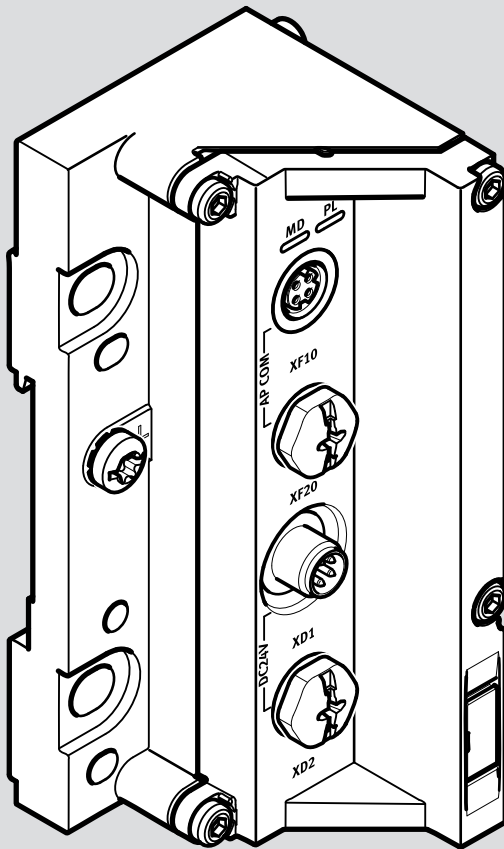


# VMPAL-EPL-AP

## End plate

# FESTO

Operating instruction



8231240

8231240  
2025-02b  
[8231242]

Original instructions

PHOENIX CONTACT is a registered trademark of its respective trademark holder in certain countries.

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# 1 About this document

## 1.1 Applicable documents



All available documents for the product → [www.festo.com/sp](http://www.festo.com/sp).

| Document                                          | Contents                                                                                                                                                           |
|---------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating instructions remote I/O system CPX-AP-I | Instruction manual and important information on the assembly, electrical installation and maintenance tasks and also description of the remote I/O system CPX-AP-I |
| Manual MPAL-VI                                    | Detailed description of installation, commissioning, maintenance and conversion of the valve terminal                                                              |
| Assembly instructions MPA                         | Wall mounting and H-rail mounting of the valve terminal                                                                                                            |

Tab. 1: Applicable documents

## 1.2 Product version

This document refers to the following product versions:

| Product      | Version              |
|--------------|----------------------|
| VMPAL-EPL-AP | Revision 1 and above |

Tab. 2: Product version

The product version can be determined from the product labelling.



There may be an updated version of this document for this or later product versions → [www.festo.com/sp](http://www.festo.com/sp).

## 1.3 Specified standards

| Version             |                  |
|---------------------|------------------|
| IEC 60204-1:2016-10 | EN 60529:1991-10 |
| EN 60204-1:2018-09  | –                |

Tab. 3: Standards specified in the document

# 2 Safety

## 2.1 Safety instructions

- Only use the product if it is in perfect technical condition.
- Observe the identifications on the product.
- Store the product in a cool, dry environment protected from UV and corrosion. Keep storage times short.
- Before working on the product, switch off the power supply and secure it against being switched on again.

## 2.2 Intended use

The product described in this document is intended exclusively for operation as an electrical interface between a remote I/O system CPX-AP and a valve terminal MPAL.

Use the product only as follows:

- Use only in an industrial environment. Outside of industrial environments, e.g. in commercial and mixed-residential areas, actions to suppress interference may have to be taken.
- Use only in combination with modules and components that are approved for the applicable product variant ➔ [www.festo.com/catalogue](http://www.festo.com/catalogue).

2.3 Training of qualified personnel

Work on the product may only be carried out by qualified personnel who can evaluate the work and detect dangers. The qualified personnel have skills and experience in dealing with electrical (open-loop) control technology.

3 Additional information

- Contact the regional Festo contact if you have technical problems ➔ [www.festo.com](http://www.festo.com).
- Accessories and spare parts ➔ [www.festo.com/catalogue](http://www.festo.com/catalogue).

