

BNI EIP 508- _05- _015- _ _ _

Configuration guide



EtherNet/IP™

IO-Link

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1

About this guide

1.1 Validity

This guide describes the integration and configuration of the following products:

- **BNI EIP 508-105-R015**
Order code: BNI008M
With display and plastic housing
- **BNI EIP 508-005-R015-013**
Order code: BNI00HW
Without display and with plastic housing
- **BNI EIP 508-105-Z015**
Order code: BNI006A
With display and metal housing
- **BNI EIP 508-005-Z015-013**
Order code: BNI00HM
Without display and with metal housing

The configuration guide does not replace the user's guide. Read the corresponding user's guide and supporting documents in full before installing and operating the product.

This guide was created in German. Other language versions are translations of this guide.

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Disclaimer

The following description is provided free of charge and is a general application example. The description should support the programming and planning of PLC applications and illustrate possible solutions. The user has no claim to warranty, error correction or updates. In particular, any claims for compensation that could result from the use of this description are excluded. This liability limitation excludes (a) damages due to loss of life, personal injury or harm to health, (b) liability in accordance with the Product Liability Act and (c) cases of intent. Prior to implementation in systems and machines, please check whether the description provided here is intended for your application. The use of this free description shall be deemed to imply acceptance of the warranty and liability limitation!

1.2 Symbols and conventions

Individual **instructions** are indicated by a preceding triangle.

► Instruction

Action sequences are numbered consecutively:

1. Instruction 1
2. Instruction 2

Numbers unless otherwise indicated are decimals (e.g. 23). Hexadecimal numbers are represented with a preceding 0x (e.g. 0x12AB).

Buttons or selectable menu entries are described in italic and small caps, e.g. *SAVE*.

Menu commands are joined with a greater-than sign, e.g. "*SETTINGS > OPTIONS*" stands for the menu command *Options* from the *Settings* menu.



Note, tip

This symbol indicates general notes.

1.3 Technical terms and abbreviations used

I/O	Input/Output
EMC	Electromagnetic compatibility
EIP	EtherNet/IP
FE	Functional earth
HW	Hardware
IODD	IO-Link Device Description
IOL	IO-Link
IoT	Internet of Things
ISDU	IO-Link-Parameter (Index Service Data Unit)
MQTT	Message Queuing Telemetry Transport
n.a.	Not available
SIO	Standard inputs/outputs
PLC	Programmable logic controller
UA	Actuator supply
US	Sensor supply

1.4 Pictures

The screenshots shown for the configuration are taken from the Rockwell RSLogix-5000 configuration project planning software.

2

System integration

2.1 Integration in Rockwell RSLogix 5000

Example of how the module can be integrated in the programming environment of Rockwell RSLogix 5000:

1. Go offline.

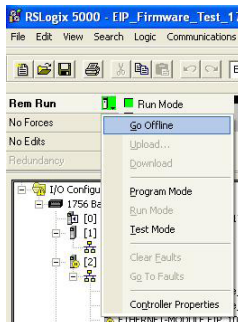


Fig. 2-1: Go offline

2. Right click on *ETHERNET* (the correct scanner card) and select *NEW MODULE...*

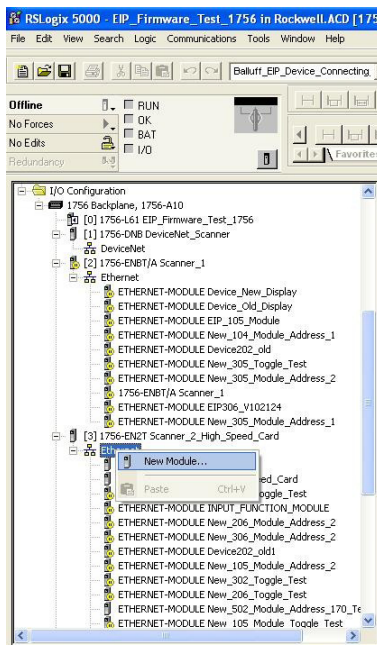


Fig. 2-2: Select New Module

3. Select the *GENERIC ETHERNET MODULE* as Ethernet module in the communication path.

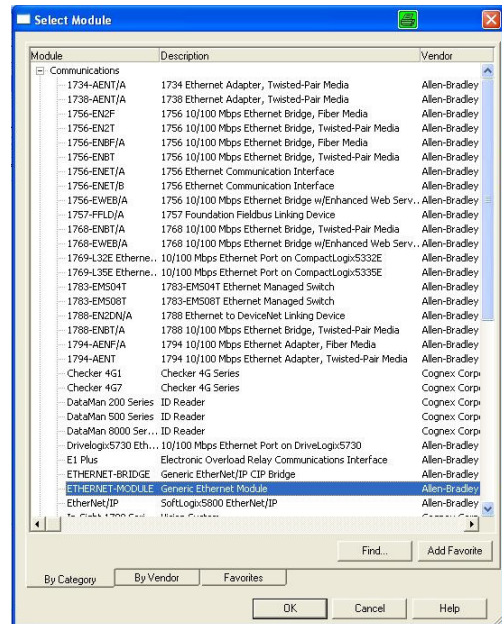


Fig. 2-3: Select Generic Ethernet Module

4. Enter tag name (user-defined), select the general format *Data SINT*, enter the IP address of the module and the correct connection parameters and confirm with *OK*.

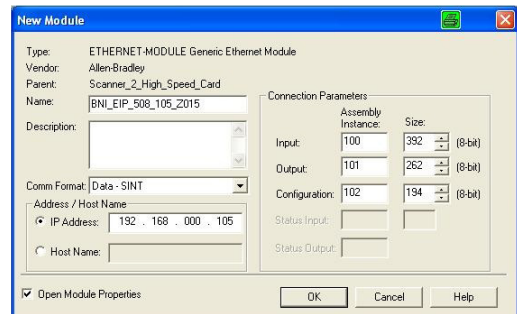


Fig. 2-4: New Module dialog

⇒ The new module and the corresponding controller tags are automatically generated.

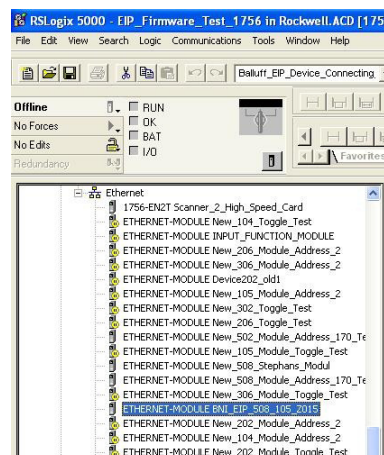


Fig. 2-5: Controller tags

5. Download the configuration with *DOWNLOAD*.

2

System integration (continued)

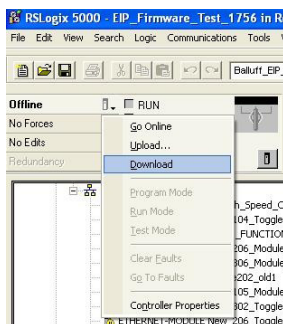


Fig. 2-6: Download configuration

After the download is completed the tags can be monitored and activated using the Controller tags option.

i Make sure to select the previously configured correct tag name.

The entry, output and configuration data are described on the following pages.

i These tags can also be used for programming.

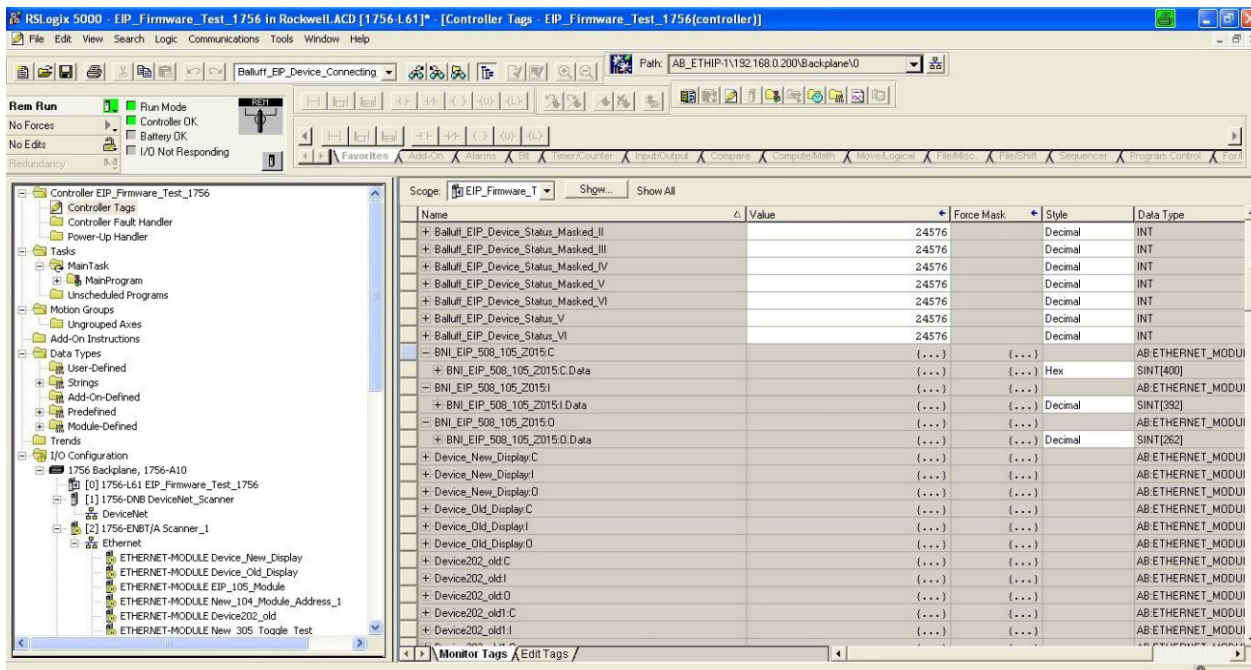


Fig. 2-7: Tag creation completed

2

System integration (continued)

2.2 Integration

2.2.1 Address details

The following settings are assigned at the factory:

- IP address: 192.168.1.1
- Subnet mask: 255.255.255.0
- Gateway address: 192.168.1.1

2.2.2 Data configuration

Enter the values from Tab. 2-1 in the control system. They describe the data sizes of the entry, output and configuration data.

Data size	Instance ID	Length of data
INPUT	100	392
OUTPUT	101	262
CONFIG	102	194

Tab. 2-1: Data configuration

2.2.3 Configuration data

Tab. 2-2 shows an assignment of the configuration data sequence. The stated standard values describe a configuration with the IO-Link function on Pin 4 and standard I/O functions on Pin 2 and 4 of every port. The input and output functions of the configured standard I/O ports are set using the process data.

Byte	Slot	Module part	Description
0...1	1	Module	General configuration for the overall module
2...25	2	IO-Link Port 0	Configuration of the IO-Link Port 0
26...49	3	IO-Link Port 1	Configuration of the IO-Link Port 1
50...73	4	IO-Link Port 2	Configuration of the IO-Link Port 2
74...97	5	IO-Link Port 3	Configuration of the IO-Link Port 3
98...121	6	IO-Link Port 4	Configuration of the IO-Link Port 4
122...145	7	IO-Link Port 5	Configuration of the IO-Link Port 5
146...169	8	IO-Link Port 6	Configuration of the IO-Link Port 6
170...193	9	IO-Link Port 7	Configuration of the IO-Link Port 7

Tab. 2-2: Configuration data

Module configuration BNI EIP-508-105-Z067

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
0	P3		P2		P1		P0		Port function 0x00: Standard-I/O 0x01: IO-Link
1	P7		P6		P5		P4		

Tab. 2-3: Module configuration

IO-Link Port configuration

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
2	Basis		Time						Cycle Time
3	Validation type						– 0: No validation – 1: Compatible (VID + DID)		
4	Manufacturer code 1						Manufacturer code		
5	Manufacturer code 2								
6	Device code 1						Device code		
7	Device code 2								
8	Device code 3								
25	Parameter server						– 0x8X Switch on – 0x0X Switch off – 0x40 Delete – 0xX1 Switch on upload – 0xX2 Switch on download		
...	The data of the other IO-Link Ports are structured identically and described below.								

Tab. 2-4: IO-Link Port configuration

2

System integration (continued)

Cycle settings

With this parameter, the IO-Link communication speed can be set. The IO-Link cycle time can be increased calculated by the multiplier and the time base.
The time base is described in Tab. 2-5, the multiplier is entered as a decimal number from 0...63.

Bit							Description
7	6	5	4	3	2	1	
Time base		Multiplier					Bit 0...5: Multiplier These bits contain a 6-bit multiplier for calculating the MasterCycleTime or MinCycle Time. Value range: 0...63.
							Bit 6...7: Time Base These bits specify the time base for calculating the MasterCycleTime or MinCycleTime.

Tab. 2-5: Time base

Possible values for *MasterCycleTime* and *MinCycleTime*:

Time base coding	Time base value	Calculation	Cycle Time
00	0.1 ms	Multiplier × time base	0.4 ¹⁾ ...6.3 ms
01	0.4 ms ¹⁾	6.4 ms + multiplier × time base	6.4...31.6 ms
10	1.6 ms	32 ms + multiplier × time base	32...132.8 ms
11	reserved	reserved	reserved

¹⁾ The value 0.4 is the result of the minimum possible transmission time according to the IO-Link Interface and System Specification

Tab. 2-6: Possible values for *MasterCycleTime* and *MiniCycleTime*

Validation settings

No validation: Validation deactivated, every device is accepted.

Compatibility: Manufacturer ID and Device ID are compared with the data of the IO-Link device.

Parameter server

Switched on: Data retention functions active, parameter data and identification data of the IO-Link device are saved in a remanent memory.

Switched off: Data retention functions deactivated, saved parameter data and identification data of the IO-Link devices remain in the memory.

Deleted: Data retention functions deactivated, saved parameter data and identification data of the IO-Link devices are deleted.

Enable upload: If only the upload is enabled, in each case the master starts an upload of the parameter data. In this case the upload is performed irrespective of the upload flag of the IO-Link device. If there are no data in the master port, an upload also takes place (e.g. after deletion of the data or before the first data upload).

Enable download: If only the download is enabled, in each case the master starts a download of the parameter data. In this case the download is also performed irrespective of the upload flag of the IO-Link device. If there are no data in the master port, an upload takes place first (e.g. after deletion of the data or before the first data upload).

Upload and download enabled: If the upload and download are enabled, a distinction is made for different parameter records depending on the upload flag of the IO-Link device.

If there are no data in the IO-Link master port, an initial upload takes place (e.g. after deletion of the data or before the first data upload).

If the upload flag is set at the IO-Link device, the parameter data are uploaded in each case.

If no upload flag is set and parameter data have already been stored, a download of the parameter data takes place in each case.



After uploading the parameter data, the Vendor ID and Device ID of the connected IO-Link device remain stored until the data records are deleted. When the connected IO-Link device is started a validation takes place and then only an IO-Link device of the same type can be used for the data retention.

If a different type of IO-Link device should be used, the content of the parameter server must be deleted.

The data storage is only supported by IO-Link devices with IO-Link Revision 1.1.

2

System integration (continued)

Upload flag at IO-Link device

The upload flag is required in order to overwrite data already saved in the parameter server with new parameter data of the same IO-Link device.

