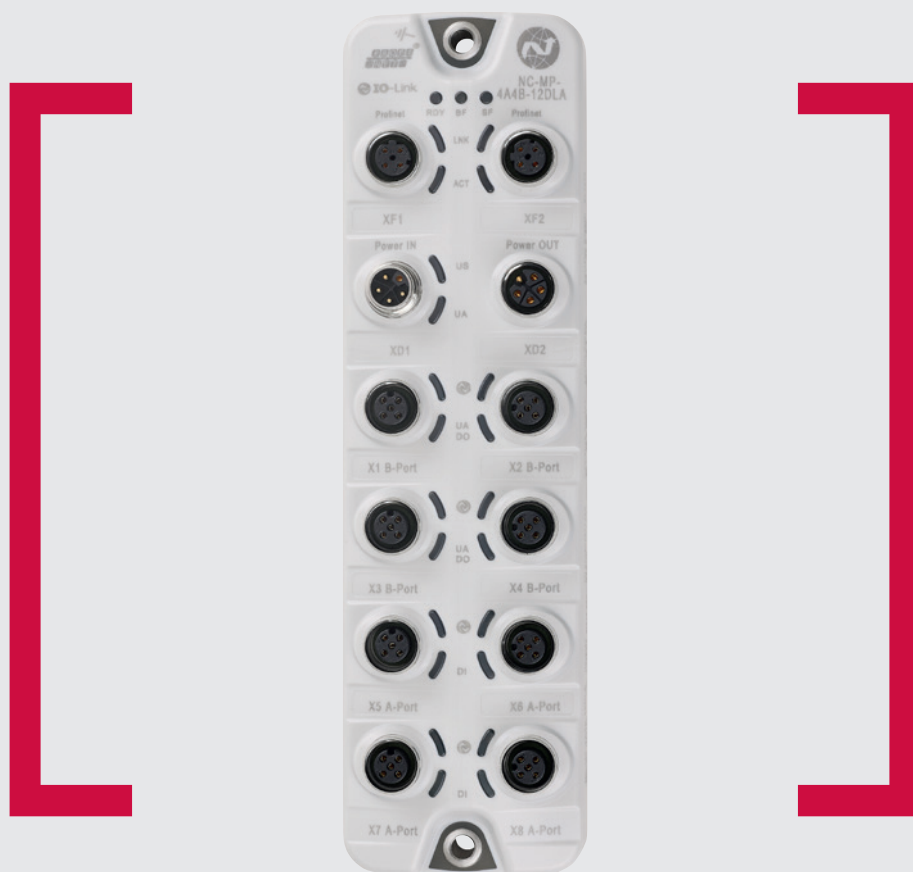


Operation Manual

IO Link Master - PROFINET NC-MP-4A4B-12DLA/AL1403



Before starting work read these instructions.

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1. Preliminary note

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1.1. Legal and copyright information

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1.2. Purpose of the document

This document is only for device types "IO-Link master - PROFINET gateway 8 port IP 65 / IP 66 / IP 67" (Part. no.: NC-MP-4A4B-12DLA/AL1403).

It is part of the device and contains information about the correct handling of the product.

- Read this document before using the device.
- Keep this document during the service life of the device.

1.3. Explanation of Symbols


WARNING

Warning of serious personal injury.
Death or serious irreversible injuries may result.


CAUTION

Warning of personal injury.
Slight reversible injuries may result.


NOTICE

Warning of damage to property



Important note
Non-compliance can result in malfunction or interference



Information
Supplementary note

► Request for action

» Reaction, result

→ "see"

abc Cross-reference

123 Decimal number

0x123 Hexadecimal number

0b010 Binary number

[...] Designation of pushbuttons, buttons or indications

1.4. Modification history


Version	Topic	Date
00	New creation of document	12/2020

2. Safety instructions

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Tampering with the unit	6

2.1. General

-  The plant manufacturer is responsible for the safety of the plant in which the device is installed.
- If the device is used in a way that is not intended by the manufacturer, the protection supported by the device may be impaired.
- Non-observance of the instructions, operation which is not in accordance with use as prescribed below, wrong installation or incorrect handling can affect the safety of operators and machinery.
- ▶ Observe these operating instructions.
 - ▶ Adhere to the warning notes on the product.

2.2. Required background knowledge

This document is intended for specialists. Specialists are people who, based on their relevant training and experience, can identify risks and avoiding potential hazards that may be caused during operation or maintenance of the product.

The document contains information about the correct handling of the product.

2.3. Safety symbols on the device



General warning

Observe instructions in chapter „Electrical connection“ (→ **Electrical connection** (→ S. 12))!

2.4. Tampering with the unit



WARNING

- Tampering with the unit.
- > In case of non-compliance:
 - Possible effects on safety of operators and machinery
 - Expiration of liability and warranty
 - ▶ Do not open the devices!
 - ▶ Do not insert any objects into the devices!
 - ▶ Prevent metal foreign bodies from penetrating!

3. Intended use

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3.1. Permitted use

The IO-Link master serves as a gateway between intelligent IO-Link devices and the PROFINET network. The device is designed for use without a control cabinet in the plant construction.

3.2. Prohibited use

The device may not be used beyond the limits of the technical data (→ **Technical data** (→ S. 53))!

4. Function

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4.1. Parameter setting

The device provides the following configuration options:

- Parameter setting of the IO-Link master of the NC-MP-4A4B-12DLA/AL1403 with parameter setting software LR DEVICE and/or PROFINET projection software
- Parameter setting of the connected IO-Link devices (sensors, actuators) with parameter setting software LR DEVICE and/or PROFINET projection software
- Storage of parameter sets of the connected IO-Link devices for automatic recovery (data storage)

4.2. Visual indication

The device has the following visual indicators:

- Status and error indication of the gateway, of the PROFINET connection and of the system
- Status display of the voltage supply
- Status and activity display of the Ethernet connection
- Status, error and short circuit/overload indication of the IO-Link ports

4.3. PROFINET

The device offers the following ProfiNet functions:

- PROFINET RT Device (Conformance Class C)
- 2-port switch for access to the PROFINET interface; integrated switch complies with RT and IRT according to PROFINET V2.3
- Gateway for transmission of the process and parameter data between the connected IO-Link devices and the higher-level PROFINET controller
- Configuration in Run (CiR)
- Supported protocols: SNMP, LLDP, MRP, DCP, RTA, RTC Class 1 (not synchronised)
- Profinet functions: FSU, I&MO - 4 read / write, S2 redundancy
- Device description: GSDML file

The following IO-Link functions:

- IO-Link master (IO-Link revision 1.0 and 1.1)
- 8 IO-Link ports for connection of IO-Link devices
- Provision of process data of the connected IO-Link devices for LR SMARTOBSERVER monitoring software (→ www.norgren.com)

4.4. IO-Link

The following IO-Link functions:

- IO-Link master (IO-Link revision 1.0 and 1.1)
- 8 IO-Link ports for connection of IO-Link devices
- Provision of process data of the connected IO-Link devices for LR SMARTOBSERVER monitoring software (→ www.norgren.com)

4.4.1. IO-Link supply

The device has 8 supplies for IO-Link devices (sensors, actuators).

The X1...X4 ports are class B ports. The ports X5...X8 are Ports Class A.

The pin 2 (UA) of the X1...X4 ports supports different operating modes (disconnected from power, supply voltage UA, digital output).

The current intensity of the supply voltages US and UA of the X1...X4 ports can be adjusted.

The current intensity of the supply voltage US of the ports X5...X8 can be set.

Every supply provides short circuit monitoring.

The device ensures fire protection for connected IO-Link devices by providing an energy-limited circuit at the ports (according to IEC61010-1 and Class 2 to UL1310).

4.4.2. Digital inputs

The device has 4 additional digital inputs (type 2 according to EN 61131-2).

The digital inputs are on pin 2 of the ports X5...X8.

All inputs refer to the potential of the device supply (pin 3).

4.4.3. Digital outputs

The device has 4 digital outputs that can be activated as an option (switching output DC-13 according to IEC 60947-5-1, 20 W).

The digital outputs are connected to pin 2 of the X1...X4 ports.

The digital outputs are supplied with the UA voltage. They refer to the potential of UA (pin 5).

4.5. Voltage output

The device has a voltage output (XD2) to supply an additional device. This makes it possible to supply several Norgren NC range devices with one voltage source (daisy chain).

5. Mounting

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Installing the device

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5.1. Installing the device



- ▶ Disconnect power before installation.
- ▶ Please observe the maximum tightening torque.
 - ▶ Use a plane mounting surface for installation.
- ▶ Fix the unit to the mounting surface using 2 M5 mounting screws and washers.
 - Tightening torque: 1.8 Nm

6. Electrical connection

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6.1. Notes



A qualified electrician must connect the unit.

- ▶ The national and international regulations setting up electrical equipment must be complied with.

The unit is only suitable for operation using SELV/PELV voltages.

- ▶ Please note the information concerning IO-Link wiring!

This unit contains components that may be damaged or destroyed by electrostatic discharge (ESD).

- ▶ Please observe the required precautions against electrostatic discharge!

The IP rating of the overall system depends on the protection ratings of the individual devices, the applied connection elements and the corresponding protective caps.

- ▶ Provide cables with a strain relief depending on the mounting conditions to avoid excessive strain on the installation points and the M12 connections.
- ▶ Ensure correct fit and proper assembly of the M12 connecting parts. If these instructions are not complied with, the specified protection rating cannot be guaranteed.

For UL applications:

- ▶ To connect the IO-Link master and the IO-Link devices, only use UL-certified cables of the CYJV or PVVA category with a minimum temperature of 80 °C (75 °C in case of maximum ambient temperature of 40 °C).

Wiring: → **Technical data** (→ S. 53)

By means of basic insulation according to EN61010-1, the circuits are separated from each other and from device surfaces that could be touched (secondary circuit with 30 V DC maximum, supplied from mains circuit up to 300 V overvoltage category II).

By means of basic insulation according to EN61010-1, the communication interfaces are separated from each other and from device surfaces that could be touched (secondary circuit with 30 V DC maximum, supplied from mains circuit up to 300 V overvoltage category II). They are designed for network environment O according to IEC TR62102.

6.2. Connect PROFINET ports



- ▶ Connect the device via the M12 socket XF1 and/or XF2 with the PROFINET network (e.g. PROFINET PLC, additional PROFINET device)
 - Tightening torque: 0.6. 0.8 Nm
- ▶ Connect the device via the M12 socket XF1 and/or XF2 with the IT network (e.g. PC with parameter setting software LR DEVICE, PC with monitoring software LR SMARTOBSERVER)
 - Tightening torque: 0.6. 0.8 Nm
- ▶ To connect the devices, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 or higher (→ **Accessories** (→ S. 51)).
- ▶ Cover the unused sockets with M12 protective caps (art. no.: E73004).
 - Tightening torque 0.6. 0.8 Nm

6.3. IO-Link Port connection

Wiring Notes:

- The power supply of the connected IO-Link devices may only be provided via the NC-MP-4A4B-12DLA/AL1403
- The ports of the device meet the requirements of the IO-Link specification 1.0 to 1.1.2
- The additional digital output ports X1 ... X4 (pin 2) meet the requirements of utilization category DC-13 according to standard IEC 60947-5-1: 20W. The connected electronics must be electrically designed for this.
- The additional digital input of ports X5 ... X8 (pin 2) meet the requirements of type 2 behavior according to standard EN 61131-2. The connected electronics must be designed electrically for this.

