



Operating Instructions  
IO-Link Master with EtherCAT interface  
DataLine  
4 Ports  
IP 65 / IP 66 / IP 67

**AL1330**

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

English

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# 1 Preliminary note

## Contents

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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 - EtherCAT gateway (DataLine) 4 port IP 65 / IP 66 / IP 67" (art. no.: AL1330).

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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#### 3.1 Permitted use

22052

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.

#### 3.2 Prohibited use

22053

The device may not be used beyond the limits of the technical data (→ **Technical data** (→ p. [61](#)))!

## 4 Function

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## 4.1 Communication, parameter setting, evaluation

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### 4.1.1 IO-Link

7773

The device offers the following IO-Link functions:

- IO-Link master (IO-Link revision 1.0 and 1.1)
- 4 IO-Link ports for connection of IO-Link devices
- Provision of process data of the connected IO-Link devices for LR SMARTOBSERVER monitoring software (→ [www.ifm.com](http://www.ifm.com))

### 4.1.2 EtherCAT

2259

The device offers the following EtherCAT functions:

- Provision of the functions of a EtherCAT Slave
- 2 port switch for access to the EtherCAT interface (X21/X22)
- Gateway for transmission of the process and parameter data between the connected IO-Link devices and the higher-level EtherCAT 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 AL1330 with LR DEVICE parameter setting software, EtherCAT projection software or ifm IoT-Core services.
- Parameter setting of the connected IO-Link devices (sensors, actuators) with LR DEVICE parameter setting software, EtherCAT 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 EtherCAT 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 4 additional digital inputs (type 2 according to EN 61131-2).

The digital inputs are on pin 2 of the IO-Link ports X01 ... X04.

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

## 4.3 IO-Link supply

7623

The device has 4 supplies for IO-Link devices.

The IO-Link ports X01...X04 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.

## Electrical connection

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## 5.2 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.

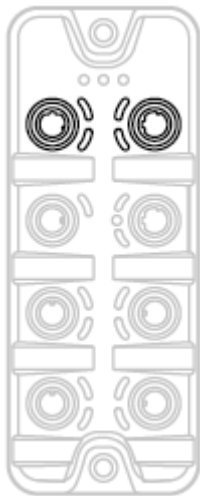
Wiring: → **Technical data** (→ p. 61)



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

## 5.3 EtherCAT ports

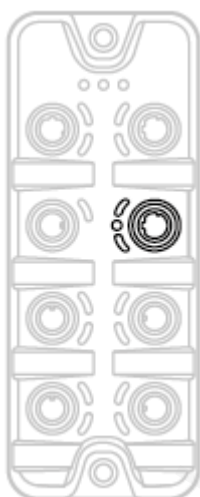
17849



- ▶ Connect the device via the M12 socket X21 and/or X22 to the EtherCAT network (e.g. EtherCAT PLC, additional EtherCAT device)
  - Tightening torque: 0.6...0.8 Nm
- ▶ To connect the devices, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 or higher (→ **Accessories** (→ p. 59)).
- ▶ Cover the unused sockets with M12 protective caps (→ **Accessories** (→ p. 59)).
  - Tightening torque 0.6...0.8 Nm

## 5.4 IoT port

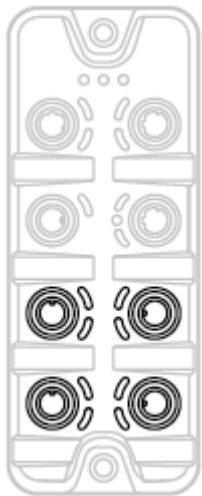
11029



- ▶ 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 or higher (→ **Accessories** (→ p. 59)).
- ▶ Cover the unused sockets with M12 protective caps (→ **Accessories** (→ p. 59)).
  - Tightening torque 0.6...0.8 Nm

## 5.5 IO-Link ports

22684



### Ports X01...X04: For use as IO-Link port class A:

- ▶ Connect the connector of the IO-Link devices with the M12 sockets X01 ... X04.
  - 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 or higher (→ Accessories).

### Ports X01...X04: For use as IO-Link port class B:

- ▶ Connect the connector of the IO-Link devices via the adapter with the M12 sockets X01 ... X04.
  - Tightening torque: 0.6...0.8 Nm
- ▶ To connect the devices, use M12 connectors with protection rating IP 65 / IP 66 / IP 67 or higher (→ Accessories).
- ▶ Cover the unused sockets with M12 protective caps (→ Accessories).
  - Tightening torque 0.6...0.8 Nm

### 5.5.1 Input circuit

18629

The inputs of the ports X01...X04 (pin 2) provide a type 2 behaviour according to standard EN61131-2, the connected electronics must be rated for this electrically.

## 5.5.2 IO-Link circuits

11616

The IO-Link interfaces of the device meet the requirements of the IO-Link specification 1.0 to 1.1.2.



The connected IO-Link devices may only be supplied via the AL1330.

Exception: Connection of IO-Link devices to ports X01...X04 via suitable connection technology for port class B operation (→ **IO-Link ports** (→ p. [16](#))):

The external supply for port class B operation must be galvanically separated from the circuit of the AL1330 by assuring basic isolation (according to EN61010-1, secondary circuit with maximum 30 V DC derived from applied voltage up to 300 V of overvoltage category II)!

The isolation must be done both for IO-Link devices and for the connection technology.

### NOTICE

Risk of material damage

If the requirements of galvanic separation of the circuits are not observed, the fire protection of the device can not be assured.

- Observe the requirements of the electrical connection of IO-Link devices for port class B operation!

Further information: → **Technical data** (→ p. [61](#))

## 5.6 Connect the device

2580



- ▶ Disconnect power.
- ▶ Connect the unit via M12 socket X31 to 24 V DC (20...30 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 or higher (→ Accessories).

If the port X01...X04 will be used as IO-Link ports Class B:

- ▶ Connect adapter for Port Class B operation to 24 V DC (20...30 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) (→ **IO-Link ports** (→ p. [16](#)))
  - Tightening torque: 0.6...0.8 Nm

## 6 Operating and display elements

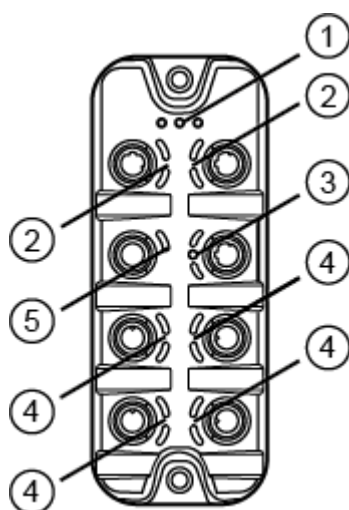
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### 6.1 Overview

17861



- ① RDY, RUN and ERR status LEDs  
→ **Status LEDs** (→ p. [20](#))
- ② Status LEDs L/A of the EtherCAT interfaces 1 (X21) and 2 (X22)  
→ **EtherCAT interface** (→ p. [21](#))
- 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...X04)  
→ **IO-Link ports (Class A)** (→ p. [22](#))
- ⑤ US status LED of the voltage supply (X31)  
→ **Voltage supply** (→ p. [21](#))

## 6.2 LED indicators

22024

The device only has the following LED indicators:

### 6.2.1 Status LEDs

1986

The RDY LED indicates the status of the gateway.

The RUN LED indicates the current state of the EtherCAT state machine.

