

BNI PNT-502-105-Z015
BNI PNT-508-105-Z015
IP67 Module
User's Guide

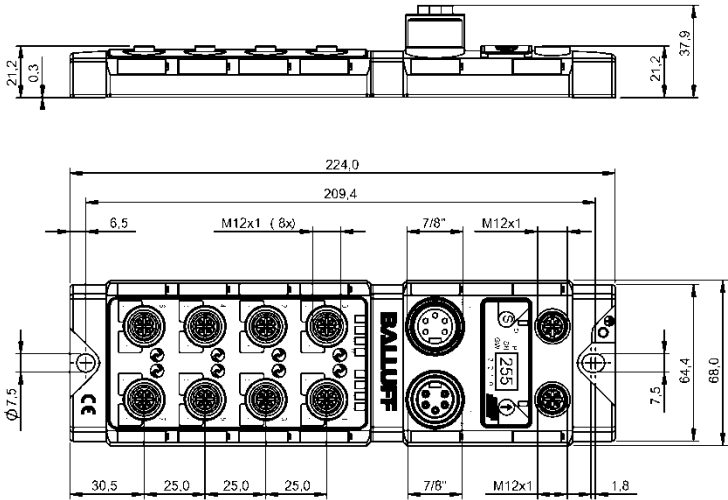




Table of contents

1	General	4
1.1.	Structure of the manual	4
1.2.	Typographical conventions	4
	Enumerations	4
	Actions	4
	Syntax	4
	Cross-references	4
1.3.	Symbols	4
1.4.	Abbreviations	4
1.5.	Deviating views	4
2	Safety	5
2.1.	Intended use	5
2.2.	Installation and startup	5
2.3.	General safety instructions	5
2.4.	Resistance to aggressive substances	5
	Hazardous voltage	5
3	Getting Started	6
3.1.	Module overview	6
3.2.	Mechanical connection	7
3.3.	Electrical connection	7
	Power supply	7
	Grounding	7
	PROFINET interface	7
	I/O port	8
	IO-Link port	8
	Port	8
4	Technical data	9
4.1.	Dimensions	9
4.2.	Mechanical data	9
4.3.	Operating conditions	9
4.4.	Electrical data	9
4.5.	PROFINET	10
4.6.	Function indicators	10
	Module status	10
	Port	11
5	Integration	12
5.1.	Configuration	12
	GSDML file	12
	Integration of the module	12
	Parameterization of the header module	13
	Hardware configuration	14
	Device name, Profinet address	15
	Establishing device relationship	15
	Assigning device name	16
	Concluding the configuration	16
5.2.	Functions in module properties	17
	Module settings	17
	Port functions	17
	Safe state	17
5.3.	Bit mapping and function	18
	Inputs pin 4	18
	Inputs pin 2	18
	Outputs pin 4	18
	Outputs pin 2	18
	IO-Link modules	18

Actuator shutdown pin 4 / pin 2	18
Actuator warning pin 4 / pin 2	18
Restart pin 4 / pin 2	18
Switching IO-Link diagnostics on / off	19
IO-Link communication	19
IO-Link PD valid	19
Peripheral error, socket	19
Short circuit	19
Sensor supply	19
Station diagnostics	19
Display LED	19
IO-Link configuration	20
IO-Link functions	20
Cycle settings	20
Data selection	20
Validation	20
Parameter server	21
6 Parameterize IO-Link Devices	22
Possibilities	22
Function block	22
Read	22
Write	22
7 Display	23
7.1. General	23
7.2. Controls and visualization	23
7.3. Display information	23
7.4. Design and symbols	24
7.5. Startup	24
7.6. Main menu	24
7.7. Factory Reset	25
7.8. Module Info	25
8 Diagnostics	26
8.1. Diagnostics message	26
8.2. Block Header	27
Block Type	27
Block Length	27
Block Version	27
Alarm Type	27
API	27
Slot	27
Subslot	28
Module Ident	29
Submodule ID	29
8.3. AlarmSpecifier	30
Sequence Number	30
Channel Diagnostic	30
Manufacturer-Specific Diagnosis	30
Submodules	30
Diagnostic State	30
ARDiagnosis State	30
User Structure ID	30
8.4. Channel Number	31
8.5. Channel Properties	32
Type	32
Accumulative	32
Maintenance	32
Specifier	32
Direction	32
8.6. Channel Error Type	33
9 Webserver	34
9.1. General Information	34
9.2. Navigation / Info	35

9.3. Login/Logout	36
9.4. "Home" dialog	37
9.5. "Ports" dialog	39
No appropriate IODD uploaded	39
Appropriate IODD uploaded	40
9.6. "IODD" dialog	42
9.7. "Config" dialog	43
9.8. "Log" dialog	45
10 Monitoring & Diagnosis	47
10.1. General	47
10.2. SNMP MIBs	47
11 Appendix	49
11.1. Scope of delivery	49
11.2. Order number	49
11.3. Order information	49
Notes	50

1 General

- 1.1. Structure of the manual** This manual is structured such that one chapter is built 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 | Function earth |
| 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 manufacturer'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.

3.1. Module overview

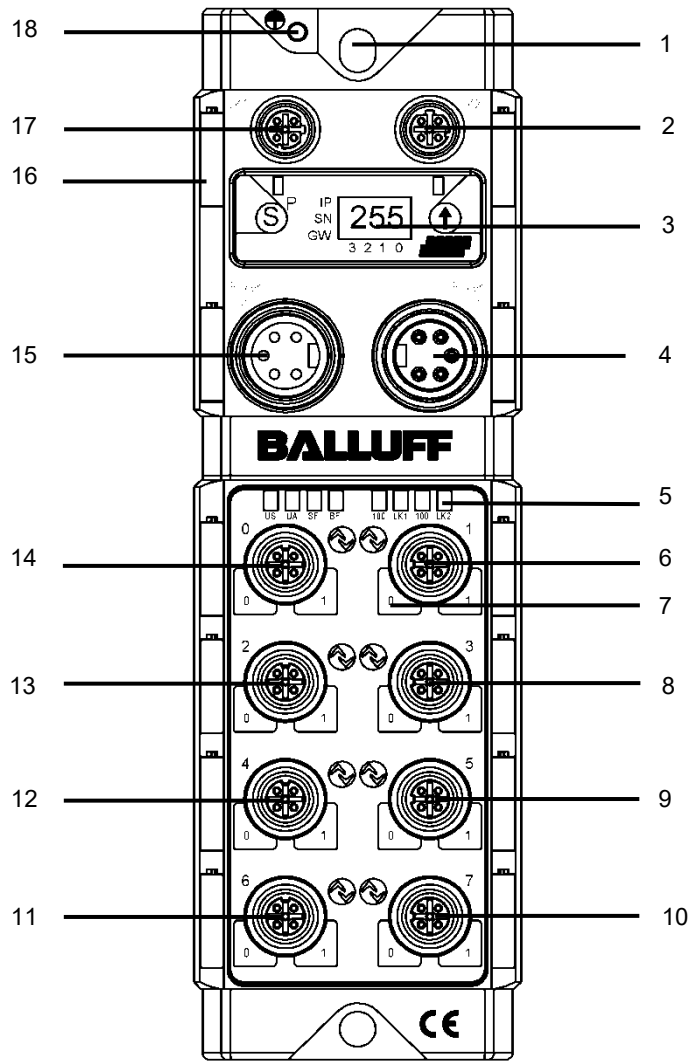


Figure 1 – Overview of BNI PNT-50x-105-Z015

- | | | | |
|----|-----------------------------|----|----------------------|
| 1 | Securing hole | 11 | Port 6 |
| 2 | PROFINET™ port 2 | 12 | Port 4 |
| 3 | Display | 13 | Port 2 |
| 4 | Power supply, input | 14 | Port 0 |
| 5 | Status LED | 15 | Power supply, output |
| 6 | Port 1 | 16 | Information sign |
| 7 | Pin/port LED: signal status | 17 | PROFINET™ port 1 |
| 8 | Port 3 | 18 | Ground connection |
| 9 | Port 5 | | |
| 10 | Port 7 | | |

3 Getting Started

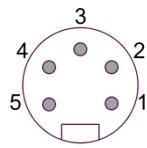
3.2. Mechanical connection

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

3.3. Electrical connection

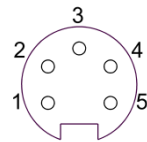
Power supply

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



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

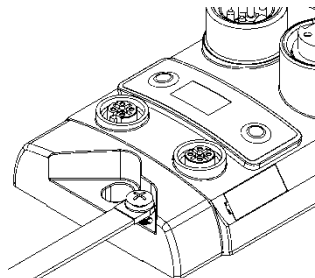
Power supply "OUTPUT" (7/8", female)



Pin	Function	Description
1	Actuator power supply ground,	0 V
2	Bus/sensor power supply ground	
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.

