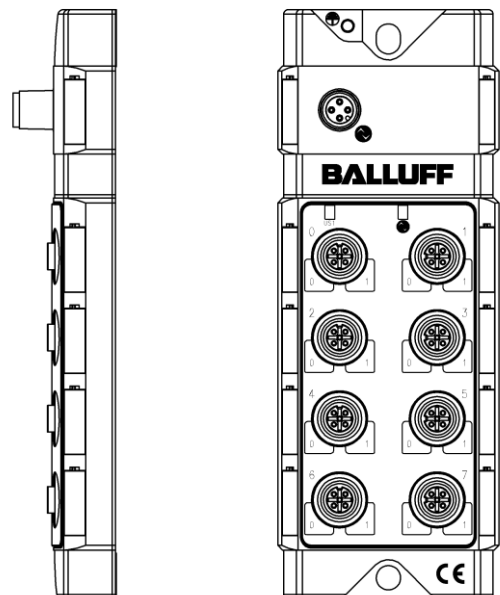
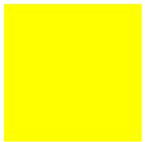


BALLUFF

sensors worldwide

BNI IOL-106-000-Z012
BNI IOL-106-S01-Z012
BNI IOL-106-S01-Z012-C01
User's Guide



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1 Notes for the user

1.1. About this guide This guide describes the Balluff Network Interface BNI IOL-106-xxx-Z012 for the application as peripheral input module to establish connection of binary sensors. Hereby it is about an IO-Link device which communicates by means of IO-Link protocol with the superordinate IO-Link master assembly.

1.2. Structure of the guide The guide is organized so that the sections build on one another.
 Section 2: Basic safety information.
 Section 3: The main steps for installing the device.
 Section 4: IO-Link, parameter and process data for the device.
 Section 5: Technical data for the device.

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. 00hex).

Cross references Cross references indicate where additional information on the topic can be found (see section 5 „Technical Data”).

1.4. Symbols



Note
 This symbol indicates a security notice which must be observed.



Note, Tipp
 This symbol indicates general notes.

1.5. Abbreviations

BNI	Balluff Network Interface
DPP	Direct Parameter Page
I-Port	Input Port
EMC	Electromagnetic Compatibility
FE	Function Earth
IOL	IO-Link
SPDU	Service Protocol Data Unit

2 Safety

2.1. Intended use

This guide describes the Balluff Network Interface BNI IOL-106-xxx-Z012 for the application as peripheral input module to establish connection of binary 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. General safety notes

Installation and start up

Installation and start up are to be performed only by trained specialists. Any damage resulting from unauthorized manipulation or improper use voids the manufacturer's guarantee and warranty.

The device complies with EMC Class A. Such equipment may generate RF noise. The operator must take precautionary measures accordingly.

The device must be powered only using an approved power supply (see section 5 "Technical data"). Only approved cable may be used.

Operating and testing

The operator is responsible for observing local prevailing safety regulations.

When defects and non-clearable faults occur in the device, take it out of service and secure against unauthorized use.

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

2.3. Meaning of the warnings



Note!

The pictogram used with the word "Caution" warns against a possible hazardous situation affecting the health of persons or resulting in equipment damage. Ignoring these warnings can result in injury or equipment damage.

Always observe the described measures for preventing this danger.