The ERR LED indicates occurring errors.

| 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                                  |
| RUN        | green | on                                                      | Device in OPERATIONAL state                                                |
|            |       | flashes (2.5 Hz)                                        | Device in PRE-OPERATIONAL state                                            |
|            |       | flashes (200 ms on, 1000 ms off)                        | Device in SAFE-OPERATIONAL state                                           |
|            |       | flashes (10 Hz)                                         | Device is booting and not yet in INIT state or device is in BOOTSRAP state |
|            |       | off                                                     | Device in INIT state                                                       |
| ERR        | red   | on                                                      | Error in application controller                                            |
|            |       | flashes (10 Hz)                                         | Boot error                                                                 |
|            |       | flashes (200 ms on, 200 ms off, 200 ms on, 1000 ms off) | Watchdog error (EtherCAT or process data)                                  |
|            |       | flashes (200 ms on, 1000 ms off)                        | Local error                                                                |
|            |       | flashes (2.5 Hz)                                        | Invalid configuration                                                      |
|            |       | off                                                     | No error                                                                   |

## 6.2.2 EtherCAT interface

17852

Each EtherCAT interface (X21, X22) has 1 L/A LED. The LED indicates the status of the Ethernet connection.

| Status LED |       |         | Description                                     |
|------------|-------|---------|-------------------------------------------------|
| L/A        | green | on      | Ethernet connection established                 |
|            |       | flashes | Data is transmitted via the Ethernet interface. |
|            |       | off     | No Ethernet connection                          |

## 6.2.3 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                    |

## 6.2.4 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. |

## 6.2.5 IO-Link ports (Class A)

22029

Each IO-Link port Class A (X01 ... X04) 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                             |

## 7 Configuration

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## 7.1 LR DEVICE

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22822

On delivery, the AL1330 is configured with the factory settings (→ **Factory settings** (→ p. [58](#))).

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

## 7.1.1 Remarks

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22369

### Offline parameter setting

22405

The AL1330 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 AL1330. 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

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

- ▶ Save changed values on the device.



If the parameter [Access Rights] = [EtherCAT + IoT]:

Different parameter settings in the EtherCAT projection software and the IoT applications can result in undesired system behaviour. The set values of the EtherCAT 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. [32](#))

## 7.1.3 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.

## 7.1.4 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<br>...<br>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<br>...<br>2147483647         | 500 ms<br>...<br>2147483647 ms |
| [Application Tag]             | Source identifier of the IO-Link master in the structure of the LR SMARTOBSERVER (String32)     | Factory setting: AL1330          |                                |



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.

## 7.1.5 Fieldbus: Configure the EtherCAT port

22759

The user can assign a name for the identification of the IO-Link master in the EtherCAT projection software.



The address of the EtherCAT port is assigned via the EtherCAT projection software.

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          |
|---------------|--------------------------------------------|--------------------------|
| [Hostname]    | Name of the device in the EtherCAT network | e.g. al1xxx              |
| [MAC address] | MAC address of the device                  | The value is firmly set. |

- ▶ Save changed values on the device.

## 7.1.6 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. [28](#))).

To activate / deactivate data transfer:

- ▶ Select [Port x] menu (x = 1...4).
- > 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.

## 7.1.7 IO-Link ports: Configure operating mode

17439

The IO-Link ports X01...X04 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...4).
- > The menu page shows the current settings.
- Set the following parameters as required:

| Name                  | Description                                                                                                           | Possible values            |                                                                |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------|
| [Mode]                | Operating mode of the IO-Link port                                                                                    | [Disabled]                 | Port deactivated                                               |
|                       |                                                                                                                       | [DI]                       | Operation as digital input                                     |
|                       |                                                                                                                       | [DO]                       | Operation as digital output                                    |
|                       |                                                                                                                       | [IO-Link]                  | Operation as IO-Link interface                                 |
| [Cycle time actual]** | Current cycle time of the data transfer between IO-Link master and IO-Link device on the port (value in microseconds) | Parameter can only be read |                                                                |
| [Cycle time preset]*  | Cycle time of the data transfer between the IO-Link master and the IO-Link device at the port (value in microseconds) | 0                          | The device automatically sets the fastest possible cycle time. |
|                       |                                                                                                                       | 1                          | 1 microsecond                                                  |
|                       |                                                                                                                       | ...                        | ...                                                            |
|                       |                                                                                                                       | 132800                     | 132800 microseconds                                            |
| [Bitrate]**           | Current transmission rate of the data transfer between the IO-Link master and the IO-Link device on the port          | Parameter can only be read |                                                                |

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

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

- Save changed values on the device.

## 7.1.8 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...4).
- > 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...4) | [No check and clear]                                | <ul style="list-style-type: none"> <li>▪ No verification of the vendor ID and device ID</li> <li>▪ No data storage</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|                             |                                                                                                                        | [Type compatible V1.0 device]                       | <ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.0 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ No data storage</li> </ul>                                                                                                                                                                                                                                                                                                                 |
|                             |                                                                                                                        | [Type compatible V1.1 device]                       | <ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ No data storage</li> </ul>                                                                                                                                                                                                                                                                                                                 |
|                             |                                                                                                                        | [Type compatible V1.1 device with Backup + Restore] | <ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ The IO-Link master saves the parameter values of the connected IO-Link device; modifications of the parameter values are also saved (observe the note!)</li> <li>▪ When connecting an IO-Link device with factory settings, the parameter values stored in the IO-Link master are restored automatically on the IO-Link device.</li> </ul> |
|                             |                                                                                                                        | [Type compatible V1.1 device with Restore]          | <ul style="list-style-type: none"> <li>▪ IO-Link device is compatible with the V1.1 IO-Link standard</li> <li>▪ Verification whether it is an IO-Link device of the same type (validation via vendor ID and device ID)</li> <li>▪ The IO-Link master saves the parameter values of the connected IO-Link device once.</li> <li>▪ When connecting an IO-Link device with factory settings, the parameter values stored in the IO-Link master are restored automatically on the IO-Link device.</li> </ul>                                                                     |
| [Vendor ID]                 | ID of the manufacturer that is to be validated                                                                         | 0<br>...<br>65535                                   | Factory setting: 0<br>ifm electronic: 310                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| [Device ID]                 | ID of the IO-Link device that is to be validated                                                                       | 0<br>...<br>16777215                                | Factory setting: 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

- Save changed values on the device.

## 7.1.9 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     | AL1330              |
| [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                            |                     |

## 7.1.10 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.

## 7.1.11 Firmware: Reboot the device

18105

When rebooting the device, all settings are kept.

To restart the AL1330:

- 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.

## 7.1.12 Configure IO-Link devices

11033

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

### Requirements:

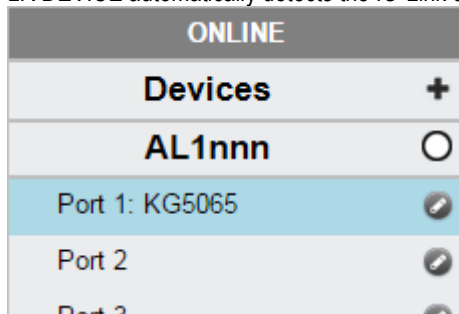
- > IO-Link master is correctly installed and connected to the LR DEVICE parameter setting software.
- > The IO-Link device is correctly connected to the AL1330.
- > Operating mode of the IO-Link port is "IO-Link" (→ **IO-Link ports: Configure operating mode** (→ p. 30)).
- > IoT has write access rights to the IO-Link master (→ **IoT: Configure access rights** (→ p. 26)).

### 1 Select IO-Link master

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

### 2 Add IO-Link device

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

## 7.2 EtherCAT

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17299

On the field bus side, the device can be configured with any EtherCAT compatible projection software. The information in the following sections refers to the EtherCAT projection software TwinCAT 3.1.

### 7.2.1 Install ESI file

12762

To represent the AL1330 in a field bus projection software ifm electronic provides an ESI file. The EDS file can be downloaded from ifm's website. In the ESI file, all parameters, process data and their valid value ranges are defined.