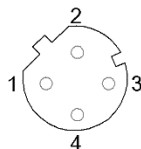
Grounding



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



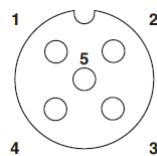
Pin	Funktion	
1	Tx+	Transmit Data +
2	Rx+	Receive Data +
3	Tx-	Transmit Data -
4	Rx-	Receive Data -

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

3 Getting Started

I/O port

M12, A-coded, female



Pin	Function
1	+24 V, 200 mA
2	Input/output
3	GND
4	Input/output
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 2A. The total current of the module must not exceed 9A.

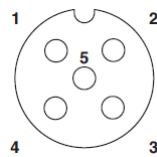


Note

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

IO-Link port

M12, A-coded, female



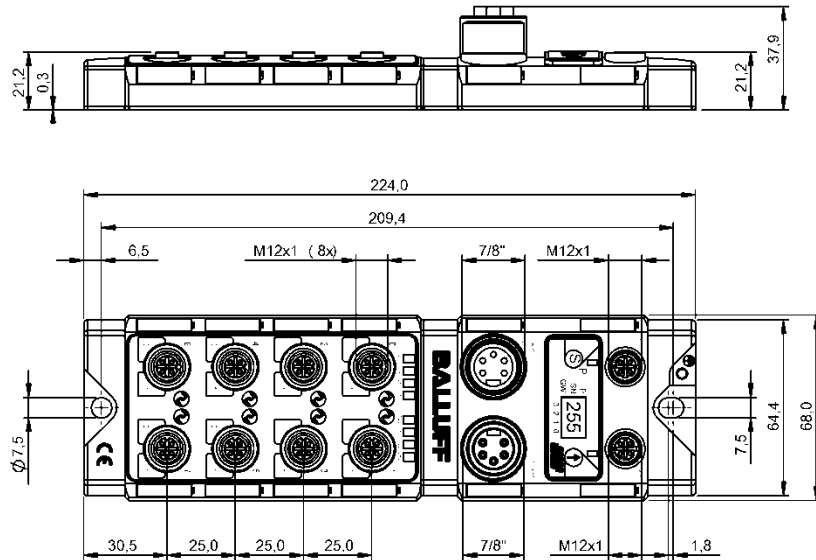
Pin	Function
1	+24 V, 1.6 A
2	Input / output 2A
3	GND
4	IO-Link / input / output 2A
5	n.a.

Port

	Port	
	0-3	4-7
BNI PNT-502-105-Z015	IN / OUT	IN / OUT / IO-Link
BNI PNT-508-105-Z015	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 g

4.3. Operating conditions

Ambient temperature	-5 °C ... 70 °C
Storage temperature	-25 C ... 70 °C

4.4. Electrical data

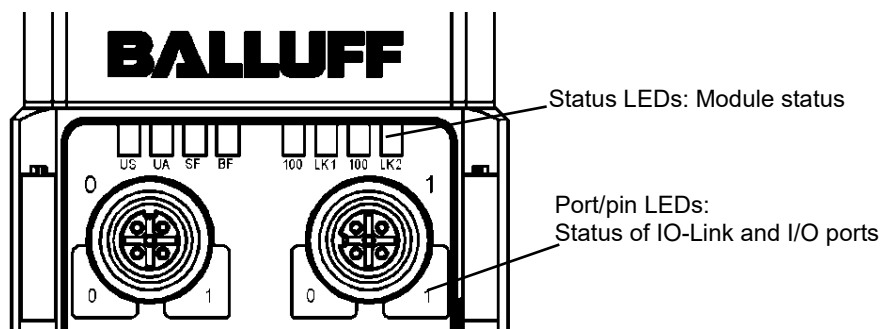
Supply voltage	18...30.2 V DC, in accordance with EN 61131-2
Ripple	<1%
Input voltage at 24 V	130 mA

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

5.1. Configuration

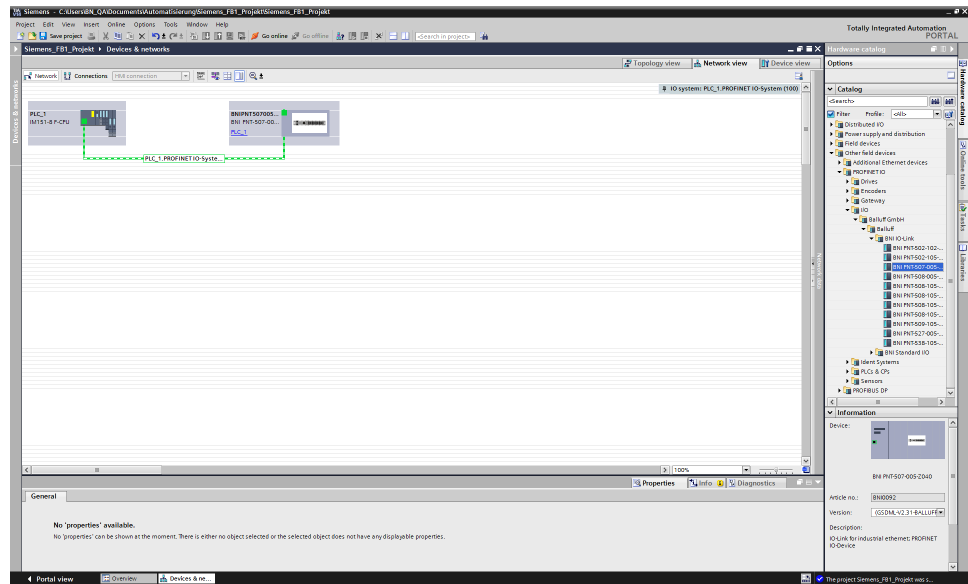
When planning Profibus devices, a device is depicted as a modular system with a header module and several data modules. The screenshots shown here have been taken from the configuration software of the Siemens HW config.

GSDML file

The device data required for project planning is saved in GSDML files (**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 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 BNP150705-00 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 0 can be used for defining the port function (input, output, diagnostics input) or diagnostics messages.

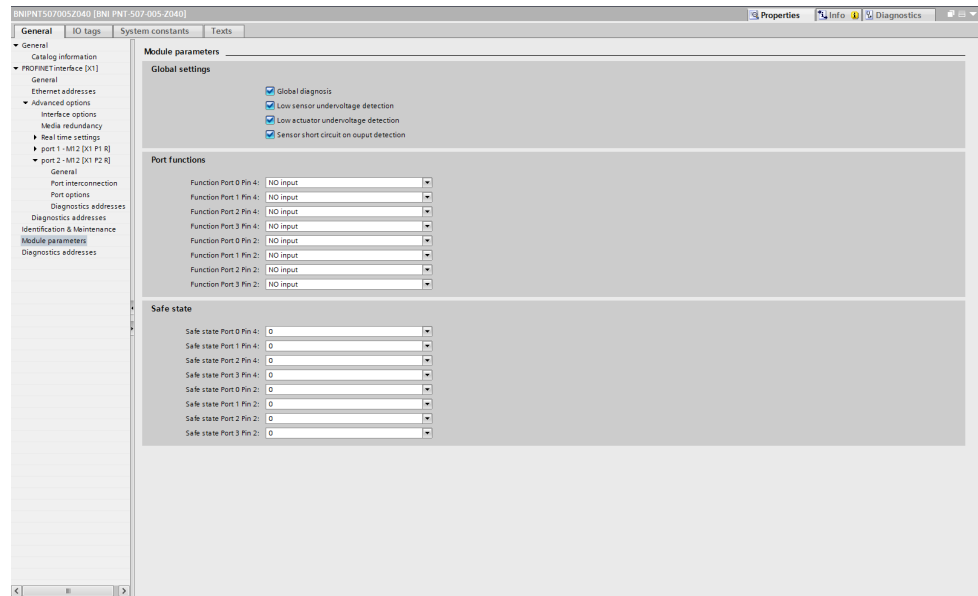
The remaining slots (2-5) preallocated in the default configuration are the placeholders for the IO-Link modules or standard I/O modules. Slot 2 is for the first IO-Link port / standard I/O port and Slot 5 for the last.

If IO-Link communication is planned for a given port, the standard I/O module must be deleted and replaced with an IO-Link module, e.g., IOL_E_2byte.

5 Integration

Parameterization 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.

Note



The use of the validation function is recommended, when device-specific modules (e.g. BNI IOL-302-S02-Z0xx) from the device catalog are been using. This ensures that no wrong devices can be connected that would otherwise be accepted with suitable process data sizes. Thus an unintentional incorrect configuration is excluded.

Hardware configuration

The 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.

The upper slots are reserved for the IO-Link ports.