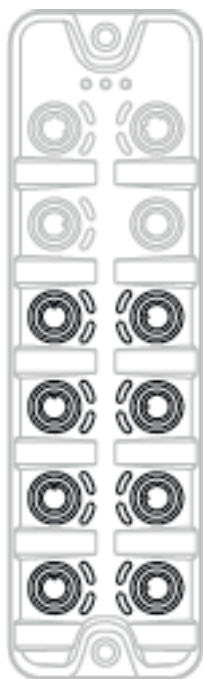


CAUTION

Connection of IO-Link Class A devices Class with Class B ports with 4/5 pole connectors
 > Risk of fire
 > Impairment of electrical safety
 > Malfunctions
 ▶ To connect IO-Link Class A devices to Class B ports, use 3-pole connectors only!



Detailed information: → IO-Link planning directive (→ www.io-link.com)



- ▶ Connect the connector of the IO-Link devices to the M12 sockets X1...X8.
 - Torque to 0,6...0,8 Nm
 - Maximum cable length per port: 20m
- ▶ Use M12 connectors with at least protection class IP65 / IP6 / IP67 for the connection (→ **Accessories** (→ S. 51)).
- ▶ Seal unused sockets with M12 sealing caps.
 - Torque: 0,6...0,8 Nm

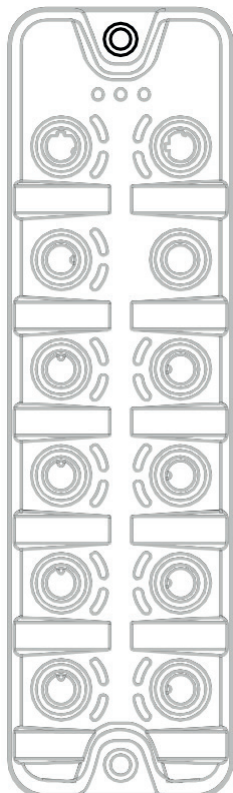
6.4. Ground the device



The FE potential is connected to the following points of the device:

- Upper mounting lug of the housing
- Ports XD1 and XD2: Pin 5 (FE)
- Ports XF1 and XF2

To ensure the protection of the device against electrical interference and to ensure the safe function of the device, the housing must be connected to the GND of the installation using the shortest possible route.



- ▶ Ground the unit via the mounting screw of the upper mounting lugs.
 - Tightening torque: 1.8 Nm
- ▶ Optional: Connect pin 5 of the port XD1 or XD2 via an L-coded M12 connector with the FE socket of the power supply.

6.5. Connect the device



CAUTION

Exceeding the maximum input current of 12 A

> Fire hazard

- ▶ Select IU and IA of the power supplies US and UA taking into account the derating characteristics of the NC-MP-4A4B-12DLA/AL1403 (→ **Derating behavior** (→ S. 54))!



- ▶ Disconnect power.
- ▶ Connect the device via M12 socket X31 to US and UA supplying 24 V DC each (20...30 V SELV/PELV; according to IEC 61010-1, secondary circuit with maximum 30 V DC, supplied from mains circuit up to 300 V of overvoltage category II).
 - Tightening torque: 0.6. 0.8 Nm
 - Recommended maximum cable length: 25 m
- ▶ To connect the device, use L-coded M12 connectors with at least protection rating IP 65 / IP 66 / IP 67 (→ **Accessories** (→ S. 51)).

Optional: Supply of additional devices (Daisy chain):

- ▶ Connect additional Master to M12 socket X32 of the NC-MP-4A4B-12DLA/AL1403 (Daisy-chain function).
 - Tightening torque: 0.6. 0.8 Nm
 - Recommended maximum cable length: 25 m
- ▶ To connect the device, use L-coded M12 connectors with at least protection rating IP 65 / IP 66 / IP 67 (→ **Accessories** (→ S. 51)).

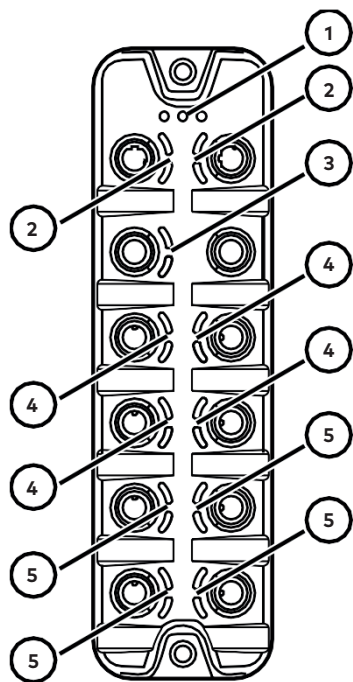


In case of cables that are longer than 25 m, take the voltage drop and the necessary minimum supply voltage of 20 V into consideration!

7. Operating and display elements

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- ① Status LEDs RDY, BF and SF (→ **Status LEDs** (→ S. 18))
- ② Status LEDs LNK and ACT of the PROFINET interfaces 1 (XF1) and 2 (XF2) (→ **Ethernet ports** (→ S. 18))
- ③ Status LEDs US and UA of the voltage supply (XD1/XD2) (→ **Voltage supply** (→ S. 19))
- ④ Status LEDs IOL and UA/DO of the IO-Link Class B ports (X1...X4) (→ **IO-Link Ports (Class B)** (→ S. 19))
- ⑤ Status LEDs IOL and DI of the IO-Link Port Class A (X5...X8) (→ **IO-Link Ports (Class A)** (→ S. 20))

7.2. LED indicators

The device only has the following LED indicators:

7.2.1. Status LEDs

The RDY LED shows the status of the gateway.

The BF LED (Bus Failure) shows the status of the PROFINET connection. The SF LED (System Failure) shows the status of the system.

Status LED			Description
RDY	green	on	Status: OK
		flashes 5 Hz	Status: Error
		flashes (200 ms on, 800 ms off)	Status: Firmware update is running
		off	Status: Gateway not running or gateway booting
BF	red	on	Bus error
		flashes 1 Hz	No connection to the PROFINET controller
		off	error-free
SF	red	on	<ul style="list-style-type: none"> Error in gateway At least 1 IO-Link device sends warning / alarm (temperature, over/under current, over/under voltage, shortcut)
		off	error-free

7.2.2. Ethernet ports

Each Ethernet port has 2 LEDs (LNK and ACT). The LEDs indicate the status of the Ethernet connection.

Status LED			Description
LNK	green	on	Ethernet connection established
		off	No Ethernet connection
ACT	yellow	flashes	Data is transmitted via the Ethernet interface.
		off	No data transmission

7.2.3. Voltage supply

The port for the voltage supply (XD1) has the LEDs with the designation US and UA. The LEDs indicate the status of the supply voltage.

Status LED			Description
US	green	on	Supply voltage US is connected
		off	either there is no supply voltage or the connected supply voltage is too low
UA	green	on	Supply voltage UA is connected
		Off	either there is no supply voltage or the connected supply voltage is too low

7.2.4. IO-Link Ports (Class B)

Each IO-Link Port Class B has 2 LEDs with the designation IOL and UA/DO. The LEDs show the status of the IO-Link ports.

Status LED			Description
IOL	yellow	Off	Port configured as DI/DO: pin 4 (C/Q) = OFF
		on	Port configured as DI/DO: pin 4 (C/Q) = ON
	green	flashing 1 Hz	Port configured as IO-Link: no IO-Link device found
		Flashing with 2 Hz	Port configured as IO-Link: Status PREOPERATE
		on	Port configured as IO-Link: Status OPERATE
	red	Flashing with 2 Hz	Port configuration error or short circuit / overload on US
		on	Transmission error
UA/DO	yellow	Off	Digital output: Pin 2 (UA) = OFF
		on	Digital output: Pin 2 (UA) = ON
	green	Off	IO-Link type A supply: Pin 2 (UA) = OFF
		on	IO-Link type B supply: Pin 2 (UA) = ON (not switchable)
	red	on	Error: Overcurrent or undervoltage

7.2.5. IO-Link Ports (Class A)

Each IO-Link Port Class A has 2 LEDs labelled IOL and DI. The LEDs indicate the status of the IO-Link port.

Status LED			Description
IOL	yellow	Off	Port configured as DI/DO: pin 4 (C/Q) = OFF
		on	Port configured as DI/DO: pin 4 (C/Q) = ON
	green	flashing 1 Hz	Port configured as IO-Link: no IO-Link device found
		Flashing with 2 Hz	Port configured as IO-Link: Status PREOPERATE
		on	Port configured as IO-Link: Status OPERATE
	red	Flashing with 2 Hz	Port configuration error or short circuit / overload on US
		on	Transmission Error
DI	yellow	Off	digital input: pin 2 = OFF
		on	digital input: pin 2 = ON

8. Setup

When the supply voltages have been switched on, the NC-MP-4A4B-12DLA/AL1403 starts with the factory settings. The LEDs signal the current operating status of the device and the ports (→ **LED indicators** (→ S. 18)).

8.1. Parameter setting options

The device can be configured with the following options:

- Software LR DEVICE (→ **LR DEVICE** (→ S. 23))
- PROFINET projecting software (→ **PROFINET** (→ S. 35))

9. Configuration

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9.1. LR DEVICE

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On delivery, the NC-MP-4A4B-12DLA/AL1403 is configured with the factory settings
 (→ **Factory Settings** (→ S. 50)). Required software: LR DEVICE (1.6.x or higher) (Part.-no.: QA0011/QA0012)

9.1.1. Remarks

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Online parameter setting

The parameters of the IO-Link master and the connected sensors and actuators can be set before installation and set-up or during operation.



Further information about offline parameter setting: → Operating instructions LR DEVICE

VPN connection



An active VPN connection blocks the access of the parameter setting software LR DEVICE to the PROFINET interface of the NC-MP-4A4B-12DLA/AL1403.

- ▶ Deactivate the VPN connection in order to be able to access the NC-MP-4A4B-12DLA/AL1403 with the LR DEVICE.

9.1.2. First access with LR DEVICE to the IO-Link master

With factory settings, the IO-Link master works in the DCP mode. In the DCP mode, the configuration options are limited. For parameter setting with LR DEVICE, the IO-Link master and the PC used for parameter setting must be configured for the same IP address range.

To access the NC-MP-4A4B-12DLA/AL1403 with LR DEVICE:

1. Preparations

- ▶ Install LR DEVICE on the PC (→ User documentation "LR DEVICE")
- ▶ Establish Ethernet connection between PC and Port XF1 or XF2.

2. Start LR DEVICE and update the device library

- ▶ Start LR DEVICE.
- ▶ Update the device library.
- > The device library contains the IO-Link device description file of the IO-Link master.

3. Look for IO-Link master

- ▶ In LR DEVICE: Scan the network for devices.
- > LR DEVICE searches the network for IO-Link masters and IO-Link devices.
- > LR DEVICE shows IO-Link masters in the device tree.

