BNI PNT-502-102-Z015

IP67 Module

User´s Guide

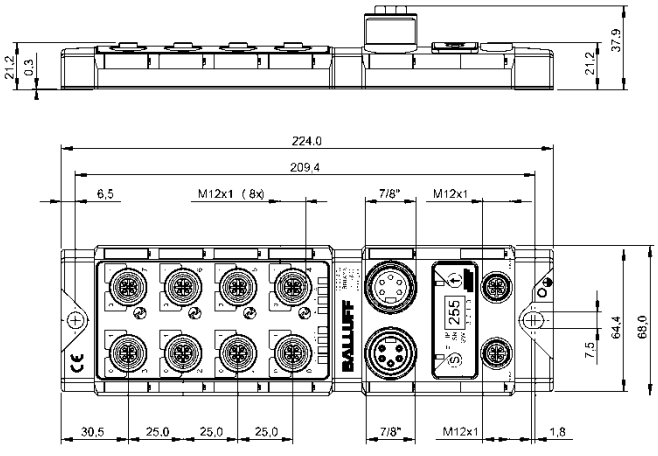


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1 General

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.

- Keyword 1
- Keyword 2

Actions

Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.

➢ Action instruction 1
↳ Result of action
➢ Action instruction 2

Actions can also be indicated as numbers in parentheses.

(1) Step 1
(2) Step 2
(3)

Syntax

Numbers:
Decimal numbers are shown without additional information (e.g., 123),
hexadecimal numbers are shown with the additional indicator hex (e.g., 00_{hex}) 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

BNI	Balluff Network Interface
EMC	Electromagnetic Compatibility
FE	Functional ground
I	Standard input port
O	Standard output port
PNT	ProfiNet™
UA	Actuator supply undervoltage
US	Sensor supply undervoltage

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 Safety

2.1. Intended use

The BNI PNT-… 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

Commissioning and inspection
Before commissioning, carefully read the operating manual.
The system must not be used in applications in which the safety of persons is dependent on the function of the device.
Authorized Personnel
Installation and commissioning may only be performed by trained specialist personnel.
Intended use
Warranty and liability claims against the manufacturer are rendered void by:

- Unauthorized tampering
- Improper use
- Use, installation or handling contrary to the instructions provided in this operating manual

Obligations of the Operating Company
The device is a piece of equipment from EMC Class A. Such equipment may generate RF noise. The operator must take appropriate precautionary measures. The device may only be used with an approved power supply. Only approved cables may be used.
Malfunctions
In the event of defects and device malfunctions that cannot be rectified, the device must be taken out of operation and protected against unauthorized use.
Intended use is ensured only when the housing is fully installed.

2.4. Resistance to aggressive substances

Attention!
The BNI modules generally have a good chemical and oil resistance. When used in aggressive media (eg chemicals, oils, lubricants and coolants each in high concentration (ie, low water content)) must be checked prior application-related material compatibility. In the event of failure or damage to the BNI modules due to such aggressive media are no claims for defects.

Hazardous voltage

Attention!
Disconnect all power before servicing equipment.

Note
In the interest of product improvement, the Balluff GmbH reserves the right to change the specifications of the product and the contents of this manual at any time without notice.

3 Getting Started

3.1. **Module overview**

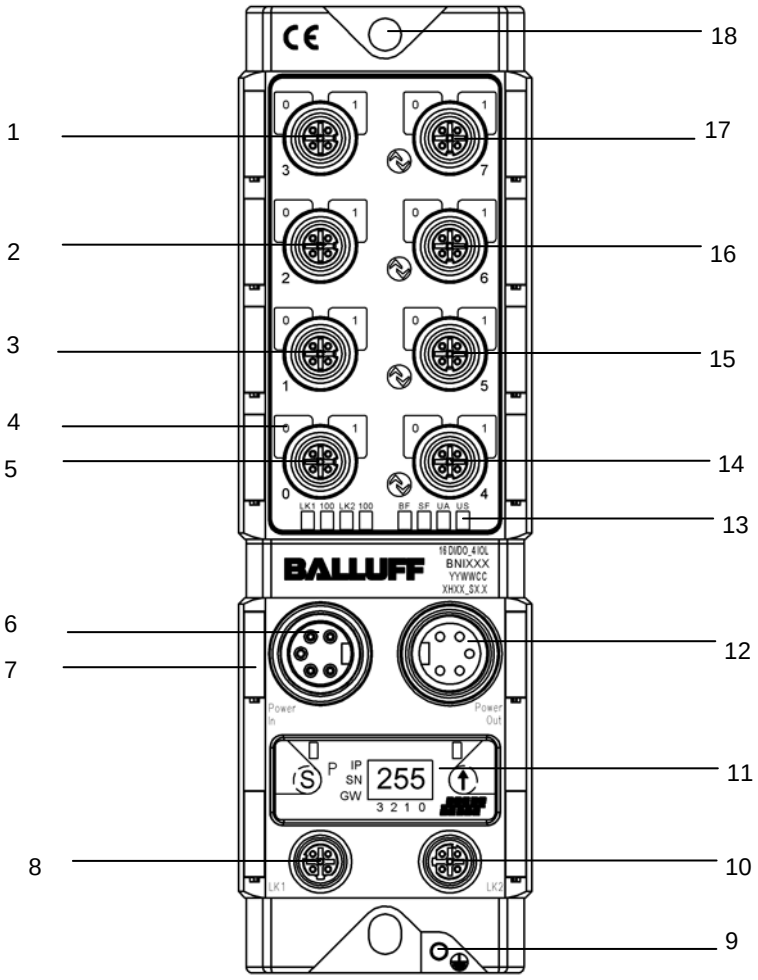


Figure 1 – Overview of BNI PNT-502-102-Z015

1	Port 3	11	Display
2	Port 2	12	Power OUT
3	Port 1	13	Status LEDs
4	Pin/Port LEDs	14	Port 4
5	Port 0	15	Port 5
6	Power IN	16	Port 6
7	Label	17	Port 7
8	PROFINET ™ port 1	18	Mounting hole
9	Grounding connection		
10	PROFINET ™ port 2		

3 Getting Started

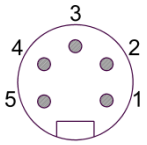
3.2. Mechanical connection

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

3.3. Electrical connection

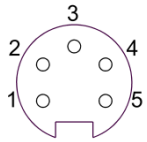
Power supply

Power supply "INPUT" (7/8", connector)



Pin	Function	Description
1	Bus/sensor and actuator power supply ground	0 V
2		
3	Function ground	FE
4	Bus/sensor power supply	+24 V
5	Actuator power supply	+24 V

Power supply "OUTPUT" (7/8", female)



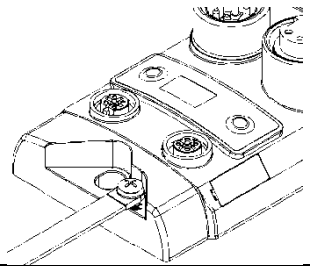
Pin	Function	Description
1	Bus/sensor and actuator power supply ground	0 V
2		
3	Function ground	FE
4	Bus/sensor power supply	+24 V
5	Actuator power supply	+24 V

Note
Where possible, use separate power supplies for sensor/bus and actuator.
Total current < 9 A The total current of all modules must not exceed 9A even in the case of series connection of the actuator supply.

Note
Interpretation of leads for power supply on 7/8 "connectors.
Cross section min. 1.5 mm^2, depending on the length of conductor and current load! From a certain line length of the conductor cross section is to check or adjust!

Note
Setting electronic line protection fuses.
It should be set to the safe operation a provision of 30-50% of continuous current!
However, this is again dependent on the type of backup and the power supply.
If required, additional buffer modules should be used to secure the power supply to minimize voltage drops.
It is recommended to use power supplies with a power reserve of min. 20%!

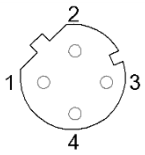
Grounding



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

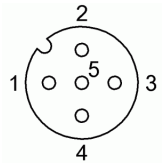


Pin	Function	Description
1	Tx+	Transmit Data +
2	Rx+	Receive Data +
3	Tx-	Transmit Data -
4	Rx-	Receive Data -

Note
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	+24 V, 1.6 A
2	Input/output 2A
3	GND
4	Input/output 2A
5	FE

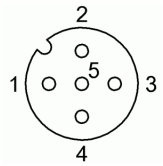
Note
For the digital sensor inputs, refer to guideline on inputs EN 61131-2, Type 2.

Note
Each output receives a maximum current of 2.0 A. The total current of the module must not exceed 4 A per pin.

