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## 1 General

- 1.1. Structure of the Guide** This guide is arranged so that one chapter builds upon 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 bulleted lists.
- Entry 1
  - Entry 2
- Actions** Action instructions are indicated by a preceding triangle. The result of an action is indicated by an arrow.
- Instruction 1
  - Result of 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<sub>hex</sub>) or the prefix "0x" (e.g., 0x00).
- Cross-references** Cross-references indicate where additional information on the topic is located.
- 
- 1.3. Symbols**
-  **Note**  
 This symbol indicates general notes.
- 
-  **Attention!**  
 This symbol indicates a security notice which must be observed.
- 
- 1.4. Abbreviations**
- |     |                               |     |                              |
|-----|-------------------------------|-----|------------------------------|
| BNI | Balluff Network Interface     | US  | Sensor supply undervoltage   |
| I   | Standard input port           | UA  | Actuator supply undervoltage |
| EIP | EtherNet/IP™                  | LK  | Link                         |
| EMC | Electromagnetic Compatibility | Mod | Module Status                |
| FE  | Function earth                | Net | Network                      |
| O   | Standard output port          |     |                              |
- 1.5. Deviating Views** Product views and illustrations in this guide may differ from the actual product. They are intended only as illustrative material.

### 2.1. Intended Use

The BNI EIP-... is a decentralized IO-Link, input and output module for connecting to the EtherNet/IP™ network.

### 2.2. Installation and Startup



#### Attention!

Installation and startup are to be performed by trained technical personnel only. Skilled specialists are people who are familiar with the work such as installation and the operation of the product and have the necessary qualifications for these tasks. Any damage resulting from unauthorized tampering or improper use shall void warranty and liability claims against the manufacturer. The operator is responsible for ensuring that the valid safety and accident prevention regulations are observed in specific individual cases.

### 2.3. General Safety Notes

#### Commissioning and inspection

Before commissioning, carefully read the User's Guide.

The system must not be used in applications in which the safety of persons depends on the function of the device.

#### Intended use

Warranty and liability claims against the manufacturer shall be rendered void by damage from:

- Unauthorized tampering
- Improper use
- Use, installation or handling contrary to the instructions provided in this User's Guide.

#### Obligations of the owner/operator

The device is a piece of equipment in accordance with EMC Class A. This device can produce RF noise. The owner/operator must take appropriate precautionary measures against this for its use. The device may be used only with a power supply approved for this. Only approved cables may be connected.

#### 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.

Approved use is ensured only when the housing is fully installed.

### 2.4. Resistance to Aggressive Substances



#### Attention!

The BNI modules always have good chemical and oil resistance. When used in aggressive media (such as chemicals, oils, lubricants and coolants, each in a high concentration (i.e. too little water content)), the material must first be checked for resistance in the particular application. No defect claims may be asserted in the event of a failure or damage to the BNI modules caused by such aggressive media.

### Dangerous Voltage



#### Attention!

Before working on the device, switch off its power supply.

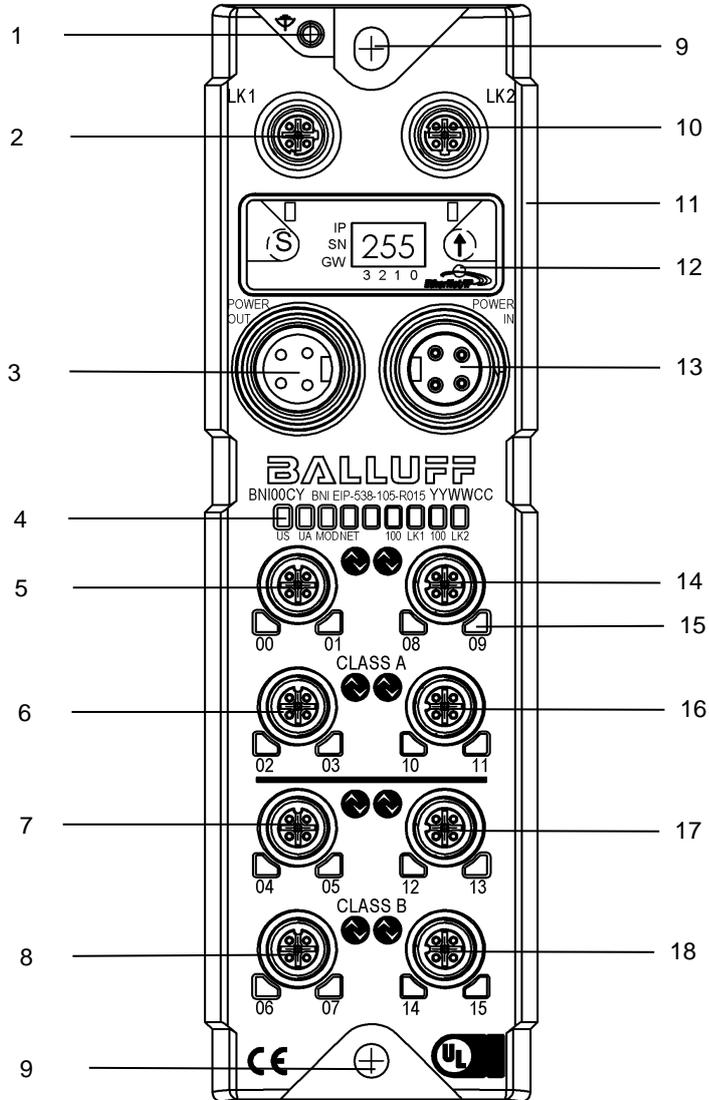


#### Note

In the interest of continuous improvement of the product, Balluff GmbH reserves the right to change the technical data of the product and the content of these instructions at any time without notice.

3 First Steps

3.1. Module Overview



- |   |                    |    |                    |
|---|--------------------|----|--------------------|
| 1 | Ground connection  | 10 | EtherNet/IP Port 2 |
| 2 | EtherNet/IP Port 1 | 11 | Labels             |
| 3 | Power OUT          | 12 | Display            |
| 4 | Status LEDs        | 13 | Power IN           |
| 5 | Port 00 / 01       | 14 | Port 08 / 09       |
| 6 | Port 02 / 03       | 15 | Pin/Port LEDs      |
| 7 | Port 04 / 05       | 16 | Port 10 / 11       |
| 8 | Port 06 / 07       | 17 | Port 12 / 13       |
| 9 | Mounting hole      | 18 | Port 14 / 15       |

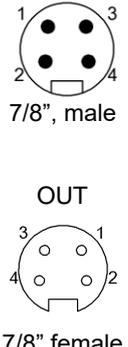
### 3 First Steps

#### 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

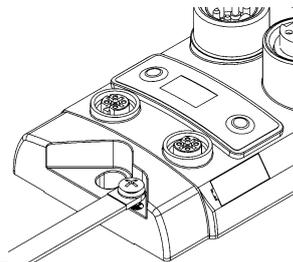
##### Power supply

	Pin	Function	Description
 <p>IN 7/8", male</p> <p>OUT 7/8" female</p>	1	P24	Extra power supply (+)
	2	+24 V	Module / sensor power supply
	3	0 V	GND modul- / sensor supply
	4	N24	Extra power supply (-)

**Note**  
 Provide sensor/bus power and actuator power from separate power sources if possible. The total current of the module must not exceed 12 A, even if the module is looped through a circuit.

**Attention!**  
**Do not separate supply voltages**  
**Non-separate voltage supply circuits for sensor and actuator can result in undesired voltage drops in the sensor supply when switching actuators.**  
 ► Therefore always use separately protected voltage supplies for sensors and actuators.  
 Also be sure to sufficiently dimension the voltage supply of the device in order to cover startup and peak currents. Design the fusing concept accordingly.

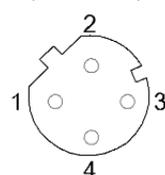
##### Grounding



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

##### EtherNet/IP Interface

M12, D-coded, female

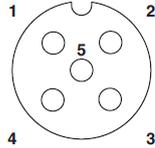


Pin	Function	
1	Tx+	Transmit Data +
2	Rx+	Receive Data +
3	Tx-	Transmit Data -
4	Rx-	Receive Data -

**3 First Steps**

**IO-Link Port**

M12, A-coded, female



Pin	Function	
	Class A	Class B
1	+24 V, 1.6 A	+24 V, 1.6 A
2	Input / Output	P24
3	0V	0V
4	Input / Output / IO-Link	Input / IO-Link
5	n.a.	N24



**Note**

The digital inputs conform to the input characteristics in EN 61131-2, Type 3



**Note**

Class A Pin 2 outputs are powered via the sensor voltage supply.



**Note**

The total current of the module must not exceed 9 A.



**Note**

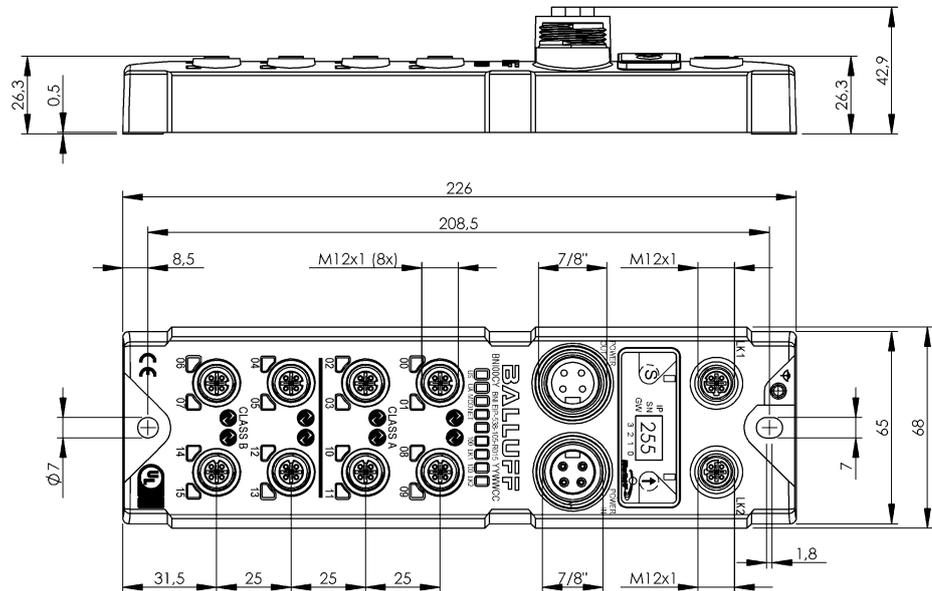
Unused sockets must be fitted with cover caps to ensure the IP 67 degree of protection.