4 Product overview

4.1 Design

4.1.1 Product design

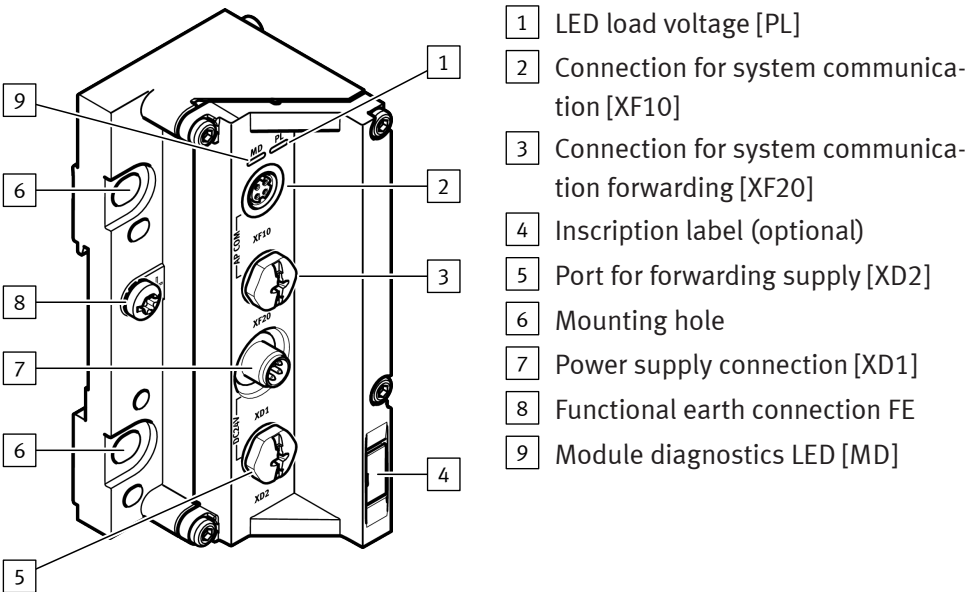


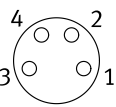
Fig. 1: Product design

4.1.2 Connecting elements

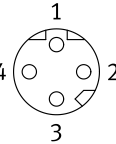
| Power supply connection [XD1] |   |                          |
|-------------------------------|---|--------------------------|
| M8 plug, 4-pin, A-coded       |   | Signal                   |
|                               | 1 | +24 V DC logic supply PS |
|                               | 2 | 0 V DC load supply PL    |
|                               | 3 | 0 V DC logic supply PS   |
|                               | 4 | +24 V DC load supply PL  |

Tab. 4: Power supply connection

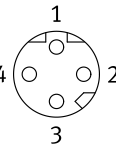
For information on power supply, see operating instructions for remote I/O system CPX-AP-I ➔ 1.1 Applicable documents.

| Connection for voltage forwarding [XD2]                                           |        |                          |
|-----------------------------------------------------------------------------------|--------|--------------------------|
| M8 socket, 4-pin, A-coded                                                         | Signal |                          |
|  | 1      | +24 V DC logic supply PS |
|                                                                                   | 2      | 0 V DC load supply PL    |
|                                                                                   | 3      | 0 V DC logic supply PS   |
|                                                                                   | 4      | +24 V DC load supply PL  |

Tab. 5: Connection for voltage forwarding

| Connection for system communication [XF10]                                        |        |     |                    |
|-----------------------------------------------------------------------------------|--------|-----|--------------------|
| Socket M8, 4-pin, D-coded                                                         | Signal |     |                    |
|  | 1      | TX– | Transmitted data – |
|                                                                                   | 2      | RX+ | Received data +    |
|                                                                                   | 3      | TX+ | Transmitted data + |
|                                                                                   | 4      | RX– | Received data –    |

Tab. 6: Connection for system communication

| Connection for system communication forwarding [XF20]                              |        |     |                    |
|------------------------------------------------------------------------------------|--------|-----|--------------------|
| Socket M8, 4-pin, D-coded                                                          | Signal |     |                    |
|  | 1      | RX– | Received data –    |
|                                                                                    | 2      | TX+ | Transmitted data + |
|                                                                                    | 3      | RX+ | Received data +    |
|                                                                                    | 4      | TX– | Transmitted data – |

Tab. 7: Connection for system communication forwarding

## 4.2 Function

The module establishes the connection between a valve terminal MPA-L and a remote I/O system CPX-AP.

## 5 Assembly

### NOTICE

#### Damage to internal electronics.

Damage to components and malfunctions due to incorrect handling.

