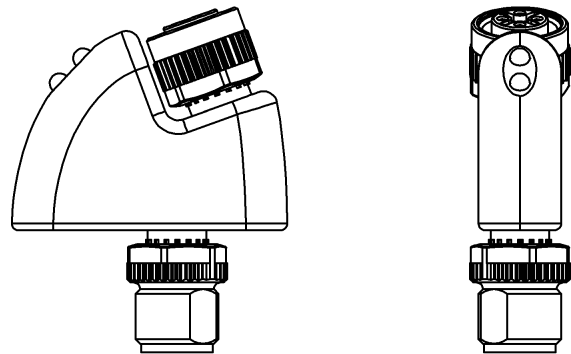




BNI IOL-722-000-K023  
BNI IOL-724-000-K023  
User's Guide



|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Notes</b>                            | <b>2</b>  |
| 1.1.     | Structure of the guide                  | 2         |
| 1.2.     | Typographical conventions               | 2         |
|          | Enumerations                            | 2         |
|          | Actions                                 | 2         |
|          | Syntax                                  | 2         |
|          | Cross references                        | 2         |
| 1.3.     | Symbols                                 | 2         |
| 1.4.     | Abbreviations                           | 2         |
| 1.5.     | Deviating views                         | 2         |
| <b>2</b> | <b>Safety</b>                           | <b>3</b>  |
| 2.1.     | Intended use                            | 3         |
| 2.2.     | Installation and startup                | 3         |
| 2.3.     | General safety notes                    | 3         |
| 2.4.     | Resistance to aggressive substances     | 3         |
|          | Hazardous voltage                       | 3         |
| <b>3</b> | <b>Getting started</b>                  | <b>4</b>  |
| 3.1.     | Connection overview                     | 4         |
| 3.2.     | Mechanical connection                   | 4         |
| 3.3.     | Electrical connection                   | 4         |
| 3.4.     | IO-Link interface                       | 4         |
|          | Connecting the module                   | 4         |
|          | Module versions                         | 5         |
| 3.5.     | Actuator interface                      | 5         |
| <b>4</b> | <b>IO-Link interface</b>                | <b>6</b>  |
| 4.1.     | IO-Link data                            | 6         |
| 4.2.     | Process data / input data - output data | 6         |
|          | Output data                             | 6         |
|          | Input data                              | 6         |
| 4.3.     | Parameter data / Request data           | 7         |
| 4.4.     | Errors                                  | 7         |
| 4.5.     | Events                                  | 7         |
| <b>5</b> | <b>Technical data</b>                   | <b>8</b>  |
| 5.1.     | Dimensions                              | 8         |
| 5.2.     | Mechanical data                         | 8         |
| 5.3.     | Electrical data                         | 8         |
| 5.4.     | Operating conditions                    | 8         |
| 5.5.     | LED indicators                          | 9         |
|          | Status LED                              | 9         |
| <b>6</b> | <b>Appendix</b>                         | <b>10</b> |
| 6.1.     | Product ordering code                   | 10        |
| 6.2.     | Order information                       | 10        |
| 6.3.     | Scope of delivery                       | 10        |

## 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     |
| O-Port | Standard output port          |
| 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-722/724-000-K023 for the application as peripheral output module to connect analogue actuators. 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

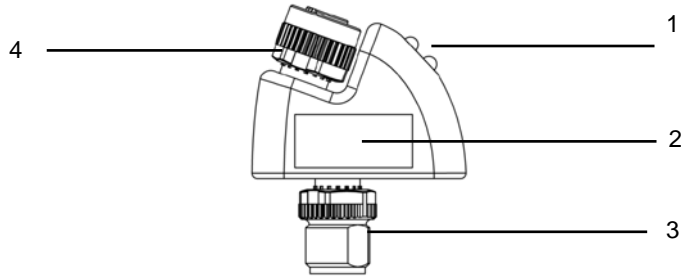


Figure 3-1: BNI IOL-...-K023

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

### 3.2. Mechanical connection

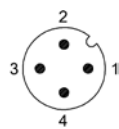
To avoid long, shielded analogue cables, the BNI IOL-722/724-000-K023 modules should be attached to the analogue unit which has to be connected. No further mechanical attachment is required.