Module addressing:

Double-click on the 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),

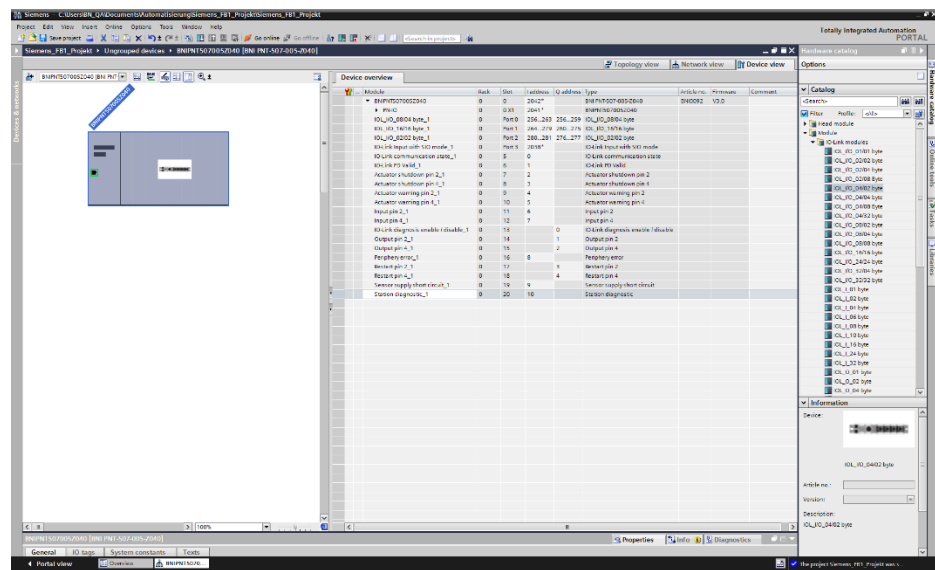
the "Standard I/O" placeholder module must be used for the corresponding slot.

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.

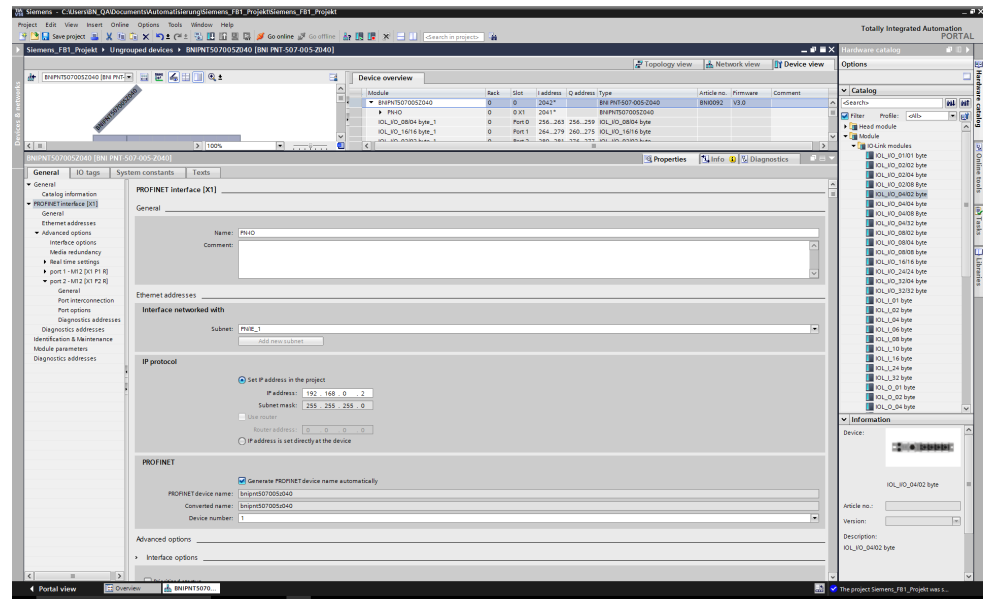


5 Integration

Device name,
Profinet address

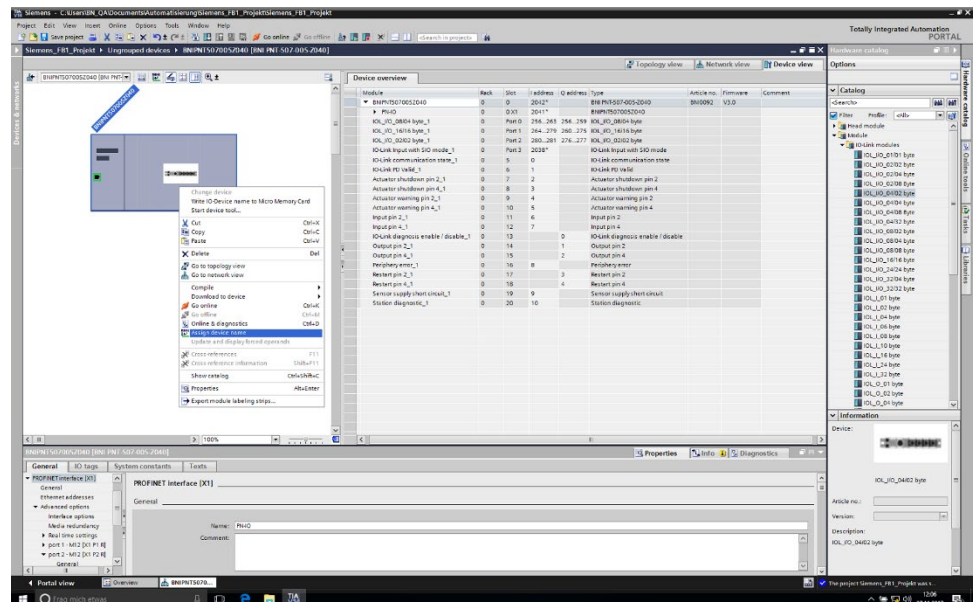
Double-click on the module in the Profinet line to view the communication parameters of the module.

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



Establishing device
relationship

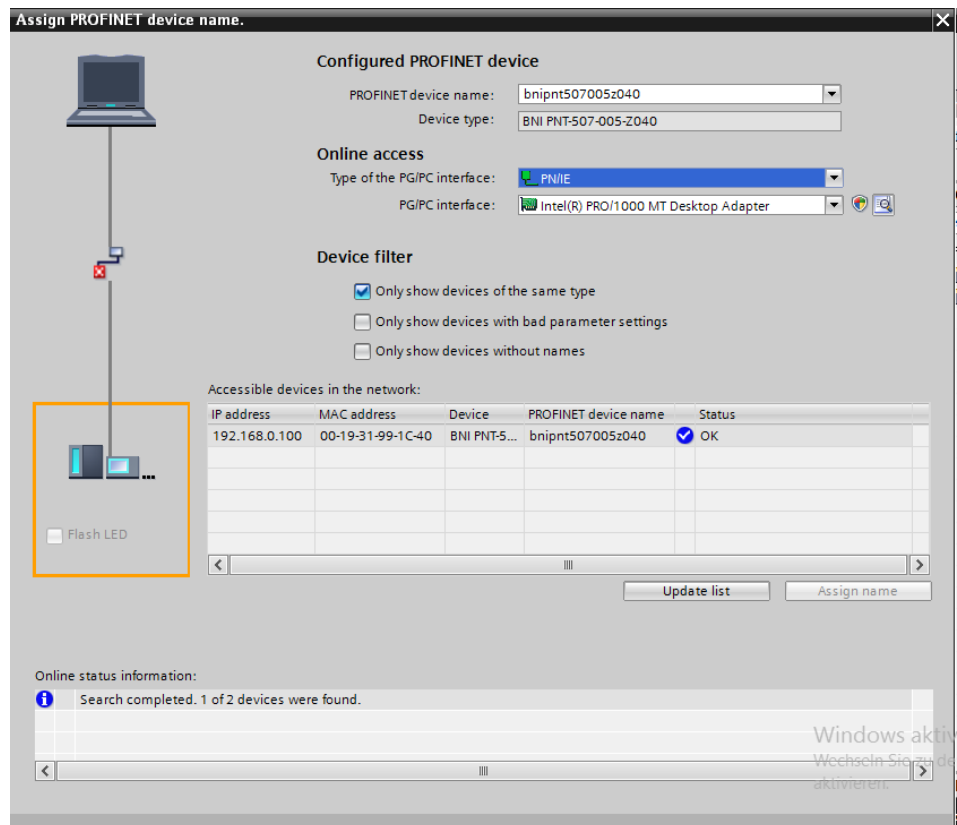
"Device view" → right-click on module → "Assign device name".



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 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, reassign the device name and download the configuration.

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:

This function allows / suppresses the diagnostic message sensor short circuit at the output of the module. (Optical diagnostics and diagnostics in configured diagnostics modules is not affected) Function applies only to channels / pins configured as outputs. Channels / pins configured as inputs are not affected.

Port functions

The function for every individual port pin can be defined here:

Closing contact	input as normally closed contact
Opening contact	input as normally open contact
Diagnostic input	input as diagnostic input. (only available for pin 2) The Led turns red when there is not signal.
Output	output function

Safe state

This function is a supplement to an output configuration of the respective port pin. For each port pin, a safe status can be predefined which is to be assumed in the event of a loss of bus communication.

