

AXL E EIP DI16 M12 6M

**Axioline E EtherNet/IP™ device,
metal housing, 16 inputs, 24 V DC,
M12 fast connection technology**



Data sheet
8421_en_01

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1 Description

The Axioline E device is designed for use within an EtherNet/IP™ network.

It is used to acquire digital signals.

The device is designed for use in systems manufacturing.

It is suitable for use without a control cabinet under harsh industrial conditions.

The Axioline E device can be used on tool platforms, directly on welding robots or in conveying technology, for example.

EtherNet/IP™ features

- 2 Ethernet ports (with integrated switch)
- Minimum cycle time of 1 ms (RPI)
- Supported protocols: ACD, DLR, IGMP v2, SNMP v1, HTTP, TFTP, FTP, BootP, DHCP
- Specification: CIP Edition 3.11; EIP adaptation of CIP 1.12
- Device description using EDS file
- Firmware can be updated
- Integrated web server for web-based management

Axioline E features

- Connection to EtherNet/IP™ network using M12 connectors (D-coded)
- Transmission speed of 10 Mbps and 100 Mbps
- Connection of digital sensors to M12 connectors (A-coded)
- Diagnostic and status indicators
- Short-circuit and overload protection of the sensor supply
- IP65/67 degree of protection



This data sheet is only valid in association with the associated user manual.



Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.net/products.

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3 Ordering data

| Description | Type | Order No. | Pcs. / Pkt. |
|---|-----------------------|-----------|-------------|
| Axioline E EtherNet/IP™ device in a metal housing with 16 digital inputs, 24 V DC, M12 fast connection technology | AXL E EIP DI16 M12 6M | 2701488 | 1 |

| Accessories | Type | Order No. | Pcs./Pkt. |
|--|---------------|-----------|-----------|
| An M12 screw plug for the unoccupied M12 sockets of the sensor/actuator cable, boxes and flush-type connectors (Protection and sealing elements) | PROT-M12 | 1680539 | 5 |
| Mounting plate for Axioline E metal devices (Assembly) | AXL E MP 60 | 2701761 | 1 |
| Snap-in markers, Sheet, white, unlabeled, can be labeled with: THERMOMARK CARD, BLUEMARK CLED, BLUEMARK LED, TOPMARK LASER, Mounting type: snapped into marker carrier, Lettering field: 7 x 10 mm (Marking) | UCT-EM (7X10) | 0830765 | 10 |

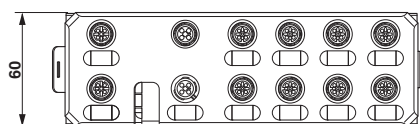
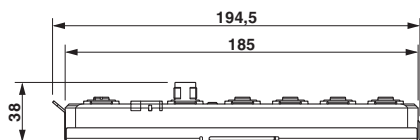
| Documentation | Type | Order No. | Pcs. / Pkt. |
|---|-----------------------------|-----------|-------------|
| User manual, English, Axioline E: system and installation | UM EN AXL E SYS INST | - | - |
| Application note, English: Updating the firmware of AXL E devices using the Windows Explorer | AH EN FIRMWARE UPDATE AXL E | - | - |

Additional ordering data

For additional accessories, visit phoenixcontact.net/products.

4 Technical data

Dimensions (nominal sizes in mm)



| | |
|--------|--------|
| Width | 60 mm |
| Height | 185 mm |
| Depth | 38 mm |

Note on dimensions

The height is 194.5 mm including the mounting plate. With fixing clips pulled out, the height is 212 mm. The depth is 38 mm including the mounting plate (30.5 mm without the mounting plate).

General data

| | |
|---------------------------------|------------------|
| Housing material | Zinc die-cast |
| Weight | 750 g |
| Ambient temperature (operation) | -25 °C ... 60 °C |



CAUTION: Risk of burns

If the device is used at an ambient temperature above 50°C, the contact temperature of metal surfaces may exceed 70°C.

| | |
|--|---|
| Ambient temperature (storage/transport) | -25 °C ... 85 °C |
| Permissible humidity (operation) | 5 % ... 95 % |
| Permissible humidity (storage/transport) | 5 % ... 95 % |
| Air pressure (operation) | 80 kPa ... 108 kPa (up to 3000 m above sea level) |
| Air pressure (storage/transport) | 70 kPa ... 106 kPa (up to 3000 m above sea level) |
| Degree of protection | IP65/67 |
| Protection class | III, IEC 61140, EN 61140, VDE 0140-1 |

Connection data

| | |
|-------------------|---------------|
| Connection method | M12 connector |
|-------------------|---------------|

Interface EtherNet/IP™

| | |
|------------------------------|---------------------------------------|
| Number | 2 |
| Connection method | M12 connectors, D-coded |
| Designation connection point | Copper cable |
| Number of positions | 4 |
| Transmission speed | 10/100 MBit/s (with auto negotiation) |
| Cycle Time | min. 1 ms (RPI) |

| EtherNet/IP™ | |
|------------------------|--|
| Equipment type | EtherNet/IP™ slave |
| EtherNet/IP™ protocols | ACD, DLR, IGMP v2 |
| Additional protocols | SNMP v1, HTTP, TFTP, FTP, BootP, DHCP |
| Specification | CIP Edition 3.11 EIP adaptation of CIP 1.12 |