4. Configure IP settings

- ▶ Click on (NC-MP-4A4B-12DLA/AL1403)
- > LR DEVICE shows the DCP view of the IO-Link master.
- ▶ Adapt the IP settings of the IO-Link master.
- ▶ Save changed values on the device.
- > LR DEVICE writes the changed values on the device.
- > The IO-Link master can be configured.

9.1.3. IoT: Configure access rights

The access rights define which instance may read and / or write the parameter data, process data and event/diagnostic messages.

In order to configure the access rights to the IO-Link master:

- ▶ Select [IoT] menu.
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values
[Access Rights]	The access rights to the parameter data, process data and the event/diagnostic messages of the IO-Link master as well as the connected IO-Link devices	[PROFINET + IoT]* <ul style="list-style-type: none"> • PROFINET and IoT Core have read and write access rights to parameters and process data • PROFINET and <IoT Core> have read access rights to events/alarms
		[PROFINET + IoT (read-only)] <ul style="list-style-type: none"> • PROFINET has read and write access rights to parameters and process data • PROFINET has read access rights to events/alarms • IoT Core only has read access rights to parameters, process data and events/alarms
		[IoT only] <ul style="list-style-type: none"> • IoT Core has read and write access rights to parameters and process data • IoT has read access rights to events/alarms • PROFINET has no access rights

* ... Factory setting

- ▶ Save changed values on the device.



If in LR DEVICE and PROFINET projection software the parameter [Access Rights] is = [PROFINET + IoT], the parameter values set in the PROFINET projection software will always apply.

If the parameter [Access Rights] = [IoT only] in LR DEVICE, set the parameter [Access Rights]

= [Keep settings] in the projection software.

Changes of the parameter [Access Rights] will only be effective after restarting the IO-Link master (→ Firmware: **Reboot the device** (→ S. 33)).

9.1.4. IoT: Configure the interface to LR AGENT or LR SMARTOBSERVER

To enable transfer of process data from the IO-Link master to LR AGENT or LR SMARTOBSERVER, the interface has to be configured accordingly.

- ▶ Select [IoT] menu.
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values	
[IP address LR Agent or SMARTOBSERVER]	IP address of LR AGENT or LR SMARTOBSERVER	Factory setting: 255.255.255.255	
[Port LR Agent or SMARTOBSERVER]	Port number that is used to send process data to LR AGENT or LR SMARTOBSERVER	0 ... 65535	Factory setting: 35100
[Interval LR Agent or SMARTOBSERVER]	Cycle time for the transfer of the process data to LR AGENT or LR SMARTOBSERVER (value in milliseconds)	[Off]	no transfer
		500 ... 2147483647	500 ms ... 2147483647 ms
[Application Tag]	Source identifier of the IO-Link master in the structure of LR AGENT or LR SMARTOBSERVER (String32)	Factory setting: NC-MP-4A4B-12DLA/AL1403	

 After changing the parameter [Port LR Agent or SMARTOBSERVER] or [Application Tag], it may take 120 seconds before the device establishes a new TCP connection.

To prevent the delay:

- ▶ Reboot the device after changing the parameter.
- ▶ Save changed values on the device.

9.1.5. Fieldbus: Configure IP settings

To be able to access the IO-Link master from the PROFINET network or with the LR DEVICE parameter setting software, the IP settings of the PROFINET interface must be adapted correspondingly.

- ▶ Select [Fieldbus] menu.
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values
[IP address]	IP address of the PROFINET interface	Factory setting: 0.0.0.0
[Subnet mask]	Subnet mask of the PROFINET network	Factory setting: 0.0.0.0
[Default gateway IP address]	IP address of the PROFINET gateway	Factory setting: 0.0.0.0
[MAC address]	MAC address of the IO-Link master	The value is firmly set.
[Fieldbus firmware]		

- ▶ Save changed values on the device.

9.1.6. IO-Link ports: Activate data transfer to LR AGENT or LR SMARTOBSERVER

The user can decide separately for each IO-Link port whether the process data of the connected IO-Link devices should be transferred to LR AGENT or LR SMARTOBSERVER.

 To transfer process data the interface to the LR AGENT or LR SMARTOBSERVER has to be correctly configured (→ IoT: **Configure the interface to LR AGENT or LR SMARTOBSERVER** (→ S. 27)).

To activate / deactivate data transfer:

- ▶ Select [Port x] menu (x = 1...8).
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values	
[Transmission to LR Agent or SMARTOBSERVER]	Transfer of process data of the connected IO-Link device to LR AGENT over LR SMARTOBSERVER	[Disabled]	Transfer process data
		[Enabled]	Do not transfer process data

- ▶ Save changed values on the device.

9.1.7. IO-Link ports: Set the operating mode Pin 2 (UA)

The pin 2 of the IO-Link ports X1...X4 supports the following operating modes:

- Off: Pin 2 is disconnected from power; The port functions as IO-Linkport type A
- On: The voltage UA is connected to pin 2; the ports functions as IO-Linkport Class B
- Digital output (DO): A binary output signal is on pin 2; the port functions as a digital switching output

The user can set the operating mode separately for each IO-Link port. To set the operating mode of pin 2 (UA) of an IO-Link port:

- ▶ Select menu [Port x] (x = 1...X1...X4)
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values	
[Mode Pin2 UA]	Operating mode of pin 2 of the port	[Off (IO-Link Type A Supply)]	IO-Link Port Class A
		[On (IO-Link Type B Supply)]	IO-Link Port Class B
		[Digital Output]	Digital switching output

- ▶ Save changed values on the device.

9.1.8. IO-Link Ports: restrict current intensity

For the IO-Link ports X1...X4, the following features can be set:

- Max. current intensity of the supply voltage US
- Max. current intensity of the supply voltage UA

For the IO-Link ports X5...X8, the following features can be set:

- Max. current intensity of the supply voltage US

To set the max. current intensity of the supply voltages US and UA of an IO-Link port:

- ▶ Select [Port x] menu (x = 1...8).
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values	
[Current Limit Pin2 UA]*	Max. current intensity of the supply voltage UA on the port (value in milliamps)	0 ... 2000*	0 mA* 2000 mA
[Current Limit Pin1 + Pin4 US]	Max. current intensity of the supply voltage US on the port (value in milliamps)	0 ... 450* ... 2000	0 mA 450 mA 2000 mA

* ... Factory setting

** ... Parameters only available for IO-Link ports X1...X4

- ▶ Save changed values on the device.

9.1.9. IO-Link ports: Set the operating mode Pin 4

pin 4 of the IO-Link-Ports X1 ... X8 supports the following operating modes:

- Disabled: no data transmission to pin 4 (C/Q) of the IO-Link port
- Digital input (DI): binary input signal at pin 4 (C/Q) of the IO-Link port
- Digital output (DO): binary output signal at pin 4 (C/Q) of the IO-Link port
- IO-Link: IO-Link data transfer via pin 4 (C/Q) of the IO-Link port

The user can set the operating mode separately for each IO-Link port.
To set the operating type of pin 4 (US) of an IO-Link port:

- Select [Port x] menu (x = 1...8).
- > The menu page shows the current settings.
- Set the following parameters as required:

Name	Description	Possible values	
[Mode Pin4 US]	Operating mode of the pin 4 of the port	[Disabled]	no data transmission
		[DI]	digital input
		[DO]	digital output
		[IO-Link]	IO-Link data
[Cycle time actual]**	Current cycle time of the data transfer between IO-Link master and IO-Link device on the port (value in microseconds)	Parameter can only be read	
[Cycle time preset]*	Cycle time of the data transfer between the IO-Link master and the IO-Link device at the port (value in microseconds)	0	The device automatically sets the fastest possible cycle time.
		1	1 microsecond
		... 132800	... 132800 microseconds
[Bitrate]**	Current transmission rate of the data transfer between the IO-Link master and the IO-Link device on the port	Parameter can only be read	

* ... Parameter only available if [Mode] = [IO-Link]

** ... Parameter only visible if the IO-Link device is connected to the IO-Link port.

- Save changed values on the device.

9.1.10. IO-Link ports: Set the device validation and data storage

The user can choose how the IO-Link ports are to behave with regard to the device validation and the storage / recovery of parameter data of the connected IO-Link device.

The following options are available:

Option	Validation of the IO-Link device	Storage of the parameter values	Recovery of the parameter values
[No check and clear]	no	no	no
[Type compatible V1.0 device]	yes, test the compatibility with IO-Link standard V1.0	no	no
[Type compatible V1.1 device]	yes, test the compatibility with IO-Link standard V1.1	no	no
[Type compatible V1.1 device with Backup + Restore]	yes, test the compatibility with IO-Link standard V1.1 and identity of design (vendor ID and device ID)	yes, automatic storage of the parameter values; changes of the current parameter values will be stored	yes, recovery of the parameter values when connecting an identical IO-Link device with factory settings
[Type compatible V1.1 device with Restore]	yes, test the compatibility with IO-Link standard V1.1 and identity of design (vendor ID and device ID)	no, there is no automatic storage changes of the current parameter values will not be stored	yes, recovery of the parameter values when connecting an identical IO-Link device with factory settings

! The options only apply if the IO-Link port is in the operating mode "IO-Link".
 For options [Type compatible V1.1 device with Backup + Restore] and [Type compatible V1.1 device with Restore]:
 If the vendor ID and device ID are changed in the online mode, the data memory will be deleted and a new backup of the parameter values of the connected IO-Link device will be created in the IO-Link master.

To configure the device validation and the data storage:

- Select [Port x] menu (x = 1...8).
- > The menu page shows the current settings.
- Set the following parameters as required:

Name	Description	Possible values
[Validation / Data Storage]	Supported IO-Link standard and behavior of the IO-Link master when connecting a new IO-Link device at port x (x = 1...8)	[No check and clear]
		[Type compatible V1.0 device]
		[Type compatible V1.1 device]
		[Type compatible V1.1 device with Backup + Restore]
		[Type compatible V1.1 device with Restore]
[Vendor ID]	ID of the manufacturer that is to be validated	0...65535 Factory setting: 0# IMI Norgren: 310
[Device ID]	ID of the IO-Link device that is to be validated	0...16777215 Factory setting: 0

- Save changed values on the device.

9.1.11. IO-Link Ports: Set fails-safe values

For the configuration mode "Independent" the user can set fail-safe values for the outputs of IO-Link ports. The fail-safe values will be activated in case of an interruption of the PROFINET connection.

To set the fail-safe values:

- ▶ Select [Port x] menu (x = 1...8).
- > The menu page shows the current settings.
- ▶ Set the following parameters as required:

Name	Description	Possible values	
[Fail-safe digital out]*	Fail-safe value of the output for operating mode "Digital Output (DO)"	[Reset]	OFF
		[Old]	old value
		[Set]	ON
[Fail-safe IO-Link]*	Fail-safe value of the output for operating mode "IO-Link"	[Off]	no Fail-safe
		[Reset]	Fail-safe: OFF
		[Old]	Fail-safe: old value
		[Pattern]	Fail-safe: byte pattern

*... Parameter only changeable, if the connection to the PROFINET controller is closed

- ▶ Save changed values on the device.