3 Getting Started

3.1. Connection overview BNI IOL-106...Z012

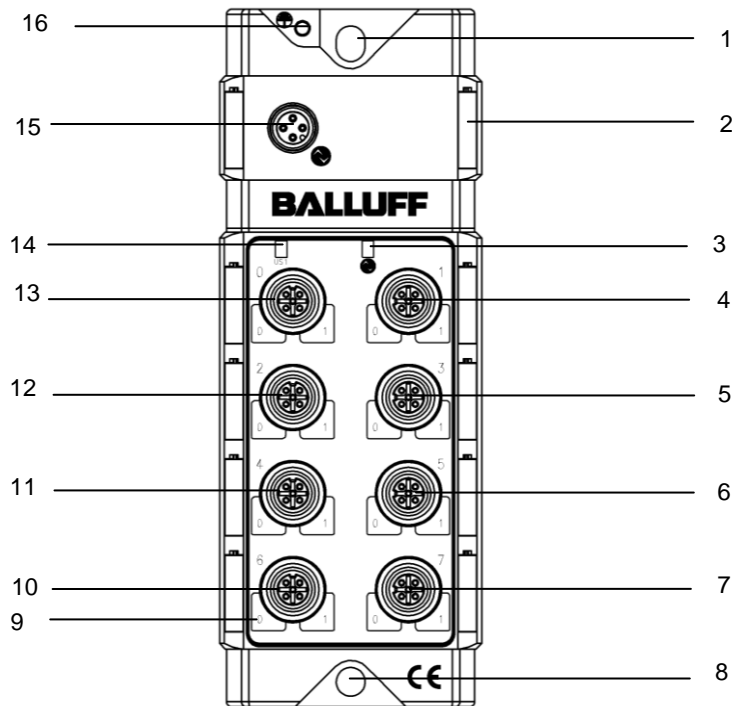


Fig. 3-1: BNI IOL-106-xxx-Z012

- | | | | |
|---|---------------------------|----|----------------------------|
| 1 | Mounting hole | 9 | Pin/Port LED: Signalstatus |
| 2 | Label | 10 | Standard I port 6 |
| 3 | Status LED: Communication | 11 | Standard I port 4 |
| 4 | Standard I port 1 | 12 | Standard I port 2 |
| 5 | Standard I port 3 | 13 | Standard I port 0 |
| 6 | Standard I port 5 | 14 | Status LED: Module supply |
| 7 | Standard I port 7 | 15 | IO-Link Interface |
| 8 | Mounting hole | 16 | FE connection |

3 Getting Started

3.2. Mechanical connection

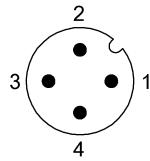
The BNI IOL-106-xxx-Z012 modules are attached by using 2 M6 screws and 2 spacers.

3.3. Electrical connection

The BNI IOL-106-xxx-Z012 modules require no separate supply voltage connection. Power is provided through the IO-Link interface by the host IO-Link Master.

IO-Link Interface

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



Pin	Function
1	Power supply controller, +24V, max 1.1A
2	-
3	GND, reference potential
4	C/Q, IO-Link Data transmission channel

Connecting the Sensor Hub

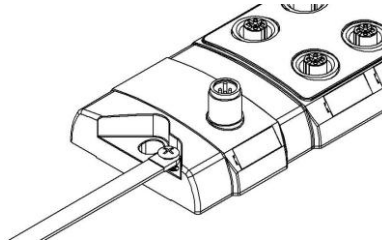
- Connection protection ground to FE terminal, if present.
- Connect the incoming IO-Link line to the Sensor Hub.



Note, Tipp

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

Function ground



Note, Tipp

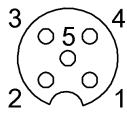
The FE connection from the housing to the machine must be low-impedance and kept as short as possible.

Module versions

Sensor Hub Version	Digital Port
BNI IOL-106-000-Z012	16 Inputs
BNI IOL-106-S01-Z012	16 Inputs with single channel monitoring
BNI IOL-106-S01-Z012-C01	16 Inputs with single channel monitoring and identification

3 Getting Started

3.4. Sensor Interface Standard I-port (M12, A-coded, female)



Pin	Function
1	+24V, 100mA
2	Sinking (NPN) Input 2
3	GND
4	Sinking (NPN) Input 1
5	-



Note, Tipp

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



Note, Tipp

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

4 Getting Started

4.1. IO-Link Data

BNI IOL-106-000-Z012		
Data transmission rate	COM2 (38,4 kBaud)	
Minimal cycle time	3 ms	
Process data length	2 Byte input	
IO-Link Revision	1.1	1.0
Frame typ	2.V	1
Process data cycle time*	3 ms	3 ms

* by min. cycle time

BNI IOL-106-S01-Z012		
Data transmission rate	COM2 (38,4 kBaud)	
Minimal cycle time	3,5 ms	
Process data length	4 Byte input	
IO-Link Revision	1.1	1.0
Frame typ	2.V	1
Process data cycle time*	3,5 ms	14 ms

* by min. cycle time

BNI IOL-106-S01-Z012-C01		
Data transmission rate	COM2 (38,4 kBaud)	
Minimal cycle time	4 ms	
Process data length	6 Byte input	
IO-Link Revision	1.1	1.0
Frame typ	2.V	1
Process data cycle time*	4 ms	24 ms

*by min. cycle time

4 Getting Started

4.2. Prozess data / Input data

BNI IOL-106-000-Z012

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

BNI IOL-106-S01-Z012

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

Byte	2								3							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Short Circuit Port 7	Short Circuit Port 5	Short Circuit Port 3	Short Circuit Port 1	Short Circuit Port 6	Short Circuit Port 4	Short Circuit Port 2	Short Circuit Port 0	-	-	-	-	-	-	-	Undervoltage US1

4 Getting Started

BNI IOL-106-S01-Z012-C01

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
Byte	2								3							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Short Circuit Port 7	Short Circuit Port 6	Short Circuit Port 5	Short Circuit Port 4	Short Circuit Port 3	Short Circuit Port 2	Short Circuit Port 1	Short Circuit Port 0	.	.	.	.	.	.	.	Undervoltage US1
Byte	4								5							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Identificationbyte 0								Identificationbyte 1							