5.3. Bit mapping and function

Bit mapping and function of the configurable modules

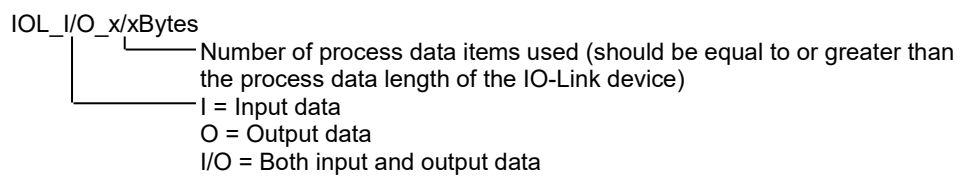
Inputs pin 4
Inputs pin 2
Outputs pin 4
Outputs pin 2

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:



Actuator shutdown pin 4 / pin 2

Shows a short circuit between a set output and 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 when a voltage is applied to a non-set output.

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

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

IO-Link PD valid

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	No UA	US actuator	US sensor

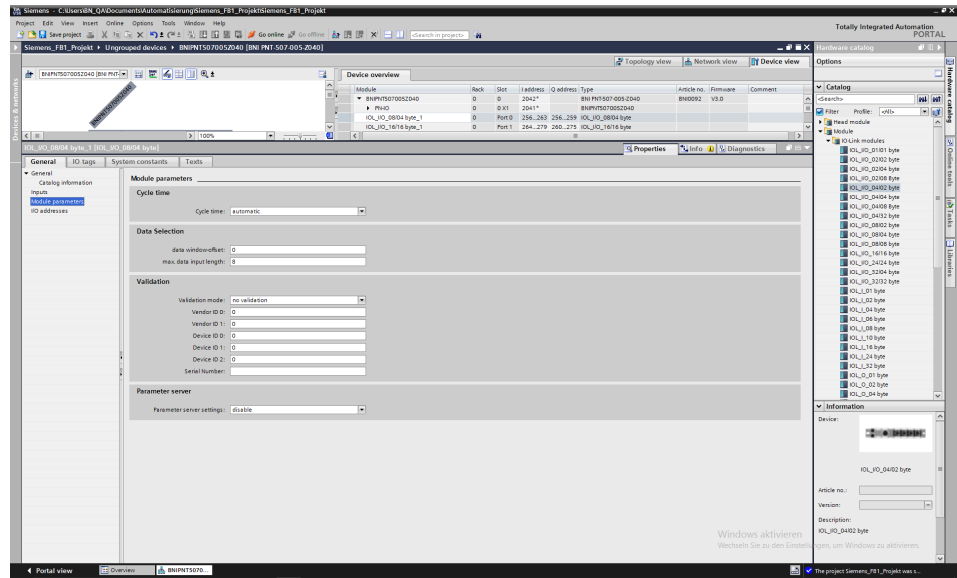
Display LED

Display functions

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

IO-Link configuration

In the IO-Link properties of the module you can change the IO-Link parameters of the respective port.



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 off:

Data management functions disabled, saved data are retained.

Delete:

Data management functions disabled, saved data is deleted.

Restore:

The parameter data are downloaded to the IO-Link device.

As soon as the saved parameter data in the parameter server of the port differ from the connected IO-Link device a download is performed.

Only exception: the parameter server is empty. Then an upload is performed once.

Save/Restore:

The parameter data are up- and downloaded to the IO-Link device.

As soon as the saved parameter data in the parameter server of the port differ from the connected IO-Link device and there are no upload requests from the IO-Link device, an upload is performed.

As soon as a device requests an upload (upload flag set) or when no data are stored in the master port (e.g. after deleting the data or before the first upload), the master starts an upload of the parameter data from the device.

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 Parameterize IO-Link Devices

Possibilities

IO-Link devices can be used via the web server, function blocks and parameterize the IO-Link Device Tool.

When using the device tool and the web server, the majority of the Parameters that are needed, taken from the software.

The sample project with the IO_Call function block from Siemens AG can be downloaded from the Balluff homepage.

Web server and IO-Link device tool access the module directly, with the function block a telegram is assembled which is transmitted to the master via DPV1 functions.

Function block

The function block "IOL_Call" constructs a telegram which is sent to the master using DPV1 functions. This requires the following settings:

Diagnostics address	The diagnostic address of the IO-Link header module is used
CAP acces	255

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

The telegram structure is described in the following table:

Area	Size in bytes	Value	Definition
Call header	1	08h	08h for „CALL“, fixed
	1	0 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

Read

To read out data, the master must be given a reading task for the corresponding slot/index/subindex.

For this, the telegram must be adapted accordingly (slot, index), as well as with "task" 0x03 for reading to be registered.

The telegram can then be sent by write instruction to the corresponding module.

The module reads the data from the IO-Link device.

The data can be retrieved by reading with the same telegram.

Write

To write data, the master must be given a writing task for the corresponding slot/index/subindex.

For this, the telegram must be adapted accordingly (slot, index), as well as with "task" 0x02 for reading to be registered.

The telegram can then be sent by write instruction to the corresponding module.

7 Display

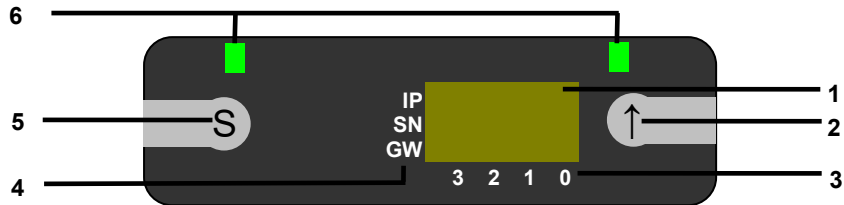
7.1. General

The display element of the BNI PNT-50x-105-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.

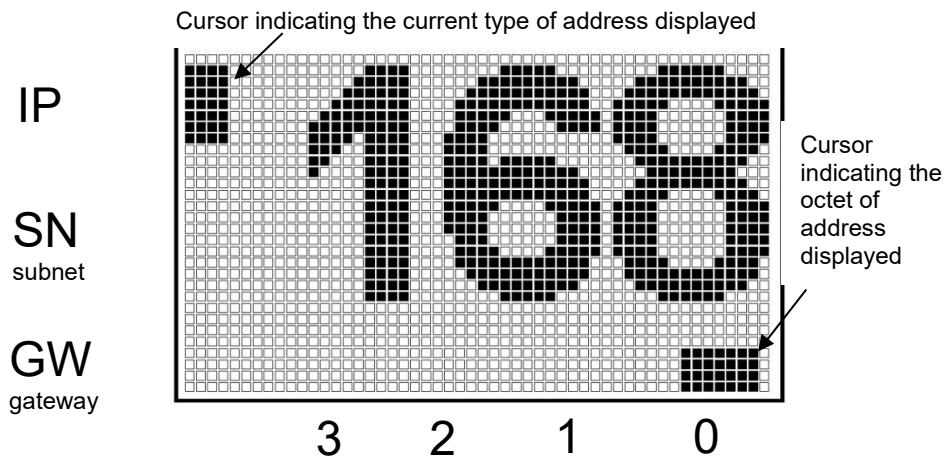
7.2. Controls and visualization



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

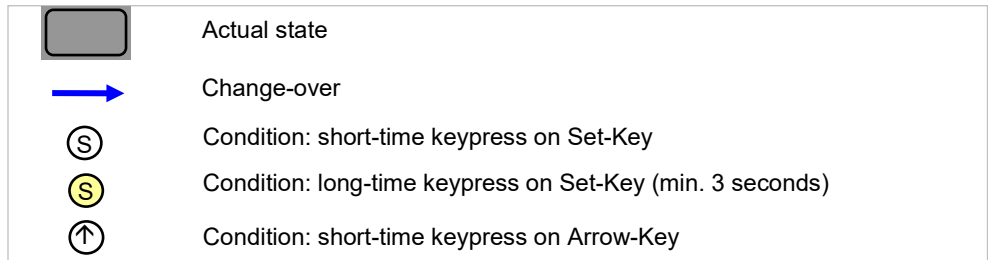
Arrow-Key: This button is used to go through the entries of a menu and is a short-time keypress. The display shows the default screen after 10 seconds of inactivity.
Octett-Cursor: The default location of the Octett-Cursor is position 0 indicating the lowest-order octet.
Address type cursor: The default 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. It is required to add the module “Display Leds” to the configuration of the control system in order to utilize this functionality.

