BALLUFF

BNI PNT-104-105-Z015 BNI PNT-202-105-Z015 BNI PNT-206-105-Z015 BNI PNT-302-105-Z015 BNI PNT-305-105-Z015 IP67 Modules User's Guide



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1 Notes

1.1.	Structure of the guide	The guide is organized so that the chapters build on one another Chapter 2: Basic safety information Chapter 3: Getting started Chapter 4: Technical data 	
1.2.	Typographical Conventions	The following typographical conventions are used in this Guide.	
	Enumerations	 Enumerations are shown in list form with bullet points. Entry 1, Entry 2. 	
	Actions	Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow. > Action instruction 1. Action result. Action instruction 2. Procedures can also be shown as numbers in brackets. (1) Step no. 1 (2) Step no. 2 (3)	
	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}) or with the prefix "0x" (e.g. 0x00)	
	Cross-references		
1.3.	Symbols	Note This symbol indicates general notes.	
		Attention! This symbol indicates a security notice which most be observed.	
1.4.	Abbreviations	BNI Balluff Network Interface I Standard input port PNT ProfiNet™ EMC Electromagnetic Compatibility FE Function ground O Standard output port	

1.5. Deviating views Product views and illustrations in this manual may differ from the actual product. They are intended only as illustrative material.

2.1.	Intended use	This guide describes The BNI PNT serves as a decentralized input and output module for connecting to an 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 notes	 Commissioning and inspection Before commissioning, carefully read the operating manual. The system must not be used in applications in which the safety of persons is dependent on the function of the device. Authorized Personnel Installation and commissioning may only be performed by trained specialist personnel. Intended use Warranty and liability claims against the manufacturer are rendered void by: Unauthorized tampering Improper use Use, installation or handling contrary to the instructions provided in this operating manual Obligations of the Operating Company The device is a piece of equipment from EMC Class A. Such equipment may generate RF noise. The operator must take appropriate precautionary measures. The device may only be used with an approved power supply. Only approved cables may be used. Malfunctions In the event of defects and device malfunctions that cannot be rectified, the device must be taken out of operation and protected against unauthorized use. 		
2.4.	Resistance to aggressive substances	Attention! The BNI modules generally have a good chemical and oil resistance. When used in aggressive media (eg chemicals, oils, lubricants and coolants each in high concentration (ie, low water content)) must be checked prior application- related material compatibility. In the event of failure or damage to the BNI modules due to such aggressive media are no claims for defects.		
	Hazardous voltage	Attention! Disconnect all power before servicing equipment.		
		Note In the interest of product improvement, the Balluff GmbH reserves the right to change the specifications of the product and the contents of this manual at any time without notice.		

3 Getting Started

3.1. Module overview



Figure 1 – Overview BNI PNT-xxx-105-Z015

- 1 Mounting hole
- 2 PROFINET [™] port 2
- 3 Display
- 4 Power Supply In
- 5 Status LED: Communication / Module
- 6 Port 1
- 7 Pin/Port LED: Signal status
- 8 Port 3
- 9 Port 5
- 10 Port 7

- 11 Port 6
- 12 Port 4
- 13 Port 2
- 14 Port 0
- 15 Power Supply Out
- 16 Label
- 17 PROFINET™ port 1
- 18 Grounding connection

3 **Getting Started**

- 3.2. Mechanical The module is attached using 2 M6 screws and 2 washers. connection Isolation pad as accessory available
- 3.3. Electrical connection

Power Supply

Power supply "IN" (7/8", male)

	• •			
3	Pin	Function	Description	
1 2	1	GND Bus- / Sensor and actuator	0.1/	
7000	2	power supply	0 V	
5 0 1	3	Function ground	FE	
	4	Bus- / Sensor power supply	+24 V	
	5	Actuator power supply	+24 V	

Power supply "OUT" (7/8" female)

3 Pin Function		Description	
2 0 4	1	GND Bus- / Sensor and actuator	0.V
70 0	2	power supply	0 v
1005	3	Function ground	FE
	4	Bus- / Sensor power supply	+24 V
	5	Actuator power supply	+24 V

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Note
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i

Provide sensor/bus power and actuator power from separate power sources if possible.

Total current <9A per Pin. The total current of all modules may not exceed 9A even when daisy chaining the actuator supply.