4 Getting Started

4.3. Parameter data / Request data

	DPP	SPDU		Object name	Length	Range	Default Value
	Index	Index	Sub-index				
Identification Data	07 _{hex}			Vendor ID	2 Byte	Read only	0378 _{hex}
	08 _{hex}			Device ID	3 Byte		050711 _{hex}
	09 _{hex}						050712 _{hex}
	0A _{hex}						050713 _{hex}
	0B _{hex}	10 _{hex}	0	Vendor name	7 Byte		BALLUFF
		11 _{hex}	0	Vendor text	15 Byte		www.balluff.com
		12 _{hex}	0	Product name	20,24 Byte		BNI IOL-106-000-Z012 BNI IOL-106-S01-Z012 BNI IOL-106-S01-Z012-C01
		13 _{hex}	0	Product ID	7 Byte		BNI0063 BNI0062 BNI0061
		14 _{hex}	0	Product text	20 Byte		Sensor hub metal NPN
		16 _{hex}	0	Hardware Revision	1 Byte		
	17 _{hex}	0	Firmware Revision	47 Byte			
	18 _{hex}	0	Application tag*	32 Byte	Read / Write		

* 32 Byte string adjustable by the user

	DPP	SPDU		Object name	Length	Range	Default Value
	Index	Index	Sub-index				
Parameter Data		40 _{hex}	0 1-16	Inversion	2 Byte	0 _{hex} ...FFF _{hex}	0000 _{hex}
		44 _{hex}	0 1-8	Sp. Monitoring	2 Byte	0 _{hex} ... FFF _{hex}	-
		60 _{hex}	0	Identification*	2 Byte	0 _{hex} ... FFF _{hex}	-

* Only in case by BNI IOL-106-S01-Z012-C01

4 Getting Started

Inversion of the inputs Index 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

Inversion port (x):

0 - Normal

1 - Inverted

4 Getting Started

Voltage Monitoring Index 44hex

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					11		9
Description	Short Circuit Port 7	Short Circuit Port 6	Short Circuit Port 5	Short Circuit Port 4	Short Circuit Port 3	Short Circuit Port 2	Short Circuit Port 1	Short Circuit Port 0	.	.	.	.	.	.	.	Undervoltage US1

Short Circuit port x = 1
 Short Circuit on port x between Pin 1 and Pin 3
 Port x = 0...7

Identification Index 60hex

Byte	0								1							
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Identification byte 0								Identification byte 1							

This parameter data will not be saved in data storage

4 Getting Started

4.4. Errors

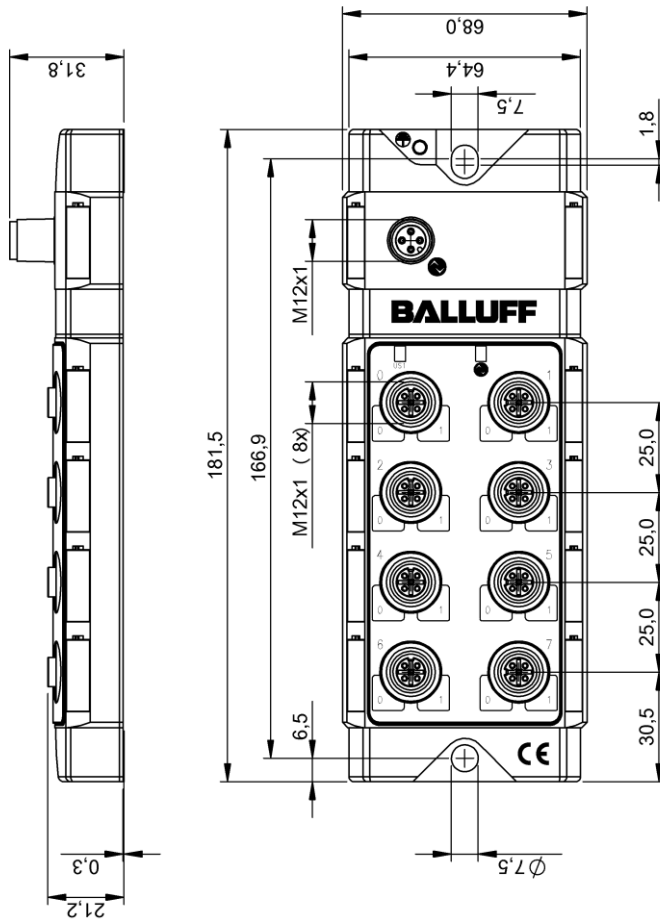
Error Code	Description
0x8011	Index not available
0x8012	Subindex not available
0x8023	Access Denied
0x8030	Parameter Value out of Range
0x8033	Parameter length overrun
0x8034	Parameter length underrun