7.3. Display information

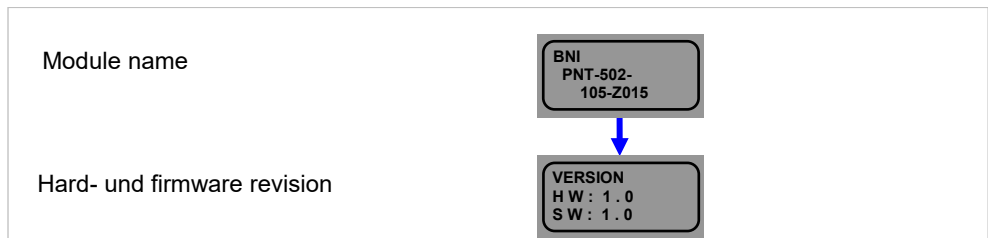


7.4. Design and symbols

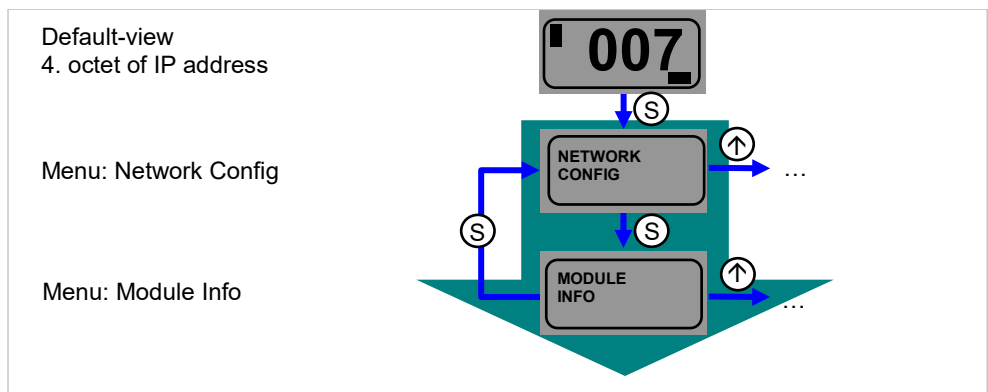
There are some symbols used in the following flow-charts to describe the display-functionality:



7.5. Startup



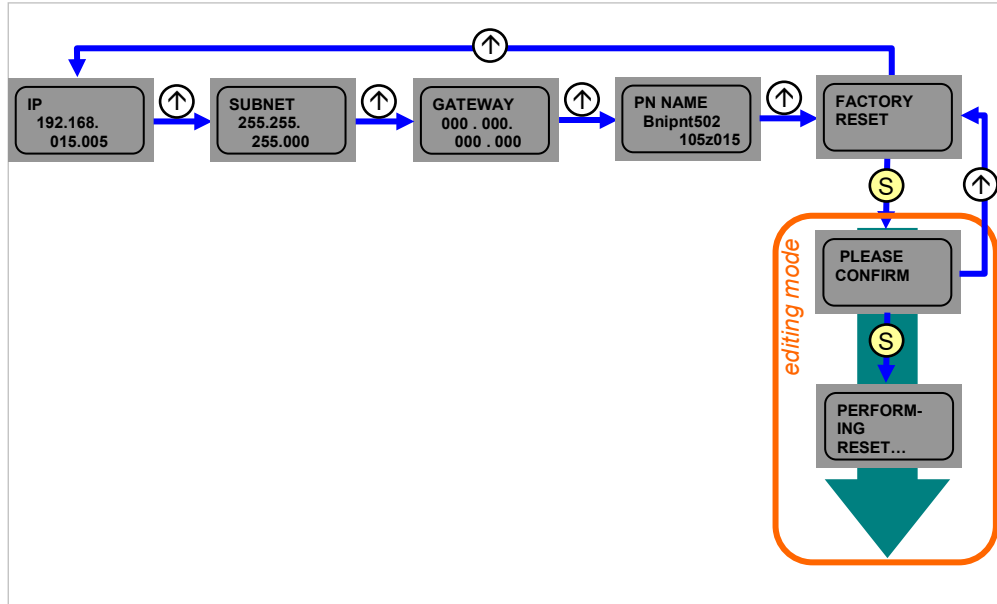
7.6. Main menu




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

7 Display

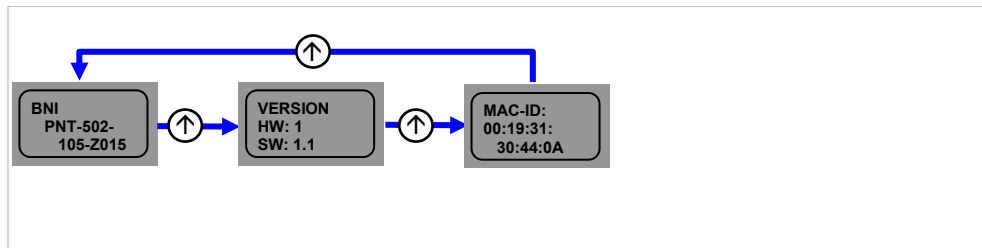
7.7. Factory Reset



- 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 performs a restart.

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

7.8. 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.

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	Subslot number	
14	00		
15	01	Module ID	
16	00		
17	00		
18	00		
19	XX		
20	00	Submodule ID	
21	00		
22	00		
23	01		
24	A8	AlarmSpecifier	AlarmSpecifier
25	XX		
26	80	User Structure ID	
27	00	Channel number	
28	00	ChannelProperties	ChannelProperties
29	08		
30	08	ChannelErrorType	
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 Low Byte preset to 0x01, High 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

BNI PNT-508-105-Z015

Possible values	Meaning
0x0001	Slot 1 (header module)
0x0002	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0003	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0004	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0005	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0006	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0007	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0008	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0009	Slot 2 - 9 (IO-Link ports 0 - 7)
0x0010	Slot 10 - 25 (Standard IO-module)
0x0011	Slot 10 - 25 (Standard IO-module)
0x0012	Slot 10 - 25 (Standard IO-module)
0x0013	Slot 10 - 25 (Standard IO-module)
0x0014	Slot 10 - 25 (Standard IO-module)
0x0015	Slot 10 - 25 (Standard IO-module)
0x0016	Slot 10 - 25 (Standard IO-module)
0x0017	Slot 10 - 25 (Standard IO-module)
0x0018	Slot 10 - 25 (Standard IO-module)
0x0019	Slot 10 - 25 (Standard IO-module)

BNI PNT-502-105-Z015

Possible values	Meaning
0x0001	Slot 1 (header module)
0x0002	Slot 2 - 5 (IO-Link ports 4 - 7)
0x0003	Slot 2 - 5 (IO-Link ports 4 - 7)
0x0004	Slot 2 - 5 (IO-Link ports 4 - 7)
0x0005	Slot 2 - 5 (IO-Link ports 4 - 7)
0x0006	Slot 6 - 21 (Standard IO-module)
0x0007	Slot 6 - 21 (Standard IO-module)
0x0008	Slot 6 - 21 (Standard IO-module)
0x0009	Slot 6 - 21 (Standard IO-module)
0x0010	Slot 6 - 21 (Standard IO-module)
0x0011	Slot 6 - 21 (Standard IO-module)
0x0012	Slot 6 - 21 (Standard IO-module)
0x0013	Slot 6 - 21 (Standard IO-module)
0x0014	Slot 6 - 21 (Standard IO-module)
0x0015	Slot 6 - 21 (Standard IO-module)

Subslot

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

Possible values	Meaning
0x0001	Subslot 1

8 Diagnostics

Module Ident

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
0x00000025	IOL IN 1 OUT 0
0x00000026	IOL IN 2 OUT 0
0x0000003A	IOL IN 4 OUT 0
0x0000003B	IOL IN 6 OUT 0
0x00000027	IOL IN 8 OUT 0
0x00000035	IOL IN 10 OUT 0
0x00000037	IOL IN 16 OUT 0
0x0000003C	IOL IN 24 OUT 0
0x00000028	IOL IN 32 OUT 0
0x00000029	IOL IN 0 OUT 1
0x0000002A	IOL IN 0 OUT 2
0x0000003D	IOL IN 0 OUT 4
0x0000003E	IOL IN 0 OUT 6
0x0000002B	IOL IN 0 OUT 8
0x00000036	IOL IN 0 OUT 10
0x00000038	IOL IN 0 OUT 16
0x0000003F	IOL IN 0 OUT 24
0x0000002C	IOL IN 0 OUT 32
0x0000002D	IOL IN 1 OUT 1
0x0000002E	IOL IN 2 OUT 2
0x00000040	IOL IN 2 OUT 4
0x00000041	IOL IN 4 OUT 2
0x00000042	IOL IN 4 OUT 4
0x0000002F	IOL IN 2 OUT 8
0x00000043	IOL IN 4 OUT 8
0x00000030	IOL IN 8 OUT 2
0x00000044	IOL IN 8 OUT 4
0x00000045	IOL IN 8 OUT 8
0x00000031	IOL IN 4 OUT 32
0x00000032	IOL IN 32 OUT 4
0x00000039	IOL IN 16 OUT 16
0x00000046	IOL IN 24 OUT 24
0x00000033	IOL IN 32 OUT 32
0x00000059	Output Pin 4
0x0000005A	Output Pin 2
0x0000005B	Input Pin 4
0x0000005C	Input Pin 2

Submodule ID

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

Possible values	Meaning
0x00000001	BNI PNT-xxx-xxx-xxxx

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 Configuration as standard I/O

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

n= number of IOL ports

Configuration as IO-Link

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

Diagnosis from IO-Link device

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

8.5. Channel Properties

2 bytes, subdivided as follows:

Type

Bit 0-7

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

Accumulative

Bit 8 not used, always 0.