In order to activate the upload flag of an IO-Link device, the data value 0x05 must be entered in the index 0x02, subindex 0.

(For information on setting parameters via IO-Link, see *I/O ports* on page 36 or *IO-Link device parameterization* on page 13).

3

Configuration via Explicit Messages

3.1 Example with Rockwell components

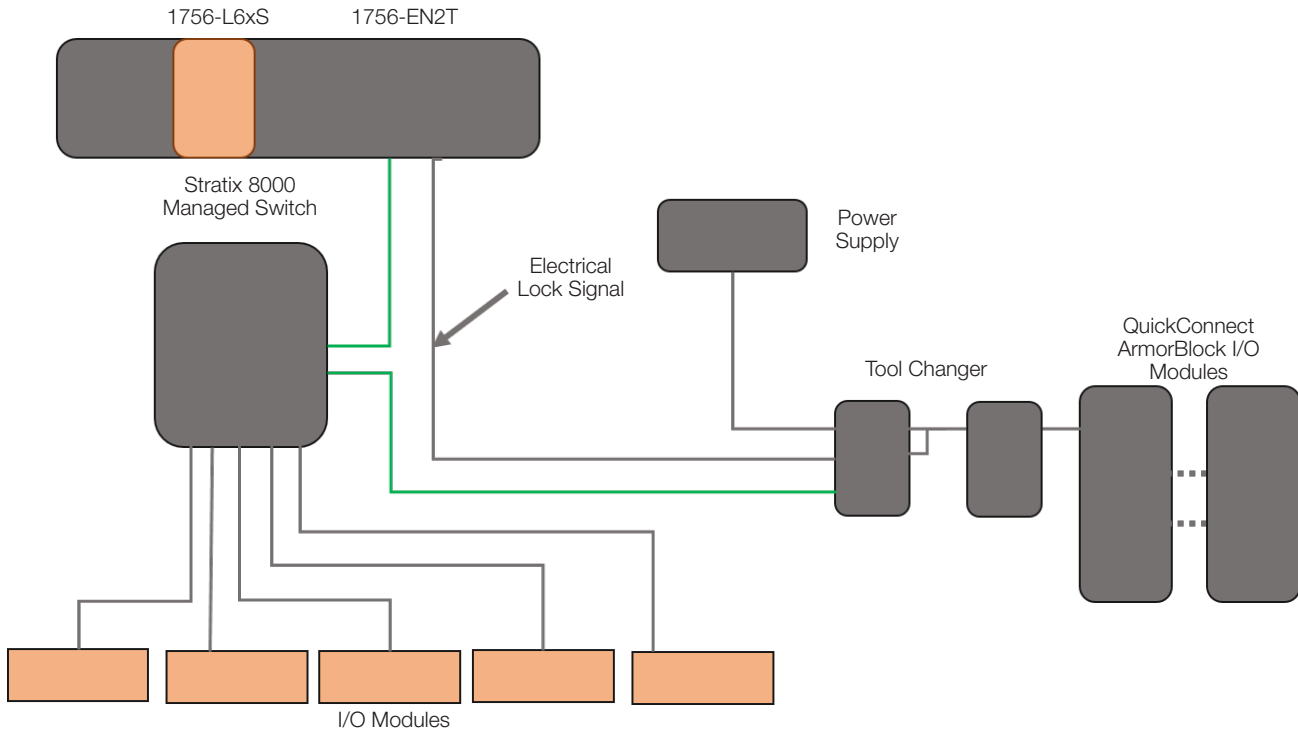


Fig. 3-1: System components (example)

Please note the following:

- Direct connection between PLC and QuickConnect slave with crossover cable
- Connection from slave to slave with patch cable
- For the topology structure only the linear topology with maximum 20 modules is permitted on the tool side.
- If required, only one Managed Switch may be used between PLC and Ethernet/IP slave.
- An Electrical Lock Signal is required for triggering the QuickConnect sequence, which reads the supply voltage of the QuickConnect slaves via the control.

3.2 PLC program



Information about the PLC program and *Add Application Logic*, see Allen Bradley Ethernet/IP QuickConnect Application Technique.

3

Configuration via Explicit Messages (continued)

3.3 Fault State

For each output at the port pins, a safe state can be pre-defined, which should be adopted in the case of a loss of bus communication.

The *Fault State* settings can be implemented via the following Class Instance Attribute of the *Explicit Messages*.

Activate / deactivate Fault State

Class	Instance	Attribute	Value
9 (0x09)	1 – m ¹⁾	6	0: Fault State disabled 1: Fault State enabled

¹⁾ m: Number of outputs

Tab. 3-1: Values for *Fault State* – Activation/Deactivation

Fault State Action

Class	Instance	Attribute	Value
9 (0x09)	1 – m ¹⁾	5	0: Output on 1: Hold last state

¹⁾ m: Number of outputs

Tab. 3-2: Values for *Fault State* – *Fault State Action*



The *Fault State* settings are only stored temporarily in the module. They are deleted again after a power reset.

In order to ensure a permanent *Fault State* configuration, the configuration must be programmed via the PLC so that it can be transferred to the module again when the system is restarted.

3

Configuration via Explicit Messages (continued)

3.4 IO-Link device parameterization

There are two ways to parameterize an IO-Link device connected to the IO-Link Port.

- Parameterization via the web server (see *I/O ports* on page 36)
- Parameterization via *Explicit Messages*

The following section describes, for example, how via Rockwell RSLogix 5000 an IO-Link device can be parameterized via *Explicit Messages*.

The MSG modules are used in the PLC program (see Fig. 3-2).

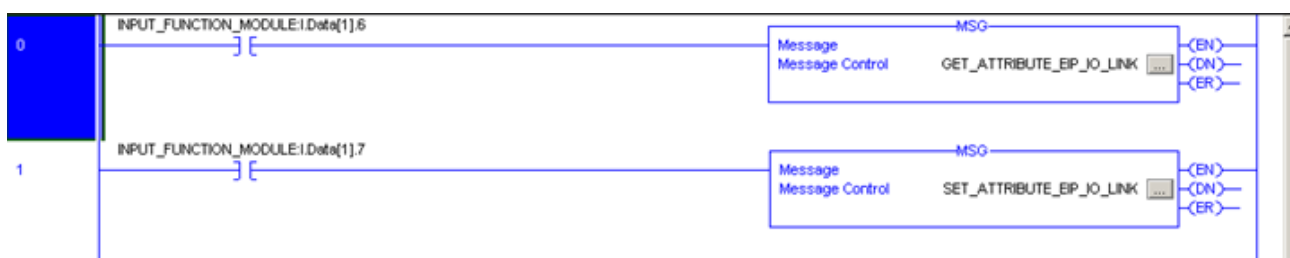


Fig. 3-2: MSG modules

3.4.1 Read IO-Link parameters

Service code	Class	Instance	Attribute
0x32	0x96	1...n ¹⁾	0x03 (Read parameters)

¹⁾ n: Number of ports

Tab. 3-3: Values for read IO-Link parameters

Source Length must at least correspond to the read parameters, but can also be bigger (in this example 100 bytes).

1. As a *Source Element* (Write) and as a *Destination Element* (Read), create a SINT[100] Array and select the first row [0].

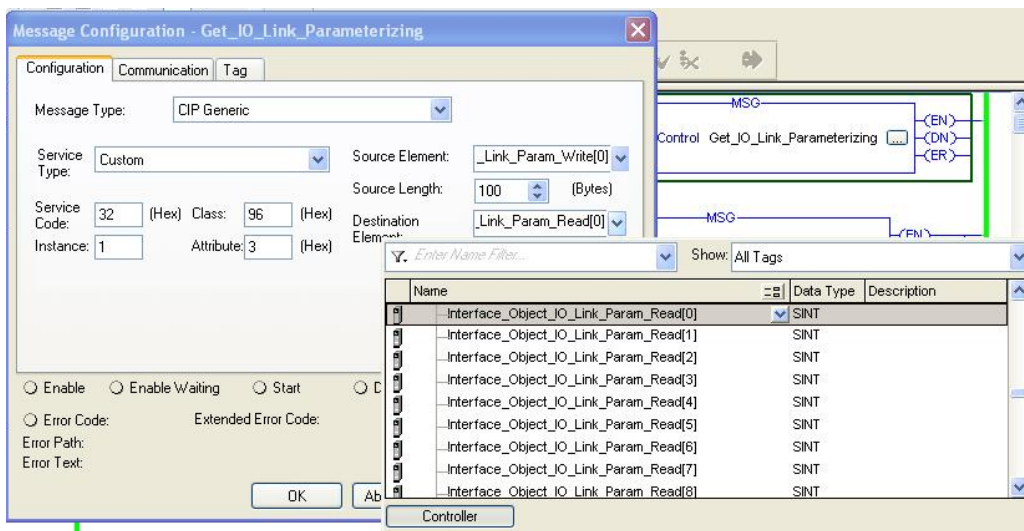


Fig. 3-3: Create SINT[100] Arrays

3

Configuration via Explicit Messages (continued)

- In the *Source Element Array* (Write) enter which index should be read (in this example Index 0x4E).

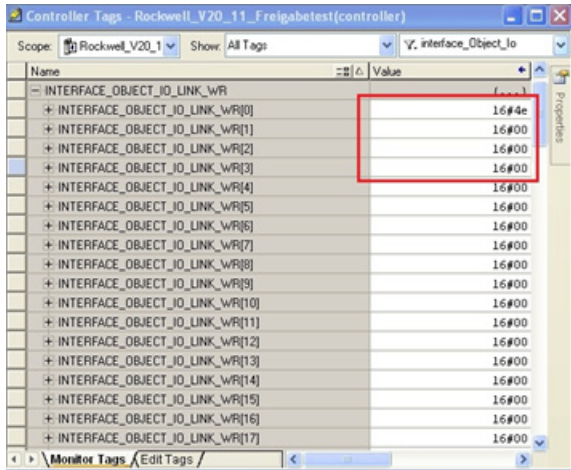


Fig. 3-4: Enter *Source Element Array*

- ⇒ The read value is displayed in the *Destination Array* (Read).
- ⇒ The error code is also displayed there in the event of a parameterization error.

- In the *COMMUNICATION* window select the Ethernet module for which parameters should be set.

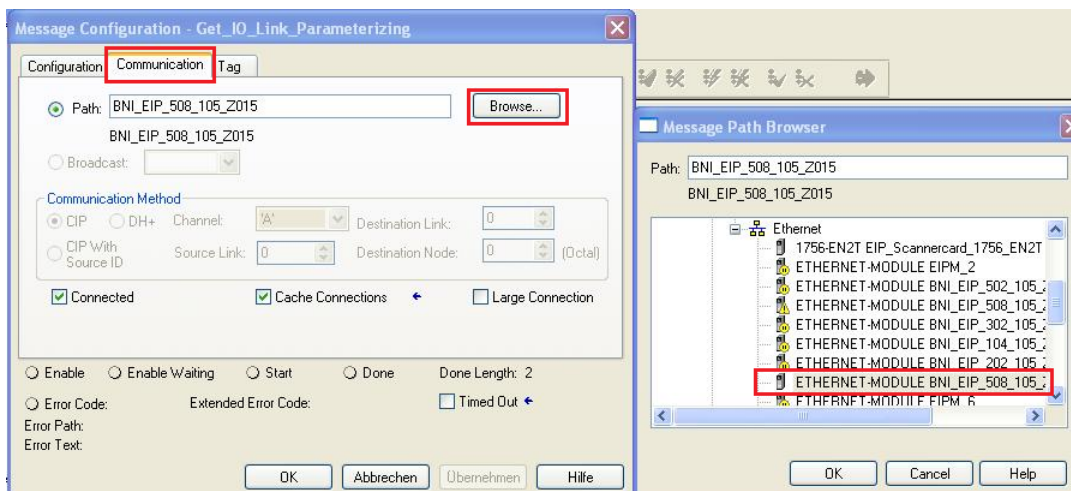


Fig. 3-5: Select Ethernet module

3

Configuration via Explicit Messages (continued)

3.4.2 Write IO-Link parameters

Service code	Class	Instance	Attribute
0x32	0x96	1 – n ¹⁾	0x02 (Write parameters)

¹⁾ n: Number of ports

Tab. 3-4: Values for write IO-Link parameters

1. Select *Source Element* and *Destination Element* as described in the example *Read IO-Link parameters* on page 13.
The *Source Length* must be the same length as the parameter data to be written. In this example the index 0x4E, subindex 0, value 0x02 are written in the *Source Element Array* (Write).
In the event of a parameterization error an error code is displayed in the *Destination Element Array* (Read).

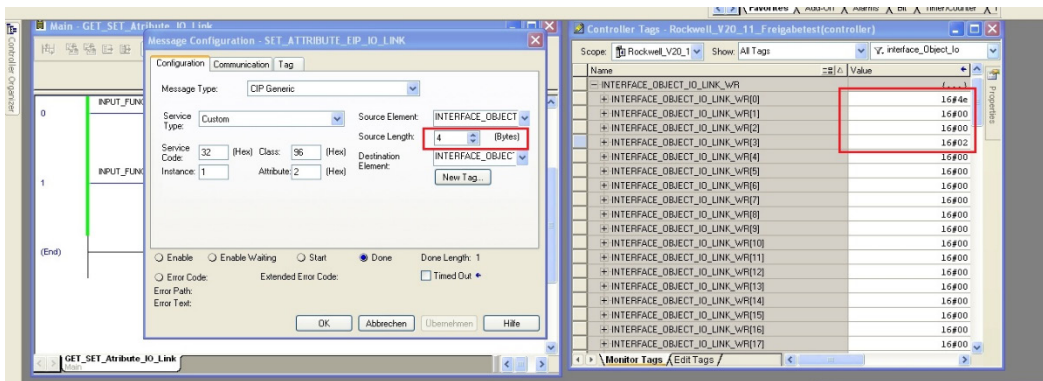


Fig. 3-6: Configuration

2. In the *COMMUNICATION* tab select the Ethernet module for which parameters should be set.

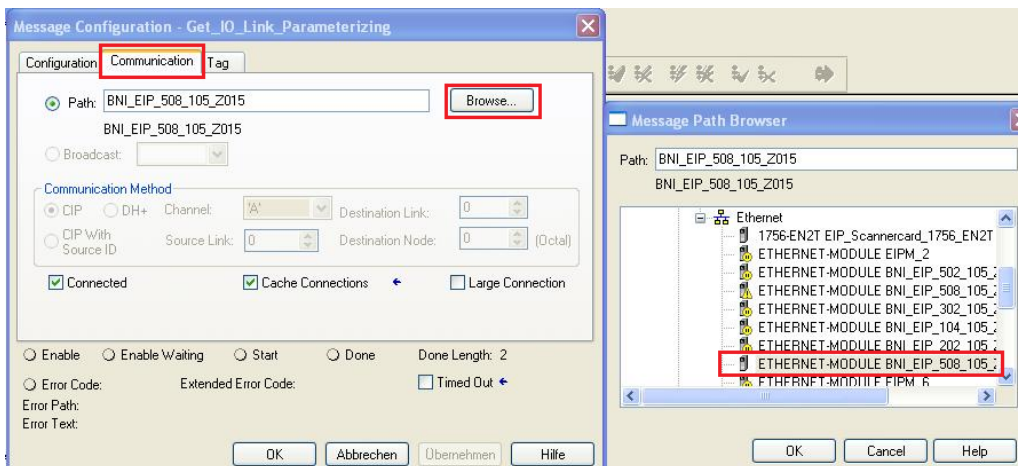


Fig. 3-7: Select Ethernet module



The Explicit Messages functions are implemented according to Volume 1: Common Industrial Protocol Specification and Volume 2: Ethernet/IP Adaption of CIP.