**Port**

	Port	
	00-03 / 08-11	04-07 / 12-15
BNI EIP-538-105-R015	Class A	Class B

## 4 Technical Data

### 4.1. Dimensions



### 4.2. Mechanical Data

Housing material	Plastic housing, resistant (Fortron 6165 A6 black)
Enclosure rating per IEC 60529	IP 67 (only when plugged-in and threaded-in)
Supply voltage	7/8" 4-pin, connector / female
Dimensions (W x H x D in mm)	68 x 226 x 42.9
Type of mounting	Screw mounting with 2 mounting 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

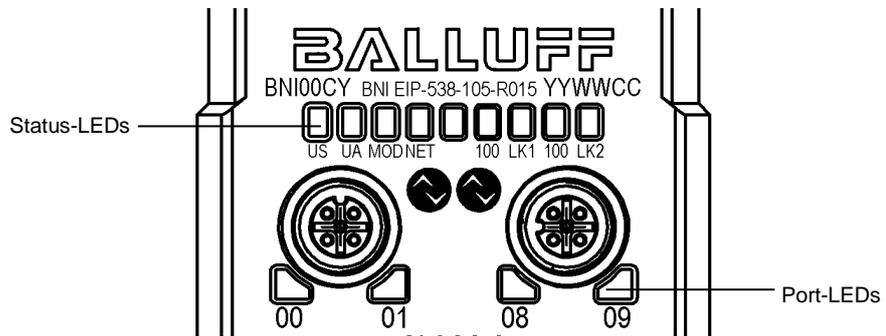
Power supply	18...30.2 V DC, in accordance with EN 61131-2
Ripple	< 1%
Input current	130 mA @ 24V

4 Technical Data

4.5. Ethernet/IP

EtherNet/IP Port	2 x 10Base/100Base Tx
Cable type (IEEE 802.3)	Shielded, twisted pair min. STP CAT 5/ STP CAT 5e
Data transfer rate	10/100 Mbps
Max. cable length	100 m
Flow control	Half Duplex/Full Duplex (IEEE 802.3x-Pause)

4.6. Function Indicators



Module Status

LED	Indicator	Function
US	Green	Sensor voltage OK
	Red, flashing	Sensor supply less than 18 V
UA	Green	Actuator supply OK
	Red, flashing	Actuator supply less than 18 V
	Red	No actuator power (<11V)
Mod	Green	No error
	Green, flashing	Wrong or no configuration
	Red, flashing	Fixed bus clock is not possible
	Red/green, flashing	Initialization sequence
Net	Off	No IP address
	Green	Connection established
	Green, flashing	Module has IP, but there is no connection
	Red, flashing	Connection timeout
	Red/green, flashing	Initialization sequence
100	Off	Transmission rate: 10 Mbit/s
	Yellow	Transmission rate: 100 Mbit/s
LK 1/2	Green	Data transfer

**Port**

Each port has two bicolored LEDs for displaying the I/O statuses.

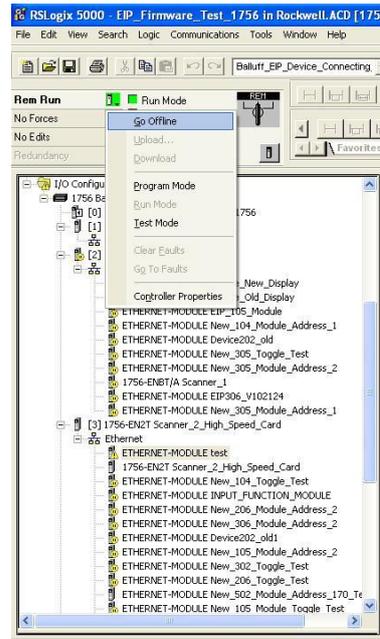
	Display	Status	Description
I/O port	Off	I/O status	The status of the input or output pins is 0
	Yellow	I/O status	The status of the input or output pins is 1
	Red	Short-circuit	Short-circuit at dedicated pin
IO-Link port	Green	IO-Link	IO-Link communication active
	Green, flashing	IO-Link	No IO-Link communication or wrong IO-Link device
	Grün, flashing quickly	IO-Link	IO-Link pre-operate during data storage
	Red	Short-circuit	IO-Link Short-circuit between pin 4 and pin 3
	Red, flashing quickly	IO-Link	Validation failed / Data storage failed / Wrong length

## 5 Integration

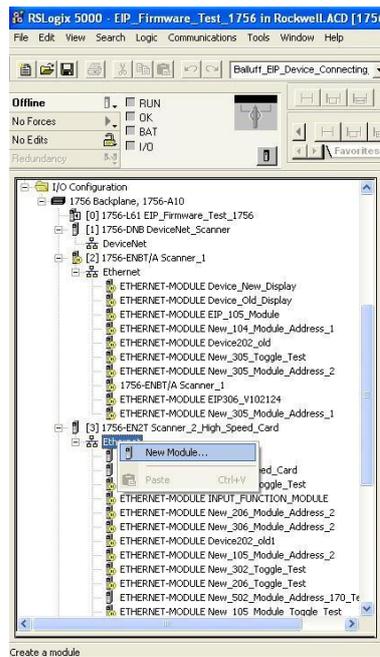
### 5.1. Integration in Rockwell RS Logix 5000

Here you see an example of how the module can be integrated into a Rockwell RS Logix 5000:

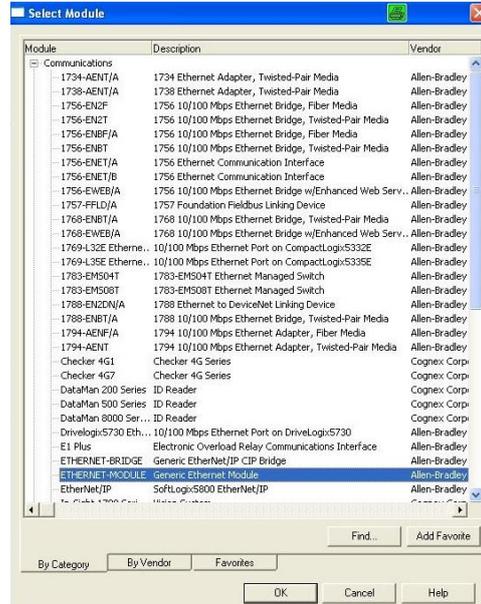
First go offline



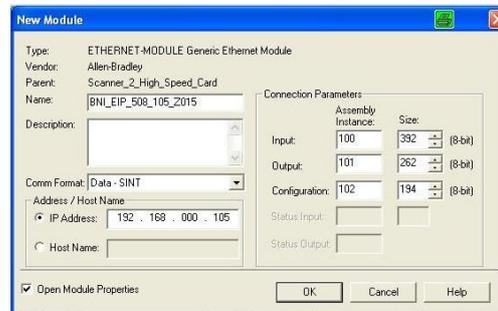
Right-click Ethernet (on the correct scanner card)  
Select a new module



Then select the general Ethernet module as the ETHERNET module in the communication path.

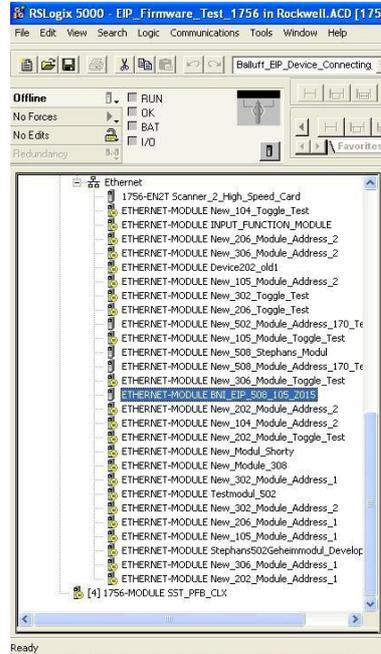


Now enter a user-defined tag name to select the Data-SINT general format, enter the IP address of the module and the correct connection parameters.

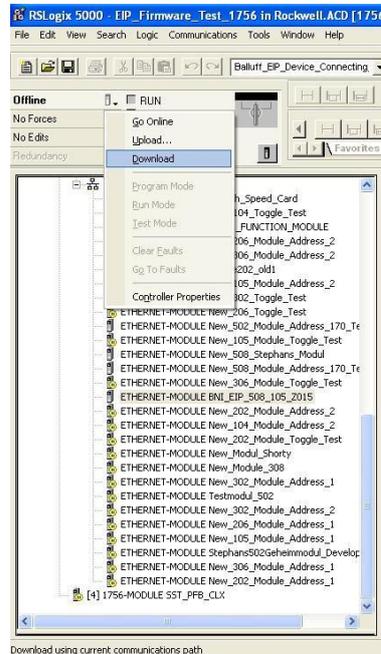


## 5 Integration

The new module and corresponding controller tags are generated automatically.



Then download the configuration.



## 5 Integration

When the download is done, you can observe and control the tags using the Controller Tags option. Make sure you select the correct tag name, which you configured beforehand.

The input, output and configuration data for this is described on the following pages.

You can use these tags for the programming, too.