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



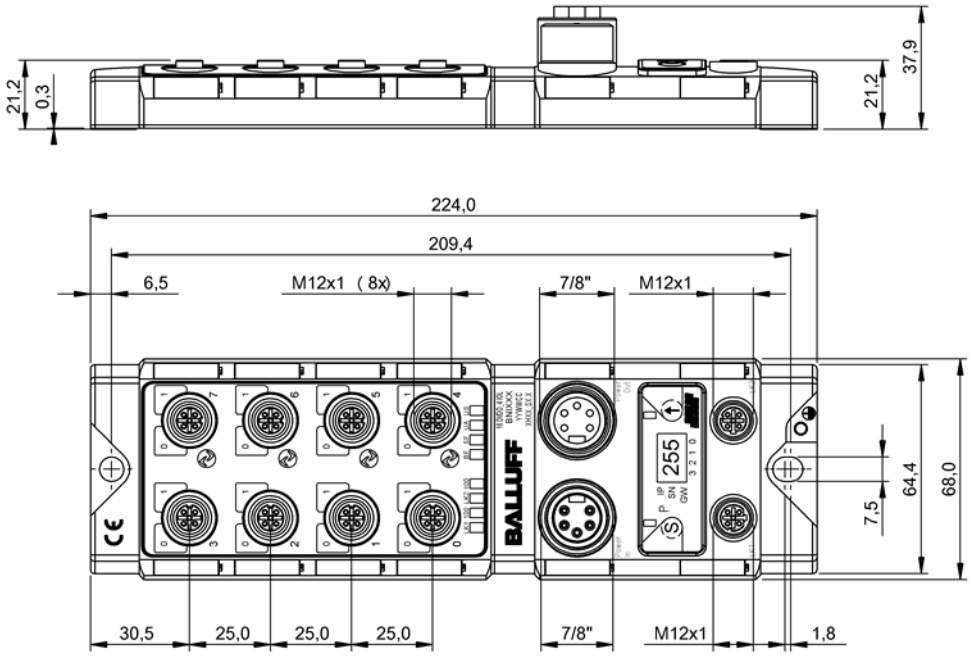
Pin	Function
1	+24 V, 1.6 A
2	Input/output 2A
3	GND
4	IO-Link / input / output 2A
5	n.a.

Port

	Port	
	0-3	4-7
BNI PNT-502-102-Z015	IN / OUT	IN / OUT / IO-Link

4 Technical data

4.1. Dimensions



4.2. Mechanical data

Housing material	Die-cast zinc, matte nickel-plated
Housing protection type in accordance with IEC 60529	IP 67 (only in plugged-in and screwed-down state)
Supply voltage	7/8" 5-pin, connector / female
Input ports / output ports	M12 , A-coded (8x female)
Dimensions (W x H x D in mm)	68 x 224 x 37.9
Type of installation	Screw installation with 2 securing holes
Ground strap installation	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

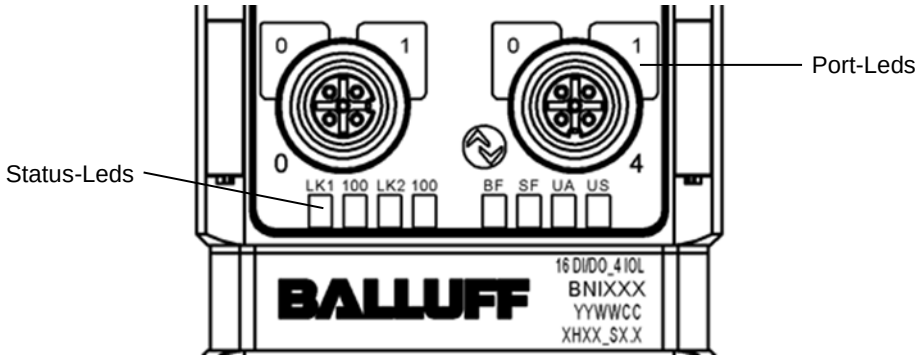
Supply voltage	18...30.2 V DC, in accordance with EN 61131-2
Ripple	<1%
Input voltage at 24 V	130 mA

4 Technical data

4.5. PROFINET

PROFINET port	1 x 10Base-/100Base-Tx
Connection for PROFINET port	M12, D-coded, female
Cable types in accordance with IEE 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	Display	Function
US	Green	Input voltage OK
	Red, flashing	Input voltage low (< 18 V)
UA	Green	Output voltage OK
	Red, flashing	Output voltage low (< 18 V)
	Red	No output voltage present (< 11V)
SF	off	No error
	Red	Watchdog timeout; channel, general or advanced diagnosis present; system error
	Red, flashing	Service DCP signal started via bus
BF	off	No error
	Red	Low speed of physical link; or no physical link
	Red, flashing	No data exchange or no configuration
100	off	Transmission rate: 10 Mbit/s
	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
Both LEDs flashing red	Short circuit at sensor supply between pin 1 and pin 3
Red	Short circuit at output at pin 2 / 4 against pin 3
Red	No high signal at diagnostic input

IO-Link port

Status	Function
Green	IO-Link – connection active
Green, flashing	No IO-Link – connection or wrong IO-Link device
Green, fast flashing	IO-Link pre-operate during data management
Red, fast flashing	Validation failed / wrong configuration of IO-Link data length
Red, fast flashing	Data management failed / wrong device for data management
Red	IO-Link short circuit, pin 4 against pin 3

5 Integration

5.1. Configuration

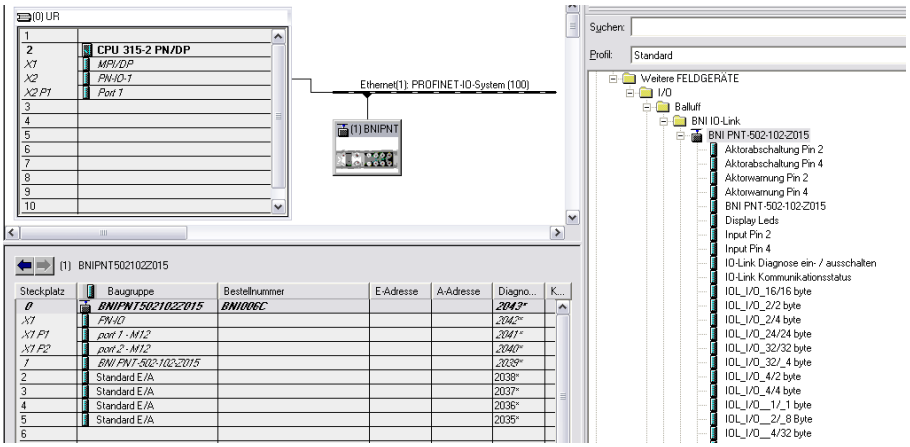
When planning Profibus devices, a device is depicted as a modular system with a header module and several data modules. The screenshots shown here have been taken from the configuration software of the Siemens HW config.

GSDML file

The device data required for project planning is saved in GSDML files (**G**eneric **S**tation **D**escription **M**arkup **L**anguage). The GSDML files are available in two languages as an Internet download (www.balluff.com). The data modules of an IO-Link module are depicted 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 modules, 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.

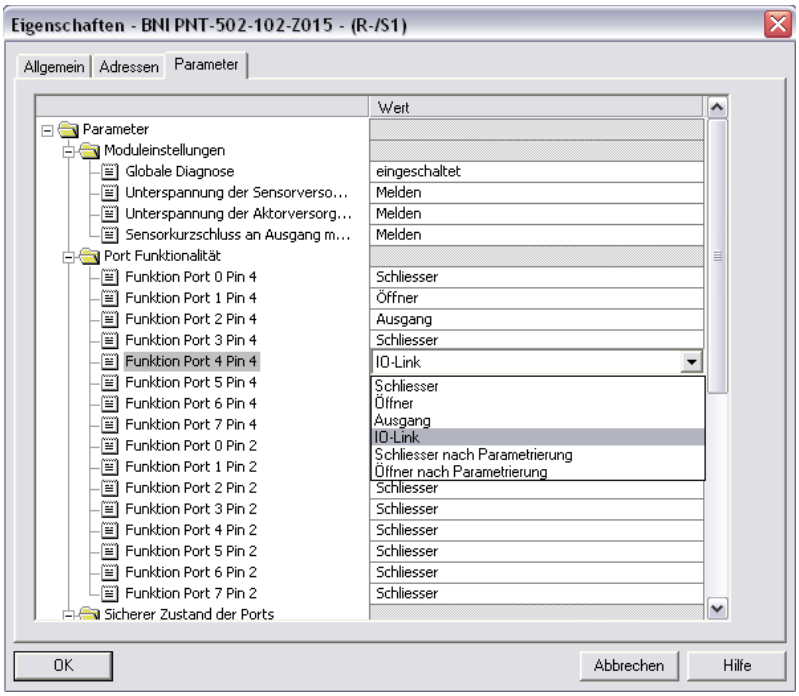


The BNIPNT502102Z015 module with submodules PN-IO, port 1-M12, port 2-M12 are used for Profinet communication.
In X1 PN-IO, functions such as prioritized run-up or the domains for the ring topology can be selected.
Slot 1 is reserved for the header module; port functions (input, output, diagnostic input, IO-Link) or diagnostic messages can be defined here.
The remaining slots preassigned in the default configuration (2-5) 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 4) and slot 5 for for the last port (port 7). 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.