| Supply: Module electronics and sensors (U_S) | |
|---|--|
| Connection method | M12 connector (T-coded) |
| Number of positions | 4 |
| Supply voltage | 24 V DC |
| Nominal supply voltage range | 18 V DC ... 31.2 V DC (including all tolerances, including ripple) |
| Typical current consumption | 190 mA ±15 % (at 24 V DC) |
| Current consumption | max. 12 A |

| Supply: Actuators (U_A) for additional devices | |
|---|--|
| Connection method | M12 connector (T-coded) |
| Number of positions | 4 |
| Supply voltage | 24 V DC |
| Nominal supply voltage range | 18 V DC ... 31.2 V DC (including all tolerances, including ripple) |
| Typical current consumption | 3 mA ±15 % (at 24 V DC) |
| Current consumption | max. 12 A |

| Digital inputs | |
|--|-------------------------------------|
| Number of inputs | 16 (EN 61131-2 types 1 and 3) |
| Connection method | M12 connector, double occupancy |
| Connection method | 2, 3, 4-wire |
| Nominal input voltage | 24 V DC |
| Nominal input current | typ. 3 mA |
| Sensor current per channel | typ. 0.75 mA (from U _S) |
| Total sensor current | max. 1.2 A (per device) |
| Input voltage range "0" signal | -30 V DC ... 5 V DC |
| Input voltage range "1" signal | 11 V DC ... 30 V DC |
| Input filter time | < 1000 µs |
| Permissible conductor length to the sensor | 30 m |
| Overload protection, short-circuit protection of sensor supply | Yes |

Electrical isolation/isolation of the voltage areas

| Test section | Test voltage |
|--|------------------------|
| 24 V supply (communications power and sensor supply, digital inputs)/ bus connection (Ethernet 1) | 500 V AC, 50 Hz, 1 min |
| 24 V supply (communications power and sensor supply, digital inputs)/ bus connection (Ethernet 2) | 500 V AC, 50 Hz, 1 min |
| 24 V supply (communications power and sensor supply, digital inputs)/FE | 500 V AC, 50 Hz, 1 min |
| Bus connection (Ethernet 1)/FE | 500 V AC, 50 Hz, 1 min |
| Bus connection (Ethernet 2)/FE | 500 V AC, 50 Hz, 1 min |
| Bus connection (Ethernet 1)/bus connection (Ethernet 2) | 500 V AC, 50 Hz, 1 min |
| 24 V supply (actuator supply)/ 24 V supply (communications power and sensor supply, digital inputs) | 500 V AC, 50 Hz, 1 min |
| 24 V supply (actuator supply)/bus connection (Ethernet 1) | 500 V AC, 50 Hz, 1 min |
| 24 V supply (actuator supply)/bus connection (Ethernet 2) | 500 V AC, 50 Hz, 1 min |
| 24 V supply (actuator supply)/FE | 500 V AC, 50 Hz, 1 min |

Mechanical tests

| | |
|--|---|
| Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6 | 5 g |
| Shock in acc. with EN 60068-2-27/IEC 60068-2-27 | 30 g, 11 ms period, half-sine shock pulse |
| Continuous shock according to EN 60068-2-27/IEC 60068-2-27 | 10 g |

Conformance with EMC Directive 2004/108/EC

Noise immunity test in accordance with EN 61000-6-2

| | |
|--|---|
| Electrostatic discharge (ESD) EN 61000-4-2/IEC 61000-4-2 | Criterion B; 6 kV contact discharge, 8 kV air discharge |
| Electromagnetic fields EN 61000-4-3/IEC 61000-4-3 | Criterion A; Field intensity: 10 V/m |
| Fast transients (burst) EN 61000-4-4/IEC 61000-4-4 | Criterion B, 2 kV |
| Transient surge voltage (surge) EN 61000-4-5/IEC 61000-4-5 | Criterion B; DC supply lines: ± 0.5 kV/ ± 0.5 kV (symmetrical/asymmetrical) |
| Conducted interference EN 61000-4-6/IEC 61000-4-6 | Criterion A; Test voltage 10 V |

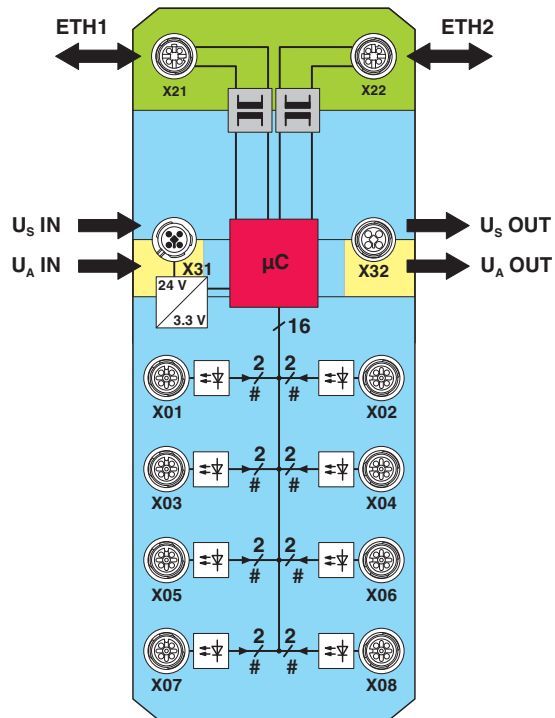
Noise emission test as per EN 61000-6-4

| | |
|--|---------|
| Radio interference properties EN 55022 | Class A |
|--|---------|

Approvals

For the latest approvals, please visit phoenixcontact.net/products.

