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

AL1323

IO-Link: 1.1.2
ifm firmware: 2.0.35 or higher
LR DEVICE: 1.2.0.107 or higher

English

7391159/00 12/2017

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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

22044

This document is only for device types "IO-Link master - EtherNet/IP gateway (DataLine) 8 port IP 65 / IP 66 / IP 67 / IP 69K" (art. no.: AL1323).

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

13839

► ... Instructions

> ... Reaction, result

→ ... Cross-reference or internet link

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	12/2017

2 Safety instructions

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2.1 General

22068

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 Warnings used

13685

⚠ 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 may result in malfunction or interference.

Information
Supplementary note.

2.4 Safety symbols on the device

15021

General warning
When this symbol is shown, consult the corresponding section in the operating instructions.

2.5 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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18761

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. 63))!

4 Function

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7482

4.1 Communication, parameter setting, evaluation

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7485

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)

4.1.2 EtherNet/IP

2259

The device offers the following EtherNet/IP functions:

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

4.1.3 Internet of Things (IoT)

8355

The device has an Ethernet port (X23) for Internet-of-Things applications. The interface allows separate access from IT networks to parameters, process and monitoring data of the IO-Link master and the connected IO-Link devices. Different protocols (e.g. TCP/IP JSON) are supported.

4.1.4 Parameter setting

7284

The device provides the following configuration options:

- Parameter setting of the IO-Link master of the AL1323 with LR DEVICE parameter setting software, EtherNet/IP projection software or ifm IoT-Core services.
- Parameter setting of the connected IO-Link devices (sensors, actuators) with LR DEVICE parameter setting software, EtherNet/IP projection software or ifm IoT-Core services
- Storage of parameter sets of the connected IO-Link devices for automatic recovery (data storage)

4.1.5 Visual indication

7772

The device has the following visual indicators:

- Status and error indication of the gateway, of the EtherNet/IP 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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5.1 Mount the device

15540

- ► 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. 17))!

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 installation environments apply a cable relief to avoid invalid load of the mounting points and the M12 connectors.

► Ensure a proper fit and correct installation of the M12 connectors. If disregarded the desired protection rating can not be guaranteed.

Wiring: → **Technical data** (→ p. 63)

The communication interfaces are seperated 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/IP ports

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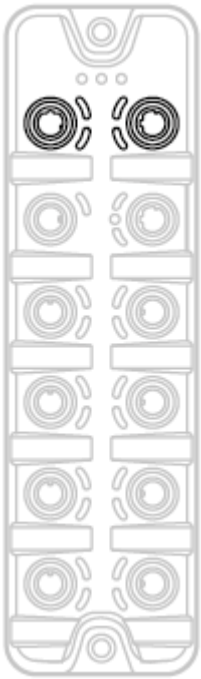
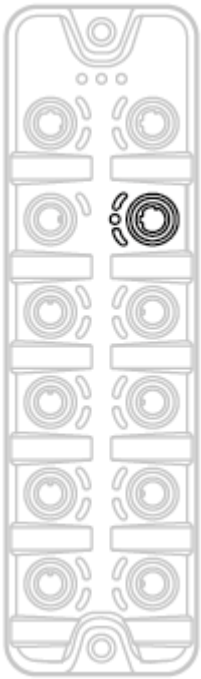


- ► Connect the device via the M12 socket X21 and/or X22 to the EtherNet/IP network
  (e.g. EtherNet/IP PLC, additional EtherNet/IP device)
  - Tightening torque: 0.6...0.8 Nm
- ► To connect the devices, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 / IP 69K or higher (→ **Accessories** (→ p. 61)).
- ► Cover the unused sockets with M12 protective caps (→ **Accessories** (→ p. 61)).
  - Tightening torque 0.6...0.8 Nm

6.3 IoT port

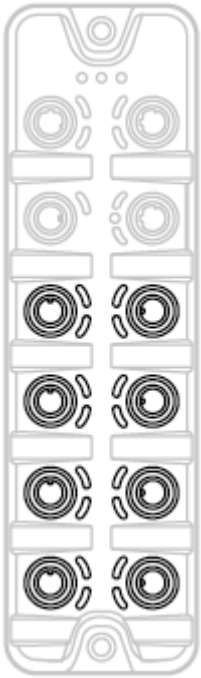
11029



- ► Connect the device via the M12 socket X23 to the IT network (e.g. laptop/PC with installed LR DEVICE parameter setting software, laptop/PC with installed LR SMARTOBSERVER monitoring software)
  - Tightening torque: 0.6...0.8 Nm
- ► To connect the devices, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 / IP 69K or higher (→ **Accessories** (→ p. 61)).
- ► Cover the unused sockets with M12 protective caps (→ **Accessories** (→ p. 61)
  - Tightening torque 0.6...0.8 Nm

6.4 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).

► Cover the unused sockets with M12 protective caps (→ Accessories).
- Tightening torque 0.6...0.8 Nm

6.4.1 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.

6.4.2 IO-Link circuits

1863

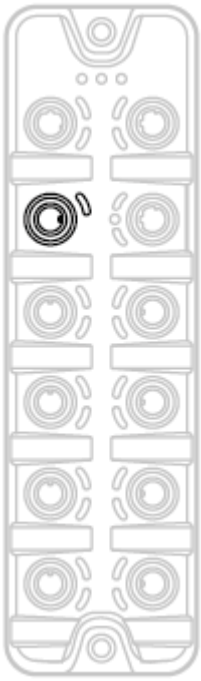
The IO-Link ports of the device meet the requirements of the IO-Link specification 1.0 bis 1.1.2.

The power supply of the connected IO-Link devices may only take place via the AL1323.

Further information: → **Technical data** (→ p. 63)

6.5 Connect the device

17542



- ► Disconnect power.
- ► Connect the device via M12 socket X31 to 24 V DC (20...28 V SELV/PELV; for cULus: max. 24 V DC; 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).

7 Operating and display elements

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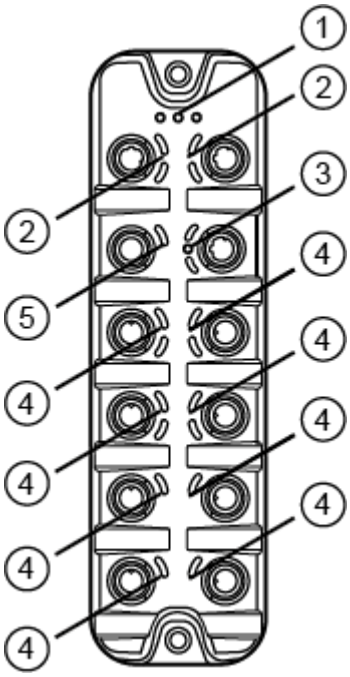
5440

7.1 Overview

17857



1. RDY, NET and MOD status LEDs
   → **Status LEDs** (→ p. 20)
2. LNK and ACT status LEDs of the EtherNet/IP interfaces 1 (X21) and 2 (X22)
   → **Ethernet interface** (→ p. 20)
3. LNK, ACT status-LEDs and IoT LED of the IoT interface (X23)
   → **IoT port** (→ p. 21)
4. IOL and DI status-LEDs of the IO-Link port (X01...X08)
   → **IO-Link ports (Class A)** (→ p. 21)
5. PWR status LED of the voltage supply (X31)
   → **Voltage supply** (→ p. 21)

7.2 LED indicators

22024

The device only has the following LED indicators:

7.2.1 Status LEDs

7707

The RDY LED indicates the status of the gateway.
The NET LED (Network Status) indicates the status of the network.
The MOD LED (Module Status) indicates the status of the EtherNet/IP module.

Status LED			Description
RDY	green	on	Gateway functions properly
		flashes 1 Hz	Error
		flashes 5 Hz	Firmware update
		off	Gateway does not function; Device reboots
NET	green	on	Connection with the EtherNet/IP PLC
		off	No IP address
	red	on	IP address is used twice
		flashes	No connection with the EtherNet/IP PLC
MOD	green	on	No error
		off	Voltage too low
	red	on	Module failed
		flashes	Configuration of the module has been changed

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 IoT port

7722

The IoT port (X23) has the 3 LNK, ACT and IoT LEDs. The LEDs indicate the status of the Ethernet connection and the device identification.

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
IoT	green	flashes	Device identification active

7.2.4 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 Us is applied.
		off	No supply voltage is applied or the applied supply voltage is too low.

7.2.5 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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22822

On delivery, the AL1323 is configured with the factory settings (→ **Factory settings** (→ p. 60)).

Required software: LR DEVICE (1.2.0.107) (art.-No.: QA0011/QA0012)

8.1.1 Remarks

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Offline parameter setting

22405

The AL1323 supports the offline parameter setting. In this context, the user creates and stores a configuration for the unit and the connected IO-Link devices without being connected to the AL1323. The configuration created in this way can be stored as a file (*.lrp) and loaded to the device and activated at a later date.

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

VPN connection

22762

An active VPN connection blocks the access of the parameter setting software LR DEVICE to the EtherNet/IP interface of the AL1323.

► Deactivate the VPN connection in order to be able to access the AL1323 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	[EtherNet/IP + IoT]	▪ EtherNet/IP and IoT Core have read and write access rights to parameters and process data ▪ EtherNet/IP and <IoT Core> have read access rights to events/alarms
		[EtherNet/IP + IoT (read-only)]	▪ EtherNet/IP has read and write access rights to parameters and process data ▪ EtherNet/IP has read access rights to events/alarms ▪ IoT Core only has read access rights to parameters, process data and events/alarms
		[IoT only]	▪ IoT Core has read and write access rights to parameters and process data ▪ IoT has read access rights to events/alarms ▪ EtherNet/IP has no access rights

► Save changed values on the device.

If the parameter [Access Rights] = [EtherNet/IP + IoT]:
Different parameter settings in the EtherNet/IP projection software and the IoT applications can result in undesired system behaviour. The set values of the EtherNet/IP 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. 31)

8.1.3 IoT: Configure IP settings

17713

For access to the IO-Link master via the IT infrastructure the user has to set the IP settings of the IoT port.

To configure the IP settings with DHCP, a DHCP server has to be active in the IT network. If no DHCP server can be reached in the IT network, an IP address is automatically assigned to the IoT port with the Zeroconfig protocol (address range: → Factory settings).

To configure the IP settings of the IoT port:

► Select [IoT] menu.

> The menu page shows the current settings.

► Set the following parameters as required:

Name	Description	Possible values	
[DHCP]	Activate/deactivate the DHCP client of the device	[Static IP]	IP settings were set by the user
		[DHCP]	IP settings are set by a DHCP server in the network.
[IP address]*	IP address of the IoT port	Factory setting: 169.254.X.X	
[Subnet mask]*	Subnet mask of the Ethernet network	Factory setting: 255.255.0.0	
[Default gateway IP address]*	IP address of the network gateway	Factory setting: 0.0.0.0	
[MAC address]	MAC address of the IoT port	The value is firmly set.	

* ... can only be edited if parameter [DHCP] = [Static IP]

► Save changed values on the device.

8.1.4 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: AL1323	

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.

8.1.5 Fieldbus: Configure the EtherNet/IP port

17304

The EtherNet/IP ports X21/X22 have to be configured via the EtherNet/IP for access to the device.

To configure the fieldbus port:

► Select [Fieldbus] menu.

> The menu page shows the current settings.

► Set the following parameters as required:

Parameter	Description	Possible values
[IP address]	IP address of the EtherNet/IP port	Factory setting: 192.168.1.250
[Subnet mask]	Subnet mask of the IP network	Factory setting: 255.255.255.0
[Default gateway IP address]	IP address of the gateway	Factory setting: 0.0.0.0
[Host name]	Name of the device in the EtherNet/IP network	e.g. al1xxx
[MAC address]	MAC address of the device	The value is firmly set.

► Save changed values on the device.

8.1.6 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. 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 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.

8.1.7 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 ... 132800	1 microsecond ... 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.

8.1.8 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]	▪ No verification of the vendor ID and device ID ▪ No data storage
		[Type compatible V1.0 device]	▪ 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 V1.1 device]	▪ 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 V1.1 device with Backup + Restore]	▪ 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; modifications of the parameter values are also saved (observe the note!) ▪ 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.
		[Type compatible V1.1 device with Restore]	▪ 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 once. ▪ 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.
[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.

8.1.9 Info: Show device information

12218

To read the general information of the ifm 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	AL1323
[Device family]	Device family of the IO-Link master	IO-Link master
[Vendor]	Vendor	ifm electronic gmbh
[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	

8.1.10 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.

8.1.11 Firmware: Reboot the device

18105

When rebooting the device, all settings are kept.

To restart the AL1323:

► 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.

8.1.12 Configure IO-Link devices

11033

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

Requirements:

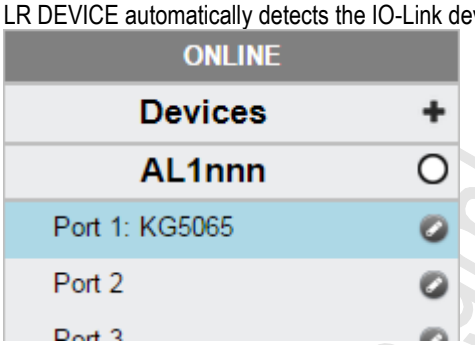
> IO-Link master is correctly installed and connected to the LR DEVICE parameter setting software.
> The IO-Link device is correctly connected to the AL1323.
> Operating mode of the IO-Link port is "IO-Link" (→ **IO-Link ports: Configure operating mode** (→ p. 29)).
> IoT has write access rights to the IO-Link master (→ **IoT: Configure access rights** (→ p. 25)).

