Operating instructions

Ethernet switch

AL3151

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1 Preliminary note

You will find instructions, technical data, approvals, accessories and further information using the QR code on the device / packaging or at documentation.ifm.com.

1.1 Legal and copyright information

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1.2 Symbols used

✓	Requirement
▶	Instruction
▷	Reaction, result
bold	Designation of keys, buttons or indications
→	Cross-reference without link
→	Cross-reference with link
	Important note Non-compliance may result in malfunction or interference
	Information Supplementary note

1.3 Warnings

Warnings indicate the possibility of personal injury and damage to property. This enables safe product handling. Warnings are graded as follows:



WARNING

Warning of serious personal injury

▷ If the warning is not observed, fatal and serious injuries are possible.



CAUTION

Warning of minor to moderate personal injury

▷ If the warning is not observed, minor to moderate injuries are possible.



ATTENTION

Warning of damage to property

▷ If the warning is not observed, damage to property is possible.

1.4 Change history

Issue	Subject	Date
00	New creation of the document	04 / 2021

Issue	Subject	Date
01	Added: Topics for UL approval	05 / 2023
02	• Added: Note on the safety symbol on the device, Safety symbol on the device 5 • Added: Note on recommended accessories, Preliminary note 3 • Corrected: Minimum temperature for UL-certified cables, Connection technology 9	10 / 2025

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2 Safety instructions

- The unit described is a subcomponent for integration into a system.
  - The system architect is responsible for the safety of the system.
  - The system architect undertakes to perform a risk assessment and to create documentation in accordance with legal and normative requirements to be provided to the operator and user of the system. This documentation must contain all necessary information and safety instructions for the operator, the user and, if applicable, for any service personnel authorised by the architect of the system.
- Read this document before setting up the product and keep it during the entire service life.
- The product must be suitable for the corresponding applications and environmental conditions without any restrictions.
- Only use the product for its intended purpose (Intended use).
- If the operating instructions or the technical data are not adhered to, personal injury and/or damage to property may occur.
- The manufacturer assumes no liability or warranty for any consequences caused by tampering with the product or incorrect use by the operator.
- Installation, electrical connection, set-up, operation and maintenance of the product must be carried out by qualified personnel authorised by the machine operator.
- Protect units and cables against damage.

2.1 Safety symbol on the device



Safety symbol on the device:

▶ Adhere to the operating instructions for the safe operation of the device.

3 Intended use

The device is used for networking of up to 6 Ethernet devices.

The device is designed for use in Ethernet networks.

The device is designed for use without a control cabinet in the food industry.

The device is designed for the use in vehicles.

Permitted use:

- indoors

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4 Function

4.1 Switch

- Type: not configurable (unmanaged)
- Operating mode: store and forward
- Forwarding of the following DCP functions:
  - Search queries
  - Signalling (flashing)
  - Set IP address
  - Set device name
  - Reset device
- MAC address table
  - Capacitance: 2000 entries
  - MAC Aging Time: 200...400 s
- Quality of Service (IEEE 802.1p, IEEE 802.1Q)
  - Priority queues: 4

4.2 Ethernet ports

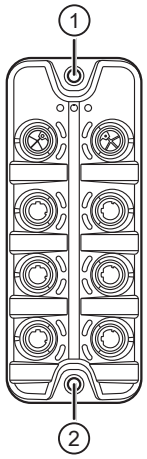
- Supported transmission standards:
  - 10Base-T (IEEE 802.3i)
  - 100Base-TX (IEEE 802.3u)
- Auto negotiation of the transmission rate (Auto Negotiation)
- Polarity detection and correction (Auto Polarity)
- Automatic detection of transmit and receive channels (Auto MDI-X)

4.3 Voltage output

The device has a port XD2 for optional supply of additional devices (daisy chain).

5 Installation

5.1 Overview



1: Upper mounting lug
2: Lower mounting lug

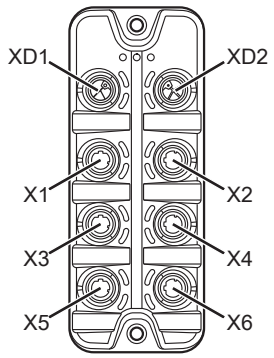
5.2 Install device

- Disconnect the power of the machine before installation.
- Use a flat mounting surface for installation.
- Observe the maximum tightening torque.