4.5. Events

IO-Link Revision 1.0	
Event Code	Description
0x5112	Low sensor voltage (US)
0x5410	Short circuit
IO-Link Revision 1.1	
Event Code	Description
0x5111	Low sensor voltage (US)
0x7710	Short circuit

5 Technical Data

5.1. Dimensions



5.2. Mechanical Data

Housing material	Die-cast zinc housing
IO-Link-Port	M12, A-coded, male,
E-Ports	M12, female, 5-poles
Enclosure rating per IEC 60529	IP67 (only when plugged in and threaded in)
Weight	ca. 500 g
Dimensions (W x H x D in mm)	68 x 181,5 x 31,8

5.3. Electrical Data

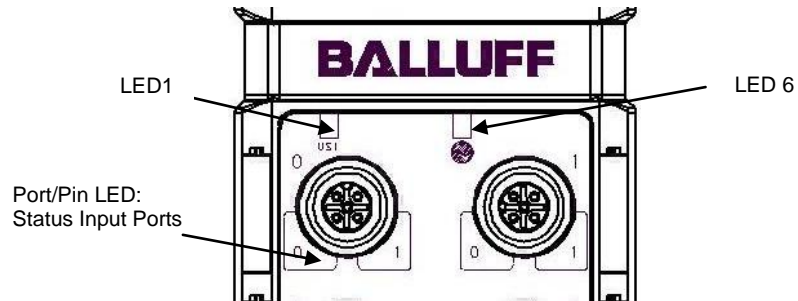
Operating conditions	18 ... 30,2 V DC, per EN 61131-2
Ripple	< 1 %
Current draw without load	≤ 45 mA

5.4. Operating conditions

Operating temperature	-5 °C ... +70 °C
Storage temperature	-25 °C ... +70 °C
EMC Immunity tests Emission tests	EMC-directive 2004/108/EEC EN 61000-6-2:2005 EN 61000-6-4:2007
Shock / vibration	EN 60068-2-6, EN 60068-2-27, EN 60068-2-29, EN 60068-2-64

5 Technical Data

5.5. LED indicators



Status LEDs

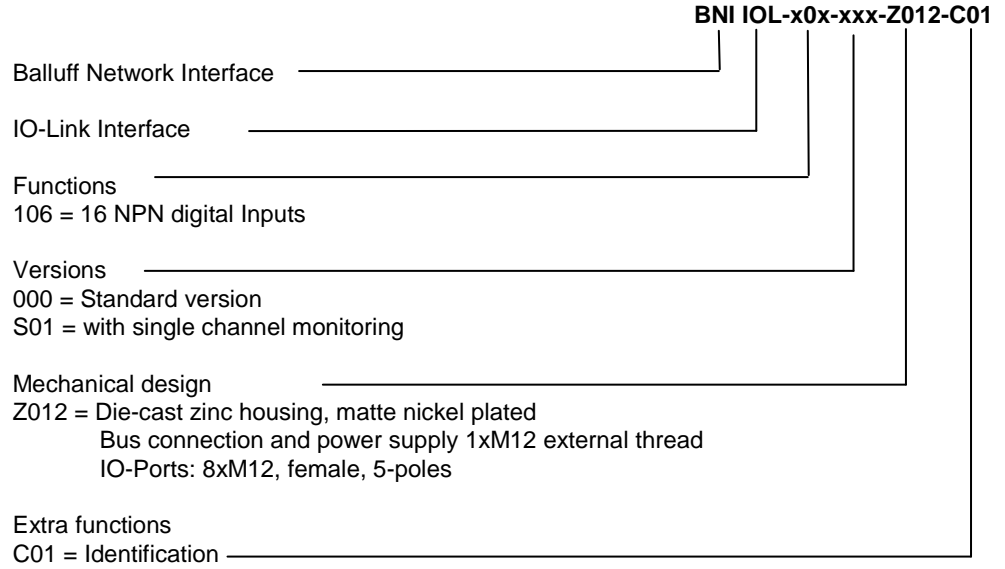
LED	Indicator	Function
LED 1	Green / Red	Supply Sensors & Module ok / Undervoltage
LED 6	Green / Green flashing	Communcation error / communication ok

LED I-Ports Standard

Indicator	Function LED Pin 2 / Pin 4
Off	Input signal = 0
Yellow static	Input signal = 1
Red	Port: SC, short circuit

6 Appendix

6.1. Product ordering code



6.2. Order information

Product ordering code	Order code
BNI IOL-106-000-Z012	BNI0063
BNI IOL-106-S01-Z012	BNI0062
BNI IOL-106-S01-Z012-C01	BNI0061

Included material

BNI IOL... consists of the following components:

- IO-Module
- 4 filter plugs M12
- Ground connection-band
- Screw M4x6
- 20 Labels

Notes

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