



 IO-Link



Operating Instructions  
IO-Link Master with PROFINET interface  
StandardLine  
8 Ports  
IP 65 / IP 66 / IP 67 / IP 69K

**AL1103**

IO-Link: 1.1.2  
ifm firmware: 2.1.28 or higher  
LR DEVICE: 1.3.1.x or higher

English

7391218 / 01 05 / 2018

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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

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This document is only for device types "IO-Link master - PROFINET gateway (StandardLine) 8 port IP 65 / IP 66 / IP 67 / IP 69K" (art. no.: AL1103).


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 Symbols and styles used

15989

 **WARNING**  
 Death or serious irreversible injuries may result.

 **CAUTION**  
 Slight reversible injuries may result.

**NOTICE**  
 Property damage is to be expected or may result.

-  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

21676

Version	Topic	Date
00	New creation of document	05 / 2018
01	Correction IoT Core	05 / 2018

## 2 Safety instructions

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### 2.1 General

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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

22046

This document is intended for specialists. Specialists are people who, based on their relevant training and experience, are capable of identifying 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

15021



General warning

Observe instructions in chapter "Electrical connection" (→ **Electrical connection** (→ p. 14))!

## 2.4 Tampering with the unit

11242

### **WARNING**

Tampering with the units can affect the safety of operators and machinery!

Tampering with the units is not allowed.

In case of non-compliance our liability and warranty expire.

- ▶ 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

7610

The IO-Link master serves as a gateway between intelligent IO-Link devices and the fieldbus. The device is designed for use without a control cabinet in the food industry.

#### 3.2 Prohibited use

22053

The device may not be used beyond the limits of the technical data (→ **Technical data** (→ p. [49](#)))!

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## 4.1 Communication, parameter setting, evaluation

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### 4.1.1 IO-Link

7773

The device offers 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.ifm.com](http://www.ifm.com))

### 4.1.2 PROFINET

2259

The device offers the following PROFINET functions:

- Provision of the functions of a Profinet RT Device (Class B)
- 2 port switch for access to the PROFINET interface (X21/X22)
- Gateway for transmission of the process and parameter data between the connected IO-Link devices and the higher-level PROFINET controller

### 4.1.3 Parameter setting

7284

The device provides the following configuration options:

- Parameter setting of the IO-Link master of the AL1103 with LR DEVICE parameter setting software or PROFINET projection software.
- Parameter setting of the connected IO-Link devices (sensors, actuators) with LR DEVICE parameter setting software or PROFINET projection software
- Storage of parameter sets of the connected IO-Link devices for automatic recovery (data storage)

#### 4.1.4 Visual indication

7772

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

#### 4.2 Digital inputs

7584

The device has 8 additional digital inputs (type 2 according to EN 61131-2).

The digital inputs are on pin 2 of the IO-Link ports X01 ... X08.

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

#### 4.3 IO-Link supply

7623

The device has 8 supplies for IO-Link devices.

The IO-Link ports X01...X08 are ports class A.

Every supply provides short circuit monitoring.

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

## 5 Mounting

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------------------------	----

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### 5.1 Mount the device

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- ▶ Disconnect the system from power before installation.
  - ▶ For installation choose a flat mounting surface.
  - ▶ Please observe the maximum tightening torque.
- 
- ▶ Fix the unit to the mounting surface using 2 M5 mounting screws and washers.
    - Tightening torque: 1.8 Nm
  - ▶ Ground the unit via the two mounting screws of the upper mounting lugs.

## 6 Electrical connection

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### 6.1 Remarks

18076



A qualified electrician must connect the unit.

- ▶ Observe the national and international regulations for the installation of electrical equipment.

Device is only suitable for operation on SELV/PELV voltages.

- ▶ Observe the information concerning IO-Link circuits (→ **IO-Link circuits** (→ p. 16))!

The device contains components that can be damaged or destroyed by electrostatic discharge (ESD).

- ▶ Observe the required safety measures against electrostatic discharge!

The IP rating depends on the individual protection ratings of the unit, the applied connection elements and the corresponding protective covers.

- ▶ For UL applications: For connecting the device and the IO-Link devices use UL certificated cables of category CYJV or PVVA with a minimum temperature rating of 100°C.
- ▶ Depending on the mounting conditions, cables must be provided with a strain relief to avoid unacceptable loads on the mounting points and M12 connections.
- ▶ Make sure that the M12 connection parts are correctly seated and mounted correctly. The specified protection rating can not be guaranteed if this is not observed.

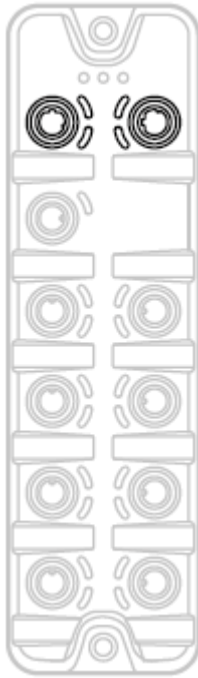
Wiring: → **Technical data** (→ p. 49)



The communication interfaces are separated from the device supply according to EN61010-1 considering basis isolation as secondary circuit with maximum 30 V DC derived from the applied voltage up to 300 V of overvoltage category II. The communication interfaces are designed for a network environment 0 according to IEC TR62102.

## 6.2 Ethernet ports

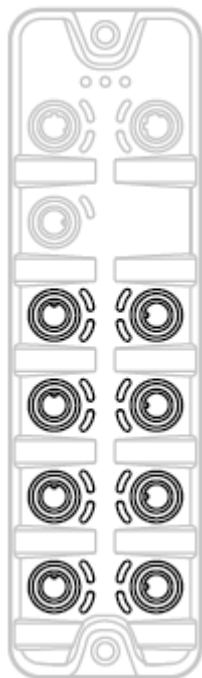
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- ▶ Connect the unit via the M12 socket X21 and/or X22 with the PROFINET network (e.g. PROFINET PLC, additional PROFINET device)
  - Tightening torque: 0.6...0.8 Nm
- ▶ Connect the unit via the M12 socket X21 and/or X22 to the IT network (e.g. laptop/PC with installed LR DEVICE, LR SMARTOBSERVER)
  - Tightening torque: 0.6...0.8 Nm
- ▶ For the connection, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 / IP 69K or higher (→ **Accessories** (→ p. 47)).
- ▶ Cover the unused sockets with M12 protective caps (art no. E12542).
  - Tightening torque: 0.6...0.8 Nm

## 6.3 IO-Link ports

8526



### Ports X01...X08: For use as IO-Link port class A:

- ▶ Connect the connector of the IO-Link devices with the M12 sockets X01 ... X08.
  - Tightening torque: 0.6...0.8 Nm
  - Maximum cable length per IO-Link interface: 20 m
- ▶ For the connection, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 / IP 69K or higher (→ **Accessories** (→ p. [47](#))).
- ▶ Cover the unused sockets with M12 protective caps (art no. E12542).
  - Tightening torque 0.6...0.8 Nm

### 6.3.1 Input circuit

18629

The inputs of the ports X01...X08 (pin 2) provide a type 2 behaviour according to standard EN61131-2, the connected electronics must be rated for this electrically.