The screenshot shows the Rockwell Automation RSLogix 5000 software interface. The main window displays the 'Controller Tags' window for the project 'EIP\_Firmware\_Test\_1756'. The left pane shows the project tree with the 'Controller Tags' folder expanded. The main pane shows a list of tags with the following columns: Name, Value, Force Mask, Style, and Data Type. The tags listed are:

Name	Value	Force Mask	Style	Data Type
+ Balluff_EIP_Device_Status_Masked_II	24576		Decimal	INT
+ Balluff_EIP_Device_Status_Masked_III	24576		Decimal	INT
+ Balluff_EIP_Device_Status_Masked_IV	24576		Decimal	INT
+ Balluff_EIP_Device_Status_Masked_V	24576		Decimal	INT
+ Balluff_EIP_Device_Status_Masked_VI	24576		Decimal	INT
+ Balluff_EIP_Device_Status_V	24576		Decimal	INT
+ Balluff_EIP_Device_Status_VI	24576		Decimal	INT
- BNI_EIP_508_105_2015.C	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ BNI_EIP_508_105_2015.C.Data	(...)	(...)	Hex	SINT[400]
- BNI_EIP_508_105_2015.I	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ BNI_EIP_508_105_2015.I.Data	(...)	(...)	Decimal	SINT[32]
- BNI_EIP_508_105_2015.O	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ BNI_EIP_508_105_2015.O.Data	(...)	(...)	Decimal	SINT[32]
+ Device_New_Display.C	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device_New_Display.I	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device_New_Display.O	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device_Old_Display.C	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device_Old_Display.I	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device_Old_Display.O	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device202_old.C	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device202_old.I	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device202_old.O	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device202_old1.C	(...)	(...)	(...)	AB.ETHERNET_MODU...
+ Device202_old1.I	(...)	(...)	(...)	AB.ETHERNET_MODU...

**5 Integration**

**5.2. Address Specifications**

These settings are factory set.

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

**5.3. Data Configuration**

Please enter the following values in the control system. They describe the data sizes of the input, output and configuration data.

	Instance ID	Data length
		538
INPUT	100	392
OUTPUT	101	262
CONFIG	102	194

**5.4. Configuration Data**

The following tables show an allocation of the configuration data sequence. The standard values specified below describe a configuration with the IO-Link function at Pin 4 and standard I/O functions at Pin 2 and 4 of each port. The input and output functions of the configured standard I/O ports are set via the process data.

**BNI EIP-538-x05-xxxx**

Byte	Slot	Module part	Description
0...1	1	Module	General configuration for the entire module
2...25	2	IO-Link port 0	Configuration of IO-Link port 0
26...49	3	IO-Link port 1	Configuration of IO-Link port 1
50...73	4	IO-Link port 2	Configuration of IO-Link port 2
74...97	5	IO-Link port 3	Configuration of IO-Link port 3
98...12	6	IO-Link port 4	Configuration of IO-Link port 4
122...1	7	IO-Link port 5	Configuration of IO-Link port 5
146...1	8	IO-Link port 6	Configuration of IO-Link port 6
170...1	9	IO-Link port 7	Configuration of IO-Link port 7

**Module Configuration BNI EIP-538-x05-xxxx**

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		

**IO-Link Port Configuration**

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
2	Basis		Time						Cycle time
3	Validation type								Validation type 0 No validation 1 Compatible (VID + DID) 2 Identical (VID + DID + SerNum)
4	Vendor ID 1								Vendor ID
5	Vendor ID 2								
6	Device ID 1								Device ID
7	Device ID 2								
8	Device ID 3								
9	Serial number 1								Serial number
...	...								
24	Serial number 16								
25	Parameter server								Parameter server 0x8X Enable 0x0X Disable 0x40 Delete 0xX1 Enable upload 0xX2 Disable download
...	The data of the other IO-Link ports are structured identically and described in the following.								

5 Integration

**Cycle Settings**

This parameter can be used to affect the IO-Link communication speed. Calculated using the multiplier and the time base, the IO-Link cycle time can be increased. The time base is described the lower table. The multiplier is entered in decimal form from 0...63.

Bit								Description
7	6	5	4	3	2	1	0	
Time base		Multiplier						<p><b>Bit 0 to 5: Multiplier</b> These bits contain a 6-bit multiplier for the calculation of MasterCycleTime or MinCycleTime. Permissible values for the multiplier are 0 to 63.</p> <p><b>Bit 6 to 7: Time Base</b> These bits specify the time base for the calculation of MasterCycleTime or MinCycleTime.</p>

Possible values of MasterCycleTime and MiniCycleTime

Time base encoding	Time base value	Calculation	Cycle time
00	0.1 ms	Multiplier x time base	0.4 ms to 6.3 ms
01	0.4 ms	6.4 ms + multiplier x time base	6.4 ms to 31.6 ms
10	1.6 ms	32.0 ms + multiplier x time base	32.0 ms to 132.8 ms
11	Reserved	Reserved	Reserved
NOTE: The value 0.4 results from the minimum possible transmission time according to A.3.7.			

**Validation Settings**

**No validation:** validation deactivated, every device will be accepted.  
**Compatibility:** manufacturer ID and device ID are compared to the IO-Link device data.  
**Identity:** manufacturer ID and device ID and serial number are compared to the IO-Link device data. The IO-Link communication is only started if there is a match.

**Parameter Server**

**Enable:** data management functions enabled, parameter data and identification data of the IO-Link device are stored permanently.

**Disable:** data management functions disabled, stored parameter data and identification data of the IO-Link device remain stored.

**Deleted:** data management functions disabled, stored parameter data and identification data of the IO-Link device are deleted.

**Enable upload:**

If only the upload is enabled, the master always starts an upload of the parameter data. In this case, the upload is independent of the upload flag of the IO-Link device. If no data is stored in the Master Port, an upload likewise takes place. (e.g. after deleting the data or before the first data upload)

**Enable download:**

If only the download is enabled, the master always starts a download of the parameter data. In this case, the download is likewise independent of the upload flag of the IO-Link device. If no data is stored in the Master Port, however, an upload takes place first. (e.g. after deleting the data or before the first data upload)

**Enable upload and download:**

If the upload and download are enabled, different parameter sets are distinguished depending on the upload flag of the IO-Link device.

If no parameter data is stored in the IO-Link master port, an initial upload takes place. (e.g. after deleting the data or before the first data upload)

If the upload flag is set on the IO-Link device, an upload of the parameter data always takes place.

If no upload flag is set and parameter data has already been stored, a download of the parameter data always takes place.

**Note**

After the upload of the parameter data, the vendor ID and device ID of the connected IO-Link device are also still saved until the data records are deleted.



When the connected IO-Link device is started, a validation takes place. Thus, only an IO-Link device of the same type can be used for the data management. If an IO-Link device of a different type is to be used, the contents of the parameter server must be deleted.

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

**Upload Flag on the IO-Link Device**

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

To enable the upload flag of an IO-Link device, the data value 0x05 must be entered in the index 0x02, subindex 0.

(For information about configuration via IO-Link, refer to the "Web Server" chapter under "Device Properties" or the "Configuration via Explicit Messages" chapter under "IO-Link Device Parameterization")

**6 Configuration via Explicit Messages**

**QuickConnect**

The BNI EIP-50x-x05-X0xx modules can be booted up and inserted faster using the QuickConnect function.

Enabling QuickConnect automatically takes over all necessary port properties on the module:

- Static IP address
- Ports at 100 Mbps full-duplex
- Auto-negotiation disabled
- Auto MDI-X disabled
- Prepared for linear topology

You can configure **QuickConnect** via the following class instance attribute of the explicit messages:

Class	Instance	Attribute	Value
245 (0xF5)	1 (0x01)	12 (0x0C)	0: disabled (default) <b>1: enabled</b>



**Note**

For QuickConnect to be enabled, ACD (Address Conflict Detection) must also be enabled. This is switched on by default.

The **ACD** can be reviewed and changed using the following class instance attributes of the explicit messages:

Class	Instance	Attribute	Value
245 (0xF5)	1 (0x01)	10 (0x0A)	0: disabled <b>1: enabled (default)</b>

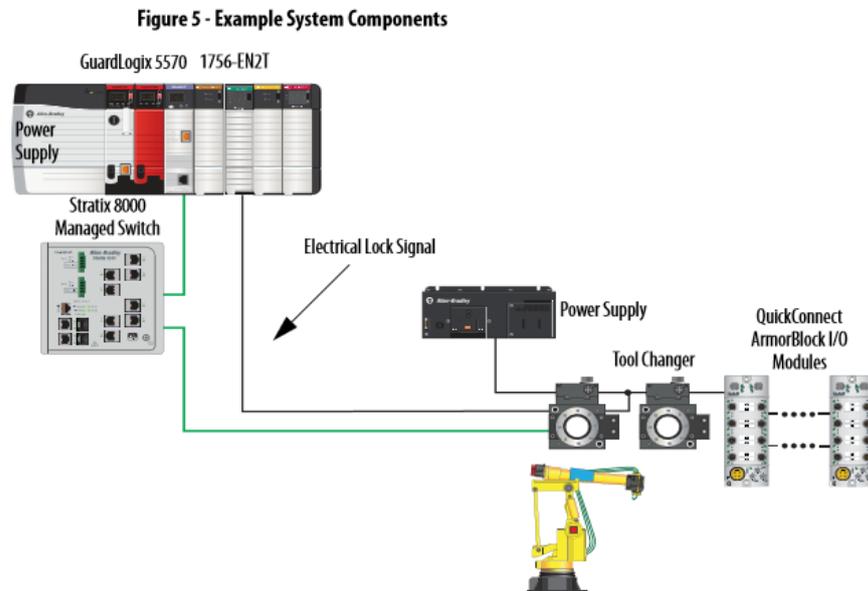
**Rockwell Automation Products that are compatible with QuickConnect**

