{Temperature value[decimal]} \times 800 \text{ [}^\circ\text{C]} / 16383 - 200\text{[}^\circ\text{C]}$$

At +600°C Temperature value is: 0x3FFF (Input data: 0xFFFC)

At -200°C Temperature value is: 0x0000 (Input data: 0x0000)

The Temperature value will be shown in 16384 steps.

4.3. Parameter data / Request data

	DPP	SPDU		Object name	Length	Range	Default value
	Index	Index	Sub-Index				
Identification Data	0x07			Vendor ID	2 Byte	read only	0x0378
	0x08						
	0x09			Device ID	3 Byte		0x050805
	0x0A						
	0x0B						
		0x10	0	Vendor name	7 Byte		BALLUFF
		0x11	0	Vendor text	15 Byte		www.balluff.com
		0x12	0	Product name	20 Byte		BNI IOL-716-000-K023
		0x13	0	Product ID	7 Byte		BNI004T
		0x14	0	Product text	22 Byte		Analog PT100 converter
	0x16	0	Hardware Revision	1 Byte	2		
	0x17	0	Firmware Revision	23 Byte	1.2		
Parameter Data		-					

4.4. Errors

Error Code	Additional Code
Device application error 0x80	Index not available 0x11
Device application error 0x80	Subindex not available 0x12

4.5. Events

Class / Qualifier			Code ( high + low)			
Mode	Type	Instance				
Appears	Error	AL	Device Hardware	Supply	Supply low voltage	U2 = Supply + 24V
0xC0	0x30	0x03	0x5000	0x0100	0x0010	0x0002
0xF3			0x5112			
Disappears	Error	AL	Device Hardware	Supply	Supply low voltage	U2 = Supply + 24V
0x80	0x30	0x03	0x5000	0x0100	0x0010	0x0002
0xB3			0x5112			



5 Technical data

5.1. Dimensions

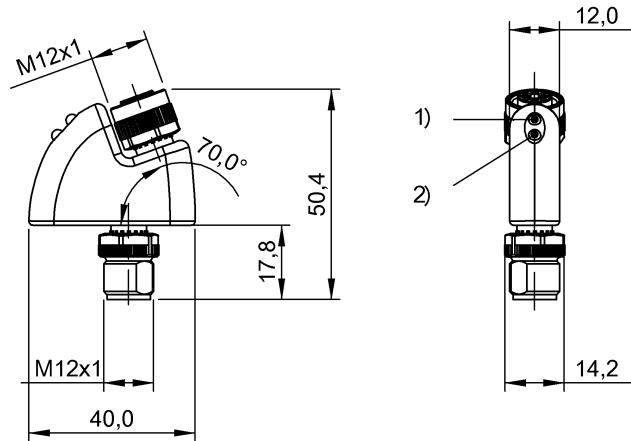


Figure 5-1: Dimensions BNI IOL-...-K023

5.2. Mechanical data

Housing materials	Plastic, Macromelt 6208
IO-Link port	M12, A-coded, male
I-port	M12, A-coded, female
Enclosure rating per IEC 60529	IP 67 (only when plugged in and threaded in)
Dimensions (W x H x D in mm)	40 x 50.4 x 14.2
Weight	ca. 50 g

5.3. Electrical data

Operating voltage	18...30.2 V DC, per EN 61131-2
Ripple	< 1%
Current draw without load	<= 30 mA
Resolution	14bit
Sampling rate	3ms

5.4. Operating conditions

Operating temperature	-5 °C ... 70 °C
Storage temperature	-25 C ... 70 °C

5.5. LED indicators

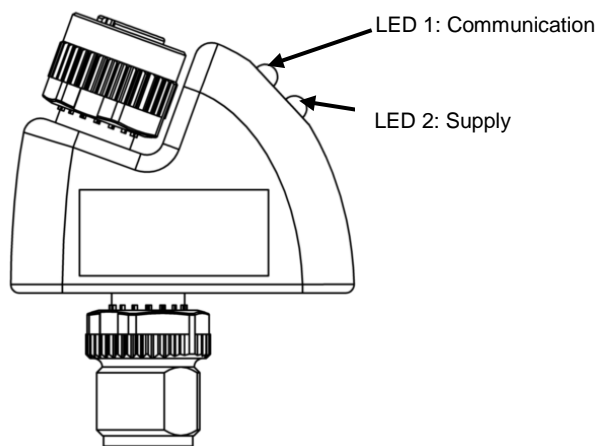


Figure 5-2: LED indicators

Status LED

BNI IOL-716-000-K023

LED	Indicator	Function
LED 1	Green / Green flashing	Communication error / Communication ok
LED 2	Green / Green flashing	Supply sensor & module ok / Undervoltage

## 6 Appendix

### 6.1. Product ordering code

**BNI IOL-716-000-K023**

Balluff Network Interface

IO-Link interface

Functions

716 = PT100 analogue input

Versions

000 = Standard design

Mechanical design

K023 = Plastic housing, Hotmelt

Bus connection and voltage supply 1xM12 male, 4-poles, external thread

Analogue port: 1xM12, female, 4-poles, internal thread

### 6.2. Order information

Order code	Material number	Product ordering code	Label color	Printing IN or OUT
BNI004T	218121	BNI IOL-716-000-K023	White	Without

### 6.3. Scope of delivery

BNI IOL-...-K023 consists of the following components:

- IO-Link module
- User's guide

**[www.balluff.com](http://www.balluff.com)**

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