### 6.3.2 IO-Link circuits

1863

The IO-Link ports of the device meet the requirements of the IO-Link specification 1.0 bis 1.1.2.



The power supply of the connected IO-Link devices may only take place via the AL1103.

Further information: → **Technical data** (→ p. [49](#))



## 6.4 Connect the device

17542



- ▶ Disconnect power.
- ▶ Connect the device via M12 socket X31 to 24 V DC (20...28 V SELV/PELV; according to EN61010-1, secondary circuit with maximum 30 V DC derived from applied voltage up to 300 V of overvoltage category II).
  - Tightening torque: 0.6...0.8 Nm
  - Maximum cable length: 25 m
- ▶ To connect the device, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 / IP 69K or higher (→ **Accessories** (→ p. [47](#))).



When using cable length greater than 25 m keep in mind the voltage drop as well as the required minimum voltage supply of 20 V!

## 7 Operating and display elements

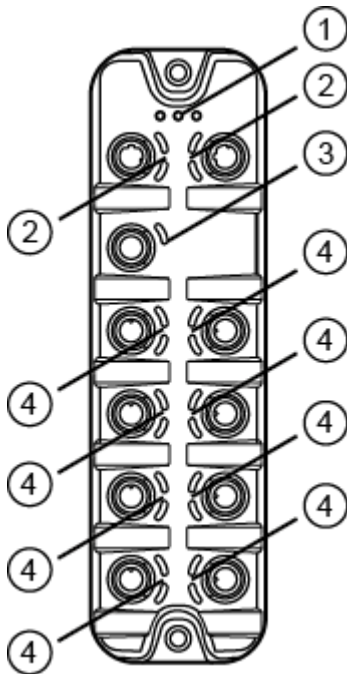
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### 7.1 Overview

22025



- ① Status LEDs RDY, BF and SF  
→ **Status LEDs** (→ p. [19](#))
- ② Status LEDs LNK and ACT of the PROFINET ports 1 (X21) and 2 (X22)  
→ **Ethernet interface** (→ p. [19](#))
- ③ Status LED US of the power supply (X31)  
→ **Voltage supply** (→ p. [20](#))
- ④ Status LEDs IOL and DI of the IO-Link ports Class A (X01...X08)  
→ **IO-Link ports (Class A)** (→ p. [20](#))

## 7.2 LED indicators

22024

The device only has the following LED indicators:

### 7.2.1 Status LEDs

22034

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	Gateway functions properly
		flashes 1 Hz	Error
		flashes 5 Hz	Firmware update
		off	Gateway does not function; Unit reboots
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"> <li>▪ Error in gateway</li> <li>▪ At least 1 IO-Link device sends warning / alarm (temperature, over/under current, over/under voltage, shortcut)</li> </ul>
		off	error-free

### 7.2.2 Ethernet interface

22027

Each Ethernet interface (X21, X22) 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

22026

The interface for voltage supply (X31) has the LED that is marked as US. The LED indicates the status of the voltage supply.

Status LED			Description
US	green	on	The supply voltage $U_s$ is applied.
		off	No supply voltage is applied or the applied supply voltage is too low.

## 7.2.4 IO-Link ports (Class A)

22029

Each IO-Link port Class A (X01 ... X08) has 2 LEDs marked as IOL and DI. The LEDs indicate the status of the IO-Link port.

Status LED			Description
IOL	yellow	on	Interface configured as DI/DO: pin 4 (C/Q) = ON
		off	Interface configured as DI/DO: pin 4 (C/Q) = OFF
	green	on	IO-Link transmission functions properly
		flashes 1 Hz	Interface configured as IO-Link, but no IO-Link transmission
	red	on	Short circuit or overload in supply voltage
		flashes 1 Hz	Transmission error
DI	yellow	on	Digital input: pin 2 (DI) = ON
		off	Digital input : pin 2 (DI) = OFF

## 8 Configuration

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## 8.1 LR DEVICE

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On delivery, the AL1103 is configured with the factory settings (→ **Factory settings** (→ p. [46](#))).

Required software: LR DEVICE (1.3.1.x or higher) (art.-no.: QA0011/QA0012)

## 8.1.1 Remarks

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### Offline parameter setting

22405

The AL1103 supports the offline parameter setting. In this context, the user creates and stores a configuration for the IO-Link master and the connected IO-Link devices without being connected to the AL1103 (OFFLINE mode). The configuration created in this way can be stored as a file (\*.lrp) and loaded to the AL1103 and activated at a later date.



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

### VPN connection

22762



An active VPN connection blocks the access of the parameter setting software LR DEVICE to the PROFINET interface of the AL1103.

- ▶ Deactivate the VPN connection in order to be able to access the AL1103 with the LR DEVICE.

## 8.1.2 IoT: Configure access rights

16555

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"> <li>▪ PROFINET and IoT Core have read and write access rights to parameters and process data</li> <li>▪ PROFINET and &lt;IoT Core&gt; have read access rights to events/alarms</li> </ul>
		[PROFINET + IoT (read-only)]	<ul style="list-style-type: none"> <li>▪ PROFINET has read and write access rights to parameters and process data</li> <li>▪ PROFINET has read access rights to events/alarms</li> <li>▪ IoT Core only has read access rights to parameters, process data and events/alarms</li> </ul>
		[IoT only]	<ul style="list-style-type: none"> <li>▪ IoT Core has read and write access rights to parameters and process data</li> <li>▪ IoT has read access rights to events/alarms</li> <li>▪ PROFINET has no access rights</li> </ul>

- ▶ Save changed values on the device.



Parameter [Access Rights]:

Different parameter settings in the PROFINET projection software and the IoT applications can result in undesired system behaviour. The set values of the PROFINET projection software apply.