9.1.12. Info: Show device information

To read the general information of the IMI Norgren IO-Link master:

- ▶ Select [Info] menu.
- > The menu page shows the current settings.

Name	Description	Possible values
[Product code]	Article number of the IO-Link master	NC-MP-4A4B-12DLA/AL1403
[Device family]	Device family of the IO-Link master	IO-Link master
[Vendor]	Vendor	IMI Norgren
[SW-Revision]	Firmware of the IO-Link master	
[HW revision]	Hardware version of the IO-Link master	
[Bootloader revision]	Bootloader version of the IO-Link master	
[Serial number]	Serial number	

9.1.13. Firmware: Reset device to factory settings

When the IO-Link master is reset, all parameters are set to the factory settings:

To reset the device to factory settings:

- ▶ Select [Firmware] menu.
- > The menu page shows the current settings.
- ▶ Click on [Factory Reset] to reset the device.
- > LR DEVICE sets the device to the factory settings.

9.1.14. Firmware: Reboot the device

When rebooting the device, all settings are kept.

To restart the NC-MP-4A4B-12DLA/AL1403:

- ▶ Select [Firmware] menu.
- > The menu page shows the current settings.
- ▶ Click on [Reboot] to reboot the device.
- > LR DEVICE reboots the IMI Norgren IO-Link master.

9.1.15. Configure IO-Link devices

To configure the IO-Link devices connected to the device with the LR DEVICE parameter setting software:

Requirements

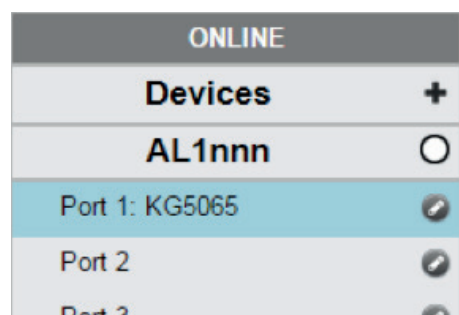
- > IO-Link master is correctly installed and connected to the LR DEVICE parameter setting software.
- > The IO-Link device is connected correctly with the NC-MP-4A4B-12DLA/AL1403.
- > Operating mode of the IO-Link port is "IO-Link" (→ **IO-Link ports: Set the operating mode Pin 4** (→ S. 30)).
- > IoT has write access rights to the IO-Link master (→ **IoT: Configure access rights** (→ S. 26)).

1. Select IO-Link master

- ▶ Start LR DEVICE.
- ▶ Update IODD file library OR:
- ▶ Import IODD file of the IO-Link device manually.
- ▶ Scan network for devices.
- > LR DEVICE detects IO-Link master.


2. Add IO-Link device

- ▶ Under [ONLINE]: Click on the required IO-Link master.
- > LR DEVICE automatically detects the IO-Link devices connected to the IO-Link master (e.g. IMI Norgren sensor KG5065).



3. Configure IO-Link device

- ▶ Mouse click on the port to which the IO-Link device is connected.
- > LR DEVICE reads and shows the current parameter values of the IO-Link device.
- ▶ Configure IO-Link device.

 Information about the available parameters of the IO-Link device:
→ IO Device Description (IODD) des IO-Link Devices

- ▶ Save the changed configuration on the IO-Link device.

9.2. PROFINET

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On the field bus side, the device can be configured with the following options:

- PROFINET projection software STEP 7 (version 5.5 SP 4 or higher)
- PROFINET projection software TIA portal



Further information about operation and functions of the PROFINET parameter setting software:

- Use the help function of the PROFINET projection software!

9.2.1. Install GSD Files

IMI Norgren provides a GSD file to map the IO-Link masters of the AL14 device family in the PROFINET projecting software. The user can download the GSD file from the IMI Norgren website (→ www.IMI-Norgren.com).

- Download the GSD file of the IO-Link masters from the IMI Norgren website.
- Launch the PROFINET projection software.
- Install GSD Files.

Once the GSD file is installed, the IO-Link masters are in the hardware catalogue in the following folder:

[Other field devices] > [PROFINET IO] > [IMI Norgren] > [IMI Norgren]

9.2.2. Integrate the IO-Link master in the project

Using the installed GSD file, the IO-Link master can be added to a project.

- ▶ Create a new project / open an existing project.
- ▶ Open the [Devices & networks] view.
- ▶ Create and configure PROFINET controller and coupling units.
- ▶ Create and configure PROFINET connection.
- ▶ Drag the IO-Link from the hardware catalogue and drop it in the project.
- > The IO-Link master is loaded with a default configuration into the project.
- > The IO-Link master is part of the project.

To integrate the IO-Link master in the infrastructure, the IP settings of the fieldbus interface must be configured correspondingly.

- ▶ In the [Devices & networks] view: Double-click on the IO-Link master
- > The overview [Device overview] of the IO-Link master.
- ▶ Select the slot [0 X1] (PN-IO).
- > The window [Properties] > [General] shows features of the fieldbus interface.
- ▶ Select the menu point [Ethernet addresses].
- ▶ Select PROFINET connection.
- ▶ Adapt the IP settings of the Ethernet interface to the features of the PROFINET connection.
- ▶ Optional: Configure further settings of the Ethernet interface.
- ▶ Save the project.
- ▶ Connect with the PROFINET controller and load the project to the controller.

9.2.3. Configure the IO-Link master

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Access to the configuration of the IO-Link master via the following slots:

Slot	Description
[1]	Profile of the IO-Link master
[1 IOLM proxy]	IOLM Proyx module

IO-Link Master: Set operating mode

The IO-Link master can be operated with different profiles.

The selection of the profile determines the following properties of the IO-Link master:

- Type and size of the process data of the IO-Link master
- Available sub-models for IO-Link ports

Profile	Module	IO-Link Master Proxy	Description
Mix Mode - Standard	8 ports	IO-Link Master Proxy 8P	Standard IO-Link Master IOLM Proxy: <ul style="list-style-type: none"> • 1 byte of cyclic input data (digital inputs) • 1 byte of cyclic output data (digital outputs) IOLD proxy (per port): • max. 33 bytes of cyclical process data (digital inputs, IO-Link inputs, PQI) • max 32 bytes of cyclical process data (IO-Link outputs)
Mix Mode - Energy Monitoring*	8 ports	IO-Link Master Proxy 8P EnMo	Standard IO-Link master with active energy monitoring IOLM Proxy: <ul style="list-style-type: none"> • 36 bytes of cyclical input data (digital inputs, energy monitoring) • 1 byte of cyclic output data (digital outputs) IOLD proxy (per port): • max. 33 bytes of cyclical input data (digital inputs, IO-Link inputs, PQI) • max. 32 bytes of cyclical output data (digital outputs, IO-Link outputs)
IO Mode	8 ports - IO Mode	IO-Link Master Proxy 8P IO-Mode	IO-Link master with compact transmission of digital process data IOLM Proxy: <ul style="list-style-type: none"> • 2byte of cyclic input data (digital inputs) • 2byte of cyclic output data (digital outputs) IOLD proxy (per port): • max. 33 bytes of cyclical input data (IO-Link inputs, PQI) • max. 32 bytes of cyclical output data (IO-Link outputs) • PROFINET has no access rights

* ... Factory setting

To adjust the profile of the IO-Link master:

- > The device catalogue is open.
- ▶ in the project: Double click on NC-MP-4A4B-12DLA/AL1403
- > The window [Device overview] of the NC-MP-4A4B-12DLA/AL1403 appears.
- ▶ In the device catalogue: Drag the required module from the [Module] folder to slot [1].
- > The selected profile is loaded with the preset IOLM proxy module.
- ▶ Optional: Change the IOLM proxy module
- ▶ In [Device overview]: Select slot [1 IOLM proxy] and remove the active IOLM proxy module.
- ▶ In the device catalogue: Drag the required module from the folder [Submodules] > [IO-Link Master Proxy] and drop it at slot [1 IOLM-proxy].
- > The selected IOLM proxy module will be loaded.
- ▶ Save the project.

Further steps:

- **IO-Link Master: Set the module parameters** (→ S. 39)
- **Configure IO-Link ports** (→ S. 40)

IO-Link Master: Set the module parameters

Parameter	IOLM proxy module		
	IO Mode	IO-Link Master Proxy 8P	IO-Link Master Proxy EnMo 8P
Enable Port Diagnosis	X	X	X
Enable Port Configuration without Tool	X	X	X
Mode Pin2 (Actuator Supply UA)	X	X	X
Current Limit Pin2 (Actuator Supply UA [mA])	X	X	X
Current Limit Pin1 + Pin4 (Sensor Supply US) [mA])	X	X	X
Fails Safe DO Mode Pin2 (Actuator Supply UA)	X	X	X
Module Failure	X	X	-



Details about the parameters of the IOLM proxy modules:
→ **Parameters of the IOLM proxy modules** (→ S. 62)

To set the parameters of an IOLM proxy module:

- > The profile of the IO-Link master is set (→ IO-Link Master: Set operating mode (→ S. 38)).
- > The device catalogue is open.
 - ▶ in the project: Double click on NC-MP-4A4B-12DLA/AL1403
- > The window [Device overview] shows the slot configuration of the NC-MP-4A4B-12DLA/AL1403.
 - ▶ Select slot [1 IOLM proxy].
- > The window [Properties] > [General] shows properties of the IO-Link master.
 - ▶ Select the [Module parameters] menu.
- > The window shows available parameters of the IOLM proxy module.
 - ▶ Change the parameter values.
 - ▶ Save the project.



If there needs to be a write access to the IO-Link master both via LR DEVICE (IoT) and via the PROFINET projecting software, the following is to be considered: The parameter values set in the PROFINET projecting software always have the highest priority.

If write access to the IO-Link master is to be only via the LR DEVICE / IoT, please make the following settings:

- LR DEVICE / IoT: Parameter [Access Rights] = [IoT only]
- PROFINET projection software: Parameter [Access Rights] = [Keep settings]

Changes of the parameter [Access Rights] will only be effective after restarting the IO-Link master.

- ▶ When the parameter is changed, restart the IO-Link master.

9.2.4. Configure IO-Link ports

Access to the configuration of the IO-Link ports via the following slots:

Slot	Description
[1 X1 (B-Port)]	Configuration of port X1
[1 X2 (B-Port)]	Configuration of port X2
[1 X3 (B-Port)]	Configuration of port X3
[1 X4 (B-Port)]	Configuration of port X4
[1 X5 (A-Port)]	Configuration of port X5
[1 X6 (A-Port)]	Configuration of port X6
[1 X7 (A-Port)]	Configuration of port X7
[1 X8 (A-Port)]	Configuration of port X8

IO-Link Ports: Configuration of the operating mode and process data

The IO-Link ports are configured with IOLD proxy modules. The IOLD proxy modules determine the following properties:

- Operating mode of the port (pin 4)
- Type and size of the process data



Details of the available IOLD proxy modules:
→ **IOLD proxy modules** (→ S. 63)

The available IOLD proxy modules depend on the selected profile of the IO-Link master.