5 Internal circuit diagram



Key:



Transmitter with electrical isolation



Power supply unit with electrical isolation



Microcontroller



Digital input



LED

Figure 1 Internal wiring of connections

Key:

| | |
|--------------|---------|
| Green area: | Network |
| Blue area: | U_S |
| Yellow area: | U_A |

6 Pin assignment

6.1 EtherNet/IP™ and power supply connection

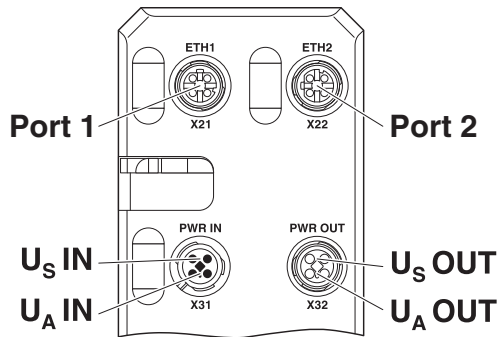


Figure 2 Connections for EtherNet/IP™ and voltage supply

| Designation | Meaning |
|--------------------------|--|
| Port 1 (X21) | Ethernet port 1 |
| Port 2 (X22) | Ethernet port 2 |
| U _S IN (X31) | Power supply IN (logic and sensors) |
| U _A IN (X31) | Power Supply IN (actuators) for additional devices |
| U _S OUT (X32) | Power supply OUT for additional devices |
| U _A OUT (X32) | Power supply OUT for additional devices |



Ground the device by means of the mounting screws.

6.2 EtherNet/IP™ pin assignment

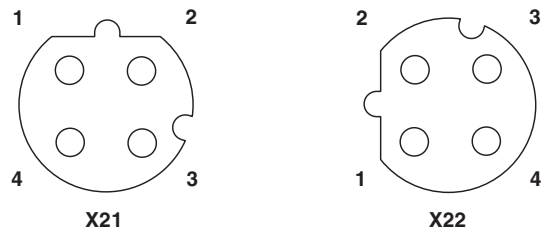


Figure 3 Ethernet pin assignment, D-coded

| Pin | Ethernet port 1 (X21) | Ethernet port 2 (X22) |
|-----|-----------------------|-----------------------|
| 1 | TX+ | TX+ |
| 2 | RX+ | RX+ |
| 3 | TX- | TX- |
| 4 | RX- | RX- |



The shield is connected to FE in the device.



The thread is used for additional shielding.

6.3 Pin assignment of the power supply U_S/U_A



Figure 4 Pin assignment of the power supply, T-coded

| Pin | IN | OUT | Conductor colors |
|-----|----------------------------|----------------------------|------------------|
| 1 | +24 V DC (U _S) | +24 V DC (U _S) | Brown |
| 2 | GND (U _A) | GND (U _A) | White |
| 3 | GND (U _S) | GND (U _S) | Blue |
| 4 | +24 V DC (U _A) | +24 V DC (U _A) | Black |

6.4 Input connection

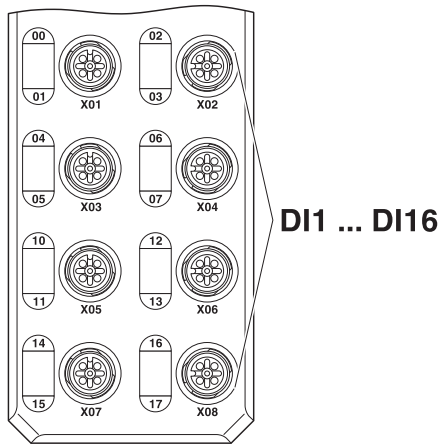


Figure 5 Input connections

| Designation | Meaning |
|----------------------------|-----------------|
| DI1 ... DI16 (X01 ... X08) | Inputs 1 ... 16 |

6.5 Pin assignment of the inputs

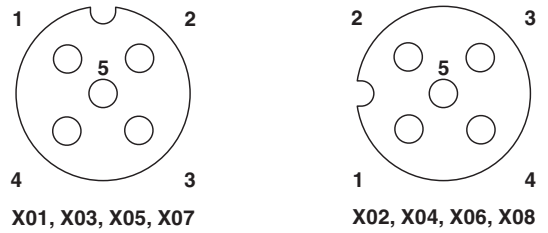


Figure 6 Pin assignment of the inputs, A-coded

| Pin | Input socket |
|-----|-----------------------|
| 1 | +24 V DC (U_S) |
| 2 | Input 2, 4, 6, ... 16 |
| 3 | GND |
| 4 | Input 1, 3, 5, ... 15 |
| 5 | FE |

7 Connection example



Figure 7 Typical connection of sensors

8 Connection notes



Note: data corruption or loss

Implement the FE connection using mounting screws, in order to ensure immunity to interference.



NOTE: device damage

To ensure IP65/IP67 protection, cover unused sockets with protective caps.



NOTE: Damage to the electronics

Only supply the sensors with the voltage U_S provided at the terminal points.



NOTE: Damage to the electronics

Observe the correct polarity of the supply voltages U_S and U_A in order to prevent damage to the device.



NOTE: Malfunction

When connecting the sensors, observe the assignment of the connections to the EtherNet/IP™ input data.



Secure the device to a level surface or to a profile. Do not use this device to bridge gaps, in order to prevent forces being transmitted via the device.



Use standard M5 screws with toothed lock washer and self-locking nuts. Observe the maximum torque of the screws.

9 Configuration via rotary encoding switch

You can configure the address assignment and other functions using rotary encoding switches.

After modifying the switch position, restart the device, as the modification to the switch position does not take effect during operation.



