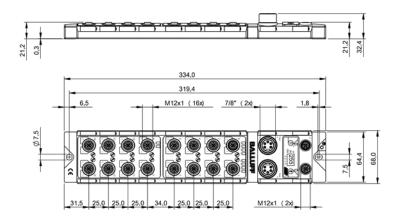
# BVLLAL

## BNI PNT-509-105-Z033 IP67 Module User's Guide



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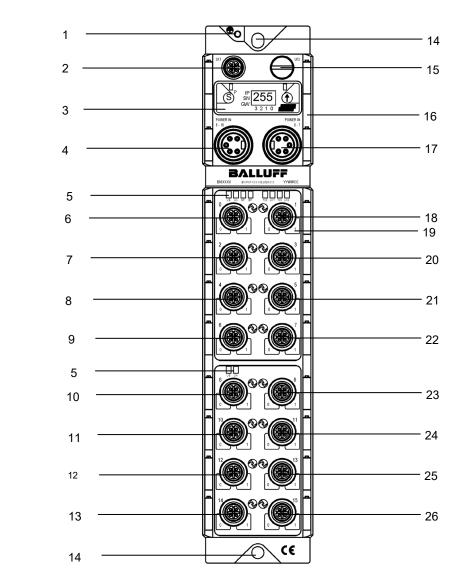
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### 1 General

1.1.	Structure of the manual	This manual is structured such that one chapter is builds on the other. Chapter 1: General Chapter 2: Basic safety instructions
1.2.	Typographical conventions	The following typographical conventions are used in this manual.
	Enumerations	Enumeration is shown in the form of lists with bullets. <ul> <li>Keyword 1</li> <li>Keyword 2</li> </ul>
	Actions	Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.
	Syntax	Numbers: Decimal numbers are shown without additional information (e.g., 123), hexadecimal numbers are shown with the additional indicator hex (e.g., 00 <sub>hex</sub> ) or the prefix "0x" (e.g., 0x00).
	Cross-references	Cross references indicate where further information on the subject can be found.
1.3.	Symbols	Note This symbol indicates general notes.
		Attention! This symbol indicates a safety instruction that must be followed without exception.
1.4.	Abbreviations	BNIBalluff Network InterfaceEMCElectromagnetic CompatibilityFEFunctional earthIStandard input portOStandard output portPNTPROFINET ™UAActuator supplyUSSensor supply
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 Safety

2.1. Proper use	The BNI PNT-509-105-Z033 is a decentral IO-Link input and output module for connecting to a PROFINET ™ network.
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 fulfills the qualifications required for this activity. Any damage resulting from unauthorized manipulation or improper use voids the anufacturer's guarantee and warranty. The Operator is responsible for ensuring that applicable of safety and accident prevention regulations are complied with.
2.3. General safety instructions	<ul> <li>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: <ul> <li>Unauthorized tampering</li> <li>Improper use</li> <li>Use, installation or handling contrary to the instructions provided in this operating manual</li> </ul> </li> <li>Obligations of the Operating Company</li> <li>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.</li></ul>
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.         Image: Note         Image: Image: Image: Note specifications of the product and the contents of this manual at any time without notice.



#### 3.1. Module overview

Figure 1 – Overview of BNI PNT-509-105-Z033

1	Function	earth
		carur

- PROFINET ™ port 1 2
- 3
- Display Power IN 8-15 4
- 5 Status LEDs
- 6 Port 0
- 7 Port 2
- 8 Port 4
- Port 6 9
- 10 Port 8
- 11 Port 10
- 12 Port 12
- 13 Port 14

- 14 Mounting hole
- 15 PROFINET ™ port 2
- 16 Label 17 Power IN 0-7
- 18 Port 1 19 Pin/Port LEDs
- 20 Port 3
- 21 Port 5 22 Port 7
- 23 Port 9
- 24 Port 11
- 25 Port 13
- 26 Port 15

3.2. Mechanical connection

The module is secured by means of two M6 screws and two washers. Insulation support is available separately.

3.3. Electrical connection

Power supply (from HW 2)

Power	Pin	Function	Description
IN 0-7	1	0 V	GND module- / sensor and actuator power
4 0 2	2	0 V	supply
5 0 1	3	FE	Function earth
7/8", male	4	+24 V	Module / sensor power supply port 0-7
	5	+24 V	Actuator power supply port 0-7
Power IN	1	0 V	GND sensor and actuator power supply
8-15	2	0 V	Give sensor and actuator power suppry
	3	FE	Function earth
5 • • 1	4	+24 V	Sensor power supply port 8-15
7/8", male	5	+24 V	Actuator power supply port 8-15

## Power supply (to HW 1)

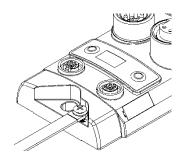
Power	Pin	Funktion	Beschreibung
IN US	1	0 V	
4 0 0 2	2	0 0	GND module- / sensor power supply
5 • • 1	3	FE	Function earth
7/8", Stecker	4	+24 V	Module- / sensor power supply port 0-7
	5	+24 V	Sensor power supply port 8-15
Power IN UA	1	0 V	
	2	0 V	GND actuator power supply
	3	FE	Function earth
7/8", Stecker	4	+24 V	Module-/ actuator power supply port 0-7
110, Oleckei	5	+24 V	Module-/ actuator power port 8-15

#### Note

i

Provide sensor/bus power and actuator power from seperate power sources if possible. Total current < 9 A per Pin. The total current of all modules may not exceed 9A power supply

#### Grounding





**Note** The ground connection between housing and machine must have a low impedance and be as short as possible.

PROFINET interface

#### M12, D-coded, female

Pin	Function	Description
1	Tx+	Transmit Data +
2	Rx+	Receive Datat +
3	Tx-	Transmit Data -
4	Rx-	Receive Datat -
	Pin 1 2 3 4	1 Tx+ 2 Rx+ 3 Tx-



#### Note

4

Unused I/O ports must be provided with cover caps in order to ensure enclosure rating IP67.

I/O port

M12, A-coded, female

	Pin	Function
$1/\sqrt{2}$	1	+24 V, 200 mA
/0_0\	2	Input/output 2A
	3	GND
	4	Input/output 2A
4 5	5	FE



For the digital sensor inputs, refer to guideline on inputs EN 61131-2, Type 3.



Note Each output receives a maximum current of 2.0 A.



1

**Note** Unused I/O ports must be provided with cover caps in order to ensure enclosure rating IP67.

**IO-Link port** 

M12, A-coded, female

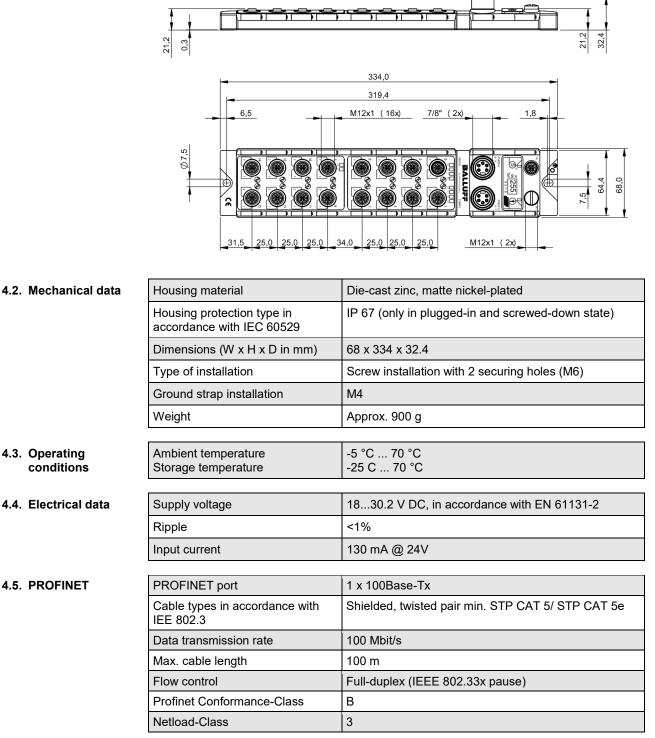
•	Pin	Function
$\sqrt{2}^2$	1	+24 V, 1.6 A
0_0/	2	Input/output 2A
asa)	3	GND
<u> </u>	4	IO-Link / input / output 2A
5	5	n.a.