### 3.3. Electrical connection

The BNI IOL-722/724-000-K023 modules require 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-...-K023 either to an IO-Link Master directly or to an analogue actuator.
- 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.

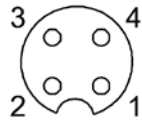
### 3 Getting started

#### Module versions

| Module versions      | Analogue port           |
|----------------------|-------------------------|
| BNI IOL-722-000-K023 | Current output (4-20mA) |
| BNI IOL-724-000-K023 | Voltage output (0-10V)  |

#### 3.5. Actuator interface

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



| Pin | Signal  |
|-----|---|
| 1   | +24V, mA*   |
| 2   | Stromausgang 4-20mA <sup>1)</sup><br>Spannungsausgang 0-10V <sup>2)</sup> |
| 3   | GND   |
| 4   | AGND  |

1) Only in case of BNI IOL-722-000-K023

2) Only in case of BNI IOL-724-000-K023

\* Depending on the IO-Link master, but max. 2A.

4 IO-Link interface

4.1. IO-Link data

**BNI IOL-722-000-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 + 2 Bytes output |

**BNI IOL-724-000-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 + 2 Bytes output |

4.2. Process data / input data - output data

Output data

| Byte 0 |  |   |   |   |   |   |   | Byte 1 |   |   |   |     |   |   |   |
|--------|--|---|---|---|---|---|---|--------|---|---|---|-----|---|---|---|
| 7      | 6  | 5 | 4 | 3 | 2 | 1 | 0 | 7      | 6 | 5 | 4 | 3   | 2 | 1 | 0 |
| MSB    | Analogue output current value (only in case of BNI IOL-722-000-K023)*<br>Analogue output voltage value (only in case of BNI IOL-724-000-K023)* |   |   |   |   |   |   |        |   |   |   | LSB | - | - |   |

Input data

| Byte 0 |  |   |   |   |   |   |   | Byte 1 |   |   |   |     |   |   |   |
|--------|--|---|---|---|---|---|---|--------|---|---|---|-----|---|---|---|
| 7      | 6  | 5 | 4 | 3 | 2 | 1 | 0 | 7      | 6 | 5 | 4 | 3   | 2 | 1 | 0 |
| MSB    | Analogue output current value echo (only in case of BNI IOL-722-000-K023)*<br>Analogue output voltage value echo (only in case of BNI IOL-724-000-K023)* |   |   |   |   |   |   |        |   |   |   | LSB | - | - |   |

\* If "Data Valid" Flag of the IO-Link communication = 1, the input data are the same as the output data (Feedback). If "Data Valid" Flag = 0, the input data = 0.



**Note**

The measuring range from 4 - 20 mAmp (for BNI IOL-722-000-K023) will be shown in 16384 steps.



**Note**

The measuring range from 0 - 10 Volt (for BNI IOL-724-000-K023) 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  |           | 0x050804<br>0x050803                                 |
|                     | 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-722-000-K023<br>BNI IOL-724-000-K023         |
|                     |       | 0x13  | 0                 | Product ID   | 7 Byte  |           | BNI 004C<br>BNI 004E                                 |
|                     |       | 0x14  | 0                 | Product text | 22 Byte |           | Analog current converter<br>Analog voltage converter |
|                     | 0x16  | 0     | Hardware Revision | 1 Byte       | 1       |           |  |
|                     | 0x17  | 0     | Firmware Revision | 23 Byte      | 1.0     |           |  |
| Parameter Data      |       |       |                   |              |         |           |  |