Grounding





Note

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

PROFINET Interface

M12, D-coded, female

2 1 (0 0)3	
<u> </u>	

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



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

3 Getting Started

I/O-Port

	Din	Function			
	FIN	Input/Output	Output	Input	
	1	+24V, 200mA	+24V, 200mA*	+24V, 200mA	
			n.c.		
	2 Input / Output 2A	Output 2A*	loput		
		input / Output ZA	n.c.	input	
	3	GND	GND	GND	
	4	Input / Output 2A	Output 2A	Input	
	5	FE	FE	FE	

* Only for BNI PNT-206-105-Z015



For the digital sensor inputs follow the input guideline per EN61131-2, type 2.



Note

Each output serves a maximum current of 2,0 amperes. Total current of the module has to be lower than 4 amperes per Pin.



Note

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

Port

	Port	
	0-3	4-7
BNI PNT-104-105-Z015	Input	
BNI PNT-202-105-Z015	Output	
BNI PNT-206-105-Z015	Output	
BNI PNT-302-105-Z015	Input / Output	
BNI PNT-305-105-Z015	Input	Output

4 Technical data

4.1. Dimensions





4.2. Mechanical data	Housing material	Die case zinc, matt nickel plated
	Enclosure rating per IEC 60529	IP 67 (only when plugged-in and threaded-in)
	Supply voltage	7/8" 5-pin (male and female)
	Input ports / Output ports	M12, A-coded (8 x female)
	Dimensions (W x H x D in mm)	68 x 224 x 37.9
	Mounting type	2-hole screw mount
	Ground strap attachment	M4
	Weight	Approx. 670 gr.
4.3. Operating conditions	Operating temperature T _a Storage temperature	-5 °C 70 °C -25 C 70 °C
4.4. Electrical data	Supply voltage	1830.2 V DC, per EN 61131-2
	Ripple	<1%
	No-load current at 24 V	130 mA

4 Technical data

4.5. PROFINET

PROFINET port	1 x 10Base-/100Base-Tx
Connection for PROFINET port	M12, D-coded
Cable types per IEEE 802.3	Shielded twisted pair min. STP CAT 5/ STP CAT 5e
Data transmission rate	10/100 Mbit/s
Max. cable length	100 m
Flow control	Half Duplex/Full Duplex (IEEE 802.33x-Pause)

4.6. Function indicators



Module status	LED	Status	Function
	110	green	Input power OK
	05	red	Low Input power (<18V)
	114	green	Output power OK
	UA	red	Low Output power (< 18V)
		off	No error
	СГ	red	Watchdog timeout; channel, generic or extended
	55		diagnosis present; system error
		red flashing	DCP signal service is initiated via the bus
	BF	off	No error
		red	No configuration; or low speed physical link; or no
			physical link
		red flashing	No data exchange
	100	off	Bus clock: 10 Mbit/s
	100	yellow	Bus clock: 100 Mbit/s
	LK	areen	Data transfer

I/O Port

Each port has two two-colour LEDs to indicate the I/O-States

Status	Function	Description
off	I/O State	State of the Input or Output Pin is 0
yellow	I/O State	State of the Input or Output Pin is 1

Status		Port configuration	
Status	Diagnostic Input	Input	Output
red	Input low	short-circuit between Pin 1 und 3	short-circuit on output Pin
red flashing	_	_	short-circuit between Pin 1 und 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
Description Markup Language). The GSDML files are available in two languages as an
Internet download (www.balluff.com). The data modules of an IO-Link block are displayed in
the project planning software according to the slot.
The GSDML file makes the possible data modules available (input or output of different data
ranges). For configuration of the IO-Link blocks, the corresponding data modules are
assigned to a slot.

Integration of the module The device can be found by searching in the catalog and inserted in the Profinet section by drag & drop.



The module BNIPNTxxx105Z015 with the

submodules PN-IO, port 1-M12, 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.

In slot 0 the port function (input, output, diagnostics input) or diagnostics messages can be defined.