5 Integration

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.



Note
IO-Link configuration:
For modules with an firmware version 2.3 or higher, the configuration of pin 4 as IO-Link port is not necessary anymore. The port is automatically configured to IO-Link, when an IO-Link process data module is used in the hardware configuration. Therefore the option to set pin 4 to IO-Link is removed in the new GSDML files.
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.

Slots 2..5 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.

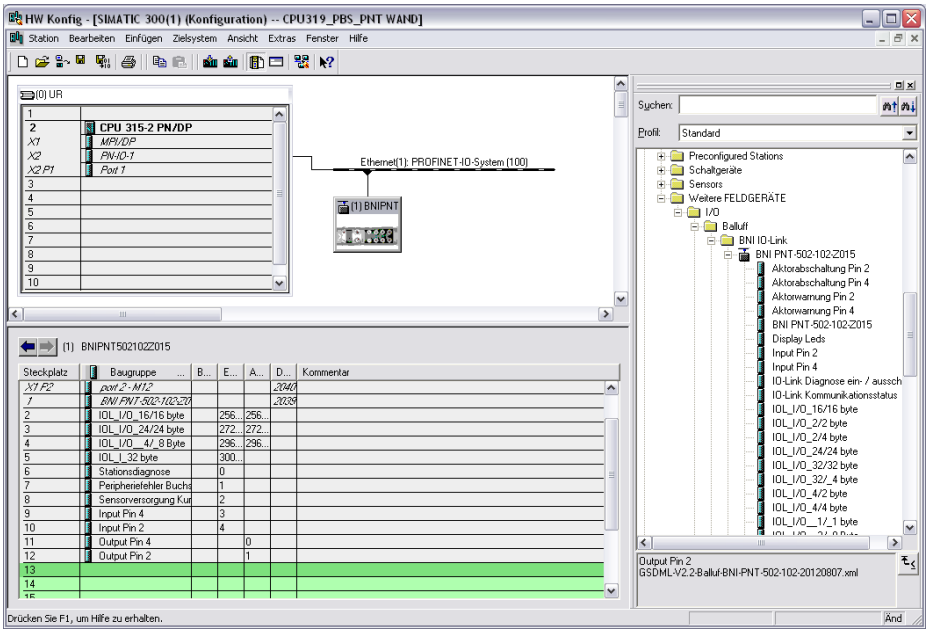
Configuring the IO-Link module:
A suitable IO-Link module that corresponds to the process data length of the IO-Link device must be selected in the catalog and dragged to the appropriate slot by means of drag & drop.
The process data length required by the device in each case can be obtained from the 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.

A description of the individual modules is provided in chapter "Bitmapping and function".

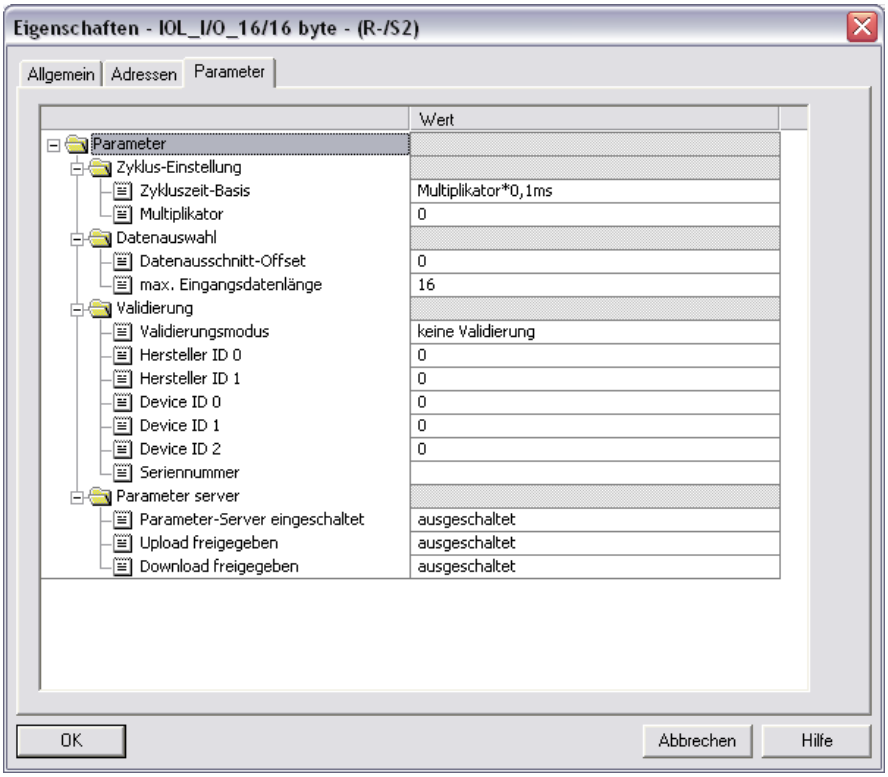


5 Integration

IO-Link configuration

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

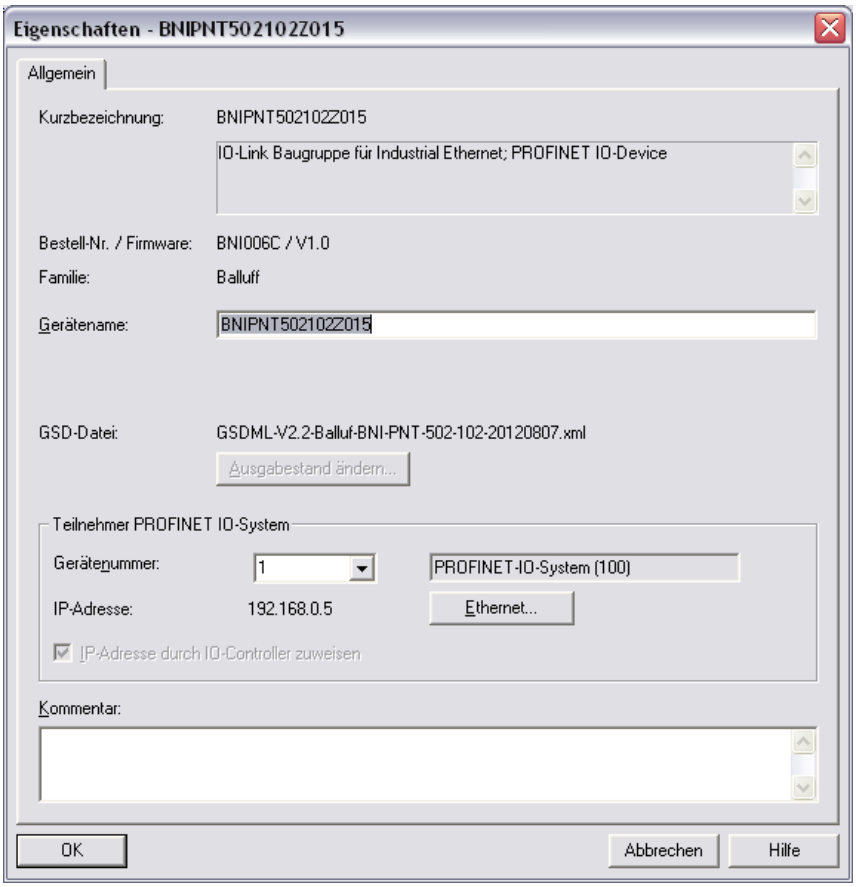
A description of the individual modules is provided in chapter "Function in the module properties."