To integrate the ESI file into EtherCAT projection software TwinCAT 3.1:

- ▶ Download ESI file of the device (→ **Download ESI file**).
- ▶ Copy downloaded file to the following subdirectory of the TwinCAT installation directory:  
`..\3.1\Config\Io\EtherCAT`
- ▶ Start TwinCAT.
- > TwinCAT loads the device description to the device catalogue.

## 7.2.2 Integrate the AL1330 into the EtherCAT project

17297

The device is integrated into the project as EtherCAT slave.

### Requirements

- > The ESI file of the AL1330 is installed (→ **Install ESI file** (→ p. 34)).

#### 1 Create/open EtherCAT project

- ▶ Launch EtherCAT projection software.
- ▶ Create a new project.  
OR  
Open an existing project.

#### 2 Configure EtherCAT PLC and IO periphery

- ▶ Select and configure EtherCAT PLC and requested I/O periphery.
- > Project contains EtherCAT PLC and I/O periphery.

#### 3 Integrate the AL1330 into the project

- ▶ In the Solution Explorer: Right-click on devices to which the AL1330 is connected.
- > Context menu appears.
- ▶ In the context menu: Select [Add new item...].
- > Window [Insert EtherCAT Device] appears.
- ▶ Select the AL1330 in the device tree under [ifm electronic] > [ifm IO-Link master].
- ▶ Click on [OK] to add the selected device to the project.
- > TwinCAT adds AL1330 to the project.

#### 4 Save the project

- ▶ Save the project.

## 7.2.3 Configure IO-Link master

18602

The IO-Link master is configured via the CoE interface (→ TwinCAT-online help). The configuration is made via the following parameters:

| Name             | Description                              | Reference                                                |
|------------------|------------------------------------------|----------------------------------------------------------|
| Current Use Case | Access rights to the IO-Link master      | → <b>Manufacturer Specific Index (0x20 00)</b> (→ p. 69) |
| Reset To Factory | Reset IO-Link master to factory settings | → <b>Manufacturer Specific Index (0x20 00)</b> (→ p. 69) |

## 7.2.4 Configure IO-Link ports

17959

The IO-Link ports are configured via the CoE interface (→ TwinCAT-online help). The user can configure each IO-Link port separately. The configuration is made via the following parameters:

| Name                        | Description                                                   | Reference                               |
|-----------------------------|---------------------------------------------------------------|-----------------------------------------|
| IO Settings                 | Configuration of the IO-Link ports X01...X04                  | → <b>IO Settings (0x8000)</b> (→ p. 71) |
| Vendor Specific IO Settings | Manufacturer-specific settings of the IO-Link ports X01...X04 | → <b>IO Settings (0x8000)</b> (→ p. 71) |

## 7.2.5 Configure cyclic process data

16556

Type and number of cyclic input and output data on the IO-Link ports are defined via the fieldbus modules (→ **EtherCAT modules** (→ p. 67)). In the factory settings, all slots are configured with the module "IOL\_4/4\_I/O".

To configure the cyclic process data:

### Requirements

- > AL1330 is integrated (→ **Integrate the AL1330 into the EtherCAT project** (→ p. 35)).

### 1 Open the device editor

- ▶ In the Solution Explorer: Double-click on the node of the AL1330.
- > The window shows the available configuration options.
- ▶ Select the tab [Slots].
- > The window shows the current configuration of the cyclic data.

### 2 Assign fieldbus modules

- ▶ In the left half of the table: Select click on slot of the requested IO-Link port.
- ▶ In the right half of the table: Click on the requested fieldbus module.
- ▶ Click on [<] to assign the requested fieldbus module to the slot.

### 3 Configure more IO-Link ports

- ▶ optional: repeat step 1 for further IO-Link ports.
- > Cyclic data is assigned to the fieldbus slots.
- > The Solution Explorer shows the configured modules as subelements of the device node.

### 4 Save the project

- ▶ Save the project.

## 7.2.6 Read and write cyclic process data

17960



- To check the validity of the cyclic process data, evaluate the PQI byte (→ **Device status / port status (0xF000)** (→ p. 73)).

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.

They cyclic process data of the IO-Link-Ports X01...X04 is accessible via the following index groups:

| Name (Index)             | Description                                       | Reference                                   |
|--------------------------|---------------------------------------------------|---------------------------------------------|
| IO-Link inputs (0x6000)  | Cyclic input data at the IO-Link ports X01...X04  | → <b>IO-Link inputs (0x6000)</b> (→ p. 70)  |
| IO-Link outputs (0x7000) | Cyclic output data at the IO-Link ports X01...X04 | → <b>IO-Link outputs (0x7000)</b> (→ p. 71) |

During the configuration of the fieldbus slots TwinCAT automatically creates variables for the cyclic input and output data. They are found in groups in the folders under the respective fieldbus modules. The user can link the variables directly with the elements of a global variable list (GVL).

The following variables are created:

| Group > Variable | Variable        | Description                                             |
|------------------|-----------------|---------------------------------------------------------|
| [TxPDO]          | [input byte n]  | Byte n of the cyclic input data of the fieldbus module  |
| [RxPDO]          | [output byte m] | Byte m of the cyclic output data of the fieldbus module |

n = 0...(max. number of bytes on configured input data)-1  
m = 0...(max. number of bytes on configured output data)-1

## 7.2.7 Read diagnostic and status information

17961

Diagnostic and status information is accessible via the following index groups:

| Name (Index)                      | Description                                                                                                                                  | Reference                                                                |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|
| MDP Standard Information (0x1000) | <ul style="list-style-type: none"> <li>Device information via IO-Link master</li> <li>Identity Object</li> <li>Diagnostic history</li> </ul> | → <b>MDP Standard Information (0x1000)</b> (→ p. <a href="#">68</a> )    |
| IO Info Data (0x9000)             | Information about IO-Link devices at IO-Link-Ports X01...X04                                                                                 | → <b>IO Info Data (0x9000)</b> (→ p. <a href="#">72</a> )                |
| IO Diag Data (0xA000)             | Diagnostic data of the IO-Link ports X01...X04                                                                                               | → <b>IO Diag data (0xA000)</b> (→ p. <a href="#">72</a> )                |
| Device Status (0xF000)            | <ul style="list-style-type: none"> <li>Status of the IO-Link devices at the IO-Link port X01...X04</li> <li>Port qualifier</li> </ul>        | → <b>Device status / port status (0xF000)</b> (→ p. <a href="#">73</a> ) |

When the IO-Link master is integrated into a EtherCAT project, TwinCAT automatically creates variables for diagnostic and status information in the Solution Explorer. They are grouped in folders under the device node. The user can link the variables directly with the elements of a global variable list (GVL).

The following variables are created:

| Group > Variable                                                       | Description                                          |
|------------------------------------------------------------------------|------------------------------------------------------|
| [TxPDO IO-Link Device Status] > [State of IO-Link Ch.n]                | Status of the IO-Link device at the IO-Link port X0n |
| [TxPDO IO-Link Port Qualifier] > [Qualifier of IO-Link Ch.n]           | Port qualifier bits of the IO-Link port X0n          |
| [TxPDO New Diagnosis Message available] > [New Message Available Flag] | Notification of new diagnostic messages              |

n ... 1...4

## 7.2.8 Configure IO-Link devices

9031

The IO-Link master supports the configuration of the connected IO-Link devices from the EtherCAT projection software. The parameters of an IO-Link device are set via IO-Link index and subindex. The number of the configurable parameters depends on the connected IO-Link device.