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> 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 EtherNet/IP: Configure the device

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1987

On the field bus side, the device can be configured with any EtherNet/IP compatible projection software.

The information in the following sections refers to the EtherNet/IP projection software RSLogix 5000.

8.2.1 Registration of the EDS file

1979

ifm provides an EDS file to integrate the AL1323 in a EtherNet/IP projection software. The user can download the EDS file from the ifm website (→ www.ifm.com). In the EDS file, all parameters, process data, and their valid value ranges are defined.

To add the AL1323 to the device catalogue of RSLogix5000:

► Download the EDS file of the AL1323 from the ifm website.
► Start RSLogix5000.
► Select [Tools] > [EDS Hardware Installation Tool].
> EDS Wizard appears.
► Register the downloaded EDS file of the AL1323 with the EDS Wizard.
> EDS Wizard installs the EDS file and adds the AL1323 to the device catalogue.

8.2.2 Integrate the AL1323 into the EtherNet/IP project

8015

The device is integrated as module of an I/O scanner in the EtherNet/IP project.

Requirements:

> The EDS file of the AL1323 is installed (→ **Registration of the EDS file** (→ p. 33)).

1 Create/open EtherNet/IP project

► Start RSLogix 5000.

► Create new EtherNet/IP project.
OR
Open an existing EtherNet/IP project.

2 Configure EtherNet/IP PLC and IO scanner

► Select and configure EtherNet/IP controller and IO scanner.

> EtherNet/IP project includes a EtherNet/IP controller and an IO scanner.

3 Integrate AL1323 in project

► In the Controller Organizer: Right mouse click on the IO scanner.

> Context menu appears.

► In the context menu: Select [New Module...].

> The window [Select Module Type] appears.

► Select AL1323 and click on [Create].

> The [New Module] window appears.

► Enter name and IP address of the AL1323.

► Click on [OK] to adopt the entered values.

> RSLogix 5000 adds AL1323 as sub-element of the IO scanner to the project.

4 Save the project

► Save EtherNet/IP project

8.2.3 Configure AL1323

8019

The AL1323 is configured via the controller tags.

Requirements:

> AL1323 is correctly integrated in the EtherNet/IP project (→ **Integrate the AL1323 into the EtherNet/IP project** (→ p. 34)).

1 Open controller tags

► In the Controller Organizer: Double click on [Controller Name_of_Project] > [Controller Tags]

> [Controller Tags] window appears.

► In the tree view: Click on [AL1323:C].

> Controller tags for the configuration of the device appear.

2 Configure AL1323

► Set the following controller tags as required:

Name	Description	Possible values	
[AL1323:C.Communication_Profile]	The access rights to the parameter data, process data and events/diagnostic messages of the IO-Link master and the connected IO-Link devices	0x00	EtherNet/IP + LineRecorder ▪ EtherNet/IP and LR DEVICE have read and write access rights to parameters and process data ▪ EtherNet/IP and LR DEVICE have read access rights to events/alarms
		0x01	EtherNet/IP + LineRecorder (ro) ▪ EtherNet/IP has read and write access rights to parameters and process data ▪ EtherNet/IP has read access rights to events/alarms ▪ LR DEVICE only has read access rights to parameters, process data and events/alarms
		0x02	EtherNet/IP only ▪ EtherNet/IP has read and write access rights to parameters and process data ▪ EtherNet/IP has read access rights to events/alarms ▪ LR DEVICE has no access rights (parameters, process data, events/alarms, web interface, firmware update)
		0x03	Continue in Use Case previous setting is valid
[AL1323:C.Port_Process_Data_Size]	Length of the process input data and process output data	0x00	2 bytes input, 2 bytes output
		0x01	4 bytes input, 4 bytes output
		0x02	8 bytes input, 8 bytes output
		0x03	16 bytes input, 16 bytes output
		0x04	32 bytes input, 32 bytes output

► Save EtherNet/IP project

8.2.4 Configure IO-Link ports

11810

The IO-Link ports are configured via the controller tags. The user can configure each IO-Link port separately.

To configure the IO-Link ports:

Requirements:

> AL1323 is correctly integrated in the EtherNet/IP project (→ **Integrate the AL1323 into the EtherNet/IP project** (→ p. 34)).

1 Open controller tags

► In the Controller Organizer: Double click on [Controller Name_of_Project] > [Controller Tags]

> [Controller Tags] window appears.

► In the tree view: Click on [AL1323:C].

> Controller tags for the configuration of the device appear.

2 Configure IO-Link ports

► Configure the following tags for each IO-Link port at will:

Name	Description	Possible values	
[AL1323:C.Port_Mode_Port_x]	Operating mode of the IO-Link port	0x00	Interface deactivated
		0x01	Operation as digital input (DI)
		0x02	Operation as digital output (DO)
		0x03	Operation as IO-Link interface
[AL1323:C.Port_Cycle_Time_Port_x]	Cycle time of the data transmission between the IO-Link master and the IO-Link device	0x00	The device automatically sets the fastest possible cycle time
		0x01	2 milliseconds
		0x02	4 milliseconds
		0x03	8 milliseconds
		0x04	16 milliseconds
		0x05	32 milliseconds
		0x06	64 milliseconds
		0x07	128 milliseconds
[AL1323:C.Swap_Port_x]	Visualisation of the process data (EtherNet/IP uses Little Endian Format (Intel), IO-Link uses Big Endian Format (Motorola))	0x00	Byte swapping for IO-Linkdata deactivated
		0x01	Byte swapping for IO-Linkdata activated
[AL1323:C.Validation_Data_Storage_Port_x]	Supported IO-Link standard and behaviour of the IO-Link master when connecting new IO-Link devices to the IO-Link port	0x00	No validation
		0x01	Type compatible V1.0 device
		0x02	Type compatible V1.1 device
		0x03	Type compatible V1.1 device with Backup + Restore
		0x04	Type compatible V1.1 device with Restore
[AL1323:C.Vendor_ID_Port_x]	Vendor ID of the manufacturer of the device on the IO-Link port	0x0000...0xFFFF ifm electronic: 0x136	

Name	Description	Possible values	
[AL1323:C.Device_ID_Port_x]	Device ID of the device on the IO-Link port	0x000000...0xFFFFFF	
[AL1323:C.Fail_Safe_Mode_Port_x]	Fail-safe mode for output data when the EtherNet/IP connection is interrupted	0x00	No Failsafe
		0x01	Failsafe Reset Value
		0x02	Failsafe Old Value
		0x03	Failsafe with Pattern
[AL1323:C.Fail_Safe_Value_DO_Port_x]	Fail-safe value for the operating mode "digital output (DO)"	0x00	Failsafe Reset Value
		0x01	Failsafe Old Value
		0x02	Failsafe Set Value

x = 1...8

► <Save EtherNet/IP project.

8.2.5 Set connections

10991

The IO-Link master supports different connection types (→ **Supported connection types** (→ p. 71)). The user can choose which object instances of the input assembly and the output assembly are used. This makes it possible to adapt the size of the transmitted and received data.

To set the connection type:

Requirements:

> AL1323 is correctly integrated into the EtherNet/IP project (→ **Integrate the AL1323 into the EtherNet/IP project** (→ p. 34)).

Open the module settings

► In the Controller Organizer: Double-click on the IO-Link master node

> Dialogue window appears.

Set connection type

► Click on [Change...].

> The [Module Definition] dialogue window appears.

► Select the required connection type from the list [Connections].

► Click on [OK] to apply the changes.

8.2.6 EtherNet/IP: Configure IO-Link devices

23106

The AL1323 supports the configuration of the connected IO-Link devices from the EtherNet/IP projection software. For this, ifm offers the EtherNet/IP object "IO-Link Request" (→ **IO-Link requests (object class: 0x80)** (→ p. 97)). The object enables direct read and write access to IO-Link objects of the IO-Link device. The extent of the configurable parameters depends on the IO-Link device.

The following services are available:

Name	Description	Reference
Read request	Send a request to read an IO-Link object	→ **Read_ISDU** (→ p. 98)
Write request	Send a request to write an IO-Link object	→ **Write_ISDU** (→ p. 102)

Information for the execution of acyclic commands: → **Execute acyclic commands** (→ p. 42)
Available parameters of the IO-Link devices: → Operating instructions of the IO-Link device

8.2.7 Read cyclic input data

8518

The user can access the cyclic input data of the connected sensors and IO-Link devices via the controller tags of the AL1323.

To check the validity of the cyclic process data, evaluate the PQI byte (→ **Mapping: IO-Link port information** (→ p. 75)).
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.

To access the input data:
► Starting RSLogix5000.
► Open a EtherNet/IP project.
► In the project tree: Mouse click on [Controller Tags] > [AL1323.I]
> The window shows the data structure with cyclic input data ([AL1323.I:Data])

Mapping of the inputs to the data structure [AL1323.I:Data]: → **Input assembly (Instance 100): I/O data + acyclic data + diagnosis data** (→ p. 72))

8.2.8 Write cyclic output data

8570

The user can access the cyclic output data of the connected actuators and IO-Link devices via the controller tags of the AL1323.

To check the validity of the cyclic process data, evaluate the PQI byte (→ **Mapping: IO-Link port information** (→ p. 75)).

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.

To access the cyclic output data:

► Starting RSLogix5000.

► Open a EtherNet/IP project.

► In the project tree: Mouse click on [Controller Tags] > [AL1323.O]

> The window shows the data structure with cyclic input data ([AL1323.O:Data])

Mapping of the outputs to the data structure [AL1323.C:O]: → **Output assembly (Instance 150): I/O data + acyclic data** (→ p. 76)).

8.2.9 Read diagnostic and status information

22152

Diagnostic and status information is a part of the cyclically transmitted process data. the input assembly includes the following diagnostic information of the IO-Link ports and the status information of the transmitted data:

Byte	Content
2	Indication of short circuit/overload of the IO-Link ports X01...X08
3	Status indication of the voltage supply of the device
43	Status information IO-Link port X01
58	Status information IO-Link port X02
73	Status information IO-Link port X03
88	Status information IO-Link port X04
103	Status information IO-Link port X05
118	Status information IO-Link port X06
133	Status information IO-Link port X07
148	Status information IO-Link port X08

To access the cyclically transmitted diagnostic and status information:

► Starting RSLogix5000.
► Open a EtherNet/IP project.
► In the project tree: Mouse click on [Controller Tags] > [AL1323.I]
> The window shows the data structure with cyclic input data ([AL1323.I:Data])

Mapping of the diagnostic and status information on the data structure [AL1323.C:I]: → **Input assembly (Instance 100): I/O data + acyclic data + diagnosis data** (→ p. 72).

8.2.10 EtherNet/IP: Programmers' notes

23323

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

- Read cyclic input and output data of the IO-Link devices
- Read diagnostic and status information
- Change parameters of the IO-Link port of the AL1323
- Read and change parameters of the connected IO-Link devices

The following sections show the available options.

Execute acyclic commands

22633

The AL1323 offers the following options to execute acyclic commands:

Command channels in cyclic process data

16384

Within the cyclic input and output data, special areas are available for the acyclic data transmission. Both read and write access can be implemented via the areas.

Principle of the command channels

9002

A cyclic command consists of a request and a response. The command request is transmitted in the Output Assembly. The command response of the IO-Link master is transmitted in the Input Assembly.

The following table shows the general process of an acyclic communication via the acyclic command channel.

Step	Output assembly	Input assembly
1	► [Trigger] = 0 > The data in the request area is invalid.	--
2	► Write the data of the request area: - Port (bytes 4 and 5) - Index (bytes 6 and 7) - Sub-index (bytes 8 and 9) - Command (byte 10) - Data (11...43)	--
3	► [Trigger] = 1 > Command is transmitted	> [Handshake] = 0
4	--	► Read [Handshake]. If [Handshake] = 0x0: > The data in the response area is invalid. ► Continue with step 4 If [Handshake] = 0x1: > The data in the response area is valid. ► Continue with step 5
5	--	► Read [Result] byte (byte 11) If [Result] = 0x00 > Command has been processed without errors If [Result] = 0x01: > An error occurred during the processing of the command. ► Read diagnostic codes (byte 13) ► Eliminate the error and repeat the execution of the command

Acyclic port commands

12063

For the acyclic access to the configuration of the IO-Link ports of the AL1323, the following commands are available:

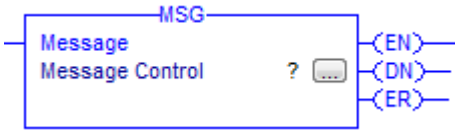
Command	Description	Reference
Set mode	Set the operating type of the IO-Link port	→ **Command 0x10 – set mode** (→ p. 82)
Set Validation ID / Data Storage	Adjust the supported IO-Link standard and the behaviour of the IO-Link master when connecting a new IO-Link device to the IO-Link port	→ **Command 0x20 – set validation ID / data storage** (→ p. 84)
Set fail-safe data pattern	Behaviour of the outputs when the EtherNet/IP connection is interrupted and setting of the corresponding fail-safe values	→ **Command 0x30 – set fail-safe data pattern** (→ p. 86)

The port commands use the same mechanisms as the acyclic command channel (→ **Acyclic command channel** (→ p. 77)).