4

Process data

4.1 Process data inputs

The input data have a size of 392 bytes. The table below shows the assignment of the process data inputs.

Byte	Module part	Description
0...7	Standard I/O ports	Process data inputs for the standard inputs
8...55	IO-Link Port 0	Process data inputs for the IO-Link Port 0
56...103	IO-Link Port 1	Process data inputs for the IO-Link Port 1
104...151	IO-Link Port 2	Process data inputs for the IO-Link Port 2
152...199	IO-Link Port 3	Process data inputs for the IO-Link Port 3
200...247	IO-Link Port 4	Process data inputs for the IO-Link Port 4
248...295	IO-Link Port 5	Process data inputs for the IO-Link Port 5
296...343	IO-Link Port 6	Process data inputs for the IO-Link Port 6
344...391	IO-Link Port 7	Process data inputs for the IO-Link Port 7

Tab. 4-1: Process data inputs BNI EIP-508-105-Z067

4.1.1 Standard input data

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
0	I32	I34	I22	I24	I12	I14	I02	I04	Input data I04: Input for port 0, pin 4 The result is only 0 when the port is configured as an IO-Link Port.
1	I72	I74	I62	I64	I52	I54	I42	I44	
2	S3		S2		S1		S0		Short circuit status Short circuit between pin 1 and 3 at reported port
3	S7		S6		S5		S4		
4	O32	O34	O22	O24	O12	O14	O02	O04	Overload status O04: Overload at port 0, pin 4 Only if the port is configured as an output.
5	O72	O74	O62	O64	O52	O54	O42	O44	
6	0	0	0	0	0	NA	PS	PA	Status of power supply NA: No actuator supply PS: Power supply of sensor PA: Power supply of actuator
7	0	0	0	0	0	0	0	0	reserved

Tab. 4-2: Standard input data

4

Process data (continued)

4.1.2 IO-Link input data

Byte	Bit								Description	
	7	6	5	4	3	2	1	0		
8...39									IO-Link Port 0 input data	
40	0	0	0	0	0	0	DC	IOL	IO-Link status IOL: Port in IO-Link mode DC: Device connected 0: reserved	
41	SC	0	0	0	0	PDI	DF	VF	IO-Link error VF: Validation failed SC: IO-Link short-circuit DF: Data storage validation failed PDI: Process data invalid	
42	Manufacturer code 1								Manufacturer code	
43	Manufacturer code 2									
44	Device code 1								Device code	
45	Device code 2									
46	Device code 3									
47	Mode		Type		0				Event 1	Mode: 0: reserved 1: Single event 2: Event outgoing 3: Event incoming Type: 0: reserved 1: Message 2: Warning 3: Error
48	Event code high									
49	Event code low									
50	Mode		Type		0				Event 2	
51	Event code high									
52	Event code low									
53	Mode		Type		0				Event 3	
54	Event code high									
55	Event code low									
...	The data of the other IO-Link Ports are structured identically and described below.									

Tab. 4-3: IO-Link input data

4

Process data (continued)

4.2 Process data outputs

The output data have a size of 262 bytes. Tab. 4-4 shows the assignment of the process data outputs.

Byte	Module part	Description
0...5	Standard I/O ports	Process data outputs for the standard inputs
6...37	IO-Link Port 0	Process data output for the IO-Link Port 0
38...69	IO-Link Port 1	Process data output for the IO-Link Port 1
70...101	IO-Link Port 2	Process data output for the IO-Link Port 2
102...133	IO-Link Port 3	Process data output for the IO-Link Port 3
134...165	IO-Link Port 4	Process data output for the IO-Link Port 4
166...197	IO-Link Port 5	Process data output for the IO-Link Port 5
198...229	IO-Link Port 6	Process data output for the IO-Link Port 6
230...261	IO-Link Port 7	Process data output for the IO-Link Port 7

Tab. 4-4: Process data outputs BNI EIP-508-105-Z067

4.2.1 Standard output data

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
0	O32	O34	O22	O24	O12	O14	O02	O04	Output data O04: Output at port 0, pin 4 The port must be configured as an output in order to use this function at an IO-Link Port.
1	O72	O74	O62	O64	O52	O54	O42	O44	
2	R32	R34	R22	R24	R12	R14	R02	R04	Restart Restart of output after identified short-circuit
3	R72	R74	R62	R64	R52	R54	R42	R44	
4	0	0	0	0	0	0	0	0	reserved
5	0	0	0	0	0	DL	GO	RO	Display control DL: Display locked / PLC lock GO: Green display LED lights up RO: Red display LED lights up

Tab. 4-5: Standard output data

4.2.2 IO-Link output data

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
6...37									IO-Link Port 0 output data
...									The data of the other IO-Link Ports are structured identically and described below.

Tab. 4-6: IO-Link output data

5

Display

5.1 General

With the installed display the address is displayed directly on the devices.



This chapter applies solely to device variants with display. Device variants with built-in display, see chapter 1.1 on page 5.

The following address types are possible:

- IP address
- Subnet mask
- Gateway address

Each address consists of 4 octets.

The display also shows information about the update of the hardware and firmware.

The display has a lock function which can be activated from the system control. Editing is no longer possible if the lock is set.

5.2 Address details

IP address: 192.168.1.1
Subnet mask: 255.255.255.0
Gateway address: 192.168.1.1

5.3 Control and display

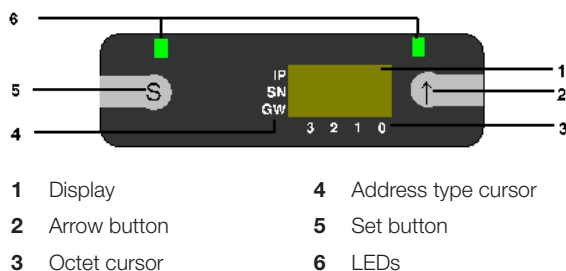


Fig. 5-1: Explanation of the control panel

5.4 Display information

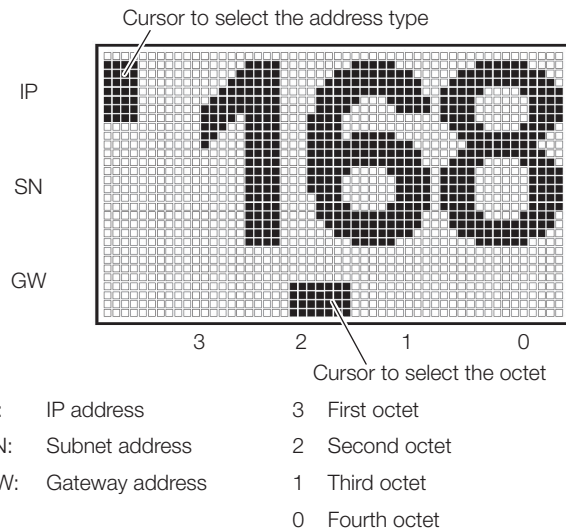


Fig. 5-2: Explanation of display

5.5 Design and symbols

In the following diagrams, a number of symbols are used to describe the display functionality:

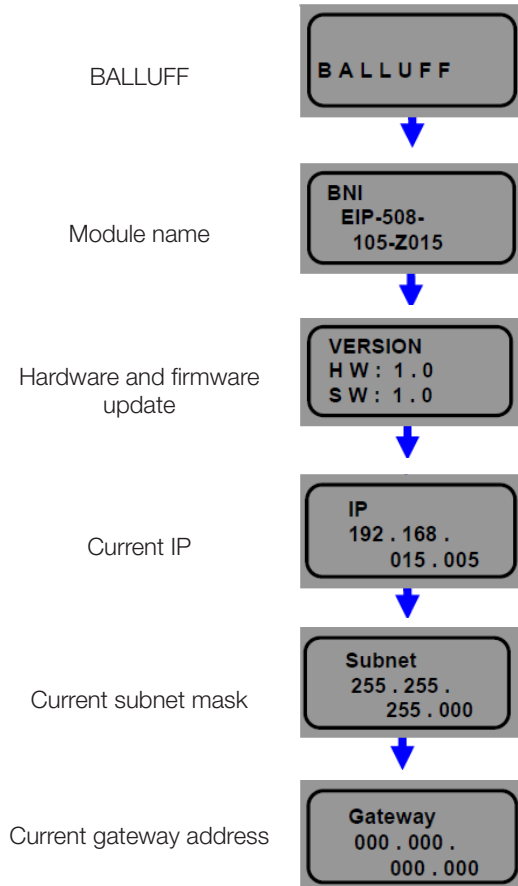
Symbol	Meaning
	Current state
	Switch
	Press the Set button briefly
	Press the Set button for several seconds (≥ 3 s)
	Press the arrow button briefly

Tab. 5-1: Explanation of symbols

5

Display (continued)

5.6 Startup



5

Display (continued)

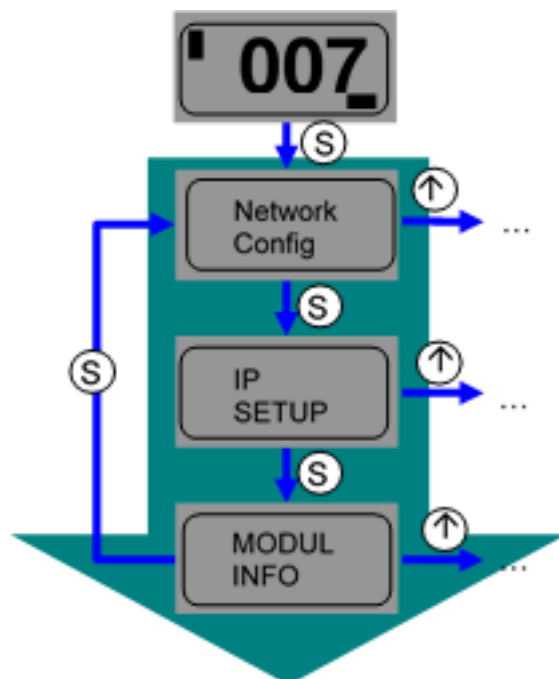
5.7 Main menu

Standard view
4th octet of the IP address

Menu: Network Config

Menu: IP Setup

Menu: Module information



- Press the Set button briefly to scroll through the main menu.
- Press the arrow button to bring up the menu.

5.8 IP Setup

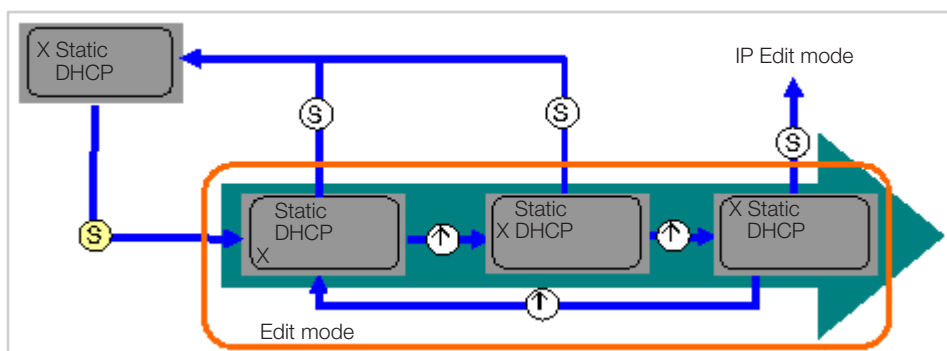


Fig. 5-3: IP Setup

- Press the Set button for several seconds to bring up Edit mode.
- The preferred value is configured by briefly pressing the arrow button.

5

Display (continued)

5.9 Network Config

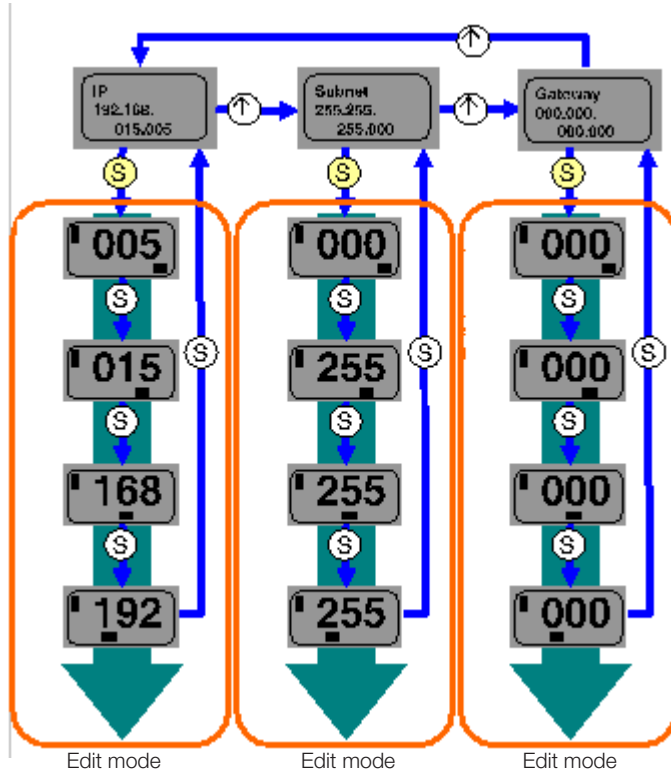


Fig. 5-4: Network Config

- ▶ Press the Set button for several seconds to bring up Edit mode.
- ▶ The preferred value is configured by briefly pressing the arrow button.
- ▶ The quick program mode is called up by pressing the arrow button for several seconds.
- ▶ Briefly press the Set button to save the input value and scroll to the next octet. The 4th octet marks the start of the editing process.
- ▶ The full address entered is saved by briefly pressing the Set button when editing the first octet. The entered value appears immediately on the IP overview display.
- ▶ Manual changes to IP, subnet or gateway lead to an automatic change of the IP Setup to *static*.

5

Display (continued)

5.10 Edit mode

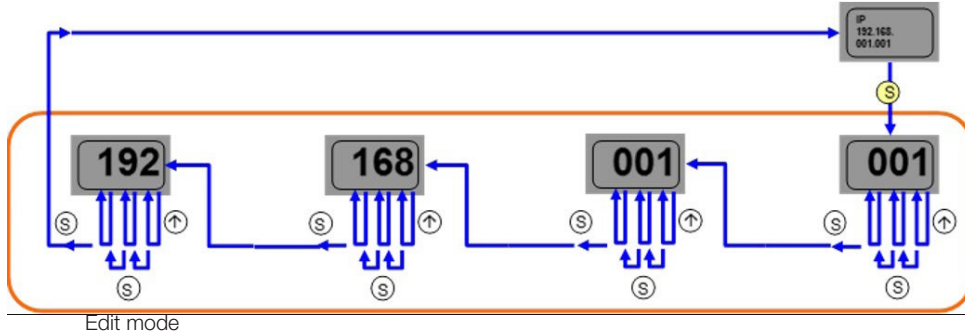


Fig. 5-5: Edit mode

1. In the Network Config menu select IP/subnet or gateway address.
2. Hold down the Set button to change to Edit mode.
3. Press the arrow button briefly to change the number.
4. Briefly press the Set button to go to the next position.
5. After the last position briefly press the Set button to go to the next octet of the address or to apply the new number after the last octet.