Changes of the parameter [Access Rights] are only effective after restarting the device.

To activate the changed access rights:

- ▶ **Firmware: Reboot the device** (→ p. [29](#))



### 8.1.3 IoT: Configure the interface to the LR SMARTOBSERVER

16552

To enable data transfer between the device and the LR SMARTOBSERVER monitoring software, the LR SMARTOBSERVER monitoring software interface has to be configured.

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

Name	Description	Possible values	
[IP address LR SMARTOBSERVER]	IP address of the PC on which the LR SMARTOBSERVER is installed.	Factory setting: 255.255.255.255	
[Port LR SMARTOBSERVER]	Port number that is used to send process data to the LR SMARTOBSERVER	0 ... 65535	Factory setting: 35100
[Interval LR SMARTOBSERVER]	Cycle time for the transfer of the process data to the 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 the LR SMARTOBSERVER (String32)	Factory setting: AL1103	



After changing the parameter [Port LR 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 the parameter change.
  
- ▶ Save changed values on the device.

### 8.1.4 Fieldbus: Set PROFINET interface

25393

For the access of the PROFINET interface the Ethernet ports X21/X22 need to be set:

- ▶ 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 IP network	Factory setting: 0.0.0.0
[Default gateway IP address]	IP address of the network gateway	Factory setting: 0.0.0.0
[MAC address]	MAC address of the PROFINETA interface	The value is firmly set.
[Fieldbus firmware]		

- ▶ Save changed values on the device.

## 8.1.5 IO-Link ports: Activate data transfer to the LR SMARTOBSERVER

16551

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



To transfer process data the interfaces to the LR SMARTOBSERVER have to be correctly configured (→ **IoT: Configure the interface to the LR SMARTOBSERVER** (→ p. [25](#))).

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 SMARTOBSERVER]	Transfer of process data of the connected IO-Link device to LR SMARTOBSERVER	[Disabled]	Process data is not transferred
		[Enabled]	Process data is transferred

- ▶ Save changed values on the device.

### 8.1.6 IO-Link ports: Configure operating mode

17439

The IO-Link ports X01...X08 of the device support the following operating modes:

- 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 mode 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]	Operating mode of the IO-Link port	[Disabled]	Port deactivated
		[DI]	Operation as digital input
		[DO]	Operation as digital output
		[IO-Link]	Operation as IO-Link interface
[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.

### 8.1.7 IO-Link ports: Set the device validation and data storage

17945

In the operating mode "IO-Link" the user can set the behaviour of the IO-Link port with regard to device validation and the storage / restoration of the parameter data of the connected IO-Link device.

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 behaviour of the device during connection of a new IO-Link device on port x (x = 1...8)	[No check and clear]	<ul style="list-style-type: none"> <li>▪ No verification of the vendor ID and device ID</li> <li>▪ No data storage</li> </ul>
		[Type compatible V1.0 device]	<ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.0 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ No data storage</li> </ul>
		[Type compatible V1.1 device]	<ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ No data storage</li> </ul>
		[Type compatible V1.1 device with Backup + Restore]	<ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ The IO-Link master saves the parameter values of the connected IO-Link device; modifications of the parameter values are also saved (observe the note!)</li> <li>▪ 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.</li> </ul>
		[Type compatible V1.1 device with Restore]	<ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ The IO-Link master saves the parameter values of the connected IO-Link device once.</li> <li>▪ 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.</li> </ul>
[Vendor ID]	ID of the manufacturer that is to be validated	0 ... 65535	Factory setting: 0 ifm electronic: 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.

### 8.1.8 Firmware: Reset device to factory settings

7209

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.

### 8.1.9 Firmware: Reboot the device

18105

When rebooting the device, all settings are kept.

To restart the AL1103:

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

## 8.1.10 Configure IO-Link devices

11033

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

### Requirements:

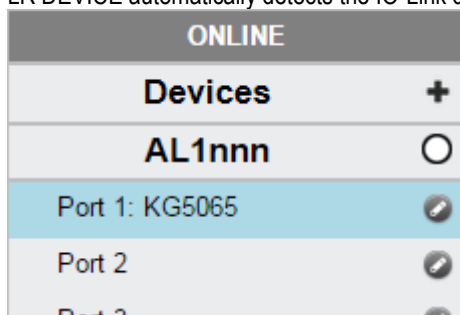
- > IO-Link master is correctly installed and connected to the LR DEVICE parameter setting software.
- > The IO-Link device is correctly connected to the AL1103.
- > Operating mode of the IO-Link port is "IO-Link" (→ **IO-Link ports: Configure operating mode** (→ p. 27)).
- > IoT has write access rights to the IO-Link master (→ **IoT: Configure access rights** (→ p. 24)).

### 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. ifm 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) of the IO-Link device

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

## 8.2 PROFINET

### Contents

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22758

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!

## 8.2.1 Install GSD file

22410

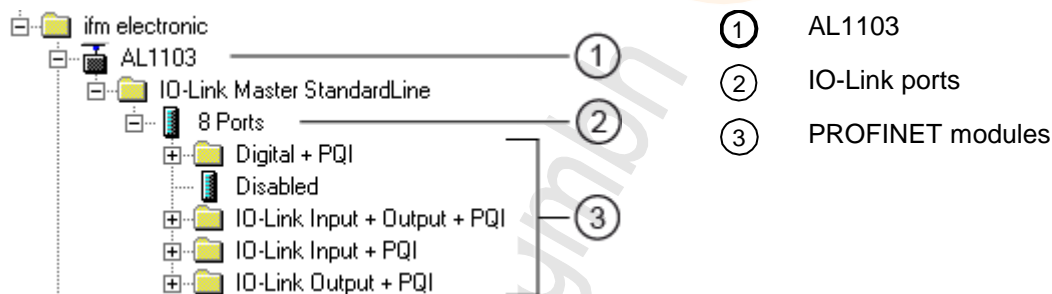
To represent the AL1103 in a field bus projection software (e.g. STEP 7), ifm provides a GSD file. The user can download the GSD file from the ifm website (→ [www.ifm.com](http://www.ifm.com)). In the GSD file, all parameters, process data, and their valid value ranges are defined.

To add the AL1103 to the STEP 7 hardware catalogue:

- ▶ Download GSD file of the AL1103 from the ifm website.
- ▶ Start STEP 7 application "HW Config".
- ▶ Select [Options] > [Install GSD files...].
- > The [Install GSD files] window appears.
- ▶ Click on [Browse ...].
- ▶ Select the GSD file of the AL1103 and click on [OK] to adopt the file.
- > The selected GSD file appears in the list.
- ▶ Select the GSD file in the list and click on [Install].
- > STEP 7 installs the GSD file and adds the IO-Link master to the hardware catalogue.