Figure 8 Rotary encoding switch

The code results from the sum of S1 x 10 plus S2 x 1. The image shows code 77 (7 x 10 + 7).

| S1 | S2 | Code | Function |
|----------|---------|------------|-----------------------------------|
| 0 | 0 | 00 | Remote access (default) |
| 0 ... 5 | 1 ... 0 | 01 ... 50 | Manual address assignment |
| 5 ... 15 | 0 ... 9 | 51 ... 159 | DHCP name assignment |
| 0 | A | 0A | Fixed address |
| 0 | E | 0E | Resetting IP parameters |
| 0 | F | 0F | Resetting to the default settings |
| Other | | | Reserved |

9.1 Remote access

Switch position 00

At this switch position, it is possible to remotely configure the device using corresponding tools (e.g., Startup+, web-based management (WBM)).

Behavior during initial startup, after resetting the IP parameters or after resetting to default settings

A valid IP address is not assigned (0.0.0.0) and communication is therefore not possible.

The device transmits continuous BootP requests (2 s, 4 s, 8 s, 2 s ...), until a valid IP address has been received.

Valid IP parameters are then automatically saved as configuration data on the device.

Each additional startup

If BootP is not explicitly deactivated, the device transmits continuous BootP requests (2 s, 4 s, 8 s, 2 s, etc.), until a valid IP address has been received.

Valid IP parameters are then automatically saved as configuration data on the device.

9.2 Manual address assignment

Switch position 01 ... 50

Default: BootP deactivated, DHCP activated

The first three octets in the IP address are preset as 192.168.0.x.

The subnet mask is 255.255.255.0.

Specify the last byte with the switch position.

As such, you can select IP addresses between 192.168.0.1 and 192.168.0.50.

Prior to transferring the IP address, a test is performed to check for any potential IP address conflicts. If a conflict is detected, the device temporarily switches the IP address to 0.0.0.0 (no IP communication). In this case, the NET LED flashes red. Eliminate the conflict and restart the device.

9.3 DHCP name assignment

Switch position 51 ... 159

This switch position is used to easily specify the DHCP host name for the device.

The host name is provided to the DHCP server via DHCP options. This is therefore able to send a DNS update to the DNS server.

The DNS name consists of one set part, which is based on the order designation, and a variable part, which is determined by the switch position.

The first part of the station name is AXL-E-EIP-.

The set number is added.

This results in the following station names: AXL-E-EIP-051 ... AXL-E-EIP-159.

Behavior during initial startup, after resetting the IP parameters or after resetting to default settings

A valid IP address is not assigned (0.0.0.0) and communication is therefore not possible.

The device transmits continuous DHCP discover messages until a valid IP address has been received.

Each additional startup

The device transmits continuous DHCP requests.

There are two possible scenarios:

1. The DHCP server assigns a new IP address.
⇒ The device applies the new IP parameters.
2. The DHCP server does not respond.
⇒ The device transmits continuous DHCP Discover messages until new IP parameters have been received.

9.4 Fixed address

Switch position 0A

Behavior during initial startup, after resetting the IP parameters or after resetting to default settings

A valid IP address is not assigned (0.0.0.0) and communication is therefore not possible.

Assign an address initially with another switch position.

Each additional startup

After a voltage reset, the device maintains the IP address which was assigned last.



With this switch position, modifying the IP address via tools or web-based management is not possible.

9.5 Resetting IP parameters

Switch position 0E

The IP parameters stored on the device are reset.

All other settings made on the device are retained.

- BootP is activated for switch position 00.
- IP address, subnet mask: 0.0.0.0

As long as the switch position 0E remains selected, no connection to the device can be established.

IP communication is deactivated (LED NET static yellow).

9.6 Resetting to the default settings

Switch position 0F

All settings are reset to default settings, including IP parameters.



The device is ready for operation after powering up, as soon as the RDY LED lights up green.
A connection to the device however cannot be established in this switch position.
As soon as the RDY LED lights up green, a new switch position can be selected on the rotary encoding switch and the device can be restarted.

9.7 Reserved/invalid switch position

The device starts with the previous settings, e.g., with the settings that were valid before the device was restarted.

An invalid switch position is indicated by the RDY LED (red on).

10 Local status and diagnostic indicators

10.1 Indicators for Ethernet ports and power supply

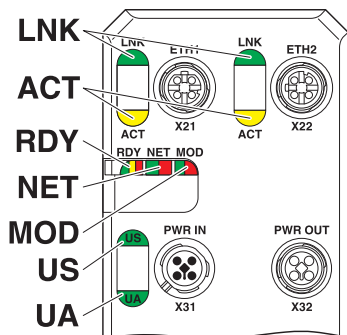


Figure 9 Indicators for Ethernet ports and power supply

| Designation | Color | Meaning | State | Description |
|-------------|------------------------------------|----------------|------------------------------|--|
| LNK 1/2 | Green | Link | Green ON | Connection present at port 1/2. |
| | | | OFF | Connection not present at port 1/2. |
| ACT 1/2 | Yellow | Activity | Yellow ON | Data transmission present at port 1/2. |
| | | | OFF | Data transmission not present at port 1/2. |
| RDY | Green/ yellow/ red | Ready | Green ON | Device is ready for operation. |
| | | | Yellow flashing | Firmware update is being performed. |
| | | | Flashing green/ yellow | Over- or undervoltage at U_S |
| | | | | Temperature of the device is in the critical area. |
| | | | | Failure of the actuator supply U_A And red US LED: sensor supply overload |
| | | | Red ON | Rotary encoding switches are set to an invalid/reserved position. |
| OFF | Device is not ready for operation. | | | |
| NET | Green/ red | Network status | Green ON | At least one CIP connection is in place and the exclusive owner connection has no timeout. |
| | | | Green flashing | An IP address is configured, no CIP connection is yet in place, and the exclusive owner connection has no timeout. |
| | | | Red ON | Duplicate IP. ACD has determined an IP address conflict. |
| | | | Red flashing | Connection timeout. A timeout of an exclusive owner connection has occurred. |
| | | | Flashing green/ red | Self test |
| | | | OFF | Device is not ready for operation. |