The module must be restarted to work with the new configuration.

5.11 Module information

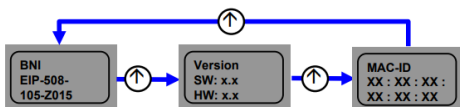


Fig. 5-6: Module information

- Scroll through the *MODULE INFORMATION* menu by briefly pressing the arrow button.

The information displayed is the product name, module updates and MacID.

5

Display (continued)

5.12 General information

- Hold down the arrow button to scroll quickly in Edit mode.
- If no button is pressed for more than 10 seconds, the display returns to the standard display (4th octet of the IP address). Unsaved changes may be lost.
- Differences between the new configuration and the configuration with which the module works are displayed with an unequal symbol. In this case the display returns to the standard display after 5 seconds.
- The display flashes in Edit mode. The display flickers in Fast Scroll mode.
- If the module receives an individual ping, the word *PING* is shown on the display for several seconds. Then the display returns to the previous display. Ping mode can be exited early by briefly pressing the Set button.
- If the module receives a double ping or more, the word *PING* appears on the display. The display can only be exited by briefly pressing the Set button. The display returns to the display before the ping.
- The LED function of the display LEDs can be defined specific to the user by setting several bits in the process data outputs (see bit layout in *Standard output data* on page 18).
- The *plc-lock* function can also be used by setting a bit in the process data outputs (see bit layout in *Standard output data* on page 18).



Edit mode cannot be selected in the display if in the process data inputs the *plc-lock* is set by a bit (see bit layout in *Standard output data* on page 18).

6

WebUI/web interface

6.1 General

The IO-Link master includes an integrated web interface for accessing detailed device information and for configuration.

Prerequisites

To use this web interface, it must be ensured that the module has been integrated in the network correctly. To do this, the IP subnet of the IO-Link master must be accessible from the PC on which the browser is being operated.

Browser

The web interface is compatible with newer versions of Google Chrome, Firefox or MS Edge.

i For more detailed version information, see the data sheet at **www.balluff.com** on the product page.

Connection setup

- To establish a connection with the web interface, enter the IP address of the BNI module in the browser's address bar.
- ⇒ WebUI starts with the homepage, with the most important device information (see Fig. 6-12).

6.2 Navigation bar

In the top window area, there is a navigation bar which enables you to switch between the different dialogs of the web interface by clicking on the corresponding icons:

- Homepage (see page 28)
- Diagnosis (see page 33)
- Settings (see page 35)
- Notifications (see page 41)
- User menu (see page 25)

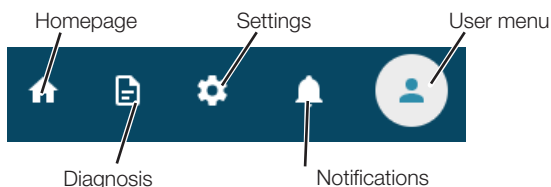


Fig. 6-1: Navigation bar

i Hover the mouse over the different icons to see the corresponding names.

6.3 User profile

Click on the user icon (person) to open a user menu:

- Select *ABOUT* to view device-specific information and documents (see chapter 6.3.1 on page 26).
- Select the national flag/language to make a language selection (see chapter 6.3.2 on page 26).
- Select *LOGIN* to log in as a user (see chapter 6.3.5 on page 27).

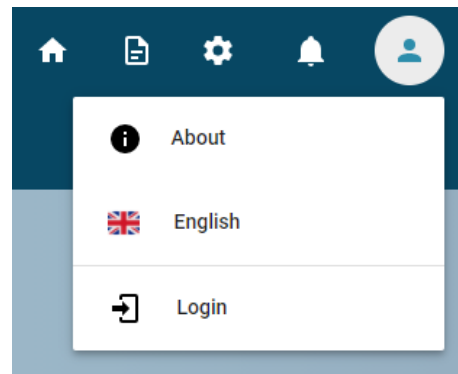


Fig. 6-2: User menu (not logged in)

When logged in, users with the *ADMIN* role can also see the user management (see Fig. 6-3).

Users with the *EXPERT* or *USER* role will see the entry *EDIT PROFILE* here instead, through which the respective profile can be viewed and, if relevant, edited.

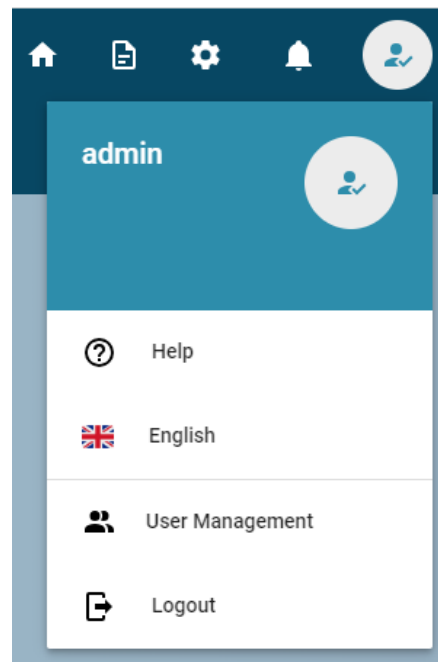


Fig. 6-3: User menu (logged in)

6

WebUI/web interface (continued)

6.3.1 Information/documents

Click on *ABOUT* to view device-specific information and documents.

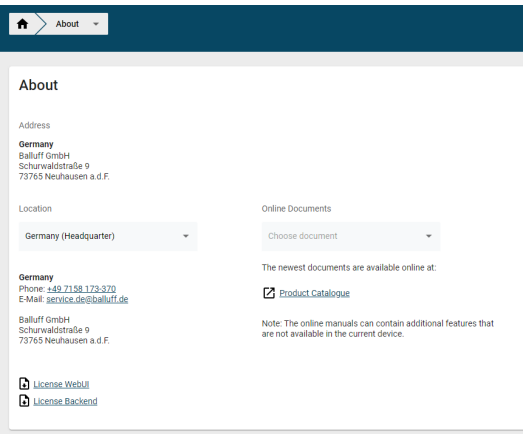


Fig. 6-4: User menu: About

The default location is Germany. Use the dropdown menu under *LOCATION* to select any desired location.

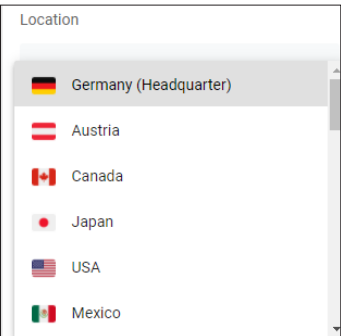


Fig. 6-5: User menu: Info – Location

Use the dropdown menu under *ONLINE DOCUMENTS* to select different online documents, such as manuals, and click on them to open in a new window.

6.3.2 Language selection

The languages German and English are supported. Click on the language *GERMAN* or *ENGLISH* to select the language.

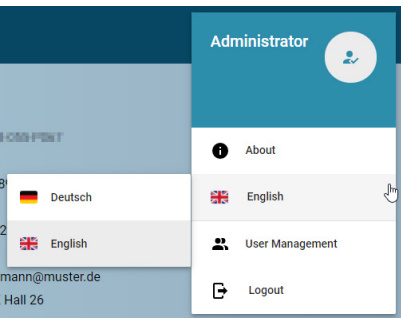


Fig. 6-6: User menu: Language selection

6.3.3 User management (ADMIN)

Select *USER MANAGEMENT* to open a view of the stored users. Information on the user status (*ACTIVE/INACTIVE*), the user name, user information, password and its confirmation in hidden view, as well as the user's role is specified.

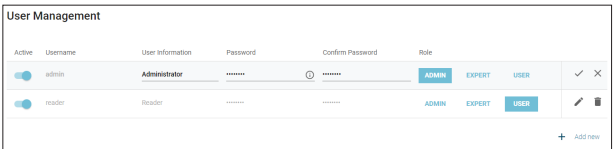


Fig. 6-7: User Management

Authorizations are role-dependent:

Authorization	User role		
	ADMIN	EXPERT	USER
Read device parameters	X	X	X
Write device parameters	X	X	–
Adding users	X	–	–
Deleting users	X	–	–

Tab. 6-1: User rights

Click on the pen icon to edit fields and buttons (see Fig. 6-8).



Fig. 6-8: Edit symbol

Click on the information icon in the password field to open a dialog box and view the requirements for a secure password.



Fig. 6-9: Information icon in the password field

A user with the *ADMIN* role can delete users with the *EXPERT* or *USER* role by clicking on the recycle bin icon.



The *admin* user cannot be deleted.

Click on **+** (*ADD NEW USER*) to add new users and confirm with ☒ after entering the corresponding information.

6

WebUI/web interface (continued)

6.3.4 Edit profile (*EXPERT/USER*)

Users with the *EXPERT* or *USER* role can view and, if relevant, change their profile via *EDIT PROFILE*. Only the relevant profile is displayed. *EXPERTS* and *USERS* can only change their own user information as well as their own password, but not their role or name. *EXPERTS* and *USERS* cannot make any profile deletions.

6.3.5 Logging in and logging out

i In its delivery state, the device supports the option of logging in as a standard user with the user name *admin* and a blank password for convenient initial configuration. However, this can only be done once in the delivery state, as this function is intended to enable the configuration of an individual administrator access.

i For security reasons, only one user can be logged in with the configuration access at the same time. Several PCs can access the IO-Link master with read access at the same time (without login). However, parallel accesses can result in response delays.

To make configuration settings on the IO-Link master via the web interface, you must first log in with the *EXPERT* or *ADMIN* role. Logging in with the *USER* role activates further dialogs in view-only mode. The user icon indicates the current status at all times.



Not logged in	Logged in
	

Fig. 6-10: User icon

Login

1. *LOGIN* (see Fig. 6-2 on page 25) opens the login dialog (see Fig. 6-11).

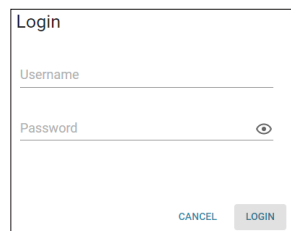


Fig. 6-11: Login dialog

2. Enter the login details and click on *LOGIN*.

i Logging in is required when notifications request it or when selecting functionalities that cannot be used without logging in.

For each device the standard password *BNIEIP* is valid for the user *admin*.

Log out

- Log out with *LOGOUT* (see Fig. 6-3 on page 25).

i If there is no interaction with the WebUI for more than five minutes, the user will be logged out automatically.

6

WebUI/web interface (continued)

6.4 Homepage

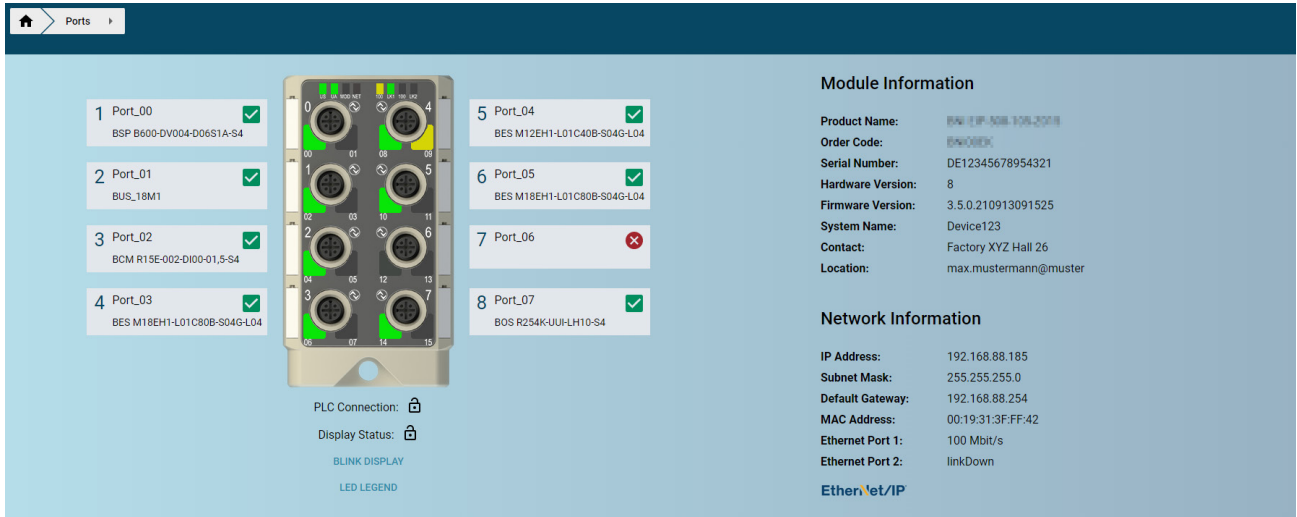


Fig. 6-12: WebUI – Homepage

The homepage (see Fig. 6-12) shows key information about the IO-Link master itself and its network activity. It also shows whether the configuration or display lock has been activated via the control unit (PLC).

6.4.1 Device Status

Some devices (including from external providers) supply the device status defined in the IO-Link Spec. In this case, this is displayed both on the homepage and in the CM dialog. On the homepage, you obtain details by clicking on the icon in the port (see Fig. 6-13). Products that do not supply the device status show a gray control box here.

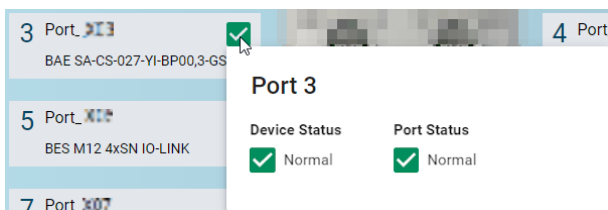


Fig. 6-13: Device Status

6.4.2 Port overview/configuration

If an IO-Link device is connected to one of the configured IO-Link ports, the module data at the ports and the device data are displayed in buttons on the left-hand side of the figure. After one of these buttons is selected, the corresponding port dialog opens.

The default value of the DeviceAlias displayed is adapted to the front label (e.g. *Port-00* for Port 1).

The port numbering always begins at 1, even if the front label indicates a different port designation, depending on the product variant, (e.g. for PROFINET X00 at Port 1). This is due to the relevant definition of port numbering in the IO-Link specification and the IO-Link/JSON specification (JSON Integration for IO-Link, Karlsruhe, 2020).

The designation of the front label is reflected in the process data layout as well as in the description file (GSD).

6

WebUI/web interface (continued)

Opening the port dialog

- Click on the corresponding port field to select the desired IO-Link port.