Available parameters of the IO-Link devices: → IO Device Description (IODD) of the IO-Link device

The user can read and write IO-Link index and subindex using the following methods:

- Acyclic communication: → **Use acyclic services** (→ p. [39](#))

## 7.2.9 EtherCAT: Programmers' notes

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17965

### Use acyclic services

17958

The AL1330 supports following services for acyclic read and write processes:

- AoE - ADS over EtherCAT (→ **Use ADS over EtherCAT** (→ p. [40](#)))
- CoE - CANopen over EtherCAT (→ **Use CANopen over EtherCAT** (→ p. [41](#)))

## Use ADS over EtherCAT

9109

AoE is suited for interruption-free access to the connected IO-Link devices during the operating time of the device. Access to the IO-Link master with AoE is not supported.



The function blocks for using AoE are part of the `tc2_system.libTwinCAT` library.

The following rules apply to the inputs of the ADS function blocks:

| Input   | Description                                              | Possible values                                                          |                                                                 |
|---------|----------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------|
| PORT    | ADS communication port =<br>0x1000 + IO-Link port number | 0x1001<br>0x1002<br>...<br>0x1004                                        | IO-Link port X01<br>IO-Link port X02<br>...<br>IO-Link port X04 |
| IDXGRP  | AoE index group                                          | 0xF302                                                                   |                                                                 |
| IDXOFFS | Index Offset                                             | e. g. access to index 21, subindex 0:<br>0x0021°0x00°0x00                |                                                                 |
|         | Bits 0-7:                                                |                                                                          |                                                                 |
|         | Bits 8-15:                                               |                                                                          |                                                                 |
|         | Bits 16-31:                                              |                                                                          |                                                                 |
| ERRID   | ADS error code                                           | e. g. access to parameters of the IO-Link<br>device refused: 0x0700°8023 |                                                                 |
|         | Bits 0-15:                                               |                                                                          |                                                                 |
|         | Bits 16-31:                                              |                                                                          |                                                                 |

## Use CANopen over EtherCAT

16206

CoE is suited for acyclic access to the IO-Link master and the connected IO-Link devices. CoE uses the fieldbus objects "IO-Link acyclic command" (→ **IO-Link Acyclic Command (0x3100)** (→ p. 70)). A separate fieldbus object is provided for each IO-Link port.

To have acyclic access to the device via CoE the user can use the following function blocks:

- FB\_EcCoESdoRead: read SDO of an EtherCAT slave
- FB\_EcCoeSdoWrite: write SDO of an EtherCAT slave



The function blocks for using CoE are part of the `Tc2_EtherCAT.library` function library.

► Add `Tc2_EtherCAT.library` function block library to the project

Description of the function blocks: → [Help function of TwinCAT](#)

The following rules apply to the inputs of the CoE function blocks:

| Input      | Description                                                                                  | Possible values                               |                                                                 |
|------------|----------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------|
| sNetId     | AMS net ID of the EtherCAT master to which the IO-Link master is connected                   | depends on the project; e.g. 172.16.2.131.2.1 |                                                                 |
| nSlaveAddr | EtherCAT address of the IO-Link port on the IO-Link master =<br>0x1000 + IO-Link port number | 0x1001<br>0x1002<br>...<br>0x1004             | IO-Link port X01<br>IO-Link port X02<br>...<br>IO-Link port X04 |
| nSubIndex  | IO-Link subindex of the parameter                                                            | depends on the device; → IODD                 |                                                                 |
| nIndex     | IO-Link index of the parameter                                                               | depends on the device; → IODD                 |                                                                 |

General process of an acyclic request:

1. Write command (subindex 0x1)
2. Enquire about status (subindex 0x2 or 0x3)
3. Optional: read requested values (subindex 0x3)



The AL1330 can only process one CoE request at a time. If during an active request another CoE request is started, the device answers with an error (SDO abort code: 0x06090030).

## 7.3 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. [50](#))

The AL1330 is of type device (→ **Overview: IoT types** (→ p. [79](#))).

It has the following sub-structures:

| Structure                         | Contents                                                                                                                                                                                                                                      |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| processdatamaster                 | <ul style="list-style-type: none"> <li>Diagnostic data (temperature, voltage, current)</li> <li>Status of the current / voltage supply</li> </ul>                                                                                             |
| 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]              | <ul style="list-style-type: none"> <li>Parameters of the IO-Link port (operating mode, transmission rate, cycle time, validation and data storage)</li> <li>Digital input data (pin 2)</li> <li>Port event</li> </ul>                         |
| iolinkmaster/port[n]/iolinkdevice | <ul style="list-style-type: none"> <li>Status information IO-Link devices on the IO-Link port</li> <li>Device information of the IO-Link device</li> <li>Process data on input/output</li> <li>Application-specific identification</li> </ul> |
| firmware                          | <ul style="list-style-type: none"> <li>Firmware of the device</li> <li>Reset devices</li> <li>Reboot the device</li> </ul>                                                                                                                    |

The user can request the available data points and services in the substructures with `gettree`(→ **Service: `gettree`** (→ p. [80](#))). 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.

### 7.3.1 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 |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <code>iotsetup/accessrights</code>             | Access rights to the IO-Link master <ul style="list-style-type: none"> <li>0 = EtherCAT + IoT</li> <li>1 = EtherCAT + IoT (read only)</li> <li>2 = IoT only</li> </ul> | rw     |
| <code>iotsetup/smobip</code>                   | IP address of the LR SMARTOBSERVER                                                                                                                                     | rw     |
| <code>iotsetup/smobport</code>                 | Port number of the LR SMARTOBSERVER                                                                                                                                    | rw     |
| <code>iotsetup/smobinterval</code>             | Cycle time for (value in milliseconds)                                                                                                                                 | rw     |
| <code>iotsetup/network/dhcp</code>             | Configuration of the IP settings of the IoT port <ul style="list-style-type: none"> <li>0 = STATIC_IP/OFF</li> <li>1 = DHCP/ON</li> </ul>                              | rw     |
| <code>iotsetup/network/ipaddress</code>        | IP address of the IoT port                                                                                                                                             | rw     |
| <code>iotsetup/network/subnetmask</code>       | Subnet mask of the network segment                                                                                                                                     | rw     |
| <code>iotsetup/network/ipdefaultgateway</code> | IP address of the network gateway                                                                                                                                      | rw     |

rw ... read and write

### 7.3.2 Configure the fieldbus port

16564

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 |
|---------------------------------------------|----------------------------------------------------|--------|
| <code>fieldbussetup/hostname</code>         | Name of the IO-Link master in the fieldbus project | rw     |
| <code>fieldbussetup/fieldbusfirmware</code> | Firmware version of the IO-Link master             | r      |

r = read only

rw ... read and write

### 7.3.3 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...X04 :

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

n ... 1...4)

r = read only

rw ... read and write

\* ... only available if EtherCAT PLC is separated from the device

### 7.3.4 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 |
|---------------------------------------|----------------------------------------------------------------------|--------|
| <code>devicetag/applicationtag</code> | Name of the IO-Link master in the fieldbus project (application tag) | rw     |

rw ... read and write

### 7.3.5 Read / write cyclic process data

10994

Cyclic process data of the IO-Link ports X01...X04 is saved in the `iolinkmaster/port[n]` substructure. The user can access the following data points:

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

n ... 1...4

r = read only

rw ... read and write

\* ... only available if EtherCAT PLC is separated from the device

### 7.3.6 Read diagnostic data

16571

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

| Name                                             | Description                                                                                                                                                                           | Access |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <code>processdatamaster/temperature</code>       | Temperature of the IO-Link master (value in °C)                                                                                                                                       | r      |
| <code>processdatamaster/voltage</code>           | Voltage applied (value in V)                                                                                                                                                          | r      |
| <code>processdatamaster/current</code>           | Current (value in A)                                                                                                                                                                  | r      |
| <code>processdatamaster/supervisionstatus</code> | Diagnostic information of the device supply <ul style="list-style-type: none"> <li>0 = no error</li> <li>1 = short circuit</li> <li>2 = overload</li> <li>3 = undervoltage</li> </ul> | r      |

r = read only

### 7.3.7 Read device information

17133

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

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

r = read only

Additional information about the AL1330 can be read with the `getidentity` service (→ **Service: getidentity** (→ p. 82)).