After installation of the GSD file, the AL1103 is in the hardware catalogue in the following folder:

- > [PROFINET IO] > [Additional Field Devices] > [IO] > [ifm electronic]





## 8.2.2 Add the IO-Link master to the PROFINET network

22406

The configuration of the PROFINET parameters is done via the PROFINET projection software. The PROFINET parameters define which data is transmitted between AL1103 and the higher-level PROFINET controller.

### Requirements:

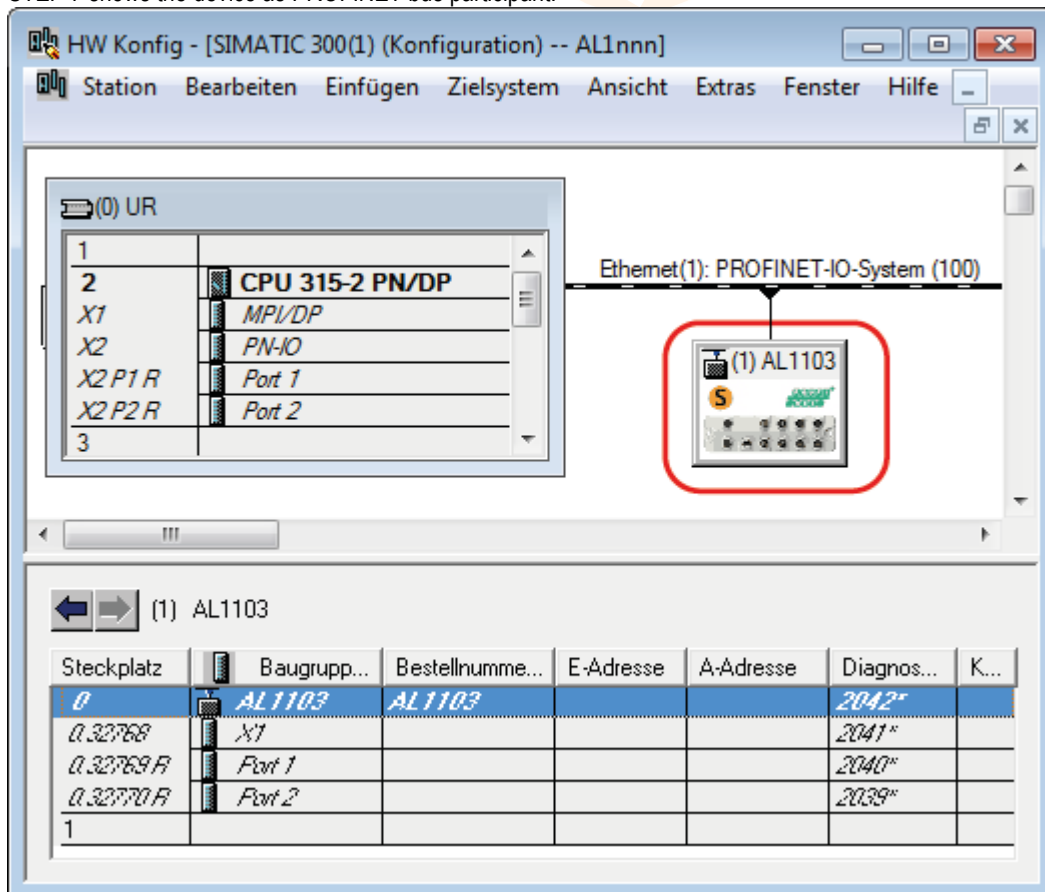
- > PROFINET has read and write permission on the AL1103 (→ **IoT: Configure access rights** (→ p. 24))
- > The GSD file of the AL1103 is installed (→ **Install GSD file** (→ p. 32))

### 1 Create/open project

- ▶ Create new PROFINET project.  
OR  
Open an existing PROFINET project.
- ▶ Configure PROFINET connection.