Port

	Port
	0 - 15
BNI PNT-509-105-Z033	IN / OUT / IO-Link

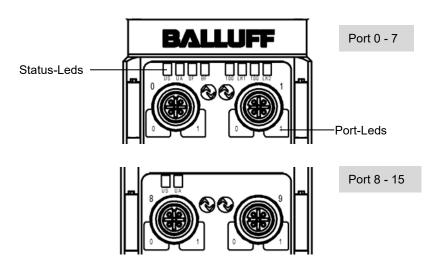
#### 4 Technical data

#### 4.1. Dimensions



#### 4 Technical data

## 4.6. Function indicators



#### Module status

LED	Display	Function
US	Green	Input voltage OK
03	Red	Input voltage low (< 18 V)
	Green	Output voltage OK
UA	Red flashing	Output voltage low (< 18 V)
	Red	Output voltage < 11 V
	off	No error
SF	Red	Diagnosis message; system fault
	Red, flashing	DCP signal service is initiated via the bus
	off	No error
BF	Red	No configuration; or no physical link
	Red, flashing	No data exchange
100	off	Transmission rate: 10 Mbit/s
100	Yellow	Transmission rate: 100 Mbit/s
LK	Green	Data transfer

#### 4 Technical data

Port

#### Standard port

Status	Function
Off	Status of input or output pin is 0
Yellow	Status of input or output pin is 1

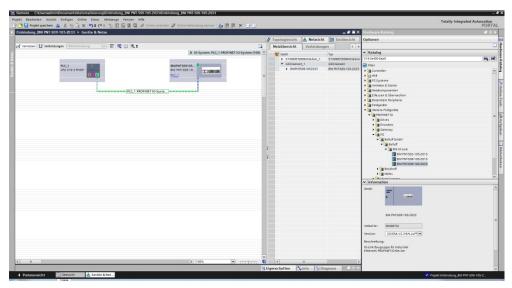
#### IO-Link port

Status	Function
Green	IO-Link – connection active
Green, flashing	No IO-Link – connection
Red, flashing	Validation failed

Status		Port configura	ition
Status	Diagnosis Input	Input	Output
Red	Input low	Short-circuit pin 1 and 3	Short-circuit on output pin
red short flashing	-	-	Short-circuit pin 1 and 3

- **5.1. Configuration** When planning Profibus devices, a device is depicted as a modular system with a header module and several data modules. The screenshots shown here have been taken from the configuration software of the Siemens HW config.
  - GSDML fileThe device data required for project planning is saved in GSDML files (Generic Station<br/>Description Markup Language). The GSDML files are available in two languages as an<br/>Internet download (www.balluff.com). The data modules of an IO-Link module are depicted in<br/>the project planning software according to the slot.<br/>The GSDML file makes the possible data modules available (input or output of different data<br/>ranges). For configuration of the IO-Link modules, the corresponding data modules are<br/>assigned to a slot.

## Integration of<br/>the moduleThe device can be found by searching in the catalog and inserted in the Profinet section by<br/>Drag & Drop.



The BNIPNT509105Z033 module with submodules PN-IO, port 1-M12 and port 2-M12 are used for Profinet communication.

In X1 PN-IO, functions such as prioritized run-up or the domains for the ring topology can be selected.

Slot 1 is reserved for the header module; port functions (input, output, diagnostic input, IO-Link) or diagnostic messages can be defined here.

The remaining slots preassigned in the default configuration (2-17) are placeholders for the IO-Link modules or standard I/O modules.

Slot 2 is for the first IO-Link port / standard I/O port (port 0), slot 17 for the last.

If IO-Link communication is planned for a given port, the standard I/O module must be deleted and replaced with an IO-Link module, e.g., IOL\_E\_2byte.

#### Prioritized acceleration / fast startup

The Balluff modules also have the function "Prioritized acceleration". If the prioritized acceleration or "fast startup" (FSU) is activated, the modules run within a time of <2s.

To activate the function, several settings must be made in the hardware configuration:

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	Ethernet addresses							l "
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	port 2 - M12 [X1 P2 R]							
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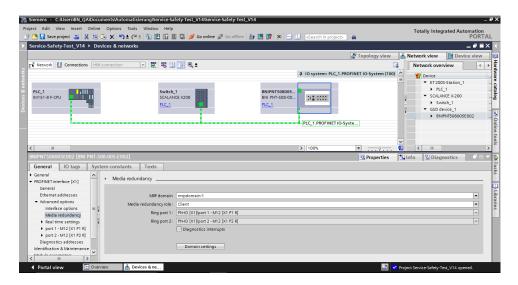
- Hook at prioritized startup

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In order to ensure optimum acceleration in <2s:

- The transfer speed at all connected ports must be fixed to 100Mbit.
- Autonegotiation must not be activated.
- Observe port direction → Port 1 IN Port 2 OUT
- Unused PN IO ports (eg last module in the Lino topology) do not have to be changed.

Ring topology /<br/>MRPThe Balluff PNT modules support the ring topology with media redundancy, which is<br/>enabled by the Media Redundancy Protocol (MRP).<br/>To do this, the module must be in the same topology instance as the MRP master<br/>(managed switch, CPU ...).<br/>The instance can be set here:



Media redundancy role must be set to "Client". By default, "non-participant" is set.

With the ring topology, it is possible to build up a redundant system. In normal operation, one side of the loop line is deactivated by the MRP master. If the cable is damaged / capped in the ring, the deactivated branch is reactivated and two line topologies are created.

To ensure an uninterrupted operation, the response monitoring time should be> 200ms. Because the MRP master takes some time to activate the second string. If the response monitoring time is less than the switching time of the MRP master, the communication breaks down.

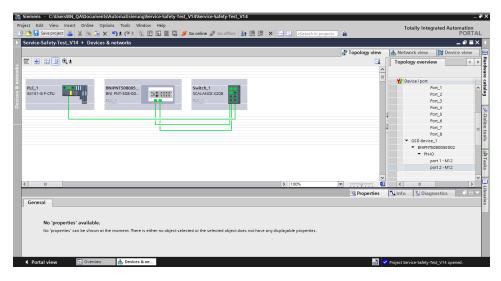
The response monitoring time is calculated from the "update time" and from the factor "Accepted update time without IO data":

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Device replacement without removable media The Balluff modules also support simple device replacement during operation. LLDP is used for this. Please follow the below mentioned instructions for an simple device replacement.

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	Call the user program if comm	unication errors occur									
Real time settings	Support device replacement v	without exchangeable me	dium								
Port [X1 P1 R]     Port [X1 P2 R]	Use IEC V2.2 LLDP mode										
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Diagnostics addresses	monitoring	30 s									
Startup											
Cycle											
Clock memory											
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Interrupts											

In the HW configuration of the CPU, the "device replacement without removable medium" must be enabled.



The PROFINET topology must be created in the HW configuration. The connections of the individual ports must match the wiring of the hardware. If the topology is not correct in the HW configuration, errors can occur.

module

Configuration Double-click on the header module to open its properties. of the header Click on the "Parameter" tab to open a menu selection for defining the port functions and diagnostic functions.

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BNIPNT509105Z033 [Module]							
General IO tags System constant	ts Texts						
▼ General	<b>1</b>						
Catalog information	Module parameters						
<ul> <li>PROFINET interface [X1]</li> </ul>	Global settings						
General							
Ethernet addresses	Global diagnosis:	enable	-				
<ul> <li>Advanced options</li> </ul>	Low sensor undervoltage						
Interface options	detection:	Report	•				
Media redundancy	Low actuator undervoltage	-					
Real time settings	detection:	Report	•				
port 1 - M12 [X1 P1 R]	Sensor short circuit on ouput detection:	Report					
port 2 - M12 [X1 P2 R]	detection:	Report					
Hardware identifier	Port functions						
Identification & Maintenance	Port runctions						
Module parameters	Function Port 0 Pin 4:	NO input					
Hardway identifier		DI D					
42	, Function Port 1 Pin 4:	NC input					
	Function Port 2 Pin 4:	Output					
<b>U</b>	Function Port 3 Pin 4:	NO input	-				
Pin configuration	Function Port 4 Pin 4:	NO input					
Threemgaration	Function Port 5 Pin 4:	NO input					
	Function Port 6 Pin 4:						
	Function Port 7 Pin 4:	NO input					
	Function Port 8 Pin 4:	NO input	•				
	Function Port 9 Pin 4:	NO input					
	Function Port 10 Pin 4:	NO input					
	Function Port 11 Pin 4:	NO input					

Note



**IO-Link configuration:** 

If the connected IO-Link device makes outputs available, pin 2 must be configured to output on the corresponding port. Standard input and output:

For each port, the function (N.C., N.O., diagnostic input (pin 2)) can be arbitrarily selected for each port at pin 2 and pin 4.

Hardware configuration	The IO-Link / standard I/O modules must now be configured appropriately for the configuration of the header module. If necessary, these can be taken over into the configuration table from the hardware catalog by means of drag & drop. By default, all ports are set to Standard I/O. If the port is to be configured as an IO-Link port, the module must be deleted and replaced with an IO-Link module.										
	Slot port 0-15 (Slot 1-16) are reserved for the IO-Link ports / standard I/O ports.										
	Module addressing: Double-click on the IO-Link modules and the remaining addressable modules to change the addressing in the "Addresses" window.										
	<b>Configuring the IO-Link module:</b> A suitable IO-Link module that corresponds to the process data length of the IO-Link device must be selected in the catalog and dragged to the appropriate slot by means of drag & drop. The process data length required by the device in each case can be obtained from the manual of the IO-Link device.										
	Configuring a standard input / output: If one of the possible port pins (pin 4) is to be configured with a standard function (input, output), the "Standard I/O" placeholder module must be used for the corresponding slot. To address the inputs and outputs, input pin 2 / 4 and output 2 /4 must be taken over from the catalog and used in the configuration according to the given modules.										
	For the SIO function, integrate the "IO-Link input with SIO mode" module.										
	With the remaining modules, the various functions are mapped into the process data areas.										
	%) Siemens - Cilbersiadmin/Documents/Automatisierung/559_Anleitung/559_Anleitung         Project Edit Verw Insert Online Options Tools Window Help         P Construction										
	Perferitory 1052033         Perfect         Perfect										

> 100%

Portal view 
 Overview
 Annu BNIPNT5091...