Port modules	Profile		
	IO Mode	Mix Mode - Standard	Mix Mode - Energy Monitoring
Deactivated	X	X	X
Digital Input		X	X
Digital Input without PD	X		
Digital Output		X	X
Digital Output without PD	X		
IO-Link Input + PQI	X	X	X
IO-Link Output + PQI	X	X	X
IO-Link Input + Output + PQI	X	X	X

X ... Parameter available

To configure the process data of a port:

Requirements:

- > The profile of the IO-Link master is set.
- > The device catalogue is open.
- > The [Device overview] view of the NC-MP-4A4B-12DLA/AL1403 is activated.
- ▶ In the device catalogue: Drag the required IOLD proxy module from the [Submodules] folder and drop it on the slot of the port.
- > The IOLD proxy module will be loaded with the factory settings.
- > IEC addresses for process data of the port will be generated.
- ▶ Save the project.

IO-Link Ports: Parameter setting

The different IOLD proxy modules have specific parameter sets.

Port Parameter	IOLD proxy modules						
	Digital Input	Digital Input without PD	Digital Output	Digital Output without PD	IO-Link Input + PQI	IO-Link Output + PQI	IO-Link Input + Output + PQI
Fail Safe Mode	-	-	X	X	-	X	X
Pattern Value	-	-	-	-	-	X	X
Enable Port Diagnosis	X	X	X	X	X	X	X
Enable Process Alarm	X	X	X	X	X	X	X
Port Configuration without Tool	-	-	-	-	X	X	X
Enable Pull/Plug	-	-	-	-	X	X	X
Port Mode	-	-	-	-	X	X	X
Validation / Data Storage	-	-	-	-	X	X	X
Vendor ID (VID)	-	-	-	-	X	X	X
Device ID (DID)	-	-	-	-	X	X	X
Port Cycle Time	-	-	-	-	X	X	X

X... Parameter available



Details about the parameters of the IOLD proxy modules:

→ **Parameters of the IOLD proxy modules** (→ S. 65)

To set the parameters of an IOLD proxy module:

- > The operating mode and the process data of the port are set.
- > Detailed view [Device overview] is opened.
 - ▶ In [Device overview]: Select the slot of the port.
- > the window [Properties] > [General] shows information via the port module.
 - ▶ Select the menu item [Module parameters].
- > The detailed view shows the current settings of the module parameters.
 - ▶ Set the parameters as required.
 - ▶ Save the project.

9.2.5. Configure IO-Link devices

The NC-MP-4A4B-12DLA/AL1403 supports the configuration of the connected IO-Link devices via the PROFINET application. The configurable parameters depend on the IO-Link device that is used.



Configurable parameters of the IO-Link devices:
→ IO Device Description (IODD) des IO-Link Devices

The following options are available:

Symbol (function block)	Description	Remarks
IO_LINK_DEVICE (FB5001)	Acyclic access to the parameters of an IO-Link device	Input parameters: • CAP: Access point for function NC-MP-4A4B-12DLA/AL1403: 0xB400 • PORT: Slot/sub-slot of the IO-Link interface of the connected IO-Link device Port X1: 1 Port X2: 2 ... Port X8: 8 • IOL_INDEX and IOL_SUBINDEX: Index and sub-index of the parameter (depends on the IO-Link device: → IO Device Description (IODD))
IOL_CALL (FB1)	Acyclic access to the parameters of an IO-Link device (obsolete)	→ IO_LINK_DEVICE (FB5001)

9.2.6. Read and write process data

During the configuration of the IO-Link master and of the ports, IEC address ranges are automatically reserved for all process data.



Depending on the selected IO-Link master profile, the digital process data of the ports (operating modes: "digital input", "digital output") will be mapped to different address ranges:

- Mix Mode: each digital process value (pin 4) receives a separate address
- IO-Mode: Digital process data of the ports (pin 4) are transferred as a compact unit in a coherent address range in the IOLM proxy.

To enable access to the cyclic process data in the application, the user must couple the reserved IEC addresses with symbolic variables. This happens in the global variable list of the project (step 7: [Symbols]; TIA portal: [PLC tags]).

Execute the following actions in the global variable list of the project:

- ▶ Create a new symbol and select the data type.
- ▶ Assign the required IEC address to the symbol.
- ▶ Adjust the properties of the symbol (write access, visibility, etc.).

Using the symbolic name, the user can read the inputs and write the outputs from the application.



- ▶ To check the validity of the cyclic process data, evaluate the PQI byte (→ Mapping: Port Qualifier Information (PQI) (→ S. 72)).

Even if the fieldbus connection is interrupted, the PQI byte indicates that the process data is valid. This may have an unintended impact on the control process.

- ▶ Take suitable measures to detect an interruption of the fieldbus connection.

9.2.7. Read I&M datasets

I&M0 provide the user with device-specific basic information. This ensures reliable identification of the device, the device's hardware and software components as well as the manufacturer.

The datasets I&M1 to 3 offer the programmer the possibility to store project-specific information on the device.

The programmer can access the I&M0 datasets of the slots 0 and 1 in the PROFINET projection software by means of the following functions:

Symbol (function block)	Description	Notes
GET_IM_DATA	<ul style="list-style-type: none"> Function block for reading the I&M datasets of a device GET_IM_DATA only supports the reading of the I&M0 dataset 	Input parameters: <ul style="list-style-type: none"> IM_TYPE = 0
RDREC	Function block for acyclic reading of datasets	Input parameters: <ul style="list-style-type: none"> I&M0: Index = 0xAFF0 I&M1: Index = 0xAFF1 I&M2: Index = 0xAFF2 I&M3: Index = 0xAFF3
WRREC	<ul style="list-style-type: none"> Function block for acyclic writing of datasets Observe access rights on datasets! 	Input parameters: <ul style="list-style-type: none"> I&M1: Index = 0xAFF1 I&M2: Index = 0xAFF2 I&M3: Index = 0xAFF3

9.2.8. Detect diagnostics and alarms



Available alarms and diagnostic messages:

→ **Diagnostic and alarms** (→ S. 75)

Symbol	Operational block	Description
I/O_FLT1	OB82	Diagnostic alarms
I/O_FLT2	OB83	Connect/disconnect alarms
RACK_FLT	OB86	Module rack failure

10. Operation

Content

Use web-based management

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10.1. Use web-based management

The device has an integrated web server. The web server generates a website with the following data:

- Status information of the ports
- Diagnostic information of the device
- Version information of the installed firmware components

To access the web interface of the IO-Link master:

- ▶ Connect the IO-Link master via port XF1 or XF2 with the laptop / PC.
- ▶ Optional: Check the IP settings of the PROFINET interface.
- ▶ Start web browser.
- ▶ In the address field of the web browser, enter the IP address of the PROFINET interface and confirm with [ENTER].
- > The web browser shows the website with the status and diagnostic information of the device.

11. Maintenance, repair and disposal

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The operation of the unit is maintenance-free.

- ▶ Dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations when it is no longer used.

11.1. Cleaning process

- ▶ Clean the surface of the unit when necessary.
- ▶ Do not use any caustic cleaning agents for this!

11.2. Update the firmware

The new firmware is installed via the device's web interface.



- ▶ During the firmware update, ensure that the device is connected to the supply voltages US and UA.

Before the firmware update:

- ▶ Deactivate the connection to the PROFINET PLC.
- ▶ Set the parameter [IP address LR AGENT or SMARTOBSERVER] to 255.255.255.255 or 0.0.0.0.
- ▶ Stop the LRAgent.LRDevice service in the Windows task manager.

After the firmware update:

- ▶ Check the settings of the interface to the LR AGENT and LR SMARTOBSERVER.

To install a new firmware version on the device:

Requirements

- > Zip file with new firmware has been downloaded and unpacked.
- > Ethernet connection between laptop/PC and device is established.

1. Call up web interface

- ▶ Start web browser.
- ▶ Enter the following into the address field of the browser: and confirm with [ENTER]:
`http://<IP address of device>/web/update`
- > Web browser shows the [Firmware Update] page.

2. Load the new firmware to the IO-Link master

- ▶ Click on [File choose].
- > A dialogue window appears.
- ▶ Select the firmware file (.bin) and click on [Open] in order to adopt the file.
- ▶ Click on [Submit] to start the firmware update.
- > Firmware is being loaded to the device.
- > After successful storage, the success message is displayed.

3. Reboot the IO-Link master

- ▶ Click on [Restart device now] to restart the device.
- > The RDY status LED flashes rapidly.
- > Firmware is updating.
- ▶ Follow the instructions in the browser.

11.3. Exchanging the IO-Link device

To exchange an IO-Link device:

Requirements

- > The new IO-Link device is in the default state, as on delivery (factory settings).
- > The new IO-Link device supports the IO-Link standard 1.1 or higher.

1. Store the parameter set of the old IO-Link device

- ▶ Create the following parameter of the IO-Link port
Device validation and data storage = [Type compatible V1.1 device with Restore]
- ▶ Save the changes on the device.
- > The IO-Link master saves the parameter values of the connected IO-Link device in the data memory.

2. Exchange IO-Link device

- ▶ Disconnect the old IO-Link device from the IO-Link master.
- ▶ Connect the new IO-Link device with the same IO-Link port of the NC-MP-4A4B-12DLA/AL1403.
- > The IO-Link master transfers the parameter values from the data memory to the new IO-Link device.
- > The new IO-Link device works with the restored parameter set.

12. Factory Settings

In the factory settings, the device has the following parameter settings:

Parameter	Factory setting
[IP address]	0.0.0.0
[Subnet mask]	0.0.0.0
[IP gateway address]	0.0.0.0
[Host name]	blank
Data Storage	empty

13. Accessories

List of accessories of NC-MP-4A4B-12DLA/AL1403: → www.Norgren.com > Product page > Accessories

14. Appendix

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14.1. Technical data

Content

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14.1.1. Application

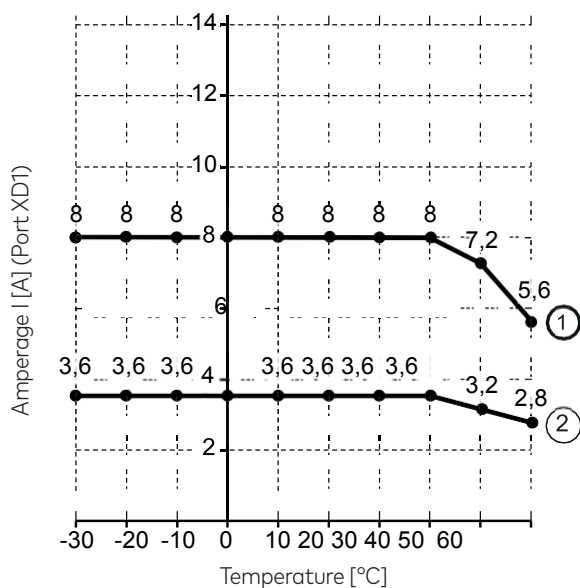
Application	
Application	I/O modules for field applications
Daisy-chain function	Voltage supply; Fieldbus interface