Device name, Profinet address

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

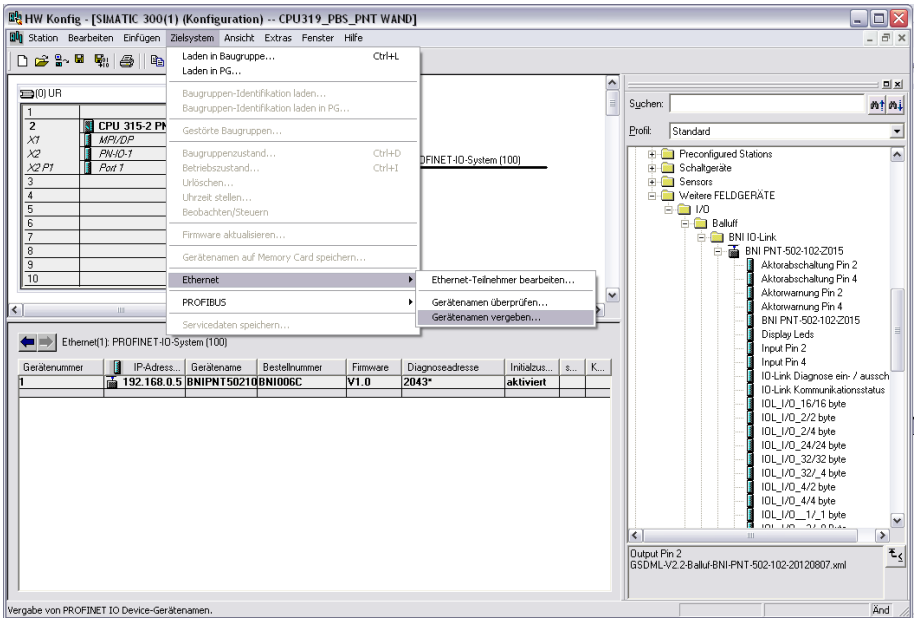
The device name and the Profinet address (IP) are configured here.



5 Integration

Establishing device relationship

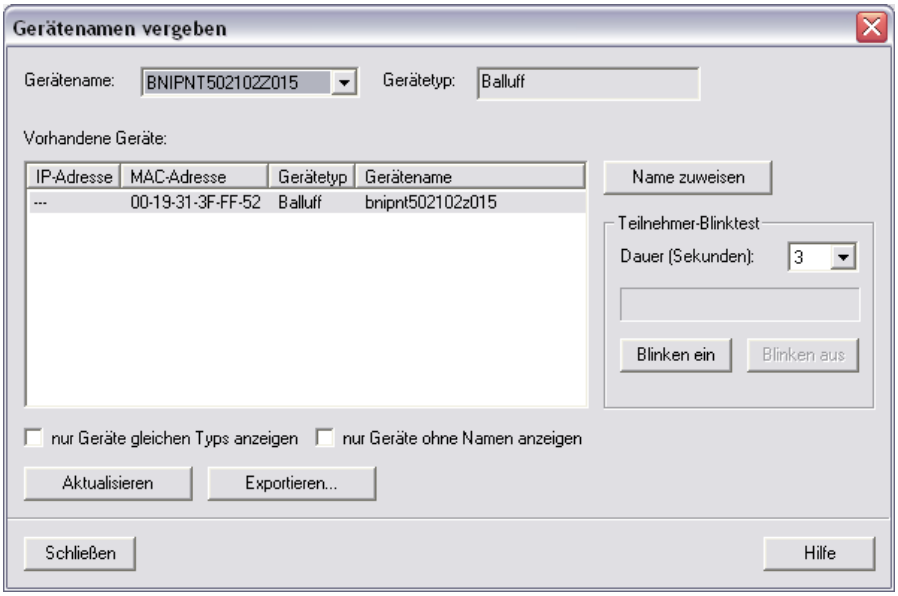
Navigate through "Target system" -> "Ethernet" -> "Assign device name" to start the tool for assigning the module a device name.



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.



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:

- Device relationship not established.
  Scan the network via "Target system" -> "Ethernet" -> "Ethernet user" -> "Search" 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.

- IO-Link is configured in the header module, the slot module is, however, missing or is connected at the wrong location.

- The IO-Link module is at the correct location, pin 4 was, however, not configured to IO-Link for the IO-Link port via the header module.

5 Integration

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 short circuit at output:
With this function, the diagnostic message sensor short circuit is allowed to output of the module / suppressed to the output of the module.
(Optical diagnostics and diagnostics in configured diagnostics modules are not affected.)
This function is valid only for channels / pins that are configured as outputs.
As inputs configured channels / pins are not affected.

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
IO-Link= IO-Link function

Make contact after configuration =	SIO mode; one IO-Link device can be configured via IO-Link and then moved to an SIO mode in which the IO-Link port pin functions as a simple switch input
Break contact after configuration =	SIO mode, as with make contact after configuration, but as break contact input

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 mapping and function of the configurable modules

Inputs pin 4
Inputs pin 2
Outputs pin 4
Outputs pin 2

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.

IO–Link modules

The IO-Link modules always have the same structure:

IOL_I/O_x/xBytes
- Number of process data items used (should be equal to or greater than the process data length of the IO-Link device)
- I = Input data
- O = Output data
- I/O = Both input and output data

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, no automatic restart is performed after an actuator short-circuit, 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

5 Integration

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.

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

IO-Link communication

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

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

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

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

Station diagnostics

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	Res.	US actuator	US sensor

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

Cycle settings This parameter can be used to influence the IO-Link communication speed.
Calculated using the multiplier and the basic cycle time, the IO-Link cycle time can be increased.
The basic cycle time can be adjusted via the scroll-down menu; the multiplier can be adjusted decimally from 0..63.

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

Validation **No validation:** Validation deactivated, every device will be accepted.
Compatibility: Manufacturer ID and device ID are compared to the module data.
The IO-Link communication is only started if there is a match. Manufacturer ID and device ID are entered in decimal format.
Identity: Manufacturer ID and device ID as well as the serial number are compared to the module data. The IO-Link communication is only started if there is a match.
Manufacturer ID and device ID are entered in decimal format, the serial number is entered in ASCII code.

5 Integration

Parameter server

Switched on: data management functions enabled, parameter data and identification data of the IO-Link device are stored permanently.
Switched off: data management functions disabled, stored parameter data and identification data of the IO-Link device remain stored.
Deleted: data management functions disabled, stored parameter data and identification data of the IO-Link device are deleted.
Upload and download locked:
Upload and download are off, no parameter data exchange takes place. Nevertheless, the IO-Link device communicates with the IO-Link port.
Enable upload:
If only the upload is enabled, the master always starts an upload of the parameter data. In this case, the upload is independent of the upload flag of the IO-Link device. If no data is stored in the Master Port, an upload likewise takes place. (e.g. after deleting the data or before the first data upload)
Enable download:
If only the download is enabled, the master always starts a download of the parameter data. In this case, the download is likewise independent of the upload flag of the IO-Link device. If no data is stored in the Master Port, there will be no parameter data exchange. Nevertheless, the IO-Link device communicates with the IO-Link port.
Enable upload and download:
If the upload and download are enabled, different parameter sets are distinguished depending on the upload flag of the IO-Link device.
If no parameter data is stored in the IO-Link master port, an initial upload takes place. (e.g. after deleting the data or before the first data upload)
If the upload flag is set on the IO-Link device, an upload of the parameter data always takes place.
If no upload flag is set and parameter data has already been stored, a download of the parameter data always takes place.

Note
After uploading the parameterization data, the vendor ID and device ID of the connected IO-Link device remain stored until the last data sets are deleted. Validation takes place upon start-up of the connected IO-Link device. As a result, only IO-Link devices of the same type can be used for data management.

6 Display

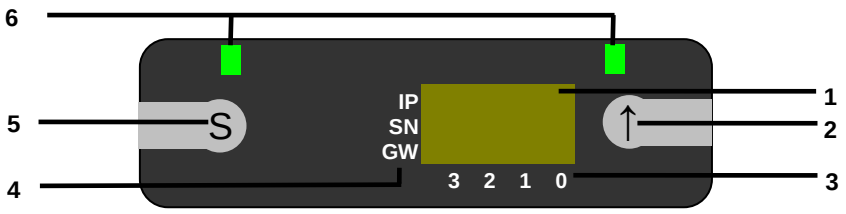
6.1. General

The display element of the BNI PNT-502-102-Z015 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.

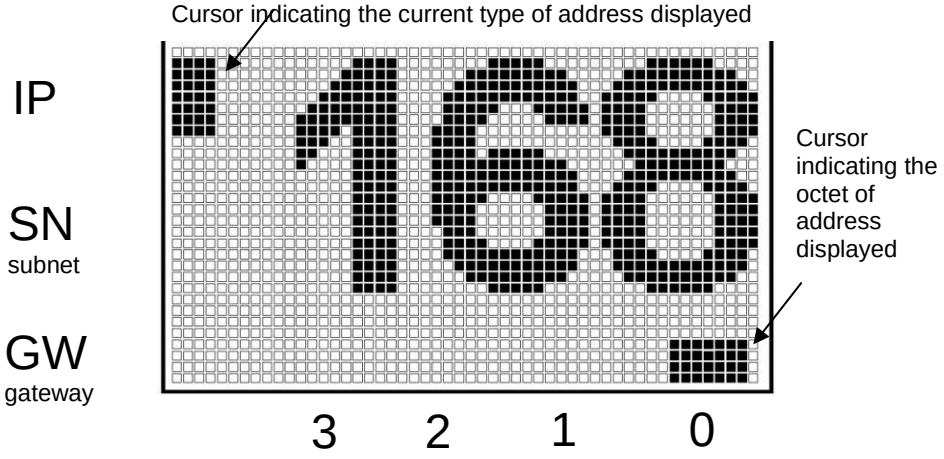
6.2. Controls and visualization



1 Display
2 Arrow-Key
3 Octett-Cursor
4 Address type cursor
5 Set-Key
6 LEDs

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.