.

IO-Link configuration Double-click on the IO-Link module to change the IO-Link parameters of the respective port pins.

Jos_vinerang + rec_r[ero ision-site	DP]  Distributed I/O PROFINET I	O-System (TOU): PN/IE_1 > BNIP	NT509105203				4
🏕 BNIPNT509105Z033 💌 🔛 🕎	🍊 🖽 🍳 ±		<b>3</b>	Device overview			
-	1-1009-1009			Module     Standard I/O_5     Standard I/O_6     IOL_I/O_32128 byte_1     Standard I/O_8     Standard I/O_8     Standard I/O_10	Rack O O O O O O O	5 6	address
<		> 100%	· · · · · · ·	Standard I/O_10 Standard I/O_11 Standard I/O_12	0	10 11 12	Ш
IOL_I/O_32/32 byte_1 [Module]							
General IO tags System constant	ts Texts						
<ul> <li>General</li> <li>Catalog information</li> </ul>	Module parameters						
Inputs	Cycle time						
Module parameters							
I/O addresses		Multiplier*0,1ms	-				
Hardware identifier	Cycle time:	0					
	Data Selection						
	data window-offset:	0					
	max. data input length:	32					
	- Validation						
	1						
		no validation	-				
	validation mode:						
	Validation mode: Vendor ID 0:						
	•	0					
	Vendor ID 0:	0					
	Vendor ID 0: Vendor ID 1:	0 0 0					
	Vendor ID 0: Vendor ID 1: Device ID 0:	0 0 0 0					
	Vendor ID 0: Vendor ID 1: Device ID 0: Device ID 1:	0 0 0 0					
	Vendor ID 0: Vendor ID 1: Device ID 0: Device ID 1: Device ID 2:	0 0 0 0					
	Vendor ID 0: Vendor ID 1: Device ID 0: Device ID 1: Device ID 2: Serial Number:	0 0 0 0 0					
	Vendor ID 0: Vendor ID 1: Device 10 0: Device 10 1: Device 10 2: Serial Number: Parameter server	0 0 0 0 0 0 0 0 0					

#### Device name, PROFINET address

Double-click on the module in the PROFINET line to view the communication parameters of the module.

The device name and the Profinet address (IP) are configured here.

		O-System (100): PN/IE_1 → BNIPNT5091	052033					
🕈 BNIPNT509105Z033 💌 🖽 🕎 🐇	🖽 🔍 ±			Devic	overview			
			-	**	Module		Rack	Slot
_			=		* BNIPNT50910	052033	0	0
					PN-IO		0	0 X1
			1		Standard I/O		0	1
<b></b>			7		Standard I/O		0	2
			÷		Standard I/O		0	3
			_		Standard I/O		0	4
					Standard I/O		0	5
			~		Standard I/O	_6	0	6
11		> 100%	•	<				
General IO tags System constants	Texts							
General				_				
Catalog information	General							
PROFINET interface [X1]								
General	Name	BNIPNT509105Z033						
Ethernet addresses							_	
<ul> <li>Advanced options</li> </ul>	Author:	admin						
Interface options	Comment:							
Media redundancy								
Real time settings								
port 1 - M12 [X1 P1 R]								_
port 2 - M12 [X1 P2 R]	Rack:	0						
Hardware identifier		0						
Identification & Maintenance								
Module parameters	Catalog information							
Hardware identifier								
	·	DUI DUT 500 105 7033						
	- Short designation:							
	Description:	IO-Link for industrial ethernet; PROFINET IO-Devi	ce					
	Article no.:	BAUGO744						
	Firmware version:							
	Hardware product version:	1						
	GSD file:	gsdml-v2.3-balluff-bni-pnt-509-105-2033-201502	205.xml					

Establishing device relationship Navigate through "Target system" -> "Ethernet" -> "Assign device name" to start the tool for assigning the module a device name.

BNIPNT509105Z033	🖽 📰 🍕 🗄 🔍 ±	<b></b>	Devic	e overview		
		~	**	Module	Rack	SI
				<ul> <li>BNIPNT509105Z033</li> </ul>	0	0
				PN-IO	0	0
				Standard I/O_1	0	1
-	T. HARRIER			Standard I/O_2	0	-
	Change device	=		Standard I/O_3	0	3
	Write IO-Device name to Micro Memory Card			Standard I/O_4	0	4
	Start device tool			Standard I/O_5	0	1
	X Cut Ctrl+X			Standard I/O_6	0	(
	Tel Copy Ctrl+C			IOL_I/O_32/32 byte_1	0	1
	Tel Paste Ctrl+V			Standard I/O_8	0	1
	× Delete Del			Standard I/O_9	0	
	Rename F2			Standard I/O_10	0	
				Standard I/O_11	0	
	🖉 Go to topology view			Standard I/O_12	0	
	👗 Go to network view			Standard I/O_13	0	
	Compile			Standard I/O_14	0	
	Download to device			Standard I/O_15	0	
	Go online     Ctrl+K	-		Standard I/O_16	0	
	Go offline Ctrl+M	•			0	
	🖞 Online & diagnostics Ctrl+D				0	1
	Assign device name	•			0	
	Receive alarms				0	
	Update and display forced operands				0	
	Cross-reference information Shift+F11				0	
					0	
	Properties Alt+Enter				0	
	Export module labeling strips				0	
					0	
					0	
					0	
					0	
					0	
					0	
					•	
					0	
					0	
		~				

#### Assigning device name

Select the desired name and use "Assign name" to assign the marked device that you found.

The device name must be the same as that previously configured under Device properties (see previous page).

Identification takes place via the MAC address (on the rear of the device) or via the Flashing test.

Configured POPFINET device         With Teacking many         Device that         Device that <th>ssign PROFINET dev</th> <th>ice name.</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	ssign PROFINET dev	ice name.						
Device gase: But Purt9696-106-2023 CHICAR CHICAR			Configured PROF	INET devi	ce			
Oline acces         Bre CRC Reiners:			PROFINET device	name:	bnipnt5091052033			
Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Net inclusion         Office:       Image: Net inclusion         Yee of the FOR's bareface:       Net inclusion         Office:       Image: Net inclusion         Yee of the FOR's bareface:       Net inclusion         Office:       Net inclusion:         Yee of the FOR's bareface:       Net inclusion:         Yee of the			Devi	ce type:	BNI PNT-509-105-2033			
Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Image: Net inclusion of Adapter:         Yee of the FOR's bareface:       Net inclusion         Office:       Image: Net inclusion         Yee of the FOR's bareface:       Net inclusion         Office:       Image: Net inclusion         Yee of the FOR's bareface:       Net inclusion         Office:       Net inclusion:         Yee of the FOR's bareface:       Net inclusion:         Yee of the			Online access					
PORC interface:     PORC interface:     PORC interface:     Porce filter     Porce fil				terface:	PINTE			
Chline status information: Colline status information: Co						T Desktop Adapter		
Childre status information: Continue status i	-		Device filter					
	8							
Circles information: Packing and ACC address: Service type: FOOFACT device name: Service 192186.02: 001931310006 BNI MTRs. biopet00105033 C CC Information: Update list: Accessed and Accesed and Accessed and Accessed and Accessed and Accessed and Ac			<u> </u>					
Accessible devices in the network: Padress MAC address Device type ROFMET device name Status Padress Do 19/3/13/00-00 NIN PMT6_ Interpret/09/05/03/2 O K Interpret/09/05/03/2 O K Interpret/09/05/05/05/2 O K Interpret/09/05			Only show d	levices with	bad parameter setting	12		
Padres         Mic Address         Derice type         FOOTHET derice name         Status           192.188.02         001931310060         BHI MIS         ImposS91055033         O K           Plank UED         ImposS91056033         O K         ImposS91055033         O K           Chline status information:         ImposS9105603         O K         ImposS9105603         O K           Online status information:         ImposS9105600         ImposS9105600         Antige na           Disech completed 0 all devices were found.         ImposS9105600         Antige na			Only show d	levices with	outnames			
Image: Status Information:           Other Status Information:         Image: Status Information:         Image: Status Information:         Image: Status Information:           Image: Status Information:         Image: Status Information:         Image: Status Information:         Image: Status Information:		Accessible dev	ces in the network:					
Criline status information: ① Search completed. 0 al 0 devices were found. ③ Search completed. 0 al 0 devices were found.								
K         Image: Control of the state		192.168.0.2	00-19-31-31-0D-6D	BNI PNT-5	bnipnt509105z033	ОК		
K         III           Orline status information:	L 🖂							
K         III           Orline status information:								
It         III           Oulline statuic information:	C Slack ( SD							
Online status information: ① Seach completed: 0 of 0 devices were found. ① Seach completed: 0 of 0 devices were found. ① Seach completed: 0 of 0 devices were found.	Fiesh LCD							_
Online status information: () Electric completed. D of D devices were found. () Electric completed. D of D devices were found.								
Search completed. 0 of 0 devices were found.     Search completed. 0 of 0 devices were found.						Update list		
Search completed. 0 of 0 devices were found.     Search completed. 0 of 0 devices were found.								
6 Search completed. 0 of 0 devices were found.	Online status informat	ion:						
Search completed. 1 of 4 devices were tound.	-							
		ted. 1 of 4 devices w	pre tound.					_
( ) II	¢			10				
							Close	