- Observe the handling specifications for electrostatically sensitive devices.
- Assemble in accordance with the "Assembly Instructions MPA" and the "Description MPAL-VI" → 1.1 Applicable documents.

## 6 Installation

- Install in accordance with the operating instructions for remote I/O system CPX-AP-A" → 1.1 Applicable documents.
- Connect the earth cable to the functional earth connection FE.

### 6.1 Connecting cables

#### ⚠ WARNING

#### Risk of injury due to electric shock.

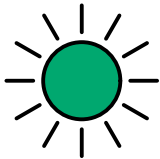
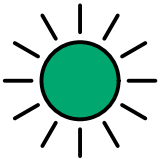
- For the electric power supply, use SELV or PELV circuits that guarantee a reliable electric disconnection from the mains network.
- Observe IEC 60204-1/EN 60204-1.

- 1. Switch off the power supply.
- 2. Use a suitable torque screwdriver with socket to tighten union nuts.
  - For example, use PHOENIX CONTACT SAC BIT M8-D10 with a tightening torque of 0.4 Nm ± 15% for M8. Different from the information for connecting cables.
- 3. Seal unused connections with cover caps.

7 Commissioning

- Commissioning of the remote I/O system CPX-AP-I in accordance with the remote I/O system CPX-AP-I operating instructions → 1.1 Applicable documents.

Response of the display components of the module after error-free commissioning

| [MD]                                                                                             | [PL]                                                                                              |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <br>Green light | <br>Green light |

Tab. 8: Response of the LED displays of the module after error-free commissioning

8 Parameterisation

Various parameters are available for reading out information about the modules in a remote I/O system CPX-AP-A and for configuring the modules for the application.

Fieldbus startup parameters

| ID    | Parameters                                                                                                                                                                                                                                                                                         | Number of instances <sup>1)</sup> | Data type | Access <sup>2)</sup> | Array size |
|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------|----------------------|------------|
| 20021 | Activation of diagnostics for defective valve<br>Factory setting = 0 (no diagnostics)                                                                                                                                                                                                              | 1                                 | BOOL      | rw                   | –          |
| 20022 | Configuration for load supply PL voltage monitoring <ul style="list-style-type: none"><li>– 0: load voltage monitoring inactive</li><li>– 1: load voltage monitoring active, with suppression of diagnostics at switch-off (factory setting)</li><li>– 2: load voltage monitoring active</li></ul> | 1                                 | UINT8     | rw                   | –          |
| 20052 | Response in error status (communication malfunction) <ul style="list-style-type: none"><li>– 0: reset outputs (factory setting)</li><li>– 1: maintain status</li></ul>                                                                                                                             | 1                                 | UINT8     | rw                   | –          |

1) Counting starting at 0.  
2) ro = read only; rw = read write

Tab. 9: Fieldbus startup parameters

Fieldbus parameters

| ID    | Parameters                     | Number of instances <sup>1)</sup> | Data type | Access <sup>2)</sup> | Array size |
|-------|--------------------------------|-----------------------------------|-----------|----------------------|------------|
| 20094 | Condition counter limit        | 32                                | UINT32    | rw                   | –          |
| 20095 | Condition counter actual value | 32                                | UINT32    | rw                   | –          |

1) Counting starting at 0.  
2) ro = read only; rw = read write

Tab. 10: Fieldbus parameters



**AP parameter**

| ID    | Parameters                                     | Number of instances <sup>1)</sup> | Data type | Access <sup>2)</sup> | Array size |
|-------|------------------------------------------------|-----------------------------------|-----------|----------------------|------------|
| 246   | Fieldbus serial number                         | 1                                 | UINT32    | ro                   | –          |
| 791   | Product Key                                    | 1                                 | CHAR      | ro                   | 12         |
| 960   | Firmware version                               | 1                                 | CHAR      | ro                   | 30         |
| 20000 | Module code                                    | 1                                 | UINT32    | ro                   | –          |
| 20085 | Measured value of temperature AP-ASIC [°C]     | 1                                 | INT16     | ro                   | –          |
| 20087 | Current measured value of logic supply PS [mV] | 1                                 | UINT16    | ro                   | –          |
| 20088 | Current measured value of load supply PL [mV]  | 1                                 | UINT16    | ro                   | –          |
| 20093 | Hardware version                               | 1                                 | UINT8     | ro                   | –          |

1) Counting starting at 0.