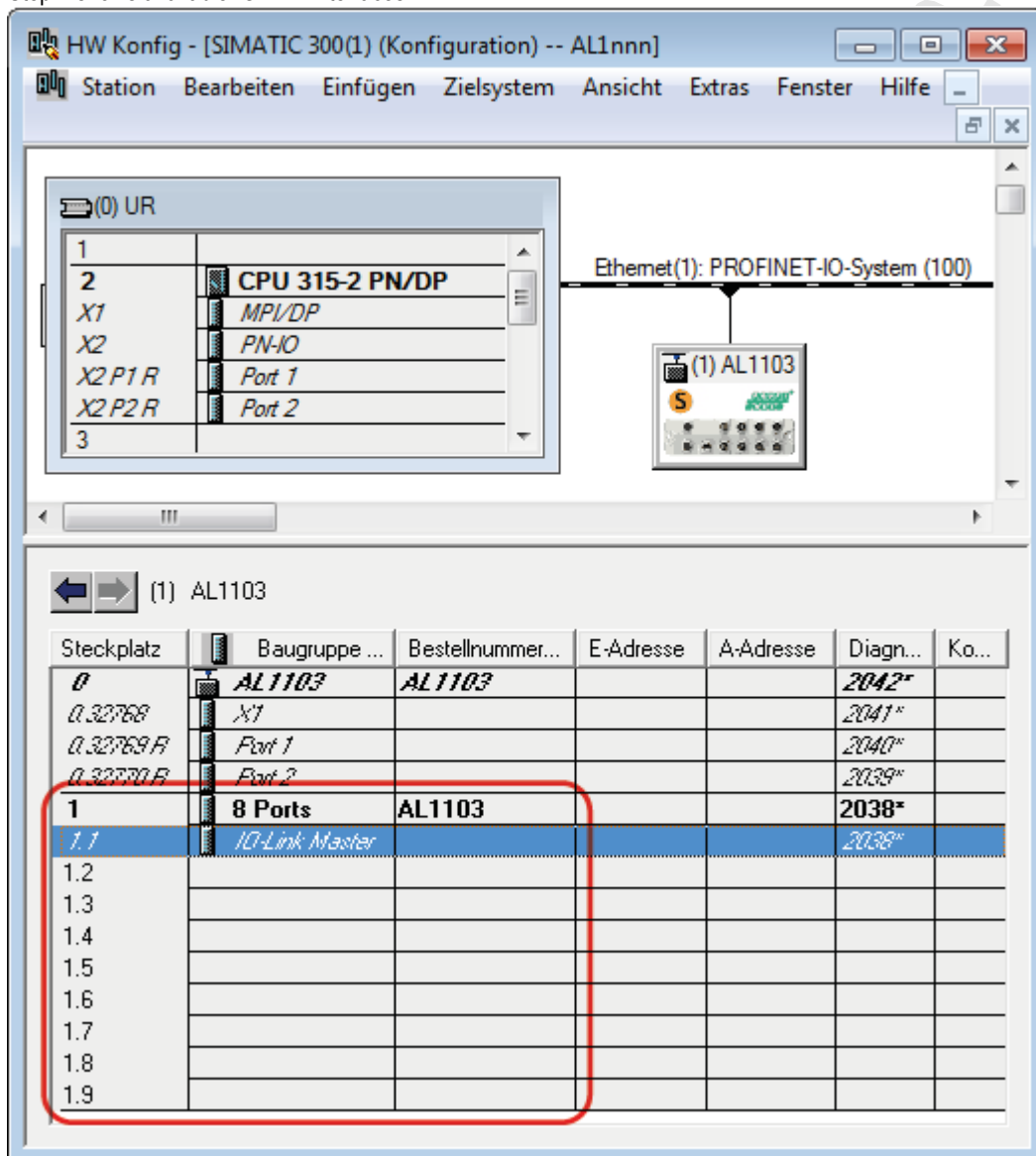
### 2 Add the IO-Link master to project

- ▶ Open STEP-7 application "HW Config".
- > Program window shows the hardware structure of the project.
- ▶ Open hardware catalogue.
- ▶ Move the [AL1103] node via drag&drop from the hardware catalogue to the PROFINET connection.
- > STEP 7 shows the device as PROFINET bus participant.



### 3 Add IO-Link ports

- ▶ Move the [8 Ports] node via drag&drop from the hardware catalogue to slot 1 of the AL1103.
- > Step 7 shows available IO-Link interfaces.



- ▶ Save the project.

## 8.2.3 Configure access rights

22760

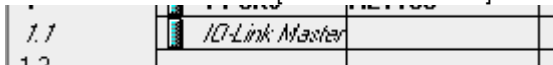
In order to configure the access rights to the device:

### 1 Open device editor

- ▶ Open STEP-7 application "HW Config".
- > Program window shows the hardware structure of the project.
- ▶ Click on IO-Link master.
- > The device editor shows the current configuration of the IO-Link master.

### 2 Configure access rights

- ▶ Double click on the slot line [1.1 IO-Link Master]



1.1	IO-Link Master
1.2	

- > The window [Properties IO-Link master] appears.
- ▶ Select [Parameters] tab.
- ▶ Set the following parameter as required: [Access Rights] (→ **Parameter of the IO-Link master** (→ p. 53))
- ▶ Click on [Add] to save the changes.



If parameter [Access Rights] = PROFINET + IoT:

Different parameter settings in the PROFINET projection software and the LR DEVICE may cause undesired system behaviour. Parameter settings applied by the PROFINET projection software always overrule the settings applied by LR DEVICE.



Changes of the parameter [Access Rights] are only effective after restarting the device (→ **Firmware: Reboot the device** (→ p. 29))

## 8.2.4 Configure IO-Link ports

17306

In STEP 7, the following assignment of the PROFINET slots to the IO-Link ports of the device applies:

Slot	Subslot	IO Link port of AL1103
1	2	X01
	3	X02
	...	...
	9	X08

Each sub-slot can be configured for cyclic transmission of process data with a PROFINET module. The selected PROFINET module determines the operation type of the IO-link interface and the configurable parameters.

Overview of the available PROFINET modules: → **PROFINET modules** (→ p. [56](#))

To add a PROFINET module to a sub-slot:

### 1 Open device editor

- ▶ In "HW Config": Click on IO-Link master.
- > The device editor shows the current configuration of the IO-Link master.

### 2 Add PROFINET module

- ▶ Open hardware catalogue.
- ▶ Drag and drop the required PROFINET module of the IO-Link master from the hardware catalogue to the slot.
- > The device editor shows the slot with the selected PROFINET module.

### 3 Set parameters of the PROFINET module

- ▶ Double click on the added slot.
- > Window [Properties] appears.
- ▶ Select [Parameters] tab.
- > The page shows the current parameter settings of the IO-Link ports.
- ▶ Set the parameters as required (marked with X in table):

Operating mode of the IO-Link ports	Available parameters						
	Fail Safe Mode	Pattern Value	Validation / Data storage	Vendor ID (VID)	Device ID	Port cycle time	IO-Link Events
DI: Digital input	--	--	--	--	--	--	X
DO: Digital output	X	--	--	--	--	--	X
IO-Link: Input	--	--	X	X	X	X	X
IO-Link: Output	X	X	X	X	X	X	X
IO-Link: Input and output	X	X	X	X	X	X	X



Further information about the parameters of the PROFINET modules: → **Parameters of the IO-Link ports** (→ p. [54](#))

- ▶ Click on [OK] to save the changes.
- > Changed settings are applied.

## 8.2.5 Configure the PROFINET port

22761

In order to configure the Ethernet interface of the AL1103:

### Prerequisites

- > AL1103 is correctly integrated in the PROFINET project (→ **Add the IO-Link master to the PROFINET network** (→ p. 33)).

### 1 Open object characteristics

- ▶ Start the application "HW Config"
- ▶ Click on AL1103.
- ▶ Select [Target System] > [Ethernet ...] > [Edit Ethernet Users].
- > [Edit Ethernet Users] window appears.

### 2 Search AL1103

- ▶ Click on [Browse ...] button.
- > [Browse Network] window appears.
- ▶ Click on [Start] button.
- > STEP 7 browses the PROFINET network for devices.
- > List shows found devices.
- ▶ Select AL1103 in list and click [OK] to adopt the device.
- > The [MAC address] shows the MAC address of the AL1103

### 3 Set IP address and network mask

- ▶ Click on the [Use IP parameters] selection field in group [Set IP configuration].
- ▶ Enter the required IP address in the [IP address] field.
- ▶ Enter the required subnet mask in the [Subnet mask] field.

### 4 Assign device names

- ▶ Enter the required PROFINET name in the [Device name] field.
- ▶ Click on the [Assign Name] button.
- > STEP 7 assigns the selected name to the AL1103.
- ▶ Click on the [Close] button to close the window.