Concluding the configuration	Download the configuration into HW config.
	At this point, the bus error on the module should disappear. There could still be an active system error, particularly if an IO-Link is used.
	Possible causes: - Line break (no IO-Link device connected) - IO-Link device fault (e.g., external voltage supply not connected) - Validation failed
	If the module still reports a bus error, there could be a problem in one of the following areas:
	<ul> <li>Device relationship not established.</li> <li>Scan the network via "Target system" -&gt; "Ethernet" -&gt; "Ethernet user" -&gt; "Search" and check whether the device is signaling under the correct device name and correct IP address.</li> <li>Adapt the Ethernet address or device name if necessary, assign the device name to the device once again and download the configuration.</li> </ul>

5.2. Functions in module properties	Description of the functions in module properties
Module settings	Global diagnostics: This function can be used to permit / suppress all diagnostics messages of the module. (optical diagnostics signals and diagnostics in configured diagnostics modules are not affected)
	Sensor supply undervoltage: This function can be used to permit / suppress the diagnostics message Sensor supply undervoltage. (Optical diagnostics and diagnostics in configured diagnostics modules are not affected)
	Actuator supply undervoltage: This function can be used to permit / suppress the diagnostics message Actuator supply undervoltage. (optical diagnostics signals and diagnostics in configured diagnostics modules are not affected)
	Sensor connection to output: This function can be used to permit / suppress the diagnostics message Sensor Short- circuit on the module output. (Visual diagnostics and diagnostics in configured diagnostics modules is not affected) Function applies only to channels/pins which are configured as outputs. Channels/pins configured as inputs are unaffected.
Port functions	The function for every individual port pin can be defined here: Make contact = input as normally open contact Break contact = input as normally closed contact Diagnostic input = Pin 2 as diagnostic input (red at 0) Output = output function
Safe state	This function is a supplement to an output configuration of the respective port pin. For each port pin, a safe status can be predefined which is to be assumed in the event of a loss of bus communication.

5.3.	Bit mapping and function	Bit n	nappi	ng an	d fun	ction	of the	confi	gurab	le mo	dules							
	Inputs pin 4 Inputs pin 2 Outputs pin 4 Outputs pin 2	inpu	ts pin	2 an	d outp	outs p	in 4, c	r outp output depict	s pin	2.					-	-		ction.
	IO-Link modules	The	IO-Li	nk mo	odules	s alwa	iys ha	ve the	e sam	ie stru	ucture	:						
	Actuator	IOL_		x/xByt	— Nu the — I = O I/C	e proc Input = Out ) = Bo	ess d data put da th inp	out an	ngth o d outp	of the out da	IO-Li ta	nk de	vice)	-		-	ater th	ian
	shutdown pin 4																	
	/ pin 2	Byte Bit	7	6	5	4	) 3	2	1	0	7	6	5	4	3	2	1	0
		Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8
	Actuator warning pin 4 /	Feedba	ack if	a volt	age is			plied	at an	outpu	it that	is no	t set.					
	pin 2	Byte	-	•	-		)		4	•	-	•	_	1			-	
		Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
		Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8
	Restart pin 4 / pin 2	If this fu				the p	ort mu							orres	pondi			
		Byte	7	6	F		)	2	4	0	7	e	F		1	2	4	0
		Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
		Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8

Switching IO-Link diagnostics on / off If this function is configured, the IO-Link diagnostics is deactivated for all ports and can be reactivated for the desired ports.

Byte				(	0							1	I			
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8

IO-Link

Bit status for each IO-Link port; feedback indicating whether communication is established.

communication

Byte				(	0							1	I			
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8

Peripheral error, socket Feedback indicating the port at which an error occurred.

Byte				0	)							1					1
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	1
Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8	

Short circuit Sensor supply Feedback indicating the port at which there is a sensor supply short circuit.

Byte				(	0							1	I			
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8

PD Valid

Indicates if the process data is valid for IO-Link devices. 1 = valid, 0 = not valid

Byte				(	0								1			
Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Description	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	Port 15	Port 14	Port 13	Port 12	Port 11	Port 10	Port 9	Port 8

Station d

Feedback indicating which fault occurred.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
IO-Link short circuit	Actuator Warning	Actuator Short circuit	Sensor voltage Short circuit	External error	No UA	UA < 18 V	US < 18 V

Display LED

**Display functions** 

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
						Green LED	Red LED

## IO-Link configuration

In the properties of the IO-Link module the IO-Link parameters of the respective port can be changed.

Anleitung PNT 507 & 527 + PLC_1 [CPU 15	16F-3 PN/DP] + Dezentrale Periphe	rie + PROFINET IO-System (100): F	PN/IE_1 + BNI	PNT507005	ZD40		_ # =>	K Hardware-Katalog	# I >
					3	Topologiesicht 💧 Netzs	icht M Gerätesicht	Optionen	
🛃 BNIPNT507005Z040 💌 🔛 🕎	4 🗉 Q.: 📑 📑	Geräteübersicht							
	<u></u>	W Baugruppe	Baugr Steck	E-Adresse	A-Adres	Typ	Artikel-Nr.	✓ Katalog	
1050		<ul> <li>BNIPNT507005Z040</li> </ul>	0 0			BNI PNT-507-005-2040	BNI0092	« Suchen»	inių init
an spin		PNHO	0 0 X1			BNIPNT507005Z040		Filter	100
and I		IOL_I/0_32/32 byte_1 IOL_I_24 byte_1	0 1	031 3255	031	IOL_IIO_32/32 byte IOL_I_24 byte		Kopfmodul	^
		IOL_O_16 byte_1	0 3	22	3247	IOL_O_16 byte		Modul     Tim Modul     ToLink modules	
	× -	IOLink Input with SIO mode 1	0 4			IOLink Input with SIO mode		IOL_NO_01/01 byte	
K II > 100%	· ····· 🛍	4		11		(a)	>	IOL_IIO_02/02 byte	
					Eig	enschaften	Diagnose	IDL_NO_02/04 byte	
	onstanten Texte							IOL_IIO_02/08 Byte IOL_IIO_04/02 byte	
▼ Allgemein	Baugruppenparameter							IOL_IO_04/02 byte	1
Kataloginformation Eingänge								IOL_I/O_04/08 Byte	
Baugruppenparameter	Zyklus-Einstellung							IOL_1/0_04/32 byte	
ElA-Adressen	Zvklusæit	eutomatisch						IOL_1/0_08/02 byte	
HWHKennung								IOL_NO_08/04 byte	
	Datenauswahl							IOL_NO_OBIOB byte	
								10L_10_24/24 byte	
	Datenausschnitt-Offset	0						IOL_1/0_32/04 byte	
	max. Eingangsdatenlänge	32						IOL_1/O_32/32 byte	
								IOL_L_01 byte	
	Validierung							IOL_LO2 byte	
	Validienunosmodus	keine Validierung						IOL_1_04 byte	
	Hersteller ID 0							IOL_LOS byte	
	Hersteller ID 1							IDL_L_10 byte	~
	Device ID 0							✓ Information	
								Gerät	^
	Device ID 1							12 II A BARRING	
	Device ID 2							-5-(a) interaction	
	Seriennummer								
	Parameter server								=
	Parameter server							IOL_I/O_01/01 byte	
	Parameter Server Einstellung	ausgescheitet	-						
								Artikel-Nr.:	
								Version:	-
								Beschreibung:	
								IOL_I/O_01/01 byte	
									~
Portalansicht     Übersicht	BNIPNTS070							Des Projekt Anleitung PNT 507 & 1	177 m

**IO-Link functions** Explanation of the possible settings in the properties of the IO-Link port

Cycle settingsThis parameter is used to reduce the IO-Link communication speed by increasing the<br/>IO-Link cycle time. Use the scroll down menu to set the cycle time.

Data selectionThe start byte of the process data can be defined with the data section offset. For the max.<br/>input data length, the actual process data length of the IO-Link device is entered. These<br/>settings are only for the input data.<br/>The visible data window for the input data can now be adjusted via an IO-Link module with<br/>appropriate process data length.

ValidationNo validation: Validation deactivated, every device will be accepted<br/>Compatibility: Manufacturer ID and device ID are compared to the module data.<br/>The IO-Link communication is only started if there is a match. Manufacturer ID and device<br/>ID are entered in decimal format.<br/>Identity: Manufacturer ID and device ID and serial number are compared to the module<br/>data. The IO-Link communication is only started if there is a match.<br/>Manufacturer ID and device ID and serial number are compared to the module<br/>data. The IO-Link communication is only started if there is a match.<br/>Manufacturer ID and device ID are entered in decimal format, the serial number is entered<br/>in ASCII code.

Parameter server

#### Switched off:

Data management functions disabled, saved data are retained.

#### Delete:

Data management functions disabled, saved data is deleted.

#### **Restore:**

Only a download of the parameter data to the IO-Link device is performed. As soon as the saved parameter data in the port parameter server differs from the that of the connected IO-Link device a download is performed. Only exception: The parameter server is empty. Then one upload is performed.