Component	Supported Rockwell Automation Products
Controller	ControlLogix® controllers: <ul style="list-style-type: none"> <li>• ControlLogix 5570 controllers</li> <li>• ControlLogix 5560 controllers</li> </ul> GuardLogix controllers: <ul style="list-style-type: none"> <li>• GuardLogix 5570 controllers</li> <li>• GuardLogix 5560 controllers</li> </ul> CompactLogix controllers: <ul style="list-style-type: none"> <li>• CompactLogix 5370 L3 controllers</li> <li>• CompactLogix 5370 L2 controllers</li> <li>• CompactLogix 5370 L1 controllers</li> </ul> Compact GuardLogix Controllers <ul style="list-style-type: none"> <li>• Compact GuardLogix 5370 L3 controllers</li> </ul>
EtherNet/IP managed switch on the controller side	Stratix® switches: <ul style="list-style-type: none"> <li>• Stratix 2500 switches</li> <li>• Stratix 5400 switches</li> <li>• Stratix 5410 switches</li> <li>• Stratix 5700 switches</li> <li>• Stratix 8000/8300 switches</li> <li>• Stratix 6000 switches</li> </ul>
EtherNet/IP communication modules	<ul style="list-style-type: none"> <li>• 1756-EN2T, firmware revision 4.003 or later</li> <li>• 1756-EN2TR, firmware revision 4.003 or later</li> <li>• 1756-EN3TR, firmware revision 4.003 or later</li> <li>• 1756-ENBT, firmware revision 6.002 or later</li> </ul>
A maximum of 20 EtherNet/IP-based I/O modules with QuickConnect capability on the tool side  For average connection times per number of modules, see <a href="#">Average Timing with Rockwell Automation Products on page 54</a> .  For network topology and architecture restrictions on the tool side, see <a href="#">Table 2 on page 14</a> .	ArmorBlock® I/O modules: <ul style="list-style-type: none"> <li>• 1732E-16CFGM12QCR</li> <li>• 1732E-16CFGM12QCWR</li> <li>• 1732E-12x4M12QCDR</li> <li>• 1732E-16CFGM12P5QCR</li> <li>• 1732E-16CFGM12P5QCWR</li> <li>• 1732E-12x4M12P5QCDR</li> </ul>
Application logic that uses generic CIP Messages to inhibit and uninhibit I/O modules	Studio 5000 Logix Designer® application, version 21.00.00 or later or RSLogix 5000® software, version 20.01.02

Source:  
 Allen-Bradley Ethernet/IP QuickConnect Application Technique  
 Page 13

## 6 Configuration via Explicit Messages

### Example with Rockwell Components



Source:

Allen-Bradley EtherNet/IP QuickConnect Application Technique, Page 11

Please also note the following:

- Direct connection between PLC and QuickConnect slave with crossover cable
- Slave-to-slave connection using patch cable
- For setting up the topology, only the linear topology with a maximum of 20 modules on the tool side is permitted.
- If needed, only one managed switch may be used between the PLC and Ethernet/IP slave.
- To trigger the QuickConnect sequence, an electrical lock signal is required that reads in the supply voltage of the QuickConnect slaves via the controller.

PLC Program

Add Application Logic

Add ladder logic to inhibit and uninhibit QuickConnect I/O modules:

- Run this logic in a periodic task with a recommended 10 ms update rate.
- The logic examples that are shown configure two ArmorBlock I/O modules. Modify the code to configure as many as 20 ArmorBlock I/O modules.

**IMPORTANT** A connection time of 500 ms with 20 QuickConnect modules is supported with only a ControlLogix 1756-L7x controller and 1756-EN2T communication module. For average connection times per number of modules, see [Average Timing with Rockwell Automation Products on page 54](#).

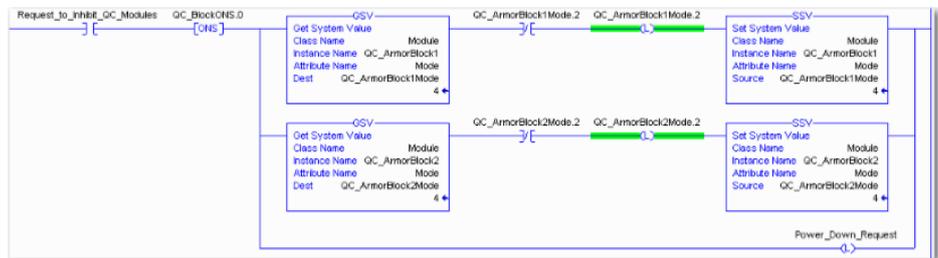
Inhibit and Power Down

Add this logic to inhibit and power down the QuickConnect modules.

1. Rung 0: Inhibit the modules.

Before making a tool change, you must uninhibit the QuickConnect ArmorBlock I/O modules mounted to the tool before powering down. Use a GSV (Mode) instruction to monitor the present state of the modules and one SSV (Mode) instruction per module to inhibit the modules.

The input condition to start the inhibit process must come from an external input. For example, as the robot is traveling back to change out the tool, this input condition must be enabled. By the time the tool is being changed, the modules are inhibited and can proceed to power down the tool and modules.

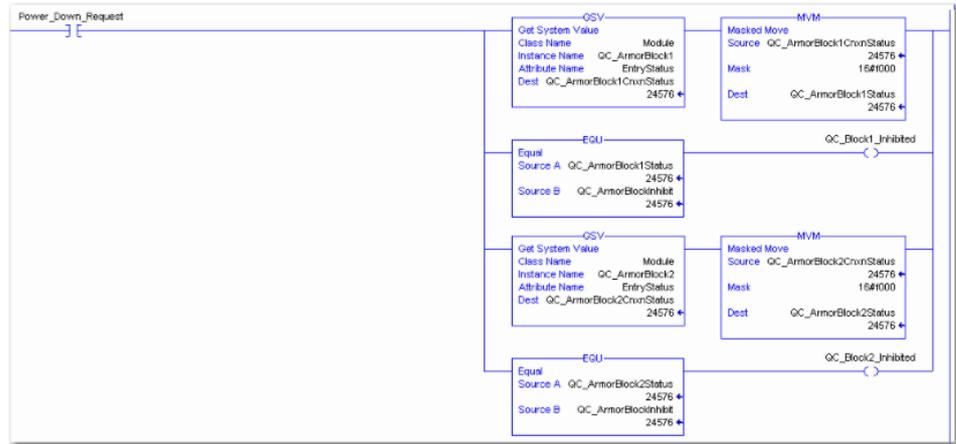


Source:  
Allen-Bradley Ethernet/IP QuickConnect Application Technique, Page 32

6 Configuration via Explicit Messages

2. Rung 1: Verify that the modules are inhibited.

After the modules have been inhibited, verify that the modules have indeed been inhibited. Use one GSV (Entry Status) instruction per module. When the Entry Status value equals a decimal value of 24576, the module can be disconnected from the robotic arm and powered down.



3. Rung 2: Power down the modules.

This rung verifies that all modules have been inhibited and powered down. The tool and modules can be physically disconnected from the robotic arm.



Source:  
Allen-Bradley Ethernet/IP QuickConnect Application Technique, Page 33

### Uninhibit and Power Up

Add this logic to uninhibit and power up the QuickConnect I/O modules.

1. Rung 3: Power up the modules.

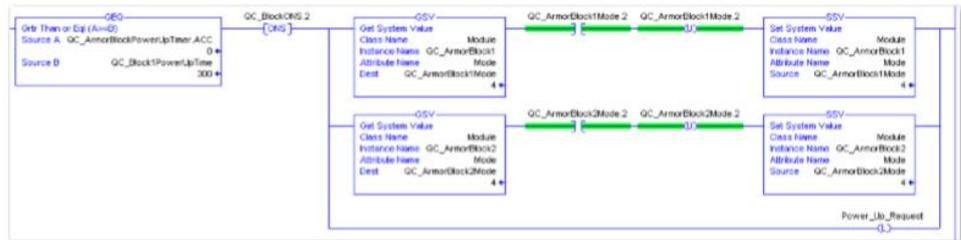
Once the tool and module is connected, an external input module sends an electrical lock input signal. On receipt of the signal, start a timer to track how long the tool and modules have been connected.

Every QuickConnect ArmorBlock I/O module has a delay time that is embedded in its electronic data sheet (EDS) file. This delay time is the amount of time the module takes to power up. The module takes about 300 ms to fully power up before establishing a connection to the controller.



2. Rung 4: Uninhibit the modules.

When the Timer. Acc is greater than or equal to the module delay time (300 ms), use an SSV (Mode) instruction to uninhibit the module. Use a GSV (Mode) instruction to verify the mode of the module at powerup.

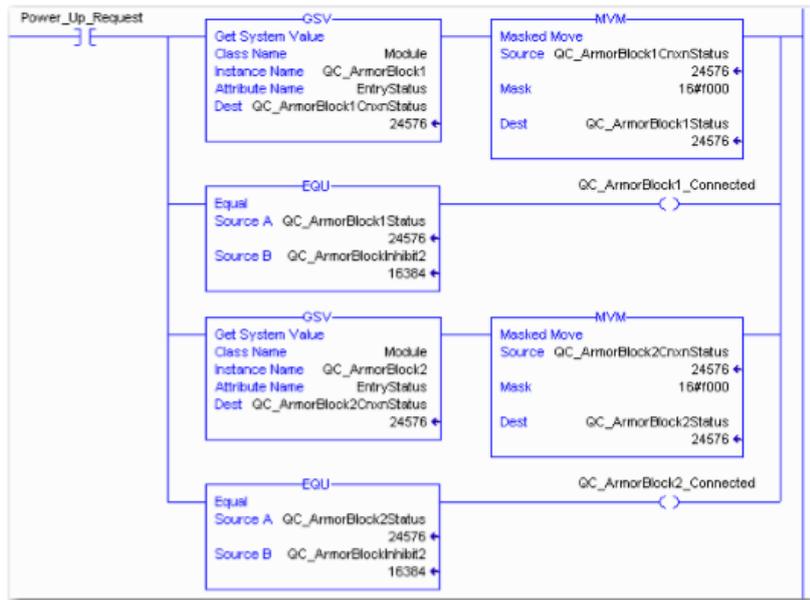


Source:  
Allen-Bradley Ethernet/IP QuickConnect Application Technique, Page 34

6 Configuration via Explicit Messages

3. (Optional) Rung 5: Verify that the modules are uninhibited.

After the modules have been uninhibited, verify that the modules have indeed been uninhibited. Use one GSV (Entry Status) instruction per module. When the Entry Status value equals a decimal value of 16384, the module has been uninhibited.



Source:  
Allen-Bradley Ethernet/IP QuickConnect Application Technique, page 35

**Fault State** A safe state that the port is to take on in the case of a loss of bus communication can be predefined for each output on the port pins.  
  