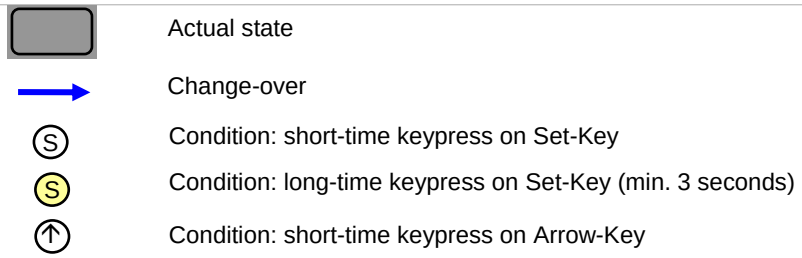
6.3. Display information



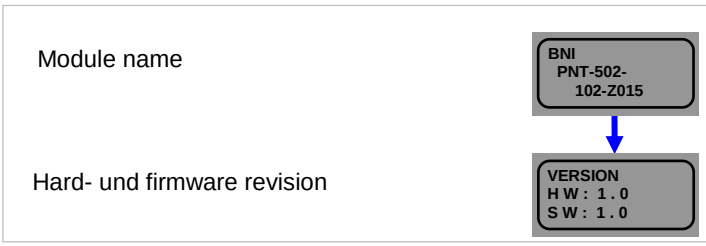
6 Display

6.4. Design and symbols

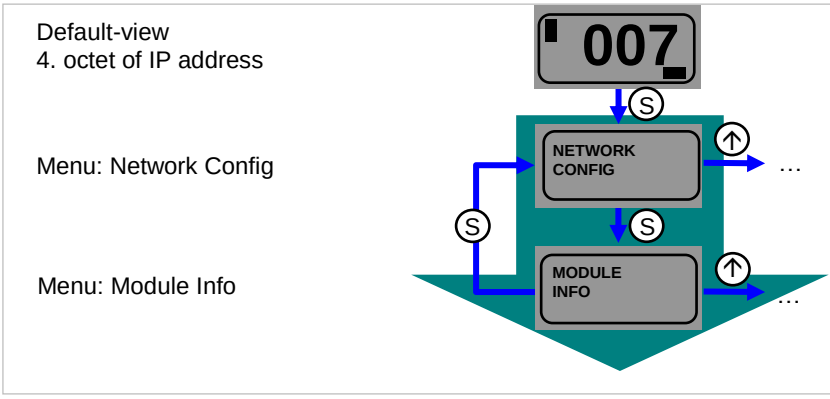
There are some symbols used in the following flow-charts to describe the display-functionality:



6.5. Startup

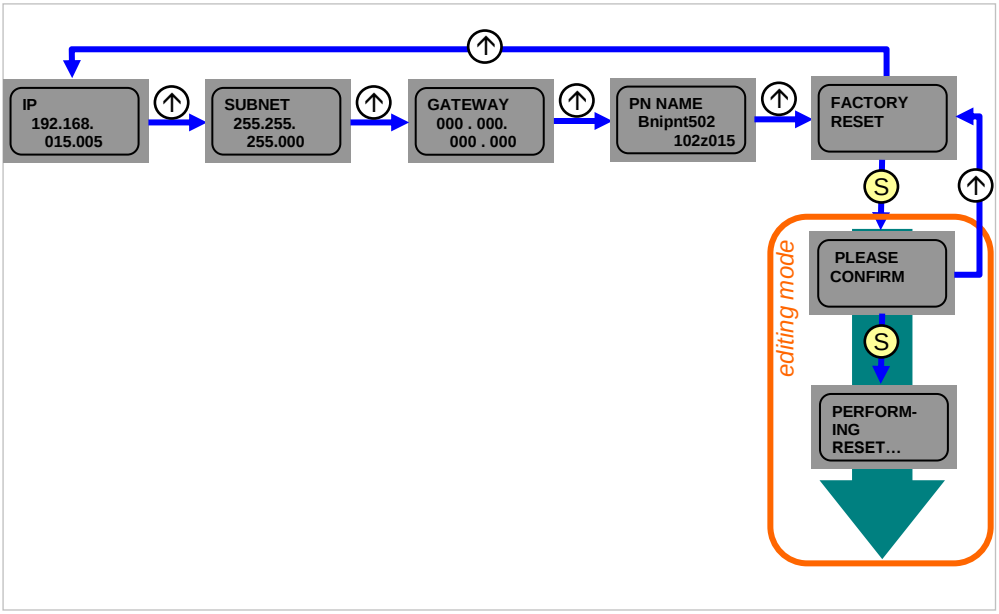


6.6. Main menu



- Go through the main menu with short-time keypress on Set-Key
- Step in a menu with short-time keypress on Arrow-Key

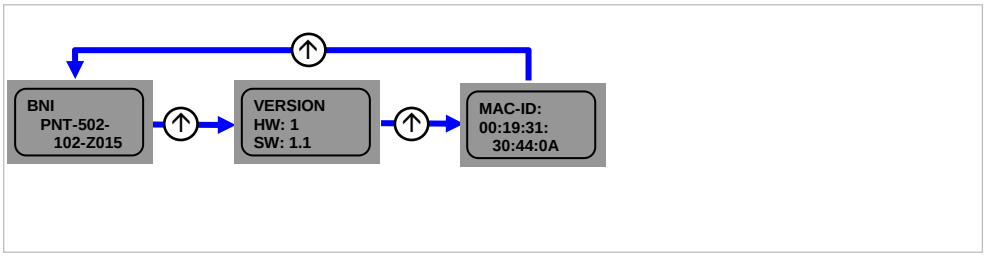
6.7. Factory Reset



- Go through the Network Config menu with short-time keypress on Arrow-Key.
- Reset the module with a long-time keypress on Set-Key at the Factory Reset menu item.
- Confirm the factory reset with a short-time keypress on Set-Key or decline it with a short-time keypress on Arrow-Key. If the factory reset is confirmed, the device performes a restart.

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

6.8. 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.

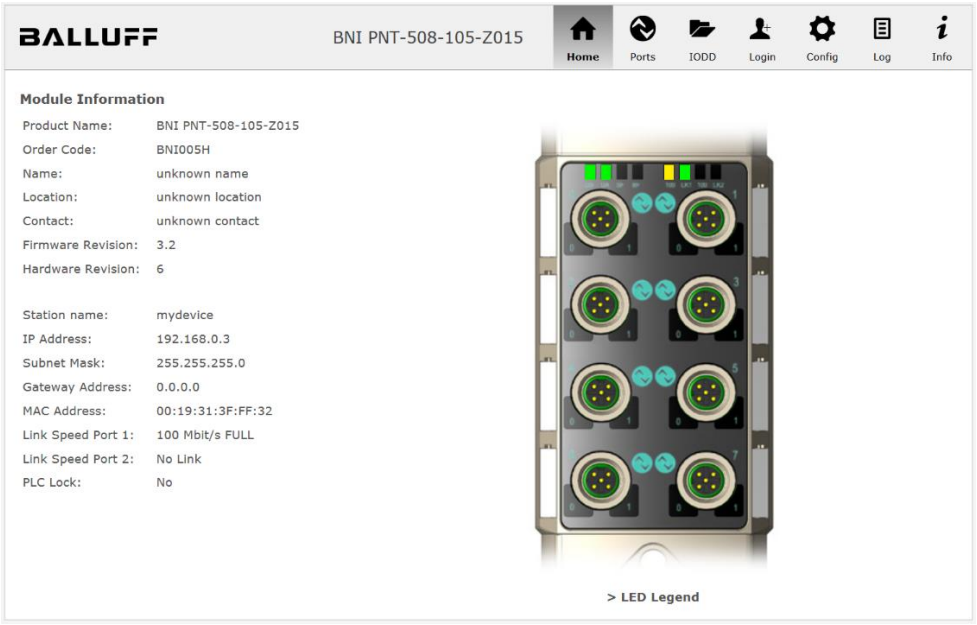
7 Webserver

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.