Configuration of	
the header	
module	

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

Ilgemein IO-Variablen Sys Ilgemein Kataloginformation ROFINET-Schnittstelle [X1]	temkonstanten Baug	Texte			
Ilgemein Kataloginformation ROFINET-Schnittstelle [X1]	Baug				
RoFINET-Schnittstelle [X1]		ruppenparameter			
NUPINE I-SCHRIttstelle [X1]	107920				
Allerancele	Mo	duleinstellungen			
Ethemet-idressen			Globale Diagnose		
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Schnittstellen Optionen			Onserspannung der sensorver	sorgung menen	
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10-Zyklus	in the second				
 port 1 - M12 [X1 P1 R] 	Por	t Funktionalität			
port 2 - M12 [X1 P2 R]		Funktion Port O Fin 4:	Schlarcar		
entification & Maintenance		Funktion Port 1 Rin 4:	Cablassas		
augruppenparameter		Funktion Fort 3 Fin 4:	schliesser		
W-Kennung		Funktion Port 2 Pin 4:	Schlesser		
		Funktion Port 3 Pin 4:	Schliesser		
		Funktion Port 0 Pin 2:	Schliesser		
		Funktion Port 1 Pin 2:	Schliesser		
	- 1	Funktion Port 2 Pin 2:	Schliesser	•	
		Funktion Port 3 Pin 2:	Schliesser		
	Sic	herer Zustand der Ports			
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		Sicherer Zustand Port 1 Pin 4:	0	-	
		Sicherer Zustand Port 2 Pin 4:	0	-	
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		sicherer zustand Port 3 Pin 4:	0		
		Sicherer Zustend Port 0 Pin 2:	U		
		Sicherer Zustand Port 1 Pin 2:	0		
		Sicherer Zustand Port 2 Pin 2:	0		
		Sicherer Zustand Port 3 Pin 2:	0		



Note 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 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

If necessary, these can be taken over into the configuration table from the hardware catalog by means of drag & drop.

Module addressing:

Double-clicking on the addressable modules allows you to change the addressing in the "Addresses" window

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.

With the remaining modules, the various functions are mapped into the process data areas.



Device name,
Profinet addressDouble-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.

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Manazia						IOL_IIO_01/01 byte	
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PROFINETSchnittstelle [X1]						IOL_IIO_02/04 byte	
Allormein	Algemein					IOL_IIO_02/08 Byte	
Ethernet-Adressen						IOL_IIO_04/02 byte	
· Erweiterte Optionen	Name:	PN-10				IOL_IIO_04/04 byte	
Schnittstellen-Optionen	Kommentar					10L_10_04/08 Byte	
Medienredundanz	KONTOENET.					Inol_10_04/32 Byte	
· Echtarit-Einstellungen							
IO-Zyklus					~		
port 1 - M12 [X1 P1 R]		10				101 10 16/16 bate	
port 2 - M12 [X1 P2 R]	Ethemet-Adressen					IDL 10 24/24 byte	
HWKennung	concercoressen					101 (IO 32/04 byte	
Identification & Maintenance	Schnittstelle vernetzt mit					IDL NO 32/32 byte	
Baugruppenparameter						IOL I 01 byte	
HWKennung	Subnetz	PN/IE_1				IDL_L02 byte	
	1					IOL_1_04 byte	
	1					10L_1_06 byte	
	IP-Protokoll					IOL_1_08 byte	
	-					IOL_L_10 byte	
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		Charles	9 B			Version:	1
	and the second se	MOPINE Poeratename automatis	.ch geneneren			Reschreibung:	
	PROFINET-Gerätename	bnipnt5070053040				101 1/0 01/01 hate	
	Konvertierter Name:	baipar507005;040				and a second second	

Establishing device relationship

 Autorege M1 Sof 24 Sof 24 - NGL (200 SISIA 14 Notice) + Doctorial to Notice 10 - Doctorial to Noti

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 Blink Test.

OFINET-Gerätename	e vergeben						
		Konfiguriertes F	PROFINET-	Gerät			
		PROFINET-Gera	ätename:	bnipnt507005z040			
4		G	Gerätetyp:	BNI PNT-507-005-204	0		
		Online-Zugang					
		Typ der PG/PC-Sch	nittstelle:	PN/IE		-	
		PG/PC-Sch	nittstelle:	Intel(R) PRO/1000	MT Desktop Adapter	• 🖲 🖸	
لح		Gerätefilter					
2		🖂 Nur Geräte	e gleichen Ty	os anzeigen			
		Nur falsch	parametrien	te Geräte anzeigen			
		Nur Gerate	e onne Name	n anzeigen			
	Erreichbare Te	ilnehmer im Netzwerk:					
	IP-Adresse	MAC-Adresse	Gerät	PROFINET-Gerätenar	ne Status		
	0.0.00	00-19-31-31-EE-25	BNI PNT-5	. –	🚹 Kein Geräten	ame zugewiesen	
							>
				L	iste aktualisieren	Name zuweisen	
Online-Statusinformatic	on: lossen. 1 von 3 Geri	äten wurden herausgefi	iltert.				
4							1
							-
						Schligßer	
						Schlieben	

