BNI CIB-508-105-Z015

CC-Link IE Field Basic IO-Link-Master

User's Guide

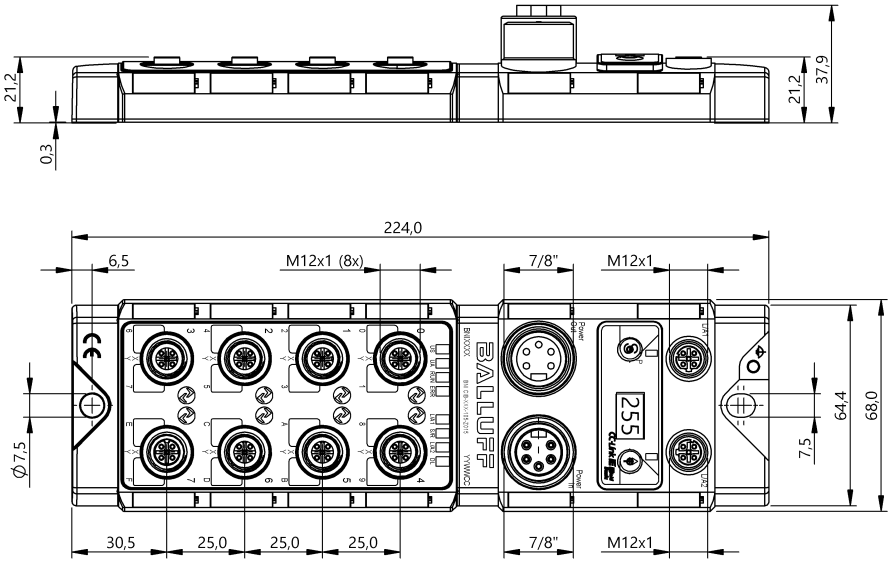


Table of contents

Table of contents 0

1 General 2
- **1.1. Structure of the guide** 2
- **1.2. Typographical conventions** 2
  - Enumerations 2
  - Actions 2
  - Syntax 2
  - Cross-references 2
- **1.3. Symbols** 2
- **1.4. Abbreviations** 2
- **1.5. Deviating views** 2

2 Safety 3
- **2.1. Intended use** 3
- **2.2. Installation and startup** 3
- **2.3. General safety notes** 3
- **2.4. Resistance to aggressive substances** 3
  - Dangerous voltage 3

3 First steps 4
- **3.1. Module overview** 4
- **3.2. Port** 5
- **3.3. Mechanical connection** 5
- **3.4. Electrical connection** 5
  - Supply voltage 5
  - Function ground 6
- **3.5. CC-Link IE Field Basic connection** 6
- **3.6. Sensor/actuator connection** 6

4 Display 7
- **4.1. General** 7
- **4.2. Factory setting** 7
- **4.3. Control and display** 7
- **4.4. Start-up** 7
- **4.5. Main menu** 8
- **4.6. Menu point: Network config** 8
- **4.7. Menu point: Module info** 8
- **4.8. Menu point: Number of occupied stations** 9
- **4.9. Menu point: Factory settings** 9

5 Integration 10
- **5.1. General** 10
- **5.2. Network parameters** 10
- **5.3. Network configuration settings** 11
- **5.4. CSP+-file (network configuration settings)** 12

6 CC-Link IE Field Basic 13
- **6.1. General** 13
  - CC-Link IE Field Basic network 13
  - Ethernet 13
  - CIB module 13
- **6.2. Pin-port numbering and addressing** 14
- **6.3. State machine** 15

7 Cyclical transmission 16
- **7.1. General** 16
- **7.2. RX and RY** 16
- **7.3. Details** 18
- **7.4. Word range RWr and RWw** 19
- **7.5. Details: Module status area** 21
- **7.6. Process data representation (Byte Swap)** 21

7.7. Initializing 22
7.8. Parameterization while running 23
7.9. Error/warning handling 24
7.10. Configuration 24

8 Parameter Processing 25
8.1. Parameter Processing 25
8.2. General settings and identification data 27
8.3. IO-Link Device Validation 29
8.4. IO-Link Data Storage Content 30
8.5. Error codes for Processing parameter 31

9 Troubleshooting 32
9.1. Indicator LEDs 32
9.2. Display in the process data 32
9.3. Error list 33

10 Technical data 34
10.1. Dimensions 34
10.2. Mechanical data 34
10.3. Operating conditions 34
10.4. Electrical data 35
10.5. CC-Link IE Field Basic 35
10.6. Function indicators 36
Module status 36
Port LED 36

11 Appendix 37
11.1. Scope of delivery 37
11.2. Order code 37
11.3. Ordering information 37

Notes 38

1 General

1.1. Structure of the guide

This guide is arranged so that one section builds upon the other.
Chapter 2: Basic safety instructions
Chapter 3: First steps
…….

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

Syntax

Numbers:
Decimal numerals are shown without an additional indicator (e.g. 123).
Hexadecimal numbers are shown with the additional reference hex or 0x (e.g. 0xA3, C2hex).

Cross-references

Cross-references indicate where additional information about the topic can be found.

1.3. Symbols

Note
This symbol indicates general notes.

Attention!
This symbol indicates a safety notice which must be observed.

1.4. Abbreviations

BNI	Balluff Network Interface
CIB	CC-Link IE Field Basic
EMC	Electromagnetic Compatibility
FE	Function earth
HW	Hardware
IOL	IO-Link
ISDU	IO-Link Parameter (Index Service Data Unit)
N/A	Not available
PLC	Programmable Logic Controller
SIO	Standard in-/outputs
SW	Software
UA	Actuator supply
US	Sensor supply
RWr	Word data input as seen from the master station
RWr	Word data output as seen from the master station
RX	Bit data input as seen from the master station
RX	Bit data output as seen from the master station

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 Safety

2.1. Intended use

The BNI CIB-Module is used as a remote I/O module and/or IO-Link module for connecting to a CC-Link IE Field Basic 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 module.
Authorized personnel
Installation and startup must only be carried out by trained technical personnel.
Intended use
Warranty and liability claims against the manufacturer are rendered void by:

- Unauthorized tampering
- Improper use
- Use, installation or handling contrary to the instructions provided in this user's guide

Obligations of the owner/operator!
The module is a piece of equipment in accordance with EMC Class A. This module can produce HF noise. The operator must take appropriate precautionary measures. The module may only be used with an approved power supply. Only approved cables may be connected.
Malfunctions
In the event of defects and device malfunctions that cannot be rectified, the module must be taken out of operation and protected against unauthorized use.
Intended use is ensured only when the housing is fully installed.

2.4. Resistance to aggressive substances

Attention!
The BNI modules 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.

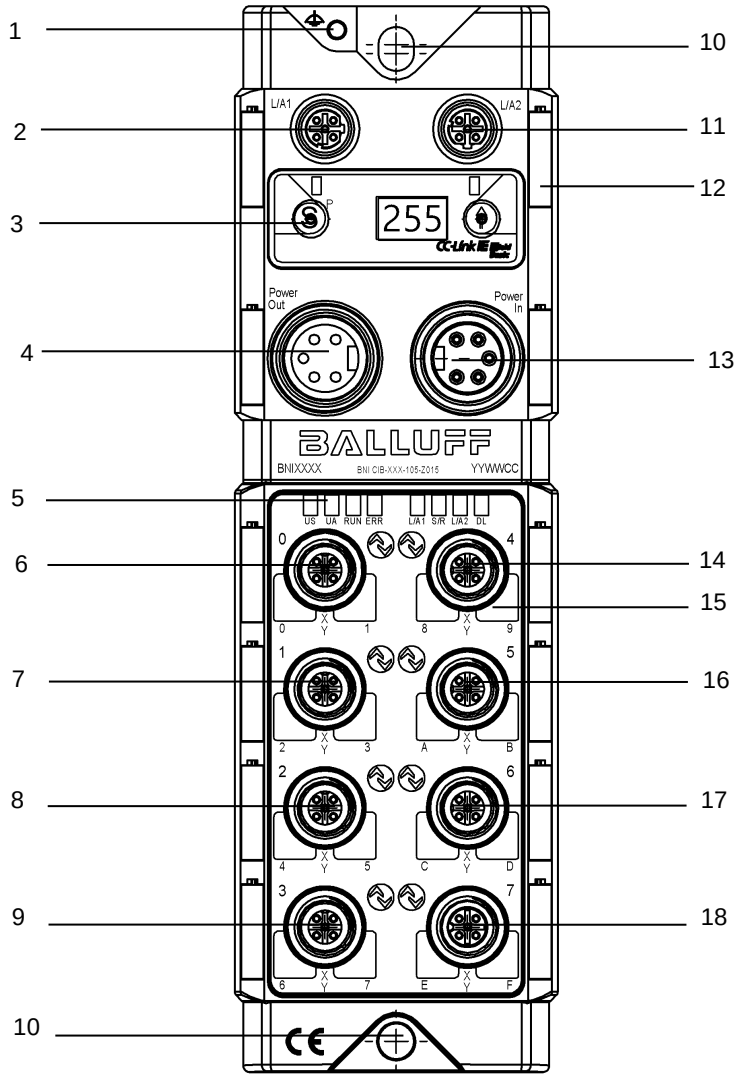
Dangerous voltage

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
2 CC-Link IE Field Basic Port 1(L/A1)
3 Display
4 Power Out
5 Status LEDs
6 Port 0
7 Port 1
8 Port 2
9 Port 3
10 Mounting hole
11 CC-Link IE Field Basic Port 2 (L/A2)
12 Labels
13 Power In
14 Port 4
15 Pin/Port LEDs
16 Port 5
17 Port 6
18 Port 7

3 First steps

3.2. Port

	Port 0-7
BNI CIB-508-105-Z015	Input / Output / IO-Link

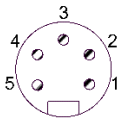
3.3. Mechanical connection

The module is secured by means of two M6 screws and two washers.

3.4. Electrical connection

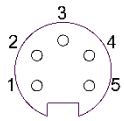
Supply voltage

Supply voltage (7/8", 5 pins, male)



PIN	Signal	Description
1	0 V	GND for module/sensor and actuator supply
2		
3	FE	Function ground
4	+24 V	Module/sensor supply (US)
5	+24 V	Actuator supply (UA)

Voltage output (7/8", 5 pins, female)



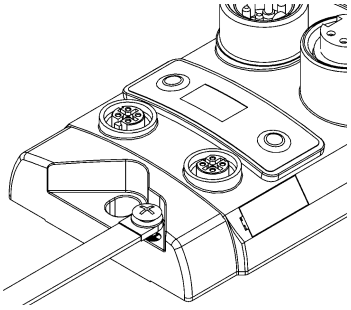
PIN	Signal	Description
1	0 V	GND for module/sensor and actuator supply
2		
3	FE	Function ground
4	+24 V	Module/sensor supply (US)
5	+24 V	Actuator supply (UA)

Note
Where possible, use a separate power source to supply the sensor/bus and actuator with power.
Total current < 9 A. The total current draw for all modules may not exceed 9A even when connected in series.
Recommended fuse 8A.