2) ro = read only; rw = read write

Tab. 11: AP parameter

## 9 Diagnostics and fault clearance

### 9.1 Diagnostic messages

For all diagnostics messages of the remote I/O system and for information on grouping and displaying the diagnostic messages see the operating instructions for remote I/O system → 1.1 Applicable documents.

The table below contains the diagnostic messages of the module.

| ID hex (dec)                  | Message                                   | Description                                                                                                      |
|-------------------------------|-------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| 02   01   0016<br>(33619990)  | Undervoltage in logic supply (PS) 24 V DC | Undervoltage of the logic supply (PS) 24 V DC was detected.                                                      |
|                               |                                           | Remedy – Check the power supply (logic)                                                                          |
|                               |                                           | Diagnostic status Warning<br>Error from firmware 1.100                                                           |
| 02   01   0017<br>(33619991)  | Overvoltage in logic supply (PS) 24 V DC  | Overvoltage of the logic supply (PS) 24 V DC was detected.                                                       |
|                               |                                           | Remedy – Check the power supply (logic)                                                                          |
|                               |                                           | Diagnostic status Warning<br>Error from firmware 1.117                                                           |
| 02   01   0105<br>(33620229)  | Undervoltage in load supply (PL) 24 V DC  | Undervoltage in the load supply (PL) 24 V DC was detected.                                                       |
|                               |                                           | Remedy – Check power supply (load)<br>– Check for short circuit                                                  |
|                               |                                           | Diagnostic status Error                                                                                          |
| 02   01   0106<br>(33620230)  | Shutdown of load supply (PL) 24 V DC      | A shutdown of the load voltage supply PL was detected. The cause can be a deliberate shutdown by emergency stop. |
|                               |                                           | Remedy – Check whether emergency stop was activated<br>– Check the load voltage supply                           |
|                               |                                           | Diagnostic status Information                                                                                    |
| 02   01   013F<br>(33620287)  | Overvoltage in load supply (PL) 24 V DC   | Overvoltage in load supply (PL) 24 V DC                                                                          |
|                               |                                           | Remedy – Check power supply                                                                                      |
|                               |                                           | Diagnostic status Error                                                                                          |
| 07   06   0268<br>(117834344) | Valve fault                               | A fault in the valve was detected.                                                                               |
|                               |                                           | Remedy – Check and/or replace valve                                                                              |

| ID hex (dec)                  | Message                                               | Description                                                                                                            |                                                                                                                                                      |
|-------------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07   06   0268<br>(117834344) | Valve fault                                           | Diagnostic status                                                                                                      | Error                                                                                                                                                |
| 08   01   0124<br>(134283556) | Communication to AP master interrupted                | The communication to the AP Master is aborted.                                                                         |                                                                                                                                                      |
|                               |                                                       | Remedy                                                                                                                 | <ul style="list-style-type: none"> <li>– Restart AP Master.</li> <li>– Check communication AP connecting cable.</li> </ul>                           |
|                               |                                                       | Diagnostic status                                                                                                      | Error                                                                                                                                                |
| 08   01   0130<br>(134283568) | Output process data watchdog of the AP module expired | Output process data watchdog of the AP module expired                                                                  |                                                                                                                                                      |
|                               |                                                       | Remedy                                                                                                                 | <ul style="list-style-type: none"> <li>– Restart AP system.</li> <li>– Check cable.</li> </ul>                                                       |
|                               |                                                       | Diagnostic status                                                                                                      | Error                                                                                                                                                |
| 08   01   0131<br>(134283569) | Input process data watchdog of the AP module expired  | Input process data watchdog of the AP module expired.                                                                  |                                                                                                                                                      |
|                               |                                                       | Remedy                                                                                                                 | <ul style="list-style-type: none"> <li>– Restart AP system.</li> <li>– Check cable.</li> </ul>                                                       |
|                               |                                                       | Diagnostic status                                                                                                      | Error                                                                                                                                                |
| 08   01   01A2<br>(134283682) | Device in emergency operation system state            | System initialisation (module detection) has failed. The system is in maintenance mode. I/O function is not available. |                                                                                                                                                      |
|                               |                                                       | Remedy                                                                                                                 | <ul style="list-style-type: none"> <li>– Restart system</li> <li>– Update firmware to the latest version</li> <li>– Contact Festo Service</li> </ul> |
|                               |                                                       | Diagnostic status                                                                                                      | Error                                                                                                                                                |
| 0C   01   01B5<br>(201392565) | Condition counter for valve coil reached              | The condition counter limit for the valve coil has been reached                                                        |                                                                                                                                                      |
|                               |                                                       | Remedy                                                                                                                 | <ul style="list-style-type: none"> <li>– Perform maintenance</li> <li>– Reset condition counter</li> </ul>                                           |
|                               |                                                       | Diagnostic status                                                                                                      | Maintenance                                                                                                                                          |