EtherNet/IP mechanisms for acyclic commands

7102

Acyclic commands can be executed with the EtherNet/IP command `Message (MSG)`.



Parameters of the available field bus objects: → **Field bus objects** (→ p. 88)

For detailed information about the `Message (MSG)` command: → Operating instructions RSLogix 5000

8.3 IoT Core

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17302

The user can access the IoT Core only via IoT port X23 of the ifm IO-Link master.
General notes on the ifm IoT Core: → **Programmers' notes** (→ p. 52)

The AL1323 is of type `device` (→ **Overview: IoT types** (→ p. 115)).
It has the following sub-structures:

Structure	Contents
processdatamaster	▪ Diagnostic data (temperature, voltage, current) ▪ Status of the current / voltage supply
deviceinfo	Device identification
timer[1]	Subscribe to data
timer[2]	Subscribe to data
iotsetup	Parameters of the IoT port (access rights, IP settings, IP settings of the LR SMARTOBSERVER)
fieldbussetup	Parameters of the fieldbus port (IP settings, device identification in fieldbus projection software)
iolinkmaster/port[n]	▪ Parameters of the IO-Link port (operating mode, transmission rate, cycle time, validation and data storage) ▪ Digital input data (pin 2) ▪ Port event
iolinkmaster/port[n]/iolinkdevice	▪ Status information IO-Link devices on the IO-Link port ▪ Device information of the IO-Link device ▪ Process data on input/output ▪ Application-specific identification
firmware	▪ Firmware of the device ▪ Reset devices ▪ Reboot the device

The user can request the available data points and services in the substructures with `gettree`(→ **Service: gettree** (→ p. 116)). The service returns the device description as tree structure. It shows the services supported by a data point: In the sub-element "subs" each data point lists all services that can be applied to it.

8.3.1 Configure IoT port

16540

The parameters of the IoT port X23 are saved in the `iotsetup` substructure. The user can access the following data points:

Name	Description	Access
iotsetup/accessrights	Access rights to the IO-Link master ▪ 0 = EtherNet/IP + IoT ▪ 1 = EtherNet/IP + IoT (read only) ▪ 2 = IoT only	rw
iotsetup/smobip	IP address of the LR SMARTOBSERVER	rw
iotsetup/smobport	Port number of the LR SMARTOBSERVER	rw
iotsetup/smobinterval	Cycle time for (value in milliseconds)	rw
iotsetup/network/dhcp	Configuration of the IP settings of the IoT port ▪ 0 = STATIC_IP/OFF ▪ 1 = DHCP/ON	rw
iotsetup/network/ipaddress	IP address of the IoT port	rw
iotsetup/network/subnetmask	Subnet mask of the network segment	rw
iotsetup/network/ipdefaultgateway	IP address of the network gateway	rw

rw ... read and write

8.3.2 Configure the fieldbus port

16458

The parameters of the fieldbus port X21/X22 are saved in the `fieldbussetup` substructure. The user can access the following data points:

Name	Description	Access
fieldbussetup/hostname	Name of the IO-Link master in the fieldbus project	rw
fieldbussetup/fieldbusfirmware	Firmware version of the IO-Link master	r
fieldbussetup/network/macaddress	MAC address of the fieldbus port	r
fieldbussetup/network/ipaddress	IP address of the fieldbus port	rw
fieldbussetup/network/subnetmask	Subnet mask of the network segment	rw
fieldbussetup/network/ipdefaultgateway	IP address of the network gateway	rw

r = read only
rw ... read and write

8.3.3 Configure IO-Link ports

16454

Parameters of the IO-Link ports of the IO-Link master are saved in the `iolinkmaster/port[n]` substructure. There are the following data points for each IO-Link-Port X01...X08 :

Name	Description	Access
iolinkmaster/port[n]/senddatatosmob	Send process data to LR SMARTOBSERVER	rw
iolinkmaster/port[n]/mode	Operating mode of the IO-Link port	rw*
iolinkmaster/port[n]/mastercycletime_preset	Cycle time of the data transfer at the IO-Link port (value in microseconds)	rw
iolinkmaster/port[n]/mastercycletime_actual	Current cycle time of the data transfer at the IO-Link port (value in microseconds)	r
iolinkmaster/port[n]/validation_datastorage_mode	Response of the IO-Link port when a new IO-Link device is connected	rw*
iolinkmaster/port[n]/validation_vendorid	IO-Link ID of the manufacturer that is to be validated	rw*
iolinkmaster/port[n]/validation_deviceid	IO-Link ID of the device that is to be validated	rw*

n ... 1...8)
r = read only
rw ... read and write
* ... only available if EtherNet/IP PLC is separated from the device

8.3.4 Set application identification

16580

The application name of the IO-Link master is saved in the `devicetag` substructure. The user can access the following data points:

Name	Description	Access
devicetag/applicationtag	Name of the IO-Link master in the fieldbus project (application tag)	rw

rw ... read and write

8.3.5 Read / write cyclic process data

10994

Cyclic process data of the IO-Link ports X01...X08 is saved in the `iolinkmaster/port[n]` substructure. The user can access the following data points:

Name	Description	Access
iolinkmaster/port[n]/pin2in	Digital input signal to pin 2 of the IO-Link port n	r
iolinkmaster/port[n]/iolinkdevice/pdin	IO-Link input signal at pin 4 of the IO-Link port n	r
iolinkmaster/port[n]/iolinkdevice/pdout	IO-Link output signal at pin 4 of the IO-Link port n	rw*

n ... 1...8
r = read only
rw ... read and write
* ... only available if EtherNet/IP PLC is separated from the device

8.3.6 Read diagnostic data

16571

Diagnostic data is saved in the `processdatamaster` substructure. The user can access the following data points:

Name	Description	Access
processdatamaster/temperature	Temperature of the IO-Link master (value in °C)	r
processdatamaster/voltage	Voltage applied (value in V)	r
processdatamaster/current	Current (value in A)	r
processdatamaster/supervisionstatus	Diagnostic information of the device supply ▪ 0 = no error ▪ 1 = short circuit ▪ 2 = overload ▪ 3 = undervoltage	r

r = read only

8.3.7 Read device information

17133

Device information is saved in the `deviceinfo` substructure. The user can access the following data points:

Name	Description	Access
deviceinfo/productcode	Article Number	r
deviceinfo/vendor	Vendor	r
deviceinfo/devicefamily	Device family	r
deviceinfo/hwrevision	Hardware revision	r
deviceinfo/serialnumber	Serial number	r
deviceinfo/swrevision	Firmware version	r
deviceinfo/bootloaderrevision	Bootloader revision	r
deviceinfo/extensionrevisions		r

r = read only

Additional information about the AL1323 can be read with the `getidentity` service (→ **Service: getidentity** (→ p. 118)).

8.3.8 Control IO-Link master

17963

The device can be controlled via the following services:

Service	Description	Access
firmware/version	Firmware version of the IO-Link master	r
firmware/reboot	Reboot IO-Link master	rw
firmware/factoryreset	Reset IO-Link master to factory settings	rw

r = read only
rw ... read and write

8.3.9 Configure IO-Link devices

11002

The ifm IoT Core supports the configuration of the connected IO-Link devices. A parameter is accessed via IO-Link index and subindex (→ IO Device Description (IODD) of the device)

The user can use the following services:

Service	Description	Access
iolinkmaster/port[n]/iolinkdevice/iolreadacyclic	Acyclic reading of a parameter of an IO-Link device	r
iolinkmaster/port[n]/iolinkdevice/iolwriteacyclic	Acyclic writing of a parameter of an IO-Link device	rw

n ... 1...8
r = read only
rw ... read and write

8.3.10 Read information about IO-Link devices

16553

Information about an IO-Link device connected via an IO-Link port is saved in the `iolinkmaster/port[n]/iolinkdevice/` substructure. The user can access the following data points:

Name	Description	Access
iolinkmaster/port[n]/iolinkdevice/status	Status of the connected IO-Link device 0 = SENSOR_NOT_CONNECTED 1 = SENSOR_IN_PREOPERATE 2 = SENSOR_IN_OPERATE 3 = SENSOR_WRONG	r
iolinkmaster/port[n]/iolinkdevice/vendorid	IO-Link ID of the manufacturer	r
iolinkmaster/port[n]/iolinkdevice/deviceid	IO-Link ID of the IO-Link device	r
iolinkmaster/port[n]/iolinkdevice/productname	Product name of the IO-Link device	r
iolinkmaster/port[n]/iolinkdevice/serial	Serial number of the IO-Link device	r
iolinkmaster/port[n]/iolinkdevice/applicationspecifictag	Device-specific identification (application tag)	rw

n ... 1...8

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16577

Example: Read process data of an IO-Link device

16574

Task: Read the current measured value of the ifm temperature sensor TN2531 at IO-Link port X06

Solution: Read the data point for the process input data with the `getdata` service.

- Request object:

```
{"code":10,"cid":4711,"adr":"/iolinkmaster/port[6]/iolinkdevice/pdin/getdata"}
```

- Return object:

```
{"cid": 4711,"data":{"value": "03C9"},"code": 200}
```

The return value is given in hexadecimal format. Besides the temperature value the return value comprises additional information (→ IO Device Description (IODD) of the sensor). The temperature value is shown in bits 2 to 15.

0x03C9 = 0b**11110010**01

Temperature value: 0b11110010 = 242

Therefore: The current temperature value is 24.2 °C.

Example: Read several parameter values of the IO-Link master simultaneously

17310

Task: The following current values are to be read by the IO-Link master. Temperature, serial number

Solution: Read the current parameter values using the getdatamult (data point temperature service: /processdatamaster/termperature; Data point serial number: /deviceinfo/serialnumber)

Request object:

```
{"code":10,"cid":4711,"adr":"/getdatamulti","data":{"datatosend":["/processdatamas
ter/temperature"],["/deviceinfo/serialnumber"]}}
```

Return object:

```
{"cid":4711,"data":{"processdatamaster/temperature":{"code":200,"data":44},"device
info/serialnumber":{"code":200,"data":"000174210147"}},"code":200}
```

Example: Change name of the IO-Link master

10987

Task: Set the name of the IO-Link master for the representation in the LR SMARTOBSERVER to AL1323.

Solution: Change the parameter [Application Tag] with the setdata service to the value [AL1323].

The data point of the parameter [Application Tag] in the device description object is /devicetag/applicationtag.

- Request object:

```
{"code":10,"cid":4711,"adr":"/devicetag/applicationtag/setdata","data":{"newvalue"
:"AL1323"}}
```

- Return object:

```
{"cid":4711,"code":200}
```

Example: read the parameter value of an IO-Link device

16546

Task: Read the serial number of the ifm temperature sensor TN2531 at IO-Link port X02

Solution: Read the serial number with the `iolreadacyclic` service from the IO-Link device (index: 21, subindex: 0)

- **Request object:**

```
{
"code":10,
"cid":4711,
"adr":"/iolinkmaster/port[2]/iolinkdevice/iolreadacyclic",
"data":{"index":21,"subindex":0}
}
```

- **Return object:**

```
{
"cid":4711,
"data":{"value":"4730323134323830373130"},
"code":200
}
```

The returned value is given in hexadecimal format. The conversion of the HEX value in a STRING value is: G0214280710

Example: change the parameter value of an IO-Link device

16578

Task: Set the output configuration OUT1 of the ifm temperature sensor TN2531 at IO-Link port X02 to the value "Hnc / hysteresis function, normally closed".

Solution: Change the parameter [ou1] of the sensor to the value 4 using the iolwriteacyclicdata service. The parameter can be accessed via IO-Link index 580, subindex 0 (→ IO-Link description of the sensor).

- Request object:

```
{"code":10,"cid":4711,"adr":"/iolinkmaster/port[2]/iolinkdevice/iolwriteacyclic","
data":{"index":580,"subindex":0,"value":4}}
```

- Response object:

```
{"cid":4711,"code":200}
```

Example: Subscribe to event

17946

Task: The current values of the following parameters should be sent regularly to a network server with IP address 192.168.0.4: product name of the IO-Link device at IO-Link port X02, cyclic input data of the IO-Link device at IO-Link port X02 and the operating temperature of the IO-Link master.

Solution: Subscribe to the required data using the subscribe service.

- **Request object:**

```
{
"code":80,
"cid":4711,
"adr":"/timer[1]/counter/datachanged/subscribe",
"data":
{
"callback":"192.168.0.44/temp",
"datatosend":[
"/iolinkmaster/port[2]/iolinkdevice/productname",
"/iolinkmaster/port[2]/iolinkdevice/pdin",
"/processdatamaster/temperature"]
}
}
```

8.3.12 Programmers' notes

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ifm IoT Core: General information

16576

The DataLine device family has one IoT Core. This component allows the user to address the IO-Link master from IT networks and to integrate it into Internet-of-Things applications.

The IoT Core provides the user with the following functions:

- Control device
- Monitoring of process data
- Read / write parameters of the IO-Link master
- Read / write parameters of the connected IO-Link devices
- Collect diagnostic data

Device description

14411

The IoT Core creates a device description on the AL1323. This device description is a structured, machine-readable data object in JSON format. All current values of parameters, diagnostic data and device information are mapped in this data object. The user can access this data object from IT networks.