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.

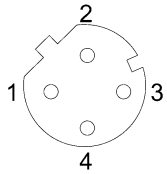
3 First steps

Function ground



Note
The FE-connection from the housing to the machine must have low impedance and be as short as possible.
We recommend using the included ground strap for the FE connection.

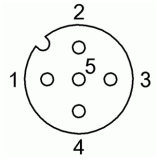
3.5. CC-Link IE Field Basic connection



M12
D-coded
female

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

3.6. Sensor/actuator connection



M12
A-coded
female

Pin	Function
1	+24 V
2	Input / Output
3	0V
4	Input / Output / IO-Link
5	n.a.

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

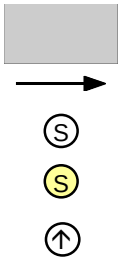
Note
The digital inputs conform to the input characteristics in EN 61131-2, type 3

4 Display

4.1. General

The built-in display allows you to set the number of occupied stations directly on the module. Additional information can also be displayed and functions carried out.

The flow charts below describe the display sequence:



Current status

Switch

Condition: Briefly press the Set key

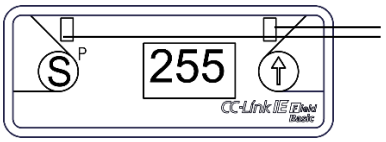
Condition: Press and hold the Set key (at least 3 seconds)

Condition: Briefly press the arrow key

4.2. Factory setting

Number of occupied stations:	2
Station address/IP address:	192.168.3.10

4.3. Control and display



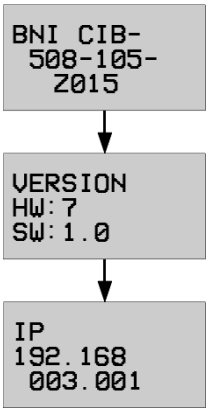
LEDs

- **Display LEDs:** The two LEDs can be controlled by the cyclic CC-Link IE Field Basic data. Green and/or red can be set.
- **(S)et/(P)rogramming Key:** This key is used to scroll through the main menu or, if held down, to start editing mode. A change is confirmed by briefly pressing the key.

  Edit mode can be locked and unlocked by a bit in the cyclic process data. Locking is indicated by a key symbol.

- **Arrow key:** This key is used to go through the menu entries. The display shows the standard screen after 10 seconds of inactivity.
- **Display:** When interacting using the keys, the respective menu point is displayed. Inactivity causes the standard view to be shown and the set station number displayed.

4.4. Start-up



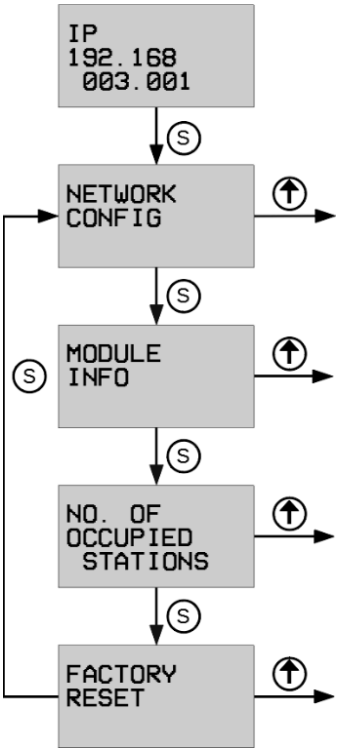
Module name

Hard- and firmware version

Station address/IP address

4 Display

4.5. Main menu



Standard view:
Station address/IP address display

Menu: Network configuration

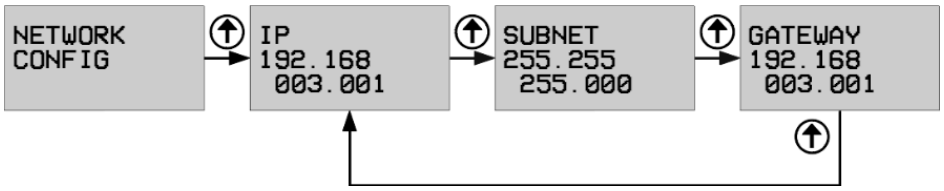
Menu: Module info

Menu: Number of occupied stations

Menu: Factory setting

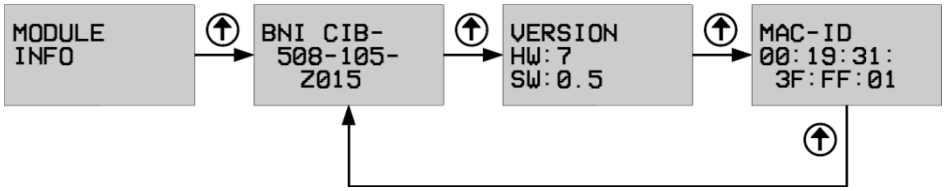
- Press the Set key briefly to scroll through the main menu.
- Press the arrow key briefly to open the menu.
- After a period of inactivity of about 10 seconds the display automatically changes back to standard view

4.6. Menu point: Network config



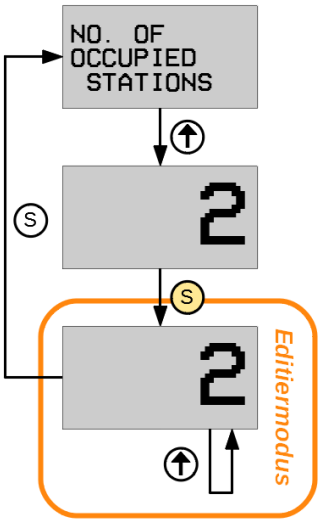
- Press the arrow key briefly to scroll through the menu.
- The configured IP address, the subnet and the configured gateway are displayed

4.7. Menu point: Module info



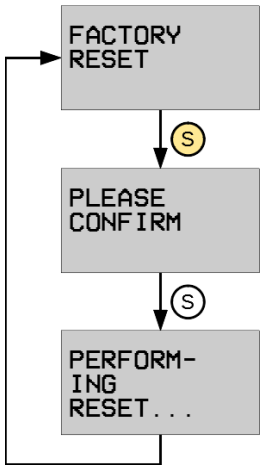
- Press the arrow key briefly to scroll through the menu.

4.8. Menu point: Number of occupied stations



- Press the arrow key briefly to display the currently assigned stations.
- Hold down the Set key for at least 3 seconds to go to Edit mode. (number starts to flash)
- Press the arrow key to change the number of occupied stations (possible values: 2-5)
- Briefly pressing the S key again exits Edit mode and applies the last displayed number of occupied stations.
  This setting takes effect immediately and does not require a restart (verify PLC settings!).
- In all cases the internal state machine is restarted. To prevent a reconfiguration during operation, we recommend setting bit RYm22$_h$ (Display Locked) to block Edit mode.

4.9. Menu point: Factory settings



- Hold down the Set key for min. 3 seconds.
- Confirm the security prompt by briefly pressing the Set key.
- The module was reset to its factory default settings.

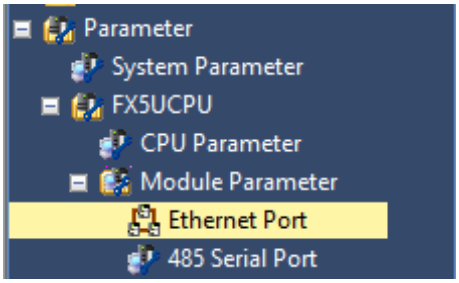
5 Integration

5.1. General

The module is used as a remote I/O module and/or IO-Link module for connecting to a CC-Link IE Field Basic network. In the following an example is used to explain how the module can be incorporated into a network with a Mitsubishi Master Station.

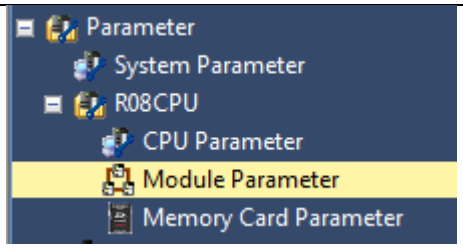
For integration the Mitsubishi Engineering Tool GxWorks3 is used.

5.2. Network parameters



Open the setting window by means of the following operation.
Depending on the CPU this option may have a different name:

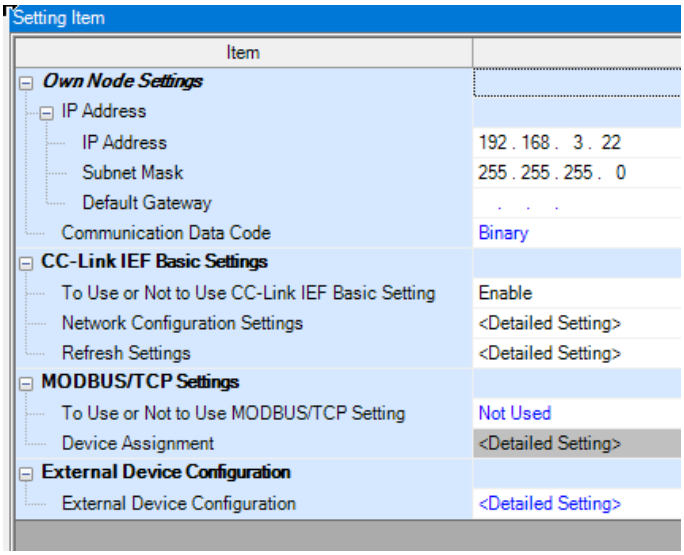
Version 1:
Project window → Parameter → *the corresponding CPU module* → Module Parameter → Ethernet Port



Version 2:
Project window → Parameter → *the corresponding CPU module* → Module Parameter

In this window you can now configure the CC-Link IE-Field Basic Master Station.

- "Own Node Settings" describes the configuration of the PLC and master station.
- Under "CC-Link IEF Basic Settings" you must enable "To use or Not to Use CC-Link IEF Basic Setting". Under "Network Configuration Settings" and "Refresh Settings" you can make additional settings for CC-Link IE Field Basic.