#### Save/Restore:

An up-/download of the parameter data to the IO-Link device is performed. As soon as the saved parameter data in the port parameter server differs from the that of the connected IO-Link device and no upload requests from the IO-Link device are present, a download is performed. As soon as a device requests an upload (upload flag set) or if there is no data saved in the

master port (e.g. after data has been deleted or before the first data upload), the master starts an upload of the parameter data from the device.



Ť

After the upload of the parameter data, the vendor ID and device ID of the connected IO-Link device are also still saved until the data records are deleted. When the connected IO-Link device is started, a validation takes place. Thus, only an IO-Link device of the same type can be used for the data management.

#### 6 Configuration of IO-Link devices

General IO-Link devices can be configured via the web server, function modules and the IO-Link device tool.

When using the device tool as well as the web server the read and write accesses are taken over by the software.

**Function block** The function block "IOL\_Call" constructs a telegram which is sent to the master using DPV1 functions. This requires the following settings:

Diagnostics address	The diagnostics address of Slot 1 is used
CAP access	255

The sample project with the IOL\_Call function module of Siemens AG can be downloaded on the Balluff homepage.

The telegram structure is described in the following table:

Area	Size in bytes	Value	Definition
Call header	1	08h	08h for "CALL", fixed
	1	0	IOL master
		163	Port number
		64255	Reserved
	2	65098	FI_Index, IO-Link header is following
IO-Link header	1	0255	Task
			2 = write
			3 = read
	2	03276	IO-Link index
		7	Port function
		65535	
	1	0255	IO-Link subindex
Data range	232		Range of the data to be written or
			read

Read	To read out data, the master must be given a reading task for the corresponding slot/index/subindex.					
	The telegram must be adapted accordingly for this purpose (slot, index), and 0x03 for reading must be entered under "Task". The telegram can then be sent by write instruction to the corresponding module.					
	The module reads the data from the IO-Link device. The data can be retrieved by reading with the same telegram.					
Write	To write data, the master must be given a writing task for the corresponding slot/index/subindex.					
	The telegram must be adapted accordingly for this purpose (slot, index), and 0x02 for writing must be entered under "Task". The telegram can then be sent by write instruction to the corresponding module.					

#### 7 Monitoring & Diagnostics

**7.1. General** The fieldbus module offers a number of diagnostics interfaces which are described in the following:

- Device diagnostics using the web interface
- Network diagnostics via SNMP
- Fieldbus-specific diagnostics using the PLC

The web interface and the fieldbus-specific diagnostics interface are each described in a separate section.

The monitoring and diagnostics interfaces on the device are accessed via the IP-based management interface over the Ethernet network. Alternately to the procedure for setting IP access described in the "Integration" section, other dedicated configuration tools can also be used together with the DCP protocol of PROFINET. The following parameters must then be set:

- IP address (IP)
- Subnet mask (SN)
- Gateway address (GW)
- Device name

The configuration settings can be reset to their factory defaults through the web interface.

Configuration settings are only possible if the module has no active connection with a controller unit.

**7.2. SNMP MIBs** Monitoring and diagnostics of the device network settings can be done over the network using the SNMPv1 protocol. This can be accessed simply from a so-called SNMP browser or common network management applications.

The following MIBs are supported:

- MIB-2 (RFC 1213)
- LLDP-MIB (IEEE 802.1AB)

Information about the fieldbus module is provided in the module-specific information of the MIB-2:

MIB variable	Description
sysDescr	A textual description of the entity. This value should include the full name and version identification of the system's hardware type, software operating-system, and networking software.
sysObjectID	{1.3.6.1.4.1.44233.1.2.1} For Balluff products with Product Enterprise Number (PEN) = 44233, the product list is defined in <b>BALLUFF-PRODUCTS-MIB</b>
sysUpTime	The time (in hundredths of a second) since the network management portion of the system was last re-initialized.
sysContact	The textual identification of the contact person for this managed node, together with information on how to contact this person. ("BALLUFF")
sysName	An administratively-assigned name for this managed node. By convention, this is the node's fully-qualified domain name. ("BNI PNT")
sysLocation	The physical location of this node (e.g. "73765 Neuhausen a.d.F, Germany")

### 7 Monitoring & Diagnostics

MIB variable	Ethernet port	IO-Link Port		
ifIndex	A unique value, contiguously starting from 1.			
ifDescr	A textual string containing information about the interface, i.e. "Ethernet X"	"IO-Link X" / "IO-IN X" / "IO-OUT X"		
ifType	IANAifType = 6 (ethernetCsmaCd) when Ethernet	IANAifType = 280 (sdci) when IO-Link-Port = 0 (other) when I/O-Port		
ifMTU	length of Ethernet MTU	length of IO-Link process data (typically max. 32 Byte) or 1, when IO-port		
ifSpeed	actual Ethernet speed	IO-Link speed (no device = 0 bit/s, Com1 Mode = 4800 bit/s, Com2 Mode 38400 bit/s, Com3 Mode = 230400 bit/s)		
ifPhysAddress	MAC address assigned to this port	This object may contain an octet string of zero length, since IO- Link is a serial P2P protocol with no specific addressing.		
ifAdminStatus	Up(1), Down(2), depending	Up(1), Down(2), depending if IO-Link capability is configured.		
ifOperStatus	Up(1), Down(2), depending if an operable.	IO-Link device is connected and		
ifLastChange	The value of sysUpTime at the time the interface entered its current operational state. If the current state was entered prior to the last re-initialization of the local network management subsystem, then this object contains a zero value.	n/a		
ifInOctets	The total number of octets receiv framing characters.	_		
ifInErrors	n/a	Number of received frames that were rejected as invalid by the IO-Link-Master (Abort).		
ifOutOctets	The total number of octets transmitted out of the interface, including framing characters.			
ifOutErrors	n/a	Number of retries by the IO- Link-Master, indicating unsuccessful packet transmissions.		

The port-specific information of the MIB-2 describes diagnostic data about the network connections, including the IO-Link ports:

#### 8 Display

8.1. General

# The display element of the BNI PNT-509-105-Z033 consists of two LEDs, two buttons and a LCD display. A backlight is built in to increase readability in low-light environments and is activated if you start going through the menu.

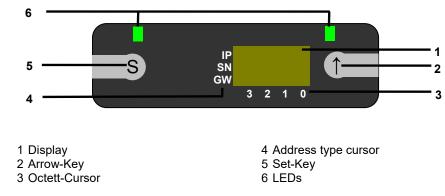
It is possible to display the station name. At delivery status, the letters "no name" show that no station name of the module is set by the control system.

The following address types are implemented and reflect the current configuration of the control system:

- IP address (IP)
- Subnet mask (SN)
- Gateway address (GW)

Each address type consists of 4 octets. Additionally the display shows information about the device name, the hard- and software version and the MAC-ID.

## 8.2. Controls and visualization



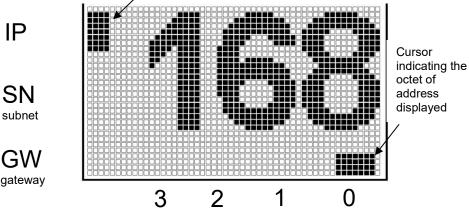
**Arrow-Key:** This button is used to go through the entries of a menu and is a short-time keypress. The display shows the default screen after 10 seconds of inactivity. **Octett-Cursor:** The default location of the Octett-Curser is position 0 indicating the lowest-order octet.

Address type cursor: The default location of the Address type cursor is position IP. **Set-Key:** This button is used to start the editing mode and save or confirm a change in the configuration.

**LEDS:** The LEDs, configured as a single LED, can be set by the control system to indicate a change in a state. Is is required to add the module "Display Leds" to the configuration of the control system in order to utilize this functionality.



Cursor indicating the current type of address displayed



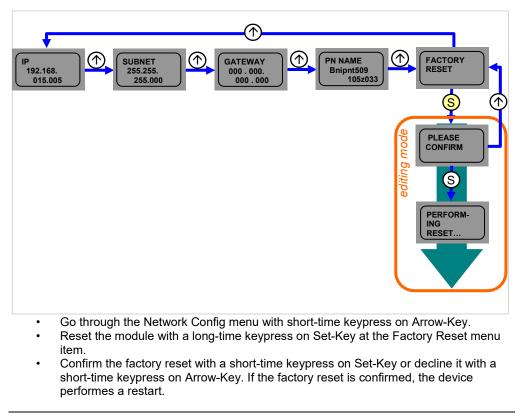
#### 8 Display

8.4. Design and symbols	There are some symbols used in the following flow-charts to describe the display- functionality:					
	Actual state					
	Change-over					
	S Condition: short-time keypress on Set-Key					
	S Condition: long-time keypress on Set-Key (min. 3 seconds)					
	Condition: short-time keypress on Arrow-Key					
8.5. Startup						
	Module name					
	Hard- und firmware revision					
8.6. Main menu	Default-view 4. octet of IP address					
	Menu: Network Config					
	Menu: Module Info					
	<ul> <li>Go through the main menu with short-time keypress on Set-Key</li> <li>Step in a menu with short-time keypress on Arrow-Key</li> </ul>					

Step in a menu with short-time keypress on Arrow-Key

#### 8 Display

#### 8.7. Factory Reset

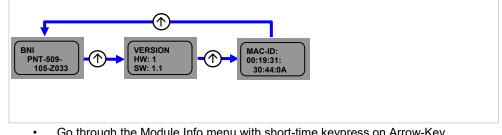


#### Note

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A factory reset can be performed only after a power reset without an attached network cable.