The complete device description can be read using the gettree (→ service **Service: gettree** (→ p. 116)).

Access ifm-IoT Core

17561

To activate the changes of the parameter values the IoT Core must have the respective write access rights to the IO-Link master (→ Parameter [Access Rights]).

The ifm IoT Core supports HTTP requests. The following request methods are available.

GET method

21300

Using the GET method the user has read access to a data point.
The syntax of the request to the IoT Core is:

```
ip/datapoint/service
```

Description	Description
ip	IP address of the IoT port X23 of the IO-Link master
data_point	Data point which is to be accessed
service	Service

The syntax of the return of the IoT Core is:

```
{
"cid":id,
"data":{"value":resp_data},
"code":err_code
}
```

parameter	Description
id	Correlation ID for the assignment of request and return
resp_data	Value of the data point; depending on the data type of the data point
err_code	Error code (→ **IoT Core: Diagnostic codes** (→ p. 55))

Example:
Request (via browser): `192.168.0.250/devicetag/applicationtag/getdata`
Return: `{"cid":-1,"data":{"value":"AL1323"}, "code":200}`

POST method

16548

Using the POST method the user has read and write access to a data point. A form with the required information is transferred to the IP address of the IO-Link master (IoT port X23).

The syntax of the request to the IoT Core is:

```
{
"code":code_id,
"cid":id,
"adr":"data_point/service",
"data":{req_data}
}
```

Parameter	Description	
code_id	ID of the service class	
	10	Request
	11	Transaction
	80	Event
id	Correlation ID for the assignment of request and return	
data_point	Data point which is to be accessed	
service	Service to be performed (→ **Overview: IoT services** (→ p. 116))	
req_data	Data to be transferred to the IoT Core (e.g. new values); indication optional (depending on the service)	

The syntax of the return of the IoT Core is:

```
{
"cid":id,
"data":{"value":resp_data},
"code":err_code
}
```

Parameter	Description
id	Correlation ID for the assignment of request and return
resp_data	Value of the data point; depending on the data type of the data point
err_code	Error code (→ **IoT Core: Diagnostic codes** (→ p. 55))

Example:

Request: `{"code":10,"cid":4711, "adr":"devicetag/applicationtag/getdata"}`

Return: `{"cid":4711,"data":{"value":"AL1323"}, "code":200}`

IoT Core: Diagnostic codes

17437

The ifm IoT Core uses the following diagnostic codes:

Code	Description
200	OK
230	OK; but reboot required
231	OK, but block request not yet terminated
232	Data accepted but changed internally
233	IP settings changed; application has to reboot the device; Wait for min. 1 second before the device is rebooted
400	Invalid request
403	Unauthorised access
500	Internal server fault
503	Service not available
530	Requested data is invalid
531	IO-Link error
532	Error in PLC

9 Operation

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22368

9.1 Identify device

16568

In the online mode, the user can identify the device using the RDY and IoT status LEDs.

► Start LR DEVICE.
► Scan network for devices.
> LR DEVICE recognises the IO-Link master.
► Click on the selection field next to the device name.
> The RDY and IoT status LEDs are flashing.

9.2 Firmware update

16582

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

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

- ► Stop EtherNet/IP PLC.
- ► Set the parameter [IP address SmartObserver] to 255.255.255.255 (→ **IoT: Configure the interface to the LR SMARTOBSERVER** (→ p. 27)).
- ► Stop the LRAgent.LRDevice service in the Windows task manager.

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 confirm with [ENTER]:
  `<IP address of the device>/web/update`

> Web browser shows the [Firmware Update] page.

2 Load new firmware to AL1323

- ► Click on [Search...].

> 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.

9.3 Exchange IO-Link device

7775

To exchange 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 / Data Storage] = Type compatible V1.1 device with Restore
OR
[Port x IO-Link Validation / Data Storage] = Type compatible V1.1 device with Restore

► Save changes.

2 Exchange IO-Link device

► Disconnect old IO-Link device from AL1323.

► Connect new IO-Link device with the same IO-Link port of the AL1323.

> 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

16557

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

parameter	Factory setting
[IP address] (EtherNet/IP)	192.168.1.250
[Subnet mask] (EtherNet/IP)	255.255.255.0
[IP gateway address] (EtherNet/IP)	0.0.0.0
[IP address] (IoT-Schnittstelle)	169.254.X.X
[Subnet mask] (IoT-Schnittstelle)	255.255.0.0
[IP gateway address] (IoT-Schnittstelle)	0.0.0.0
[Host name]	blank
Data memory (Data Storage)	blank

12 Accessories

17853

List of accessories of AL1323: → www.ifm.com > Product page > Accessories

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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; cULus: max. 24 DC)
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

10921

Interfaces	
Communication interface	Ethernet; IO-Link
Communication interface	IO-Link; TCP/IP; EtherNet/IP
Ethernet	
Transmission standard	10Base-T; 100Base-TX
Transmission rate [MBit/s]	10; 100
Protocol	TCP/IP; EtherNet/IP
Factory settings	▪ IP address: 192.168.1.250 ▪ Subnet mask: 255.255.255.0 ▪ Gateway IP address: 0.0.0.0 ▪ MAC address: see type label
IO-Link master	
Type of transmission	COM 1 / COM 2 / COM 3
IO-Link revision	V1.1
Number of ports Class A	8
IoT interface	
Transmission standard	10Base-T; 100Base-TX
Transmission rate [Mbits/s]	10; 100
Protocol	DCP, DCHP, Auto IP
Factory settings	▪ IP address: 169.254.X.X ▪ Subnet mask: 255.255.0.0 ▪ Gateway IP address: 0.0.0.0 ▪ MAC address: see type label

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	▪ EN 61000-6-2 ▪ EN 61000-6-4
MTTF [Years]	90

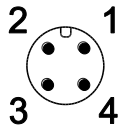
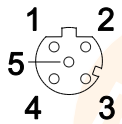
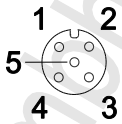
13.1.9 Mechanical data

22825

Mechanical data	
Weight [g]	395.8
Materials	Housing: PA grey; socket: stainless steel (1.4404 / 316L)

13.1.10 Electrical connection

22826

Voltage supply IN X31	
Connector	M12
Wiring	 1: + 24 V DC (US) 2: - 3: GND (US) 4: -
Ethernet IN / OUT X21, X22	
Connector	M12
Wiring	 1: TX + 2: RX + 3: TX - 4: RX - 5: -
Process connection IO-Link Ports Class A X01...X0<IOL_AnzPorts>	
Connector	M12
Wiring	 1: + 24 V DC (US) 2: DI 3: GND (US) 4: C/Q IO-Link 5: -

13.2 EtherNet/IP

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13.2.1 Parameter data

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Configuration Assembly (Instance 199)

10234

The values of the Configuration Assembly are set in RSLogix 5000 via the controller tags of the EtherNet/IP project.

Bytes	Contents
0	Communication profile (→ **Communication profile** (→ p. 69))
1	Process Data Length (→ **Process data length** (→ p. 69))
2	X01: Operating mode (→ **Port configuration** (→ p. 70))
3	X01: Cycle time IO-Link master - IO-Link device (→ **Port configuration** (→ p. 70))
4	X01: Byte swap (→ **Port configuration** (→ p. 70))
5	X01: Data storage and validation (→ **Port configuration** (→ p. 70))
6	X01: Vendor ID (LSB) (→ **Port configuration** (→ p. 70))
7	X01: Vendor ID (MSB) (→ **Port configuration** (→ p. 70))
8	X01: Device ID (LSB) (→ **Port configuration** (→ p. 70))
9	X01: Device ID (→ **Port configuration** (→ p. 70))
10	X01: Device ID (MSB) (→ **Port configuration** (→ p. 70))
11	X01: reserved
12	X01: Fail Safe Mode (→ **Port configuration** (→ p. 70))
13	X01: Fail safe value of DO (pin 4) (→ **Port configuration** (→ p. 70))
14...25	X02: Port configuration (→ row 2...13)
26...37	X03: Port configuration (→ row 2...13)
38...49	X04: Port configuration (→ row 2...13)
50...61	X05: Port configuration (→ row 2...13)
62...73	X06: Port configuration (→ row 2...13)
74...85	X07: Port configuration (→ row 2...13)
86...97	X08: Port configuration (→ row 2...13)

Communication profile

23072

Name	Description	Possible values	
[Communication profile]	The access rights to the parameter data, process data and the events/diagnostic messages of the IO-Link master as well as the connected IO-Link devices.	0x00	EtherNet/IP + <IOL_AccessRights>
		0x01	EtherNet/IP + <IOL_AccessRights> (ro)
		0x02	EtherNet/IP only
		0x03	Continue in Use Case

Process data length

22987

Name	Description	Possible values	
[Process data length]	Length of the process input data and process output data	0x00	2 bytes input data, 2 bytes output data ▪ Input assembly: 206 bytes ▪ Output assembly: 62 bytes
		0x01	4 bytes input data, 4 bytes output data ▪ Input assembly: 222 bytes ▪ Output assembly: 78 bytes
		0x02	8 bytes input data, 8 bytes output data ▪ Input assembly: 254 bytes ▪ Output assembly: 110 bytes
		0x03	16 bytes input data, 16 bytes output data ▪ Input assembly: 318 bytes ▪ Output assembly: 174 bytes
		0x04	32 bytes input data, 32 bytes output data ▪ Input assembly: 446 bytes ▪ Output assembly: 302 bytes

Port configuration

7423

Name	Description	Possible values	
[X0n: Port Mode]	Operating mode of the IO-Link port	0x00	Interface deactivated
		0x01	Operation as digital input (DI)
		0x02	Operation as digital output (DO)
		0x03	Operation as IO-Link interface
[X0n: Master Cycle Time]	Cycle time of the data transmission between the IO-Link master and the IO-Link device	0x00	The device automatically sets the fastest possible cycle time
		0x01	2 milliseconds
		0x02	4 milliseconds
		0x03	8 milliseconds
		0x04	16 milliseconds
		0x05	32 milliseconds
		0x06	64 milliseconds
		0x07	128 milliseconds
[X0n: Byte Swap]	Visualisation of the process data (EtherNet/IP uses Little Endian Format (Intel), IO-Link uses Big Endian Format (Motorola))	0x00	Byte swapping for IO-Link process data deactivated
		0x01	Byte swapping for IO-Link process data activated
[X0n: Validation ID]	Supported IO-Link standard and behaviour of the IO-Link master when connecting new IO-Link devices to the IO-Link port	0x00	No validation
		0x01	Type compatible V1.0 device
		0x02	Type compatible V1.1 device
		0x03	Type compatible V1.1 device with Backup + Restore
		0x04	Type compatibe V1.1 device with Backup
[X0n: VID (LSB)]	Vendor ID of the manufacturer of the device on the IO-Link port	per byte: 0x00...0xFF 0xYYZZ - YY = VID (MSB) - ZZ = VID (LSB)	
[X0n: VID (MSB)]			
[X0n: DID (LSB)]	Device ID of the device on the IO-Link port	per byte: 0x00...0xFF 0xXXYYZZ - XX = DID (MSB) - YY = DID - ZZ = DID (LSB)	
[X0n: DID]			
[X0n: DID (MSB)]			
[X0n: Fail-safe Mode]	Fail-safe mode for output data when the EtherNet/IP connection is interrupted	0x00	No Failsafe
		0x01	Failsafe Reset Value
		0x02	Failsafe Old Value
		0x03	Failsafe with Pattern
[X0n: Fail-safe Value of DO pin 4]	Fail-safe value for the operating mode "digital output (DO)"	0x00	Failsafe Reset Value
		0x01	Failsafe Old Value
		0x02	Failsafe Set Value

13.2.2 Cyclic data

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Supported connection types

16535

Name	Configuration Assemby	Input Assembly - Instance	Output Assembly - Instance
Exclusive Owner with IO-Link I/O + Status + Events	199	100	150
Input Only with IO-Link Inputs + Status + Events	199	100	-
Listen Only with IO-Link Input + Status + Events	199	100	-

Input assembly (Instance 100): I/O data + acyclic data + diagnosis data

11134

Byte	Content
0...1	Digital inputs of the IO-Link ports in the DI operating mode (→ **Mapping: digital input data (DI)** (→ p. 73))
2...3	Status information (→ **Mapping: Status information** (→ p. 73))
4...45	Acyclic command area: Response channel (→ **Response channel** (→ p. 79))
46...47	Port X01: PQI (→ **Mapping: PQI** (→ p. 74))
48...63	Port X01: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
64...65	Port X02: PQI (→ **Mapping: PQI** (→ p. 74))
66...81	Port X02: Diagnostic, vendor ID, device ID, results (→ **Mapping: IO-Link port information** (→ p. 75))
82...83	Port X03: PQI (→ **Mapping: PQI** (→ p. 74))
84...99	Port X03: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
100...101	Port X04: PQI (→ **Mapping: PQI** (→ p. 74))
102...117	Port X04: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
118...119	Port X05: PQI (→ **Mapping: PQI** (→ p. 74))
120...135	Port X05: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
136...137	Port X06: PQI (→ **Mapping: PQI** (→ p. 74))
138...153	Port X06: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
154...155	Port X07: PQI (→ **Mapping: PQI** (→ p. 74))
156...171	Port X07: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
172...173	Port X08: PQI (→ **Mapping: PQI** (→ p. 74))
174...189	Port X08: Diagnostic, vendor ID, device ID, events (→ **Mapping: IO-Link port information** (→ p. 75))
190	Port X01: Cyclic input data (n bytes)
190+n	Port X02: Cyclic input data (n bytes)
190+2n	Port X03: Cyclic input data (n bytes)
190+3n	Port X04: Cyclic input data (n bytes)
190+4n	Port X05: Cyclic input data (n bytes)
190+5n	Port X06: Cyclic input data (n bytes)
190+6n	Port X07: Cyclic input data (n bytes)
190+7n	Port X08: Cyclic input data (n bytes)