| Designation | Color | Meaning | State | Description |
|-------------|---------------|-----------------------|------------------------|---|
| MOD | Green/ red | Module status | Green ON | Normal operation |
| | | | Green flashing | The device is not configured. |
| | | | Red ON | A recoverable error has occurred. |
| | | | Red flashing | A unrecoverable error has occurred. |
| | | | Flashing green/ red | Self test |
| | | | OFF | Device is not ready for operation. |
| US | Green/ red | U _{Sensorik} | Green ON | Communications power/sensor voltage present |
| | | | OFF | Communications power/sensor voltage not present or too low. |
| | | | Red ON | Sensor voltage overload |
| UA | Green | U _{Aktorik} | ON | Actuator voltage present. |
| | | | OFF | Actuator voltage not present. |

10.2 Input indicators

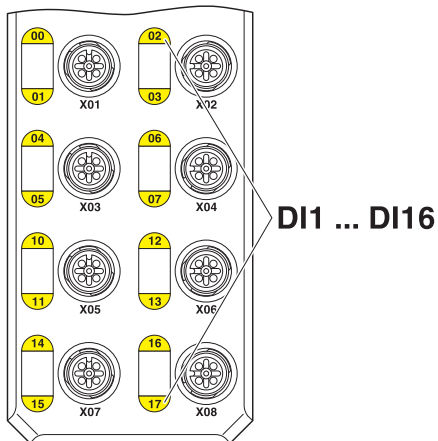


Figure 10 LEDs of the inputs

| Designation | Color | Meaning | State | Description |
|-------------------------|--------|----------------------|-------|-------------------|
| 00 ... 07, 10 ... 17 | Yellow | Status of the inputs | ON | Input is set. |
| | | | OFF | Input is not set. |



The numbering of the LEDs is as follows: the first number specifies the byte, the second number specifies the bit.

11 EtherNet/IP™ object classes, messages, and services

The device supports the Common Industrial Protocol (CIP) by using digital input points (DIPs) and digital output points (DOPs) according to the ODVA specification. EtherNet/IP™ uses the Common Industrial Protocol (CIP) as the application layer. IP and TCP or UDP are used for the network and transport layers. CIP and EtherNet/IP™ are standardized by the ODVA on a manufacturer-neutral basis. The Common Industrial Protocol is an object-oriented protocol with two different types of communication between a controller and termination devices.

The following table describes the two communication types.

| Connection type | Description |
|--------------------|---|
| Explicit messaging | This means that a controller or an engineering system sends a request and the termination device responds. For example, explicit messaging can be used for configuration and/or diagnostics. |
| Implicit messaging | Implicit messaging is used for the cyclic transmission of I/O data. That means, for example, that a termination device sends an analog value which is present at a termination device input. The time for a transmission cycle can be set via the requested packet interval (RPI). |

11.1 CIP class services

The device supports the following class services and instance services:

| Service code | | Service name |
|--------------|-----|----------------------|
| dec | hex | |
| 01 | 01 | Get_Attribute_All |
| 02 | 02 | Set_Attribute_All |
| 05 | 05 | Reset |
| 09 | 09 | Delete |
| 14 | 0E | Get_Attribute_Single |
| 16 | 10 | Set_Attribute_Single |

11.2 CIP object classes

The device supports the following CIP object classes:

| Class code | | Object type |
|------------|-----|----------------------------|
| dec | hex | |
| 01 | 01 | Identity object |
| 04 | 04 | Assembly object |
| 06 | 06 | Connection manager object |
| 08 | 08 | Digital input point object |
| 71 | 47 | Device level ring object |
| 72 | 48 | Quality of Service object |
| 245 | F5 | TCP/IP interface object |
| 246 | F6 | Ethernet link object |

11.3 Identity object (class code 01_{hex})

The Identity object is required by all devices and provides the device ID and general information about the device.

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|------------------------|--------|-----------|-------|
| 1 | Version | Get | UINT | 1 |
| 2 | Max instance | Get | UINT | 1 |
| 6 | Max class attribute | Get | UINT | 7 |
| 7 | Max instance attribute | Get | UINT | 10 |

