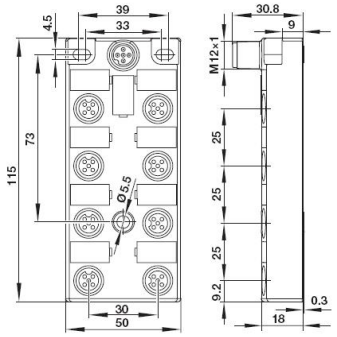
BALLUFF

sensors worldwide

BNI IOL-104-000-K006
BNI IOL-102-000-K006

IO-Link Sensorhub digital

User's Guide



Content

1 Notes to the User 2
1.1. About this guide 2
1.2. Structure 2
1.3. Typographical conventions 2
Enumerations 2
Actions 2
Syntax 2
Cross references 2
1.4. Symbols 2
1.5. Abbreviations 2

2 Safety 3
2.1. Intended use 3
2.2. Installation and Startup 3
2.3. General Safety Notes 3
2.4. Resistance to Aggressive Substances 3
Dangerous voltage 3

3 Getting Started 4
3.1. Connection overview 4
3.2. Mechanical connection 6
3.3. Electrical connection 6
3.4. IO-Link interface 6
3.5. Sensor interface 6

4 IO-Link Interface 7
4.1. Communication parameters 7
4.2. Process data 7
Input data 7
Output data 7
4.3. Parameter data / On-request data 7
Inversion 40hex 8
4.4. Errors 8
4.5. Events 8

5 Technical Data 9
5.1. Dimensions 9
5.2. Mechanical data 9
5.3. Electrical data 9
5.4. Operating conditions 9
5.5. Indicators / LEDs 10
Module Status 10
Digital Inputs 10

6 Appendix 11
6.1. Type designation code 11
6.2. Order information 11

1 Notes to the User

1.1. About this guide

This guide describes the Balluff IO-Link sensor hub module. Connection to the host interface master is made through the IO-Link protocol.
Functionally this compact, cost-effective module is comparable with a passive splitter box: It takes conventional sensor signals and passes them over the IO-Link interface.

1.2. Structure

In this guide the sections build on one another.
Chapter 2 : Basic safety information.
…….

1.3. 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. 00_{hex}).

Cross references

Cross-references indicate where additional information on the topic can be found.

1.4. Symbols

Caution!
This symbol indicates a security notice which most be observed

Note, tip
This symbol indicates general notes.

1.5. Abbreviations

BCD	Binary coded switch
BNI	Balluff Network Interface
DPP	Direct Parameter Page
EMC	Electromagnetic Compatibility
I-Port	Digital Input-Port
DI	Digital In
FE	Function ground
IOL	IO-Link
LSB	Least Significant Bit
MSB	Most Significant Bit
SPDU	Service Protocol Data Unit

2 Safety

2.1. Intended use

The BNI IOL-… is a decentralized sensor input module which is connected to a host IO-Link master over an IO-Link interface.

2.2. Installation and Startup

Caution
Installation and startup must only be carried out by trained technical personnel. Qualified personnel are people who are familiar with installation and operation of the product and have the necessary qualifications for these tasks. Any damage resulting from unauthorized tampering or improper use voids the manufacturer's guarantee and warranty. The operator must ensure that appropriate safety and accident prevention regulations are observed.

2.3. General Safety Notes

Commissioning and inspection
Before commissioning, carefully read the user's guide.
The system must not be used in applications in which the safety of persons is dependent upon proper functioning of the device.
Authorized personnel
Installation and startup must only be carried out by trained technical 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 user's guide

Obligations of the operating company
The device is a piece of equipment in accordance with EMC Class A. This device can produce RF noise. The operator must take appropriate precautionary measures. The device may only be used with an approved power supply. Use only approved cables.
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

Caution
The BNI modules always have good chemical and oil resistance. When used in aggressive media (such as chemicals, oils, lubricants and coolants, each in a high concentration (i.e. too little water content)), the material must first be checked for resistance in the particular application. No defect claims may be asserted in the event of a failure or damage to the BNI modules caused by such aggressive media.