Legend:
n = [2,4,8,16,32]; is determined by the parameter [Prozess_Data_Length] (→ **Process data length** (→ p. 69))

Mapping: digital input data (DI)

22708

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X08: pin 4	X07: pin 4	X06: pin4	X05: pin 4	X04: pin 4	X03: pin 4	X02: pin 4	X01: pin 4
X08: pin 2	X05: pin 2	X06: pin 2	X05: pin 2	X04: pin 2	X03: pin 2	X02: pin 2	X01: pin 2

Legend:

X0n: pin 4	Signal level on pin 4 of the IO-Link port	1 bit	0x0 = OFF 0x1 = ON
X0n: pin 2	Signal level on pin 2 of the IO-Link port	1 Bit	0x0 = OFF 0x1 = ON

Mapping: Status information

15474

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X08: Short / OL	X07: Short / OL	X06: Short / OL	X05: Short /OL	X04: Short / OL	X03: Short / OL	X02: Short / OL	X01: Short / OL
reserved	reserved	reserved	reserved	reserved	reserved	Sensor PWR	AUX PWR

Legend:

Short / OL	Occurrence of a short circuit or of an overvoltage on the IO-Link port	1 bit	0x0 = without errors 0x1 = short circuit or overvoltage detected
Sensor PWR	Status of the supply voltage US	1 bit	0x0 = supply voltage US not available 0x1 = supply voltage US available
AUX Power	Status of the supply voltage UA	1 bit	0x0 = supply voltage UA not available 0x1 = supply voltage UA available

Mapping: PQI

11015

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
reserved	Wrong PD Output Length	Wrong PD Input Length	Wrong Cycle Time	Wrong VID / DID	Invalid Data Bit	Device Conn	IOL Mode
reserved							

Legend:

IOL mode	Operating mode of the IO-Link port	1 bit	0x0 = IO-Link inactive 0x1 = IO-Link active
Device Conn	Connection of the device	1 bit	0x0 = available 0x1 = not available
Invalid Data Bit	Status of the process input data on the IO-Link port	1 bit	0x0 = data valid 0x1 = data invalid
Wrong VID / DID	Status of the vendor ID / device ID	1 bit	0x0 = VID / DID are correct 0x1 = wrong VID or DID
Wrong Cycle Time	Status of the cycle time	1 bit	0x0 = cycle time is correct 0x1 = wrong cycle time
Wrong PD Input Length	Status of the length of the process input data	1 bit	0x0 = length is correct 0x1 = configuration of the length of the input data is wrong
Wrong PD Output Length	Status of the length of the process output data	1 bit	0x0 = length is correct 0x1 = configuration of the length of the output data is wrong

Mapping: IO-Link port information

23465

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VID (LSB)							
VID (MSB)							
DID (LSB)							
DID							
DID (MSB)							
reserved							
Event Mode		Event Type		Event Source	Event Instance		
Event Code 1							
Event Code 2							
Event Mode		Event Type		Event Source	Event Instance		
Event Code 1							
Event Code 2							
Event Mode		Event Type		Event Source	Event Instance		
Event Code 1							
Event Code 2							
reserved							

Legend:

VID	Vendor ID of the connected IO-Link device	16 bits	0x0000...0xFFFF 0xXXYY - XX = VID (MSB) - YY = VID (LSB)
DID	Device ID of the connected IO-Link device	24 bits	0x000000...0xFFFFFF 0xXXYYZZ - XX = DID (MSB) - YY = DID - ZZ = DID (LSB)
Event Mode	Event mode	2 bits	
Event Type	Event type	2 bits	
Event Source	Evens source	1 bit	depends on the device (→ operating instructions of the IO-Link device)
Event Instance	Event instance	3 bits	
Event Code 1	Event code	8 bits	
Event Code 2	Event code	8 bits	

Output assembly (Instance 150): I/O data + acyclic data

9214

Byte	Content
0	Digital output data of the IO-Link ports in the DO operating mode (→ **Mapping: Digital output data (DO)** (→ p. 76))
1	reserved
2	reserved
3	reserved
4...45	Acyclic command area: Request channel (→ **Request channel** (→ p. 78))
46	Port X01: Acyclic output data (n bytes)
46+n	Port X02: Acyclic output data (n bytes)
46+2n	Port X03: Acyclic output data (n bytes)
46+3n	Port X04: Acyclic output data (n bytes)
46+4n	Port X05: Acyclic output data (n bytes)
46+5n	Port X06: Acyclic output data (n bytes)
46+6n	Port X07: Acyclic output data (n bytes)
46+7n	Port X08: Acyclic output data (n bytes)

Legend:
n = [2,4,8,16,32]; is determined by the parameter [Prozess_Data_Length] (→ **Process data length** (→ p. 69))

Mapping: Digital output data (DO)

19841

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
X08: pin 4	X07: pin 4	X06: pin4	X05: pin 4	X04: pin 4	X03: pin 4	X02: pin 4	X01: pin 4

Legend:

X0n: pin 4	Signal level on pin 4 of the IO-Link port	1 bit	0x0 = OFF 0x1 = ON

13.2.3 Acyclic data

22427

Acyclic command channel

10236

In the cyclic process data, command channels for the transmission of acyclic data is available.

Object	Contents	Bytes	Access
Output assembly	Request channel (field bus PLC >>> IO-Link master) → **Request channel** (→ p. 78)	4...45	r/w
Input assembly	Response channel (IO-Link master >>> fieldbus PLC) → **Response channel** (→ p. 79)	4...45	r

Legend:

r = only read access rights
r/w = read and write access rights

Request channel

17657

Byte	Content	
4	Port no. (LSB)	
5	Port no. (MSB)	
6	Index (LSB)	
7	Index (MSB)	
8	Sub-index (LSB)	
9	Sub-index (MSB)	
10	Trigger	Command
11	Length of the user data (number of bytes)	
12	Data (byte 0)	
13	Data (byte 1)	
..	...	
43	Data (byte 31)	
44	reserved	
45	reserved	

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) ▪ Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = port X08
Port no. (MSB)	Number of the IO-Link port (high byte) ▪ Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Index (LSB)	Index of the IO-Link object (low byte) ▪ Index = 0xXX**YY** ▪ Index (LSB) = 0x**YY**	8 bits	0x00...0xFF
Index (MSB)	Index of the IO-Link object (high byte) ▪ Index = 0x**XX**YY ▪ Index (MSB) = 0x**XX**	8 bits	0x00...0xFF
Sub-index (LSB)	Sub-index of the IO-Link object (low byte) ▪ Sub-index = 0xXX**YY** ▪ Sub-index (LSB) = 0x**YY**	8 bits	0x00...0xFF
Sub-index (MSB)	Sub-index of the IO-Link object (high byte) ▪ Sub-index = 0x**XX**YY ▪ Sub-index (MSB) = 0x**XX**	8 bits	0x00...0xFF
Trigger	Control of the command execution	1 bit	0x0 = do not process command 0x1 = execute command
Command	Command number	7 bits	0x01 = read 0x02 = write
Length of the user data	Number of bytes that contain relevant user data	8 bits	0x00 = 0 bytes ... 0x20 = 32 bytes
Data (byte n)	User data	8 bits	0x00...0xFF

Response channel

8468

Byte	Content	
4	Port no. (LSB)	
5	Port no. (MSB)	
6	Index (LSB)	
7	Index (MSB)	
8	Sub-index (LSB)	
9	Sub-index (MSB)	
10	Handshake	Command
11	Result	
12	Length of the response data (number of bytes)	
13	Data (byte 0) or diagnostic data	
14	Data (byte 1)	
...	...	
44	Data (byte 31)	
45	reserved	

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) ▪ Port no. = 0xXXYY ▪ Port no. (LSB) = 0xYY	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = Port X08
Port no. (MSB)	Number of the IO-Link port (high byte) ▪ Port no. = 0xXXYY ▪ Port no. (MSB) = 0xXX	8 bits	0x00
Index (LSB)	Index of the IO-Link object (low byte) ▪ Index = 0xXXYY ▪ Index (LSB) = 0xYY	8 bits	0x00...0xFF
Index (MSB)	Index of the IO-Link object (high byte) ▪ Index = 0xXXYY ▪ Index (MSB) = 0xXX	8 bits	0x00...0xFF
Sub-index (LSB)	Sub-index of the IO-Link object (low byte) ▪ Sub-index = 0xXXYY ▪ Sub-index (LSB) = 0xYY	8 bits	0x00...0xFF
Sub-index (MSB)	Sub-index of the IO-Link object (high byte) ▪ Sub-index = 0xXXYY ▪ Sub-index (MSB) = 0xXX	8 bits	0x00...0xFF
Handshake	Validity of the response data	1 bit	0x0 = invalid data 0x1 = data is invalid
Command	Command number	7 bits	0x01 = read 0x02 = write
Result	Status of the command processing	8 bits	0x00 = command processed without errors 0x01 = errors occurred
Length of the response data	Number of bytes that contain relevant user data	8 bits	0x00 = 0 bytes ... 0x20 = 32 bytes

Data (byte 0) or diagnostic data	User data (byte 0) or error codes	8 bits	User data: 0x00...0xFF Error codes: → **Error codes** (→ p. 80)
Data (byte n)	User data (byte n)	8 bits	0x00...0xFF

Error codes

15475

Error code	Description
0x71	Service not available (unknown command has been sent to the IO-Link port)
0x72	Port blocked (another cyclic process accesses the IO-Link port)
0x74	Invalid data (wrong parameter has been sent in the command)
0x76	Wrong port (wrong port number)
0x77	Wrong port function (wrong port function or wrong parameter has been sent to the device)
0x78	Invalid length (set length is > 0x20)
0x80	Error in the device application (→ description of IODD of the IO-Link device)

Acyclic commands

Contents

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22631

Command 0x10 – set mode

23461

The command changes the operating mode of an IO-Link port of the AL1323.

Corresponding parameter: [Port Mode] (→ **Port configuration** (→ p. 70))

Command request

22990

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Port no. (LSB)							
5	Port no. (MSB)							
6	reserved							
7	reserved							
8	reserved							
9	reserved							
10	Trigger	0x10						
11	Target mode							
12...45	reserved							

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = port X08
Port no. (MSB)	Number of the IO-Link port (high byte) Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Trigger	Control of the command execution	1 bit	0x0 = do not process command 0x1 = execute command
Target mode	Operating type of the IO-Link port	8 bits	0x00 = deactivated 0x01 = operation as digital input (DI) 0x02 = operation as digital output (DO) 0x03 = operation as IO-Link intervals

Command response

8039

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Port no. (LSB)							
5	Port no. (MSB)							
6	reserved							
7	reserved							
8	reserved							
9	reserved							
10	Handshake	0x10						
11	Result							
12	Target Mode							
13...45	reserved							

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = Port X08
Port no. (MSB)	Number of the IO-Link port (high byte) Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Handshake	Status of the execution of the command	1 bit	0x0 = command is executed 0x1 = execution of the command was successful
Result	Error indication	8 bits	0x00 = no errors 0x01 = errors occurred
Target mode	Operating type of the IO-Link port	8 bits	0x00 = deactivated 0x01 = operation as digital input (DI) 0x02 = operation as digital output (DO) 0x03 = operation as IO-Link intervals

Command 0x20 – set validation ID / data storage

23462

The command sets the behaviour of the IO-Link master when connecting a new IO-Link device to an IO-Linkport of the device.

Corresponding parameter: [Validation ID] (→ **Port configuration** (→ p. 70))

Command request

7337

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Port no. (LSB)							
5	Port no. (MSB)							
6	reserved							
7	reserved							
8	reserved							
9	reserved							
10	Trigger	0x20						
11	Validation ID							
9...42	reserved							

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bit	0x01 = port X01 0x02 = port X02 ... 0x08 = port X08
Port no. (MSB)	Number of the IO-Link port (high byte) Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Trigger	Control command execution	1 bit	0x0 = do not process command 0x1 = execute command
Validation ID	Behaviour of the IO-Link master when connecting an IO-Link device to the IO-Link port	8 bits	0x00 = No check 0x01 = Type compatible V1.0 device 0x02 = Type compatible V1.1 device 0x03 = Type compatible V1.1 device with Backup + Restore 0x04 = Type compatible V1.1 device with Restore

Command response

20764

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Port no. (LSB)							
5	Port no. (MB)							
6	reserved							
7	reserved							
8	reserved							
9	reserved							
10	Handshake	0x20						
11	Result							
12	Validation ID							
13..45	reserved							

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = port X08
Port no. (MSB)	Number of the IO-Link port (high byte) Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Handshake	Status of the execution of the command	1 bit	0x0 = command is executed 0x1 = execution of the command was successful
Result	Error indication	8 bits	0x00 = no errors 0x01 = errors occurred
Validation ID	Behaviour of the IO-Link master when connecting an IO-Link device to the IO-Link port	8 bits	0x00 = No check 0x01 = Type compatible V1.0 Device 0x02 = Type compatible V1.1 Device 0x03 = Type compatible V1.1 Device with Backup + Restore 0x04 = Type compatible V1.1 Device with Restore

Command 0x30 – set fail-safe data pattern

23464

The command sets the behaviour of the outputs when the EtherNet/IP connection and the corresponding fail-safe values are interrupted.