#### 8.8. Module Info



- Go through the Module Info menu with short-time keypress on Arrow-Key.
- You can select between the device name, the hard and software version and the MAC-ID.

 
 9.1. General information
 The BNI fieldbus module contains an integrated web server for retrieving detailed device information and for configuring the device.

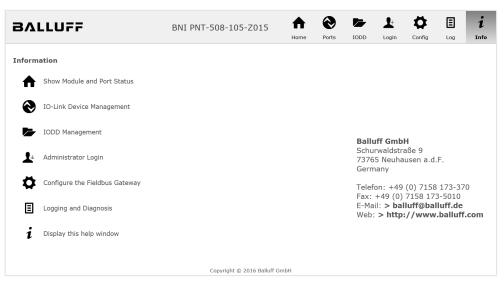
To use the web interface you must first ensure that the module has been correctly integrated into your network. In addition the IP subnet of the BNI module must be accessible from the PC on which the browser is running. For the supported web browsers, please refer to the corresponding data sheet.

For open a connection with the web server, enter the IP address of the module in the address line of the browser. The homepage then appears with the essential device information.

BALLUF	F	BNI PNT-508-105-Z015	f Home	Ports	IODD	Login	Config	Log	i
Module Informati	on								
Product Name:	BNI PNT-508-105-Z015								
Order Code:	BNI005H					-			
Name:	unknown name	ſ							
Location:	unknown location	ľ		00					
Contact:	unknown contact			))~~~					
Firmware Revision:	3.2			1					
Hardware Revision:	6					3			
Station name:	mydevice			)~~					
IP Address:	192.168.0.3	L	0	1		•			
Subnet Mask:	255.255.255.0	P				5			
Gateway Address:	0.0.0.0			Jee	$( \bigcirc )$				
MAC Address:	00:19:31:3F:FF:32			2					
Link Speed Port 1:	100 Mbit/s FULL	h							
Link Speed Port 2:	No Link	r i i i i i i i i i i i i i i i i i i i		00		7			
PLC Lock:	No	Ļ			$\odot$				
			>	LED Leg	gend				

**9.2. Navigation / Info** The navigation bar is located in the upper area of the window, which allows you to switch between the various dialogs of the web interface. To do this click on the corresponding icon.

When the "Info" tab is selected the following overview appears:



The "BALLUFF" logo at upper right links to the international Balluff homepage.

# **9.3. Login/Logout** To make configuration settings on the fieldbus module using the web interface, you must first log in. Functionalities which cannot be used without logging in are indicated by the grayed out buttons.

The default password is:	
BNI PNT-XXX-XXX-XXXX	"BNIPNT"
BNI EIP-XXX-XXX-XXXX	"BNIEIP"
BNI ECT-XXX-XXX-XXXX	"BNIECT"

The password cannot be changed!



After successfully logging in the dialogs are shown as follows:

BALLUFF	BNI PNT-508-105-Z015	<b>h</b> Home	Ports	IODD	Logout	Config	E	i Info
User Login	Logout Successfully logged in.							

Use the "Logout" button to log out again. After 5 minutes of no interaction with the Webserver the user is automatically logged out.

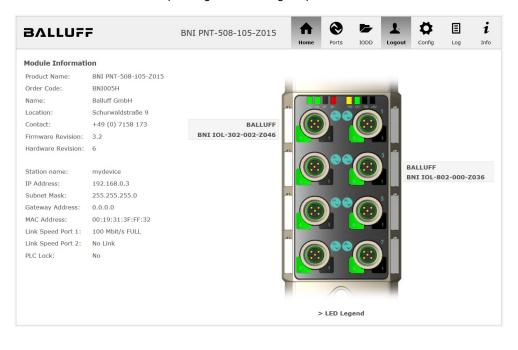


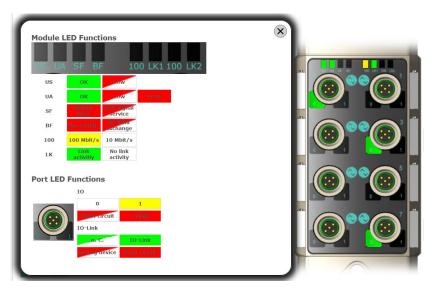
For security reasons the fieldbus module shows only one login at a time with configuration access. Reading (without logging in) is however possible from multiple PCs at the same time on the fieldbus module.

# **9.4. "Home" dialog** Under "Home" you are given the essential information about the fieldbus itself and its network activity. You are also shown whether the configuration block was enabled by the controller (PLC).

Information is also shown about the current process data and the status of the module via the corresponding LEDs. After selecting "LED Legend" a Help dialog appears which explains the meaning of the LEDs.

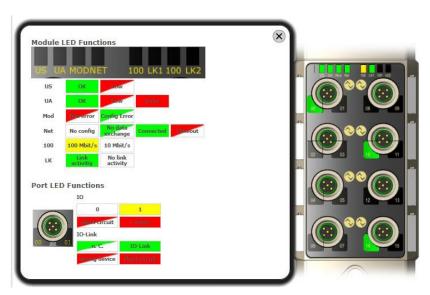
If an IO-Link device is connected to one of the configured IO-Link terminals, some of the device data will be displayed in addition to the module data in the form of a link. After selecting one of these links the corresponding device dialog is opened.





PNT:

EIP:



9.5. "Ports" dialog

The "Ports" dialog displays information and process data for the connected IO-Link devices. Select the desired IO-Link Port in the image of the fieldbus module on the right side to see the device data.



**Note** The IO-Link device data are only displayed if the port is also configured as an IO-Link port!

**No appropriate IODD uploaded** It is possible to read and write the configuration parameters of the IO-Link device via the "Parameters" option. The parameter indexes and subindexes of the IO-Link device are described in the corresponding separate user's guide (and follow the IO-Link conventions).

Under "Events" you can see whether a diagnostic event from the IO-Link device exists.

Under "Parameter Server Content" you can view the content of the parameter server if parameter data is stored on the parameter server.

BALLUF	F	BNI	PNT-508-105-Z015	<b>h</b> ome	<b>e</b> Ports	IODD	Logout	Config	Log	i Info
IO-Link Device Pre Identification Data Vendor ID: Device ID: Vendor Name: Vendor Text: Product Name: Product Name:		i							)**© )**©	
Product D: Product Text: Serial Number: Hardware Revision: Firmware Revision: Application specific tag:	Sensor/Actor hub M8 7A 69 68 67 6A 68 73		58 F6 64 6C 75							•
Process Data Inputs (hex): Outputs (hex):	20 00 00 00									
Parameters Index: Subindex: Data (hex): Result:	Read      Write	Apply	Clear							
Events Current Event:	Secondary supply volta	age fault (Por	t Class B) - Check toleranc	e						
Parameter server of Vendor ID (hex): Device ID (hex): Checksum (hex): Content (hex):	content 00 00 00 00 00 00 00 00 00 (none)									

"Ports" dialog with direct parameter access

Appropriate IODD If an IODD appropriate to the IO-Link device connected to the currently selected port has been uploaded (see "Dialog "IODD"), the normal dialog for "Process Data" and "Parameters" is not displayed, but rather an expanded dialog.

Information from the IODD of the device is used so that the data can be better understood.

Thus in the following screenshot not only are the input data of the distance sensor displayed as a hex number, but also interpreted and labeled under "Input". Since the sensor has no parameters, none are displayed.

BVITAL	F	BNI PNT-508-105-Z015	<b>h</b>	Ports	Logout	Config	Log	i Info
IO-Link Device Pr	operties (Port 2)							
Identification Data	1							
Vendor ID:	0x0378				(			
Device ID:	0x020101							
Vendor Name:	BALLUFF				(			
Vendor Text:	www.balluff.com							
Product Name:	BAW M18MI-BLC50B-S040	3			(			
Product ID:	153938				(			
Product Text:	Inductive distance sensor,	; 15mm			(		••@	
Serial Number:					(			
Hardware Revision	: 1.00						$\frown$	
Firmware Revision:	1.01							
Application specific tag:								
Process Data						_		,
Inputs (hex):	00 03 FF							
Outputs (hex):	no outputs					$\leq$	N	
					HD-LM MIN	0		
Input								
Distance absolute					1023			
Reserved bits					0			
Events								
Current Event:	no Event							
Parameter server	content							
Vendor ID (hex):	00 00							
Device ID (hex):	00 00 00							
Checksum (hex):	00 00 00 00							
Content (hex):	(none)							

Dialog "Ports": IODD interpretation and device image

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### 9 Webserver

If the IODD of the IO-Link device on the currently selected port has parameters, these are shown in table format (see following screenshot). In this example the parameters for the Balluff Smart Light are shown.

The Smart Light is a signal light which can be used in three different modes. These modes can be set using an IO-Link parameter. The parameter values and associated texts are stored in the IODD.

This means "Operation Mode" can be read out and displayed ("Read" and "Read All" buttons) or written to the device ("Write" button).

If subindexes have no buttons they cannot be individually processed but rather only the entire index at once.