14.1.2. Electrical data

Electrical data	
Operating voltage [V]	20...30 DC; (US; according to SELV/PELV)
Current consumption [mA]	300...3900; (US)
protection class	III
Additional voltage supply[V]	20...30 DC; (UA)
Sensor supply US	
Total current rating [A]	3,6
Current rating per port [A]	2; (configurable: 0...2; factory setting: 0.45)
Actuator supply UA	
Total current rating [A]	8
Current rating per port [A]	2; (configurable: 0...2; factory setting: 2)

Derating behavior

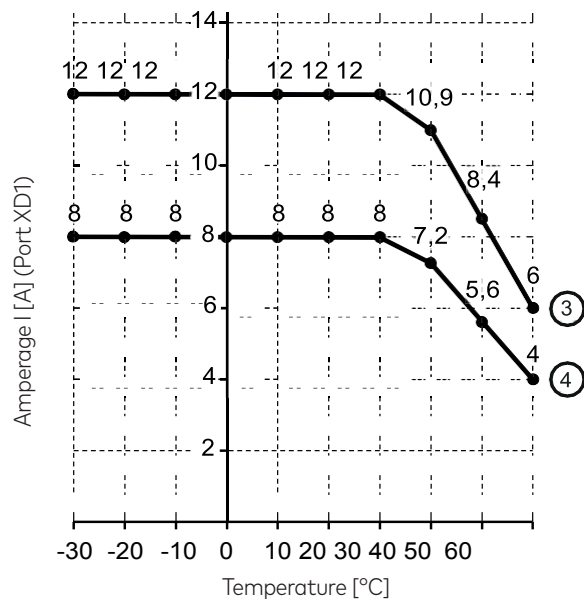
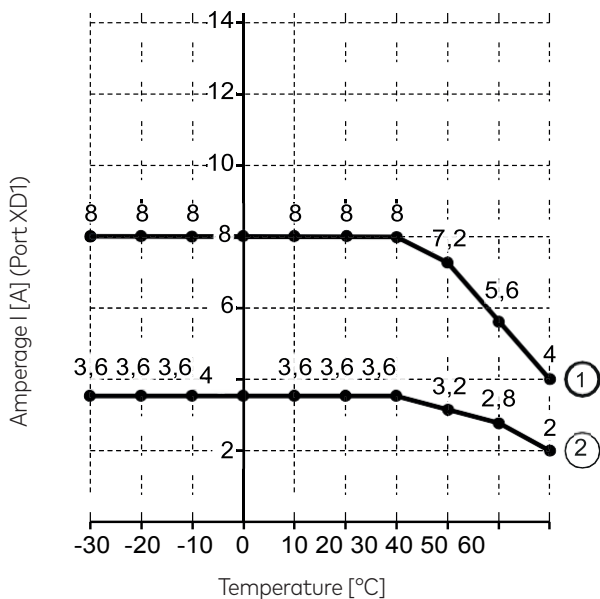
Derating without daisy chain



① UA to ports X1...X4

② US to ports X1...X8

Derating without daisy chain



- ① XD1: UA to port X1...X4
- ② US to ports X1...X8
- ③ UA to ports X1...X4
- ④ US to ports X1...X8

Example:

Temperature	I_{UA}	I_{US}	$I_{UAdaisychain}$	$I_{USDaisychain}$
30°C	8 A	3.6 A	8 A	12 A

14.1.3. Inputs/outputs

Inputs/outputs	
total number of inputs and outputs	24; (configurable)
Number of inputs and outputs	Number of digital inputs: 12; Number of outputs: 12

14.1.4. Inputs

Inputs	
Number of digital inputs	12; (IO-Link Port Class A: 4 x 2; IO-Link Port Class B: 4 x 1)
Switching level high [V]	11...30
Switching level low [V]	0...5
Digital inputs protected against short circuits	yes

14.1.5. Outputs

Outputs	
Number of digital outputs	12; (IO-Link Port Class A: 4 x 1; IO-Link Port Class B: 4 x 2)
Short-circuit protection	yes
Actuator supply UA	
Max.current load per output [mA]	2000
Sensor supply US	
Max. current load per output [mA]	2000

14.1.6. Interfaces

Interfaces	
Communication interface	Ethernet; IO-Link
Ethernet	
Max.current load per output [mA]	2000
Transmission standard	10Base-T; 100Base-TX
Transmission rate [MBit/s]	10; 100
Protocol	PROFINET IO
Factory settings	<ul style="list-style-type: none"> • IP address: 0.0.0.0 • Subnet mask: 0.0.0.0 • Gateway IP address: 0.0.0.0 • MAC Address: see type label
Addition	CC-C (Conformance Class C); S2 redundancy; Configuration in Run (CiR); IRT capability; SNMP
IO-Link Master	
Type of transmission	COM 1 / COM 2 / COM 3
IO-Link revision	1.1
Number of ports class A	4
Number of class B ports	4

14.1.7. Environmental conditions

Environmental conditions	
Ambient temperature [°C]	-25...60
Storage temperature [°C]	-25...85
Max. perm. relative air humidity [%]	90
Protection rating	IP 65; IP 66; IP 67
Degree of soiling	2



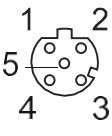
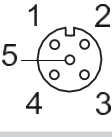
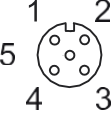
14.1.8. Approvals / tests

Approvals / tests	
EMC	<ul style="list-style-type: none"> • EN 61000-6-2 • EN 61000-6-4
Shock resistance	DIN EN 60068-2-27
Vibration resistance	<ul style="list-style-type: none"> • DIN EN 60068-2-64 2009-04 • DIN EN 60068-2-6 2008-10

14.1.9. Mechanical data

Mechanical data	
Weight [g]	412,1
Materials	Housing: PA; socket: brass nickel-plated

14.1.10 Electrical connection

Voltage supply IN XD1				
Connector	M12 (L-coded)			
Wiring		1:	+ 24 V DC (US)	
		2:	GND (UA)	
		3:	GND (US)	
		4:	+24 V DC (UA)	
		5:	FE	
Voltage supply OUT XD2				
Connector	M12 (L-coded)			
Wiring		1:	+ 24 V DC (US)	
		2:	GND (UA)	
		3:	GND (US)	
		4:	+24 V DC (UA)	
		5:	FE	
Ethernet IN / OUT XF1, XF2				
Connector	M12			
Wiring		1:	TX +	
		2:	RX +	
		3:	TX -	
		4:	RX -	
		5:	-	
Process connection Ports Class B X1...X4				
Connector	M12			
Wiring		1:	Sensor supply (US) L+	
		2:	Actuator supply (UA) L+ / DO	
		3:	Sensor supply (US) L-	
		4:	C/Q IO-Link	
		5:	Actuator supply (UA) L-	
Process connection of Ports Class A X5...X8				
Connector	M12			
Wiring		1:	Sensor supply (US) L+	
		2:	DI	
		3:	Sensor supply (US) L-	
		4:	C/Q IO-Link	
		5:	-	

14.2. PROFINET

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14.2.1. Device structure

Slot	Subslot	Label	Description
0	0x8000	X1	Parameter PROFINET-IO
	0x8001	X1 P1	Parameter Port XF1
	0x8002	X1 P2	Parameter Port XF2
1	0x1	IOLM proxy	→ IOLM proxy module (→ S. 61) → Parameters of the IOLM proxy modules (→ S. 62)
	0x2	X1 (B-Port)	→ IOLD proxy modules (→ S. 63) → Parameters of the IOLD proxy modules (→ S. 65)
	0x3	X2 (B-Port)	
	0x4	X3 (B-Port)	
	0x5	X4 (B-Port)	
	0x6	X5 (A-Port)	
	0x7	X6 (A-Port)	
	0x8	X7 (A-Port)	
	0x9	X8 (A-Port)	

14.2.2. Parameter data

Content

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IOLM proxy module

Module	IO-Link Master Proxy	Description
8 Ports	IO-Link Master Proxy 8P	Standard IO-Link Master
8 Ports	IO-Link Master Proxy 8P EnMo	IO-Link master with energy monitoring
8 Ports - IO Mode	IO-Link Master Proxy 8P IO-Mode	IO-Link Master IO Mode

Parameters of the IOLM proxy modules

Parameter	Description	Possible values	
[Enable Port Diagnosis]	Enable / disable diagnostic data of the port	Disabled	disabled
		Enabled	enabled
[Port Configuration without Tool]	Enable configuration of the IO-Link ports via IODD and the communication tool	Disabled	disabled
		Enabled	enabled
[Access Rights]	The access rights to the parameter data, process data and events/diagnostic messages of the IO-Link master and the connected IO-Link devices	PROFINET + IoT	<ul style="list-style-type: none"> • PROFINET and LR DEVICE have read and write access rights to parameters and process data • PROFINET and LR DEVICE have read access rights to events/alarms
		PROFINET + IoT (ro)	<ul style="list-style-type: none"> • PROFINET has read and write access rights to parameters and process data • PROFINET has read access rights to events/alarms • LR DEVICE only has read access rights to parameters, process data and events/alarms
		PROFINET only	<ul style="list-style-type: none"> • PROFINET has read and write access rights to parameters and process data • PROFINET has read access rights to events/alarms • LR DEVICE has no access rights (parameters, process data, events/alarms, web interface, firmware update)
		keep setting	previous setting is valid*
[Mode Pin2 (Actuator Supply UA)]	Operating mode of the supply voltage UA on pin 2 of the IO-Link port	OFF (IO-Link Type A Supply)	UA disables operation as IO-Link Port Class A*
		ON (IO-Link Type B Supply)	UA enabled: Operation as IO-Link port class B
		Digital Output	Operation as digital output
[Current Limit Pin2 (Actuator Supply UA) [mA]]	maximum current value of the supply voltage UA on pin 2 of the IO-Link port (only for Class B Ports)	per IO-Link port:	
		0 ... 2000	0 mA ... 2000 mA*
[Current Limit Pin1 + Pin4 (Sensor Supply US) [mA]]	maximum current voltage of the supply voltage US on pin 1 and pin 4 of the IO-Link port	per IO-Link port:	
		0 ... 450 ... 2000	0 mA ... 450 mA* ... 2000 mA
[Fail Safe DO Mode Pin 2 (Actuator Supply UA)]	Behavior of the additional digital output if the PROFINET connection is interrupted	Fail Safe Reset Value	Failsafe enabled: reset value
		Fail Safe Old Value	Failsafe enabled: Hold last value*
		Fail Safe Set Value	Failsafe enabled: set the defined value