The fault state settings can be configured using the following class instance attributes of the explicit messages.

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

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

m: Number of outputs

**Note**  
 The fault state settings are stored only temporarily in the module. They are deleted after a power reset.  
 To ensure a long-term fault state configuration, the configuration has to be programmed via the PLC so that the settings are transferred to the module again when the system is restarted.

## 6 Configuration via Explicit Messages

### IO-Link Device Parameterization

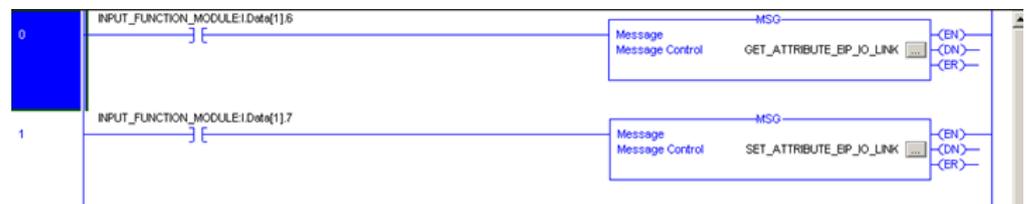
There are two options for configuring an IO-Link device connected to the IO-Link port.

- Configuration via the web server refer to the "Web Server" chapter under "Device Properties"
- Configuration via explicit messages

An example describes how an IO-Link can be parameterized with explicit messages via Rockwell RSLogix 5000

Explicit Messages can be parameterized

For this purpose, the "MSG" components in the PLC program are used.



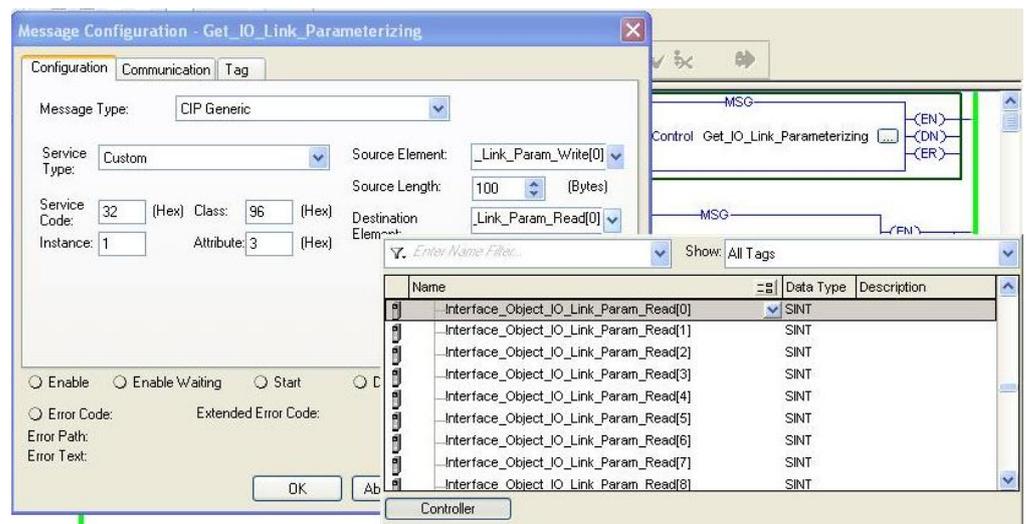
### Read IO-Link Parameter

Service Code	Class	Instance	Attribute
0x32	0x96	1 - n	0x03 (Read Parameter)

n: Number of ports

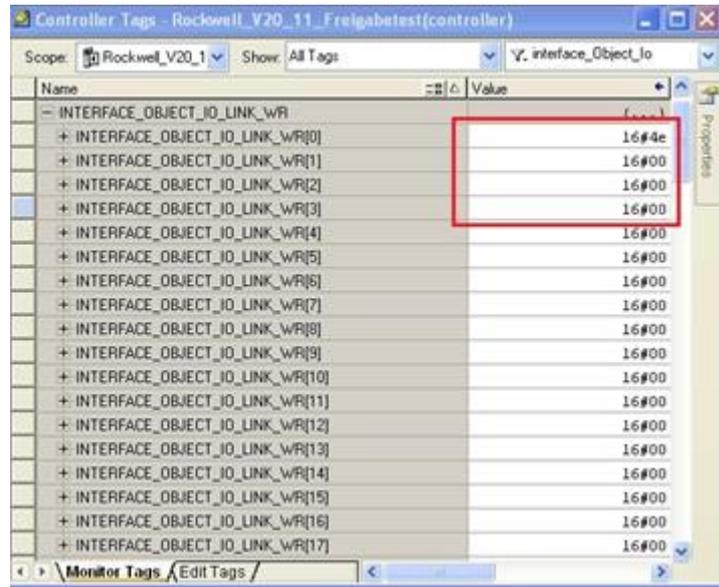
Source Length must correspond to at least the read parameters, but a larger value can also be entered. (In this example, 100 bytes)

As the Source Element (Write) and as the Destination Element (Read), create one SINT[100] array each and select the first line[0].



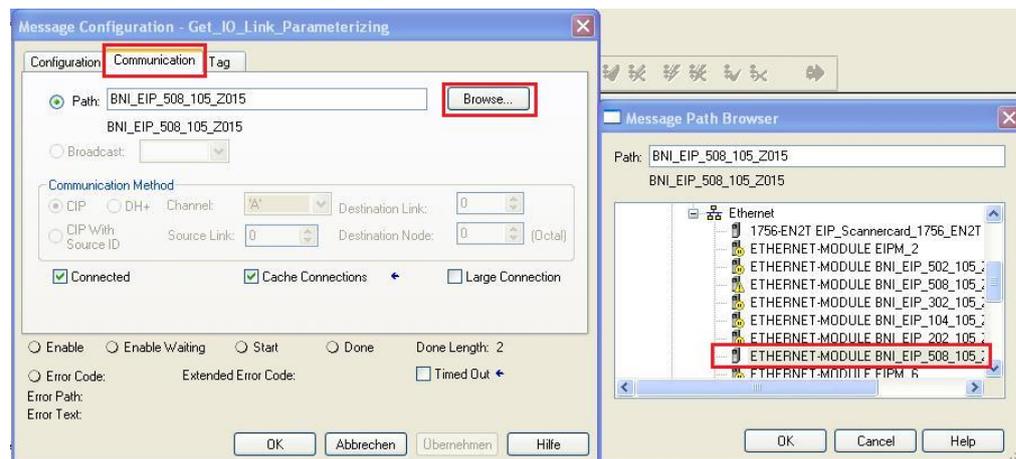
6 Configuration via Explicit Messages

In the Source Element Array (Write), enter which index is to be read. In this example, this is index 0x4E.



Destination Array (Read) shows the read-out value. In case of a configuration error, the error code is likewise displayed there.

In the "Communication" window, you have to select the Ethernet module on which the configuration is to take place.



## 6 Configuration via Explicit Messages

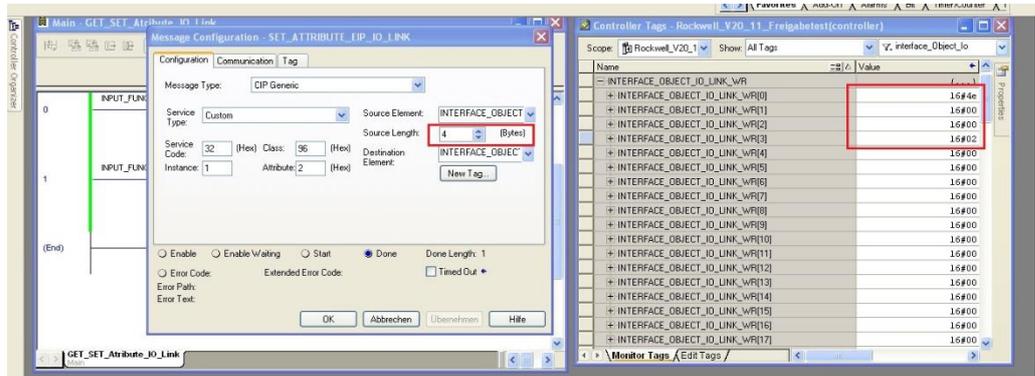
### Write IO-Link Parameter

Service Code	Class	Instance	Attribute
0x32	0x96	1 - n	0x02  (Write Parameter)

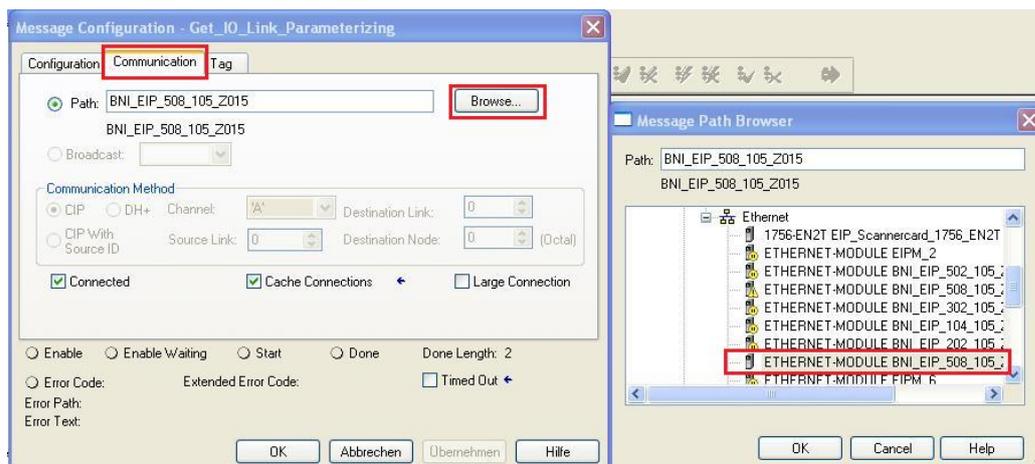
n: Number of ports

Source Element and Destination Element are to be selected so they are identical to the previous example, "Read IO-Link parameter".  
The Source Length must be exactly the same length as the parameter data to be written.

In this example, index 0x4E, subindex 0, value 0x02 is written in Source Element Array (Write).  
In case of a configuration error, the Destination Element Array (Read) displays an error code.