Maintenance

Bit 9-10

Possible values		Meaning
Bit 9	Bit 10	
0x00	0x00	Diagnostics

Specifier

Bit 11-12

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

Direction

Bit 13-15

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

8 Diagnostics

8.6. Channel Error Type

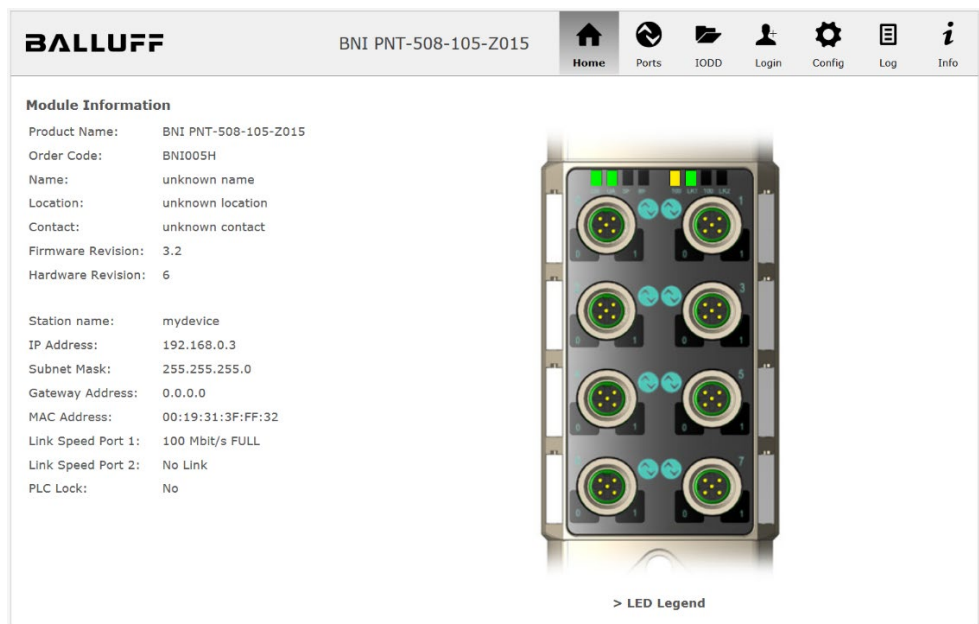
Error code in hex	Description
0x0000	Unknown error
0x0001	Short circuit
0x0002	Undervoltage
0x0003	Overvoltage
0x0004	Overload
0x0005	Temperature limit exceeded
0x0006	Cable break
0x0007	Upper threshold exceeded
0x0008	Lower threshold undershot
0x0009	Error
0x001A	External error
0x001B	Sensor has incorrect configuration (IO-Link device)
0x0101	Actuator warning
0x0105	Actuator supply undervoltage
0x0104	No actuator supply

9.1. General Information

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

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

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

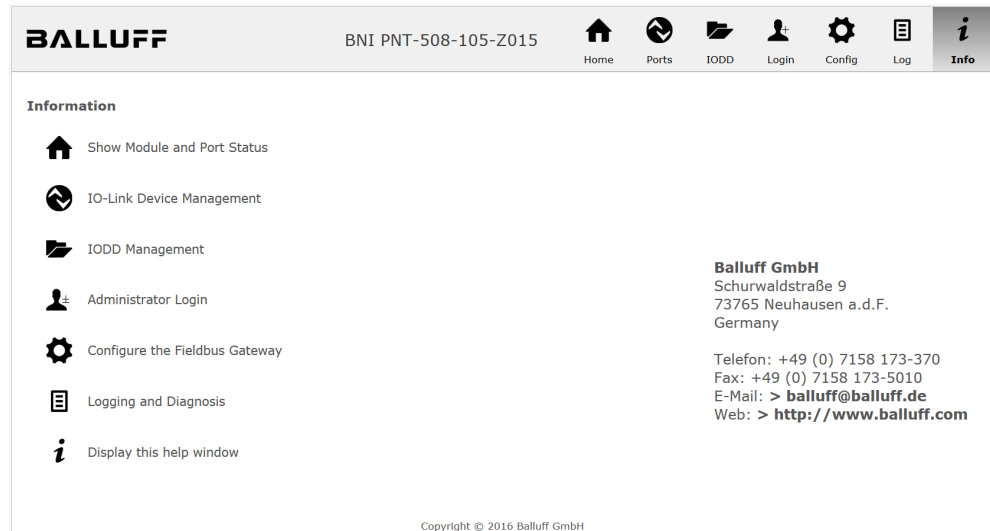


10 Webservice

9.2. Navigation / Info

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

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



BALLUFF BNI PNT-508-105-Z015

Home Ports IODD Login Config Log **Info**

Information

- Show Module and Port Status
- IO-Link Device Management
- IODD Management
- Administrator Login
- Configure the Fieldbus Gateway
- Logging and Diagnosis
- Display this help window

Balluff GmbH
Schurwaldstraße 9
73765 Neuhausen a.d.F.
Germany

Telefon: +49 (0) 7158 173-370
Fax: +49 (0) 7158 173-5010
E-Mail: > balluff@balluff.de
Web: > <http://www.balluff.com>

Copyright © 2016 Balluff GmbH

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

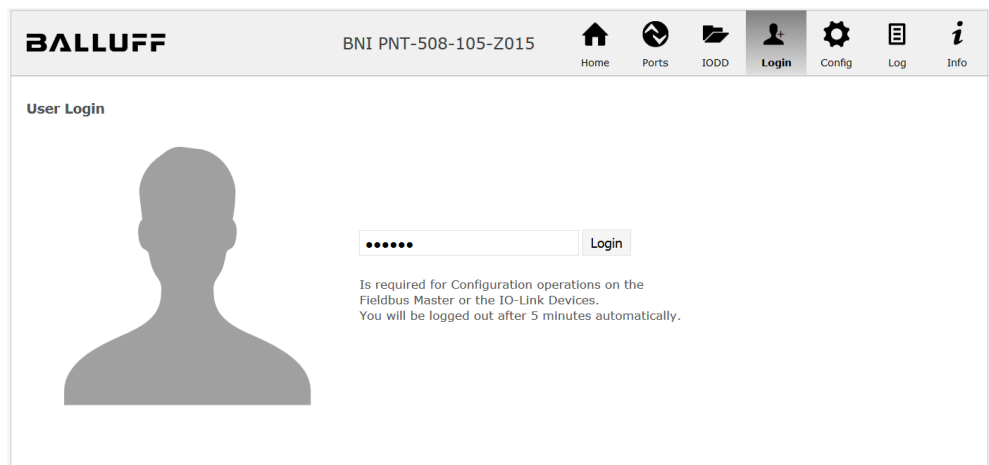
9.3. Login/Logout

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

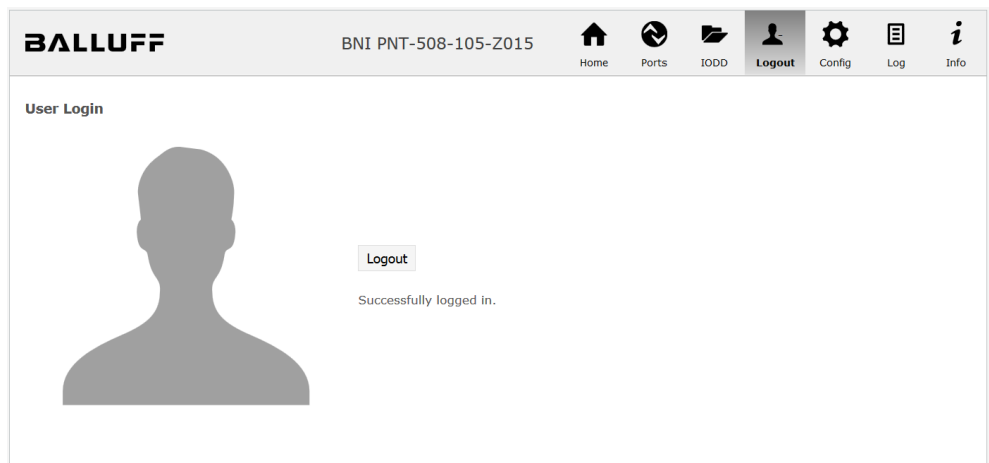
The default password is:

BNI PNT-XXX-XXX-XXXX	"BNIPNT"
BNI EIP-XXX-XXX-XXXX	"BNIEIP"
BNI ECT-XXX-XXX-XXXX	"BNIECT"

The password cannot be changed!