5.3. Network configuration settings

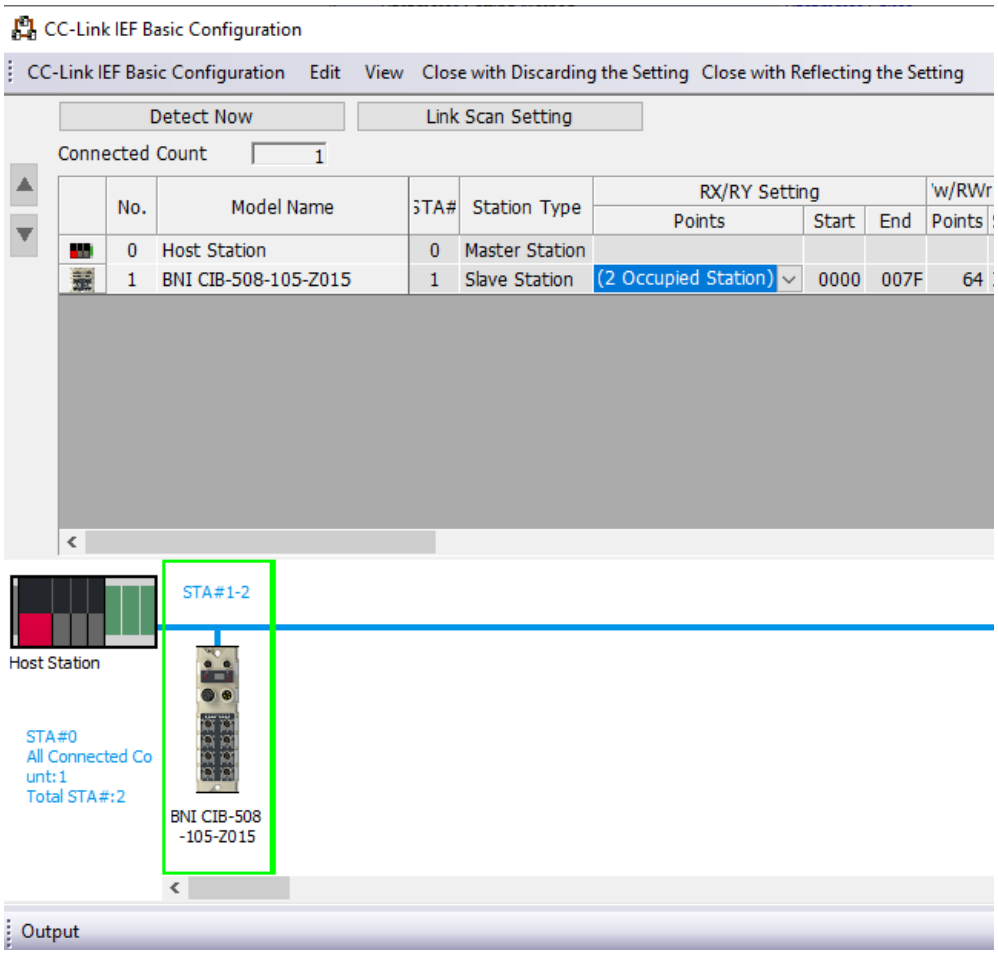
In the configuration window the individual stations can now be integrated. You can either select the required module from the module list before installation and drag-and-drop it to the network line, or click on "DetectNow" after the installation.

The DetectNow function allows automatic identification of the modules in the CC-Link IE Field Basic network. The information sent by the module is compared with the module list and the respective module is added. The IP address can be set for each module.

Note: Each BNI CIB module has as a factory default setting IP address 192.168.3.10.

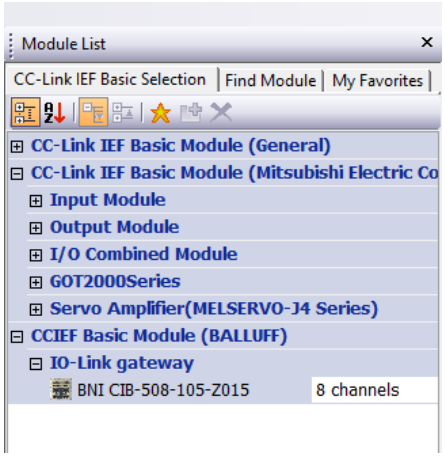
After configuration is complete, the setting must still be saved. Click on "Close with Reflecting Setting" and in the settings window click on "End" to apply the settings there as well. Adjust Refresh Parameters" accordingly.

Then load the configuration into the controller. The controller must then be restarted.



5 Integration

5.4. CSP+-file (network configuration settings)



To start up the CIB module, all that is needed is the general profile of an Intelligent Device Station from the module list. If however you wish to use custom functionalities of the CIB module as well as pre-defined data mapping, the respective profile must be registered in GxWorks3. You will find the corresponding CSP+ file at http://www.balluff.com.

For registering please close all projects in GxWorks3 and register as follows.

Menu Tools → Profile Management → Register Profile → Select zip-file → Ok

If you want to install a new version:
First carry out the following steps:

Menu Tools → Profile Management → Delete Profile → Choose Module → Delete → Ok

The profile is then listed as a separate item in the module list under BALLUFF.

If the number of IO-Link devices in the system and the entire process data size are known, the "Points" column can be used to configure the corresponding number of occupied stations known.

Here again the "Refresh Parameters" need to be adjusted accordingly.

6 CC-Link IE Field Basic

6.1. General

CC-Link IE Field Basic is an open fieldbus based on Ethernet technology. The Ethernet technology allows traditional Ethernet cables to be used. CC-Link IE Field Basic is designed for star topologies only.
A traditional 100Base-T switch is entirely sufficient here.
Due to the switch integrated into the CIB module which enables a star topology, line topologies can also be realized. This means that you can connect multiple CIB modules together in a string.

CC-Link IE Field Basic network

Element		Specification
Maximum number of stations in a network		64 maximum (One module may occupy multiple stations)
Group		The maximum number of stations in a group is 16. (To connect more than 16 stations you must use several groups.)
Cyclical data	RY	64 bits (per station) (One module may occupy multiple stations.)
	RX	64 bits (per station) (One module may occupy multiple stations.)
	RWw	32 words (per station) (One module may occupy multiple stations.)
	RWr	32 words (per station) (One module may occupy multiple stations.)
Port numbers		61450 (cyclic data) 61451 (port number of the slave station for NodeSearch and IPAddressSet)

Ethernet

Element	Specification
Communication speed	100 Mbps
Network topology	Star
Connection cable	Ethernet cable 100Base-T Standard: Category 5e or higher (double shielded recommended)
Maximum distance between stations	100m max. (ANSI/TIA/EIA-568-B, Category 5e)
Total cable length	Star: Depends on system configuration

CIB module

Element	Specification
Maximum number of occupied stations	5

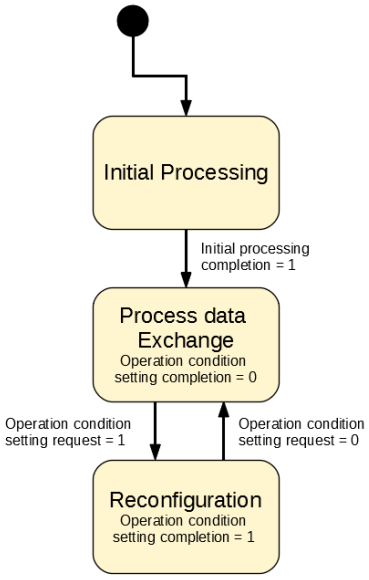
6 CC-Link IE Field Basic

6.2. Pin-port numbering and addressing

The following table provides information about the association of the labeling on the module (port and label) and the specific assignment for pin and process data (Register).
DI = Digital Input
DO = Digital Output

Port No.	Pin	Labels	Register (configured DI)	Register (configured DO)	Register (configured IO-Link, example for 8 bytes PD size)
0	4	XY 0	RXm00$_h$	RYm00$_h$	RWrm04$_h$ – RWrm07$_h$ RWwm04$_h$ – RWw07$_h$
	2	XY 1	RXm01$_h$	RYm01$_h$	only DO/DI
1	4	XY 2	RXm02$_h$	RYm02$_h$	RWrm08$_h$ – RWrm0B$_h$ RWwm08$_h$ – RWwm0B$_h$
	2	XY 3	RXm03$_h$	RYm03$_h$	only DO/DI
2	4	XY 4	RXm04$_h$	RYm04$_h$	RWrm0C$_h$ – RWrm0F$_h$ RWwm0C$_h$ – RWwm0F$_h$
	2	XY 5	RXm05$_h$	RYm05$_h$	only DO/DI
3	4	XY 6	RXm06$_h$	RYm06$_h$	RWrm10$_h$ – RWrm13$_h$ RWwm10$_h$ – RWwm13$_h$
	2	XY 7	RXm07$_h$	RYm07$_h$	only DO/DI
4	4	XY 8	RXm08$_h$	RYm08$_h$	RWrm14$_h$ – RWrm17$_h$ RWwm14$_h$ – RWwm17$_h$
	2	XY 9	RXm09$_h$	RYm09$_h$	only DO/DI
5	4	XY A	RXm0A$_h$	RYm0A$_h$	RWrm18$_h$ – RWrm1B$_h$ RWwm18$_h$ – RWwm1B$_h$
	2	XY B	RXm0B$_h$	RYm0B$_h$	only DO/DI
6	4	XY C	RXm0C$_h$	RYm0C$_h$	RWrm1C$_h$ – RWrm1F$_h$ RWwm1C$_h$ – RWwm1F$_h$
	2	XY D	RXm0D$_h$	RYm0D$_h$	only DO/DI
7	4	XY E	RXm0E$_h$	RYm0E$_h$	RWr(m+1)00$_h$ – RWr(m+1)03$_h$ RWw(m+1)00$_h$ – RWw(m+1)03$_h$
	2	XY F	RXm0F$_h$	RYm0F$_h$	only DO/DI

6.3. State machine



The CIB module has an internal status machine which places the application into various states regardless of the CC-Link IE-Field Basic status machine. The states only become active when the CIB module is in cyclic communication.

The status machine is shown here in simplified form and shows the triggers needed to change the statuses.

As soon a cyclic communication starts the CIB module switches to "Initial Processing" status. At this time configurations and settings can be made.

As soon as the "Initial Processing completion" flag is set to "1", the module switches to process data operation using the previously configured settings.

"The reconfiguration refers only to the reconfiguration data in the process data image. This does not affect SLMP. As soon as the "Operation condition setting request“ flag has been set to "1" the system reverts to the reconfiguration state, which instantly applies the configured values from the process data image. There is no IO-Link of IO process data communication here. The "Operation condition setting completion“ flag is set to "1". This indicates that reconfiguration is finished. Resetting the "Operation condition setting request“ flag to "0" causes the IO-Link gateway to start communication using the new configuration.

7 Cyclical transmission

7.1. General

Cyclic data transmission is divided into a bit and a word area.
CC-Link IE Field Basic is based on stations, whereby each station incorporates 64 bits and 32 words.
The BNI CIB module can be configured for between 2 and 5 stations and thereby offers various process data sizes of 8 to 32 bytes. The bit area is the same for all station configurations. In addition to the status information, the word area also contains the IO-Link process data, the size of which varies with the configuration. The process data size applies to both input and output data. A word is filled with two bytes.