**Note** Each changed value must be individually written by clicking on the "Write" button!

Param	eters			
				Read All
64 (0)	Operating mode (rw)	Segment mode 👻	Write	Read
65 (0)	Number of segments (rw)	One segment 🔻	Write	Read
66 (0)	Type of level indicator (rw)	Bottom-up 👻	Write	Read
67 (0)	Resolution of level indicator (rw)	8 bit 👻	Write	Read
68 (0)	Level mode, segment 1 (rw)	See child elements		
68 (1)	Level mode, segment 1 color	Off •	Write	Read
68 (2)	Level mode, segment 1 dominance	◎ Color is not dominant ◎ Color is dominant	Write	Read
69 <b>(</b> 0)	Level mode, segment 2 (rw)	See child elements		
69 (1)	Level mode, segment 2 color	Off 👻	Write	Read
69 (2)	Level mode, segment 2 dominance	Color is not dominant Color is dominant	Write	Read
70 (0)	Level mode, segment 3 (rw)	See child elements		
70 (1)	Level mode, segment 3 color	Off •	Write	Read
70 (2)	Level mode, segment 3 dominance	Color is not dominant Color is dominant	Write	Read
71 (0)	Level mode, segment 4 (rw)	See child elements		
71 (1)	Level mode, segment 4 color	Off •	Write	Read
71 (2)	Level mode, segment 4 dominance	© Color is not dominant © Color is dominant	Write	Read

"Ports" dialog: Parameter list of an IO-Link device with uploaded IODD

**9.6. "IODD" dialog** Using this dialog you can transfer IODDs (device description files for IO-Link devices) and the associated device images to the fieldbus module, so that a detailed representation of the connected IO-Link devices in the "Ports" dialog is possible.

When IO-Link devices are connected and IO-Link ports are activated, the dialog shows a table with information about the IO-Link devices.

The fieldbus module file system supports only device names in "8+3" format, i.e. with a restricted name length. Since IODD files are generally published with a long file name, these must be renamed and given a shorter naming scheme on the PC before uploading to the fieldbus module.

For this a help setting is provided in the dialog, with the associated required IODD file name for the currently connected IO-Link devices shown in the bottom section of the list (column IODD Filename).

Image files without IODD can also be uploaded; the images are still displayed in the "Ports" dialog.

BALLUFF			BNI	BNI PNT-508-105-Z015			3		1	₽	Ξ	i
						Home	Port	IODD	Logout	Config	Log	Info
IODD Mana	igement				Inf	ormation						
Device	Picture					s module has a						
BA050A01.xi	ml X	Delete		names in 8.3 convention. Please rename your IODDs according the suggested filename in the table below.							ig to	
BA020101.xr	ml X	Delete			The	suggested filen	ame is	generated a	ccording to	following	rule:	
BA050D20.x	ml X	Delete				• The first two	charad	ters of the	file name a	re the firs	t two lett	ers of
Choose the IG		oad: 20101.png				the IODD Ve characters ar • The remain hexadecimal	e subs ng 6	ituted by un characters	nderscores. must en	code the	Devicel	
Upload					Not	e that the filena	me mu	st contain th	ne DeviceID	that is in	the IODE	) file!
Currently c	onnected	l IO - Link Device	es:									
				Vandar ID	Device ID		-					
Vendor Nan	ne Produc	t Name	Product ID	venuor 1D	Device ID	1000 Filenam	e					
Vendor Nan BALLUFF		<b>:t Name</b> 302-002-Z046	BNI00AU	0000	050D20	BA050D20.xml	e					
	BNI IOI						e					

Using the "Delete" button you can delete IODDs and device images from the fieldbus when needed.



Note

Before selecting the IODD it must be renamed on the PC to the file name which is shown in the table in the "IODD Filename" column!

**9.7. "Config" dialog** The configuration page enables configuration of the module. You can change both the module information texts and the port configuration. The "Set Ports" action is not permanently stored in the device and is lost after the next reboot

The "Set Ports" action is not permanently stored in the device and is lost after the next reboot or reset.

PNT / ECT:



#### 0 Ŀ Ö Ξ i A BALLUFF BNI EIP-508-105-Z015 IODD Logo Info Log Module Configuration Port Configuration Name Balluff GmbH Pin Pin Mode Schurwaldstraße 9 Mode IO Link Digital Input/Output V V Contact Digital Input/Output ~ Digital Input/Output ~ +49 (0) 7158 173 O DHCP Client IO Link Digital Input/Output V Static IP Digital Input/Output ~ Digital Input/Output ~ IP Address: 192 . 168 . 0 . 159 Digital Input/Output Digital Input/Output Subnet Mask: V V Digital Input/Output ~ Digital Input/Output V 255 .255 .255 .0 Gateway Address: 192 .168 .0 .1 Digital Input/Output IO Link V O Factory IP Digital Input/Output Digital Input/Output ~ IP Address: 192.168.1.1 Subnet Mask: 255.255.255.0 Gateway Address: 192.168.1.1 In order to change the IP adress, it's necessary to reboot the module after saving the configuration. Save Configuration Reboot Factory Reset Set Ports

The parameter set "Module Configuration" on the left side is used by clicking "Save Configuration" and permanently stored in the device.

The "Reboot" button reboots the device as if the power to the module had been turned off and on again.

Clicking on "Factory Reset" deletes the configuration and log files saved in the device and then performs a reboot, so that the device is restored to the default factory configuration as on delivery.

# EIP:

# 9.8. "Log" dialog

This dialog provides general service information about the device as well as a logging function.

The upper table (see screenshot below) contains important information for all service inquiries.



If you have a detailed question about a specific situation, send us a screenshot of this Web site or print the site as a PDF.

Logging shows events which have occurred in chronological order. This provides a tool for detailed troubleshooting in equipment.

ЯЛL	LUFF		BNI PI	NT-508-105-	Z015	<b>h</b> Home	Ports	IODD	Logout	Config	E	1 In
Inform	nation											
Produ	ct name:	BNI PNT-508-105-Z015	Bi	rowser time:	2016-12-3	16 10:26:	29.495					
Firmw	are revision:	3.2	S	stem uptime:	50 secs 29	91 msecs						
MAC a	address:	00:19:31:3F:FF:02	Fr	ee flash space:	1720 KB							
IP add	Iress:	192.168.0.10	W	eb version	2.0.113							
Brows	ser version:	Firefox 50.0										
Log							Set mod	ule time	Clea	r Log	Update I	Loa
9									0.00	209	opuller	209
No.	Severity	Date		Origin				Messag	le			
0	Notice	2000-01-01 00:0	0:00.404	SYS	Syster	m startup	(Oct 6 2	016, 11:54	:01)			
1	Notice	2000-01-01 00:0	0:00.437	SYS	Set M/	Set MAC address: 00:19:31:3F:FF:02						
2	Notice	2000-01-01 00:0	0:00.493	IOL_MASTE	R IO-Lin	IO-Link Master started						
3	Informatio	nal 2000-01-01 00:0	0:00.501	IOL_MASTE	R FW ve	rsion 1.2.	.8					
4	Notice	2000-01-01 00:0	0:01.999	ETH	Port 1	Port 1: Link Up (100 MBit/s, full duplex)						
5	Notice	2000-01-01 00:0	0:37.926	WEB_IF	Login	successfu	ıl, IP addr	ess: 192.1	68.0.50			
6	Error	2000-01-01 00:0	0:41.902	IOL_MASTE	R Port 0	: Device d	lisconnec	ted				
7	Error	2000-01-01 00:0	0:42.272	IOL_MASTE	R Port 1	: Device d	lisconnec	ted				
8	Error	2000-01-01 00:0	0:42.981	IOL_MASTE	R Port 3	: Device d	lisconnec	ted				
9	Notice	2000-01-01 00:0	0:43.169	IOL_MASTE	R Port 2	: ISDU re	ad error:	Error code	80 Addit	ional Code	e 11	
10	Notice	2000-01-01 00:0	0:43.347	IOL_MASTE	R Port 2	: ISDU re	ad error:	Error code	80 Addit	ional Code	e 11	
11	Warning	2000-01-01 00:0	0:43.347	IOL_MASTE	R Port 2	: BNI IOL-	-101-S01	-K018 con	nected			
12	Notice	2000-01-01 00:0	0:44.145	IOL_MASTE	R Port 4	: ISDU re	ad error:	Error code	80 Addit	ional Cod	e 11	
13	Error	2000-01-01 00:0	0:44.183	IOL_MASTE	R Port 5	: Device d	lisconnec	ted				
14	Warning	2000-01-01 00:0	0:44.499	IOL_MASTE	R Port 4	: BNI IOL-	-801-000	-Z036 con	nected			
15	Error	2000-01-01 00:0	0:44.830	IOL_MASTE	R Port 6	: Device d	lisconnec	ted				
16	Error	2000-01-01 00:0	0:45.200	IOL_MASTE	R Port 7	: Device d	lisconnec	ted				

Events are classified using the "Severity" column:

# Internal Error (Emergency, Alert, Critical)

→ The fieldbus module has detected a fault in itself (hardware or software) which should not occur during normal operation. If this happens, the module must be serviced or replaced.

# External Error (Error, Warning)

→ The fieldbus module has detected what may be a non-permissible event which is affecting the module from the outside. The system may require troubleshooting.

# Event (Informational, Notice)

The fieldbus module has detected an important normal operating event and reports it. These may include for example configuration actions over the web interface and other configuration interfaces which are also recorded.