After successfully logging in the dialogs are shown as follows:



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.

10 Webservice

9.4. "Home" dialog

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

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

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

The screenshot displays the Balluff web interface for a BNI PNT-508-105-2015 module. The interface includes a navigation bar with icons for Home, Ports, IODD, Logout, Config, Log, and Info. The main content area is divided into two sections: "Module Information" and a terminal status diagram.

Module Information

Product Name:	BNI PNT-508-105-2015
Order Code:	BNI005H
Name:	Balluff GmbH
Location:	Schurwaldstraße 9
Contact:	+49 (0) 7158 173
Firmware Revision:	3.2
Hardware Revision:	6
Station name:	mydevice
IP Address:	192.168.0.3
Subnet Mask:	255.255.255.0
Gateway Address:	0.0.0.0
MAC Address:	00:19:31:3F:FF:32
Link Speed Port 1:	100 Mbit/s FULL
Link Speed Port 2:	No Link
PLC Lock:	No

The terminal status diagram shows a vertical array of eight ports. The top two ports are labeled "BALLUFF BNI IOL-302-002-Z046" and "BALLUFF BNI IOL-802-000-Z036". The diagram includes a legend for the LEDs, with a link labeled "> LED Legend".

PNT:

Module LED Functions

LED	0	1
US	OK	Low
UA	OK	Low Error
SF	System error	Integral Service
BF	No fault	No data exchange
100	100 Mbit/s	10 Mbit/s
LK	Link activity	No link activity

Port LED Functions

IO	0	1
IO-Link	Open circuit	IO-Link
IO-Link	IO-Link	IO-Link
IO-Link	Missing device	IO-Link

EIP:

Module LED Functions

LED	0	1
US	OK	Low
UA	OK	Low Error
Mod	No error	Config Error
Net	No config	No data exchange
100	100 Mbit/s	10 Mbit/s
LK	Link activity	No link activity

Port LED Functions

IO	0	1
IO-Link	Open circuit	IO-Link
IO-Link	IO-Link	IO-Link
IO-Link	Missing device	IO-Link

10 Webservice

9.5. "Ports" dialog

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



Note

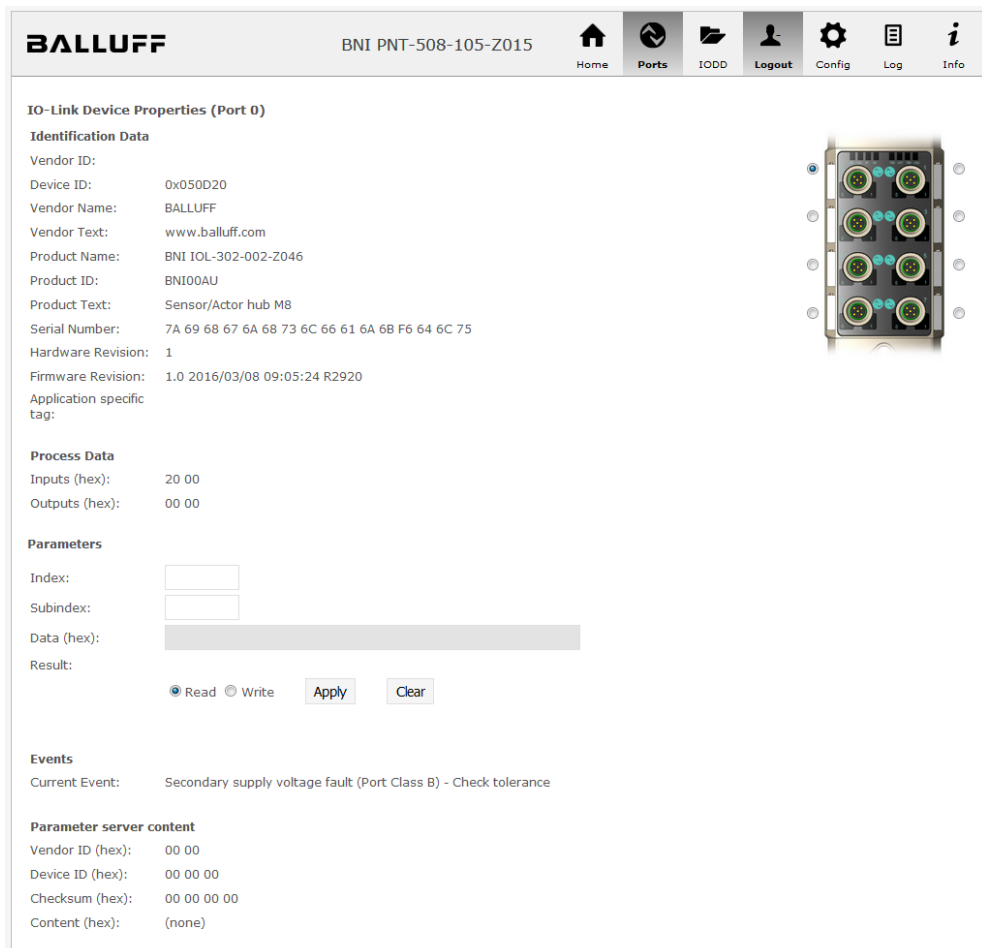
The IO-Link device data are only displayed if the port is also configured as an IO-Link port!

No appropriate IODD uploaded

It is possible to read and write the configuration parameters of the IO-Link device via the "Parameters" option. The parameter indexes and subindexes of the IO-Link device are described in the corresponding separate user's guide (and follow the IO-Link conventions).

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

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



"Ports" dialog with direct parameter access

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.

BALLUFF BNI PNT-508-105-Z015

Home Ports IODD Logout Config Log Info

IO-Link Device Properties (Port 2)

Identification Data

Vendor ID: 0x0378
 Device ID: 0x020101
 Vendor Name: BALLUFF
 Vendor Text: www.balluff.com
 Product Name: BAW M18MI-BLC50B-S04G
 Product ID: 153938
 Product Text: Inductive distance sensor, 1...5mm
 Serial Number:
 Hardware Revision: 1.00
 Firmware Revision: 1.01
 Application specific tag:

Process Data

Inputs (hex): 00 03 FF
 Outputs (hex): no outputs

Input

Distance absolute	1023
Reserved bits	0

Events

Current Event: no Event

Parameter server content

Vendor ID (hex): 00 00
 Device ID (hex): 00 00 00
 Checksum (hex): 00 00 00 00
 Content (hex): (none)

Dialog "Ports": IODD interpretation and device image

10 Webservice

If 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 IO-Link.

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!

Parameters				Read All
64 (0)	Operating mode (rw)	Segment mode ▾	Write	Read
65 (0)	Number of segments (rw)	One segment ▾	Write	Read
66 (0)	Type of level indicator (rw)	Bottom-up ▾	Write	Read
67 (0)	Resolution of level indicator (rw)	8 bit ▾	Write	Read
68 (0)	Level mode, segment 1 (rw)	See child elements		
68 (1)	Level mode, segment 1 color	Off ▾	Write	Read
68 (2)	Level mode, segment 1 dominance	<input type="radio"/> Color is not dominant <input type="radio"/> Color is dominant	Write	Read
69 (0)	Level mode, segment 2 (rw)	See child elements		
69 (1)	Level mode, segment 2 color	Off ▾	Write	Read
69 (2)	Level mode, segment 2 dominance	<input type="radio"/> Color is not dominant <input type="radio"/> Color is dominant	Write	Read
70 (0)	Level mode, segment 3 (rw)	See child elements		
70 (1)	Level mode, segment 3 color	Off ▾	Write	Read
70 (2)	Level mode, segment 3 dominance	<input type="radio"/> Color is not dominant <input type="radio"/> Color is dominant	Write	Read
71 (0)	Level mode, segment 4 (rw)	See child elements		
71 (1)	Level mode, segment 4 color	Off ▾	Write	Read
71 (2)	Level mode, segment 4 dominance	<input type="radio"/> Color is not dominant <input type="radio"/> Color is dominant	Write	Read

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

9.6. "IODD" dialog

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

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

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

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

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

IODD Management

Device	Picture
BA050A01.xml X	Delete
BA020101.xml X	Delete
BA050D20.xml X	Delete

Choose the IODD to upload:

Durchsuchen... BA020101.png

Upload

Information

This module has a FAT12 file system, which means it supports only file names in 8.3 convention. **Please rename your IODDs according to the suggested filename in the table below.**

The suggested filename is generated according to following rule:

- The first two characters of the file name are the first two letters of the IODD Vendor Name. If the device has no vendor name, those characters are substituted by underscores.
- The remaining 6 characters must encode the DeviceID in hexadecimal representation (padded with zeros if necessary).

Note that the filename must contain the DeviceID that is in the IODD file!