"Device view " \rightarrow Right-click on the module \rightarrow "Assign device name".

Concluding the configuration Download the configuration into HW config. At this point, the bus error on the module should disappear. If the module still reports a bus error, there could be a problem in one of the following areas: • Device relationship not established. Scan the network and check whether the device is signaling under the correct device name and correct IP address. Adapt the Ethernet address or device name if necessary, assign the device or to the device once again and download the configuration. 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 suppl undervoltage: Optical diagnostics and diagnostics in configured diagnostics in configured diagnostics modules are not affected) Actuator supply undervoltage: This function can be used to permit / suppress the diagnostics message Actuator suppl undervoltage. (optical diagnostics and diagnostics in configured diagnostics in configured diagnostics in configured 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 in configured diagnostics in configured diagnostics in configured diagnostics in configured diagnostics in coulpute as outputs. Channels/pins which are		
At this point, the bus error on the module should disappear. If the module still reports a bus error, there could be a problem in one of the following areas: Device relationship not established. Scan the network and check whether the device is signaling under the correct device name and correct IP address. Adapt the Ethernet address or device name if necessary, assign the device r to the device or again and download the configuration. 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 diagnostic 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 in out 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 a 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 is 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 in configured diagnostics modules is not affected) Sensor contect in put as normally open contact Break contact = input as normally open contact Break contact = input as normally closed contact Output = output function Safe state<th>Concluding the configuration</th><th>Download the configuration into HW config.</th>	Concluding the configuration	Download the configuration into HW config.
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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 suppl undervoltage. (optical diagnostics and diagnostics in configured diagnostics modules a not affected) Actuator supply undervoltage: This function can be used to permit / suppress the diagnostics message Actuator suppl undervoltage. (optical diagnostics signals and diagnostics in configured diagnostics modules a 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 message Sensor Short circuit on the module output. (Visual diagnostics and diagnostics in configured diagnostic a outputs. Channels/pins which are configured diagnost outputs. Channels/pins which are configured diagnost 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 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 assumed in the event of a failure in bus communication.		 Device relationship not established. Scan the network and check whether the device is signaling under the correct device name and correct IP address. Adapt the Ethernet address or device name if necessary, assign the device name to the device once again and download the configuration.
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 suppl undervoltage. (optical diagnostics and diagnostics in configured diagnostics modules a not affected) Actuator supply undervoltage: This function can be used to permit / suppress the diagnostics message Actuator suppl 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 in configured diagnostics modules are not affected) Sensor connection to output: This function can be used to permit / suppress the diagnostics in configured diagnostics modules is not affected) Sensor connection to output: This function can be used to permit / suppress the diagnostics in configured diagnost modules is not affected) Port functions The function for every individual port pin (suppress only to channels/pins which are configured a 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 open contact 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 assumed in the event of a fallure in bus communication.	5.2. Functions in module propertie	Description of the functions in module properties s
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Actuator supply undervoltage: This function can be used to permit / suppress the diagnostics message Actuator suppundervoltage. (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 diagnost modules is not affected) Function applies only to channels/pins which are configured a outputs. Channels/pins configured as inputs are unaffected.Port functionsThe function for every individual port pin can be defined here: Make contact = input as normally open contact Break contact = input as normally closed contact Output = output functionSafe stateThis 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 assumed in the event of a failure in bus communication.		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)
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 diagnost modules is not affected) Function applies only to channels/pins which are configured a outputs. Channels/pins configured as inputs are unaffected.Port functionsThe function for every individual port pin can be defined here: Make contact = input as normally open contact Break contact = input as normally closed contact Output = output functionSafe stateThis 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 assumed in the event of a failure in bus communication.		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)
Port functionsThe function for every individual port pin can be defined here: Make contact = input as normally open contact Break contact = input as normally closed contact Output = output functionSafe stateThis 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 assumed in the event of a failure in bus communication.		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.
Safe stateThis 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 assumed in the event of a failure in bus communication.	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 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 assumed in the event of a failure in bus communication.