Corresponding parameter: [Fail-safe Mode] (→ **Port configuration** (→ p. 70))
The number of the required fail-safe values results from the size of the output data (→ **Process data length** (→ p. 69)).

Command request

23527

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Port no. (LSB)							
5	Port no. (MSB)							
6	reserved							
7	reserved							
8	reserved							
9	reserved							
10	Trigger	0x30						
11	Fail-safe mode							
12	Byte Length N							
13	Fail-safe data (byte 0)							
...	...							
44	Fail-safe data (byte 31)							
45	reserved							

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = port X08
Port no. (MSB)	Number of the IO-Link port (high byte) Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Fail-safe mode	Behaviour of the outputs when the EtherNet/IP connection is interrupted and setting of the corresponding fail-safe values	8 bits	0x00 = No Fail-safe 0x01 = Fail-safe Reset Value 0x02 = Fail-safe Old Value 0x03 = Fail-safe with Pattern
Trigger	Control command execution	1 bit	0x0 = do not process command 0x1 = execute command
Byte Length N	Number of the bytes that contain fail-safe values	8 bits	0x00 = 0 bytes ... 0x20 = 32 bytes
Fail-safe data (byte n)	Fail-Safe value n (n = 0...31)	8 bits	0x00...0xFF

Command response

23529

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
4	Port no. (LSB)							
5	Port no. (MSB)							
6	reserved							
7	reserved							
8	reserved							
9	reserved							
10	Handshake	0x30						
11	Result							
12	Fail-safe mode							
13...45	reserved							

Legend:

Port no. (LSB)	Number of the IO-Link port (low byte) Port no. = 0xXX**YY** ▪ Port no. (LSB) = 0x**YY**	8 bits	0x01 = port X01 0x02 = port X02 ... 0x08 = port X08
Port no. (MSB)	Number of the IO-Link port (high byte) Port no. = 0x**XX**YY ▪ Port no. (MSB) = 0x**XX**	8 bits	0x00
Handshake	Status of the execution of the command	1 bit	0x0 = command is executed 0x1 = execution of the command was successful
Result	Error indication	8 bits	0x00 = no errors 0x01 = errors occurred
Fail-safe mode	Behaviour of the outputs when the EtherNet/IP connection is interrupted	8 bits	0x00 = No Fail-safe 0x01 = Fail-safe Reset Value 0x02 = Fail-safe Old Value 0x03 = Fail-safe with Pattern

Field bus objects

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22640

CIP class services

23651

The device supports the following class and instance services:

Class code		Service	Description
dec	hex		
01	01	Get Attribute All	Read all attribute values of the class or instance
02	02	Set Attribute All	Change all attribute values of the class or instance
05	05	Reset	Reset
09	09	Delete	Delete
14	0E	Get Attribute Single	Read single attribute value of the class or instance
16	10	Set Attribute Single	Change single attribute value of the class or instance
75	4B	Read ISDU	Read ISDU
76	4C	Write ISDU	Write ISDU
78	4E	Forward Close	Close connection
84	54	Forward Open	Open new connection

CIP object classes

23652

The device supports the following CIP object classes:

Class code		Object type	Reference
dec	hex		
01	01	Identity Object	→ **Identity Object (object class: 0x01)** (→ p. 90)
02	02	Message Router Object	→ **Message Router Object (object class: 0x02)** (→ p. 92)
04	04	Assembly Object	→ **Assembly Object (object class: 0x04)** (→ p. 93)
06	06	Connection Manager Object	→ **Connection Manager Object (object class: 0x06)** (→ p. 94)
71	47	Device Level Ring Object	→ **Device Level Ring Object (object class: 0x47)** (→ p. 95)
72	48	Quality of Service	→ **Quality of Service (object class: 0x48)** (→ p. 96)
128	80	IO-Link Requests	→ **IO-Link requests (object class: 0x80)** (→ p. 97)
245	F5	TCP/IP Object	→ **TCP/IP object (object class: 0xF5)** (→ p. 105)
246	F6	Ethernet Link Object	→ **Ethernet Link Object (object class: 0xF6)** (→ p. 108)

Identity Object (object class: 0x01)

23119

The Identity Object contains the general information about the device.

Class attributes

23648

Attr. ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	1
2	Get	Max instance	UINT	Max. number of instances of the object	1
6	Get	Maximum ID Number Class Attributes	UINT	ID of the last class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	ID of the last instance attribute	9

Instance attributes

23649

Attr. ID	Access	Name	Data type	Description	Preset
1	Get	Vendor ID	UINT	Manufacturer ID	322
2	Get	Device type	UINT	Type of unit	12
3	Get	Product code	UINT	Identification of a particular product of a vendor	1323
4	Get	Revision	STRUCT	Revision of the article that is represented by the Identity Object	1.1
		▪ Major revision	USINT	Main revision (1...127)	1
		▪ Minor revision	USINT	Side revision (3 digits, if necessary with zeros in the beginning)	1
5	Get	Status	WORD	Status of the device	
6	Get	Serial number	UDINT	Serial number of the device	
7	Get	Product Name	SHORT STRING	Readable device designation (max. 32 ASCII characters)	IO-Link Master DL EIP 8P IP69K
8	Get	State	USINT	Current status of the device (according to status transition diagram)	
				0 Nonexistent	
				1 Device Self Testing	
				2 Standby	
				3 Operational	
				4 Major Recoverable Fault	
				5 Major Unrecoverable Fault	
				6...254 Reserved	
				255 Default for Get_Attributes_All service	
9	Get	Configuration Consistency Value	UINT	The content shows the configuration of the device	0

Supported services

23667

Service code		Name	Class	Attribute	Description
dec	hex				
01	01	Get_Attribute_All	yes	yes	Read all attributes
05	05	Reset	yes	yes	Reset
14	0E	Get_Attribute_Single	yes	yes	Read single attribute
16	10	Set_Attribute_Single	yes	yes	Change single attribute

If an Identity Object receives a reset request, it carries out the following actions:

- It checks if it supports the requested reset type.
- It responds to the request.
- It tries to execute the requested reset type.

Supported reset types:

- 0 Reboot the device (obligatory for all EtherNet/IP devices).
- 1 Restore factory settings and reboot the device.

Message Router Object (object class: 0x02)

23694

The Message Router Object provides an access with which an EtherNet/IP client can address a service to any object class or instance in the physical device.

Class attributes

23695

Attr. ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	1
2	Get	Max instance	UINT	Max. number of instances of the object	1
3	Get	Number of Instances	UINT	Number of instances	1
6	Get	Maximum ID Number Class Attributes	UINT	ID of the last class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	ID of the last instance attribute	0

Instance attributes

23696

The object has no instance attributes.

Supported services

23697

Service code		Name	Class	Attribute	Description
dec	hex				
14	0E	Get_Attribute_Single	yes	no	Read single attribute value

Assembly Object (object class: 0x04)

23690

The Assembly Object combines attributes of several objects to allow data to be sent to or received from each object via one connection.

Class attributes

23691

Attr. ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	2
2	Get	Max instance	UINT	Max. number of instances of the object	0x00C7
3	Get	Number of Instances	UINT	Number of instances	3
6	Get	Maximum ID Number Class Attributes	UINT	ID of the last class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	ID of the last instance attribute	4

Instance attributes

23692

Attr. ID	Access	Name	Data type	Description	Preset
100	Get	Input assembly	STRUCT	Cyclic input data (→ **Input assembly (Instance 100): I/O data + acyclic data + diagnosis data** (→ p. 72))	--
150	Get, Set	Output assembly	STRUCT	Cyclic output data (→ **Output assembly (Instance 150): I/O data + acyclic data** (→ p. 76))	--
199	Get, Set	Configuration assembly	STRUCT	Configuration data (→ **Configuration Assembly (Instance 199)** (→ p. 68))	--

Supported services

23693

Service code		Name	Class	Attribute	Description
dec	hex				
14	0E	Get_Attribute_Single	yes	yes	Read attribute value
16	10	Set_Attribute_Single	no	yes	Change attribute value

Connection Manager Object (object class: 0x06)

23698

The Connection Manager Object structures and manages the internal resources that are used for the connection.

Class attributes

23699

Attr ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	1
2	Get	Max instance	UINT	Max. number of instances of the object	1
3	Get	Number of Instances	UINT	Number of instances	3
6	Get	Maximum ID Number Class Attributes	UINT	ID of the last class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	ID of the last instance attribute	0

Instance attributes

23696

The object has no instance attributes.

Supported services

23701

Service code		Name	Class	Attribute	Description
dec	hex				
14	0E	Get_Attribute_Single	yes	yes	Read single attribute
16	10	Set_Attribute_Single	no	yes	Change single attribute
78	4E	Forward_Close	yes	no	Close connection
84	54	Forward_Open	yes	no	Open new connection

Device Level Ring Object (object class: 0x47)

23657

The Device Level Ring (DLR) Object represents the interface for configuration and status information.

Class attributes

23658

Attr ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	3
2	Get	Max instance	UINT	Max. number of instances of the object	1
6	Get	Maximum ID Number Class Attributes	UINT	ID of the last class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	ID of the last instance attribute	12

Instance attributes

23659

Attr. ID	Access	Name	Data type	Description		Preset
1	Get	Network Topology	USINT	current network topology		0
2	Get	Network status	USINT	current network status		0
10	Get	Active Supervisor	STRUCT of	Identification of the supervisor		0
			▪ UDINT	IP address of the supervisor		
			▪ ARRAY of 6 USINTs	MAC address of the supervisor		
12	Get	Capability Flags	DWORD	DLR functions of the device		0x82
				Bit 0	Announced-based ring node	0
				Bit 1	Beacon-based ring node	1
				Bit 2...4	reserved	--
				Bit 5	Supervisor capable	0
				Bit 6	Redundant Gateway capable	0
				Bit 7	Flush_Table frame capable	1
				Bit 8..31	reserved	--

I

Supported services

23660

Service code		Name	Class	Attribute	Description
dec	hex				
1	01	Get_Attribute_All	no	yes	Read all attribute values
14	0E	Get_Attribute_Single	yes	yes	Read single attribute value

Quality of Service (object class: 0x48)

23661

Quality of Service (QoS) enables prioritising of Ethernet frames. The priorities of the Ethernet frames can be influenced with the attributes "Differentiate Service Code Points" (DSCP) or "802.1Q Tag".

Class attributes

23662

Attr ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	3
2	Get	Max instance	UINT	Max. number of instances of the object	1
6	Get	Maximum ID Number Class Attributes	UINT	ID of the last class attribute	7
7	Get	Maximum ID Number Instance Attributes	UINT	ID of the last instance attribute	8

Instance attributes

23663

Attr ID	Access	Name	Data type	Description	Value
1	Get	802.1Q tagRevision	USINT	Current network topology	0
2	Get, Set	DSCP PTP Event	USINT	DSCP value for PTP event frames	59
3	Get, Set	DSCP PTP general	USINT	DSCP value for PTP general frames	47
4	Get, Set	DSCP PTP Urgent	USINT	DSCP value for implicit messages with "urgent" priority	55
5	Get, Set	DSCP Scheduled	USINT	DSCP value for implicit messages with "scheduled" priority	47
6	Get, Set	DSCP High	USINT	DSCP value for implicit messages with "high" priority	43
7	Get, Set	DSCP Low	USINT	DSCP value for implicit messages with "low" priority	31
8	Get, Set	DSCP explicit	USINT	DSCP value for explicit messages with "scheduled" priority	27

Supported services

23664

Service code		Name	Class	Attribute	Description
dec	hex				
01	01	Get_Attribute_All	yes	yes	Read all attribute values
14	0E	Get_Attribute_Single	no	yes	Read single attribute value

IO-Link requests (object class: 0x80)

23121

The manufacturer-specific object "IO-Link Requests" enables read and write access to the IO-Link objects of an IO-Link device connected to a AL1323 via ISDU (Index Service Data Unit). The object projects the mechanisms of the CIP addressing on the IO-Link protocol.

Class attributes

23668

Attr ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	4
2	Get	Max instance	UINT	Max. number of instances of the object	2
6	Get	Maximum ID Number Class Attributes	UINT	Number of instances of the object	8

Instance attributes

23669

The required IO-Link port of the device is addressed via the instance attribute.

Supported services

23670

Service code		Name	Class	Attribute	Description
dec	hex				
75	4B	→ Read_ISDU (→ p. 98)	no	yes	Read ISDU
76	4C	→ Write_ISDU (→ p. 102)	no	yes	Read ISDU

Read_ISDU

23118

With Read_ISDU, parameters of a connected IO-Link device can be read.