In the "Communication" window, you likewise have to select the Ethernet module on which the configuration is to take place.



### Note



The explicit messages functions are implemented in accordance with the Volume 1: Common Industrial Protocol Specification and Volume 2: Ethernet/IP Adaption of CIP.

7 Process Data

7.1. Process Data Inputs

The input data size is 200 bytes. Take a look at the tables below for the allocation of the process data inputs.

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

Standard Input Data

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

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 <i>IOL: Port in IO-Link mode</i> <i>DC: Device connected</i> <i>0: Reserved</i>	
41	SC	0	0	0	0	PDI	DF	VF	IO-Link error <i>VF: Validation failed</i> <i>SC: IO-Link short-circuit</i> <i>DF: Data storage validation failed</i> <i>PDI: Process data invalid</i>	
42	Vendor ID 1								Vendor ID	
43	Vendor ID 2									
44	Device ID 1								Device ID	
45	Device ID 2									
46	Device ID 3									
47	Mode	Type	0						Event 1	<i>Mode:</i> <i>0: Reserved</i> <i>1: Event single shot</i> <i>2: Event going</i> <i>3: Event coming</i> <i>Type:</i> <i>0: Reserved</i> <i>1: Message</i> <i>2: Warning</i> <i>3: Error</i>
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 in the following.									

7 Process Data

7.2. Process Data Outputs

The output data size is 134 bytes. Take a look at the tables below for the allocation of the process data outputs.

**BNI EIP-538-xx5-xxxx**

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

Standard Output Data

Byte	Bit								Description
	7	6	5	4	3	2	1	0	
0	0				O12	O14	O02	O04	Output data O04 → Output on Port 0, Pin 4
1	0				O52	O54	O42	O44	To use this function at an IO-Link port, the port has to be configured as an output.
2	0				R12	R14	R02	R04	Restart
3	0				R52	R54	R42	R44	Restart of the output after a short-circuit is detected
4	0								Reserved
5	0					DL	GO	RO	Display control system DL: Display disabled / PLC lock GO: Green display LED illuminates RO: Red display LED illuminates

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 in the following.

8.1. General

With the implemented display, the address is output directly to the devices BNI EIP...  
The following address types are possible:

- IP address
- Subnet mask
- Gateway address

Each address is composed of 4 octets.

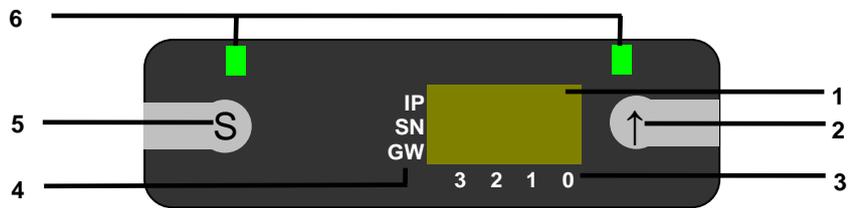
The display also shows information about the hardware and firmware update.

The display has a locking function that can be enabled from the control panel. If the lock is set, no more editing can be done (see bit layout, Chapter 6.2 Standard output data).

8.2. Address Specifications

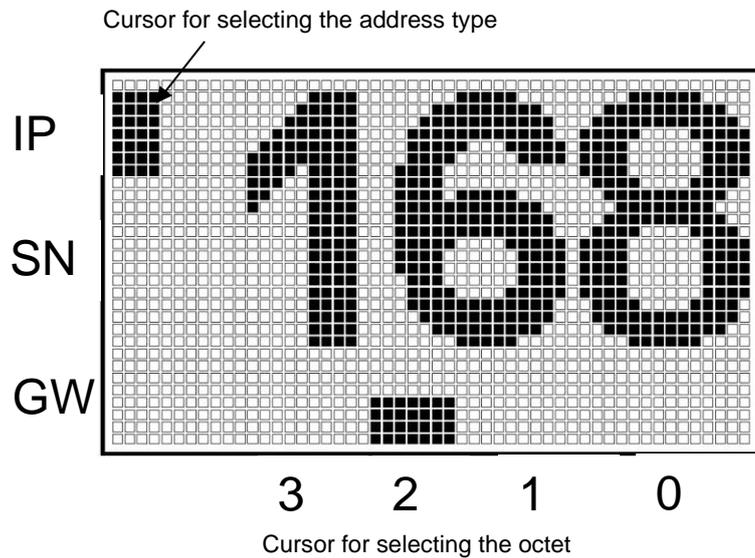
IP address: 192.168.1.1  
Subnet mask: 255.255.255.0  
Gateway address: 192.168.1.1

8.3. Control and Display



- |                |                       |
|----------------|-----------------------|
| 1 Display      | 4 Address type cursor |
| 2 Arrow key    | 5 "Set" key           |
| 3 Octet cursor | 6 LED                 |

8.4. Display Information

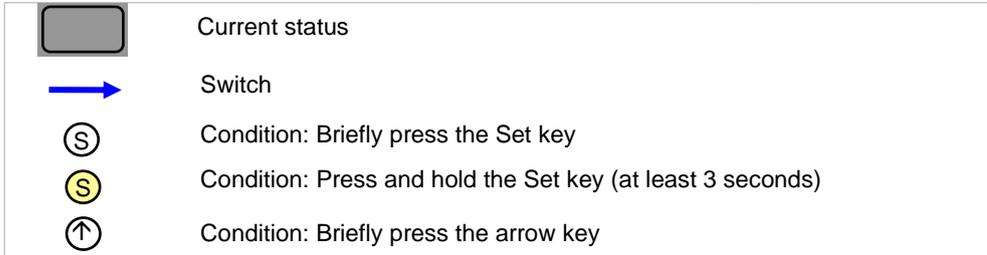


- |                     |                 |
|---------------------|-----------------|
| IP: IP address      | 3: First octet  |
| SN: Subnet address  | 2: Second octet |
| GW: Gateway address | 1: Third octet  |
|                     | 0: Fourth octet |

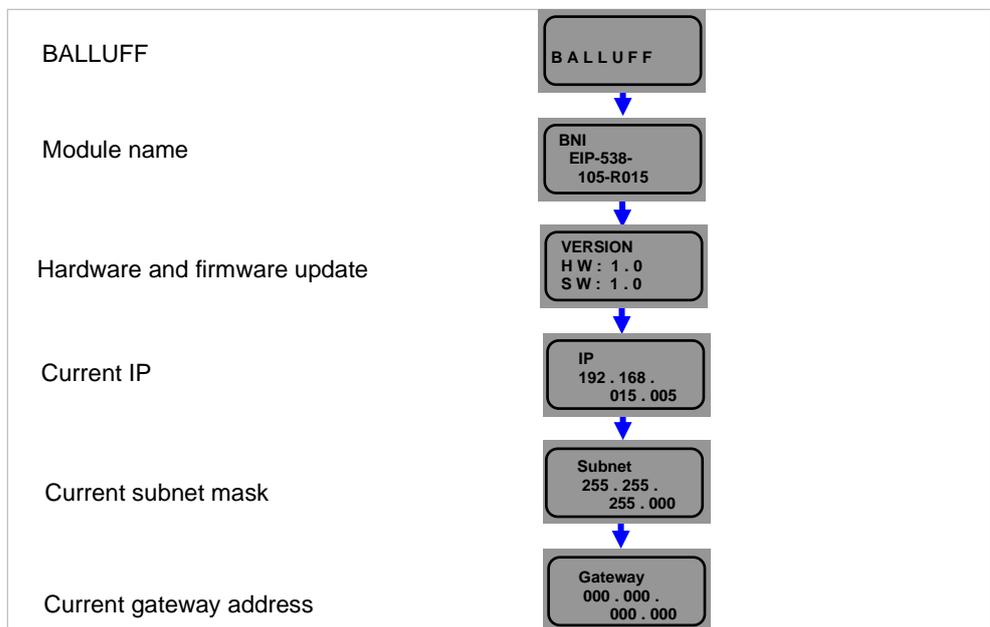
8 Display

8.5. Design and Symbols

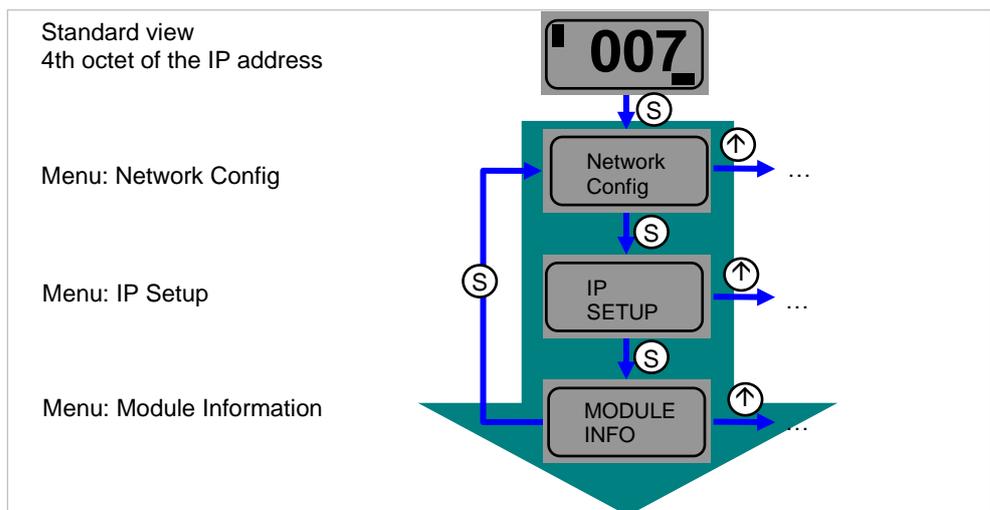
In the following flow charts, some symbols are used to describe the display functionality:



8.6. Startup

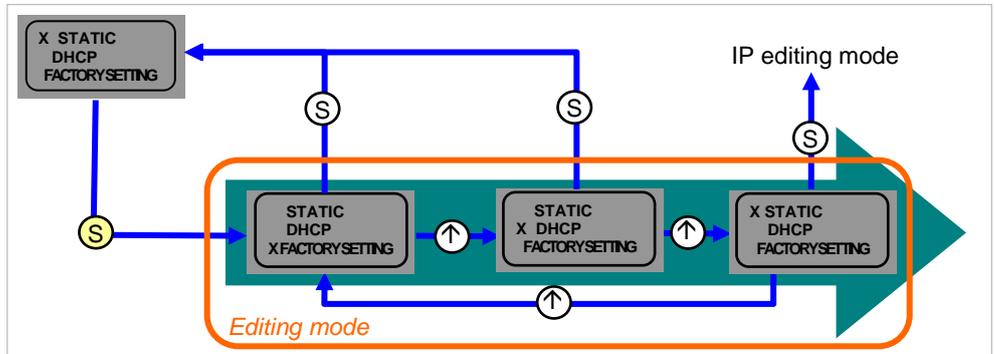


8.7. Main Menu



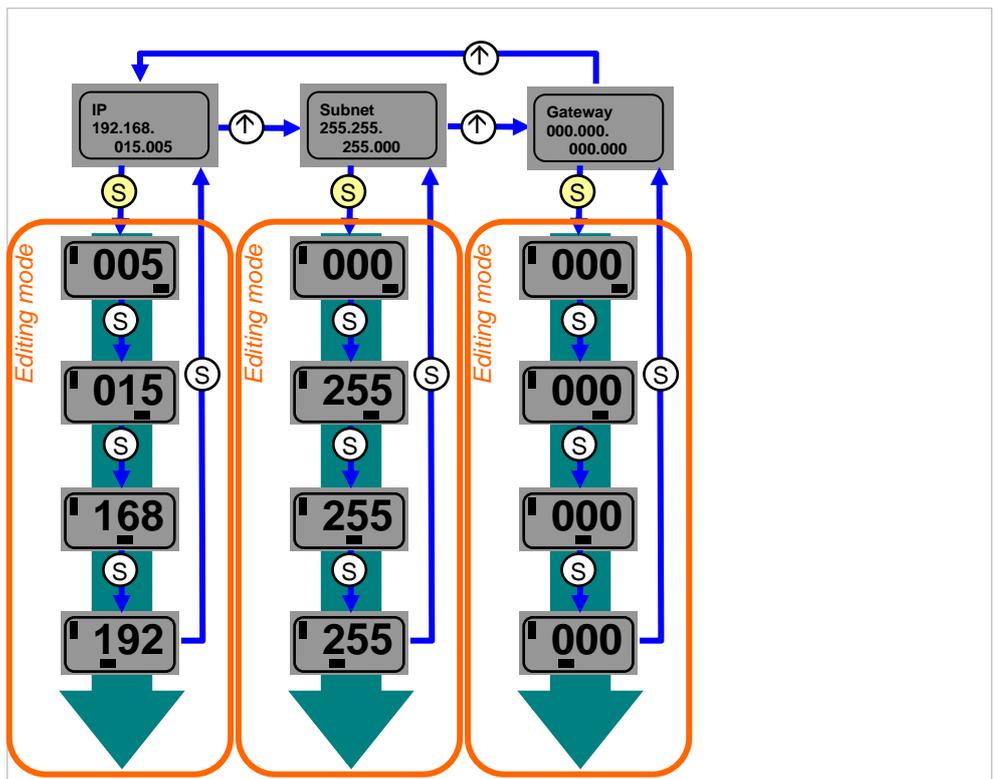
- Press the Set key briefly to scroll through the main menu.
- Press the arrow key to open the menu.

8.8. IP Setup



- Press and hold the Set key to call up the editing mode.
- The preferred value is configured by briefly pressing the arrow key.

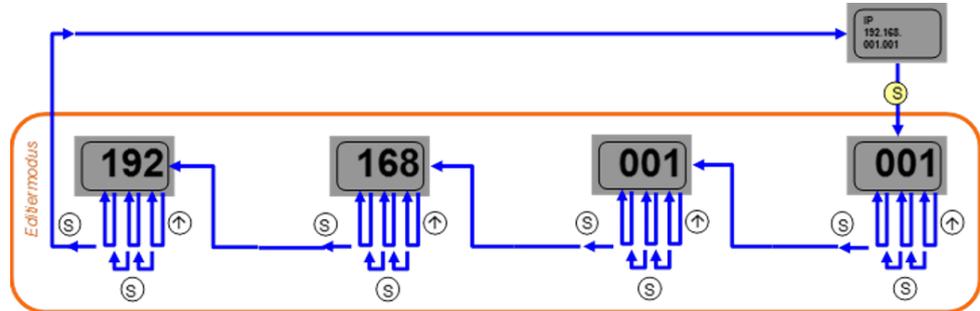
8.9. Network Config



- Press and hold the Set key to call up the editing mode.
- The preferred value is configured by briefly pressing the arrow key.
- Press and hold the arrow key to call up the fast program mode.
- Briefly pressing the Set key saves the entered value and scrolls to the next octet. The 4th octet represents the beginning of the editing process.
- The completely entered address is saved by briefly pressing the Set key when editing the first octet. The entered value appears right afterwards in the IP overview display.
- Manual changes to IP, subnet or gateway lead to an automatic change of the IP setup to "static".

8 Display

8.10. Edit mode



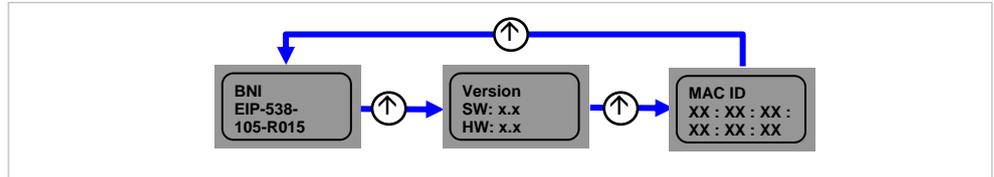
- In the Network Configuration menu, select IP / Subnet or Gateway Address.
- Press the set button long to switch to edit mode.
- Press the arrow key briefly to change the number.
- Press the Set button briefly to move to the next position.
- After the last digit, press the set button briefly to move to the next octet of the address or to accept the new number after the last octet.



**Note**

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

## 8.11. Module Information



- Briefly pressing the arrow key allows scrolling through the "Module information" menu.
- The product name, module updates and Mac-ID are displayed as information.

## 8.12. General Information

- Press and hold the arrow key to scroll quickly in editing mode.
- If no key is pressed for 10 seconds, the view reverts to the standard display (4th octet of the IP address). Changes that have not been saved will be lost.
- Differences between the new configuration and the configuration with which the module works are indicated by an unequal sign. In this case, the screen switches to the standard display after 5 seconds.
- The display flashes in editing mode. The display flickers in fast scroll mode.
- If the module receives a single ping, the word "Ping" appears on the display for a couple of seconds. Then the previous display returns. You can exit ping mode sooner by briefly pressing the Set key.
- If the module receives two or more pings, the word "Ping" appears on the display. You can exit the display only by briefly pressing the Set key. Then the display before the ping returns.
- The LED function of the display LEDs can be set in a user-specific manner by setting several bits in the process data outputs. (see bit layout, standard output data)
- The plc lock function can also be used by setting a bit in the process data outputs. (see bit layout, standard output data)

**Note**

You cannot select editing mode in the display if the plc lock is set in the process data inputs by a bit (see bit layout, standard output data)

## 9 Web Server

### 9.1. General

The BNI fieldbus module provides 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.

The screenshot displays the web interface for the Balluff BNI PNT-508-105-Z015 module. The interface includes a navigation bar with icons for Home, Ports, TODD, Login, Config, Log, and Info. The main content area is titled "Module Information" and lists the following details:

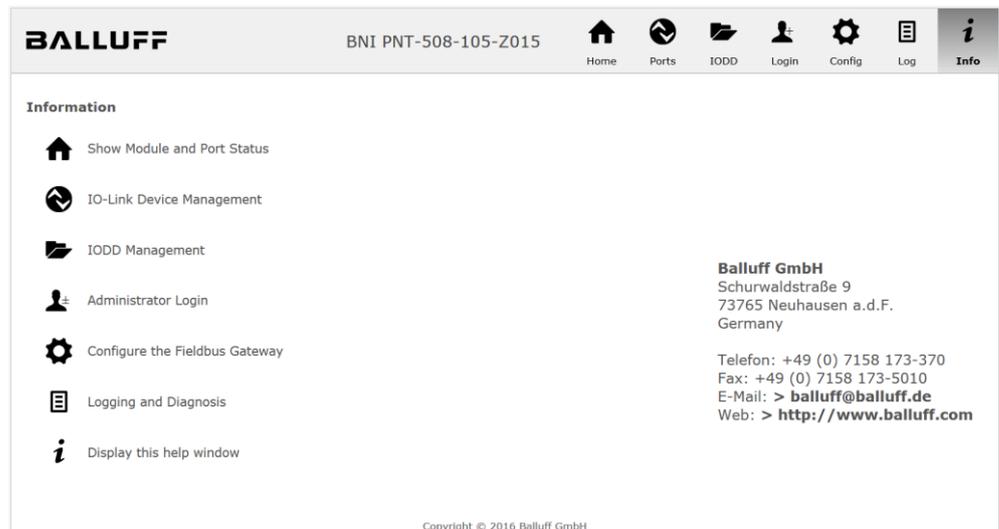
Product Name:	BNI PNT-508-105-Z015
Order Code:	BNI005H
Name:	unknown name
Location:	unknown location
Contact:	unknown contact
Firmware Revision:	3.2
Hardware Revision:	6
Station name:	mydevice
IP Address:	192.168.0.3
Subnet Mask:	255.255.255.0
Gateway Address:	0.0.0.0
MAC Address:	00:19:31:3F:FF:32
Link Speed Port 1:	100 Mbit/s FULL
Link Speed Port 2:	No Link
PLC Lock:	No

To the right of the text is a photograph of the physical module, which features four RJ45 ports arranged in a 2x2 grid. Each port has a corresponding LED indicator. Below the photograph is a link labeled "> LED Legend".