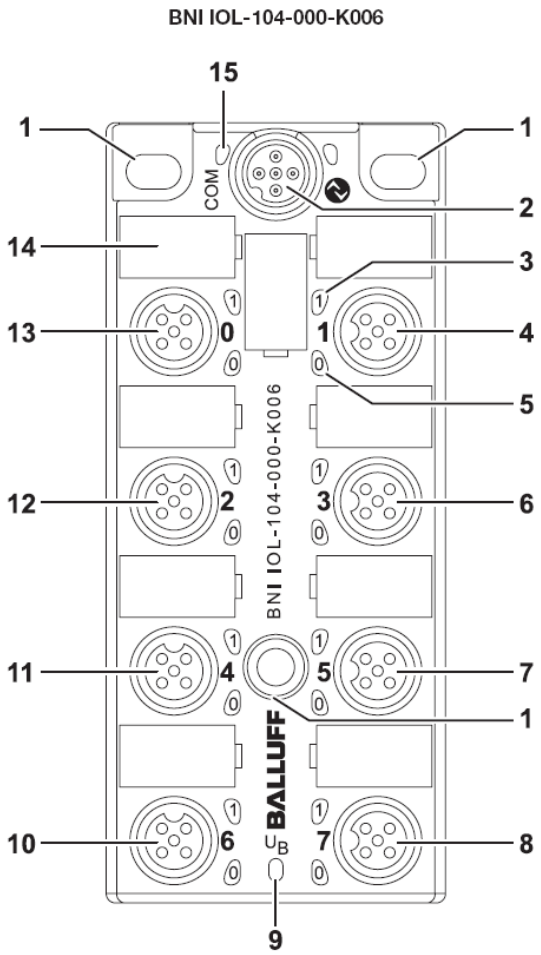
Dangerous voltage

Caution
Before maintenance, disconnect the device from the power supply.

Note
In the interests of product improvement, Balluff GmbH reserves the right to change the technical data of the product and the content of this manual at any time without notice.

3 Getting Started

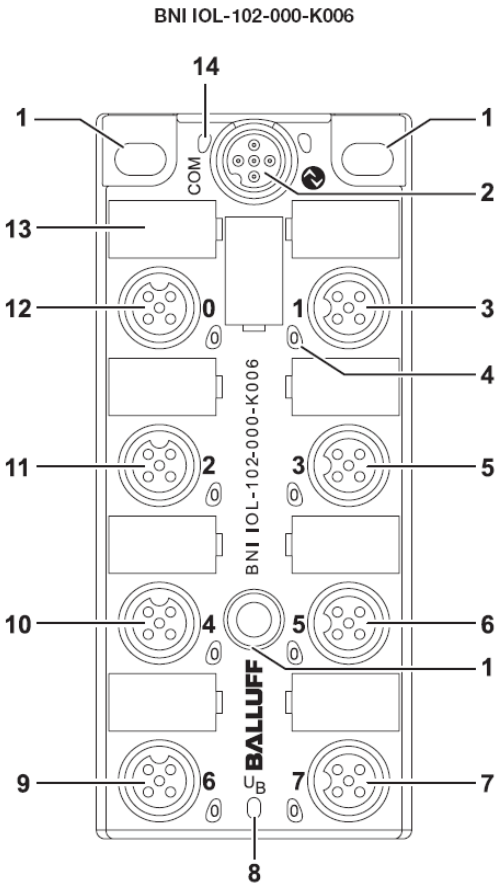
3.1. Connection overview



BNI IOL-104-000-K006

1 Mounting hole
2 IO-Link interface
3 Status-LED: Input (Pin 2)
4 Standard-Input-Port 1
5 Status-LED: Input (Pin 4)
6 Standard-Input-Port 3
7 Standard- Input -Port 5
8 Standard- Input -Port 7
9 Status LED „Power Supply“
10 Standard Input -Port 6
11 Standard Input -Port 4
12 Standard Input -Port 2
13 Standard Input -Port 0
14 Label
15 Status-LED „COM“