Read Request

23702

Attribute determines the IO-Link port to which the IO-Link device is connected. The area "User Specific Service Data" contains the IO-Link index and the IO-Link sub-index of the IO-Link object whose value is to be read:

CIP format	Data type	MSG Config	IO-Link mapping
Class ID	UINT	0x80	IO-Link acyclic access
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x01...0x08	Port number
Service code ID	USINT	0x4B	Read Request (ISDU_Read)
User specific service data	UINT	Index	IO-Link ISDU object index
	USINT	Subindex	IO-Link ISDU object sub-index

Read response

23114

- **Positive response**

If the service has been executed successfully (Error Code = 0), the read data are returned bit by bit (User Specific Service Data). The answer has the following format:

CIP format	Data type	MSG Config	IO-Link mapping
Class ID	UINT	0x80	IO-Link acyclic access
Instance ID	UINT	1	IO-Link master
Attributes	USINT	1...8	Port number
Service code ID	USINT	0x4C	Read response
Error code	USINT	0	--
Extended error code	USINT	0	--
User specific service data	USINT	e.g. 0xAB	Data (byte 0)
	USINT	e.g. 0xCD	Data (byte 1)
	...		...
	USINT	e.g. 0xEF	Data (byte n)

The read data is in the IO-Link format. If necessary, the user needs to adapt the byte arrangement of the read data to the CIP format.

- **Negative response**

If an error occurs while executing the service (Error Code <> 0), an extended error code is transmitted. The answer has the following format:

CIP format	Data type	MSG Config	IO-Link mapping
Class ID	UINT	128	IO-Link acyclic access
Instance ID	UINT	1	IO-Link master
Service code ID	USINT	0x4B	Read response
Attributes	USINT	1...8	port number
Error code	USINT	<> 0	--
Extended error code	USINT	0	--
User specific service data	USINT		IO-Link error code (if error code = 0x1E)
	USINT		Additional code (if error code = 0x1E)

Error code:

Code	Description
0x02	Resource not available: The IO-Link port is busy processing another acyclic service.
0x05	Invalid class ID or instance ID
0x08	Wrong service ID: only service code 0x4B or 0x4C is permitted
0x09	Wrong attribute ID: wrong port number
0x20	Invalid parameter value (e.g. invalid length)
0x1E	Embedded service, error: Error occurred during an IO-Link service. Byte 0 and byte 1 of the User Specific Service Data contain the IO-Link error code and an additional code that are returned by the IO-Link master (see below).

IO-Link error code:

Code	Description
0x00	RESULT_SUCCESS
0x01	RESULT_STATE_CONFLICT
0x02	RESULT_NOT_SUPPORTED
0x03	RESULT_SERVICE_PENDING
0x04	RESULT_WRONG_PARAMETER
0x05	RESULT_NO_COMMUNICATION
0x06	RESULT_MIN_CYCLE_TIME
0x07	RESULT_NO_RESOURCES
0x08	RESULT_ABORT
0x1E	RESULT_UNKNOWN_COMMAND
0x1F	RESULT_NOT_CONNECTED
0x20	RESULT_NOT_ALLOWED
0x21	RESULT_WRONG_LENGTH
0x22	RESULT_WRONG_TYPE

Example: reading the parameter value of anIO-Link device

23110

Task: reading the value of the parameter X of an IO-Link device

- IO-Link device in the port: 0x02
- Parameter X in the object directory of an IO-Link device: Index: 90, sub-index 3

From this, the following results for the configuration of the EtherNet/IP command Message (MSG):

CIP format	Data type	MSG Config	Description
Class ID	UINT	0x80	IO-Link acyclic access
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x02	Port number
Service code ID	USINT	0x4B	Service "ISDU_Read"
User specific service data	UINT	0x005A	IO-Link ISDU object index
	USINT	0x03	IO-Link ISDU object sub-index

After successful execution of the request, the response area has the following content:

CIP format	Data type	MSG Config	Description
Class ID	UINT	0x80	Object class "IO-Link Requests"
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x02	Port number
Service code ID	USINT	0x4B	Service "ISDU_Read"
Error code	USINT	0x00	Request processed successfully
Extended error code	USINT	0x00	--
User specific service data	USINT	e.g. 0x12	Parameter value that has been read (byte 0)
	USINT	e.g. 0x34	Parameter value that has been read (byte 1)

If an error occurs while the request is executed, the response area has the following content:

CIP format	Data type	MSG Config	Description
Class ID	UINT	0x80	Object class "IO-Link Requests"
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x02	Port number
Service code ID	USINT	0x4B	Service "ISDU_Read"
Error code	USINT	9x1E	Error code: Embedded service error
Extended error code	USINT	0x00	--
User specific service data	USINT	e.g. 0x04	IO-Link error code: wrong parameter
	USINT	e.g. 0x27	Additional code

Write_ISDU

23111

With Write_ISDU, the parameters of a connected IO-Link device can be changed.

Write Request

23703

Attribute determines the IO-Link port to which the IO-Link device is connected. The area "User Specific Service Data" contains the IO-Link index, the IO-Link sub-index of the IO-Link object whose value is to be changed. It is followed, bit by bit, by the value that is to be assigned to the parameter.

CIP format	Data type	MSG Config	IO-Link mapping
Class	UINT	0x80	IO-Link acyclic access
Instance	UINT	0x1	IO-Link master
Attribute	USINT	0x01...0x08	Port number
Service code ID	USINT	0x4C	Write Request (ISDU_Write)
User specific service data	UINT	Index	IO-Link ISDU object index
	USINT	Subindex	IO-Link ISDU object sub-index
	USINT	e.g. 0xAB	IO-Link ISDU data (byte 0)
	USINT	e.g. 0xBC	IO-Link ISDU data (byte 1)

Write response

23115

- **Positive response**

If the service has been executed successfully (Error Code = 0), the area "User Specific Data" stays empty The answer has the following format:

CIP format	Data type	MSG Config	IO-Link mapping
Class	UINT	0x80	IO-Link acyclic access
Instance	UINT	0x01	IO-Link master
Attribute	USINT	0x01...0x08	Port number
Service code ID	USINT	0x4C	Service "ISDU_Write"
Error code	USINT	0	--
Extended error code	USINT	0	--

- **Negative response**

If an error occurs while executing the service (Error Code <> 0), an extended error code is transmitted. The answer has the following format:

CIP format	Data type	MSG Config	IO-Link mapping
Class ID	UINT	128	IO-Link acyclic access
Instance ID	UINT	1	IO-Link master
Service code ID	USINT	0x4B	Read response
Attributes	USINT	1...8	Port number
Error code	USINT	<> 0	--
Extended error code	USINT	0	--
User specific service data	USINT		IO-Link error code (if error code = 0x1E)
	USINT		Additional code (if error code = 0x1E)

Error code:

Code	description
0x02	Resource not available: The IO-Link port is busy processing another acyclic service.
0x05	Invalid class ID or instance ID
0x08	Wrong service ID: only service code 0x4B or 0x4C is permitted
0x09	Wrong attribute ID: wrong port number
0x20	Invalid parameter value (e.g. invalid length)
0x1E	Embedded service, error: Error occurred during an IO-Link service. Byte 0 and byte 1 of the User Specific Service Data contain the IO-Link error code and an additional code that are returned by the IO-Link master (see below).

IO-Link error code:

Code	description
0x00	RESULT_SUCCESS
0x01	RESULT_STATE_CONFLICT
0x02	RESULT_NOT_SUPPORTED
0x03	RESULT_SERVICE_PENDING
0x04	RESULT_WRONG_PARAMETER
0x05	RESULT_NO_COMMUNICATION
0x06	RESULT_MIN_CYCLE_TIME
0x07	RESULT_NO_RESOURCES
0x08	RESULT_ABORT
0x1E	RESULT_UNKNOWN_COMMAND
0x1F	RESULT_NOT_CONNECTED
0x20	RESULT_NOT_ALLOWED
0x21	RESULT_WRONG_LENGTH
0x22	RESULT_WRONG_TYPE

Example: changing the parameter value of an IO-Link device

23109

Task: changing the parameter X of an IO-Link device

- IO-Link device in the port: 0x03
- Parameter X in the object directory of an IO-Link device: Index: 91, sub-index 5
- new parameter value: 0xABCD

From this, the following results for the configuration of the EtherNet/IP command Message (MSG):

CIP format	Data type	MSG Config	Description
Class ID	UINT	0x80	IO-Link acyclic access
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x03	Port number
Service code ID	USINT	0x4C	Service "ISDU_Write"
User specific service data	UINT	0x005B	IO-Link ISDU object index
	USINT	0x05	IO-Link ISDU object sub-index
	USINT	0xAB	New parameter value (MSB)
	USINT	0xCD	New parameter value (LSB)

After successful execution of the request, the response area has the following content:

CIP format	Data type	MSG Config	Description
Class ID	UINT	0x80	Object class "IO-Link Requests"
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x03	Port number
Service code ID	USINT	0x4B	Service "ISDU_Write"
Error code	USINT	0x00	Request processed successfully
Extended error code	USINT	0x00	--

If an error occurs while the request is executed, the response area has the following content:

CIP format	Data type	MSG Config	Description
Class ID	UINT	0x80	Object class "IO-Link Requests"
Instance ID	UINT	0x01	IO-Link master
Attributes	USINT	0x03	Port number
Service code ID	USINT	0x4B	Service "ISDU_Write"
Error code	USINT	0x1E	Error code: Embedded Service Error
Extended error code	USINT	0x00	--
User specific service data	USINT	e.g. 0x04	IO-Link error code: wrong parameter
	USINT	e.g. 0x27	Additional code

TCP/IP object (object class: 0xF5)

23127

TCP/IP Interface Object enables the configuration of the physical network interface of the device.

Class attributes

23647

Attr ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	4
2	Get	Max instance	UINT	Max. number of instances of the object	1

Instance attributes

23650

Attr. ID	Access	Name	Data type	Description		Preset
1	Get	Status	DWORD	Status of the TCP/IP interface		
				Bit 0...3	Configuration status of the interface	
				Bit 4	Mcast pending (always 0)	
				Bit 5	Interface configuration pending	
				Bit 6	ACD Status	
				Bit 7	ACD Fault	
				Bit 8...31	reserved	
2	Get	Configuration Capability	DWORD	Functions of the interface (flags)		0x95 (BOOTP,DHCP Client,TCP/IP configurable, ACD capable)
				Bit 0	BOOTP Client	
				Bit 1	reserved	
				Bit 2	DHCP Client	
				Bit 3	reserved	
				Bit 4	TCP/IP configurable via EtherNet/IP	
				Bit 5	reserved	
				Bit 6	reserved	
				Bit 7	ACD Capable	
				Bit 8...31	reserved	
3	Get/Set	Configuration Control	DWORD	Interface control (control flags):		0
				Bit 0...3	Start-up configuration	
					0 Static IP configuration	
					1 Configuration via BOOTP	
					2 Configuration via DHCP	
				Bit 4	reserved	
				Bit 5...31	reserved	

Attr. ID	Access	Name	Data type	Description	Preset
4	Get	Physical Link Object path	STRUCT:	Logical path to the physical communication interface: the Ethernet Link object	
		▪ Path Size	▪ UINT	Length (in Little Endian Format as WORD)	02 00
		▪ Path	▪ Padded EPATH	Path	20 F6 24 01
				Class ID = 0xF6 Ethernet Link Object	
				Instance ID = 1	
5	Get/Set	Interface Configuration	STRUCT:	TCP/IP configuration	
		▪ IP Address	▪ UDINT	IP adress	192.168.1.250
		▪ Network mask	▪ UDINT	Subnet mask	255.255.255.0
		▪ Gateway address	▪ UDINT	Default gateway address	0.0.0.0
		▪ Name Server	▪ UDINT	1. Name Server	0.0.0.0
		▪ Name Server 2	▪ UDINT	2. Name Server	0.0.0.0
		▪ Domain Name	▪ STRING	Default domain name	0
6	Get, Set	Host name	STRING	Host name	0
				0 no name configured	
8	Get	TTL value		TTL value	1
9	Get	Mcast Config			0
10	Get/Set	SelectAcd	BOOL	activate ACD	1
				0 deactivate	
				1 activate	
11	Get/Set	Last Conflict Detected	STRUCT:	Structure with information via the latest detected conflict	0
			▪ USINT	Condition of the ACD activity with the latest detected conflict	
				0 Noconflictdetetcted	
				1 Probelpv4Address	
				2 OngoingDetection	
				3 SemiActiveProbe	
			▪ ARRAY of 6 USINT	MAC address	
			▪ ARRAY of 28 USINT	Copy of the data of the ARP PDU in which the conflict was detected	
13	Get/Set	Encapsulation Inactivity Timeout	UINT	Inactivity before the TCP connection is deactivated (in seconds)	120

Supported services

23666

Service code		Name	Class	Attribute	Description
dec	hex				
01	01	Get_Attribute_All	no	yes	Read all attributes
14	0E	Get_Attribute_Single	yes	yes	Read single attribute
16	10	Set_Attribute_Single	no	yes	Change single attribute

Ethernet Link Object (object class: 0xF6)

23129

The Ethernet Link Object contains status information of the Ethernet interface.