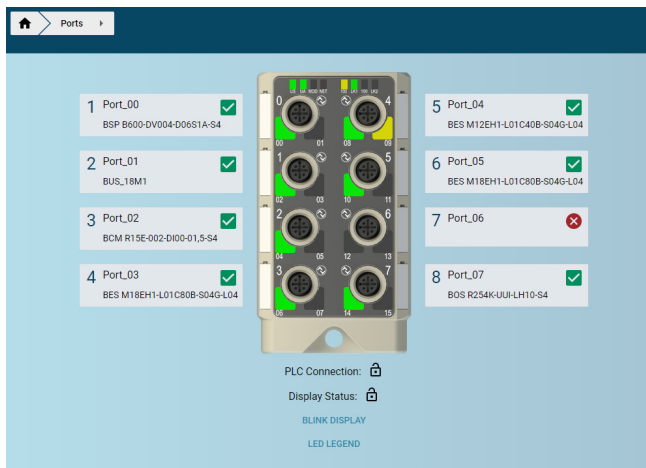


Fig. 6-14: Selecting the IO-Link port in the breadcrumb

- Alternatively, select the target port via the breadcrumb navigation in the header.

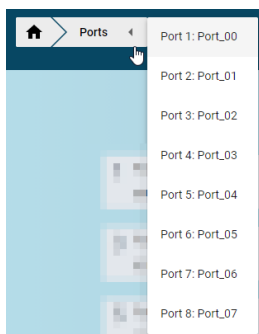


Fig. 6-15: Selecting the IO-Link port in the breadcrumb navigation



The IO-Link device data is only displayed if the port is configured as an IO-Link port (can be identified by the green port LED).

6

WebUI/web interface (continued)

Ports dialog

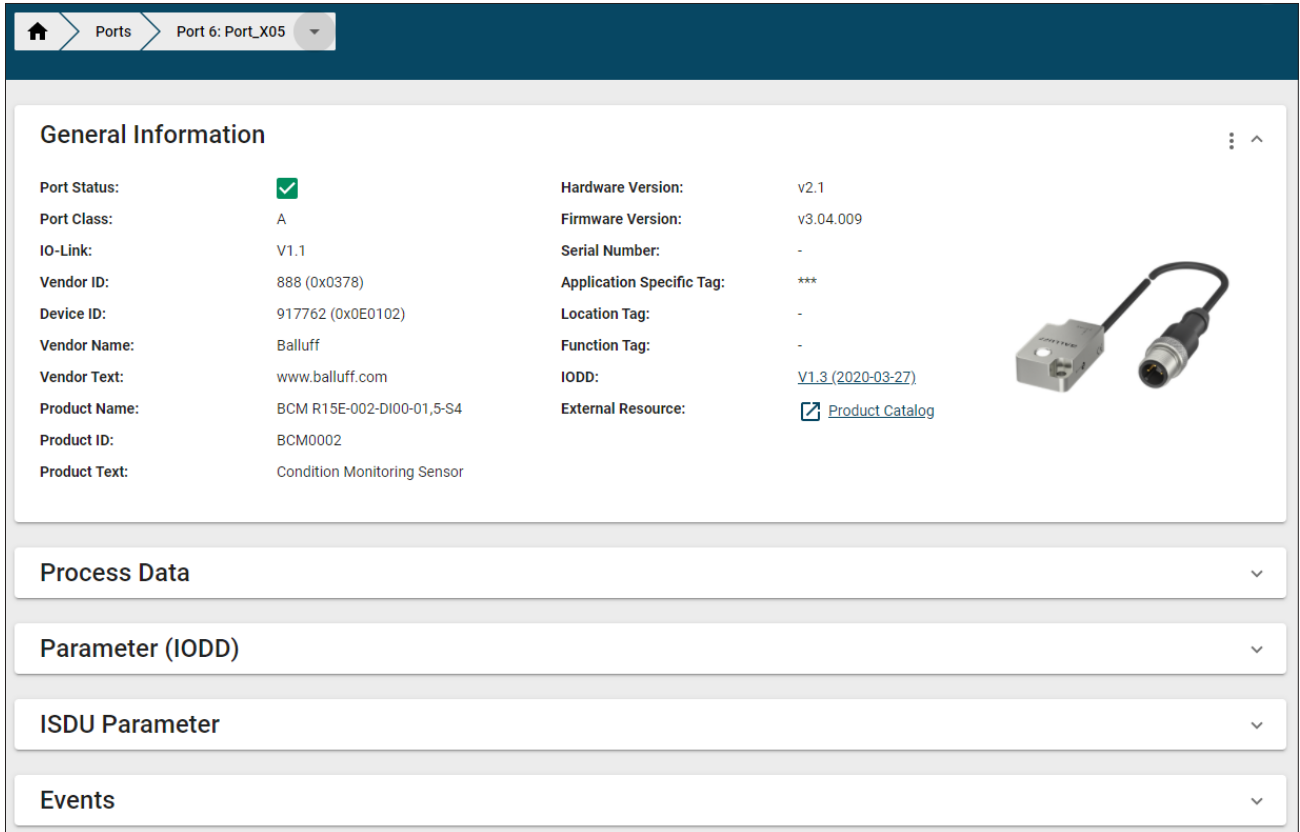


Fig. 6-16: Ports dialog

Click on the expand symbol of a closed tab page to view e.g. information on relevant ISDU parameters. Information that is not currently required can be hidden by clicking on the collapse symbol .

General

Under *GENERAL INFORMATION*, you can find manufacturer information as well as other general information on the current module.

Under *IODD*, you can see whether a suitable IODD for the IO-Link device connected to this port is uploaded to the IO-Link master (see Fig. 6-17).

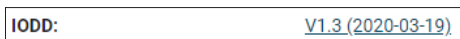


Fig. 6-17: IODD

If this is not the case, click on *UPLOAD IODD* to access the *SETTINGS* tab page.

Based on the connected IO-Link devices, the corresponding device description can be selected for upload.

Process data

Under *PROCESS DATA*, interpreted data is only shown if a suitable IODD is saved.

To display the data more clearly, information from the device's IODD is used here. So, in Fig. 6-18, you can see not only the input data of the example sensor as a hexadecimal number, but also interpreted under *INPUT* and provided with corresponding labels from the IODD.

Process Data	
Input (Hex):	3D BD 09 D6 3E 1B DE 6D 3E 2C C7 8C 41 E8 EB 83 00 00 40 00
Output (Hex):	0
Pin 2 Input:	0
Vibration Velocity - Input	
Name	Value
Vibration Velocity RMS v-RMS X	0.0923 mm/s

Fig. 6-18: IODD interpretation

6

WebUI/web interface (continued)

Parameter (IODD)

i The Parameter (ISDU) tab page is only displayed if a suitable IODD is uploaded for the IO-Link device connected to the selected port. *UPLOAD IODD*, see *GENERAL INFORMATION*.

Under *PARAMETER (IODD)*, the device identification data of the IO-Link device is displayed in a table when the *IDENTIFICATION* tab page is selected (e.g. Fig. 6-19). The corresponding texts are saved in the IODD.

The input values can either be read out from the IO-Link device individually for a subindex by clicking on *READ* or for the entire tab page via *READ ALL*. A successful request is indicated by a green bar on the right-hand edge of the relevant table row.

Index (Subindex)	Parameter	Observation	Diagnosis	Value	READ ALL
16 (0)	Vendor Name (rw)			Balluff	READ
17 (0)	Vendor Text (rw)			www.balluff.com	READ
18 (0)	Product Name (rw)			BCM 8100-000-000-01-0-0-0	READ
19 (0)	Product ID (rw)			BCM0002	READ
20 (0)	Product Text (rw)			Condition Monitoring Sensor	READ
21 (0)	Serial Number (rw)			DE00700010000000	READ
22 (0)	Firmware Version (rw)			V2.1	READ
23 (0)	Pressure Version (rw)			V3.04.000	READ
24 (0)	Application Specific Tag (rw)			***	READ

Fig. 6-19: Dialog view after clicking on *READ ALL* or, for each subindex, on *READ*

The *APPLICATION SPECIFIC TAG* is an application-specific field in IO-Link devices and, in the current example (see Fig. 6-20), can either be read out from the IO-Link device with *READ* or can be individually configured by clicking on the gray input field with the same name and described with *WRITE* (provided the required write authorization exists). It is also possible to enter a company-internal device name in this field.

24 (0)	Application Specific Tag (rw)	test1234	WRITE	READ
--------	-------------------------------	----------	-------	------

Fig. 6-20: Application Specific Tag

If the IODD of the IO-Link device at the currently selected port also has parameters, these are also displayed in the form of a table (see Fig. 6-21). Similarly to the process for device identification data, parameter values and associated texts from the saved IODD can be configured, depending on the parameter, via *READ* or *READ ALL*.

If available, click on the ▼ icon to open a dropdown list and select a value or select a value within a specific range and confirm with *WRITE*.

If there is no *READ* button next to subindices, these indices cannot be processed individually, but only as a complete index.

Index (Subindex)	Parameter	Observation	Diagnosis	Value	READ ALL
12 (0)	Device Access Locks (rw)				WRITE READ
12 (1)	Device Access Locks Parameter (write) Access Lock (rw)			<input type="checkbox"/>	
12 (2)	Device Access Locks Data Storage Lock (rw)			<input type="checkbox"/>	
2 (0)	Standard Command (wo)				Device Reset
2 (0)	Standard Command (wo)				Application Reset
2 (0)	Standard Command (wo)				Restore Factory Settings
2 (0)	Standard Command (wo)				Maintenance Reset
100 (0)	Device Command (wo)				Reset Device Temperature
100 (0)	Device Command (wo)				Reset Contact Temperature
100 (0)	Device Command (wo)				Reset Humidity
100 (0)	Device Command (wo)				Reset Ambient Pressure

Fig. 6-21: *PORTS* dialog: Extract from the parameter list of an IO-Link device with uploaded IODD after clicking on *READ ALL* or *Read* for individual subindices

i Each changed value must be written individually by clicking on *WRITE*!

ISDU Parameter

Configuration parameters of the IO-Link device can be read and written via the *ISDU PARAMETER* option. The parameter indices and subindices of the IO-Link device follow the IO-Link conventions and are described in the corresponding user's guide.

Parameter indices and subindices can be entered both in decimal and hexadecimal format, while data can only be entered in hexadecimal format.

An input is confirmed with *SET* or can be rejected with *DELETE*.

Events

Under *EVENTS*, you can see whether there is a diagnosis event from the IO-Link device.

The events can be displayed in ascending or descending order. The list of events can be updated via further options of the *EVENTS* card (see Fig. 6-22) or can be downloaded in CSV format.

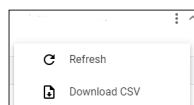


Fig. 6-22: Further options of the *EVENTS* tab page

6

WebUI/web interface (continued)

6.4.3 LEDs

The LEDs of the IO-Link master display information on the current process data and the module status. The meanings of the LEDs can be viewed in a legend.

Opening the LED legend

► Click on *LED LEGEND*.

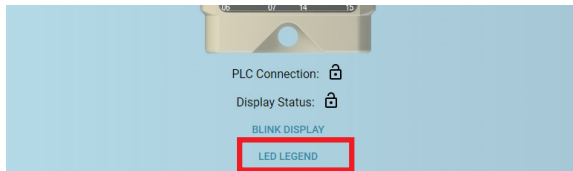


Fig. 6-23: Opening the LED legend

⇒ The legend appears.

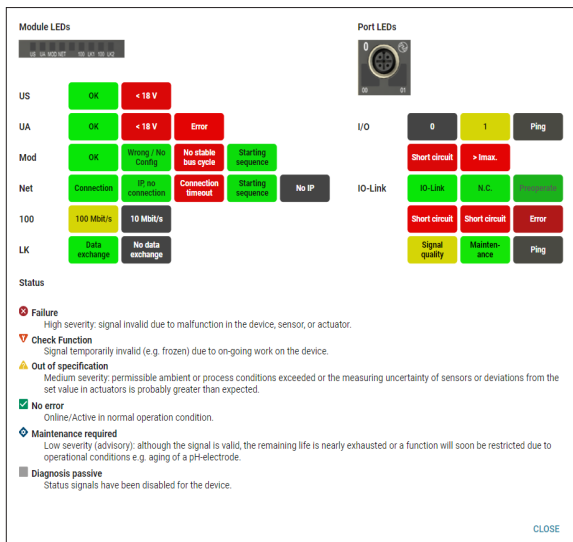


Fig. 6-24: LED legend

6.4.4 Blink display

With *BLINK DISPLAY* the IO-Link Master can be pinpointed visually. The display flashes for 180 seconds.

6

WebUI/web interface (continued)

6.5 Diagnosis

Click on the corresponding icon in the navigation bar (see chapter 6.2 on page 25) to access the *DIAGNOSIS* dialog.

The *DIAGNOSIS* dialog provides general service information about the device and a logging function.

The *STATUS* tab page contains important information for all service requests, while the *ACTIVITY LOG* tab page contains a table view of the log information. The information can be printed as a PDF by clicking on the printer icon (e.g. for a service request).



If you have a specific question about a specific case, save or print this website as a PDF file and send it to us for technical support. You can find the corresponding contact details at **www.balluff.com**.

6.5.1 Status

Via the *STATUS* item, you can view information about the device, such as the browser version used or the system operating time.

Status				
Product Name:	BNI PNT-508-055-P067	IP Address:	192.168.88.185	
Order Code:	BNI00EK	Subnet Mask:	255.255.255.0	
Product URI:	https://www.balluff.com/BNI%20PNT-508-055-P067/BNI00EK/DE12345678951	Default Gateway:	192.168.88.254	
Serial Number:	DE12345678951	Ethernet Port 1:	linkDown	
Hardware Version:	8	Ethernet Port 2:	100 Mbit/s	
Firmware Version:	3.5.0.0	Station Name:	p067	
WebUI Version:	1.0.4	PLC Connection:	No	
IOLMFV Version:	1.3.0.148	Free Flash Memory:	1933 kB	
MAC Address:	00:19:31:3F:FF:37	Browser Version:	chrome 86.0.4240	
System Name:	P067	Browser Time:	12:45:24	
Contact:	SIN	System Time:	2000-01-01 00:28:14	
Location:	Kemnat Labor	System Uptime:	0 h 28 min 14 sec	
		Deleted Log Entries:	-	
Activity Log				

Fig. 6-25: Status

6

WebUI/web interface (continued)

6.5.2 Activity log

The *ACTIVITY LOG* displays events that have occurred in chronological order. It is therefore an important tool for detailed troubleshooting in systems.

The expanded *ACTIVITY LOG* tab page provides a table view of the log information, which can be sorted by numbers. The log information consists of a note regarding the severity, a date stamp, information on the origin and the log message itself.