## 7.3.8 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 |
|-----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------|
| <code>iolinkmaster/port[n]/iolinkdevice/status</code>                 | Status of the connected IO-Link device<br>0 = SENSOR_NOT_CONNECTED<br>1 = SENSOR_IN_PREOPERATE<br>2 = SENSOR_IN_OPERATE<br>3 = SENSOR_WRONG | r      |
| <code>iolinkmaster/port[n]/iolinkdevice/vendorid</code>               | IO-Link ID of the manufacturer                                                                                                              | r      |
| <code>iolinkmaster/port[n]/iolinkdevice/deviceid</code>               | IO-Link ID of the IO-Link device                                                                                                            | r      |
| <code>iolinkmaster/port[n]/iolinkdevice/productname</code>            | Product name of the IO-Link device                                                                                                          | r      |
| <code>iolinkmaster/port[n]/iolinkdevice/serial</code>                 | Serial number of the IO-Link device                                                                                                         | r      |
| <code>iolinkmaster/port[n]/iolinkdevice/applicationspecifictag</code> | Device-specific identification (application tag)                                                                                            | rw     |

n ... 1...4

## 7.3.9 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 |
|----------------------------------------------------------------|-----------------------------------------------------|--------|
| <code>iolinkmaster/port[n]/iolinkdevice/iolreadacyclic</code>  | Acyclic reading of a parameter of an IO-Link device | r      |
| <code>iolinkmaster/port[n]/iolinkdevice/iolwriteacyclic</code> | Acyclic writing of a parameter of an IO-Link device | rw     |

n ... 1...4

r = read only

rw ... read and write

## 7.3.10 Control IO-Link master

17963

The device can be controlled via the following services:

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

r = read only

rw ... read and write

## 7.3.11 Examples

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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 = 0b1111001001

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/temperature`; Data point serial number: `/deviceinfo/serialnumber`)

**Request object:**

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

**Return object:**

```
{"cid":4711,"data":{"processdatamaster/temperature":{"code":200,"data":44},"deviceinfo/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 AL1330.

**Solution:** Change the parameter [Application Tag] with the setdata service to the value [AL1330].

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":"AL1330"}}
```