## 8.2.6 Configure IO-Link devices

18428

The AL1103 supports the configuration of the connected IO-Link devices out of the PROFINET projection software. The configurable parameters depend on the corresponding IO-Link device. Information about the usable functions: → **PROFINET: Programmers' notes** (→ p. 39)



Available parameters of the IO-Link devices: → Operating instructions of the IO-Link device

## 8.2.7 Read and write data cyclically

17372



- ▶ To check the validity of the cyclic process data, evaluate the PQI byte (→ **Mapping: IO-Link port information**).

Even with an interruption of the fieldbus connection the PQI byte indicates that the process data is valid. This can have unintended impact on the control process.

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

## 8.2.8 PROFINET: Read & write device information

22783

I&M0 provide the user with device-specific basic information. This ensures reliable identification of the device, the device's hardware and software components, and 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 via the following functions:



Information about the usable function blocks: → **PROFINET: Programmers' notes** (→ p. [39](#))

Further information about the I&M datasets: → **I&M datasets** (→ p. [58](#))

## 8.2.9 PROFINET: Programmers' notes

12761

The programmer can access on the following data from the PLC application:

- Read device information of the AL1103
- Read diagnostics and alarms
- Set parameters of the connected IO-Link devices

The following sections show the available options.



Further information about the functional/operational blocks: → Help function of the PROFINET projection software

### Read and write I&M datasets

2261

Symbol / function block	Meaning	Remarks
GET_IM_DATA / FB	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"> <li>▪ IM_TYPE = 0</li> </ul>
RDREC	Function block for acyclic reading of datasets	Input parameters: <ul style="list-style-type: none"> <li>▪ I&amp;M0: Index = 0xAFF0</li> <li>▪ I&amp;M1: Index = 0xAFF1</li> <li>▪ I&amp;M2: Index = 0xAFF2</li> <li>▪ I&amp;M3: Index = 0xAFF3</li> </ul>
WRREC	Function block for acyclic writing of datasets Observe access rights on datasets!	Input parameters: <ul style="list-style-type: none"> <li>▪ I&amp;M1: Index = 0xAFF1</li> <li>▪ I&amp;M2: Index = 0xAFF2</li> <li>▪ I&amp;M3: Index = 0xAFF3</li> </ul>

### Detect diagnostics and alarms

2272

Symbol / operational block	Meaning	Remarks
I/O_FLT1 / OB82	Diagnostic alarms	
I/O_FLT2 / OB83	Pull/plug in alarms	
RACK_FLT / OB86	Module rack failure	



Available alarms and diagnostic messages: → **Diagnostic and alarms** (→ p. [60](#))

## Configure IO-Link devices

1860

Symbol / function block	Description	Remarks
IO_LINK_DEVICE / FB5001	Acyclic access to the parameters of an IO-Link device	Input parameters: <ul style="list-style-type: none"> <li>▪ CAP: Access point for function AL1103: 0xB400</li> <li>▪ PORT: HW-ID: Slot/sub-slot of the IO-Link port with connected IO-Link device                          Port X01: 1                          Port X02: 2                          ...                          Port X08: 8</li> <li>▪ IOL_INDEX and IOL_SUBINDEX: depends on the IO-Link device (→ operating instructions of the IO-Link device)</li> </ul>
IOL_CALL / FB1	Acyclic access to the parameters of an IO-Link devices (obsolete)	→ IO_LINK_DEVICE



## 9 Operation

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22368

### 9.1 Identify device

22816

In the online mode, the user can identify the device using the status LEDs RDY, BF and SF

- ▶ Start LR DEVICE.
- ▶ Scan network for devices.
- > LR DEVICE detects the device.
- ▶ Click on the selection field next to the device name.



- > The status LEDs on the unit flash asynchronously.

## 9.2 Web interface: Read device and diagnostic information

12744

In order to read the diagnostic information about the current device status via the web interface:

- ▶ Connect laptop/PC and AL1103 via the Ethernet internet.
- ▶ Start web browser.
- ▶ Enter the IP address of the AL1103 into the address field of the browser and press [ENTER] to confirm.
- > Web browser shows the web interface of the device.
- > The page shows the following data:
  - Table with connected IO-Link devices

Name	Description
[Port]	Number of the IO-Link interface
[Mode]	Operating mode of the IO-Link interface
[Comm. Mode]	Baud rate of the IO-Link interface
[MasterCycleTime]	Cycle time
[Vendor ID]	ID of the manufacturer of the IO-Link device
[Device ID]	ID of the IO-Link device
[Name]	Article number of the IO-Link device <ul style="list-style-type: none"> <li>▪ For ifm articles: This article number is stored along with a link to the produkt page on the ifm website.</li> </ul>
[Serial]	Serial number of the IO-Link device
[LR Mode / Interval]	Cycle time for the communication with the SmartObserver

- Diagnostic information of the device

Name	Description
[SW-Version]	
[Current]	Current (in mA)
[Voltage]	Voltage (in mV)
[Short Circuit]	Number of detected short circuits
[Overload]	Number of detected overloads
[Undervoltage]	Number of detected under voltages
[Temperature]	Device temperature (in °C)

- Version information of the installed firmware components

Name	Description
[Firmware]	Firmware version
[Container]	Version of the firmware container
[Bootloader Version]	Version of the boot loader
[Fieldbus Firmware]	Version of the PROFINET firmware

## 9.3 Firmware update

22425

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



If the firmware update is not successful, deactivate all connections to the PROFINET PLC, LR SMARTOBSERVER and LR DEVICE and repeat the process.

- ▶ Close connection to PROFINET PLC.
- ▶ Set the parameter [IP address SmartObserver] to 255.255.255.255 or 0.0.0.0 (→ **IoT: Configure the interface to the LR SMARTOBSERVER** (→ p. 25)).
- ▶ Stop the LRAgent.LRDevice service in the Windows task manager.

After the firmware update check the settings of the LR SMARTOBSERVER interface!

To install a new firmware version on the device:

### Requirements

- > File with new firmware has been downloaded.
- > 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 press [ENTER] to confirm:  
`https://<IP address of the device>/web/update`
- > Web browser shows the [Firmware Update] page.

### 2 Load new firmware to AL1103

- ▶ Click on [Select file].
- > Dialogue window appears.
- ▶ Select the firmware file 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 Restart the device

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

## 9.4 Replace IO-Link device

7775

To replace an IO-Link device:

**Requirement:**

- > IO-Link device is with factory settings.
- > IO-Link device supports IO-Link standard 1.1 or higher.