- Fasten the module onto the mounting surface using two M5 screws and washers (tightening torque: 1.8 Nm).
- Observe the notes on how to ground the unit: Ground connection 11

6 Electrical connection

6.1 Overview



XD1: Voltage supply
XD2: Voltage output
X1: Ethernet port 1
X2: Ethernet port 2
X3: Ethernet port 3
X4: Ethernet port 4
X5. Ethernet port 5
X6: Ethernet port 6

6.2 General wiring information

The device must be connected by a qualified electrician.

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

The device is only suitable for operation using SELV voltages.

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

- Please observe the required precautions against electrostatic discharge!

The circuits are insulated from each other and from touchable surfaces of the device with basic insulation according to EN 61010-1.

The communication interfaces are insulated from each other and from touchable surfaces of the device with basic insulation according to EN61010-1. They are designed for network environment 0 according to IEC TR62102).

6.2.1 Connection technology

The M12 connection parts in the device comply with the ingress resistance requirements of the standard EN 61076-2-101. To adhere to the protection rating, only cables certified to this standard must be used. The system architect undertakes to ensure the ingress resistance of cables they have cut to length.

- Carry out the fitting according to the indications of the cable manufacturer. Permissible tightening torque: 0.6...0.8Nm.
- During installation, place the M12 connector vertically so that the coupling nut will not damage the thread.
- Provide cables with a strain relief depending on the mounting conditions to avoid excessive strain on the installation points and the M12 connections.
- Ensure correct fit and proper assembly of the M12 connection parts.
- Cover unused ports with M12 protective caps (art. no.: E12542).

For UL applications:

To connect devices and Ethernet devices, only use UL-certified cables of category CYJV or PVVA with a minimum temperature of 90 °C.

6.3 Ethernet

The Ethernet devices are connected via the Ethernet ports.

The ports can be used by the Ethernet devices as required.

Connecting the Ethernet ports to each other will cause the device to fail.

- Do not connect the Ethernet ports of the device to each other.

Wiring:



1: TX+
2: RX+
3: TX-
4: RX-
5: n.c.

- Connect Ethernet devices to the ports X1...X6.
- For connection, use an M12 connector (with at least protection rating: IP 65 / IP 66 / IP 67 / IP 69K). Max. cable length: 100 m.

6.4 Voltage output

The supply voltages US and UA are looped through from port power IN to power OUT. This allows another device to be supplied via port power OUT (daisy chain).

Max. current of US and UA: 16 A each

Wiring:

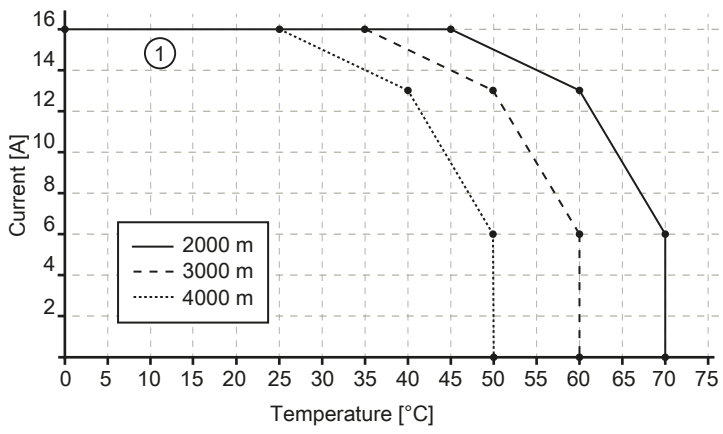


1: L+ (US)
2: L- (UA)
3: L- (US)
4: L+ (UA)
5: FE

- Optional: Connect another device to port XD2.
- For connection, use L-coded M12 connectors (with at least protection rating: IP 65 / IP 66 / IP 67 / IP 69K).
- Observe the derating behaviour of the device 10!

6.4.1 Derating behaviour

The currents $I_{US\text{-}daisy\text{-}chain}$ and $I_{UA\text{-}daisy\text{-}chain}$ available at port XD2 depend on the ambient temperature of the device.