Activity Log					Insert filter here...
No. ↓	Severity	Date	Origin	Message	
101	NOTICE	2000-01-01 00:27:51.852	REST	Status 110: GET /iolink/v1/devices/Port_X00/processdata/value	
100	NOTICE	2000-01-01 00:27:47.635	REST	Status 110: GET /iolink/v1/devices/Port_X07/processdata/value	
99	NOTICE	2000-01-01 00:26:09.943	REST	Status 110: GET /iolink/v1/devices/Port_X00/processdata/value	
98	NOTICE	2000-01-01 00:24:56.853	REST	Status 110: GET /iolink/v1/devices/Port_X03/processdata/value	
97	NOTICE	2000-01-01 00:24:49.148	REST	Status 311: GET /iolink/v1/devices/Port_X00/parameters/8192/value	
96	NOTICE	2000-01-01 00:24:49.104	IOLM	Port 0: ISDUAcessError: Read: Index 0x2000/0x0: Code 0x8011	
95	NOTICE	2000-01-01 00:24:24.958	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
94	NOTICE	2000-01-01 00:23:50.977	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
93	NOTICE	2000-01-01 00:23:08.998	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
92	NOTICE	2000-01-01 00:22:57.011	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
91	NOTICE	2000-01-01 00:21:42.926	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
90	NOTICE	2000-01-01 00:21:24.963	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
89	NOTICE	2000-01-01 00:21:18.970	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
88	NOTICE	2000-01-01 00:19:58.987	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	
87	NOTICE	2000-01-01 00:19:31.016	REST	Status 110: GET /iolink/v1/devices/Port_X05/processdata/value	

Fig. 6-26: Activity log

Events are classified via the *SEVERITY* column:

- Internal error (Emergency, Alert, Critical)
The IO-Link master has found an internal defect (hardware or software), which should not normally occur. If this occurs, the module must be maintained or replaced.
- External error (Error, Warning)
The IO-Link master has found a potentially impermissible event, which is affecting the module from outside. Troubleshooting in the system might be necessary.
- Event (Informational, Notice)
The IO-Link master has found an important *normal* operating event (such as configuration actions via the web interface and other configuration interfaces, which are recorded) and reports it.

Under additional options (:) you can access more actions for the log (the log entries are saved in a ring buffer):

- *REFRESH*
- *DOWNLOAD CSV*
- *CLEAR*

6

WebUI/web interface (continued)

6.6 Settings

The *SETTINGS* dialog enables the configuration of connected modules and IO-Link devices. Click on the corresponding icon in the navigation bar (see chapter 6.2 on page 25) to access the Settings dialog.

i Changing and saving settings as well as implementing restarts and resetting to factory defaults can only be performed by users with corresponding authorizations (*ADMIN*, *EXPERT*).

Module

Under *MODULE*, general settings, such as the module name, device time and network settings can be made. Settings can be applied by clicking on *SAVE* and permanently stored in the device.

The module time can be set as follows:

1. Under *MODULE* (see Fig. 6-27), either enter the *MODULE TIME* manually by clicking on the calendar icon or transfer the current browser time to the IO-Link master via the *GET FROM PC* dialog.

Fig. 6-27: Setting the module time

2. Apply the settings permanently by clicking on *SAVE*.

i The module time is not permanently stored. After a reset, reboot or a de-energized phase, the time begins in the year 2000 again.

The *IP ADDRESS*, *SUBNET MASK* and *GATEWAY ADDRESS* fields can be reset separately via the *FACTORY DEFAULT* button (see Fig. 6-28).

Fig. 6-28: Network settings

RESTART restarts the module (like switching the power supply off and on).

RESET TO FACTORY SETTINGS completely deletes the configuration saved in the device and then performs a reboot. The device is reset to the delivery state.

6

WebUI/web interface (continued)

I/O ports

Via the *I/O PORTS* dialog, the ports of a module can be displayed and configured.

Select *SET CONFIGURATION FOR ALL PORTS* to set the *IO-LINK [AUTOSTART]*, *DIGITAL IN* and *DIGITAL OUT* configuration modes to the desired mode for all ports.

The screenshot displays the 'Settings' page with the 'I/O Ports' tab selected. It features a grid of 8 port configuration cards, each for a specific port (Port 1 to Port 8). Each card includes the following fields and controls:

- Port X** (where X is the port number)
- Device Alias**: master1portX
- Modus Pin 4**: IO-Link [Autostart] (dropdown menu)
- Cycle Time**: 0 ms
- Modus Pin 2 (CLASS_A_WITH_PORT_POWER_OFF_ON)**: Digital In (dropdown menu)
- Buttons**: UNDO and SAVE

At the top of the page, there is a 'Set configuration for all ports (Pin4/Pin2):' dropdown menu and a 'SET ALL' button.

Fig. 6-29: IO Ports settings

Click on *SET ALL* to open a dialog window in which the action can be confirmed or canceled. With a corresponding selection, the message *I/O PORT CONFIGURATION(S) SUCCESSFULLY SAVED* appears in the bottom part of the website.

The 'Set All' dialog box is shown, containing the text: 'Do you really want to set all I/O-Port configurations of the module?'. Below the text are two buttons: 'CANCEL' and 'SET ALL'.

Fig. 6-30: Set All dialog

The ports can also be configured individually by entering or selecting the *DEVICE ALIAS*, *MODUS PIN 4*, *CYCLE TIME* and *MODUS PIN 2 (CLASS_A)* points. The inputs are confirmed with *SET* or reset with *UNDO*.

6

WebUI/web interface (continued)

Application recommendation for a Port X in the context of the other designation variables (see Fig. 6-31):

- *DEVICE ALIAS* – name of the device that shows what function the sensor executes (e.g. *rear left end switch, temperature at boiler floor, etc.*)
- *MODE PIN 4* – selection of the actuation (e.g. *Deactivated, IO-Link [Manual], IO-Link [Autostart] or Digital In/Out*. Depending on the selection, further dialog fields open, which require an input (e.g. when the *IO-Link [Manual]* option is selected).

i If no backup and validation are required on the port, the option *IO-Link [Autostart]* can be selected for which the validation and backup are switched off.

- *VALIDATION AND BACKUP* – If for the point *Mode Pin 4* the option *IO-Link [Manual]* has been selected, the following mandatory fields marked with “*” must be completed.

Selection	Validation	Backup
No device check	–	–
V1.0 Compatible	Check conformity between connected IO-Link device (1.0) and default value using Device and Vendor ID	–
V1.1 Compatible		–
V1.1 Backup and recovery		Automatic backup of parameter values. Changes to the current parameter values are saved. The parameter values are restored when a similar IO-Link device is connected.
V1.1 Recovery		No automatic backup of parameter values. Changes to the current parameter values are not saved. The parameter values are restored when a similar IO-Link device is connected.

- *CYCLE TIME* – if the *IO-Link [Manual]* or *IO-Link [Autostart]* options are selected for point *Modus Pin 4*, the desired communication cycle can be set by selecting the corresponding value from the dropdown list.
- *MODE PIN 2* – Is defined as *DIGITAL IN/OUT*.

Port 2

Device Alias
Port_01

Modus Pin 4
IO-Link [Manual]

Validation and Backup *

Device ID *

Valid: Dec. or hexadec. numbers

Vendor ID *

Valid: Dec. or hexadec. numbers

Cycle Time
8.4 ms

Modus Pin 2 (CLASS_A)
Digital In

UNDO SET

Fig. 6-31: *MODUS PIN 4* selection options dialog and Port 2: Configuration dialog of the *IO-LINK [MANUAL]* option

i The port configuration is not permanently stored. After a reset, reboot or a de-energized phase, the settings are lost.

i It is not possible to reconfigure a port configured as an IO-Link directly to another IO-Link mode. The respective port must be deactivated beforehand. It is also not possible to change the validation information for *IO-Link [Manual]* without first deactivating the port.

6

WebUI/web interface (continued)

IoT

The IoT settings of the device can be made via *IoT*. This includes the HTTP server settings as well as the MQTT client settings.

HTTP server settings

HTTP server settings can be used to enable or disable encrypted communication with the web server using HTTP(S).

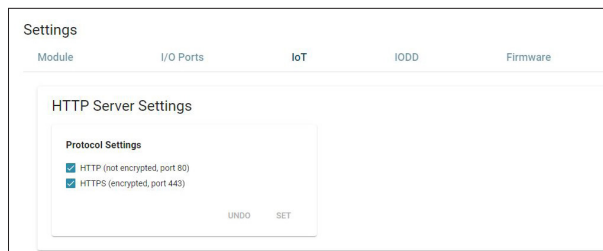


Fig. 6-32: HTTP server settings

MQTT client settings

The BNI features a MQTT interface that allows parameters and product information to be called up. The *MQTT client settings* can be used to configure this interface and view the connection status.

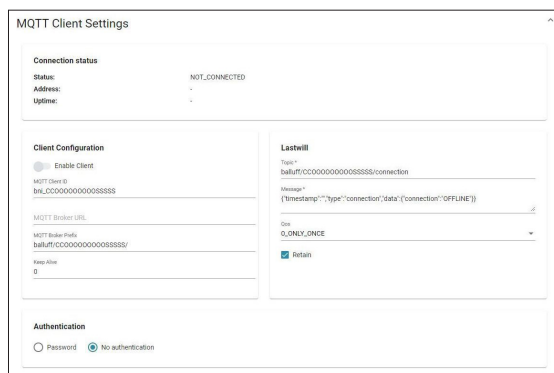


Fig. 6-33: MQTT client settings

Connection status: The following information can be viewed:

- *STATUS* – Indicates whether the client is connected or there is an error.
- *UPTIME* – Displays the elapsed time in seconds since the connection was established.
- *ADDRESS* – Displays the address of the broker to which the client is currently connected.

Client configuration: The following settings can be made:

- *ENABLE CLIENT* – Enables or disables the client.
- *MQTT CLIENT ID* – Defines the client ID that will be used for the connection.
- *MQTT BROKER URL* – Defines the address of the broker.
- *MQTT BROKER PREFIX* – Defines a prefix to be placed in front of each MQTT topic (e.g. {*prefix*}/*identification*).
- *KEEP ALIVE* – Defines the keep alive time of the MQTT in seconds.

Lastwill: Allows a message to be configured that is to be sent automatically when the client disconnects from the broker. The following settings can be made:

- *TOPIC* – Defines the topic of the message.
- *MESSAGE* – Defines the content of the message.
- *QoS* – Defines the QoS (Quality of Service) level at which the message is sent.
- *RETAIN* – Sends the message with or without the retain flag.

Authentication: The following settings can be made:

- *PASSWORD*: Authentication is done with password (and username).
- *NO AUTHENTICATION*: The client logs on to the broker anonymously.


6

WebUI/web interface (continued)

IODD

Via the *IODD* dialog, device description files for IO-Link devices (IODDs) and the associated device images can be uploaded to the IO-Link master so that a more detailed illustration of the connected IO-Link devices can be provided in the *PORTS* dialog.

Connected IO-Link devices

When IO-Link devices are connected and IO-Link ports are activated, the dialog shows a table with information on the IO-Link devices. This can be updated by clicking on the refresh icon .

Settings

Module

I/O Ports

IoT

IODD

Firmware

Output Test

Connected Devices

Port	IODD	Vendor Name	Product Name	Product ID	Vendor ID	Device ID	IO-Link Version	IODD-Finder
1	-	BALLUFF	BNI IOL-712-000-K023	BNI0041	888	329730	1.0	
2	-	Balluff	BOS R254K-UII-PR10-S4	BOS R254K-UII-PR10-S4	888	264974	1.1	
3	-	BALLUFF	BNI IOL-800-000-Z036	BNI007T	888	330245	1.1	
4	-	Balluff	BOS R254K-UII-RE10-S4	BOS R254K-UII-RE10-S4	888	264964	1.1	
5	-	BALLUFF	BNI IOL-302-000-Z012	BNI003U	888	329478	1.0	
6	-	Balluff	BNI IOL-302-002-K006	BNI007Z	888	330496	1.1	
7	-	BALLUFF	BNI IOL-104-S02-Z012 with BNI IOL-104-S02-Z012	BNI00CR with BNI00CR	888	331345	1.1	
8	-	BALLUFF	BNI IOL-752-V13-K007	BNI006F	888	328735	1.1	

Fig. 6-34: Connected IO-Link devices

Available IODDs

The available IODDs are listed under *AVAILABLE IODDs* and can be removed by clicking on the recycle bin icon, if necessary.


















Available IODDs 									
Port	Icon	Vendor Name	Product Name	Product ID	Vendor ID	Device ID	Version	Filename	
6		Balluff	BCM R15E-002-DI00-01,5-S4	BCM0002	888	917762	V1.3 (2020-03-27)	BA0E0102	
		Balluff	BCM R15E-001-DI00-01,5-S4	BCM0001	888	917761	V1.3 (2020-04-03)	BA0E0101	
		BALLUFF	BES05T	BES05T	888	132099	V0.13 (2020-03-25)	BA020403	
		Sensirion AG	SFC5420-CVE UAGL	1-100992-01	621	12669952	V1.1 (2014-07-22)	SEC15400	
7		Balluff	BOS R254K-UII-LH10-S4	BOS R254K-UII-LH10-S4	888	264964	V2.5 (2020-02-28)	BA040B04	
5		STEGO Elektrotechnik GmbH	CSS 01411.2-xx	CSS 01411.2-xx	1222	18	V1.03 (2019-07-26)	ST000012	
		Balluff	BNI IOL-302-002-K006 with BNI IOL-302-002-K006	BNI007Z with BNI007Z	888	330497	V1.5 (2018-02-15)	BA050B01	
		Balluff	BNI IOL-302-002-K006 with BNI IOL-751-V08-K007	BNI007Z with BNI006N	888	330498	V1.5 (2018-02-15)	BA050B02	

Fig. 6-35: Available IODDs

6

WebUI/web interface (continued)

An IODD can be uploaded via the *SELECT IODD FOR UPLOAD* dialog between the two tab pages.



Fig. 6-36: Upload IODD

With its FAT12 file system, the IO-Link master only supports file names in 8+3 format, i.e. with a restricted name length. Since IODD files are usually published with long file names, these must be renamed according to a specific schema for storage on the IO-Link master. This is done automatically in the background for IODD files. If an individual image file is selected for upload via *UPLOAD FILE*, which does not meet the naming requirements, a dialog will open with a corresponding message.

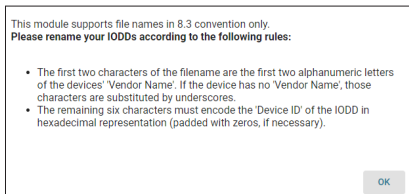


Fig. 6-37: Info message

6

WebUI/web interface (continued)

The *CONNECTED IO-LINK DEVICES* bar also displays help in the form of a list of currently connected IO-Link devices as well as the associated, required IODD file name (column *IODD FILENAME*).



To avoid manual renaming of the associated image files, we recommend uploading ZIP files with the IODD content.

Firmware

Under *FIRMWARE* you can see which version of the firmware is being used and when it was uploaded. Via *FIRMWARE UPLOAD*, you can upload a different firmware version. Only files in BFW format are supported.



Fig. 6-38: Firmware view

Output test

Via the *OUTPUT TEST* dialog, every output pin can be tested online. To set the output to either 0 or 1, the respective pin must be configured first as a *DIGITAL OUTPUT* via the *I/O PORTS* dialog. At a physical port, a maximum of 2 pins can be configured accordingly, depending on the variant. This can either be confirmed via *I/O PORTS > SET SPECIFIED CONFIGURATION FOR ALL PORTS: > DIGITAL OUT > SET ALL > SET ALL* or can be done individually. In the following example illustration, some available pins are configured as digital outputs:



Fig. 6-39: Output test (example)

6

WebUI/web interface (continued)

6.7 Notifications

Via the navigation bar, click on the corresponding icon (see chapter 6.2 on page 25) to access the notifications (see Fig. 6-40).

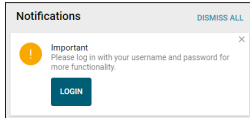


Fig. 6-40: Notification: Request for password change

The notification history can be deleted with *DISMISS ALL*.