**1 Set data storage**

- ▶ Set the following parameters of the IO-Link port:  
Validation and Data Storage = [Type compatible V1.1 device with Restore]
- ▶ Save changes.

**2 Replace IO-Link device**

- ▶ Disconnect old IO-Link device from IO-Link master.
- ▶ Connect new IO-Link device with the same IO-Link port of the AL1103.
- > IO-Link master copies parameter values from the data memory to the new IO-Link device.

## 10 Maintenance

21577

The operation of the unit is maintenance-free.

- ▶ Clean the surface of the unit when necessary. Do not use any caustic cleaning agents for this!
- ▶ After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.



## 11 Factory settings

22671

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

Parameters	Factory setting
[IP address]	0.0.0.0
[Subnet mask]	0.0.0.0
[IP gateway address]	0.0.0.0
[PROFINET name]	blank
Data Storage	empty

## 12 Accessories

17853

List of accessories of AL1103: → [www.ifm.com](http://www.ifm.com) > Product page > Accessories



# 13 Appendix

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7156



## 13.1 Technical data

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9011

### 13.1.1 Application

23710

Application	
Application	Hygienic systems; I/O modules for field applications
Daisy-chain function	Fieldbus interface

### 13.1.2 Electrical data

22819

Electrical data	
Operating voltage [V]	20...28 DC; (US; to SELV/PELV)
Current Consumption [mA]	300...3900; (US)
Protection class	III
Sensor supply US	
Max. current load total [A]	3.6

### 13.1.3 Inputs / outputs

23711

Inputs / outputs	
Total number of inputs and outputs	16; (configurable)

## 13.1.4 Inputs

22820

Inputs	
Number of digital inputs	16; (IO-Link Port Class A: 8 x 2)
Switching level high [V]	11...28 DC
Switching level low [V]	0...5 DC
Digital inputs protected against short circuits	yes

## 13.1.5 Outputs

22821

Outputs (digital)	
Output function	8; (IO-Link Port Class A: 8 x 1)
Max. current load per output [mA]	200
Short-circuit protection	yes

## 13.1.6 Interfaces

22630

Interfaces	
Communication interface	Ethernet; IO-Link
Communication interface	IO-Link; TCP/IP; PROFINET IO
<b>Ethernet</b>	
Transmission standard	10Base-T; 100Base-TX
Transmission rate	10; 100
Protocol	TCP/IP; PROFINET IO
Factory settings	<ul style="list-style-type: none"> <li>▪ IP address: 0.0.0.0</li> <li>▪ Subnet mask: 0.0.0.0</li> <li>▪ Gateway IP address: 0.0.0.0</li> <li>▪ MAC address: see type label</li> </ul>
<b>IO-Link Master</b>	
Transmission type	COM 1 / COM 2 / COM 3
IO-Link revision	V1.1
Number of ports class A	8

### 13.1.7 Operating conditions

22823

Operating conditions	
Applications	Indoor use
Ambient temperature [°C]	-25...60
Storage temperature [°C]	-25...85
Max. perm. relative air humidity [%]	90
Max. height above sea level [m]	2000
Protection rating	IP 65; IP 66; IP 67; IP 69K; (operation with stainless steel protective caps: IP 69K)
Pollution Degree	2

### 13.1.8 Approvals / tests

22824

Approval / tests	
EMC	<ul style="list-style-type: none"> <li>▪ EN 61000-6-2</li> <li>▪ EN 61000-6-4</li> </ul>
MTTF [Years]	90

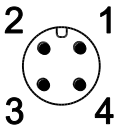
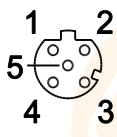
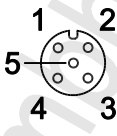
### 13.1.9 Mechanical data

22825

Mechanical data	
Weight [g]	385
Materials	Housing: PA grey; socket: stainless steel (1.4404 / 316L)

### 13.1.10 Electrical connection

17850

Voltage supply IN X31											
Plug and socket connection	M12										
Wiring	 <table style="display: inline-table; vertical-align: middle;"> <tr> <td>1:</td> <td>+ 24 V DC (US)</td> </tr> <tr> <td>2:</td> <td>-</td> </tr> <tr> <td>3:</td> <td>GND (US)</td> </tr> <tr> <td>4:</td> <td>-</td> </tr> </table>	1:	+ 24 V DC (US)	2:	-	3:	GND (US)	4:	-		
1:	+ 24 V DC (US)										
2:	-										
3:	GND (US)										
4:	-										
Ethernet IN / OUT X21, X22											
Plug and socket connection	M12										
Wiring	 <table style="display: inline-table; vertical-align: middle;"> <tr> <td>1:</td> <td>TX +</td> </tr> <tr> <td>2:</td> <td>RX +</td> </tr> <tr> <td>3:</td> <td>TX -</td> </tr> <tr> <td>4:</td> <td>RX -</td> </tr> <tr> <td>5:</td> <td>-</td> </tr> </table>	1:	TX +	2:	RX +	3:	TX -	4:	RX -	5:	-
1:	TX +										
2:	RX +										
3:	TX -										
4:	RX -										
5:	-										
Process connection IO-Link ports Class A X01...X08											
Plug and socket connection	M12										
Wiring	 <table style="display: inline-table; vertical-align: middle;"> <tr> <td>1:</td> <td>+ 24 V DC (US)</td> </tr> <tr> <td>2:</td> <td>DI</td> </tr> <tr> <td>3:</td> <td>GND (US)</td> </tr> <tr> <td>4:</td> <td>C/Q IO-Link</td> </tr> <tr> <td>5:</td> <td>-</td> </tr> </table>	1:	+ 24 V DC (US)	2:	DI	3:	GND (US)	4:	C/Q IO-Link	5:	-
1:	+ 24 V DC (US)										
2:	DI										
3:	GND (US)										
4:	C/Q IO-Link										
5:	-										

## 13.2 PROFINET

### Contents

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### 13.2.1 Parameter data

22786

Slot	Sub-slot	Name	Description
1	1	Master	Parameter data of the IO-Link master (→ <b>Parameter of the IO-Link master</b> (→ p. 53))
	2	Port X01	<ul style="list-style-type: none"> <li>Parameter data of the IO-Link ports (→ <b>Parameters of the IO-Link ports</b> (→ p. 54))</li> <li>Fieldbus modules (→ <b>PROFINET modules</b> (→ p. 56))</li> </ul>
	3	Port X02	
	4	Port X03	
	5	Port X04	