* ... Factory settings

IOLD proxy modules

Content

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Port modules: I/O Mode

Module	Port Mode	Process data
IO-Link 1 I / 1 O Byte + PQI	IO-Link	1 byte input data and 1 byte output data and PQI
IO-Link 1 I / 15 O Byte + PQI	IO-Link	1 byte input data and 15 bytes output data and PQI
IO-Link 2 I / 2 O Byte + PQI	IO-Link	2 bytes input data and 2 bytes output data and PQI
IO-Link 4 I / 1 O Byte + PQI	IO-Link	4 bytes input data and 1 byte output data and PQI
IO-Link 4 I / 4 O Byte + PQI	IO-Link	4 bytes input data and 4 bytes output data and PQI
IO-Link 8 I / 1 O Byte + PQI	IO-Link	8 bytes input data and 1 byte output data and PQI
IO-Link 8 I / 8 O Byte + PQI	IO-Link	8 bytes input data and 8 bytes output data and PQI
IO-Link 16 I / 1 O Byte + PQI	IO-Link	16 bytes input data and 1 byte output data and PQI
IO-Link 16 I / 16 O Byte + PQI	IO-Link	16 bytes input data and 16 bytes output data and PQI
IO-Link 32 I / 1 O Byte + PQI	IO-Link	32 bytes input data and 1 byte output data and PQI
IO-Link 32 I / 32 O Byte + PQI	IO-Link	32 bytes input data and 32 bytes output data and PQI
IO-Link 1 I Byte + PQI	IO-Link	1 bytes input data and PQI
IO-Link 2 I Byte + PQI	IO-Link	2 bytes input data and PQI
IO-Link 4 I Byte + PQI	IO-Link	4 bytes input data and PQI
IO-Link 8 I Byte + PQI	IO-Link	8 bytes input data and PQI
IO-Link 16 I Byte + PQI	IO-Link	16 bytes input data and PQI
IO-Link 32 I Byte + PQI	IO-Link	32 bytes input data and PQI
IO-Link 1 O Byte + PQI	IO-Link	1 bytes output data and PQI
IO-Link 2 O Byte + PQI	IO-Link	2 bytes output data and PQI
IO-Link 4 O Byte + PQI	IO-Link	4 bytes output data and PQI
IO-Link 8 O Byte + PQI	IO-Link	8 bytes output data and PQI
IO-Link 16 O Byte + PQI	IO-Link	16 bytes output data and PQI
IO-Link 32 O Byte + PQI	IO-Link	32 bytes output data and PQI
Digital Input without PD	DI	digital input
Digital Output without PD	DO	digital output
Disabled	disabled	Port disabled

Port modules: Mix Mode

Module	Port Mode	Process data
IO-Link 1 I / 1 O Byte + PQI	IO-Link	1 byte input data and 1 byte output data and PQI
IO-Link 1 I / 15 O Byte + PQI	IO-Link	1 byte input data and 15 bytes output data and PQI
IO-Link 2 I / 2 O Byte + PQI	IO-Link	2 bytes input data and 2 bytes output data and PQI
IO-Link 4 I / 1 O Byte + PQI	IO-Link	4 bytes input data and 1 byte output data and PQI
IO-Link 4 I / 4 O Byte + PQI	IO-Link	4 bytes input data and 4 bytes output data and PQI
IO-Link 8 I / 1 O Byte + PQI	IO-Link	8 bytes input data and 1 byte output data and PQI
IO-Link 8 I / 8 O Byte + PQI	IO-Link	8 bytes input data and 8 bytes output data and PQI
IO-Link 16 I / 1 O Byte + PQI	IO-Link	16 bytes input data and 1 byte output data and PQI
IO-Link 16 I / 16 O Byte + PQI	IO-Link	16 bytes input data and 16 bytes output data and PQI
IO-Link 32 I / 1 O Byte + PQI	IO-Link	32 bytes input data and 1 byte output data and PQI
IO-Link 32 I / 32 O Byte + PQI	IO-Link	32 bytes input data and 32 bytes output data and PQI
IO-Link 1 I Byte + PQI	IO-Link	1 bytes input data and PQI
IO-Link 2 I Byte + PQI	IO-Link	2 bytes input data and PQI
IO-Link 4 I Byte + PQI	IO-Link	4 bytes input data and PQI
IO-Link 8 I Byte + PQI	IO-Link	8 bytes input data and PQI
IO-Link 16 I Byte + PQI	IO-Link	16 bytes input data and PQI
IO-Link 32 I Byte + PQI	IO-Link	32 bytes input data and PQI
IO-Link 1 O Byte + PQI	IO-Link	1 bytes output data and PQI
IO-Link 2 O Byte + PQI	IO-Link	2 bytes output data and PQI
IO-Link 4 O Byte + PQI	IO-Link	4 bytes output data and PQI
IO-Link 8 O Byte + PQI	IO-Link	8 bytes output data and PQI
IO-Link 16 O Byte + PQI	IO-Link	16 bytes output data and PQI
IO-Link 32 O Byte + PQI	IO-Link	32 bytes output data and PQI
Digital Input	DI	digital input
Digital Output	DO	digital output
Disabled	disabled	Port deactivated

Parameters of the IOLD proxy modules

Parameter	Description	Possible values	
[Enable Port Diagnosis]	Enable / disable diagnostic messages of the port	Disabled	disabled
		Enabled*	enabled
[Enable Process Alarm]	enable/disable process alarms	Disabled	disabled
		Enabled*	enabled
[Port Configuration without Tool]	Enable configuration of the IO-Link ports via IODD and the communication tool	Disabled	disabled
		Enabled*	enabled
[Enable Pull/Plug]	enable/disable pull/plug alarm	Disabled	Alarm disabled
		Enabled*	Alarm enabled
[Port Mode]	Configuration mode for ports when booting	Deactivated	Port deactivated
		Apply Port Configuration	Use values projected in PROFINET
		AutoStart	Use the set values of the IO-Link device
		DI Pin4	digital input
		DO Pin4	digital output
[Validation / Data Storage]	Supported IO-Link standard and behavior of the NC-MP-4A4B-12DLA/AL1403 when connecting new IO-Link devices to the IO-Link port	no Device check and clear*	<ul style="list-style-type: none"> no verification of the vendor ID and device ID no data storage
		type compatible Device (V1.0)	<ul style="list-style-type: none"> IO-Link device is compatible with the V1.0 IO-Link standard Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID) no data storage
		type compatible Device (V1.1)	<ul style="list-style-type: none"> IO-Link device is compatible with the V1.1 IO-Link standard Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID) no data storage
		type compatible Device (V1.1) with Backup + Restore	<ul style="list-style-type: none"> IO-Link device is compatible with the V1.1 IO-Link standard Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID) The IO-Link master saves the parameter values of the connected IO-Link device; The changes of the parameter values are saved as well When connecting an IO-Link device with factory settings, the parameter values stored in the IO-Link master are restored automatically on the IO-Link device.

Parameter	Description	Possible values	
		type compatible Device (V1.1) with Restore	<ul style="list-style-type: none"> IO-Link device is compatible with the V1.1 IO-Link standard Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID) The IO-Link master stores the parameter values of the connected IO-Link device once if the data memory of the NC-MP-4A4B-12DLA/AL1403 is empty. When connecting an IO-Link device with factory settings, the parameter values stored in the IO-Link master are restored automatically on the IO-Link device.
[Port cycle time]	Cycle time of the data transmission on the IO-Link port	As fast as possible*	The device automatically sets the fastest possible cycle time
		2.0 ms	2 milliseconds
		4.0 ms	4 milliseconds
		8.0 ms	8 milliseconds
		16.0 ms	16 milliseconds
		32.0 ms	32 milliseconds
		64.0 ms	64 milliseconds
		128.0 ms	128 milliseconds
[Vendor ID]	ID of the manufacturer that is to be validated	0* ... 65535	ID of the manufacturer of the IO-Link device (Norgren: 310)
[Device ID]	ID of the IO-Link device that is to be validated	0* ... 16777215	ID of the IO-Link device
[Fail safe Mode]	Behavior in case the PROFINET connection is interrupted	No Fail Safe	disabled
		Fail Safe Reset Value	Failsafe enabled: reset to default values
		Fail Safe Old Value	Failsafe enabled: maintain the most recent valid process value
		Fail Safe Set Value	Failsafe enabled:
		Fail Safe with Pattern	Failsafe enabled: set user-defined values
[Pattern Value]	<ul style="list-style-type: none"> required values for the process data in case the connection is interrupted (as hexadecimal value) Pattern depends on the size of the selected PROFINET module 	Per output 0x00*...0xFF	

14.2.3. Cyclic data

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IOLD Proxy: Digital Input	65

IOLM Proxy: IO Mode

Input data: 2 bytes

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	Port X8: Digital Input (Pin 2)	Port X7: Digital Input (Pin 2)	Port X6: Digital Input (Pin 2)	Port X5: Digital Input (Pin 2)	Port X4: Digital Input (Pin 2)	Port X3: Digital Input (Pin 2)	Port X2: Digital Input (Pin 2)	Port X1: Digital Input (Pin 2)
n+1	Port X8: Digital Input (Pin 4)	Port X7: Digital Input (Pin 4)	Port X6: Digital Input (Pin 4)	Port X5: Digital Input (Pin 4)	Port X4: Digital Input (Pin 4)	Port X3: Digital Input (Pin 4)	Port X2: Digital Input (Pin 4)	Port X1: Digital Input (Pin 4)

Legend:

[Port Xn: Digital Input (Pin 2)]	Switching status of the digital input of the Xn port (pin 2)	1 bit	0x0	OFF
			0x1	ON
[Port Xm: Digital Input (Pin 4)]	Switching status of the digital input of the Xm port (pin 4)	1 bit	0x0	OFF
			0x1	ON

Output data: 2 bytes

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	res.	res.	res.	res.	Port X4: Digital Output (Pin 2)	Port X3: Digital Output (Pin 2)	Port X2 Digital Output (Pin 2)	Port X1: Digital Output (Pin 2)
n+1	Port X8: Digital Output (Pin 4)	Port X7: Digital Output (Pin 4)	Port X6: Digital Output (Pin 4)	Port X5: Digital Output (Pin 4)	Port X4: Digital Output (Pin 4)	Port X3: Digital Output (Pin 4)	Port X2 Digital Output (Pin 4)	Port X1: Digital Output (Pin 4)

Legend:

[Port Xn: Digital Output (Pin 2)]	Switching status of the digital output of the Xn port (pin 2)	1 bit	0x0	OFF
			0x1	ON
[Port Xm: Digital Output (Pin 4)]	Switching status of the digital output of the Xm port (pin 4)	1 bit	0x0	OFF
			0x1	ON

IOLM Proxy: Mix Mode

Input data: 1 byte

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	Port X8: Digital Input (Pin 2)	Port X7: Digital Input (Pin 2)	Port X6: Digital Input (Pin 2)	Port X5: Digital Input (Pin 2)	Port X4: Digital Input (Pin 2)	Port X3: Digital Input (Pin 2)	Port X2: Digital Input (Pin 2)	Port X1: Digital Input (Pin 2)

Legend:

[Port Xn: Digital Input (Pin 2)] Switching status of the digital input of the Xn port (pin 2) 1 bit 0x0 OFF
0x1 ON

Output data: 1 byte

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	res.	res.	res.	res.	Port X4: Digital Output (Pin 2)	Port X3: Digital Output (Pin 2)	Port X2: Digital Output (Pin 2)	Port X1: Digital Output (Pin 2)

Legend:

[Port Xn: Digital Output (Pin 2)] Switching status of the digital output of the Xn port (pin 2) 1 bit 0x0 OFF
0x1 ON