Instance attributes

| Attribute | Name | Access | Data type | Value | |
|-----------|---------------------------------|--------|-----------|---|---------------------------|
| 1 | Vendor ID | Get | UINT | 562 | |
| 2 | Device type | Get | UINT | General purpose discrete I/O | |
| 3 | Product code | Get | UINT | 8174 | |
| 4 | Revision | Get | STRUC of: | 1 | |
| | Major revision | | USINT | 1 | |
| | Minor revision | | USINT | 1 | |
| 5 | Status | Get | WORD | Bit 0 | Owned |
| | | | | Bit 1 | Reserved |
| | | | | Bit 2 | Configured |
| | | | | Bit 3 | Reserved |
| | | | | Bit 4 ... Bit 7 | Extended device status |
| | | | | Bit 8 | Minor recoverable fault |
| | | | | Bit 9 | Minor unrecoverable fault |
| | | | | Bit 10 | Major recoverable fault |
| | | | | Bit 11 | Major unrecoverable fault |
| | | | | Bit 12 ... Bit 15 | Extended device status 2 |
| 6 | Serial number | Get | UDINT | Is fixed in production process | |
| 7 | Product name | Get | STRING | AXL E EIP DI16 M12 6M | |
| 8 | State | Get | USINT | 0 = Nonexistent | |
| | | | | 1 = Device self testing | |
| | | | | 2 = Standby | |
| | | | | 3 = Operational | |
| | | | | 4 = Major recoverable fault | |
| | | | | 5 = Major unrecoverable fault | |
| | | | | 6 ... 254 = Reserved | |
| | | | | 255 = Default for Get_Attribute_All service | |
| 9 | Configuration consistency value | Get | USINT | CRC checksum | |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 01 | 01 | Yes | Yes | Get_Attribute_All |
| 05 | 05 | No | Yes | Reset |
| 14 | 0E | Yes | Yes | Get_Attribute_Single |
| 16 | 10 | No | Yes | Set_Attribute_Single |

11.4 Assembly object (class code 4_{hex})

The Assembly object combines attributes of multiple objects to allow data to or from each object to be sent or received via a single connection.

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|--------------|--------|-----------|-------|
| 1 | Version | Get | UINT | 2 |
| 2 | Max instance | Get | UINT | 102 |

Instance attributes

| Attribute | Name | Access | Data type | Description |
|-----------|------|----------|---------------|---|
| 3 | Data | Get, Set | ARRAY of Byte | Current Process data of the correspondent Assembly instance |
| 4 | Size | Get | UINT | Number of bytes in attribute 3 |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 14 | 0E | Yes | Yes | Get_Attribute_Single |
| 16 | 10 | No | Yes | Set_Attribute_Single |

11.5 Connection manager object (class code 06_{hex})

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|--------------|--------|-----------|-------|
| 1 | Version | Get | UINT | 1 |
| 2 | Max instance | Get | UINT | 1 |

11.6 Discrete Input Point object (class code 08_{hex})

The Digital input point (DIP) object mirrors the digital inputs. This object can be used in simple toggle switches as well as in complex I/O control modules. Each device has a separate instance for each digital input.

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|---------|--------|-----------|-------|
| 1 | Version | Get | UINT | 2 |

Instance attributes

| Attribute | Name | Access | Data type | Value |
|-----------|--------|--------|-----------|-------------------|
| 3 | Value | Get | BOOL | 0 = off; 1 = on |
| 4 | Status | Get | BOOL | 0 = OK; 1 = Fault |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 14 | 0E | Yes | Yes | Get_Attribute_Single |
| 16 | 10 | No | Yes | Set_Attribute_Single |

11.7 Device level ring object (class code 47_{hex})

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|---------|--------|-----------|-------|
| 1 | Version | Get | UINT | 2 |

Instance attributes

| Attribute | Name | Access | Datentyp | Wert/ Beschreibung | |
|-----------|---------------------------|--------|-------------------|--|---------------------------|
| 1 | Network topology | Get | USINT | 0 = Linear 1 = Ring | |
| 2 | Network status | Get | USINT | 0 = Normal 1 = Ring fault 2 = Unexpected loop detected 3 = Partial network fault 4 = Rapid fault/Restore cycle | |
| 10 | Active supervisor address | Get | STRUCT of: | IP and/or MAC address of the active ring supervisor | |
| | | | UDINT | Supervisor IP address | |
| | | | ARRAY of 6 USINTs | Supervisor MAC address | |
| 12 | Capability flags | Get | DWORD | Bit 0 | Announced-based ring node |
| | | | | Bit 1 | Beacon-based ring note |
| | | | | Bit 2 ... Bit 4 | Reserved |
| | | | | Bit 5 | Supervisor capable |
| | | | | Bit 6 ... Bit 31 | Reserved |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 1 | 01 | Yes | Yes | Get_Attribute_Single |
| 14 | 0E | Yes | Yes | Set_Attribute_Single |

11.8 Quality of service object (class code 48_{hex})

Quality of Service (QoS) affects the forwarding and handling of data streams and results in individual data streams being given differential treatment (usually preferential). QoS can be used, e.g., to guarantee a transmission bandwidth for individual data streams. The device uses QoS in connection with prioritization.

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|--------------|--------|-----------|-------|
| 1 | Version | Get | UINT | 1 |
| 2 | Max instance | Get | UINT | 1 |

Instance attributes

| Attribute | Name | Access | Data type | Value/Description |
|-----------|-------------------|----------|-----------|---|
| 1 | 802.1Q tag enable | Get, Set | UINT | 0 = off (default); 1 = on |
| 4 | DSCP urgent | Get, Set | USINT | DSCP value for CIP transport class 0/1 Urgent priority message (default 55) |
| 5 | DSCP scheduled | Get, Set | USINT | DSCP value for CIP transport class 0/1 Scheduled priority message (default 47) |
| 6 | DSCP high | Get, Set | USINT | DSCP value for CIP transport class 0/1 High priority message (default 43) |
| 7 | DSCP low | Get, Set | USINT | DSCP value for CIP transport class 0/1 Low priority message (default 31) |
| 8 | DSCP explicit | Get, Set | USINT | DSCP value for CIP explicit messages (transport class 2/3 and UCMM) and all other EtherNet/IP encapsulation messages (default 27) |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 14 | 0E | Yes | Yes | Get_Attribute_Single |
| 16 | 10 | No | Yes | Set_Attribute_Single |