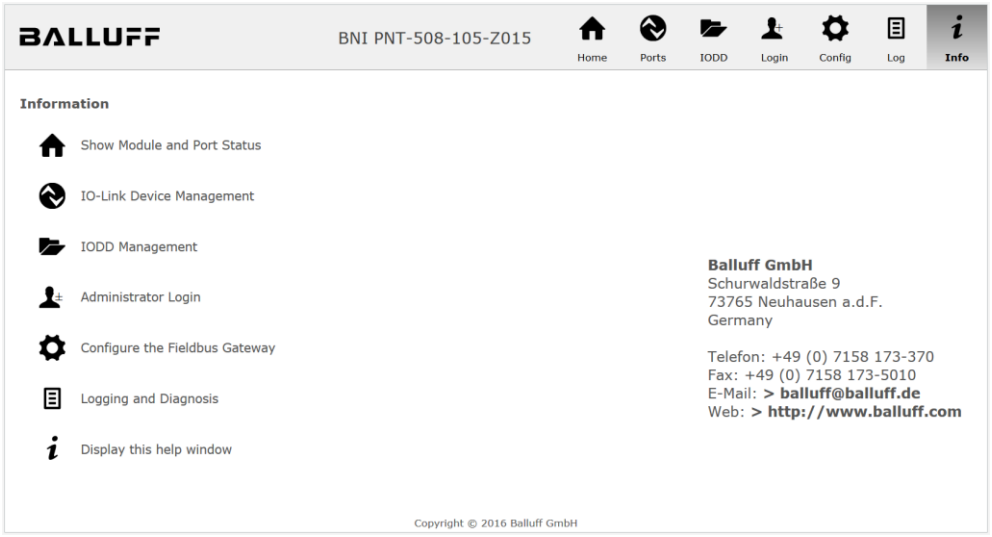
For open a connection with the web server, enter the IP address of the module in the address line of the browser. The homepage then appears with the essential device information.



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 Webserver

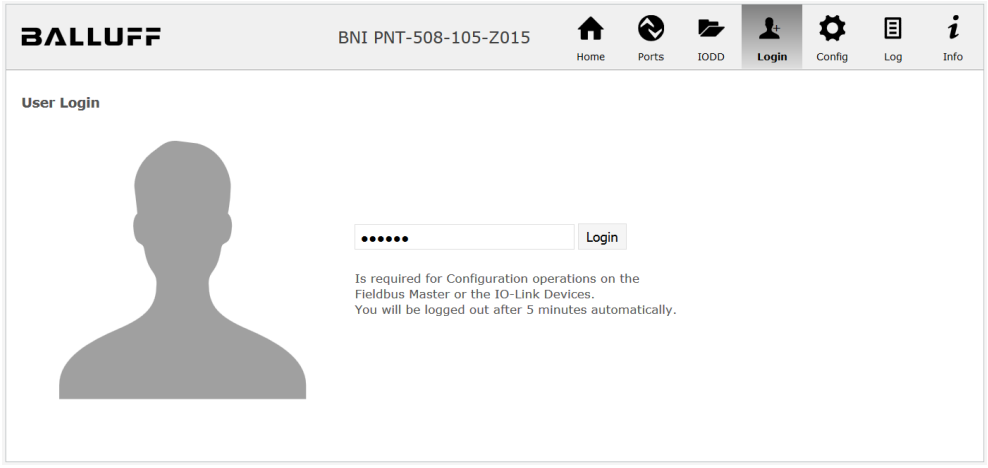
7.3. Login/Logout

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 grayed out buttons.

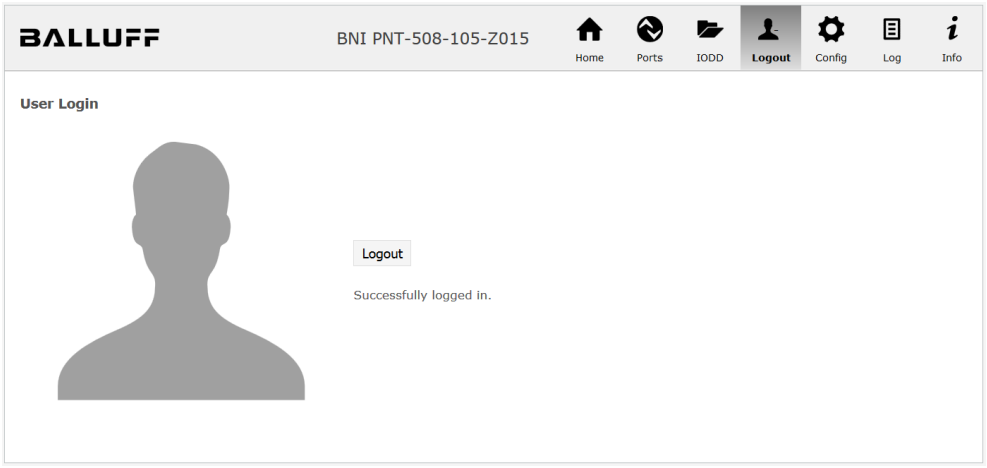
The default password is:

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:



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.

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.



7 Webserver

PNT:



EIP:



7.5. "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.

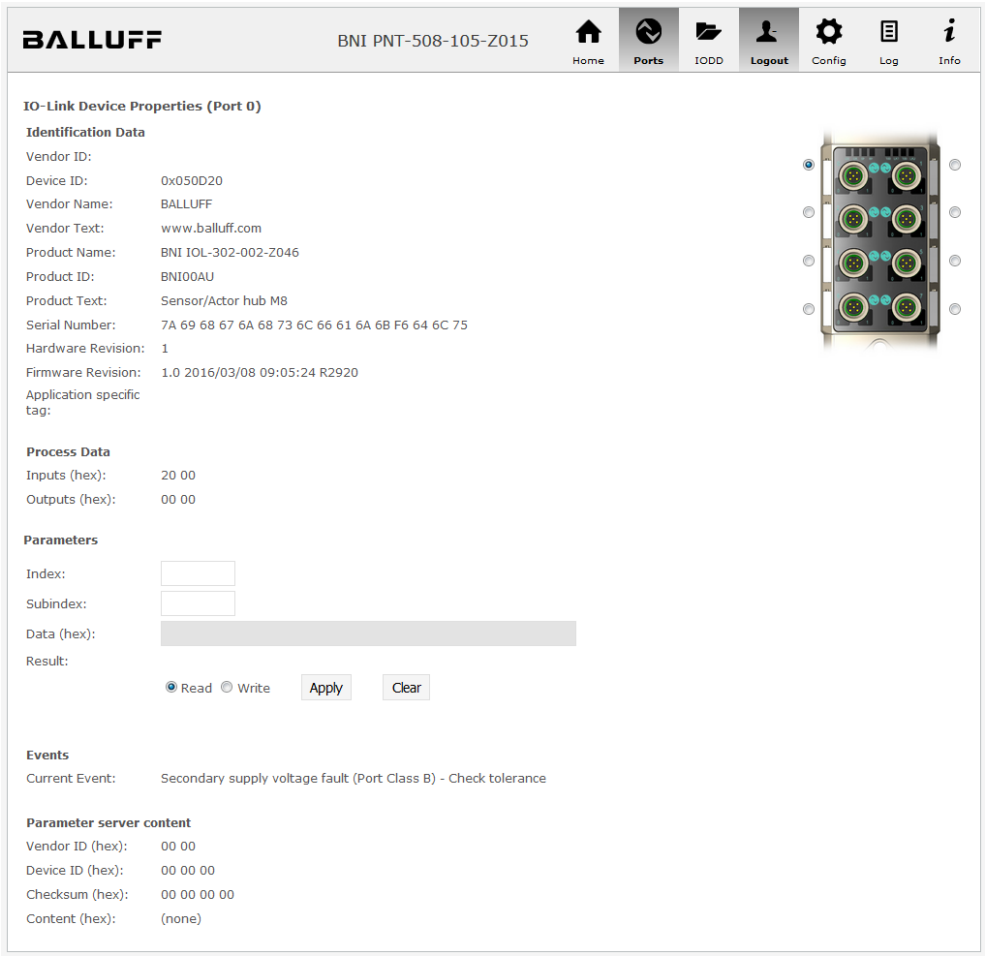
Note
The IO-Link device data are only displayed if the port is also configured as an IO-Link port!

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.