Tab. 12: Diagnostic messages

## 9.2 Application-specific diagnostic functions

### Switching cycle counter (Condition counter)

The electrical interface with electrical power supply provides a channel-based switching cycle counter for every solenoid coil. A diagnostic message is sent when the switching cycle counter reaches the critical limit. The diagnostic message can be used as a trigger for all types of maintenance work in the application (e.g. reminder of lubrication or replacement of parts). The diagnostic message has the diagnostic status Maintenance and is deactivated by default.

- Every solenoid coil is assigned an actual value and a critical limit: fieldbus parameters ID 20095 and ID 20094.
- The switching cycle counter is incremented at every rising edge of the switching signal.
- The switching cycle counter counts up to its maximum value of 0xFF.FF.FF.FF. The switching cycle counter then remains at the maximum value. There is no overflow.
- If the critical limit is reached or exceeded, the channel-related diagnostic message ID 0C | 01 | 01B5 (201392565) is sent.
- The diagnostic message can be cancelled by setting the critical limit to a value higher than the current actual value. Or the actual value or the critical limit can be set to 0.

- The diagnostic message ID 0C | 01 | 01B5 (201392565) is deactivated if the critical limit memory has the value 0 (factory setting).
- If the electrical interface is changed, actual values and critical limits can be manually transferred to another electrical interface by read-out and read-in.
- If a valve is replaced, the actual value remains unchanged in the electrical interface and can be reset manually with the fieldbus parameter ID 20095.
- The actual value of the switching cycle counter is saved to the non-volatile memory of the electrical interface when the logic supply PS is switched off.

### **Load voltage monitoring**

In the factory setting the load voltage monitoring differentiates between "undervoltage/overvoltage load supply PL" and "shutdown load supply PL". The difference between "undervoltage load supply PL" and "shutdown load supply PL" is helpful if a deliberately initiated shutdown is not intended to trigger an error message in the higher-level controller, e.g. emergency stop. A critical undervoltage, e.g. as a result of excessively high voltage drop in the cable, is always reported as an error.

The activation/deactivation and use of the load voltage monitoring is controlled via the fieldbus startup parameter with ID 20022.

For additional information on load voltage monitoring see ➔ operating instructions remote I/O system CPX-AP-I or CPX-AP-A ➔ 1.1 Applicable documents.

### **Valve fault**

The "valve defective" diagnostic message with the ID 117834344 is triggered if a problem is detected at the switching output for the corresponding valve coil.

The diagnostics can be activated via the parameter with the ID 20021 "activation of diagnostics in case of defective valve". It is only triggered if the defective channel receives a switch-on command via the process data.

The diagnostics can be resolved by:

- Run voltage cycle 24 V PS
- Run voltage cycle 24 V PL
- Switch on channel again

### 9.3 LED indicators

| LED                                                                                                           |                                                                                               | Meaning                                                                                                  | Action                                                                |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| <br>off                      | ON <br>OFF   | The logic supply PS is not available                                                                     | – Check the connection of the logic supply PS.                        |
| <br>green light              | ON <br>OFF   | The logic supply (PS) is available.<br>Module diagnostics not active.                                    | –                                                                     |
| <br>flashing green at 0.5 Hz | ON <br>OFF   | Module diagnostics is active.<br>"Information" degree of severity<br>E.g. switching off load supply (PL) | –                                                                     |
| <br>flashing red at 0.5 Hz   | ON <br>OFF   | Module diagnostics is active.<br>"Warning" degree of severity<br>E.g. parameterisation error             | Carry out appropriate remedial measures, e.g. check parameterisation. |
| <br>red light                | ON <br>OFF   | Module diagnostics is active.<br>"Error" degree of severity<br>E.g. undervoltage in load supply (PL)     | Take appropriate remedial action, e.g. check load supply (PL).        |
| <br>flashing red at 2 Hz    | ON <br>OFF  | The module ramp-up is not yet completed.<br>The system communication is not yet initialised.             | –                                                                     |
| <br>flashing green at 2 Hz | ON <br>OFF | Module identification (service function)                                                                 | –                                                                     |