11.9 TCP/IP object (class code F5_{hex})

Class attributes

| Attribute | Name | Access | Data type | Value |
|-----------|--------------|--------|-----------|-------|
| 1 | Version | Get | UINT | 3 |
| 2 | Max instance | Get | UINT | 1 |

Instance attributes

| Attribute | Name | Access | Data type | Description | |
|-----------|--------------------------|----------|--------------|------------------------------|---|
| 1 | Status | Get | DWORD | Bit 0 ... Bit 3 | Interface configuration status |
| | | | | Bit 4 | Mcast pending (always 0) |
| | | | | Bit 5 | Interface configuration pending |
| | | | | Bit 6 | AcidStatus |
| | | | | Bit 7 | AcidFault |
| | | | | Bit 8 ... Bit 31 | Reserved |
| 2 | Configuration capability | Get | DWORD | Bit 0 | BOOTP client |
| | | | | Bit 1 | Not supported |
| | | | | Bit 2 | DHCP client |
| | | | | Bit 3 | Not supported |
| | | | | Bit 4 | TCP/IP config settable via ETH/IP |
| | | | | Bit 5 | Not supported |
| | | | | Bit 6 | Not supported |
| | | | | Bit 7 | AcidCapable |
| | | | | Bit 8 ... Bit 31 | Reserved |
| 3 | Configuration control | Get, Set | DWORD | Bit 0 ... Bit 3 | 0 = The device use static IP configuration 1 = The device use BOOTP 2 = The device use DHCP |
| | | | | Bit 4 | Not supported |
| | | | | Bit 5 ... Bit 31 | Reserved |
| 4 | Physical link object | Get | STRUCT of: | Path to Physical link object | |
| | Path size | | UINT | 4 | |
| | Path | | Padded EPATH | 0x20, 0xF6, 0x25, 0x01 | |

| Attribute | Name | Access | Data type | Description |
|-----------|---------------------------|----------|--------------------|--|
| 5 | Interface configuration | Get, Set | STRUCT of: | TCP/IP network interface configuration |
| | IP address | | UDINT | The device's IP address |
| | Network mask | | UDINT | The device's network mask |
| | Gateway address | | UDINT | Default gateway address |
| | Name server | | UDINT | Primary name server (always 0.0.0.0) |
| | Name server 2 | | UDINT | Secondary name server (always 0.0.0.0) |
| | Domain name | | STRING | Default domain name (always empty) |
| 6 | Host name | Get, Set | STRING | The device's host name |
| 10 | SelectAcid | Get, Set | BOOL | 0 = disable; 1 = enable (default) |
| 11 | Last conflict detected | Set | STRUCT of: | Structure containing information related to the last conflict detected |
| | AcidActivity | | USINT | State of ACD activity when last conflict detected 0 = NoconflictDetected (default) 1 = Probelpv4Address 2 = OngoingDetection 3 = SemiActiveProbe |
| | Remote MAC | | ARRAY of 6 USINTs | MAC address of remote node from the ARP PDU in which a conflict was detected |
| | ArpPdu | | Array of 28 USINTs | Copy of the raw ARP PDU in which a conflict was detected. |
| 12 | Ethernet/IP quick connect | Get, Set | BOOL | 0 = disable (default); 1 = enable |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 1 | 01 | Yes | Yes | Get_Attribute_All |
| 14 | 0E | Yes | Yes | Get_Attribute_Single |
| 16 | 10 | No | Yes | Set_Attribute_Single |

11.10 Ethernet link object (class code F6_{hex})

Class attributes

| Attribute | Name | Access | Data type | Description |
|-----------|---------------------|--------|-----------|-------------|
| 1 | Version | Get | UINT | 3 |
| 2 | Max instance | Get | UINT | 10 |
| 3 | Number of instances | Get | UINT | 2 |

Instance attributes

| Attribute | Name | Access | Data type | Description | |
|------------------------|-------------------|--|-------------------|---|---|
| 1 | Interface speed | Get | UDINT | Interface speed currently in use. Speed in bps (e.g. 10, 100) | |
| 2 | Interface flags | Get | DWORD | Bit 0 | Link status |
| | | | | Bit 1 | Half/Full duplex status 0 = Half duplex; 1 = Full duplex |
| | | | | Bit 2 ... Bit 4 | Auto negotiation status 0 = Auto negotiation in progress 1 = Auto negotiation and speed detection failed 2 = Auto negotiation failed but detected speed 3 = Successfully negotiated 4 = Auto negotiation not attempted |
| | | | | Bit 5 | Not supported |
| | | | | Bit 6 | Not supported |
| 3 | Physical address | Get | ARRAY of 6 USINTs | MAC layer address | |
| 6 | Interface control | Set | STRUC of: | Configuration for physical interface | |
| | Control bits | | WORD | Interface control bits | |
| | | | Bit 0 | Auto-negotiate (set) 0 = Auto negotiation disabled 1 = Auto negotiation enabled | |
| | | | Bit 1 | Forced duplex mode (set) 0 = Half duplex ; 1 = Full duplex Set only if auto negotiation is disabled | |
| Forced interface speed | UINT | The Forced interface speed bits indicate the speed at which the interface shall operate. 10 = 10 Mbps 100 = 100 Mbps Set only if auto negotiation is disabled | | | |
| 10 | Interface lable | Get | STRING | Interface name | |