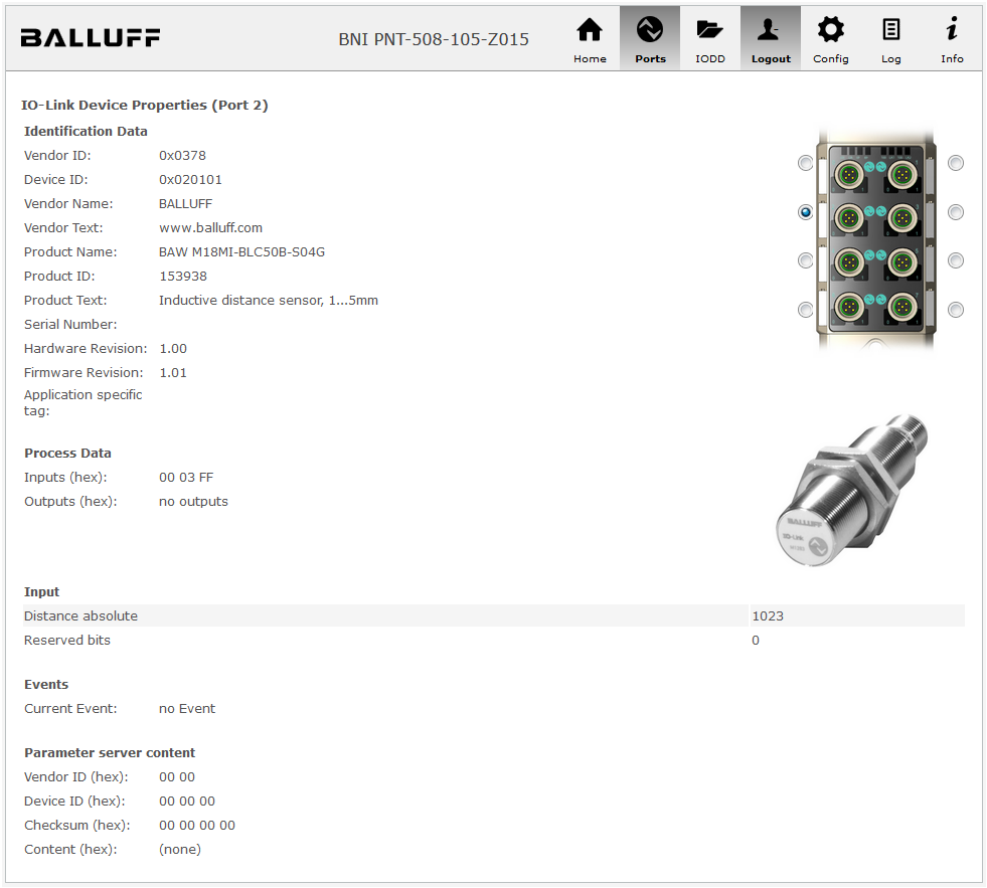
"Ports" dialog with direct parameter access

7 Webserver

Appropriate IODD uploaded

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.

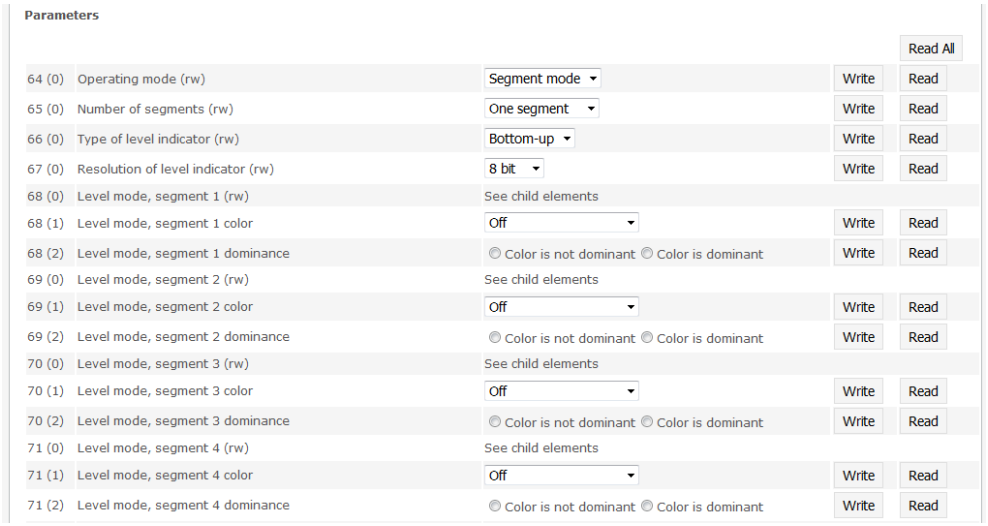


Dialog "Ports“: IODD interpretation and device image

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!



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

7 Webserver

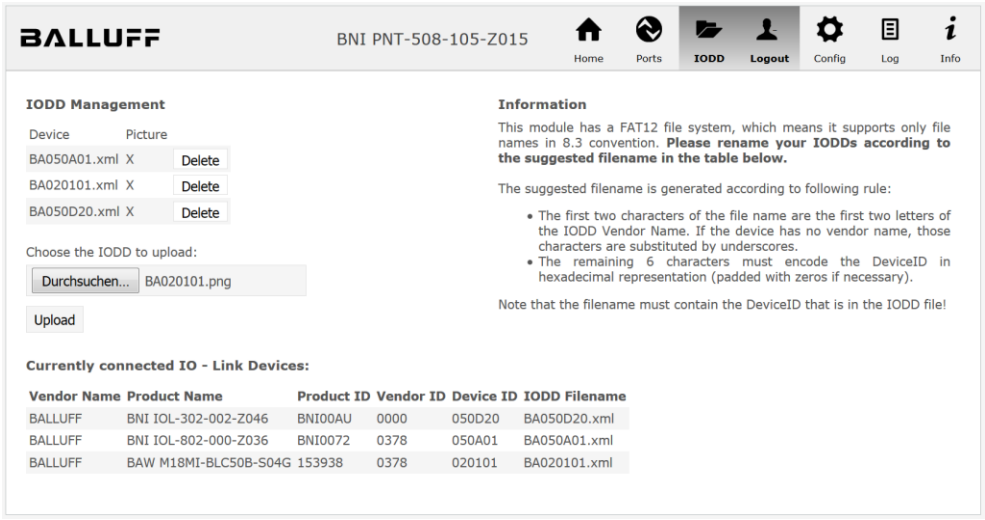
7.6. "IODD" dialog

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.



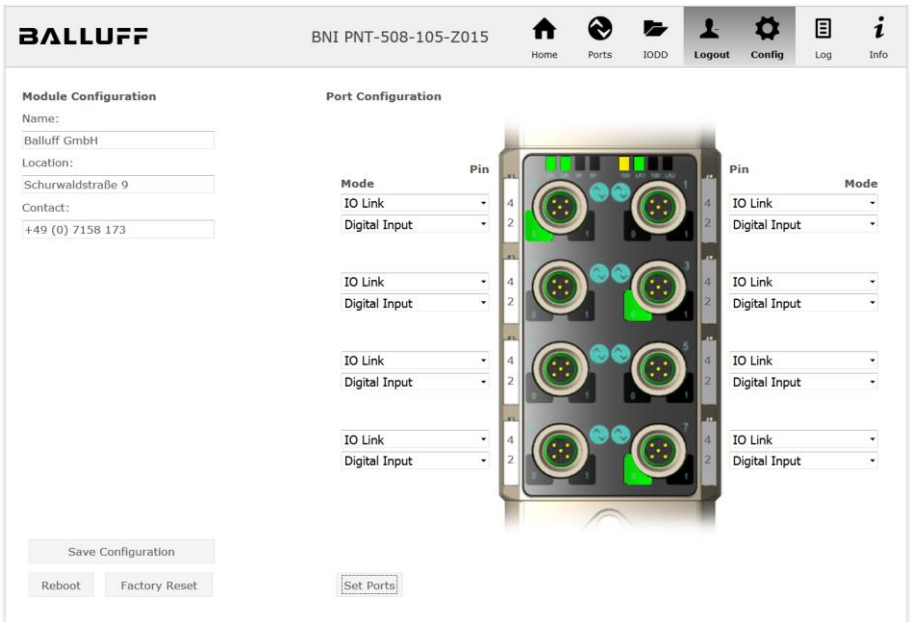
Using the "Delete" button you can delete IODDs and device images from the fieldbus when needed.

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!

7.7. "Config" dialog

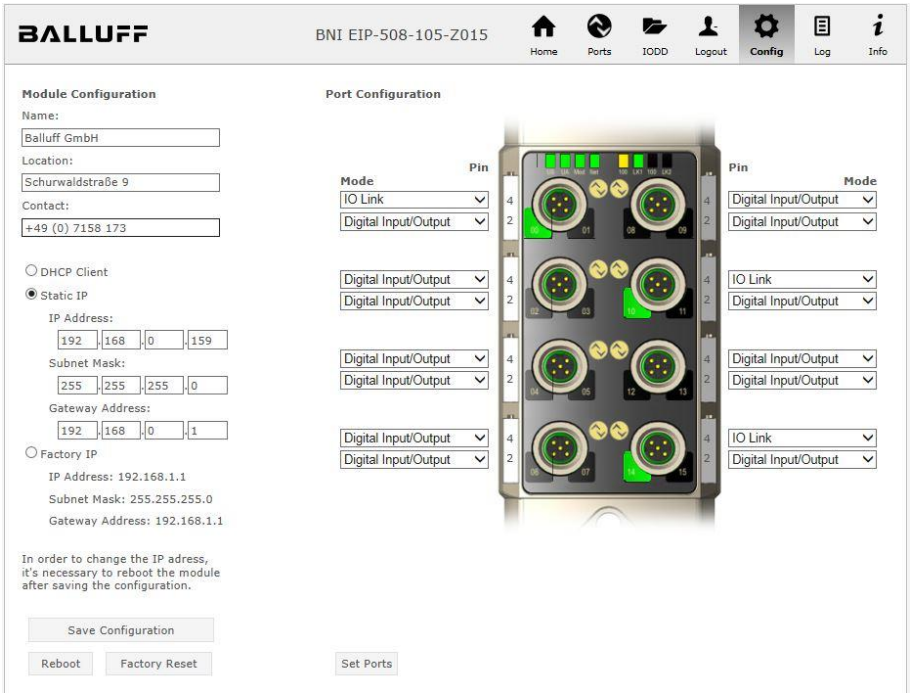
The configuration page enables configuration of the module. You can change both the module information texts and the port configuration.
The "Set Ports" action is not permanently stored in the device and is lost after the next reboot or reset.