3 Getting Started



BNI IOL-102-000-K006

1 Mounting Hole
2 IO-Link interface
3 Standard-Input-Port 1
4 Status-LED: Input (Pin 4)
5 Standard- Input -Port 3
6 Standard- Input -Port 5
7 Standard- Input -Port 7
8 Status LED “Power Supply”
9 Standard Input -Port 6
10 Standard Input -Port 4
11 Standard Input -Port 2
12 Standard Input -Port 0
13 Label
14 Status-LED “COM”

3 Getting Started

3.2. Mechanical connection

The BNI IOL modules are attached using 3 M4 screws (Item 1, Fig. 3-1/3-2).

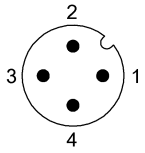
3.3. Electrical connection

The Sensor Hub modules require no separate supply voltage connection.
Power is provided through the IO-Link interface by the host IO-Link Master.

3.4. IO-Link interface

The IO-Link connection is made using an M12 connector (A-coded, male).

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



Pin	Function
1	Supply voltage, +24 V, max. 1.6 A
2	-
3	GND, reference potential
4	C/Q, IO-Link data transmission channel

- Connect protection ground to FE terminal, if present.
- Connect the incoming IO-Link line to the Sensor Hub.

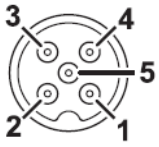
Note!
A standard sensor cable is used for connecting to the host IO-Link Master.

3.5. Sensor interface

Module-specific connection possibilities:

Sensor-Hub	Digital Input-Ports
BNI IOL-104-000-K006	16
BNI IOL-102-000-K006	8

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



Pin	Function
1	+24 V, max. 100 mA
2	Input (only BNI IOL-104…)
3	0 V, GND
4	Input
5	-

Note!
For the digital sensor inputs follow the input guideline per EN 61131-2, Type 2.

Note!
Unused I/O port sockets must be fitted with cover caps to ensure IP67 protection rating.

4 IO-Link Interface

4.1. Communication parameters

Baud rate	COM2 (38,4 kBaud)
Frame type	2.2
Minimum cycle time	3 ms
Process data cycle	3 ms at minimum cycle time

4.2. Process data

Following Process data is transmitted between IO-Link Master and IO-Link Device:

Input data Data which is sent from Device to Master.
Output data Data which is sent from Master to Device.

Input data

Byte	0								1*							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Input Port 7 Pin 4	Input Port 6 Pin 4	Input Port 5 Pin 4	Input Port 4 Pin 4	Input Port 3 Pin 4	Input Port 2 Pin 4	Input Port 1 Pin 4	Input Port 0 Pin 4	Input Port 7 Pin 2	Input Port 6 Pin 2	Input Port 5 Pin 2	Input Port 4 Pin 2	Input Port 3 Pin 2	Input Port 2 Pin 2	Input Port 1 Pin 2	Input Port 0 Pin 2

*Only for BNI IOL-104-000-K006

Output data

There is no output data at BNI IOL-102-… and BNI IOL-104-…

4.3. Parameter data / On-request data

	DPP	SPDU		Parameter	Data width	Value range	Default Value
	Index	Index	Sub-index				
Identification Data	07hex			Vendor ID	2 Byte	Read only	0378hex
	08hex						
	09hex			Device ID	3 Byte		050101hex (BNI IOL 104-000-K006 050102hex (BNI IOL-102-000-K006)
	0Ahex						
	0Bhex						
		10hex	0	Vendor Name	8 Byte		BALLUFF
		11hex	0	Vendor text	16 Byte		www.balluff.com
		12hex	0	Product Name	21 Byte		BNI IOL-104-000-K006/ BNI IOL-102-000-K006
		13hex	0	Product ID	7 Byte		BNI0006 (BNI IOL-104-000-K006) BNI0005 (BNI IOL-102-000-K006)
		14hex	0	Product text	27 Byte		IO-Link Sensor-Hub digital
		16hex		Hardware Revision	3 Byte		
		17hex	0	Firmware Revision	3 Byte		
Parameter Data	10hex	40hex	0 1-16	Inversion	2 Byte	0hex… FFFFhex	0000hex