Common services

| Service code | | Class | Instance | Service name |
|--------------|-----|-------|----------|----------------------|
| dec | hex | | | |
| 1 | 01 | Yes | No | Get_Attribute_All |
| 14 | 0E | Yes | Yes | Get_Attribute_Single |

12 EtherNet/IP™ Assembly instances

| | Exclusive owner | Input only | Listen only |
|------------------------------------|-----------------|------------|-------------|
| Input data length in bytes | - | 6 | 6 |
| Assembly instance | - | 101 | 101 |
| Output data length in bytes | - | 0 | 0 |
| Assembly instance | - | 193 | 192 |
| Configuration data length in bytes | - | - | - |
| Assembly instance | - | - | - |

12.1 Assembly instance 101 (IN process data)

| Byte | Function | Description |
|---------|-------------|-----------------------------|
| 0 ... 3 | Status byte | Status information |
| 4 | Input data | Input data channel 1 ... 8 |
| 5 | Input data | Input data channel 9 ... 16 |

The first four bytes of the input data have the same format for all Axioline E versions.

| Bit 31 ... bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
|------------------|--|----------|----------|-------|-------|-------|
| Reserved | Supply of the module electronics and sensors (U_S) | | Reserved | | | |
| Reserved | Undervoltage | Overload | Reserved | | | |

| Byte | Input process data | | | | | | | | | | | | | | | |
|------------|--------------------|----|-----|----|-----|----|-----|----|--------|----|-----|----|-----|----|-----|----|
| | Byte 0 | | | | | | | | Byte 1 | | | | | | | |
| Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| IN | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 |
| Connection | X04 | | X03 | | X02 | | X01 | | X08 | | X07 | | X06 | | X05 | |
| Pin | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 |
| DI | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 |

Key:

- Bit: Process data assignment
- IN: LED marking
- DI: Input of the device

13 Startup

13.1 Delivery state/default settings

By default upon delivery, the following functions and features are available:

IP settings

| | |
|------------------|-----------|
| IP parameters: | 0.0.0.0 |
| Subnet mask: | 0.0.0.0 |
| Default Gateway: | 0.0.0.0 |
| BootP: | activated |

Firmware update

| | |
|-----------------------------------|-----------------|
| Firmware update on next re-start: | deactivated |
| TFTP server IP address: | 192.168.210.211 |
| Firmware file name: | FIRMWARE.NXF |

System identification

| | |
|------------------|-------------------------|
| Device name: | No name assigned |
| Description: | No description assigned |
| Device location: | No location assigned |
| Contact: | No contact assigned |

Web-based Management (WBM)

| | |
|------------|---------|
| User name: | admin |
| Password: | private |

13.2 Restoring the default settings

There are two options for resetting the default settings:

- Via web-based management, go to the Administration web page > default settings and follow the instructions.
- Via the rotary coding switch, switch position 0F

13.3 Starting the firmware

Once you have connected the power, the firmware is started.

After completion of the firmware boot process, the NET LED either lights up or flashes green.

14 SNMP - Simple Network Management Protocol

The device supports SNMP v1.

Management Information Base - MIB



The corresponding latest MIBs are available on the Internet at phoenixcontact.net/products.

For the object descriptions, please refer to the ASN1 descriptions for this product.

The password for read access is “public” and cannot be changed.

By default upon delivery, the password for write/read access is “private” and can be modified at any time.

15 DLR - Device Level Ring

The device supports DLR.

DLR is a protocol that works on Layer 2 for multi-port-EtherNet/IP™ devices.

The use of DLR is transparent for the protocols which work on higher levels such as TCP/IP.

DLR increases the network availability, thanks to a redundant ring topology with a switch-over time of less than 3 ms for error detection and reconfiguration.

The DLR protocol supports the 1-ring topology; multiple rings or overlapping rings are not possible.

16 WBM - Web-based management

The device has a web server, which generates the required pages for web-based management and, depending on the requirements of the user, sends them to a standard web browser. Web-based management can be used to access static information (e.g., technical data, MAC address) or dynamic information (e.g., IP address, status information).

Calling web-based management

The device web server can be addressed using the IP address if configured accordingly. The homepage (web page) of the device is accessed by entering the URL “http://ip-address”.

Example: http://172.16.113.38

The default user name is “admin”, the default password is “private”.



If you cannot access the WBM pages, check the connection settings in your browser and deactivate the proxy, if set.

17 Firmware update

In order to update the firmware of the device, the device must be provided with a firmware container via a TFTP server or it must be loaded onto the device via FTP. Any FTP client or TFTP server can be used for this. The update must always be initiated by the web-based management. When carrying out the firmware update, the RDY LED flashes yellow.

18 Quick Connect

The device supports Quick Connect Class A.

After switching on the mains voltage, it is ready to operate in under 350 ms in order to process a connection request.

A cyclic process data connection can be established in under 500 ms.

19 Connection types

The device supports the connection types Exclusive Owner, Input Only, and Listen Only.

- Exclusive Owner and Input Only can be configured by the scanner as a Multicast or Point to Point connection in the Target to Originator direction.
- Listen Only connections can only be used as Multicast.

In the case of the AXL E Ethernet/IP™ device, the data is transmitted to the scanner with a connection.

20 Device description (EDS)

In the case of EtherNet/IP™, a device description file (EDS) is required for various configuration tools.

For each Axioline E EtherNet/IP™ device, an individual specific EDS file is provided.

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