PNT / ECT:



7 Webserver

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.

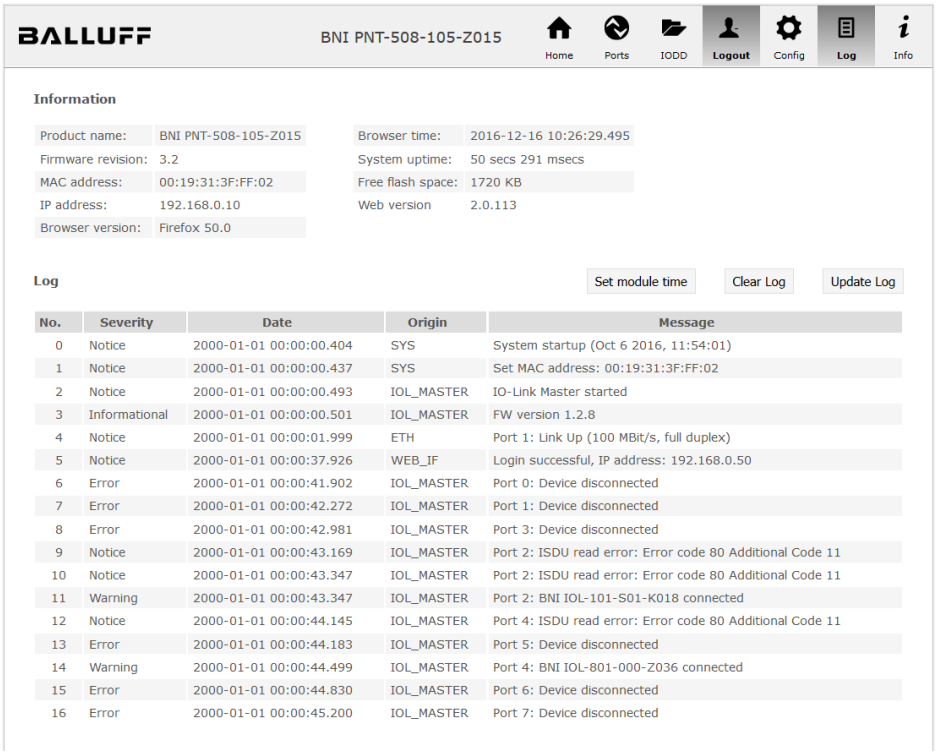
7.8. "Log" dialog

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.

Note
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.



7 Webserver

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 Diagnostics

8.1. 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	Block Type	Block Header
1	02		
2	00	Block Length	
3	1E		
4	01	Block Version High	
5	00	Block Version Low	
6	00	Alarm type	
7	01		
8	00	API	
9	00		
10	00		
11	00		
12	00	Slot number	
13	01		
14	00	Subslot number	
15	01		
16	00	Module ID	
17	00		
18	00		
19	17		
20	00	Submodule ID	
21	00		
22	00		
23	01		
24	A8	AlarmSpecifier	AlarmSpecifier
25	36		
26	80	User Structure ID	
27	00		
28	00	Channel number	
29	08		
30	08	ChannelProperties	ChannelProperties
31	00		
32	00	ChannelErrorType	
33	1 A		

8 Diagnostics

8.2. 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 Header are described by the Block Type to define the data type.

Possible values	Meaning
0x0002	Alarm Notification Low

Block Length

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
0x00000000	Default value

Slot

2 bytes of data that describe which slot of the module reports an error

Slot	Meaning	
0001	Standard I/O	Port 0-7
0002	IO-Link	Port 4
0003	IO-Link	Port 5
0004	IO-Link	Port 6
0005	IO-Link	Port 7

Subslot

2 bytes of data that describe 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
0x00000017	BNI PNT-502-102-Z015 (header module)

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
0x00000001	BNI PNT-502-102-Z015 (header module)

8.3. **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 Diagnosis Bit 12

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

8 Diagnostics

8.4. **Channel Number** 2 bytes of data that describe where the error on the module has occurred.

Slot 1: Configuration as standard I/O ports	
Value	**Position**
0x0000	Port 0 pin 4
0x0001	Port 1 pin 4
0x0002	Port 2 pin 4
0x0003	Port 3 pin 4
0x0004	Port 4 pin 4
0x0005	Port 5 pin 4
0x0006	Port 6 pin 4
0x0007	Port 7 pin 4
0x000A	Port 0 pin 2
0x000B	Port 1 pin 2
0x000C	Port 2 pin 2
0x000D	Port 3 pin 2
0x000E	Port 4 pin 2
0x000F	Port 5 pin 2
0x0010	Port 6 pin 2
0x0011	Port 7 pin 2
0x0020	**Error on the module:** Error affects the whole module, not a single port. (for example undervoltage)
Slot 2-5: Configuration as IO-Link	
0x0000	Error on IO-Link port
0x0001	Error on IO-Link device

8.5. **Channel Properties**

2 bytes, subdivided as follows:

Type

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

Possible values		Meaning
Bit 9	Bit 10	
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

8 Diagnostics

8.6. Channel Error Type

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

9 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 and the web server, most of the parameters that are required are taken over by the software.

Function block

The function block "IOL_Call" generates a telegram, which is sent via DPV1 functions to the master. Therefore the following settings are used:

Diagnosis address	The diagnosis address from slot 1 is used
CAP	255

The sample project with the IOL_Call function module from Siemens AG can be downloaded on the Balluff homepage.

The telegram has the following structure:

Area	Size in bytes	Value	Definition
Call header	1	08h	08h for "CALL", fixed
	1	0 1…63 64…255	IOL master Port number Reserved
	2	65098	FI_Index, IO-Link header is following
IO-Link header	1	0…255	Task 2 = write 3 = read
	2	0…32767 65535	IO-Link index Port function
	1	0…255	IO-Link subindex
Data range	232		Range of the data to be written or read

Reading

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.

Writing

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.

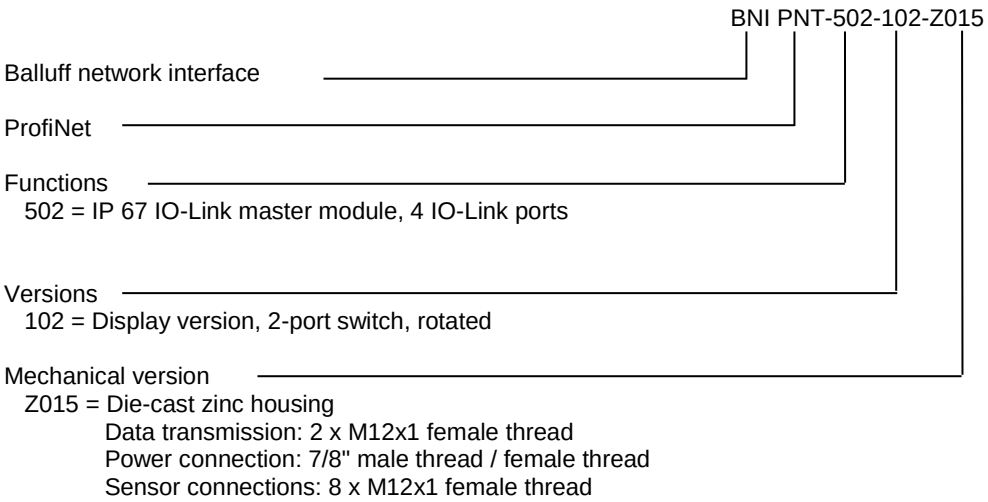
10 Appendix

10.1. Scope of delivery

The BNI PNT comprises the following elements:

- IO-Link block
- 4x M12 dummy plugs
- Ground strap
- M4x6 screw
- 20 information signs

10.2. Order number



10.3. Order information

Product ordering code	Ordering code
BNI PNT-502-102-Z015	BNI006C

Notes

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