Number of stations	Size of the process data (RWr and RWw)
2	8 bytes in-/out process data per port
3	16 bytes in-/out process data per port
4	24 bytes in-/out process data per port
5	32 bytes in-/out process data per port

7.2. RX and RY

Register	Slave → Master	Register	Master → Slave
RXm00$_h$	X 0 (Port 0, Pin 4)	RYm00$_h$	Y 0 (Port 0, Pin 4)
RXm01$_h$	X 1 (Port 0, Pin 2)	RYm01$_h$	Y 1 (Port 0, Pin 2)
RXm02$_h$	X 2 (Port 1, Pin 4)	RYm02$_h$	Y 2 (Port 1, Pin 4)
RXm03$_h$	X 3 (Port 1, Pin 2)	RYm03$_h$	Y 3 (Port 1, Pin 2)
RXm04$_h$	X 4 (Port 2, Pin 4)	RYm04$_h$	Y 4 (Port 2, Pin 4)
RXm05$_h$	X 5 (Port 2, Pin 2)	RYm05$_h$	Y 5 (Port 2, Pin 2)
RXm06$_h$	X 6 (Port 3, Pin 4)	RYm06$_h$	Y 6 (Port 3, Pin 4)
RXm07$_h$	X 7 (Port 3, Pin 2)	RYm07$_h$	Y 7 (Port 3, Pin 2)
RXm08$_h$	X 8 (Port 4, Pin 4)	RYm08$_h$	Y 8 (Port 4, Pin 4)
RXm09$_h$	X 9 (Port 4, Pin 2)	RYm09$_h$	Y 9 (Port 4, Pin 2)
RXm0A$_h$	X A (Port 5, Pin 4)	RYm0A$_h$	Y A (Port 5, Pin 4)
RXm0B$_h$	X B (Port 5, Pin 2)	RYm0B$_h$	Y B (Port 5, Pin 2)
RXm0C$_h$	X C (Port 6, Pin 4)	RYm0C$_h$	Y C (Port 6, Pin 4)
RXm0D$_h$	X D (Port 6, Pin 2)	RYm0D$_h$	Y D (Port 6, Pin 2)
RXm0E$_h$	X E (Port 7, Pin 4)	RYm0E$_h$	Y E (Port 7, Pin 4)
RXm0F$_h$	X F (Port 7, Pin 2)	RYm0F$_h$	Y F (Port 7, Pin 2)
RXm10$_h$	Diagnostic XY 0	RYm10$_h$	Direction XY 0
RXm11$_h$	Diagnostic XY 1	RYm11$_h$	Direction XY 1
RXm12$_h$	Diagnostic XY 2	RYm12$_h$	Direction XY 2
RXm13$_h$	Diagnostic XY 3	RYm13$_h$	Direction XY 3
RXm14$_h$	Diagnostic XY 4	RYm14$_h$	Direction XY 4
RXm15$_h$	Diagnostic XY 5	RYm15$_h$	Direction XY 5
RXm16$_h$	Diagnostic XY 6	RYm16$_h$	Direction XY 6
RXm17$_h$	Diagnostic XY 7	RYm17$_h$	Direction XY 7
RXm18$_h$	Diagnostic XY 8	RYm18$_h$	Direction XY 8
RXm19$_h$	Diagnostic XY 9	RYm19$_h$	Direction XY 9
RXm1A$_h$	Diagnostic XY A	RYm1A$_h$	Direction XY A
RXm1B$_h$	Diagnostic XY B	RYm1B$_h$	Direction XY B
RXm1C$_h$	Diagnostic XY C	RYm1C$_h$	Direction XY C
RXm1D$_h$	Diagnostic XY D	RYm1D$_h$	Direction XY D
RXm1E$_h$	Diagnostic XY E	RYm1E$_h$	Direction XY E
RXm1F$_h$	Diagnostic XY F	RYm1F$_h$	Direction XY F
RXm20$_h$	Diagnostic Port 0	RYm20$_h$	Display Red LED
RXm21$_h$	Diagnostic Port 1	RYm21$_h$	Display Green LED
RXm22$_h$	Diagnostic Port 2	RYm22$_h$	Display Locked

m = assigned module station number

Register	Slave → Master	Register	Master → Slave
RXm23$_h$	Diagnostic Port 3	RYm23$_h$	Reserved
RXm24$_h$	Diagnostic Port 4	RYm24$_h$	
RXm25$_h$	Diagnostic Port 5	RYm25$_h$	
RXm26$_h$	Diagnostic Port 6	RYm26$_h$	
RXm27$_h$	Diagnostic Port 7	RYm27$_h$	
RXm28$_h$	US Voltage <18V	RYm28$_h$	
RXm29$_h$	UA Voltage <18V	RYm29$_h$	
RXm2A$_h$	UA Voltage <11V	RYm2A$_h$	
RXm2B$_h$ – RXm2F$_h$	Reserved	RYm2B$_h$ – RYm2F$_h$	
RXm30$_h$	IO-Link Port 0 established	RYm30$_h$	IO-Link Port 0 enable
RXm31$_h$	IO-Link Port 1 established	RYm31$_h$	IO-Link Port 1 enable
RXm32$_h$	IO-Link Port 2 established	RYm32$_h$	IO-Link Port 2 enable
RXm33$_h$	IO-Link Port 3 established	RYm33$_h$	IO-Link Port 3 enable
RXm34$_h$	IO-Link Port 4 established	RYm34$_h$	IO-Link Port 4 enable
RXm35$_h$	IO-Link Port 5 established	RYm35$_h$	IO-Link Port 5 enable
RXm36$_h$	IO-Link Port 6 established	RYm36$_h$	IO-Link Port 6 enable
RXm37$_h$	IO-Link Port 7 established	RYm37$_h$	IO-Link Port 7 enable
RXm38$_h$	IO-Link Port 0 Event Flag	RYm38$_h$	IO-Link Port 0 Event clear
RXm39$_h$	IO-Link Port 1 Event Flag	RYm39$_h$	IO-Link Port 1 Event clear
RXm3A$_h$	IO-Link Port 2 Event Flag	RYm3A$_h$	IO-Link Port 2 Event clear
RXm3B$_h$	IO-Link Port 3 Event Flag	RYm3B$_h$	IO-Link Port 3 Event clear
RXm3C$_h$	IO-Link Port 4 Event Flag	RYm3C$_h$	IO-Link Port 4 Event clear
RXm3D$_h$	IO-Link Port 5 Event Flag	RYm3D$_h$	IO-Link Port 5 Event clear
RXm3E$_h$	IO-Link Port 6 Event Flag	RYm3E$_h$	IO-Link Port 6 Event clear
RXm3F$_h$	IO-Link Port 7 Event Flag	RYm3F$_h$	IO-Link Port 7 Event clear
RX(m+1)00$_h$	IO-Link Port 0 Data Valid Flag	RY(m+1)00$_h$	IO-Link Port 0 Byte Swap
RX(m+1)01$_h$	IO-Link Port 1 Data Valid Flag	RY(m+1)01$_h$	IO-Link Port 1 Byte Swap
RX(m+1)02$_h$	IO-Link Port 2 Data Valid Flag	RY(m+1)02$_h$	IO-Link Port 2 Byte Swap
RX(m+1)03$_h$	IO-Link Port 3 Data Valid Flag	RY(m+1)03$_h$	IO-Link Port 3 Byte Swap
RX(m+1)04$_h$	IO-Link Port 4 Data Valid Flag	RY(m+1)04$_h$	IO-Link Port 4 Byte Swap
RX(m+1)05$_h$	IO-Link Port 5 Data Valid Flag	RY(m+1)05$_h$	IO-Link Port 5 Byte Swap
RX(m+1)06$_h$	IO-Link Port 6 Data Valid Flag	RY(m+1)06$_h$	IO-Link Port 6 Byte Swap
RX(m+1)07$_h$	IO-Link Port 7 Data Valid Flag	RY(m+1)07$_h$	IO-Link Port 7 Byte Swap
RX(m+1)08$_h$ – RX(m+1)3F$_h$	Reserved	RY(m+1)08$_h$ – RY(m+1)3F$_h$	Reserved

m = assigned module station number

7 Cyclical transmission

7.3. Details

Signal name	Description
Direction: Slave → Master (CIB → PLC)	
Input X 0-F (port 0-7, pin 2/4)	Digital input signal for the corresponding pin (high active, active if 1, inactive if 0)
Diagnostics In-/output 0 - F	Error on corresponding input/output pin (if 1): • Short circuit between pin and GND when pin configured as output and set to active (PNP module). • Short circuit between pin and UA when pin configured as output and set to inactive (PNP module). • Short circuit between pin and UA when pin configured as output and set to active (NPN module). • Short circuit between pin and GND when pin configured as output and set to inactive (NPN module)
Diagnostics Port 0-7	Error on the corresponding supply line of the port (if 1) e.g. overcurrent, short-circuit on Pin 1.
US voltage <18V	1, if voltage on US is less than 18V
UA voltage <18V	1, if voltage on UA is less than 18V
UA voltage <11V	1, if voltage on UA is less than 11V or no voltage on UA
IO-Link Channel 0-7 open	1 if an IO-Link device is connected and IO-Link communication is running. If IO-Link Validation is active, the result of the validation is indicated by this bit.
IO-Link Channel 0-7 Event Flag	1 if an event from a connected IO-Link device is pending.
IO-Link Channel 0-7 Data Valid Flag	1 if an IO-Link device is connected, IO-Link communication is running and the process data from the IO-Link device is valid.
Direction: Master → Slave (PLC → CIB)	
Output X 0-F (port 0-7, pin 2/4)	Digital output signal 00h – 0Fh
Port direction 0 – F Pin2/4	When setting the port direction: Bit = 0: the corresponding pin functions as a digital input Bit = 1: the corresponding pin functions as a digital output Used only during initial processing or reconfiguration
Display red LED	When setting the bit to 1 the red LEDs on the display come on
Display green LED	When setting the bit to 1 the green LEDs on the display come on
Display lock	If set to 1, no changes can be made on the display. A key symbol is displayed.
Activate IO-Link Channel 0-7	If set to 1, the channel runs in IO-Link mode. Used only during initial processing or reconfiguration
IO-Link Channel 0-7 Event Clear	If set to 1, then all Events of the IO-Link channel are cleared. If the bit remains at 1, all new Events are automatically cleared.
IO-Link Channel 0-7 Byte Swap	If set to 1, Byte Swap is enabled. Used only during initial processing or reconfiguration

7.4. Word range RWr and RWw

Depending on the number of configured stations the process data mapping differs in the word range.