Currently connected IO - Link Devices:

Vendor Name	Product Name	Product ID	Vendor ID	Device ID	IODD Filename
BALLUFF	BNI IOL-302-002-Z046	BNI00AU	0000	050D20	BA050D20.xml
BALLUFF	BNI IOL-802-000-Z036	BNI0072	0378	050A01	BA050A01.xml
BALLUFF	BAW M18MI-BLC50B-S04G	153938	0378	020101	BA020101.xml

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!

10 Websserver

9.7. "Config" dialog

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

PNT / ECT:

BALLUFF BNI PNT-508-105-Z015

Home Ports IOOD Logout Config Log Info

Module Configuration

Name:
Balluff GmbH

Location:
Schurwaldstraße 9

Contact:
+49 (0) 7158 173

Save Configuration

Reboot Factory Reset

Port Configuration

Mode	Pin	Pin	Mode
IO Link	4	4	IO Link
Digital Input	2	2	Digital Input
IO Link	4	4	IO Link
Digital Input	2	2	Digital Input
IO Link	4	4	IO Link
Digital Input	2	2	Digital Input
IO Link	4	4	IO Link
Digital Input	2	2	Digital Input

Set Ports

EIP:

The screenshot displays the web interface for the BALLUFF BNI EIP-508-105-Z015 module. The interface is divided into two main sections: "Module Configuration" on the left and "Port Configuration" on the right. The top navigation bar includes icons for Home, Ports, IODD, Logout, Config, Log, and Info.

Module Configuration:

- Name:** Balluff GmbH
- Location:** Schurwaldstraße 9
- Contact:** +49 (0) 7158 173
- IP Settings:**
 - DHCP Client
 - Static IP
 - IP Address: 192.168.0.159
 - Subnet Mask: 255.255.255.0
 - Gateway Address: 192.168.0.1
 - Factory IP
 - IP Address: 192.168.1.1
 - Subnet Mask: 255.255.255.0
 - Gateway Address: 192.168.1.1

Port Configuration:

This section shows a central image of the module with four ports. Each port has a "Pin" column (4 and 2) and a "Mode" dropdown menu. The modes are set to "IO Link" for the top two ports and "Digital Input/Output" for the bottom two ports. A "Set Ports" button is located at the bottom of this section.

At the bottom of the Module Configuration section, there are buttons for "Save Configuration", "Reboot", and "Factory Reset". A note states: "In order to change the IP address, it's necessary to reboot the module after saving the configuration."

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.

10 Webservice

9.8. "Log" dialog

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

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



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.

The screenshot shows the Balluff web interface for device BNI PNT-508-105-Z015. The top navigation bar includes Home, Ports, IODD, Logout, Config, Log, and Info. The 'Information' section displays the following data:

Product name:	BNI PNT-508-105-Z015	Browser time:	2016-12-16 10:26:29.495
Firmware revision:	3.2	System uptime:	50 secs 291 msec
MAC address:	00:19:31:3F:FF:02	Free flash space:	1720 KB
IP address:	192.168.0.10	Web version:	2.0.113
Browser version:	Firefox 50.0		

The 'Log' section contains a table with the following columns: No., Severity, Date, Origin, and Message. The log entries are as follows:

No.	Severity	Date	Origin	Message
0	Notice	2000-01-01 00:00:00.404	SYS	System startup (Oct 6 2016, 11:54:01)
1	Notice	2000-01-01 00:00:00.437	SYS	Set MAC address: 00:19:31:3F:FF:02
2	Notice	2000-01-01 00:00:00.493	IOL_MASTER	IO-Link Master started
3	Informational	2000-01-01 00:00:00.501	IOL_MASTER	FW version 1.2.8
4	Notice	2000-01-01 00:00:01.999	ETH	Port 1: Link Up (100 MBit/s, full duplex)
5	Notice	2000-01-01 00:00:37.926	WEB_IF	Login successful, IP address: 192.168.0.50
6	Error	2000-01-01 00:00:41.902	IOL_MASTER	Port 0: Device disconnected
7	Error	2000-01-01 00:00:42.272	IOL_MASTER	Port 1: Device disconnected
8	Error	2000-01-01 00:00:42.981	IOL_MASTER	Port 3: Device disconnected
9	Notice	2000-01-01 00:00:43.169	IOL_MASTER	Port 2: ISDU read error: Error code 80 Additional Code 11
10	Notice	2000-01-01 00:00:43.347	IOL_MASTER	Port 2: ISDU read error: Error code 80 Additional Code 11
11	Warning	2000-01-01 00:00:43.347	IOL_MASTER	Port 2: BNI IOL-101-S01-K018 connected
12	Notice	2000-01-01 00:00:44.145	IOL_MASTER	Port 4: ISDU read error: Error code 80 Additional Code 11
13	Error	2000-01-01 00:00:44.183	IOL_MASTER	Port 5: Device disconnected
14	Warning	2000-01-01 00:00:44.499	IOL_MASTER	Port 4: BNI IOL-801-000-Z036 connected
15	Error	2000-01-01 00:00:44.830	IOL_MASTER	Port 6: Device disconnected
16	Error	2000-01-01 00:00:45.200	IOL_MASTER	Port 7: Device disconnected

Events are classified using the "**Severity**" column:

Internal Error (Emergency, Alert, Critical)

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

External Error (Error, Warning)

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

Event (Informational, Notice)

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

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

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

10 Monitoring & Diagnosis

10.1. General

The field bus module offers several diagnosis interfaces, which are described below:

- Device diagnosis via the web interface
- Network diagnosis via SNMP
- Field bus-specific diagnosis via the PLC

The web interface and field bus-specific diagnosis interfaces are respectively described in a separate chapter.

Access to the device monitoring and diagnosis interfaces is performed via the IP-based management interface over the Ethernet network. As an alternative to the procedure described in the "Integration" chapter, the necessary setting of the IP access can be performed by means of other dedicated configuration tools using the PROFINET DCP protocol. The following parameters must be set for this purpose:

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

The configuration settings can be reset to the default settings (delivery condition) via the web interface.

Configuration settings are only possible when the module has no active connection to a control unit.

10.2. SNMP MIBs

Device network interface monitoring and diagnosis can be performed over the network with the help of the SNMPv1 protocol. Access to the latter is easy via a so-called SNMP browser or common network management applications.

The following MIBs are supported:

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

Field bus module information is supplied in the MIB-2 module-related information:

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")

11 Monitoring & Diagnosis

The MIB-2 port-related information diagnosis data on the network connections, including the IO-Link ports, is displayed:

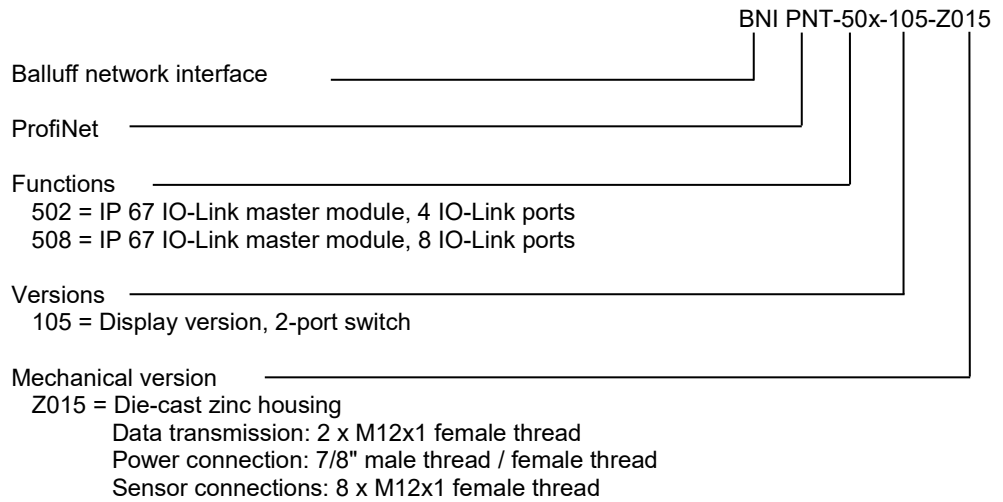
MIB Variable	Ethernet port	IO-Link Port
ifIndex	A unique value, contiguously starting from 1.	
ifDescr	A textual string containing information about the interface, i.e. "Ethernet X"	"IO-Link X" / "IO-IN X" / "IO-OUT X"
ifType	IANAifType = 6 (ethernetCsmacd) when Ethernet	IANAifType = 280 (sdci) when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

11 Appendix

11.1. Scope of delivery

- The BNI PNT comprises the following elements:
- IO-Link block
 - 4x M12 dummy plugs
 - Ground strap
 - M4x6 screw
 - 20 information signs

11.2. Order number



11.3. Order information

Product ordering code	Ordering code
BNI PNT-502-105-Z015	BNI004U
BNI PNT-508-105-Z015	BNI005H

Notes

www.balluff.com

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