Class attributes

23645

Attr ID	Access	Name	Data type	Description	Value
1	Get	Revision	UINT	Revision of the object	4
2	Get	Max Instance	UINT	Max. number of instances of the object	2
3	Get	Number of Instances	UINT	Number of instances of the object	2

Instance attributes

23646

Attr. ID	Access	Name	Data type	Description		Preset
1	Get	Interface Speed	UDINT	Current data rate (in bytes/s) 10 Mbps,100 Mbps.		100
2	Get	Interface Status Flags	DWORD	Status flag of the interface		0x20
				Bit 0	Link status	
				Bit 1	Half/full duplex	
				Bit 2...4	Auto negotiation status	
				Bit 5	Manual setting requires reset	
				Bit 6	Local Hardware Fault	
				Bit 7...31	reserved	
3	Get	Physical Address	ARRAY of 6 USINTS	MAC address		
4	Get	Interface Counters	STRUCT of 11 UDINTs	Interface-specific counter		
5	Get	Media counters	STRUCT of 12 UDINTs	Medium-specific counter		
6	Get, Set	Interface control	STRUCT of	Control bits: Bit 0: Auto negotiate Bit 1: Forced Duplex Mode (full 1, half 0)		0
			▪ WORD	Control bits of the interface		
				Bit 0	0 = auto-negotiation active	
					1 = auto-negotiation inactive	
				Bit 1	0 = Half duplex	
					1 = Full duplex	
				Bit 2..15	reserved	
			▪ UINT	Data rate of the interface		
				10	10 Mbps	
				100	100 Mpbs	

Attr. ID	Access	Name	Data type	Description		Preset
7	Get	Interface Type	USINT	Physical interface type		2
				0	unknown	
				1	Internal interface	
				2	Twisted pair	
				3	Optical fibre	
				4...255	reserved	
8	Get	Interface state	USINT	Current status of the interface		0
				0	unknown	
				1	active; ready for transmission and reception	
				2	not active	
				3	Test mode	
				4...255	reserved	
9	Get	Admin State	USINT	Control of the access to the interface		1
				0	reserved	
				1	Activate interface	
				2	Deactivate interface	
				3...255	reserved	
10	Get	Interface label	SHORT_ STRING	Designation of the interface		"X21" (instance 1) "X22" (instance 2)
11	Get	Interface capability	STRUCT of	Capabilities of the interface		
			▪ DWORD	Transmission rate		
				10	10 Mbps	
				100	100 Mbps	
			▪ DWORD	Duplex mode		
				HD	Half duplex	
				FD	Full duplex	
300	Get, Set	MDIX	???	MDIX configuration		3
				0		
				1	MDI	
				2	MDIX	
				3	autoMDI	
				4...255	reserved	

Supported services

23665

Service code		Name	Class	Attribute	Description
dec	hex				
01	01	Get_Attribute_All	no	yes	Read all attribute values
14	0E	Get_Attribute_Single	yes	yes	Read single attribute value
16	10	Set_Attribute_Single	no	yes	Change single attribute value

13.3 ifm IoT Core

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13.3.1 Overview: IoT profile

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Profile: deviceinfo

17135

Element (identifier)	Properties	mandatory	Comments
deviceinfo	▪ type = structure ▪ profiles = deviceinfo		characterises the element as device information
deviceinfo/devicename	type = data	optional	
deviceinfo/devicefamiliy	type = data	optional	
deviceinfo/devicevariant	type = data	optional	
deviceinfo/devicesymbol	type = data	optional	
deviceinfo/deviceicon	type = data	optional	
deviceinfo/serialnumber	type = data	mandatory	
deviceinfo/productid	type = data	optional	
deviceinfo/productname	type = data	optional	
deviceinfo/productcode	type = data	mandatory	
deviceinfo/producttext	type = data	optional	
deviceinfo/ordernumber	type = data	optional	
deviceinfo/productiondate	type = data	optional	
deviceinfo/productioncode	type = data	optional	
deviceinfo/hwrevision	type = data	mandatory	
deviceinfo/swrevision	type = data	mandatory	
deviceinfo/bootloaderrevision	type = data	optional	
deviceinfo/vendor	type = data	optional	
deviceinfo/vendortext	type = data	optional	
deviceinfo/vendorurl	type = data	optional	
deviceinfo/vendorlogo	type = data	optional	
deviceinfo/productwebsite	type = data	optional	
deviceinfo/supportcontact	type = data	optional	
deviceinfo/icon	type = data	optional	
deviceinfo/image	type = data	optional	
deviceinfo/standards	type = data	optional	

Profile: devicetag

17438

Element (identifier)	Properties	mandatory	Comments
devicetag	▪ type = structure ▪ profiles = devicetag		
devicetag/applicationtag	type = data	mandatory	
devicetag/applicationgroup	type = data	optional	
devicetag/machinecode	type = data	optional	
devicetag/tenant	type = data	optional	

Profile: iolinkmaster

14997

Element (identifier)	Properties	mandatory	Comments
masterport	▪ type = structure ▪ profiles = iolinkmaster		Executable service
masterport/mode	▪ type = data ▪ profile = parameter	mandatory	
masterport/comspeed	▪ type = data ▪ profile = parameter	mandatory	
masterport/mastercycletime_actual	▪ type = data ▪ profile = parameter	mandatory	
masterport/mastercycletime_preset	▪ type = data ▪ profile = parameter	mandatory	
masterport/validation_datastorage_mode	▪ type = data ▪ profile = parameter	mandatory	
masterport/validation_vendorid	▪ type = data ▪ profile = parameter	mandatory	
masterport/validation_deviceid	▪ type = data ▪ profile = parameter	mandatory	
masterport/additionalpins_in	▪ type = data ▪ profile = processdata	optional	
masterport/additionalpins_out	▪ type = data ▪ profile = processdata	optional	
masterport/portevent	▪ type = data	mandatory	
masterport/iolinkdevice	▪ type = structure ▪ profile = iolinkdevice_full	mandatory	

Profile: parameter

16545

The profile is used to mark the elements of type `data` as parameters (acyclic data). The profile defines no substructure.

Profile: processdata

16569

The profile is used to mark the elements of type `data` as process data (cyclic data). The profile does not define a substructure.

Profile: service

16575

Element (identifier)	Properties	mandatory	Comments
service	▪ type = service ▪ profiles = service		Executable service

Profile: software

10999

Element (identifier)	Properties	mandatory	Comments
software	▪ type = structure ▪ profiles = software		characterises the element as software
software/version	type = data	mandatory	
software/reboot	type = service	optional	
software/factoryreset	type = service	optional	
software/status	type = structure	optional	
software/diag	type = structure	optional	

Profile: timer

10997

Element (identifier)	Properties	mandatory	Comments
timer	▪ type = structure ▪ profiles = timer		Executable service
timer/counter	▪ type = data ▪ profile = parameter	mandatory	
timer/interval	▪ type = data ▪ profile = parameter	optional	
timer/start	type = service	optional	
timer/start	type = service	optional	

13.3.2 Overview: IoT types

16547

The ifm IoT Core uses the following element types:

Name	Description
structure	Element is a structure element (like a folder in a file system)
service	Element is a service that can be addressed from the network
Event	Element is an event that can be started by the firmware and sends messages.
data	Element is a data point
device	Root element a device represents

13.3.3 Overview: IoT services

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17708

Service: factoryreset

12188

Name: factoryreset
Description: The service sets the parameters of the device to the factory settings.
Applicable to: different objects
Request data: none
Return data (data): none

Service: gettree

17435

Name: gettree
Description: The service reads the complete device description of the AL1323 and provides it as JSON object.
Applicable to: Objects of the `device` type
Request data: none
Return data (data):

Data field	Required field	Data type	Default	Description
Identifier	mandatory	STRING		Identifier of the root element
type	mandatory	STRING		Type of the element
format	optional	JSON object	empty	Format of the data content
uid	optional	STRING	empty	
profiles	optional	JSON array	empty	
subs	mandatory	JSON array		Subelements
hash	optional	STRING		

Service: getdata

12223

Name: getdata
Description: Service reads the value of a data point and provides it.
Applicable to: Objects of the `data` type
Request data: none
Return data (data):

Data field	Required field	Data type	Default	Description
value	mandatory	STRING		Value of the element/data point

Example: `{"code":10,"cid":4711,"adr":"devicetag/applicationtag/getdata"}`

Service: getdatamulti

17964

Name: getdatamulti
Description: The service sequentially reads the values of several data points and provides them. The value and the diagnostic code are provided for each data point.
Applicable to: Objects of the `data` type
Request data:

Data field	Required field	Data type	Default	Description
datatosend	mandatory	ARRAY OF STRINGS		List of data points to be requested; data points must support the service getdata
consistent	optional	BOOL	false	

Return data (data): for each requested data point

Data field	Required field	Data type	Default	Description
Data point	mandatory	STRING		Data point request
code	mandatory	INT		Diagnostic code of the request
data	mandatory	STRING		Value of the data point

Service: getidentity

17134

Name: getidentity

Description: The service reads the complete device description of the AL1323 and provides it as JSON object.

Applicable to: Objects of the `device` type

Request data: none

Return data (data):

Data field	Required field	Data type	Default	Description
iot		device		Device description as JSON object
iot.name	mandatory	STRING		
iot.uid	optional	STRING		
iot.version	mandatory	STRING		
iot.catalogue	optional	ARRAY OF OBJECTS		
iot.deviceclass	optional	ARRAY OF STRING		
iot.serverlist		ARRAY OF OBJECTS		
device	optional			AL1323
device.serialnumber	optional			Serial number
device.hwrevision	optional			Hardware version
device.swrevision	optional			Software version
device.custom	optional			

Service: getsubscriptioninfo

17436

Name: getsubscriptioninfo

Description: The service provides information about an existing subscription (subscribe).

Applicable to: Objects of the `event` type

Request data:

Data field	Required field	Data type	Default	Description
subscriptionid	mandatory	INT		ID of the subscription

Return data (data): none

Service: iolreadacyclic

12222

Name: iolreadacyclic
Description: The service acyclically reads the parameter value of an IO-Link device. It is accessed via IO-Link index and subindex.
Applicable to: IO-Link specific objects
Request data:

Data field	Required field	Data type	Default	Description
index	mandatory	NUMBER		IO-Link index of the parameter
subindex	mandatory	NUMBER		IO-Link subindex of the parameter

Return data (data):

Data field	Required field	Data type	Default	Description
value	mandatory	STRING		Value in hexadecimal format

Service: iolwriteacyclic

11035

Name: iolwriteacyclic
Description: The service acyclically writes the parameter value of an IO-Link device. It is accessed via IO-Link index and subindex.
Applicable to: IO-Link specific objects
Request data:

Data field	Required field	Data type	Default	Description
index	mandatory	NUMBER		IO-Link index of the parameter
subindex	mandatory	NUMBER		IO-Link subindex of the parameter
value	mandatory	NUMBER		New value of the parameter

Return data (data): none

Service: reboot

10986

Name: reboot
Description: The service reboots the device.
Applicable to: different objects
Request data: none
Return data (data): none

Service: setblock

12224

Name: setblock
Description: The service simultaneously sets the values of several data points of a structure.
Applicable to: Objects of the `data` type
Request data:

Data field	Required field	Data type	Default	Description
datatosend	mandatory	ARRAY OF (STRINGS)		List of data points and their new values; data points must support the service setdata
consistent	optional	BOOL	false	

Return data (data): none

Example:

```
{
"code":10,
"cid":4711,
"adr":"/iotsetup/network/setblock",
"data":{"consistent":true,"datatosend":["ipaddresse":"192.168.0.6","ipdefaultgatew
ay":"192.168.0.250"]}
}
```

Service: setdata

11036

Name: setdata
Description: The service sets the value of the data point.
Applicable to: Objects of the `data` type
Request data:

Data field	Required field	Data type	Default	Description
newvalue	mandatory	STRING		New value of the element/data point

Return data (data): none
Example:

```
{
"code":10,
"cid":4711,
"adr":"devicetag/applicationtag/setdata",
"data":{"newvalue":"ifm IO-Link master"}
}
```

Service: setelementinfo

7159

Name: setelementinfo
Description: The service sets the uid of an element.
Applicable to: Objects of the `device` type
Request data:

Data field	Required field	Data type	Default	Description
url	mandatory	STRING		URL of the element to be changed
uid	optional	STRING		UID to be set
profiles	optional	JSON array		
format	optional	JSON object		

Return data (data):

Data field	Required field	Data type	Default	Description
identifier	mandatory	STRING		Identifier of the element
type	mandatory	STRING		Type of the element
format	optional	JSON object	blank	Format of the data or the service content
uid	optional	STRING	blank	
profiles	optional	JSON array	blank	
hash	optional	STRING	--	

Service: subscribe

10920

Name: subscribe
Description: The service subscribes to the values of data points. The data points to be subscribed are transferred as a list. The IO-Link master sends changes to the data drain defined in callback.
Applicable to: Objects of the `event` type
Request data:

Data field	Required field	Data type	Default	Description
callback	mandatory	STRING		Address to which IoT Core event notifications are to be sent; complete URL: ipaddress:port/path
datatosend	mandatory	ARRAY OF STRINGS		List from URLs of data elements; elements have to support getdata

Return data (data): none

Service: unsubscribe

16567

Name: unsubscribe

Description: The service deletes an existing subscription. unsubcribe is successful if cid and the callback address are registered for a subscription (subscribe). If the STRING "DELETE" is provided in callback, the IO-Link master deletes all active subscriptions.

Applicable to: Objects of the `event` type

Request data:

Data field	Required field	Data type	Default	Description
callback	mandatory	STRING		Address to which IoT Core event notifications are to be sent; complete URL: ipaddress:port/path

Return data (data): none

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