2 assigned stations (8 bytes per channel)

Register	Slave → Master	Register	Master → Slave
RWrm00$_h$ – RWrm03$_h$	Status Area	RWwm00$_h$ – RWwm03$_h$	Operation Area
RWrm04$_h$ – RWrm07$_h$	Input process data IO-Link port 0	RWwm04$_h$ – RWwm07$_h$	Output process data IO-Link port 0
RWrm08$_h$ – RWrm0B$_h$	Input process data IO-Link port 1	RWwm08$_h$ – RWwm0B$_h$	Output process data IO-Link port 1
RWrm0C$_h$ – RWrm0F$_h$	Input process data IO-Link port 2	RWwm0C$_h$ – RWwm0F$_h$	Output process data IO-Link port 2
RWrm10$_h$ – RWrm13$_h$	Input process data IO-Link port 3	RWwm10$_h$ – RWwm13$_h$	Output process data IO-Link port 3
RWrm14$_h$ – RWrm17$_h$	Input process data IO-Link port 4	RWwm14$_h$ – RWwm17$_h$	Output process data IO-Link port 4
RWrm18$_h$ – RWrm1B$_h$	Input process data IO-Link port 5	RWwm18$_h$ – RWwm1B$_h$	Output process data IO-Link port 5
RWrm1C$_h$ – RWrm1F$_h$	Input process data IO-Link port 6	RWwm1C$_h$ – RWwm1F$_h$	Output process data IO-Link port 6
RWr(m+1)00$_h$ – RWr(m+1)03$_h$	Input process data IO-Link port 7	RWw(m+1)00$_h$ – RWw(m+1)03$_h$	Output process data IO-Link port 7

m = assigned module station number

3 assigned stations (16 bytes per channel)

Register	Slave → Master	Register	Master → Slave
RWrm00$_h$ – RWrm03$_h$	Status Area	RWwm00$_h$ – RWwm03$_h$	Operation Area
RWrm04$_h$ – RWrm0B$_h$	Input process data IO-Link port 0	RWwm04$_h$ – RWwm0B$_h$	Output process data IO-Link port 0
RWrm0C$_h$ – RWrm13$_h$	Input process data IO-Link port 1	RWwm0C$_h$ – RWwm13$_h$	Output process data IO-Link port 1
RWrm14$_h$ – RWrm1B$_h$	Input process data IO-Link port 2	RWwm14$_h$ – RWwm1B$_h$	Output process data IO-Link port 2
RWrm1C$_h$ – RWr(m+1)03$_h$	Input process data IO-Link port 3	RWwm1C$_h$ – RWw(m+1)03$_h$	Output process data IO-Link port 3
RWr(m+1)04$_h$ – RWr(m+1)0B$_h$	Input process data IO-Link port 4	RWw(m+1)04$_h$– RWw(m+1)0B$_h$	Output process data IO-Link port 4
RWr(m+1)0C$_h$ – RWr(m+1)13$_h$	Input process data IO-Link port 5	RWw(m+1)0C$_h$ – RWw(m+1)13$_h$	Output process data IO-Link port 5
RWr(m+1)14$_h$ – RWr(m+1)1B$_h$	Input process data IO-Link port 6	RWw(m+1)14$_h$ – RWw(m+1)1B$_h$	Output process data IO-Link port 6
RWr(m+1)1C$_h$ – RWr(m+2)03$_h$	Input process data IO-Link port 7	RWw(m+1)1C$_h$ – RWw(m+2)03$_h$	Output process data IO-Link port 7

m = assigned module station number

7 Cyclical transmission

4 assigned stations (24 bytes per channel)

Register	Slave → Master	Register	Master → Slave
RWrm00$_h$ – RWrm03$_h$	Status Area	RWwm00$_h$ – RWwm03$_h$	Operation Area
RWrm04$_h$ – RWrm0F$_h$	Input process data IO-Link port 0	RWw04$_h$ – RWw0B$_h$	Output process data IO-Link port 0
RWrm10$_h$ – RWrm1B$_h$	Input process data IO-Link port 1	RWwm10$_h$ – RWwm1B$_h$	Output process data IO-Link port 1
RWrm1C$_h$ – RWr(m+1)07$_h$	Input process data IO-Link port 2	RWwm1C$_h$ – RWw(m+1)07$_h$	Output process data IO-Link port 2
RWr(m+1)08$_h$ – RWr(m+1)13$_h$	Input process data IO-Link port 3	RWw(m+1)08$_h$ – RWw(m+1)13$_h$	Output process data IO-Link port 3
RWr(m+1)14$_h$ – RWr(m+1)1F$_h$	Input process data IO-Link port 4	RWw(m+2)14$_h$ – RWw(m+2)1F$_h$	Output process data IO-Link port 4
RWr(m+2)00$_h$ – RWr(m+2)0B$_h$	Input process data IO-Link port 5	RWw(m+2)00$_h$ – RWw(m+2)0B$_h$	Output process data IO-Link port 5
RWr(m+2)0C$_h$ – RWr(m+2)17$_h$	Input process data IO-Link port 6	RWw(m+2)0C$_h$ – RWw(m+2)17$_h$	Output process data IO-Link port 6
RWr(m+2)18$_h$ – RWr(m+3)03$_h$	Input process data IO-Link port 7	RWw(m+2)18$_h$ – RWw(m+3)03$_h$	Output process data IO-Link port 7

m = assigned module station number

5 assigned stations (32 bytes per channel)

Register	Slave → Master	Register	Master → Slave
RWrm00$_h$ – RWrm03$_h$	Status Area	RWwm00$_h$ – RWwm03$_h$	Operation Area
RWrm04$_h$ – RWrm13$_h$	Input process data IO-Link port 0	RWwm04$_h$ – RWwm13$_h$	Output process data IO-Link port 0
RWrm14$_h$ – RWr(m+1)03$_h$	Input process data IO-Link port 1	RWwm14$_h$ – RWw(m+1)03$_h$	Output process data IO-Link port 1
RWr(m+1)04$_h$ – RWr(m+1)13$_h$	Input process data IO-Link port 2	RWw(m+1)04$_h$ – RWw(m+1)13$_h$	Output process data IO-Link port 2
RWr(m+1)14$_h$ – RWr(m+2)03$_h$	Input process data IO-Link port 3	RWw(m+1)14$_h$ – RWw(m+2)03$_h$	Output process data IO-Link port 3
RWr(m+2)04$_h$ – RWr(m+2)13$_h$	Input process data IO-Link port 4	RWw(m+2)04$_h$ – RWw(m+2)13$_h$	Output process data IO-Link port 4
RWr(m+2)14$_h$ – RWr(m+3)03$_h$	Input process data IO-Link port 5	RWw(m+2)14$_h$ – RWw(m+3)03$_h$	Output process data IO-Link port 5
RWr(m+3)04$_h$ – RWr(m+3)13$_h$	Input process data IO-Link port 6	RWw(m+3)04$_h$ – RWw(m+3)13$_h$	Output process data IO-Link port 6
RWr(m+3)14$_h$ – RWr(m+4)03$_h$	Input process data IO-Link port 7	RWw(m+3)14$_h$ – RWw(m+4)03$_h$	Output process data IO-Link port 7

m = assigned module station number

Status and operation area

Register	Slave → Master	Register	Master → Slave
RWrm00$_h$	Module status area	RWwm00$_h$	Module operat. area
RWrm01$_h$	Error code	RWwm01$_h$	Usage prohibited
RWrm02$_h$	Warning code	RWwm02$_h$	Usage prohibited
RWrm03$_h$	Usage prohibited	RWwm03$_h$	Usage prohibited

7.5. Details: Module status area

Register	Slave → Master	Register	Master → Slave
RWrm00$_h$.b0	Reserved	RWwm00$_h$.b0	Reserved
RWrm00$_h$.b1		RWwm00$_h$.b1	
RWrm00$_h$.b2		RWwm00$_h$.b2	
RWrm00$_h$.b3		RWwm00$_h$.b3	
RWrm00$_h$.b4		RWwm00$_h$.b4	
RWrm00$_h$.b5		RWwm00$_h$.b5	
RWrm00$_h$.b6		RWwm00$_h$.b6	
RWrm00$_h$.b7		RWwm00$_h$.b7	
RWrm00$_h$.b8	Initial processing request	RWwm00$_h$.b8	Initial processing completion
RWrm00$_h$.b9	Operation condition setting active	RWwm00$_h$.b9	Operation condition setting request
RWrm00$_h$.b10	Error status	RWwm00$_h$.b10	Error clear request
RWrm00$_h$.b11	Station Ready	RWwm00$_h$.b11	Reserved
RWrm00$_h$.b12	Warning status	RWwm00$_h$.b12	Warning clear request
RWrm00$_h$.b13	Reserved	RWwm00$_h$.b13	Reserved
RWrm00$_h$.b14		RWwm00$_h$.b14	
RWrm00$_h$.b15		RWwm00$_h$.b15	

7.6. Process data representation (Byte Swap)

The process data representation is configured using the Byte Swap option. This is configurable for each IO-Link channel individually and is enabled (1) or disabled (0) using bits RY(m+1)00$_h$ - RY(m+1)07$_h$. The option applies to both input and output data.

With Byte Swap enabled the process data image looks as follows
(Example for output data):

Word Address	High Byte	Low Byte
RWwm00$_h$	IOL PD Byte 0	IOL PD Byte 1
RWwm01$_h$	IOL PD Byte 2	IOL PD Byte 3
RWwm02$_h$	IOL PD Byte 4	IOL PD Byte 5
…	…	…

If Byte Swap is disabled, the process data are represented as follows:

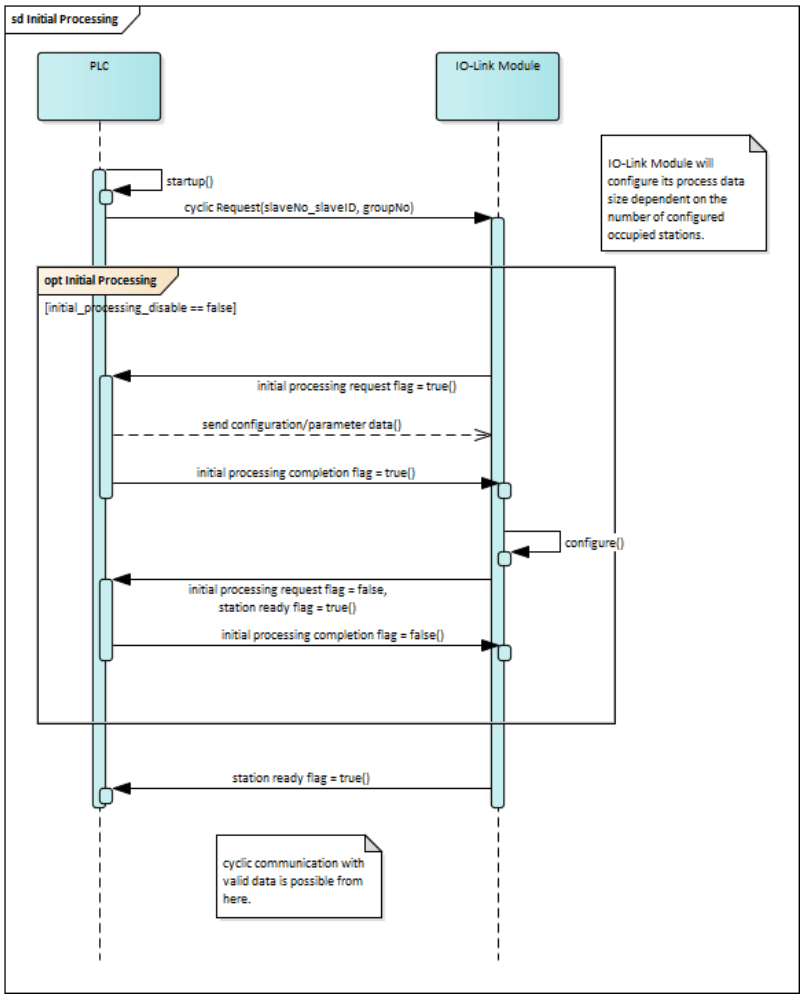
Word Address	High Byte	Low Byte
RWwm00$_h$	IOL PD Byte 1	IOL PD Byte 0
RWwm01$_h$	IOL PD Byte 3	IOL PD Byte 2
RWwm02$_h$	IOL PD Byte 5	IOL PD Byte 4
…	…	…

7 Cyclical transmission

7.7. Initializing

The CIB module starts up with an "Initial processing" mechanism.