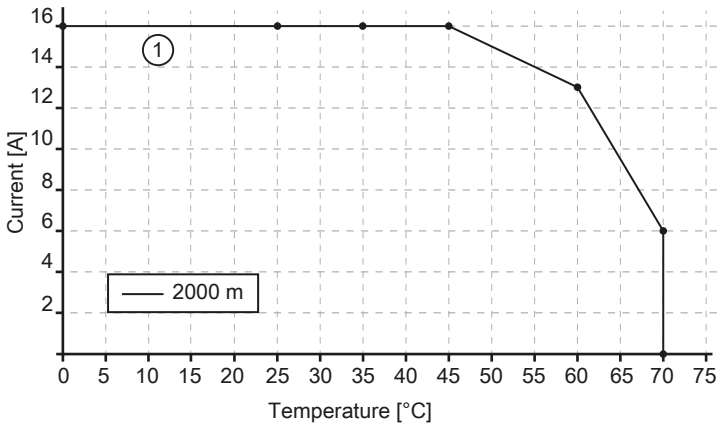


1: $I_{US\text{-}daisy\text{-}chain}$ / $I_{UA\text{-}daisy\text{-}chain}$

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For UL applications:

1: $I_{US\text{-}daisy\text{-}chain}$ / $I_{UA\text{-}daisy\text{-}chain}$



6.5 Ground connection

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

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

▶ To ensure the protection of the device against electrical interference and to ensure the safe function of the device, the housing has to be connected to ground of the supply using the shortest possible route.

▶ Ground the unit via the mounting screw of the upper mounting lug.

▶ Optional: Connect pin 5 of the port XD1 / XD2 via an L-coded M12 connector with functional earth.

6.6 Voltage supply

The device is connected to the supply voltage US via the power IN port. The supply voltage US supplies the device with voltage.

Optionally, an additional supply voltage UA can be fed to the device via port power IN. UA is used exclusively to supply additional devices via port power OUT (daisy chain).

Max. current consumption: 100 mA (12 V) / 50 mA (24 V)

Port XD1 has overvoltage protection (US).

The port XD1 has reverse polarity protection (US).

The port XD1 has cross reverse polarity protection (US, UA).

The port XD1 has an inrush current limitation.

ATTENTION

Current surge with high voltage input due to disconnection of the device from battery supply while the engine is running

▷ Damage to the device

▶ When supplied by the on-board system in vehicles, do not disconnect the device from the battery when the engine is running.

Wiring:



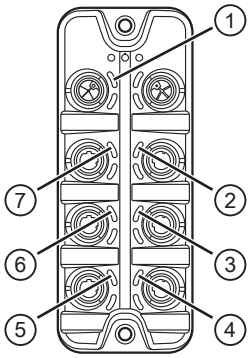
1: L+ (US)
2: L- (UA)
3: L- (US)
4: L+ (UA)
5: FE

- Disconnect power.
- Connect the device via port XD1 to supply voltage US with 12 / 24 V DC (8…32 V SELV according to DIN 60950).
- For UL applications: Connect the device via port XD1 to 24 V DC (8…28 V SELV/PELV;
- Optional: Connect the device via port XD1 to supply voltage UA with 12 / 24 V DC (8…32 V SELV according to DIN 60950).
- For UL applications: Optional: Connect the device via port XD1 to supply voltage UA with 12 / 24 V DC (8…28 V SELV according to DIN 60950).
- For connection, use an L-coded M12 connector (with at least protection rating: IP 65 / IP 66 / IP 67 / IP 69K).

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7 Operating and display elements

7.1 LEDs



1: US (port XD1)
2: LNK / ACT (port X2)
3: LNK / ACT (port X4)
4: LNK / ACT (port X6)
5: LNK / ACT (port X5)
6: LNK / ACT (port X3)
7: LNK / ACT (port X1)

7.1.1 Voltage supply

LED	Description	Colour	State	Description
US	Voltage supply status	Green	Off	No supply voltage is applied or the applied supply voltage is too low
			On	Supply voltage applied

7.1.2 Ethernet

LED	Description	Colour	State	Description
LNK / ACT	Status Connection / Activity	Green	Off	No Ethernet connection
			On	Ethernet connection established
			flashes	Data transmission

8 Set-up

- ▶ Install the device correctly.
- ▶ Establish a correct electrical connection with the device.
- ▷ Once connected to the supply voltage, the device will start.
- ▷ The LEDs show the status of the device.
- ▷ The unit is ready for operation.

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9 Maintenance, repair and disposal

If used correctly, the unit is maintenance-free.

- After use, dispose of the unit in an environmentally friendly way in accordance with the applicable national regulations.

9.1 Cleaning the housing surface

Clean the surface of the device when necessary.

- Disconnect the device from the supply voltage.
- Clean the device from dirt using a soft, chemically untreated and dry cloth.
- In case of severe soiling, use a damp cloth.
- Do not use any caustic cleaning agents for this!