5.3. Bit mapping and function

Inputs pin 4 Inputs pin 2 Outputs pin 4 Outputs pin 2 Bit mapping and function of the configurable modules

Signal from configured inputs or outputs are depicted in the modules Inputs pin 4 / Inputs pin 2 and Outputs pin 4, Outputs pin 2.

The "Inputs pin 2" module also depicts the diagnostic inputs of the diagnostic input function.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0

Actuator shutdown pin 4 / pin 2

Depicts a short circuit between a set output to ground at the respective port pin.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0

Actuator warning pin 4 / pin 2

Feedback if a voltage is being supplied at an output that is not set.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0

Restart pin 4 / pin 2

If this function is configured, after an actuator short-circuit there is no automatic restart, but rather the port must be activated by inserting the corresponding bit.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0

Peripheral error, socket	Feedback indicating the port at which an error occurred.								
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	
Short-circuit Sensor supply	Feedbac	k indicat	ing the p	oort at wh	hich ther	e is a se	nsor sup	oly short	circuit.
	DIL /	DILO	DILÜ	DIL 4	DIL J	DIL Z		DILU	
	Port 7	Port 6	Port 5	Port 4	Port 3	Port 2	Port 1	Port 0	
Station diagnostics	Feedbac	k indicat	ing whic	h fault o	ccurred.				_
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
				d)					

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	Res.	US actuator	US sensor

6.1. 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	Block Type	
1	02	Бюск туре	
2	00	Block Length	
3	1E	Block Length	
4	01	Block Version High	
5	00	Block Version Low	
6	00	Alarm type	
7	01	,	
8	00		
9	00		
10	00		
11	00		
12	00	Slot number	Block Header
13	01	Slot number	
14	00	Subalat number	
15	01	Subsidi number	
16	00	Module ID	
17	00		
18	00		
19	17		
20	00		
21	00		
22	00		
23	01		
24	XX	Alerra Creasifier	
25	36	AlarmSpecilier	
26	80		
27	00	User Structure ID	AlarmSpecifier
28	XX		
29	XX	Channel number	
30	08	Object of D	
31	00	ChannelProperties	
32	00		ChannelProperties
33	1 A	ChannelError I ype	

Block Header	The first part of the diagnosis	is the so-called Block Header, which is 24 bytes long.						
Block Type	The first 2 bytes of the Block type.	Header are described by the Block Type to define the d						
	Possible values	Meaning						
	0x0002	Alarm Notification Low						
Block Length	2 bytes of data that define the diagnostics message, the 2 b Length must be added).	2 bytes of data that define the length of the following diagnostics message (for the complete diagnostics message, the 2 bytes from the Block Type and the 2 bytes from the Block Length must be added).						
Block Version High	1 byte, preset to 0x01							
Block Version Low	1 byte, preset to 0x00							
Alarm Type	2 bytes; the information on the type of alarm is provided here							
	Possible values	Meaning						
	0x0001	Diagnostics						
API	4 bytes, default is 0.							
	Possible values	Meaning						
	0x0000000	Default value						
Slot	2 bytes of data that describe which slot of the module reports an error							
	Possible values	Meaning						
	0x0010	Slot 2-15 (Standard IO modules)						
	0x0011	Slot 2-15 (Standard IO modules)						
	0x0012	Slot 2-15 (Standard IO modules)						
	0x0013	Slot 2-15 (Standard IO modules)						
	0x0014	Slot 2-15 (Standard IO modules)						
	0x0015	Slot 2-15 (Standard IO modules)						
	0x0016	Slot 2-15 (Standard IO modules)						
	0x0017	Slot 2-15 (Standard IO modules)						
	0x0018	Slot 2-15 (Standard IO modules)						
Subslot	2 bytes of data that describe	which subslot of the slot reports an error						
	Possible values	Meaning						
	0x0001	Subslot 1						
	0/0001	Cubblet 1						