### 9.2. Navigation / Info

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

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



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

## 9 Web Server

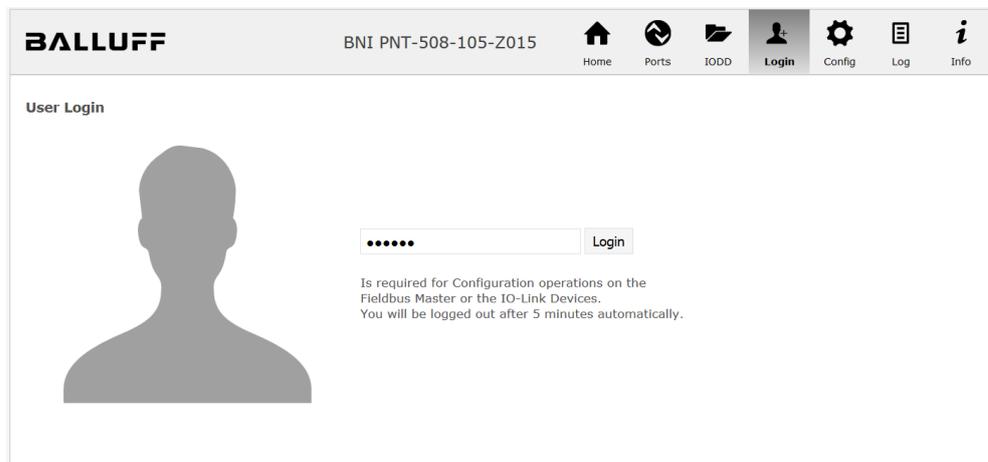
### 9.3. Login/Logout

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.

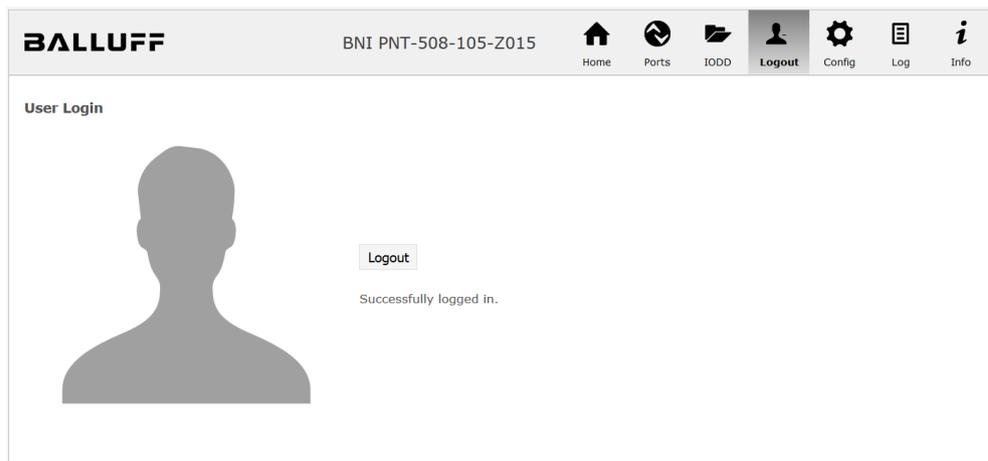
The default password is:

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 web server 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.

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.



9 Web Server

PNT:



EIP:



9.5. "Ports" Dialog

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



**Note**

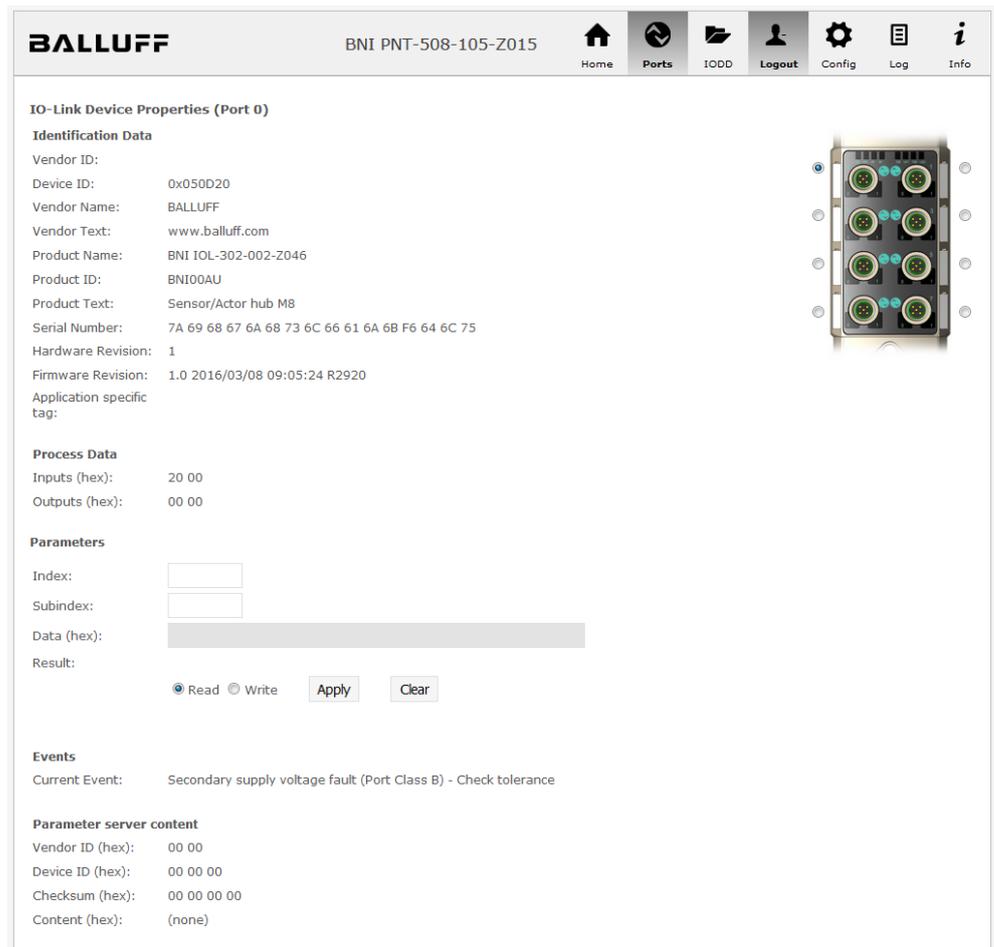
The IO-Link device data are only displayed if the port is also configured as an IO-Link port!

**No appropriate IODD uploaded**

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

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

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



"Ports" dialog with direct parameter access

9 Web Server

**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

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 checked="" 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 checked="" 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 checked="" 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 checked="" 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.



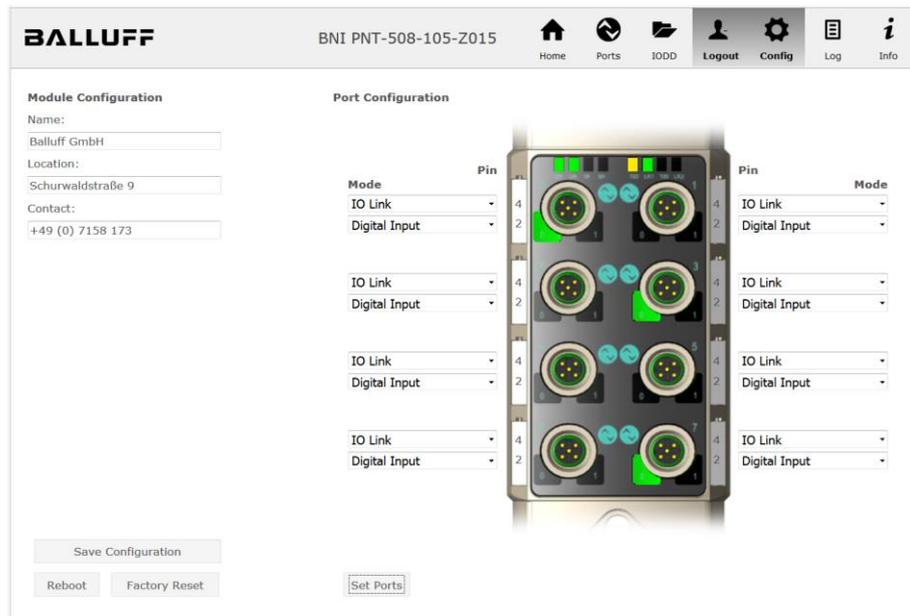
**Note**

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!

### 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:



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 and Port Configuration.

**Module Configuration:**

- Name:** Balluff GmbH
- Location:** Schurwaldstraße 9
- Contact:** +49 (0) 7158 173
- IP Configuration:**
  - 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:**

The Port Configuration section shows a central image of the module's port panel with configuration options for each port. The ports are arranged in a 4x2 grid. Each port has a 'Pin' (4 or 2) and a 'Mode' dropdown menu. The modes are set to 'IO Link' for the top two ports of each pair and 'Digital Input/Output' for the bottom two ports of each pair.

**Buttons:**

- Save Configuration
- Reboot
- Factory Reset
- Set Ports

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

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

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

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 includes buttons for 'Set module time', 'Clear Log', and 'Update Log'. Below is a table of log entries:

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 Appendix

### 10.1. Scope of Delivery

The BNI EIP comprises the following elements:

- EtherNet/IP Module
- 4x M12 dummy plugs
- Grounding strap
- M4x6 screw
- 20 labels

### 10.2. Order Number

BNI EIP-538-105-R015

Balluff Network Interface

EtherNet IP

Functions

538 = IP 67 IO-Link module, 4 IO-Link ports Class A, 4 IO-Link ports Class B

Variants

105 = Display version, 2-port switch

Mechanical version

R015 = plastic housing, resistant (Fortron 6165 A6 black)

Data transmission: 2 x M12x1 internal thread

Power supply: 7/8" external thread, 7/8" internal thread

Sensor connections: 8 x M12x1 internal thread

### 10.3. Ordering Information

Product order code	Order code
BNI EIP-538-105-R015	BNI00CY

**[www.balluff.com](http://www.balluff.com)**

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