- 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"]
  }
}
```

## 7.3.12 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 AL1330. 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. [80](#))).

## 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 (→ <b>IoT Core: Diagnostic codes</b> (→ p. 53))            |

Example:

Request (via browser): 192.168.0.250/devicetag/applicationtag/getdata

Return: {"cid":-1,"data":{"value":"AL1330"}, "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 (→ <a href="#">Overview: IoT services</a> (→ p. <a href="#">80</a> ))            |
| 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 (→ <a href="#">IoT Core: Diagnostic codes</a> (→ p. <a href="#">53</a> )) |

Example:

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

Return: {"cid":4711,"data":{"value":"AL1330"}, "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                                                                                                    |

## 8 Operation

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22368

### 8.1 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.

## 8.2 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 EtherCAT PLC, LR SMARTOBSERVER and LR DEVICE and repeat the process.

- ▶ Stop EtherCAT PLC.
- ▶ Set the parameter [IP address SmartObserver] to 255.255.255.255 (→ **IoT: Configure the interface to the LR SMARTOBSERVER** (→ p. 28)).
- ▶ 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 AL1330

- ▶ 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.

## 8.3 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 AL1330.
- ▶ Connect new IO-Link device with the same IO-Link port of the AL1330.
- > IO-Link master copies parameter values from the data memory to the new IO-Link device.

## 9 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.

## 10 Factory settings

16549

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

| Parameter                            | Factory setting |
|--------------------------------------|-----------------|
| [IP address] (IoT interface)         | 169.254.X.X     |
| [Subnet mask] (IoT interface)        | 255.255.0.0     |
| [IP gateway address] (IoT interface) | 0.0.0.0         |
| [Host name]                          | blank           |
| Data memory (data storage)           | blank           |

## 11 Accessories

17853

List of accessories of AL1330: → [www.ifm.com](http://www.ifm.com) > Product page > Accessories



## 12 Appendix

### Contents

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7156

## 12.1 Technical data

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9011

### 12.1.1 Application

23710

| Application          |                                    |
|----------------------|------------------------------------|
| Application          | I/O modules for field applications |
| Daisy-chain function | Fieldbus interface                 |

### 12.1.2 Electrical data

22819

| Electrical data             |                                                   |
|-----------------------------|---------------------------------------------------|
| Operating voltage [V]       | 20...30 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                                               |

### 12.1.3 Inputs / outputs

23711

| Inputs / outputs                   |                   |
|------------------------------------|-------------------|
| Total number of inputs and outputs | 8; (configurable) |

## 12.1.4 Inputs

22820

| Inputs                                          |                                  |
|-------------------------------------------------|----------------------------------|
| Number of digital inputs                        | 8; (IO-Link Port Class A: 4 x 2) |
| Switching level high [V]                        | 11...30 DC                       |
| Switching level low [V]                         | 0...5 DC                         |
| Digital inputs protected against short circuits | yes                              |

## 12.1.5 Outputs

22821

| Outputs (digital)                 |                                  |
|-----------------------------------|----------------------------------|
| Output function                   | 4; (IO-Link Port Class A: 4 x 1) |
| Max. current load per output [mA] | 200                              |
| Short-circuit protection          | yes                              |

## 12.1.6 Interfaces

17947

| Interfaces                 |                                                                                                                                                                                       |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Communication interface    | Ethernet; IO-Link                                                                                                                                                                     |
| Communication interface    | IO-Link; TCP/IP; EtherCAT                                                                                                                                                             |
| <b>Ethernet</b>            |                                                                                                                                                                                       |
| Transmission standard      | 10Base-T; 100Base-TX                                                                                                                                                                  |
| Transmission rate [MBit/s] | 10; 100                                                                                                                                                                               |
| Protocol                   | TCP/IP; EtherCAT                                                                                                                                                                      |
| Factory settings           | MAC address: see type label                                                                                                                                                           |
| <b>IO-Link master</b>      |                                                                                                                                                                                       |
| Type of transmission       | COM 1 / COM 2 / COM 3                                                                                                                                                                 |
| IO-Link revision           | V1.1                                                                                                                                                                                  |
| Number of ports Class A    | 4                                                                                                                                                                                     |
| <b>IoT interface</b>       |                                                                                                                                                                                       |
| Transmission standard      | 10Base-T; 100Base-TX                                                                                                                                                                  |
| Transmission rate [MBit/s] | 10; 100                                                                                                                                                                               |
| Protocol                   | DCP, DHCP, Auto IP                                                                                                                                                                    |
| Factory settings           | <ul style="list-style-type: none"> <li>IP address: 169.254.X.X</li> <li>Subnet mask: 255.255.0.0</li> <li>Gateway IP address: 0.0.0.0</li> <li>MAC address: see type label</li> </ul> |

## 12.1.7 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 |
| Pollution Degree                     | 2                   |

## 12.1.8 Approvals / tests

22824

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

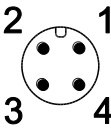
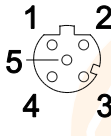
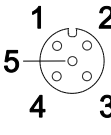
## 12.1.9 Mechanical data

22825

| Mechanical data |                                          |
|-----------------|------------------------------------------|
| Weight [g]      | 271.8                                    |
| Materials       | Housing: PA; socket: brass nickel-plated |

## 12.1.10 Electrical connection

17850

| Voltage supply IN X31                                           |                                                                                     |                                                                     |
|-----------------------------------------------------------------|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| Plug and socket connection                                      | M12                                                                                 |                                                                     |
| Wiring                                                          |    | 1: + 24 V DC (US)<br>2: -<br>3: GND (US)<br>4: -                    |
| Ethernet IN / OUT X21, X22                                      |                                                                                     |                                                                     |
| Plug and socket connection                                      | M12                                                                                 |                                                                     |
| Wiring                                                          |    | 1: TX +<br>2: RX +<br>3: TX -<br>4: RX -<br>5: -                    |
| IoT X32                                                         |                                                                                     |                                                                     |
| Plug and socket connection                                      | M12                                                                                 |                                                                     |
| Wiring                                                          |  | 1: TX +<br>2: RX +<br>3: TX -<br>4: RX -<br>5: -                    |
| Process connection IO-Link ports Class A X01...X0<IOL_AnzPorts> |                                                                                     |                                                                     |
| Plug and socket connection                                      | M12                                                                                 |                                                                     |
| Wiring                                                          |  | 1: + 24 V DC (US)<br>2: DI<br>3: GND (US)<br>4: C/Q IO-Link<br>5: - |

## 12.2 EtherCAT

### Contents

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22433

## 12.2.1 Parameter data

### Contents

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1568

### Fieldbus parameters

8953

The fieldbus parameters contain information for the integration of the device into the EtherCAT network:

| Name             | Description                        | Possible values |
|------------------|------------------------------------|-----------------|
| EtherCAT address | "Explicit Device ID" of the device | 0...65534       |

### ESI file

10277

To represent the AL1330 in a field bus projection software ifm electronic provides an ESI file. The EDS file can be downloaded from ifm's website. In the ESI file, all parameters, process data and their valid value ranges are defined.

## 12.2.2 Cyclic data

### Contents

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22429

### EtherCAT modules

9461

| Module              | Description         |                                                  |
|---------------------|---------------------|--------------------------------------------------|
| IOL_In_4Byte        | IO-Link activated   | 4-byte input data                                |
| IOL_In_8Byte        |                     | 8-byte input data                                |
| IOL_In_16Byte       |                     | 16-byte input data                               |
| IOL_In_32Byte       |                     | 32-byte input data                               |
| IOL_Out_4Byte       |                     | 4-byte output data                               |
| IOL_Out_8Byte       |                     | 8-byte output data                               |
| IOL_Out_16Byte      |                     | 16-byte output data                              |
| IOL_Out_32Byte      |                     | 32-byte output data                              |
| IOL_4/4_I/O bytes   |                     | 4-byte input data / 4-byte output data (default) |
| IOL_8/8_I/O bytes   |                     | 8-byte input data / 8-byte output data           |
| IOL_4/16_I/O bytes  |                     | 4-byte input data / 16-byte output data          |
| IOL_16/4_I/O bytes  |                     | 16-byte input data / 4-byte output data          |
| IOL_16/16_I/O bytes |                     | 16-byte input data / 16-byte output data         |
| IOL_32/32_I/O bytes |                     | 32-byte input data / 32-byte output data         |
| Digital_IN          | IO-Link deactivated | Digital input                                    |
| Digital_OUT         |                     | Digital output                                   |
| Deactivated         | deactivated         |                                                  |

## 12.2.3 Acyclic data

22427

### Note

16560

The device implements a "Modular Device Profile" with an "IO-Link profile" according to ETG.5001.1.

### MDP Standard Information (0x1000)

9043

Identity information about the device and current and available process data constellations

| Index  | Description                                                                                                                                                                                                                                                                                                                                                                 | Possible values / reference | Data type / access                                                                               |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------|
| 0x1000 | Device Type                                                                                                                                                                                                                                                                                                                                                                 | MDP Profile = 0x184C1389    | UINT32 / ro                                                                                      |
| 0x1008 | Manufacturer Device Name                                                                                                                                                                                                                                                                                                                                                    | "<IOL_ECAT_ProdName>"       | STRING / ro                                                                                      |
| 0x1009 | Manufacturer Hardware Version                                                                                                                                                                                                                                                                                                                                               | e.g. "AA"                   | STRING / ro                                                                                      |
| 0x100A | Manufacturer Software Version                                                                                                                                                                                                                                                                                                                                               |                             | STRING / ro                                                                                      |
| 0x1018 | Identity Object <ul style="list-style-type: none"> <li>Subindex 0x1: Vendor ID</li> <li>Subindex 0x2: Product Code</li> <li>Subindex 0x3: Revision Number:</li> <li>Subindex 0x4: Serial Number</li> </ul>                                                                                                                                                                  | 0x622<br>"AL1330"           | UINT32 / ro<br>UINT32 / ro<br>UINT32 / ro<br>UINT32 / ro                                         |