6.8 REST API

Via the REST-API interface, identification data, process data and configuration settings of the IO-Link master and other connected devices can be requested and modified. The REST API interface is also used by the user interface of the web interface for communication with the module.

The REST API specification implemented in the module is saved in YAML files in the device and can be downloaded (*INFO > LOCAL DOCUMENTS*) and displayed, e.g., in the Swagger Editor (<http://editor.swagger.io/>). This module supports the following REST APIs:

- Generic REST API for Balluff devices and applications.
Base path of the REST API in the module:
`http://[ip-address]/api/balluff/v1/`
- The REST API (*JSON for IO-Link*) standardized by the IO-Link community.
Link to the official documentation (*JSON for IO-Link*) in the general download area of the IO-Link community:
<https://io-link.com/de/Download/Download.php> > IO-Link Integration area > *JSON Integration for IO-Link* (ZIP file)
Base path of the REST API in the module:
`http://[ip-address]/iolink/v1/`



The specification *JSON for IO-Link REST API* describes a further functionality for process data and parameters, which requires IODD support. This functionality is also not fully implemented in the current version. The module only supports uploading of IODDs. Writing/reading process data or parameters with their names is not supported.

Some examples below explain how REST API is applied.

- GET requests (chapter 6.8.2 bis 6.8.4) can be executed without login, as no system changes or modifications are made.
- POST methods (chapters 6.8.5 and 6.8.6) require the use of a login.

6.8.1 Login

Login is possible by entering the following address:

`http://[ip-address]/api/balluff/v1/users/login`

A JSON object is also specified, in which, as shown below, a user name and password are specified (see chapter 6.3.5 on page 27):

```
{
  "username": "[username]",
  "password": "[password]",
}
If the login was successful, a
bearer token is returned, e.g.:
{
  "bearer": "7euh07tdfawjej"
}
In addition, a cookie is set that must
be sent with each request, e.g.:
{
  "JSESSIONID:fgaa74a4fa2xdfg"
}
```

This token can now be used to perform methods that require authentication. For this, a corresponding request must be equipped with the following headers:

- **Authorization: Bearer 7euh07tdfawjej**
- **Cookie: JSESSIONID fgaa74a4fa2xdfg**



HTTPS results in the following different cookie:

- **Cookie: __Secure-JSESSIONID...**

6.8.2 Requesting the device identification of the module

The device identification data of an IO-Link master can be requested via the following addresses:

- [http://\[ip-address\]/api/balluff/v1/identification](http://[ip-address]/api/balluff/v1/identification)
- [http://\[ip-address\]/iolink/v1/masters/1/identification](http://[ip-address]/iolink/v1/masters/1/identification)

In the event of a successful request, an answer is supplied in the form of a JSON object with parameters such as the *vendorID*, the *serialNumber* of the *firmwareRevision* of the respective IO-Link master.

```

{
  "deviceId": 5329730,
  "vendorId": 888,
  "masterId": 5329730,
  "serialNumber": "DE01234567",
  "productId": "BNI005H",
  "vendorName": "Balluff",
  "vendorUrl": "https://www.balluff.com",
  "productName": "BNI PNT-508-105-Z015",
  "productInstanceUri": "https://www.balluff.com/BNI%20PNT-508-105-Z015/BNI005H/DE01234567",
  "firmwareRevision": "3.4 Update: 2 Revision: 6494",
  "hardwareRevision": "7",
  "manualUrl": "https://assets.balluff.com/WebBinary1/MAN_BNI_PNT_50X_105_Z015_DE_L19_DOK_883219_13_000.pdf",
  "masterType": "Master acc.V1.1",
  "applicationSpecificTag": "",
  "locationTag": "",
  "functionTag": ""
}

```

Fig. 6-41: Requesting the device identification

6.8.3 Requesting port information

All relevant configuration and status data for all IO ports of a module can be requested via:

[http://\[ip-address\]/api/balluff/v1/ports/information](http://[ip-address]/api/balluff/v1/ports/information)

```

[
  {
    "portNumber": 1,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 3,
        "unit": "ms",
        "deviceAlias": "Port_X00",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  },
  {
    "portNumber": 2,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 3,
        "unit": "ms",
        "deviceAlias": "Port_X01",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  },
  {
    "portNumber": 3,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 2,
        "unit": "ms",
        "deviceAlias": "masterIport3",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  },
  {
    "portNumber": 4,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 10,
        "unit": "ms",
        "deviceAlias": "masterIport4",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  },
  {
    "portNumber": 5,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 8,
        "unit": "ms",
        "deviceAlias": "masterIport5",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  },
  {
    "portNumber": 6,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 0,
        "unit": "ms",
        "deviceAlias": "masterIport6",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  },
  {
    "portNumber": 7,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 2,
        "unit": "ms",
        "deviceAlias": "masterIport7",
        "iqConfiguration": "DEACTIVATED"
      }
    }
  },
  {
    "portNumber": 8,
    "maxPowerSupply": {
      "value": 0.3,
      "unit": "A",
      "portType": "CLASS_A",
      "mode": "IOLINK_AUTOSTART",
      "cycleTime": {
        "value": 2,
        "unit": "ms",
        "deviceAlias": "my8Device",
        "iqConfiguration": "DIGITAL_INPUT"
      }
    }
  }
]

```

Fig. 6-42: Requesting the port identification

6.8.4 Requesting an IO-Link device parameter (applicationSpecificTag)

Device-specific parameters can be requested via the following addresses:

- [http://\[ip-address\]/api/balluff/v1/devices/identification](http://[ip-address]/api/balluff/v1/devices/identification)
- [http://\[ip-address\]/iolink/v1/devices/\[deviceAlias\]/identification](http://[ip-address]/iolink/v1/devices/[deviceAlias]/identification)

A request via the generic REST API is the bulk version of the identical request via *JSON for IO-Link*.

In the case of a request via *JSON for IO-Link*, a *deviceAlias* is also specified. This corresponds to the device designation that must be configured previously. The standard device designation is *Port_Xyz*, with *yz* representing the port number (e.g. *Port_00*).

In the case of successful execution, a JSON object with parameters such as *vendorID*, *productName* and *applicationSpecificTag* is supplied as a response.

6.8.5 Setting an IO-Link device parameter (applicationSpecificTag)



The use of a POST request requires login (see chapter 6.8.1 on page 42).

Device-specific parameters for connected IO-Link devices can be set via the following address:

[http://\[ip-address\]/iolink/v1/devices/{deviceAlias}/parameters/{index}/value](http://[ip-address]/iolink/v1/devices/{deviceAlias}/parameters/{index}/value)

The *deviceAlias* corresponds to the device designation of the IO-Link device (e.g. *Port_X00*). The *Index* reflects the ISDU parameter variable to be set in the IO-Link device. In the case of the *applicationSpecificTag*, this would be the value 24.

To set values, a JSON object must also be specified, in which corresponding parameters and values are specified as in the following example:

```

{
  "value": [
    49,
    50,
    51,
    52,
    53,
    54
  ]
}

```

In the case above, parameter 24 (*applicationSpecificTag*) was described with the ASCII string 123456.

Successful execution is not confirmed in the form of a JSON object, but with a Code 204 (*Successful operation*).

6

WebUI/web interface (continued)

6.8.6 Setting a master parameter (sysName)



The use of a POST request requires login (see chapter 6.8.1 on page 42).

A master parameter, such as *SysName*, can be set via the following address: `http://[ip-address]/api/balluff/v1/`

A JSON object with the corresponding information must also be specified:

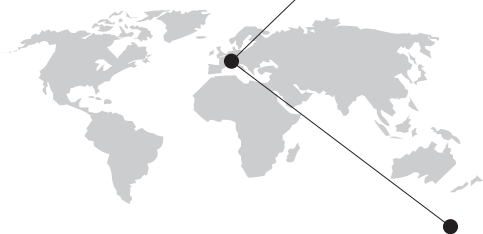
```
{  
  "sysName": "[SysName]"  
}
```

Successful execution is not confirmed in the form of a JSON object, but with a Code 204 (*Successful operation*).



If you are unable to implement your application case with the examples listed below and the information from the specifications for the REST APIs, please contact us with a description of your application case.

You can find the corresponding contact details at **www.balluff.com**.



www.balluff.com/go/contact

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BNI EIP-508- _05-Z015- _ _ _

User's guide



www.balluff.com

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1

About this guide

1.1 Validity

This guide provides all necessary information for the safe use of the following EtherNet/IP IO-Link master:

- **BNI-EIP-508-105-Z015**
Order code: BNI006A
With display
- **BNI-EIP-508-005-Z015-013**
Order code: BNI00HM
Without display

Read this guide and the other applicable documents completely before installing and operating the product.

Original User's guide

This guide was created in German. Other language versions are translations of this guide.

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1.2 Other applicable documents

Additional information about this product can be found at **www.balluff.com** on the product page, e.g. in the following documents:

- Data sheet
- Declaration of Conformity
- Disposal

1.3 Symbols and conventions

Individual **instructions** are indicated by a preceding triangle.

- Instruction

Action sequences are numbered consecutively:

1. Instruction 1
2. Instruction 2

Numbers unless otherwise indicated are decimals (e.g. 23). Hexadecimal numbers are represented with a preceding 0x (e.g. 0x12AB).

Buttons or selectable menu entries are described in *italic* and small caps, e.g. *SAVE*.

Menu commands are joined with a greater-than sign, e.g. "*SETTINGS > OPTIONS*" stands for the menu command *Options* from the *Settings* menu.



Note, tip

This symbol indicates general notes.



1.4 Explanation of the warnings

Always observe the warnings in this guide and the measures described to avoid hazards.

The warnings used here contain various signal words and are structured as follows:

SIGNAL WORD
Type and source of the hazard Consequences if not complied with ► Measures to avoid hazards

The individual signal words mean:

NOTICE Identifies a danger that could damage or destroy the product .
 CAUTION The general warning symbol together with the signal word CAUTION indicates a hazard which can lead to slight or moderate injuries .
 DANGER The general warning symbol in conjunction with the signal word DANGER identifies a hazard which, if not avoided, will certainly result in death or serious injury .

1.5 Technical terms and abbreviations used

C/Q	Switching and communication line
EIP	EtherNet/IP
EMC	Electromagnetic compatibility
FE	Functional earth
GND	Electrical ground, 0 V
I/O	Standard inputs and outputs
IOL	IO-Link
ISDU	IO-Link-Parameter (Index Service Data Unit)
n.a.	Not available
UA	Actuator supply
US	Sensor supply

1.6 Pictures

Product views and pictures in these operating instructions may differ from the specified product.

2

Safety notes

2.1 Intended use

The Ethernet/IP-IO-Link master serves as decentralized I/O and IO-Link Block for connection to an Ethernet/IP fieldbus and is intended for use in industrial applications.

The module may only be operated with an approved power supply. Only approved lines may be connected.

Proper function according to the specifications in the technical data is only assured when the product is used solely as described in the user's guide and the respective documents as well as in compliance with the technical specifications and requirements and only with suitable original Balluff accessories.

Otherwise, there is deemed to be unintended use.

Unintended use is not permitted and will result in the loss of warranty and liability claims against the manufacturer.

2.2 Reasonably foreseeable misuse

The product is not intended for the following applications and areas and may not be used there:

- In safety-oriented applications in which personal safety depends on the device function
- In explosive atmospheres
- In food applications

2.3 General safety notes

Activities such as **installation**, **connection** and **startup** may only be carried out by qualified personnel.

Qualified personnel are persons whose technical training, knowledge and experience as well as knowledge of the relevant regulations allows them to assess the work assigned to them, recognize possible hazards and take appropriate safety measures.

The **operator** is responsible for ensuring that local safety regulations are observed.

In particular, the operator must take steps to ensure that a defect in the product will not result in hazards to persons or equipment.

The product must not be opened, modified or changed. If defects and unresolvable faults occur in the product, take it out of service and secure against unauthorized use.

BNI modules generally have good chemical and oil resistance. When used in aggressive media (e.g. chemicals, oils, lubricants and coolants) in high concentrations (e.g. due to low water content), the material resistance must be checked in advance for the specific application. In the event of failure or damage to the BNI modules due to these kinds of aggressive media, claims for defects are ruled out.

Hot surfaces

The housing heats up under normal operating conditions. There is a risk of burn injuries. Avoid direct skin contact with the surface.

3

Scope of delivery, transport and storage

3.1 Scope of delivery

- IO-Link master
- 1 × Screw M4x6
- 1 × spring lock washer
- 4 × cap
- 20 × Inscription label
- Grounding strap
- Installation guide

Accessories are not included in the scope of delivery and must be ordered separately.



Recommended accessories can be found at
www.balluff.com on the product page.

3.2 Transport

- ▶ Transport product to location of use in original packaging.

3.3 Storage conditions

- ▶ Store product in original packaging.
- ▶ Observe ambient conditions (see *Ambient conditions* on page 13).

4

Product description

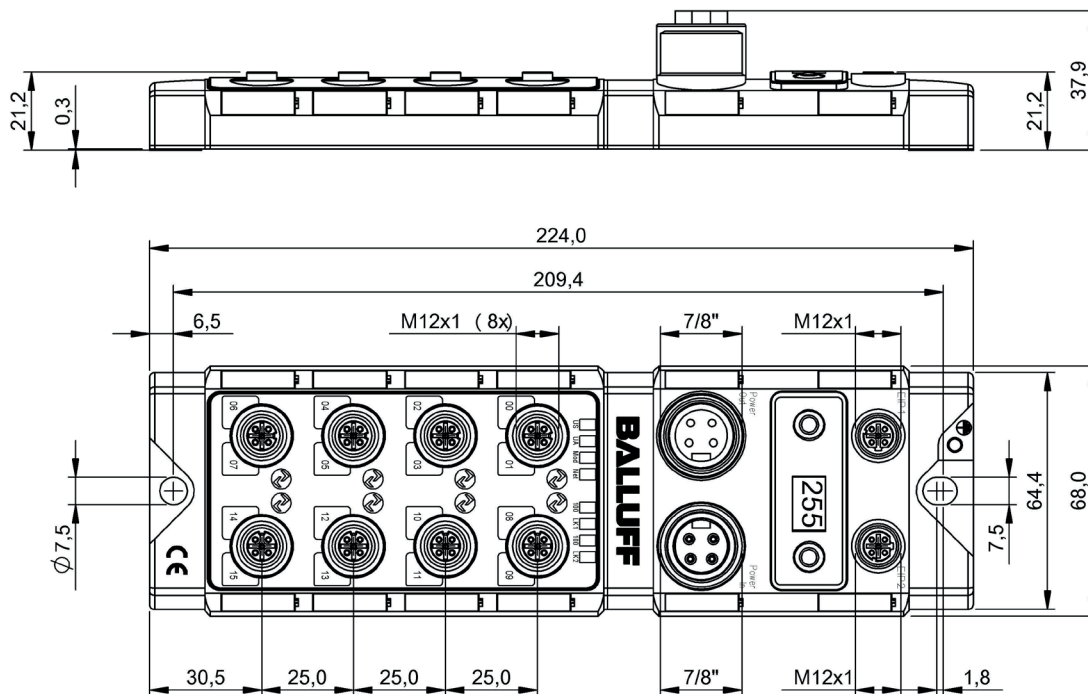


Fig.4-1: Dimensions, design and function

4.1 Construction

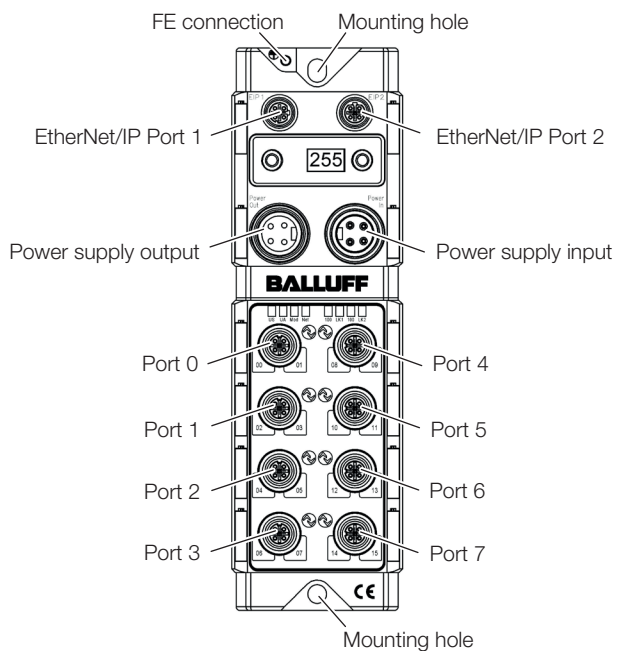


Fig.4-2: Device overview

4.2 Function

The Ethernet/IP-IO-Link master is a decentralized and configurable gateway that processes and evaluates the input and output signals of standard sensors and actuators as well as process data from connected IO-Link devices.