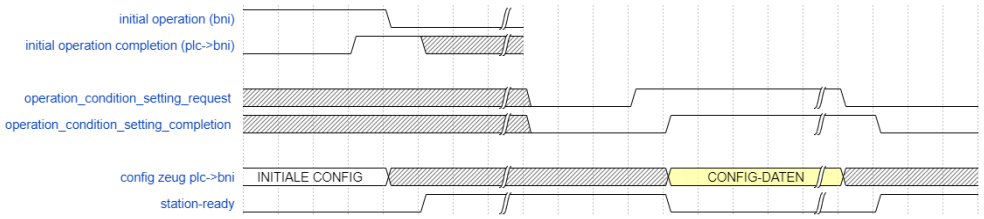
This initialization is normally handled by function blocks. If there are no function blocks, the following procedure should be followed:



Settings for the IO-Link master can be made directly in the process data. Using the RY bits you can enable IO-Link channels, determine the direction of the DI/DO pins and enable the process data byte swapping. The settings are applied after setting the Initial Processing Completion flag.

7.8. Parameterization while running

The device can be re-parameterized while running. Re-parameterization means that the ports are reconfigured or Byte Swap is enabled. Follow this procedure to re-parameterize while running:



While the Operation Condition Request flag is set no IO-Link communication takes place. Outputs are disabled and inputs are not read. Settings can be made just as is possible during the Initial Processing phase.
The operation condition setting completion flag indicates that the configuration was successfully applied.

7 Cyclical transmission

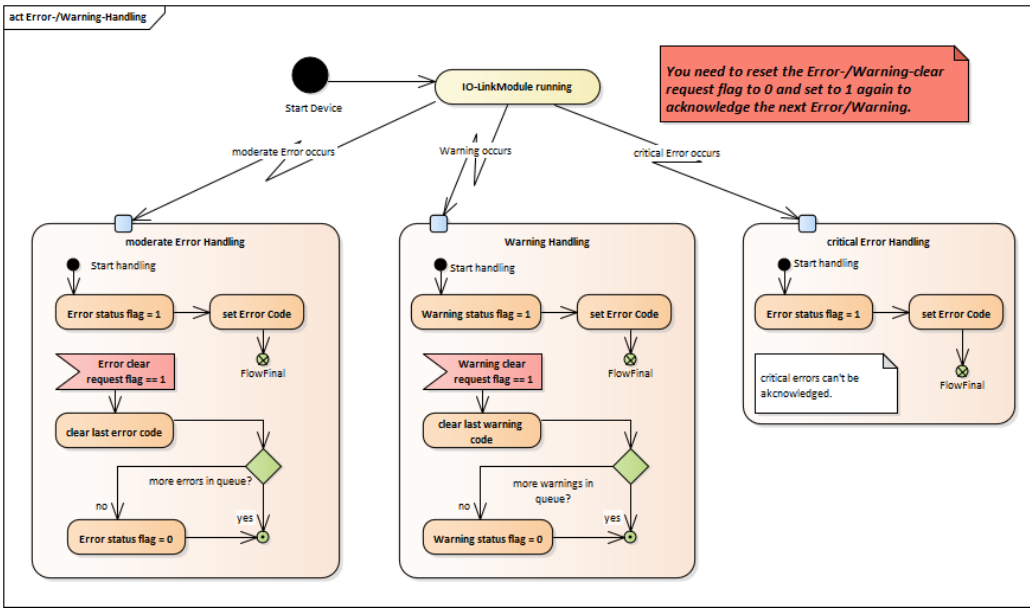
7.9. Error/warning handling

Errors or warnings are indicated by the status bits "Error status" and "Warning status". When an error occurs, "Ready" is reset. Once the error has been remedied and cleared, the module uses "Ready" to indicate normal status.

There are three error types. Measures for error handling can be found in Section 9.

- Major errors. These cannot be cleared.
- Moderate errors. These can be cleared.
- Minor errors/warnings. These can be cleared

The following shows how the status bits are used.



7.10. Configuration

In general the module is configured after startup. The configuration is sent cyclically in the bit area but only applied in the module if the following conditions are met:

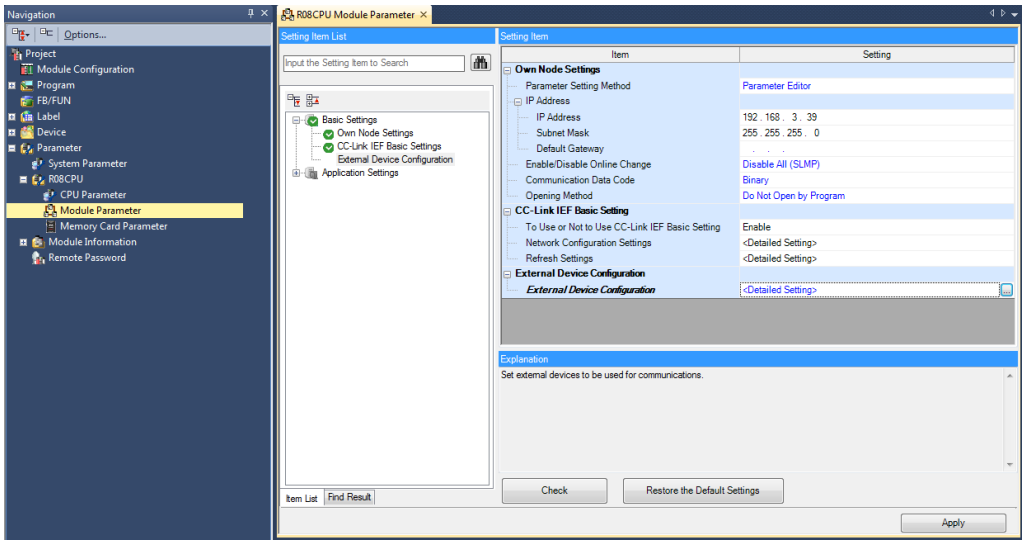
- The module does not send "Ready" (not ready) and "Initial processing completion" is set.
- The module is in Reconfiguration status and "Operation condition setting request" is set to "0".

The BNI CIB module is freely configurable. You may use any port as an input, output or IO-Link. IO-Link is only possible on Pin 4.

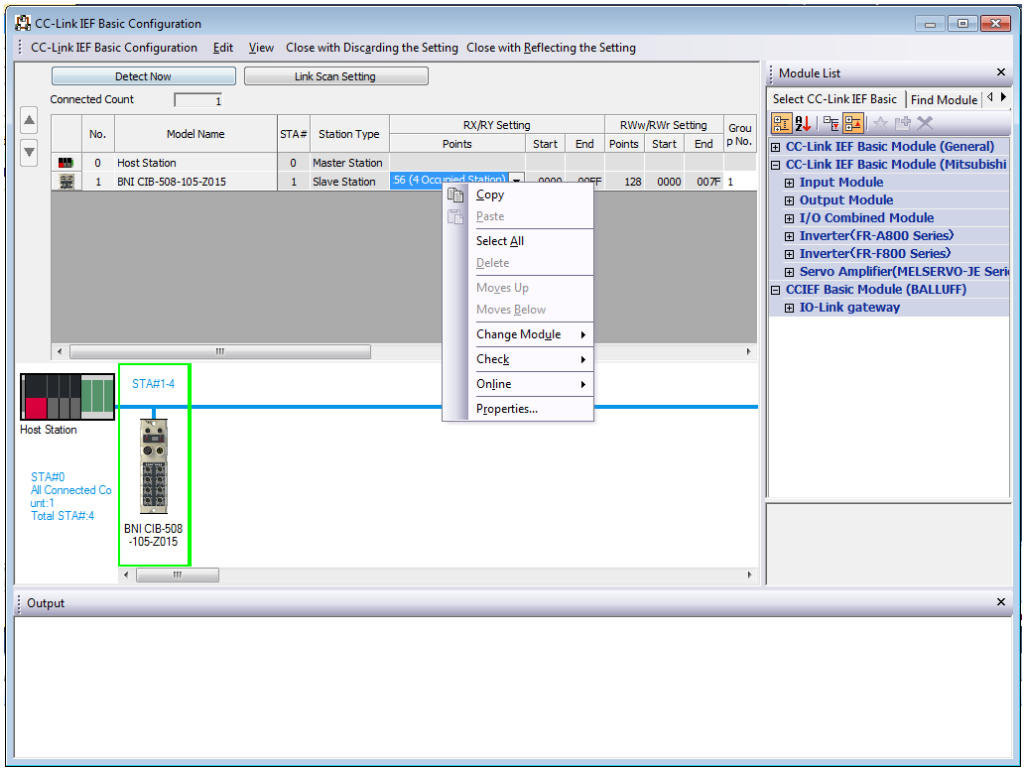
8 Parameter Processing

8.1. Parameter Processing

The CIB module supports "Parameter Processing of Slave Station“. This uses the acyclical part of the SLMP specification. (Not to be confused with stand-alone SLMP devices.)
Entry is the same as in 5.2. Network Parameters.