4.4. Errors

| Error Code               | Additional Code        |
|--------------------------|------------------------|
| Device application error | Index not available    |
| 0x80                     | 0x11                   |
| Device application error | SubIndex not available |
| 0x80                     | 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              | 0x010<br>0 | 0x0010             | 0x0002            |
| 0xF3              |       |          | 0x5112              |            |                    |                   |
| Disappears        | Error | AL       | Device Hardware     | Supply     | Supply low voltage | U2 = Supply + 24V |
| 0x80              | 0x30  | 0x03     | 0x5000              | 0x010<br>0 | 0x0010             | 0x0002            |
| 0xB3              |       |          | 0x5112              |            |                    |                   |



5 Technical data

5.1. Dimensions

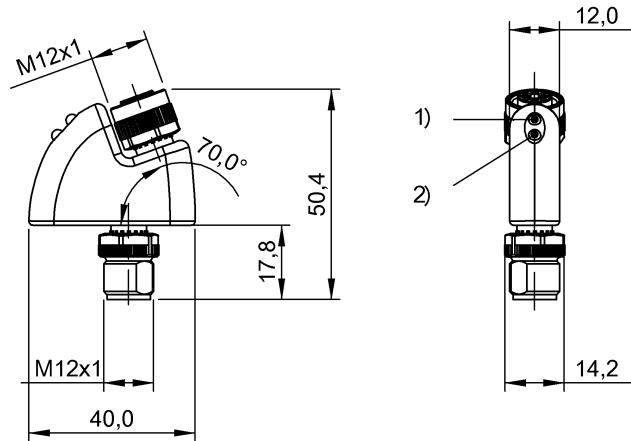


Figure 5-1: Dimensions BNI IOL-...-K023

5.2. Mechanical data

|                                |  |
|--------------------------------|--|
| Housing materials              | Plastic, Macromelt 6208                      |
| IO-Link port                   | M12, A-coded, male                           |
| O-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                          |

5.4. Operating conditions

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

5.5. LED indicators

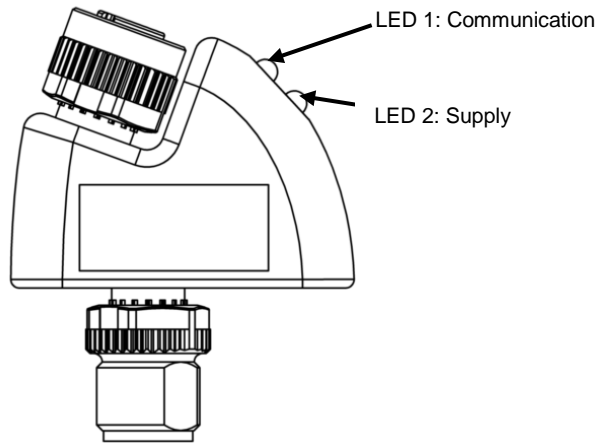


Figure 5-2: LED indicators

Status LED

BNI IOL-72x-000-K023

| LED   | Anzeige                | Funktion                                   |
|-------|------------------------|--|
| LED 1 | Green / Green flashing | Kommunikationsfehler / Kommunikation ok    |
| LED 2 | Green / Green flashing | Supply Actuator & Module ok / Undervoltage |

## 6 Appendix

### 6.1. Product ordering code

**BNI IOL-72x-000-K023**

Balluff Network Interface

IO-Link interface

Functions

722 = Current output 4-20mA

724 = Voltage output 0-10V

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 |
|------------|-----------------|-----------------------|-------------------|--------------------|
| BNI004C    | 213980          | BNI IOL-722-000-K023  | Red<br>(RAL5015)  | O                  |
| BNI004E    | 213982          | BNI IOL-724-000-K023  | Blue<br>(RAL3020) | O                  |

### 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)**

Balluff GmbH  
Schurwaldstrasse 9  
73765 Neuhausen a.d.F.  
Deutschland  
Tel. +49 7158 173-0  
Fax +49 7158 5010  
[balluff@balluff.de](mailto:balluff@balluff.de)