IOLM Proxy: Mix Mode with Energy Monitoring

Input data: 36 bytes

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	Port X8: Digital Input (Pin 2)	Port X7: Digital Input (Pin 2)	Port X6: Digital Input (Pin 2)	Port X5: Digital Input (Pin 2)	Port X4: Digital Input (Pin 2)	Port X3: Digital Input (Pin 2)	Port X2: Digital Input (Pin 2)	Port X1: Digital Input (Pin 2)
n+1	res.	res.	res.	res.	res.	res.	Status Actuator Supply UA	Status Sensor Supply US
n+2	Supply Voltage Actuator [mV] (MSB)							
n+3	Supply Voltage Actuator [mV] (LSB)							
n+4	Supply Current Actuator [mA] (MSB)							
n+5	Supply Current Actuator [mA] (LSB)							
n+6	Supply Voltage Sensor [mV] (MSB)							
n+7	Supply Voltage Sensor [mV] (LSB)							
n+8	Supply Current Sensor [mA] (MSB)							
n+9	Supply Current Sensor [mA] (LSB)							
n+10	Port X8: Status Actuator Port	Port X7: Status Actuator Port	Port X6: Status Actuator Port	Port X5: Status Actuator Port	Port X4: Status Actuator Port	Port X3: Status Actuator Port	Port X2: Status Actuator Port	Port X1: Status Actuator Port

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n+11	Port X1: Actuator Current [mA] (MSB)							
n+12	Port X1: Actuator Current [mA] (LSB)							
n+13	Port X2: Actuator Current [mA] (MSB)							
n+14	Port X2: Actuator Current [mA] (LSB)							
n+15	Port X3: Actuator Current [mA] (MSB)							
n+16	Port X3: Actuator Current [mA] (LSB)							
n+17	Port X4: Actuator Current [mA] (MSB)							
n+18	Port X4: Actuator Current [mA] (LSB)							
n+19	Port X8: Status Sensor Port	Port X7: Status Sensor Port	Port X6: Status Sensor Port	Port X5: Status Sensor Port	Port X4: Status Sensor Port	Port X3: Status Sensor Port	Port X2: Status Sensor Port	Port X1: Status Sensor Port
n+20	Port X1: Sensor Current [mA] (MSB)							
n+21	Port X1: Sensor Current [mA] (LSB)							
n+22	Port X2: Sensor Current [mA] (MSB)							
n+23	Port X2: Sensor Current [mA] (LSB)							
n+24	Port X3: Sensor Current [mA] (MSB)							
n+25	Port X3: Sensor Current [mA] (LSB)							
n+26	Port X4: Sensor Current [mA] (MSB)							
n+27	Port X4: Sensor Current [mA] (LSB)							
n+28	Port X5: Sensor Current [mA] (MSB)							
n+29	Port X5: Sensor Current [mA] (LSB)							
n+30	Port X6: Sensor Current [mA] (MSB)							
n+31	Port X6: Sensor Current [mA] (LSB)							
n+32	Port X7: Sensor Current [mA] (MSB)							
n+33	Port X7: Sensor Current [mA] (LSB)							
n+34	Port X8: Sensor Current [mA] (MSB)							
n+35	Port X8: Sensor Current [mA] (LSB)							

[Port Xn: Digital Input (Pin 2)]	Switching status of the digital input of the Xn port (pin 2)	1 bit	0x0	OFF
			0x1	ON
[Status Actuator Supply UA]	Status of the supply voltage UA	1 bit	0x0	UA is connected and no error
			0x1	Error
[Status Sensor Supply US]	Status of the supply voltage US	1 bit	0x0	no error
			0x1	Error

[Supply Voltage Actuator [mV]]	voltage value of the supply voltage UA (value in mV)	2 bytes	0x0000 ... 0xFFFF
[Supply Current Actuator [mA]]	Current intensity value of the supply voltage UA (value in mA)	2 bytes	0x0000 ... 0xFFFF
[Supply Voltage Sensor [mV]]	Voltage value of the supply voltage US (value in mV)	2 bytes	0x0000 ... 0xFFFF
[Supply Current Sensor [mA]]	Current intensity value of the supply voltage US (value in mA)	2 bytes	0x0000 ... 0xFFFF
[Port Xn: Status Actuator Port]	Status of the supply voltage UA of the port	1 bit	0x0 no error 0x1 error
[Port Xn: Actuator Current [mA]]	Current intensity value of the supply voltage UA on pin 2 of the Xn port (value in mA)	2 bytes	0x0000 ... 0xFFFF
[Port Xm: Status Sensor Port]	Status of the supply voltage US of the port	1 bit	0x0 no error 0x1 error
[Port Xm: Sensor Current [mA]]	Current intensity value of the supply voltage US on pin 1 and pin 4 of the Xm port (value in mA)	2 bytes	0x0000 ... 0xFFFF

Byte (offset)	Contents							
	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
n	res.	res.	res.	res.	Port X4: Digital Output (Pin 2)	Port X3: Digital Output (Pin 2)	Port X2 Digital Output (Pin 2)	Port X1: Digital Output (Pin 2)

Legend:

[Port Xn: Digital Output (Pin 2)]	Switching status of the digital output of the Xn port (pin 2)	1 bit	0x0 OFF 0x1 ON
-----------------------------------	---	-------	-------------------

Port modules: I/O Mode

Input data:

Byte	Contents
0	IO-Link input data (n bytes)
n	Port Qualifier Information (→ Mapping: Port Qualifier Information (PQI) (→ S. 72))

Legend:

n ... Number of bytes on input data (n = [0, 1, 2, 4, 8, 16, 32])

Output data:

Byte	Contents
0	IO-Link output data (m bytes)

Legend:

m ... Number of bytes on output data (m = [0, 1, 2, 4, 8, 16, 32])

Mapping: Port Qualifier Information (PQI)

Bit							
7	6	5	4	3	2	1	0
PQ	DevErr	DevComm	PortActive	SubstDev	NewPar	res.	res.

Legend:

[NewPar]	1 bit	0x0	no IO-Link device parameter update detected
		0x1	IO-Link device parameter detected
[SubstDev]	1 bit	0x0	No exchange IO-Link device detected (identical serial number)
		0x1	Exchange IO-Link device detected (different serial number)
[PortActive]	1 bit	0x0	Disable the port via the port function
		0x1	Port enabled
[DevComm]	1 bit	0x0	no IO-Link device available
		0x1	IO-Link device detected; IO-Link device in PREOPERATE or OPERATE mode
[DevErr]	1 bit	0x0	no error/warning
		0x1	Error/warning of IO-Link device or port
[PQ]	1 bit	0x0	Invalid I/O process data from the IO-Link device
		0x1	Invalid I/O process data of the IO-Link device

IOLD Proxy: Digital Output

Byte	Contents
0	Digital Output

[Digital Output]	Digital output (pin 4)	0x00	OFF
		0x01...0xFF	ON

IOLD Proxy: Digital Input

Byte	Contents
0	Digital Input

[Digital Input]	Digital Input (pin 4)	0x00	OFF
		0x01	ON

14.2.4. Acyclic data

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I&M datasets

The NC-MP-4A4B-12DLA/AL1403 supports the following I&M datasets (I&M = Identification & Maintenance):

I&M0 (Slot 0)

Variable	Description	Access	Size
Vendor ID	IO-Link ID of the manufacturer	r	2
OrderID	Order number of the device (numbers are separated by blanks)	r	20
Serial number	Serial number of the device (numbers separated by blanks)	r	16
Hardware revision	Hardware revision of the device	r	2
Software revision prefix	Prefix of the software revision of the device (V, R, P, U or T)	r	1
Software Revision	Software revision (numbers separated by blanks, e.g. x y z in "Vx.y.z")	r	3
Revision Counter	Revision counter; is incremented with each parameter change	r	2
Profile ID	ID of sub-module profile (Slot 0: 0x0000)	r	2
Profile Specific Type	additional value for profile ID; 0, if not used	r	2
IMVersion	I&M version (default value: 0x0101)	r	2
IMSupported	Supported I&M datasets (0x1110 for I&M1-3)	r	2

r ... only read

I&M1 (Slot 0)

Variable	Description	Access	Size
TagFunction of submodule	function of the device (ASCII, padded with spaces)	r/w	32
TagLocation of submodule	Location of the device in the plant (ASCII, padded with spaces)	r/w	22

r/w ... read and write

I&M2 (Slot 0)

Variable	Description	Access	Size
Installation_Date	Installation date of the device (ASCII, padded with spaces)	r/w	16
	reserved	r/w	38

r/w ... read and write

I&M3 (Slot 0)

Variable	Description	Access	Size
Descriptor	Description of the device (ASCII, padded with spaces)	r/w	54

r/w ... read and write

I&M0 (Slot 1)

Variable	Description	Access	Size
Vendor ID	IO-Link ID of the manufacturer	r	2
OrderID	Order number of the device (numbers are separated by blanks)	r	20
Serial number	Serial number of the device (numbers separated by blanks)	r	16
Hardware revision	Hardware revision of the device	r	2
Software revision prefix	Prefix of the software revision of the device (V, R, P, U or T)	r	1
SOFTWARE_REVISION	Software revision (numbers separated by blanks, e.g. x y z in "Vx.y.z")	r	3
REVISION_COUNTER	Revision counter; is incremented with each parameter change	r	2
Profile ID	ID of the sub-module profile (Slot 1: 0x4E01 = IOLink)	r	2
Profile Specific Type	additional value for profile ID; 0, if not used	r	2
IMVersion	I&M version (default value: 0x0101)	r	2
IMSupported	Supported I&M datasets (0x0E for I&M1-3)	r	2

r ... only read

Diagnostic and alarms

ECD code	Name	Description	Type
0x02	EVNT_CODE_M_PDU_CHECK	Receive frame with CRC error	Alarm
0x1B	EVNT_CODE_S_RETRY	Repetitions detected	Alarm
0x1E	EVNT_CODE_P_SHORT	Short circuit on C/Q cable detected	Diagnostics
0x1F	EVNT_CODE_P_SENSOR	Error in the sensor supply	Diagnostics
0x20	EVNT_CODE_P_ACTOR	Error in the actuator supply	Diagnostics
0x21	EVNT_CODE_P_POWER	Error in the power supply of the IO-Link master	Diagnostics
0x28	EVNT_CODE_DSREADY_NOACTION	Data storage completed, but no action, since CRC was correct	Alarm
0x29	DS_FAULT_IDENT	Sensor does not match the content of the data memory	Alarm
0x2A	DS_FAULT_SIZE	Sensor parameters too large for data memory	Alarm
0x2B	DS_FAULT_UPLOAD	Error during data memory transmission from the sensor	Alarm
0x2C	DS_FAULT_DOWNLOAD	Error during data memory transmission to the sensor	Alarm
0x2F	DS_FAULT_DEVICE_LOCKED	Error during data storage because the device is blocked	Alarm
0x32	EVNT_CODES_DSREADY_DOWNLOAD	Parameter transmission to the sensor finished	Alarm
0x33	EVNT_CODE_DSREADY_UPLOAD	Parameter transmission from the sensor finished	Diagnostics

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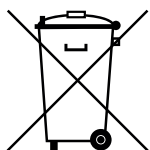
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