Мос	lule ID	4 bytes of data that descr (The module ID is saved	ribe which module is inserted in the respective slot. in the GSDML)
		Possible values	Meaning
		0x00000059	Output pin 4
		0x000005A	Output pin 2
		0x000005B	Input pin 4
		0x000005C	Input pin 2
Sub	module ID	4 bytes of data that desc (The submodule ID is say	ribe which submodule is used with the respective module ved in the GSDML)
		Possible values	Meaning
		0x0000001	BNI PNT-302-105-Z015 (header module)
6.3. Alar	mSpecifier	2 bytes, subdivided as fo	llows:
Seq Nun	uence nber	Bit 0-10, this counter is ir	ncremented with every new diagnostic message.
Cha Diag	nnel gnostic	Bit 11	
		Possible values	Meaning
		0x00	No diagnosis related to channel is pending
		0x01	Diagnosis related to channel is pending
Man Spe	ufacturer- cific	Bit 12	
Diag	gnosis	Possible values	Meaning
		0x00	No diagnosis related to manufacturer is pending
		0x01	Diagnosis related to manufacturer is pending
Sub Diao	modules mostic 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	
ARI Stat	Diagnosis e	Bit 15	
		Possible values	Meaning
		0x00	No further diagnosis of module is present
		0x01	At least one further diagnosis of the module is present
Use	r Structure ID	2 bytes, describes the typ	pe of diagnosis
		Possible values	Meaning
		0x8000	Channel-related diagnosis

6.4. 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

6.5. Channel

2 bytes, subdivided as follows:

Properties

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 bits
0x03	4 bits
0x04	8 bits
0x05	16 bits
0x06	32 bits
0x07	64 bits
0x08 – 0xFF	Reserved
Bit 0-7	

Accumulative

Bit 8 not used, always 0.

Maintenance

Possible 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	•

6.6. Channel Error Type

Error code in hex	Description				
0x0000	Unknown error				
0x0001	Short-circuit				
0x0002	Undervoltage				
0x0003	lvervoltage				
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)				
0x0101	Actuator warning				
0x0105	Actuator supply undervoltage				
0x0104	No actuator power supply				

7.1. General 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. Please use Internet Explorer 10 or newer as the browser; older versions may result in display problems.

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-302-105-Z015	home	Login	Config	E	i Info
Module Informati	ion						
Product Name:	BNI PNT-302-105-Z015						
Order Code:	BNI0052			-			
Name:	MyNiceModule						
Location:	73765 Neuhausen a.d.F, Germany			1			
Contact:	Balluff GmbH						
Firmware Revision:	3.2						
Hardware Revision:	6		6	3			
Station name:	myweb						
IP Address:	192.168.0.4						
Subnet Mask:	255.255.255.0						
Gateway Address:	0.0.0.0						
MAC Address:	00:19:31:3F:FF:32			1			
Link Speed Port 1:	100 Mbit/s FULL			7 🚢			
Link Speed Port 2:	No Link						
PLC Lock:	No						
<u>prof</u> i [®] Nett		LED Leg	gend				

7.2. 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.

7.3. 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 graved 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:



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



Note 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. **7.4. "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



PNT:



EIP:



7.5. "Config" dialog The configuration page enables configuration of the module. You can change the module information texts and the (for EIP) IP-Configuration.

PNT / ECT:

Port Configuration							
		10					
Mode	Pin		100 641 100 642	· ·	'n		Mode
Digital Output	•	4		4	Digital Input		*
Digital Output	*	2		2	Digital Input		*
Digital Input Digital Input Digital Input	*				Digital Input Digital Input Digital Input		*
Digital Input Digital Input	*	4 2		4	Digital Input Digital Input		*
		1					
	Digital Output Digital Output Digital Input Digital Input Digital Input Digital Input Digital Input Digital Input	Digital Output	Digital Output Digital Output Digital Input Digital Input	Digital Output Digital Output Digital Output V Digital Input Digital Input Digital Input Digital Input Digital Input Digital Input V	Digital Output Digital Output Digital Output v Digital Input Digital Input Digital Input Digital Input Digital Input Digital Input v Digital Input v v Digital Input v	Digital Output • Digital Output • Digital Output • Digital Input • Digital	Digital Output • Digital Output • Digital Input • <t< td=""></t<>

EIP:



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.

7.6. "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.