4 IO-Link Interface

Inversion 40hex

Byte	0								1*							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Sub Index	8	7	6	5	4	3	2	1	16	15	14	13	12	11	10	9
Description	Inversion Port 7 Pin 4	Inversion Port 6 Pin 4	Inversion Port 5 Pin 4	Inversion Port 4 Pin 4	Inversion Port 3 Pin 4	Inversion Port 2 Pin 4	Inversion Port 1 Pin 4	Inversion Port 0 Pin 4	Inversion Port 7 Pin 2	Inversion Port 6 Pin 2	Inversion Port 5 Pin 2	Inversion Port 4 Pin 2	Inversion Port 3 Pin 2	Inversion Port 2 Pin 2	Inversion Port 1 Pin 2	Inversion Port 0 Pin 2

* Only for BNI IOL-104-000-K006

4.4. Errors

Error Code	Description
0x8011	Index not available
0x8012	Subindex not available
0x8030	Value out of range

4.5. Events

Event Code	Description
0x5112	Low sensor voltage (US)
0x5160	Supply periphery

5 Technical Data

5.1. Dimensions

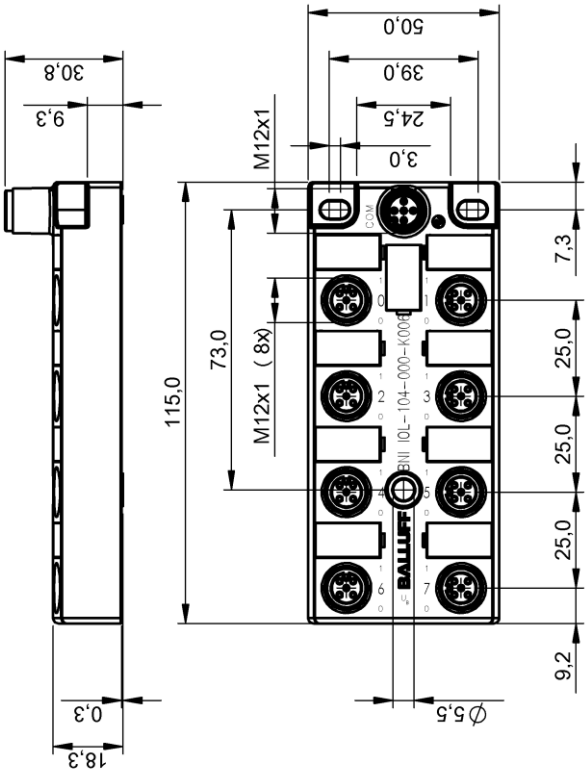


Abbildung 5-1: Abmessungen in mm

5.2. Mechanical data

Housing material	Plastic, transparent
IO-Link Port	M12, A-coded, male
I ports	M12, A-coded, female (8x)
Enclosure rating	IP67 (only when plugged-in and threaded-in)
Weight	90 g
Dimensions (L × W × H, excluding connector)	115 × 50 × 30.8 mm

5.3. Electrical data

Operating voltage	18 ... 30.2 V DC, per EN 61131-2
Ripple	< 1 %
Current draw without load	≤ 40 mA

5.4. Operating conditions

Operating temperature	-5 °C … +55 °C
Storage temperature	-25 °C … +70 °C
EMC Immunity tests: Emission tests:	 EN 61000-6-2:2005 AC:2005 EN 61000-6-4:2007 A1:2011
Vibration/shock	EN 60068 Part 2-6/27