#### Parameter of the IO-Link master

22788

Parameter	Description	Possible values	
[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 + LineRecorder	<ul style="list-style-type: none"> <li>PROFINET and LR DEVICE have read and write access rights to parameters and process data</li> <li>PROFINET and LR DEVICE have read access rights to events/alarms</li> </ul>
		PROFINET + LineRecorder (ro)	<ul style="list-style-type: none"> <li>PROFINET has read and write access rights to parameters and process data</li> <li>PROFINET has read access rights to events/alarms</li> <li>LR DEVICE only has read access rights to parameters, process data and events/alarms</li> </ul>
		PROFINET only	<ul style="list-style-type: none"> <li>PROFINET has read and write access rights to parameters and process data</li> <li>PROFINET has read access rights to events/alarms</li> <li>LR DEVICE has no access rights (parameters, process data, events/alarms, web interface, firmware update)</li> </ul>
		keep setting	keeps settings

## Parameters of the IO-Link ports

22787

Parameter	Description	Possible values	
[Fail-safe mode]	Behaviour in case the PROFINET connection is interrupted	No Fail Safe	deactivated
		Fail Safe Reset Value	reset to default values
		Fail Safe Old Value	maintain the most recent valid process value
		Fail Safe with Pattern	set user-defined values
[Pattern Value]*	<ul style="list-style-type: none"> <li>required values for the process data in case the connection is interrupted (as hexadecimal value)</li> <li>Pattern depends on the size of the selected PROFINET module</li> </ul>	Per byte: 0x00 ... 0xFF	
[Port cycle time]	Cycle time of the data transmission at the IO-Link port	as fast as possible	The device automatically sets the fastest possible cycle time
		2.0 ms ... 128.0 ms	2 milliseconds ... 128 milliseconds
[Validation / Data Storage]	Supported IO-Link standard and behaviour of the AL1103 when a new IO-Link device is connected to the IO-Link port	no check and clear	<ul style="list-style-type: none"> <li>no verification of the vendor ID and device ID</li> <li>no data storage</li> </ul>
		Type compatible V1.0 device	<ul style="list-style-type: none"> <li>IO-Link device is compatible with the V1.0 IO-Link standard</li> <li>Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>no data storage</li> </ul>
		Type compatible V1.1 device	<ul style="list-style-type: none"> <li>IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>no data storage</li> </ul>
		Type compatible V1.1 device with Backup + Restore	<ul style="list-style-type: none"> <li>IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>The IO-Link master saves the parameter values of the connected IO-Link device; modifications of the parameter values are also stored (→ observe the note!)</li> <li>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.</li> </ul>

Parameter	Description	Possible values	
		Type compatible V1.1 device with Restore	<ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ The IO-Link master stores the parameter values of the connected IO-Link device once if the data memory of the AL1103 is empty.</li> <li>▪ 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.</li> </ul>
[Vendor ID (VID)]	ID of the manufacturer that is to be validated	0 ... 65535	ID of the manufacturer of the IO-Link device (ifm electronic: 310)
[Device ID]	ID of the IO-Link device that is to be validated	0 ... 16777215	ID of the IO-Link device
[IO-Link Events]	Enable / disable the transmission of IO-Link events	Disabled	IO-Link won't be transmitted
		Enabled	IO-Link events will be transmitted

\* ... settings are only valid if [Fail Safe Mode] = Fail Safe with Pattern



If the parameter values of an IO-Link device are changed with IO\_LINK\_DEVICE, the backup mechanism remains ineffective. The changed parameter values are not stored on the IO-Link master.

## 13.2.2 Cyclic data

### Contents

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22429

### PROFINET modules

22685

Module	Description	
IO-Link 32I/32O + PQI	IO-Link activated	32 bytes input and output data and PQI
IO-Link 16I/16O + PQI		16 bytes input and output data and PQI
IO-Link 8I/8O + PQI		8 bytes input and output data and PQI
IO-Link 4I/4O + PQI		4 bytes input and output data and PQI
IO-Link 2I/ 2O + PQI		2 bytes input and output data and PQI
IO-Link 1I/1O + PQI		1 byte input and output data and PQI
IO-Link 1I/15O + PQI		1 byte input and 15 bytes output data and PQI
IO-Link 32I + PQI		32 bytes input data and PQI
IO-Link 16I + PQI		16 bytes input data and PQI
IO-Link 8I + PQI		8 bytes input data and PQI
IO-Link 4I + PQI		4 bytes input data and PQI
IO-Link 2I + PQI		2 bytes input data and PQI
IO-Link 1I + PQI		1 bytes input data and PQI
IO-Link 32O + PQI		32 bytes output data and PQI
IO-Link 16O + PQI		16 bytes output data and PQI
IO-Link 8O + PQI		8 bytes output data and PQI
IO-Link 4O + PQI		4 bytes output data and PQI
IO-Link 2O + PQI		2 bytes output data and PQI
IO-Link 1O + PQI		1 bytes output data and PQI
DI + PQI		IO-Link deactivated
DO + PQI	Digital output and PQI	
Disabled	deactivated	



## PQI (Port Qualifier Information)

22686

Port Qualifier Information (PQI) contains diagnostic information about the IO-Link port. In addition to the process data, the IO-Link master sends the PQI to the PROFINET controller.

Bit							
7	6	5	4	3	2	1	0
PQ	DE	DA	--	--	--	DI2	DI4

Legend:

- [DI4] Signal status of the digital input on pin 4 (DI)
 

FALSE	OFF
TRUE	ON
- [DI2] Signal status of the digital input on pin 2 (if used)
 

FALSE	OFF
TRUE	ON
- [DA] Device Available: shows if the IO-Link device has been recognised and if the device is in the "preoperate" or in the "operate" state
 

FALSE	no device
TRUE	device detected
- [DE] Device Error: shows if an error or a warning occurred; Note: The user needs to determine the cause of the fault separately via acyclic services.
 

FALSE	no error
TRUE	error detected
- [PQ] Port Qualifier: shows if IO data is valid
 

FALSE	invalid
TRUE	valid

### 13.2.3 Acyclic data

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#### I&M datasets

22778

The AL1103 supports the following I&M datasets (I&M = Identification & Maintenance):

#### I&M0 (Slot 0)

22779

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)

22765

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)

22780

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)**

22781

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)**

22782

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

22784

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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