BALLU	FF		BNI PNT-302-105-Z015				015	♠	Ŧ	\$	Ξ	i	
									Home	Login	Config	Log	Info
Information													
Product name	: BNI PN	IT-302-105-Z015		Browser time:		2017	-01-23 15:58:00	.039					
Firmware revi	sion: 3.2			System up	time:	4 mi	ns 46 secs 959 m	secs					
MAC address:	00:19:	31:99:CA:32		Free flash	space:	2068	8 KB						
IP address:	192.16	8.0.4		Web versio	on	2.0.1	110						
Browser versi	on: Firefox	Firefox 50.0											
Log								Set mo	dule time	Clear	r Loa	Update	Loa
-											5		5
No. S	everity	Dat	te		Origi	n			Messag	e			
0 Notic	e	2000-01-01 00:0	00:00.4	26	SYS System startup (Oct 20 2016		2016, 14:57:42)						
1 Notic	e	2000-01-01 00:0	00:00.456		56 SYS Set MAC address: 0		s: 00:19	00:19:31:99:CA:32					
2 Infor	mational	2000-01-01 00:0	00:00.459		SYS Configuration updated with new data from devi		vice file						
3 Notic	e	2000-01-01 00:0	00:01.959		59 ETH P		Port 0: Link Up (100 MBit/s, full duplex)						
4 Notic	e	2000-01-01 00:0	04:42.911		WEB_	WEB_IF Login successful, IP a		, IP add	ress: 192.16	8.0.50			
5 Notic	e	2000-01-01 00:0)4:45.1	4:45.129		IF	Logout, IP address: 192.168.0.50						

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.

8 Monitoring & Diagnostics

8.1. 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.

8.2. 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 BALLUFF-PRODUCTS-MIB
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")

8 Monitoring & Diagnostics

MIB variable	Ethernet port IO-Link Port		
ifIndex	A unique value, contiguously		
	starting from 1.		
ifDescr	A textual string containing	"IO-Link X" / "IO-IN X" / "IO-OUT	
	information about the interface,	X"	
	i.e. "Ethernet X"		
ifType	IANAIT I ype = 6	IANAif I ype = 280 (sdci) when	
	(ethemetCsmaCd) when	IO-LINK-POR	
	Ethemet		
ifMTU	length of Ethernet MTU	length of IO-Link process data	
		(typically max. 32 bytes) 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	This object may contain an octet	
	ροπ	String of zero length, since IO-	
		with no specific addressing	
if∆dminStatus	LIp(1) Dowp(2) depending	Up(1) Down(2) depending if	
in tailine tatae		IO-Link capability is configured.	
ifOperStatus	Up(1), Down(2), depending if an	IO-Link device is connected and	
-	operable.		
ifLastChange	The value of sysUpTime at the	n/a	
	time the interface entered its		
	current operational state. If the		
	current state was entered prior		
	to the last re-initialization of the		
	subsystem then this object		
	contains a zero value		
ifInOctets	The total number of octets receiv	ed on the interface, including	
	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 interview.		nitted out of the interface,	
10.15	including framing characters.		
IfOutErrors	n/a	Number of retries by the IO-	
		LINK-Waster, Indicating	
		transmissions	
		นสาวการราบกร.	

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

9 Appendix

9.1. Included material	 The BNI PNT consists of the following components: Standard I/O Module 4 blind plugs M12 Ground strap Screw M4x6 20 labels 	
9.2. Order code	Balluff Network Interface ProfiNet Functions 104 = IP 67 Standard Input Module 202 = IP 67 Standard Output Module 206 = IP 67 Standard Output Module 302 = IP 67 Standard I/O Module 305 = IP 67 Standard I/O Module Variants 105 = Display version, 2-port switch Mechanical version Z015 = Material: Die-cast zinc housing Uplink: 2 x M12x1 internal thread Power: 7/8" external thread and 7/8" internal thread Sensor Ports: 8 x M12x1 internal thread	BNI PNT-xxx-105-Z015

9.3. Order Information

Product ordering code	Order code
BNI PNT-104-105-Z015	BNI0053
BNI PNT-202-105-Z015	BNI005F
BNI PNT-206-105-Z015	BNI007L
BNI PNT-302-105-Z015	BNI0052
BNI PNT-305-105-Z015	BNI005K

Notes

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