| 0x10F3 | Diagnostics History <ul style="list-style-type: none"> <li>Subindex 0x1: Maximum Messages</li> <li>Subindex 0x2: Newest Messages</li> <li>Subindex 0x3: Newest Ack. Message</li> <li>Subindex 0x4: New Message Available</li> <li>Subindex 0x5: Flags</li> <li>Subindex 0x06: Diagnostics Message 01</li> <li>...</li> <li>Subindex 0x45: Diagnostics Message 64</li> </ul> |                             | UINT8 / ro<br>UINT8 / ro<br>UINT8 / rw<br>BOOL / rw<br>UINT16 / rw<br>STRING / ro<br>STRING / ro |
| 0x10F8 | Timestamp (value in ns)                                                                                                                                                                                                                                                                                                                                                     |                             | UINT64 / ro                                                                                      |
| 0x160n | TxPDO Mapping of IO-Link Outputs                                                                                                                                                                                                                                                                                                                                            |                             | ro                                                                                               |
| 0x1A0n | TxPDO Mapping of IO-Link Inputs                                                                                                                                                                                                                                                                                                                                             |                             | ro                                                                                               |
| 0x1A08 | TxPDO Mapping of New Messages Available                                                                                                                                                                                                                                                                                                                                     |                             | ro                                                                                               |
| 0x1A09 | TxPDO Mapping of Timestamp                                                                                                                                                                                                                                                                                                                                                  |                             | ro                                                                                               |
| 0x1A81 | TxPDO Mapping of IO-Link Device Status                                                                                                                                                                                                                                                                                                                                      |                             | ro                                                                                               |
| 0x1A82 | TxPDO Mapping of IO-Link Port Qualifier                                                                                                                                                                                                                                                                                                                                     |                             |                                                                                                  |

ro = read only

rw ... read and write

## Manufacturer Specific Index (0x20 00)

11011

Manufacturer-specific parameters

| Index  | Description                      | Possible values                                                                                                                                                                                                                                   | Data type / access |
|--------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 0x2001 | Component Name                   | "EtherCAT IO-Link Gateway"                                                                                                                                                                                                                        | STRING / ro        |
| 0x2002 | Vendor Name                      | "ifm electronic"                                                                                                                                                                                                                                  | STRING / ro        |
| 0x2003 | Vendor URL                       | "www.ifm.com"                                                                                                                                                                                                                                     | STRING / ro        |
| 0x2004 | Order Number                     | "AL1330"                                                                                                                                                                                                                                          | STRING / ro        |
| 0x2005 | Manufacturing Date               |                                                                                                                                                                                                                                                   | STRING / ro        |
| 0x2006 | QS Date                          |                                                                                                                                                                                                                                                   | STRING / ro        |
| 0x2007 | Installation Location            | Location of installation (user-defined)                                                                                                                                                                                                           | STRING / rw        |
| 0x200A | Equipment ID                     | Device name (user-defined)                                                                                                                                                                                                                        | STRING / rw        |
| 0x2F00 | Reset To Factory                 | <ul style="list-style-type: none"> <li>MSB: 0xA5</li> <li>LSB:                             <ul style="list-style-type: none"> <li>0x00 = Factory Reset of System + NVMEM</li> <li>0x01 = Factory Reset of System</li> </ul> </li> </ul>           | UINT16 / w         |
| 0x2F01 | Device Localization              | 0x00: LED RDY flashing for 5 s                                                                                                                                                                                                                    | UINT8 / w          |
| 0x2F02 | Current Use Case (Access Rights) | <ul style="list-style-type: none"> <li>MSB: 0xA5</li> <li>LSB:                             <ul style="list-style-type: none"> <li>0x00: EtherCAT + IoT</li> <li>0x01: EtherCAT + IoT (read only)</li> <li>0x02: IoT (only)</li> </ul> </li> </ul> | UINT16 / rw        |

ro = read only  
 rw ... read and write  
 w ... write only



## IO-Link outputs (0x7000)

23089

### Output data of the IO-Link ports X01...X04

Selection of the IO-Link port via n (n = 0: port X01, n = 1: port X02,...)

| Index  | Description                                                                                                                          | Possible values       | Data type / access    |
|--------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-----------------------|
| 0x70n0 | IO-Link outputs <ul style="list-style-type: none"> <li>Subindex 0x01: Byte 1</li> <li>...</li> <li>Subindex 0x20: Byte 32</li> </ul> | per byte: 0x00...0xFF | each byte: UINT8 / ro |

ro = read only

## IO Settings (0x8000)

16550

## Manufacturer-specific settings of the IO-Link ports X01...X04

Selection of the IO-Link port via n (n = 0: port X01, n = 1: port X02,...)

| Index  | IO-Link parameters                                                                                                                                                                                                                                                                                                                          | Possible values                                                                                                                                                                                                                      | Data type / access                                                                                 |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| 0x80n0 | IO Settings <ul style="list-style-type: none"> <li>Subindex 0x04: Device ID</li> <li>Subindex 0x05: Vendor ID</li> <li>Subindex 0x20: IO-Link revision</li> <li>Subindex 0x22: Cycle Time</li> <li>Subindex 0x24: Process Data In Length</li> <li>Subindex 0x25: Process Data Out Length</li> <li>Subindex 0x028: Master Control</li> </ul> | 0x000000...0xFFFFFFFF<br>0x0000...0xFFFF<br>ifm electronic: 0x136<br>0x10: IO-Link revision 1.0<br>0x11: IO-Link revision 1.1<br>0x00: Deactivated<br>0x01: Digital input<br>0x02: Digital output<br>0x03: IO-Link                   | UINT32 / rw<br>UINT32 / rw<br>UINT8 / rw<br>UINT32 / rw<br>UINT8 / rw<br>UINT8 / rw<br>UINT16 / rw |
| 0x80n8 | Vendor Specific IO Settings <ul style="list-style-type: none"> <li>Subindex 0x01: Validation ID</li> <li>Subindex 0x02: Reconfigure</li> <li>Subindex 0x03: Byte Swap</li> </ul>                                                                                                                                                            | 0x00: No check<br>0x01: V1.0 device, no DS<br>0x02: V1.1 device, no DS<br>0x03: V1.1 device, backup + restore<br>0x04: V1.1 device, restore<br>0x00: No action<br>0xFF: Activate configuration<br>0x00: No action<br>0x01: Byte swap | UINT8 / rw<br>UINT8 / rw<br>UINT8 / rw                                                             |

rw ... read and write

## IO Info Data (0x9000)

17300

Current value of the connected IO-Link devices

Selection of the IO-Link port via n (n = 0: port X01, n = 1: port X02,...)

| Index  | IO-Link parameters                                                                                                                                                                                                                                                                                                        | Possible values | Data type / access                                                                               |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|--------------------------------------------------------------------------------------------------|
| 0x90n0 | IO Info Data <ul style="list-style-type: none"> <li>Subindex 0x04: Device ID</li> <li>Subindex 0x05: Vendor ID</li> <li>Subindex 0x20: IO-Link revision</li> <li>Subindex 0x21: Frame capability</li> <li>Subindex 0x22: Cycle time</li> <li>Subindex 0x24: PD In length</li> <li>Subindex 0x25: PD Out length</li> </ul> |                 | UINT32 / ro<br>UINT32 / ro<br>UINT8 / ro<br>UINT8 / ro<br>UINT8 / ro<br>UINT8 / ro<br>UINT8 / ro |

ro = read only

## IO Diag data (0xA000)

16537

The device provides the following diagnostic data for each port:

Selection of the IO-Link port via n (n = 0: port X01, n = 1: port X02,...)

| Index  | IO-Link parameters                                                                                                               | Possible values                                                                    | Data type / access                       |
|--------|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------|
| 0xA0n0 | IO Diag Data0 <ul style="list-style-type: none"> <li>Subindex 0x01: IO-Link state</li> <li>Subindex 0x02: Lost frames</li> </ul> | 0x00: INACTIVE<br>0x01: DIGINPUT<br>0x02: DIGOUTPUT<br>0x08: OPERATE<br>0x09: STOP | UINT8 / ro<br><br><br><br><br>UINT8 / ro |

ro = read only

## Device status / port status (0xF000)

17933

Status of the IO-Link device at the port X01...X04

Selection of the IO-Link port via n (n = 0: port X01, n = 1: port X02,...)

| Index  | IO-Link parameters                                                                                                                                             | Possible values                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Data type / access         |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 0xF000 | Module device profile <ul style="list-style-type: none"> <li>Subindex 0x01: Module index distance</li> <li>Subindex 0x02: Maximum number of modules</li> </ul> | 0x0010<br>0x0004                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | UINT16 / ro<br>UINT16 / ro |
| 0xF030 | Configured module Ident list                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            |
| 0xF050 | Detected module ident list                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                            |
| 0xF100 | Device status <ul style="list-style-type: none"> <li>High nibble (0xbbbb)</li> <li>Low nibble (0xbbbb)</li> </ul>                                              | 0x0: No error<br>0x3: Invalid device ID<br>0x4: Invalid vendor ID<br>0x7: Invalid cycle time<br>0x8: Invalid length of PD In<br>0x9: Invalid length of PD Out<br>0xA: No device detected<br>0xB: Supply voltage low or short circuit<br>0xD: Unspecified error<br><br>0x0: Deactivated<br>0x1: Digital input<br>0x2: Digital output<br>0x3: OP: IO-Link, operating state<br>0x4: STOP: IO-Link, not operating state (fault or no device)<br>0x5: PreOP: IO-Link, device in PreOP state | UINT8 / ro                 |
| 0xF101 | IO-Link port qualifier <ul style="list-style-type: none"> <li>Subindex 0x00: PQI port X01</li> <li>...</li> <li>Subindex 0x0n: PQI port X04</li> </ul>         | → <b>Mapping: Port qualifier (0xF101)</b> (→ p. <a href="#">74</a> )                                                                                                                                                                                                                                                                                                                                                                                                                   |                            |

ro = read only

## Mapping: Port qualifier (0xF101)

14998

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

| Bit |    |    |      |     |    |     |     |
|-----|----|----|------|-----|----|-----|-----|
| 7   | 6  | 5  | 4    | 3   | 2  | 1   | 0   |
| PVI | DE | DA | DACT | PVO | -- | DI2 | DI4 |

Legend:

|      |                                                                                                                                                  |   |                              |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------------------|
| DI4  | Signal status of the digital input on pin 4 (if used)                                                                                            | 0 | OFF                          |
|      |                                                                                                                                                  | 1 | ON                           |
| DI2  | Signal status of the digital input on pin 2 (if used)                                                                                            | 0 | OFF                          |
|      |                                                                                                                                                  | 1 | ON                           |
| PVO  | Port validity output: Validity of the output data of the IO-Link device                                                                          | 0 | invalid                      |
|      |                                                                                                                                                  | 1 | valid                        |
| DACT | Device deactivated: shows if the IO-Link port is configured and can be used                                                                      | 0 | deactivated or not available |