5 Technical Data

5.5. Indicators / LEDs

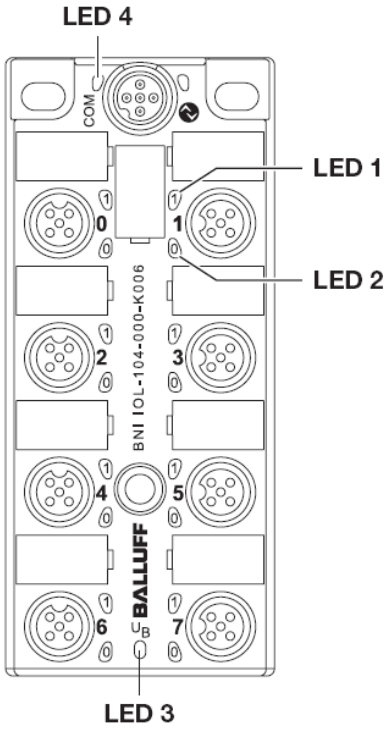


Abb. 5-2: LED-indicators COM and I-Ports

Module Status

LED 4, IO-Link-Communication

Signal	Function
Green	No communikation
Green, negative pulsed	Communikation OK
Red	Communication line overload
Off	Module unpowered

LED 3, Module supply

Signal	Function
Green	Supply voltage OK
Green rapidly flashing	Supply voltage < 18 V
Green slowly flashing	Short circuit on input port
Off	Module unpowered

Digital Inputs

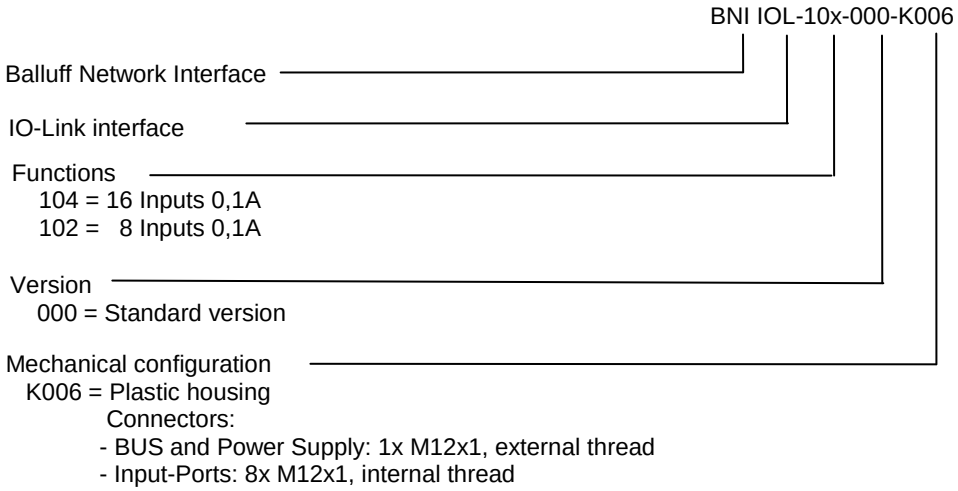
LEDs are associated with the digital ports which indicate the operating states:

LED 1 – Input pin 2 (only BNI IOL 104)
LED 2 - Input pin 4

Signal	Function
Yellow	Input signal = 1
Off	Input signal = 0

6 Appendix

6.1. Type designation code



6.2. Order information

Type	Order code
BNI IOL-104-000-K006	BNI0006
BNI IOL-102-000-K006	BNI0005

Notes

www.balluff.com

Balluff GmbH
Schurwaldstrasse 9
73765 Neuhausen a.d.F.
Germany
Tel. +49 7158 173-0
Fax +49 7158 5010
balluff@balluff.de

Nr. 894235 E • Edition B16 • Replaces Edition 1301 • Subject to modification

BALLUFF