Tab. 13: Module diagnostics LED [MD]

| LED                                                                                                             |                                                                                               | Meaning                                            | Action                    |
|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------|
| <br>green light              | ON <br>OFF | The load supply PL is available.                   | –                         |
| <br>flashing green at 0.5 Hz | ON <br>OFF | The load supply PL is not available.               | Check the load supply PL. |
| <br>flashing red at 0.5 Hz   | ON <br>OFF | The load supply PL is outside the tolerance range. | Check the load supply PL. |

Tab. 14: Load supply LED [PL]

## 10 Technical data

| General technical data                                                                                               |         |                                                                                                          |
|----------------------------------------------------------------------------------------------------------------------|---------|----------------------------------------------------------------------------------------------------------|
| General technical data for remote I/O system CPX-AP                                                                  |         | Instruction manual for remote I/O system CPX-AP → 1.1 Applicable documents                               |
| Dimensions<br>(length × width × height)                                                                              | [mm]    | 107.5 × 43.1 × 50.2                                                                                      |
| Product weight                                                                                                       | [g]     | 194                                                                                                      |
| Mounting position                                                                                                    |         | Documentation for valve terminal MPAL → 1.1 Applicable documents                                         |
| Ambient temperature                                                                                                  | [°C]    | −20 ... +60                                                                                              |
| Storage temperature                                                                                                  | [°C]    | −40 ... +70 <sup>1)</sup>                                                                                |
| Storage time                                                                                                         | [years] | 2 (max.)                                                                                                 |
| Humidity (non-condensing)                                                                                            | [%]     | 5 ... 95                                                                                                 |
| Number of valves                                                                                                     |         | 16 (max.)                                                                                                |
| Number of valve coils                                                                                                |         | 32 (max.)                                                                                                |
| Assigned address space<br>(inputs/outputs)                                                                           | [Byte]  | −/4                                                                                                      |
| Module code (hex/dec)                                                                                                |         | 0x2020/8224d                                                                                             |
| Module identification                                                                                                |         | VMPAL-EPL-AP                                                                                             |
| Degree of protection in accordance with EN 60529                                                                     |         | IP65/IP67<br>(if assembled, cables connected and connections that are not needed sealed with cover caps) |
| Protection against electric shock<br>(protection against direct and indirect contact in accordance with IEC 61010-1) |         | by the use of SELV/PELV circuits<br>(safe extra-low voltage/protected extra-low voltage)                 |
| Electromagnetic compatibility                                                                                        |         | See declaration of conformity → <a href="http://www.festo.com">www.festo.com</a>                         |

1) Storage temperature of valve terminal different

Tab. 15: General technical data

| Power supply                                                            |        |                     |
|-------------------------------------------------------------------------|--------|---------------------|
| Logic supply PS                                                         | [V DC] | 24 ± 25 %           |
| Intrinsic current consumption at nominal operating voltage 24 V from PS | [mA]   | 30                  |
| Load supply PL                                                          | [V DC] | 24 ± 10 %           |
| Intrinsic current consumption at nominal operating voltage 24 V from PL | [mA]   | 16                  |
| Capacitive load at load supply PL                                       |        |                     |
| 24 V PL to 0 V PL                                                       | [nF]   | Typ. 70             |
| 24 V PL to FE                                                           | [nF]   | Typ. 70             |
| 0 V PL to FE                                                            | [nF]   | Typ. 35             |
| Electrical isolation                                                    |        |                     |
| Between PS and PL                                                       |        | yes                 |
| Between the channels                                                    |        | no                  |
| Short-circuit protection                                                |        |                     |
| Per channel                                                             |        | electronic          |
| Response after end of overload                                          |        | No automatic return |

Tab. 16: Power supply

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