The data is transmitted via an existing fieldbus interface to a higher-level controller set up by the user for further processing.

A web server is available on the IO-Link master for configuration and diagnostics.



For configuration information, see the configuration guide at www.balluff.com on the product page.

4

Product description (continued)

4.3 Display elements

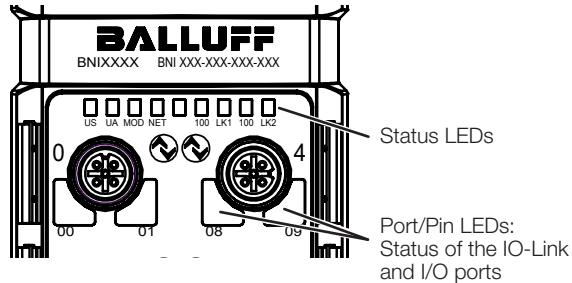


Fig.4-3: Display elements

Port/Pin LEDs

LED number	Assignment
Even	Pin 4
Odd	Pin 2

Tab. 4-1: Port/Pin LEDs

Port/Pin LEDs Standard Port

Signal	Meaning
Off	State of input or output pins is 0
Yellow, static	State of input or output pins is 1
Both LEDs red flashing	Short circuit of sensor supply between pin 1 and pin 3
Red, static	Short circuit at output on pin 2/4 against pin 3
Red, static	No high signal at diagnostic input
Red, static	24 V input signal on configured output (actuator warning)

Tab. 4-2: LEDs Standard Port

Port/Pin LEDs IO-Link Port

Signal	Meaning
Green, static	IO-Link connection active
Green flashing	No IO-Link connection or incorrect IO-Link device
Green, fast flashing	IO-Link: Preoperate during data storage
Red, fast flashing	Validation failed / incorrect configuration of the IO-Link data length
Red, fast flashing	Data storage failed / incorrect device for data storage
Red, static	IO-Link: Short circuit of pin 4 against pin 3

Tab. 4-3: LEDs IO-Link Port

Status LEDs

LED	Signal	Meaning
US	Green, static	Input voltage OK
	Red flashing	Input voltage low (< 18 V)
UA	Green, static	Output voltage OK
	Red flashing	Output voltage low (< 18 V)
	Red, static	No output voltage present (< 11 V)
MOD	Green flashing	Incorrect or no module configuration
	Green, static	Module in progress.
	Red flashing	Fixed bus cycle not possible
	Red/Green flashing	Starting sequence
NET	Off	Module has no IP address.
	Green flashing	Module has an IP address, but no connection established.
	Green, static	Connection is established.
	Red flashing	Connection timeout
	Red/Green flashing	Starting sequence
100	Off	Transmission rate: 10 Mbit/s
	Yellow, static	Transmission rate: 100 Mbit/s
LK1/2	Green flashing	Data transfer

Tab. 4-4: Status LEDs

4.4 Labeling

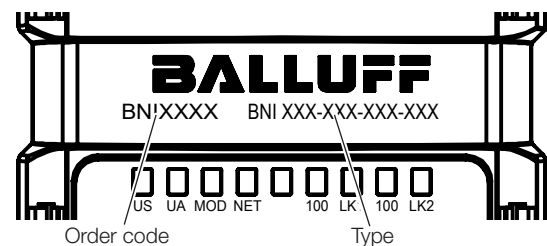


Fig.4-4: Labeling (example)

5

Installation and connection

5.1 Installation



For dimensions, see Fig.4-1 on page 7.

- Fasten the module with 2 M6 screws and a maximum tightening torque of 3 Nm using the mounting holes (see Fig.4-2 on page 7).

5.2 Electrical connection

Requirements for complying with the protection classes:

For IP67, all plugs and caps must be properly connected and the tightening torque of 0.6 Nm must be observed (see data sheets of connectors and caps).

5.2.1 Power supply

NOTICE

Unwanted voltage dips

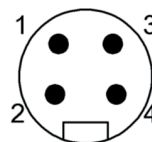
Non-separated electric circuits of the power supplies for sensor and actuator can lead to unwanted voltage dips of the sensor supply when switching actuators.

- Fuse the power supplies for sensors and actuators separately.
- Make sure that the power supply of the device is sufficiently dimensioned to cover start-up and peak currents and design the fuse protection concept accordingly.



- Establish power supply of sensor/bus and actuator via a separate power source if possible.
- The total current for the sensor and actuator supply must not exceed 9 A each.
- For UL: Observe cable requirements and power supply requirements (see chapter 8.7.2 on page 14)!

7/8" connector



7/8" socket

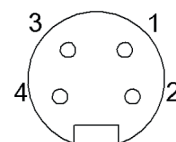


Fig.5-1: Top view of 7/8" plug (left) and socket (right)

Pin	Signal	Description
1	UA	Actuator supply +24 V
2	US	Module/sensor supply +24 V
3	GND	Common ground
4		

Tab. 5-1: Pin assignment

5

Installation and connection (continued)

5.2.2 EtherNet/IP interface

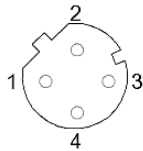


Fig.5-2: Top view of M12 socket, D-coded

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

Tab. 5-2: Pin assignment

5.2.3 I/O-Port

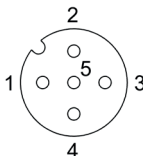


Fig.5-3: Top view of M12 socket

Pin	Signal	Description
1	US	+24 V, 2 A
2	I/O	Input / Output (2 A)
3	GND	Electrical ground 0 V
4	I/O, C/Q	Input / Output (2 A) / IO-Link
5	n. a.	Not available

Tab. 5-3: Pin assignment

i For the digital sensor inputs, see the directive on inputs EN 61131-2, type 3.

i Unused ports must be covered with caps to ensure IP67 protection.

i The IO-Link output is fed from the sensor supply.

5.2.4 Grounding

To counteract EMC interference, the functional earth connection must be used.

- Connect the earth terminal to the functional earth (FE) of the machine.

i The FE connection between the housing and the machine must have a low impedance and be as short as possible.

- Use the grounding strap included in the scope of delivery.

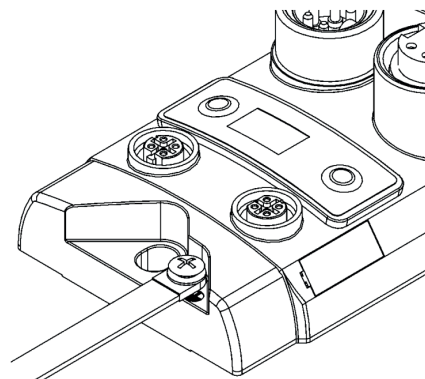


Fig.5-4: Ground connection

5.3 Cable routing

Cable length

The Ethernet cable may be max. 100 meters long.
 The IO-Link single-ended cordset may be max. 20 meters long.

6

Startup and operation

6.1 Startup


DANGER

Uncontrolled system movement

When starting up, if the network module is part of a closed loop system whose parameters have not yet been set, the system may perform uncontrolled movements. This could result in personal injury and equipment damage.

- ▶ Persons must keep away from the system's hazardous zones.
- ▶ Startup must be performed only by trained technical personnel.
- ▶ Observe the safety instructions of the equipment or system manufacturer.

1. Check connections for tightness and correct polarity. Replace damaged connections.
2. Turn on the system.

 Check for the correct values, especially after replacing the BNI or after repair by the manufacturer.

6.2 Operation

CAUTION

Danger of burns from hot surfaces


The housing heats up under normal operating conditions. There is a risk of burn injuries.

- ▶ Avoid direct skin contact with the surface.

Operating notes

- Regularly check function of the BNI and all associated components.
- Take the sensor out of service whenever there is a malfunction.
- Secure the system against unauthorized use.
- Check fasteners and retighten if needed.

6.3 Cleaning

 For UL requirements, see chapter 8.7.2 on page 14.

The product may only be cleaned when switched off.

6.4 Maintenance

The product is maintenance-free.

Depending on the operating conditions, it may be necessary to regularly check and, if necessary, retighten the tightening torques of the plugs and caps to maintain the protection classes (see chapter 5.2 on page 9).

7

Repair, disassembly and disposal

7.1 Repair

Repairs to the product may only be performed by Balluff.
If the product is defective, contact our Service Center.

7.2 Disassembly

- ▶ Only disassemble the device when it is de-energized!

7.3 Disposal

- ▶ Observe the national regulations for disposal.



Additional information can be found at
www.balluff.com on the product page.

8

Technical data

The specifications are typical values for 24 V DC at room temperature.

The product is immediately ready for use.



For performance data for UL, see chapter 8.7.2 on page 14.



Further data can be found at www.balluff.com on the product page.

8.1 Ambient conditions

Ambient temperature	−25...+70 °C
Storage temperature	−25...+70 °C
Protection class (in screwed state)	IP67

8.2 Electrical data

Operating voltage U_b	18...30.2 V DC, as per EN 61131-2
Residual ripple	< 1%
Input current at 24 V	130 mA

8.3 Electrical connection

Connection (power supply IN/ OUT)	7/8", 4-pin, plug/socket
Input/output ports	M12, A-coded, 8 × socket

8.4 Interface

EtherNet/IP

EtherNet/IP Port	2 × 10Base/100Base-Tx
Connection for EtherNet/IP Port	M12, D-coded, socket
Cable types as per IEEE 802.3	Shielded twisted pair min. STP CAT 5/ STP CAT 5e
Data transmission rate	10/100 Mbit/s
Max. cable length	100 m
Flow control	Half-duplex/full-duplex (IEEE 802.33x-Pause)

IO-Link

IO-Link version	1.1.3
Transmission rate	
COM1	4.8 kBaud
COM2	38.4 kBaud
COM3	230.4 kBaud
Port class	Port Class A (8 ×)

8.5 Materials

Housing material	Zinc die-cast
------------------	---------------

8.6 Mechanical features

Installation	2-hole screw mounting
Ground strap fastening	Screw M4
Dimensions (W × H × D)	68 × 224 × 37.9 mm
Weight	Approx. 670 g

8

Technical data (continued)

8.7 Approvals and markings



Additional information on directives, approvals and standards can be found at **www.balluff.com** on the product page.

The product meets the requirement of the EN 61131-2 standard for zone A.

8.7.1 CE



The CE Mark verifies that our products meet the requirements of the current EU Directive.

8.7.2 UL

Cleaning

Clean the product only with dry cloth or cloth dampened only with water!

UL requirements



File E319845
 Classification Type 1
 Ambient temperature +45 °C

The power supply has to be an isolated type or SELV type.

Performance data

- Power input, nominal rated voltage 24 V DC
 - 130 mA maximum consumption
 - 9 A including all output loads
- Power output, nominal rated voltage 24 V DC
 - max. 8.8 A
- Digital input, nominal rated voltage 24 V DC
 - max. 30 mA/pin (point)
- Digital output, nominal rated voltage 24 V DC
 - Class A IO-Link Port pin 1/3
 - 0.5 A/Port Pilot Duty
 - 1.6 A/port (point) Resistive / General use
 - Class A IO-Link Port pin 2/3
 - 0.5 A/Port Pilot Duty
 - 2 A/port (point) resistive/ general use (switchable)
 - Class A IO-Link Port pin 4/3
 - 0.5 A/Port Pilot Duty
 - 2 A/port (point) resistive/ general use (switchable) + IO-Link
 - 8.8 A or less per device

Cable sizes

Power supply cable:

Listed or R/C cable (CYJV2) with 7/8" 4-pin threaded connector with minimum 24 V, minimum 9 A for all models. S, SJ, SO, ST, SV or R/C (AVLV2) cables identified or specified on the UL Style Page as suitable for external connections, rated 300 V or greater, 14 AWG or larger, unless identified with the maximum load current and overcurrent protection for the cable in accordance with the table below.

Mains connection cable:

Listed or R/C cable (CYJV2) with a 7/8", 4-pin female threaded connector and a rated voltage of at least 24 V and at least 9 A for all models. Listed S, SJ, SO, ST, SV or R/C cable (AVLV2) marked or specified on the UL Style Page as suitable for external connections, rated 300 V minimum and 14 AWG minimum, unless marked with the maximum load current and overcurrent protection for the cable in accordance with the table below.

Communication cable:

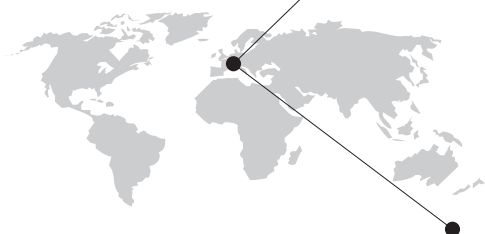
Listed or R/C cable (CYJV2) with A, B, or D-coded male or female threads, as applicable, for connection to Article 9, M12 plug rated 24 V minimum and 1 A minimum. R/C cable (AVLV2), identified or specified on the UL Style Page as suitable for external connections, with minimum 28 AWG and minimum 300 V.

Input/output cable:

Listed or R/C cable (CYJV2) with A-coded M12 threaded connector, minimum 24 V, minimum 4 A. R/C cable (AVLV2), identified or specified on the UL Style Page as suitable for external connections, rated 300 V or greater, 20 AWG or larger, unless the maximum load current and overcurrent protection for the cable are specified in accordance with the table below.

Cable conductor size, AWG	14	16	18	20	22	24	26	28	30
Overcurrent protection maximum amperage [amps]	12	8	5.6	5	3	2	1	0.8	0.5
Maximum load [amps]	9	8	5.6	4	2.4	1.6	0.8	0.6	0.4

Tab. 8-1: Cable sizes



www.balluff.com/go/contact

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