Clicking on "Set Module Time" sends the current browser time to the fieldbus module but does not permanently store it. After a reset, reboot or loss of power the time begins to run again from the year 2000.

Clicking on "Update Log" refreshes the display, and "Clear Log" deletes all entries. The log entries are stored in a ring buffer.

#### **10.1. Diagnostics** message The diagnostics message that is generated by the module in the event of an error is usually read out by the PLC and processed. It is also possible to read out the diagnosis from the module by means of function modules and evaluate it.

The diagnostics message is 34 bytes long and divided into 3 blocks: Block Header, Alarm Specifier, Channel Properties

Byte	Value	Meaning	Block			
0	00					
1	02	Block Type				
2	00	Block Length				
3	1E	BIOCK Length				
4	01	Block Version High				
5	00	Block Version Low				
6	00	Alarm type				
7	01	Alarin type				
8	00					
9	00	API				
10	00	API				
11	00					
12	00	Olat available a	Block Header			
13	XX	Slot number				
14	00					
15	01	Subslot number				
16	00					
17	00					
18	00	Module ID				
19	ХХ					
20	00					
21	00					
22	00	Submodule ID				
23	01					
24	XX					
25	36	AlarmSpecifier				
26	80					
27	00	User Structure ID	AlarmSpecifier			
28	XX					
29	XX	Channel number				
30	08					
31	00	ChannelProperties				
32	00		ChannelProperties			
33	1 A	ChannelErrorType				
00			1			

10.2.	Block Header	The first part of the diagn	nosis is the so-called Block Header, which is 24 bytes long.
В	lock Type	The first 2 bytes of the BI type.	lock Header are described by the Block Type to define the data
		Possible values	Meaning
		0x0002	Alarm Notification Low
В	lock Length		e the length of the following diagnostics message. ostics message, the 2 bytes from the Block Type and the 2 bytes ust be added.)
	lock Version igh	1 byte, preset to 0x01	
	lock Version ow	1 byte, preset to 0x00	
Α	larm Type	2 bytes; the information of	on the type of alarm is provided here
		Possible values	Meaning
		0x0001	Diagnostics
A	PI	4 bytes, default is 0.	
		Possible values	Meaning
		0x00000000	Default value
SI	lot	2 bytes of data that desci	ribe which slot of the module reports an error
		Possible values	Meaning
		0x0001 - 0x0010	Slot 1-16 (IO-Link ports 0 – 15)
		0x0011 - 0x0018	Slot 17-32 (Standard IO-module)
S	ubslot	2 bytes of data that desc	ribe which subslot of the slot reports an error
		Possible values	Meaning
		0x0001	Subslot 1

# Module ID

4 bytes of data that describe which module is inserted in the respective slot. (The module ID is saved in the GSDML)

Possible values	Meaning
0x0000025	IOL IN 1 OUT 0
0x0000026	IOL IN 2 OUT 0
0x000003A	IOL IN 4 OUT 0
0x000003B	IOL IN 6 OUT 0
0x0000027	IOL IN 8 OUT 0
0x0000035	IOL IN 10 OUT 0
0x0000037	IOL IN 16 OUT 0
0x000003C	IOL IN 24 OUT 0
0x0000028	IOL IN 32 OUT 0
0x0000029	IOL IN 0 OUT 1
0x000002A	IOL IN 0 OUT 2
0x000003D	IOL IN 0 OUT 4
0x000003E	IOL IN 0 OUT 6
0x000002B	IOL IN 0 OUT 8
0x0000036	IOL IN 0 OUT 10
0x0000038	IOL IN 0 OUT 16
0x000003F	IOL IN 0 OUT 24
0x000002C	IOL IN 0 OUT 32
0x000002D	IOL IN 1 OUT 1
0x000002E	IOL IN 2 OUT 2
0x0000040	IOL IN 2 OUT 4
0x0000041	IOL IN 4 OUT 2
0x0000042	IOL IN 4 OUT 4
0x000002F	IOL IN 2 OUT 8
0x0000043	IOL IN 4 OUT 8
0x0000030	IOL IN 8 OUT 2
0x00000044	IOL IN 8 OUT 4
0x0000045	IOL IN 8 OUT 8
0x0000031	IOL IN 4 OUT 32
0x0000032	IOL IN 32 OUT 4
0x0000039	IOL IN 16 OUT 16
0x0000046	IOL IN 24 OUT 24
0x0000033	IOL IN 32 OUT 32
0x0000059	Output pin 4
0x000005A	Output pin 2
0x000005B	Input pin 4
0x000005C	Input pin 2

# Submodule ID

4 bytes of data that describe which submodule is used with the respective module. (The submodule ID is saved in the GSDML.)

Possible values	Meaning
0x0000001	BNI PNT-509-105-Z033 (header module)

10.3. AlarmSpecifier	2 bytes, subdivided as follows:		
Sequence Number	Bit 0-10, this counter is incremented with every new diagnostic message.		
Channel Diagnostic	Bit 11		
	Possible values	Meaning	
	0x00	No diagnosis related to channel is pending	
	0x01	Diagnosis related to channel is pending	
Manufacturer- Specific	Bit 12		
Diagnosis	Possible values	Meaning	
	0x00	No diagnosis related to manufacturer is pending	
	0x01	Diagnosis related to channel is pending	
Submodules Diagnostic State	Bit 13		
	Possible values	Meaning	
	0x00	No further diagnosis of submodule present	
	0x01	At least one further diagnosis of the submodule present	
	Bit 14 reserved		
ARDiagnosis State	Bit 15		
	Possible values	Meaning	
	0x00	No further diagnosis of module is present	
	0x01	At least one further diagnosis of the module is present	
User Structure ID	2 bytes, describes the type of diagnosis		
	Possible values	Meaning	
	0x8000	Channel-related diagnosis	

# 10.4. Channel Number Configuration as standard I/O

Error Type	Channel Number
Undervoltage US	8000
Undervoltage UA	8000
No UA	8000
Sensor Short circuit Pin 1 - 3	0n
Actor Short circuit Pin 2 - 3	0n
Actor Short circuit Pin 4 - 3	0n

n = Number of IOL-Ports

Configuration as IO-Link

Error Type	Channel Number
Line break	0
Short circuit IOL Pin 4 - 3	0
Sensor short circuit Pin 1 - 3	0
IOL Device wrong configuration	0

Diagnostics of IO-Link devices

Error Type	Channel Number
Short circuit	1
Undervoltage	1
Upper threshold exceeded	1
Lower threshold undershot	1

# 10.5. Channel Properties

2 bytes, subdivided as follows:

# Туре

Possible values	Meaning
0x00	Used if the channel number is 0x8000 or none of the types defined below is relevant.
0x01	1 bit
0x02	2 bit
0x03	4 bit
0x04	8 bit
0x05	16 bit
0x06	32 bit
0x07	64 bit
0x08 – 0xFF	Reserved
Bit 0-7	

Accumulative

Bit 8 not used, always 0.

# Maintenance

Possib	le values		
Bit 9	Bit 10	Meaning	
0x00	0x00	Diagnostics	
Bit 9-10			

# Specifier

Possible values	Meaning
0x00	Not used
0x01	Diagnosis appeared
0x02	Diagnosis left
0x03	Diagnosis left, but another is still active
Bit 11-12	

# Direction

Possible values	Meaning
0x00	Manufacturer-specific
0x01	Channel used as input
0x02	Channel used as output
0x03	Channel used as input and output
Bit 13-15	

# Bit 13-15

# 10.6. Channel Error Туре

Error code in hex	Description
0x0000	Unknown error
0x0001	Short circuit
0x0002	Undervoltage Bus-/sensor supply port 0-7
0x0003	Overvoltage
0x0004	Overload
0x0005	Temperature limit exceeded
0x0006	Cable break
0x0007	Upper threshold exceeded
0x0008	Lower threshold undershot
0x0009	Error
0x001A	External error
0x001B	Sensor has incorrect configuration (IO-Link device)
0x001C	Data storage error
0x0100	Short circuit of the sensor supply
0x0101	Actuator warning
0x0102	Actuator short circuit
0x0104	No actuator supply port 0-7
0x0105	Undervoltage actuator supply port 0-7
0x0108	Undervoltage Bus-/sensor supply port 8-15
0x0109	No Bus-/sensor supply port 8-15
0x010A	Undervoltage actuator supply port 8-15
0x010B	No actuator supply port 8-15

11 Appendix

11.1. Scope of delivery	<ul> <li>The BNI PNT comprises the following elements:</li> <li>IO-Link block</li> <li>4x M12 dummy plugs</li> <li>Ground strap</li> <li>M4x6 screw</li> <li>20 information signs</li> </ul>	
11.2. Order number		BNI PNT-xxx-105-Z033
	Balluff network interface	
	ProfiNet	
	Functions 509 = IP 67 IO-Link master module, 16 IO-Link ports	
	Versions 105 = Display version, 2-port switch	
	Mechanical version Z033 = Die-cast zinc housing Data transmission: 2 x M12x1 female thread Power connection: 2 x 7/8" male thread Sensor connections: 16 x M12x1 female thread	

11.3. Order information	Product ordering code	Ordering code
	BNI PNT-509-105-Z033	BNI007M

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