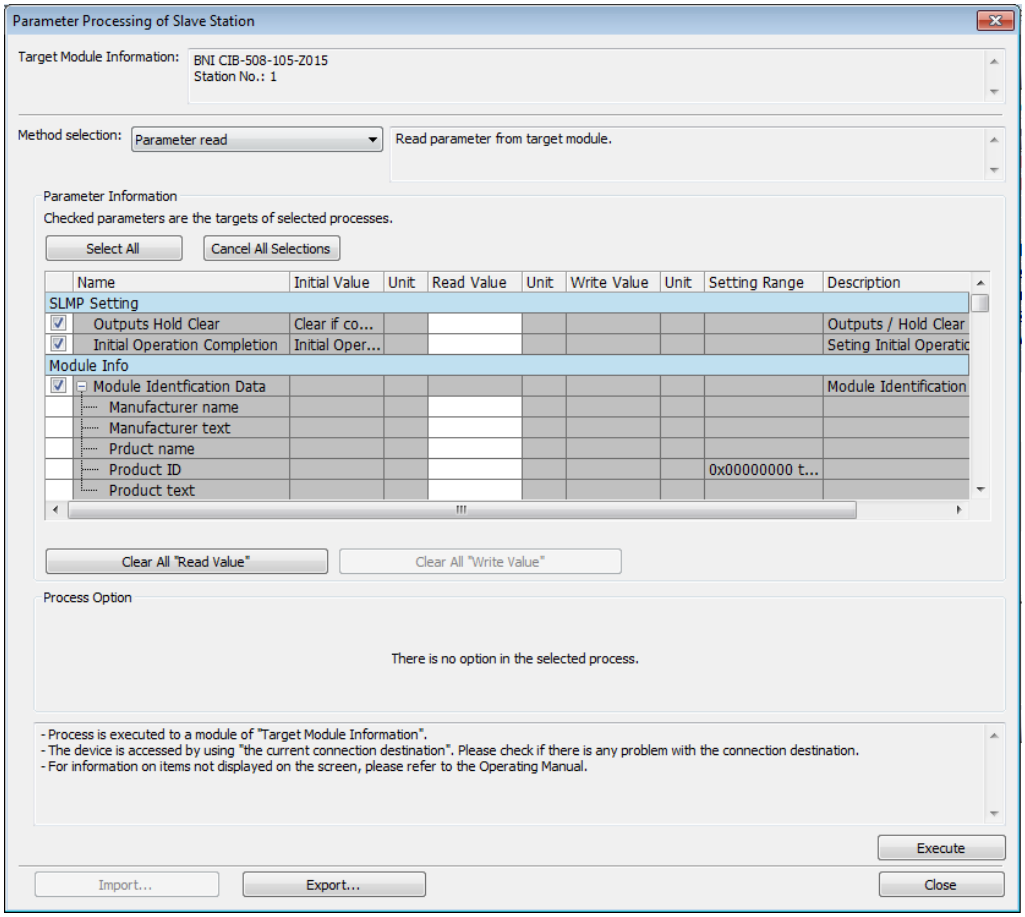


Now select "Network Configuration Settings".
Right-click on the device previously detected using "Detect Now".

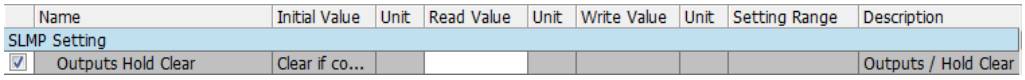


8 Parameter Processing

Now select Online → Parameter Processing of Slave Station. The following window should open:



Use the drop-down menu "Method Selection" to select whether you want to read or write parameters. Clicking on the "Execute" button either reads or writes all the selected parameters. Use the checkboxes at the left of each parameter block to select this.

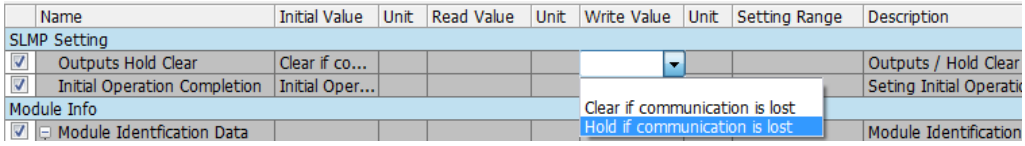


Initial Value: The Initial Value column always shows the initial value, i.e. also the one the module uses for starting from the factory settings.

Read Value: When parameters have been read the value is shown here. Note: When a parameter has been written, it will only be the same when reading if the configuration was applied in the intermediate step using the "Initial Operation Completion" contained in the process data image.

Write Value: If "Method Selection" is set to Parameter Write, the fields are no longer disabled and the values which are to be written can be entered here. If values are read-only, the area remains grayed-out also in the "Parameter Write" mode selection. See **Fehler! Verweisquelle konnte nicht gefunden werden.** Module Identification.

Setting Range: Indicates the allowed value range for the field. If the field is empty, then enumeration is used. This means the values are already shown in the drop-down menu as shown here:



Use the "Import" and "Export" buttons to store all the currently read and written values in the form of a CSV spreadsheet file. And if devices are to be loaded with the same or similar configurations, this CSV file can be imported and written directly using the saved settings.

8.2. General settings and identification data

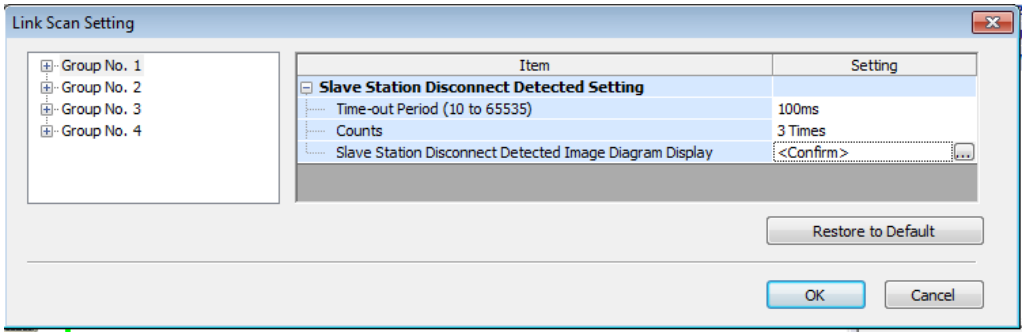
The following describes the functions of the first three parameters:

Outputs Hold Clear:
This parameter defines the behavior of the digital outputs when the connection between the PLC and CIB slave is interrupted.

This parameter has the following selection options:

- **Clear if communication is lost (factory default):**
  In this setting all the outputs are turned off when communication is lost.
- **Hold if communication is lost:**
  In this setting all the outputs retain their state when communication is lost.

Important: The time until the next actual clearing of the outputs also depends on "Link Scan Settings". In the "CC-Link IEF Basic Configuration" window there is a "Link Scan Setting" button which can be used to set a "Time-out Period" and the "Counts" for the respective group of CC-Link IE Field Basic devices:



The "Time-out Period" multiplied by the number of "Counts" along with the tolerance of the processing time of the CIB module gives you the turn-off time. gives you the tolerance of the processing time of the CIB module. Or in this example from the illustration approx.
100ms * 3 ~ 300ms.

These times are freely selectable for the up to four groups in the CC-Link IE Field Basic network.

8 Parameter Processing

Initial Operation Setting:
In the default device setting the CIB module always starts in "Initial Operation" mode, i.e. the configuration state. If you want to have all the configuration data loaded from the process data image (e.g. IO-Link Channel Enable) at startup and skip the "Initial Operation" step, disable this setting.

This parameter has the following selection options:

- **Initial Operation Setting On (default setting):**
  Device starts in the configuration state, no configuration data are saved.
- **Initial Operation Setting Off:**
  Device saves configuration and starts directly without configuration setting.

Module Info (Module Identification Data):
The "Module Info" parameter is read-only. It shows only manufacturer data:

The following values can be expected:

- **Manufacturer name:**
  Balluff
- **Manufacturer text:**
  www.balluff.de
- **Product name:**
  BNI CIB-508-105-Z015
- **Product ID:**
  0x00005086
- **Product text:**
  (empty)

8.3. IO-Link Device Validation

The IO-Link Device Validation is a functionality from the *"IO-Link Interface and System Specification V1.1.2"*.
This is a security mechanism that can prevent unintended or intended improper installation of IO-Link devices.

The following parameters are used for identification of the IO-Link devices (also shown in the parameter image):

- **Vendor ID: (2 bytes)**
  Vendor-specific identification number, for example for Balluff IO-Link devices 0x0378
  Can be read from the IO-Link device using the DPP (Direct Parameter Page)
  Index range: 0x07-0x08
- **Device ID: (3 bytes)**
  Device-specific identification number is unique with respect to the IO-Link device as variant.
  Example: 0x0005010B
  Can be read from the IO-Link device using the DPP (Direct Parameter Page)
  Index range: 0x09-0x0B
- **Serial Number (16 bytes):**
  Is an absolutely unique designation referring to the IO-Link device itself. There should never be two identical serial numbers (in combination with Vendor and Device ID)
  This can be read from the IO-Link de ice using the ISDU Index: 0x15
  As shown in the following illustration, the 16-byte long serial number is broken down into 4-byte pieces so that it can be sent to the CIB module.

☑	Device Validation Port 2					
	ValidationType	Disabled		Disabled		Identity
	VendorID	0x0000		0x0000		
	DeviceID	0x00000000		0x00000000		
	Serial Number 0-3	0x00000000		0x00000000		
	Serial Number 4-7	0x00000000		0x00000000		
	Serial Number 8-11	0x00000000		0x00000000		
	Serial Number 12-15	0x00000000		0x00000000		

There are essentially three configuration possibilities for the Validation Type parameter:

- **Disabled (default setting):**
  The "Device Validation" functionality is fully disabled.
- **Compatibility:**
  Compatibility is checked, i.e. whether the Vendor ID and Device ID are the same as the connected device.
- **Identity:**
  Checks whether Vendor ID, Device ID and serial number are identical.

The configuration is directly applied, i.e. the IO-Link ports are also restarted.

If the "Compatibility" or "Identity" checks fail, the port LED, which is normally solid green for an active IO-Link connection or flashing green when waiting for an IO-Link device, flashes red to indicate a validation error when starting IO-Link.
A corresponding IO-Link diagnostic is provided.

8 Parameter Processing

Each IO-Link port/channel has a structure with Device Validation. In this case the parameter groups:

- Device Validation Port 0
- Device Validation Port 1
- Device Validation Port 2
- Device Validation Port 3
- Device Validation Port 4
- Device Validation Port 5
- Device Validation Port 6
- Device Validation Port 7

8.4. IO-Link Data Storage Content

The IO-Link Storage Configuration is a functionality from the *„IO-Link Interface and System Specification V1.1.2“.*

For Data Storage or also called Parameter Server (data retention function) we are dealing with a functionality wherein all the parameters written to the IO-Link device can be saved and reflected back.

This means when enabled all settings/parameters (ISDU indices) are saved by the CIB module, which takes place from the IO-Link device.

If Data Storage is enabled, a validation of the device is enabled analogous to the Device Validation option. This means if data have been stored in Data Storage and another device is connected, these data are not sent to the wrong device.
Validation is based on the Vendor ID and Device ID.

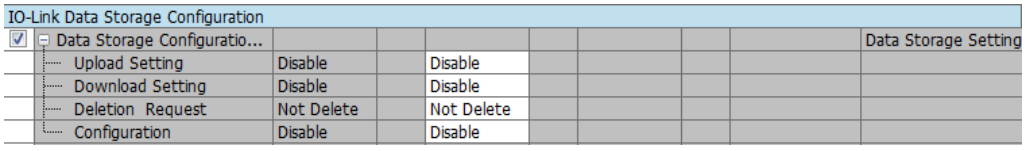
The specific setting options are as follows:

- **Configuration (Enable/Disable):**
  This field can be "Enable" or "Disable" (factory default).
  This fully enables or disables the Data Storage mechanism.

- **Upload Setting (Enable/Disable):**
  If this setting is set to Enable, every time the IO-Link device indicates that new data are present (Upload flag is set by changed ISDU indices or newly written ISDU indices), an image of this is stored on the CIB module. **Caution:** Even if the setting is disabled but the Download setting is enabled and Data Storage is empty, initially the Data Storage is filled by the device.