|      |                                                                                                                                                  | 1 | activated and can be used    |
| DA   | Device available: shows if the IO-Link device has been recognised and if the device is in the "preoperate" or in the "operate" state             | 0 | No device                    |
|      |                                                                                                                                                  | 1 | device detected              |
| DE   | Device error: shows if an error or a warning occurred; Note: The user needs to determine the cause of the fault separately via acyclic services. | 0 | no error                     |
|      |                                                                                                                                                  | 1 | Error                        |
| PVI  | Port validity input: Validity of the input data of the IO-Link device                                                                            | 0 | invalid                      |
|      |                                                                                                                                                  | 1 | valid                        |

## 12.3 ifm IoT Core

### Contents

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8988

## 12.3.1 Overview: IoT profile

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17711

### Profile: deviceinfo

17135

| Element (identifier)          | Properties                                                                                        | mandatory | Comments                                        |
|-------------------------------|---------------------------------------------------------------------------------------------------|-----------|-------------------------------------------------|
| deviceinfo                    | <ul style="list-style-type: none"> <li>type = structure</li> <li>profiles = deviceinfo</li> </ul> |           | characterises the element as device information |
| deviceinfo/devicename         | type = data                                                                                       | optional  |                                                 |
| deviceinfo/devicefamily       | 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                  | <ul style="list-style-type: none"> <li>type = structure</li> <li>profiles = devicetag</li> </ul> |           |          |
| 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                             | <ul style="list-style-type: none"> <li>type = structure</li> <li>profiles = iolinkmaster</li> </ul>     |           | Executable service |
| masterport/mode                        | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/comspeed                    | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/mastercycletime_actual      | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/mastercycletime_preset      | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/validation_datastorage_mode | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/validation_vendorid         | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/validation_deviceid         | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>              | mandatory |                    |
| masterport/additionalpins_in           | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = processdata</li> </ul>            | optional  |                    |
| masterport/additionalpins_out          | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = processdata</li> </ul>            | optional  |                    |
| masterport/portevent                   | <ul style="list-style-type: none"> <li>type = data</li> </ul>                                           | mandatory |                    |
| masterport/iolinkdevice                | <ul style="list-style-type: none"> <li>type = structure</li> <li>profile = iolinkdevice_full</li> </ul> | 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              | <ul style="list-style-type: none"> <li>type = service</li> <li>profiles = service</li> </ul> |           | Executable service |

## Profile: software

10999

| Element (identifier)  | Properties                                                                                      | mandatory | Comments                              |
|-----------------------|-------------------------------------------------------------------------------------------------|-----------|---------------------------------------|
| software              | <ul style="list-style-type: none"> <li>type = structure</li> <li>profiles = software</li> </ul> |           | 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                | <ul style="list-style-type: none"> <li>type = structure</li> <li>profiles = timer</li> </ul> |           | Executable service |
| timer/counter        | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>   | mandatory |                    |
| timer/interval       | <ul style="list-style-type: none"> <li>type = data</li> <li>profile = parameter</li> </ul>   | optional  |                    |
| timer/start          | type = service                                                                               | optional  |                    |
| timer/start          | type = service                                                                               | optional  |                    |

## 12.3.2 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                                            |

## 12.3.3 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 AL1330 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 AL1330 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       |                  |         | AL1330                            |
| 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":["ipadresse":"192.168.0.6","ipdefaultgateway":"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. unsubscribe 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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| HU | ifm electronic kft. • 9028 Győr • phone +36-96 / 518-397                                                                                                                                                                                                                                                                                                                                                                                                 |
| IN | ifm electronic India Private Limited • Kolhapur, 416234 • phone +91 / 231 / 267 27 70                                                                                                                                                                                                                                                                                                                                                                    |
| IE | ifm electronic (Ireland) Ltd. • Dublin 22 • phone +353 / 1 / 461 32 00                                                                                                                                                                                                                                                                                                                                                                                   |
| IT | ifm electronic s.r.l. • 20864 Agrate Brianza (MB) • phone +39 39-6899982                                                                                                                                                                                                                                                                                                                                                                                 |
| JP | efector co., ltd. • Chiba-shi, Chiba 261-7118 • phone +81 043-299-2070                                                                                                                                                                                                                                                                                                                                                                                   |
| KR | ifm electronic Ltd. • 04420 Seoul • phone +82 2-790-5610                                                                                                                                                                                                                                                                                                                                                                                                 |
| MX | ifm efector S. de R.L. de C.V. • San Pedro Garza Garcia, N.L. 66269 • phone +52-81-8040-3535                                                                                                                                                                                                                                                                                                                                                             |
| MY | ifm electronic Pte. Ltd • 47100 Puchong, Selangor • phone +603 8066 9853                                                                                                                                                                                                                                                                                                                                                                                 |
| NA | ifm electronic (pty) Ltd • 25 Dr. W. Kulz Street Windhoek • phone +264 61 300984                                                                                                                                                                                                                                                                                                                                                                         |
| NL | ifm electronic b.v. • 3843 GA Harderwijk • phone +31 341-438 438                                                                                                                                                                                                                                                                                                                                                                                         |
| NZ | ifm efector pty ltd • 930 Great South Road Penrose, Auckland • phone +64 / 95 79 69 91                                                                                                                                                                                                                                                                                                                                                                   |
| PL | ifm electronic sp. z o.o. • 40-106 Katowice • phone +48 32 70 56 400                                                                                                                                                                                                                                                                                                                                                                                     |
| PT | ifm electronic s.a. • 4410-137 São Félix da Marinha • phone +351 223 71 71 08                                                                                                                                                                                                                                                                                                                                                                            |
| RO | ifm electronic s.r.l. • Sibiu 557260 • phone +40 269 224 550                                                                                                                                                                                                                                                                                                                                                                                             |
| RU | ifm electronic • 105318 Moscow • phone +7 495 921-44-14                                                                                                                                                                                                                                                                                                                                                                                                  |
| SG | ifm electronic Pte Ltd • 609 916 Singapore • phone +65 6562 8661                                                                                                                                                                                                                                                                                                                                                                                         |
| SK | ifm electronic s.r.o. • 831 06 Bratislava • phone +421 244 872 329                                                                                                                                                                                                                                                                                                                                                                                       |
| SE | ifm electronic ab • 412 50 Göteborg • phone +46 31-750 23 00                                                                                                                                                                                                                                                                                                                                                                                             |
| TR | ifm electronic Ltd. Sti. • 34381 Sisli, Istanbul • phone +90 212 210 50 80                                                                                                                                                                                                                                                                                                                                                                               |
| TW | ifm electronic • Kaohsiung City, 806, Taiwan R.O.C. • phone +886 7 3357778                                                                                                                                                                                                                                                                                                                                                                               |
| UA | TOV ifm electronic • 02660 Kiev • phone +380 44 501-85-43                                                                                                                                                                                                                                                                                                                                                                                                |
| US | ifm efector inc. • Malvern, PA 19355 • phone +1 800-441-8246                                                                                                                                                                                                                                                                                                                                                                                             |
| VN | ifm electronic Vietnam Co., Ltd. • 700000 Ho Chi Minh City • phone +84-28-2253.6715                                                                                                                                                                                                                                                                                                                                                                      |
| ZA | ifm electronic (Pty) Ltd. • 0157 Pretoria • phone +27 12 450 0412                                                                                                                                                                                                                                                                                                                                                                                        |

Technische Änderungen behalten wir uns ohne vorherige Ankündigung vor.

We reserve the right to make technical alterations without prior notice.

Nous nous réservons le droit de modifier les données techniques sans préavis.