- **Download Setting (Enable/Disable):**
  Only a download of the parameter data to the IO-Link device is performed. As soon as the saved parameter data the Data Storage of the port differs from the that of the connected IO-Link device, a download is performed. Only exception: The parameter server is empty. Then one upload is performed.

- **Deletion Request (Delete/Not Delete):**
  If set, the contents of Data Storage is deleted.



8.5. Error codes for Processing parameter

If while transmitting parameters errors occur in the Engineering Tool:

Error code	Description
0xXXXXCEE0	SLMP_ERROR_UNDER_EXECUTION
0xXXXXCEE1	SLMP_ERROR_REQUEST_DATA_SIZE
0xXXXXCEE2	SLMP_ERROR_RESPONSE_DATA_SIZE
0xXXXXCF20	SLMP_ERROR_CAN_NOT_COMMUNICATION_SETTING
0xXXXXCF30	SLMP_ERROR_NO_EXIST_PARAMETER_ID
0xXXXXC061	SLMP_ERROR_WRONG_DATA
0xXXXXCF31	SLMP_ERROR_CAN_NOT_PARAMETER_SET

- **SLMP_ERROR_RESPONSE_DATA_SIZE:**
- **SLMP_ERROR_REQUEST_DATA_SIZE:**
- **SLMP_ERROR_CAN_NOT_COMMUNICATION_SETTING:**
- **SLMP_ERROR_NO_EXIST_PARAMETER_ID:**
  There may be a newer or older version of the CSP_ file compared with the firmware version.

- **SLMP_ERROR_UNDER_EXECUTION:**
  Another SLMP telegram is currently under execution

- **SLMP_ERROR_CAN_NOT_PARAMETER_SET:**
  It is currently not possible to write parameters, since the start conditions are not met.
  Cause: parameters were written simultaneously from more than one Engineering Tool,
  or there was an error in the Engineering Tool

- **SLMP_ERROR_WRONG_DATA:**
  The received data are incorrect, such as wrong port number. For example a value is read/ written for port 9 even though no such port exists.

9 Troubleshooting

9.1. Indicator LEDs

The LEDs on the module indicate the status of the module and its ports. The following situations may occur:

Error indicator	Description / Procedure
US/UA LED is red / red flashing	There is undervoltage on the US/UA supply. Check the voltages and their installation.
ERR is red	There is no CC-Link IE Field Basic communication taking place. Start cyclic CC-Link IE Field Basic communication.
L/A1/2 goes off or never comes on	Check whether the Ethernet cables are correctly installed. Check whether 100 BASE-T Ethernet cables are used. Check whether the distance between stations is 100m or less. If you are using a switch, check whether it is turned on.
Port LED is red	Check whether: - There is no actuator warning. A configured output may not be used as an input. - There is no overload. An output can handle max. 2A.
Both port LEDs are red flashing	Check whether: - There is no short circuit or high load on Pin1.

9.2. Display in the process data

In the word process data range RWrm00$_h$ -RWrm02$_h$ status messages, warnings and errors are shown. If an error is present the RWrm00$_h$.b10 bit is set. If there is a warning, the RWrm00$_h$.b12 bit is set.
The corresponding error codes are found in Register RWrm01$_h$. The warning codes are found in Register RWrm02$_h$.

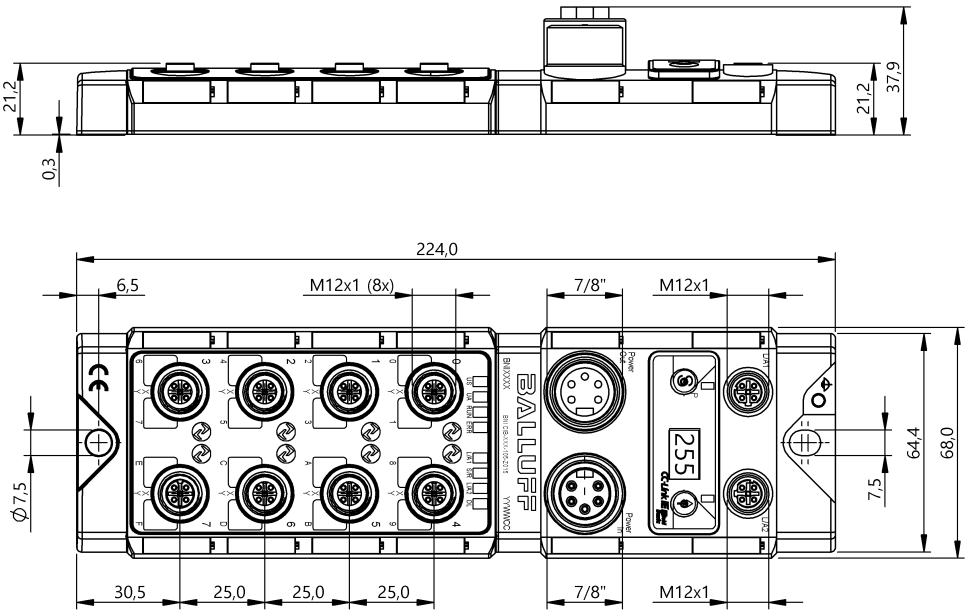
Moderate errors always begin with 0xE2XX. The actual IO-Link error code is in the lowest byte, e.g. 0xE235 for Function not available. If IO-Link errors occur which are not described in this manual, please refer to the manual for the respective IO-Link device. Warnings are displayed in the Word area.

9.3. Error list

Error code	Source	Classification	Description / Procedure
0x0001	Gateway	Major	Watchdog was tripped. Take measures to prevent interference - use shielded cables. Then perform a restart.
0x0005	Gateway	Major	Internal communication error See 0x0001
0x0101	Gateway	Moderate	Undervoltage Check the cyclic bit range to see which voltage is affected.
0x0102	Gateway	Moderate	Diagnostics Check the cyclic bit range to see which port or pin is affected.
0x0103	Gateway	Warning	Station or network number changed while the system is running
0xD529	Gateway	Major	Internal SW error.
0xD52B	Gateway	Major	MAC initialization failed
0xE243	Gateway	Moderate	IO-Link port is wrong
0xE119	Gateway	Moderate	Incorrect parameter value in the SLMP telegram
0xE118	Gateway	Moderate	Incorrect Device Validation type

10 Technical data

10.1. Dimensions



10.2. Mechanical data

Housing material	Zinc die-casting, matte nickel-plated
Enclosure rating per IEC 60529	IP 67 (only in plugged-in and screwed-down state)
Supply voltage	7/8", 5-pin, male and female
Input ports / output ports	M12, A-coded (8 x female)
Dimensions (W x H x D in mm)	68 x 224 x 37.9
Installation type	Screw mounting with 2 mounting holes
Ground connection	M4
Weight	Approx. 685 g

10.3. Operating conditions

Ambient temperature Storage temperature	–5 °C … 70 °C –25 °C … 70 °C

10 Technical data

10.4. Electrical data

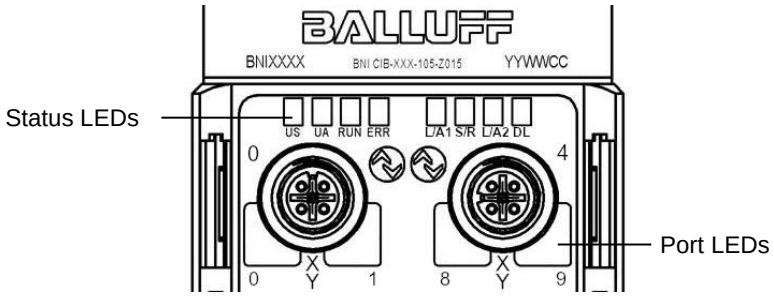
Voltage supply	18…30.2 V DC, per EN 61131-2
Ripple	< 1%
Current consumption without load (US)	200 mA @ 24V
Maximum load current (UA)	9 A (total)
Input type PNP/NPN	EN 61131-2, type 3
Output type PNP/NPN	EN 61131-2
Load current per PNP/NPN output (Pin 2)/(Pin 4)	max. 2 A
Load current Pin 1	max. 1.3 A (temperature-dependent)

10.5. CC-Link IE Field Basic

Technology	Ethernet
Connection	M12, D-coded
Cable type	IEEE 802.3 100 Base-T and ANSI/TIA/EIA-568-B (Category 5e) 4 pairs of shielded cable. Double-shielded cable recommended.
Data transfer rate	100 Mbps
Max. cable length between stations	Up to 100 m

10 Technical data

10.6. Function indicators



Module status

LED	Status	Function
US	Off	No supply voltage
	Green	Sensor supply OK
	Red	Sensor supply less than 18 V
UA	Off	No supply voltage
	Green	Actuator supply OK
	Red, flashing	Actuator supply less than 18 V
	Red	Actuator supply less than 11 V
RUN	Off	General firmware error in module or reset
	Green	Normal module operation
ERR	Off	Communication OK
	Red	Communication error / device error
L/A 1/2	Orange	Link on respective port
S/R	Off	No CC-Link IE Field Basic communication
	Green, flashing	CC-Link IE Field Basic communication
DL	Off	No CC-Link IE Field Basic communication
	Green, flashing	Cyclic communication without this slave
	Green	Cyclic communication with this slave

Port LED

Each M12 port (digital in-/output) has two 2-color LEDs assigned to it which indicate the configuration or operating states.

LED	Port mode	Indicator	Description
Pin4, Pin2	SIO input	Off	Input signal = 0
		Yellow	Input signal = 1
		Red	Both LEDs flashing: Short circuit on Pin1-Pin3
Pin4, Pin2	SIO output	Off	Output signal = 0
		Yellow	Output signal = 1
		Red	Only one LED: Short circuit / overload on corresponding Pin4 or Pin2
			Both LEDs flashing: Short circuit between Pin1 and Pin3 or short circuit on both output pins
Only Pin4	IO-Link	Off	IOL Port not enabled
		Green, flashing	IOL Port enabled, but no IO-Link communication
		Green, rapidly flashing	Parameter data adjustment with Data Storage
		Green	IO-Link enabled and communication running

11 Appendix

11.1. Scope of delivery

- CC-Link IE Field Basic Module
- 4x M12 dummy plugs
- Grounding strap
- M4x6 screw
- Spring washer
- 20 labels
- Installation guide

11.2. Order code

BNI CIB-5xx-105-Z015

Balluff Network Interface

CC-Link IE Field Basic interface

Functions
508 = IP 67 SIO + IOL module, max. 16 in-/outputs, max. 8 IO-Link connections

Variants
105 = Display version

Mechanical version
Z015 = Die-cast zinc housing
Material: 1. Balluff housing version
Bus: 2 x M12x1 internal thread
Power port: 7/8" external thread
I/O ports: 8 x M12x1 internal thread

11.3. Ordering information

Type code	Order code
BNI CIB-508-105-Z015	BNI00E7

Notes

www.balluff.com

No. 947741-726 EN • 01.130147 • Edition G20 • Replaces Edition E20 • Subject to changes

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

BALLUFF