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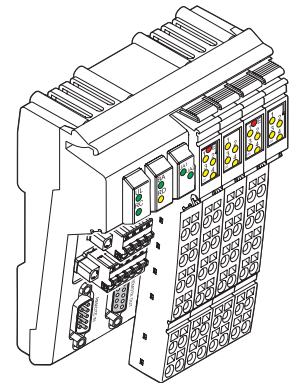
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ILB IB 24 DO16-DSUB



**Inline Block IO Module
for INTERBUS With 16 Digital Outputs;
Bus Connection via D-SUB Connectors**

AUTOMATIONWORX

Data Sheet
7119_en_02

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Description

The ILB IB 24 DO16-DSUB module is designed for use within an INTERBUS network. It is used to output digital signals.

INTERBUS Features

- Remote bus connection via D-SUB connector
- 500 kbps transmission speed
- Diagnostic and status indicators

Output Features

- Connections for 16 digital actuators
- Connection of actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 A
- Total current of all outputs: 8 A
- Short-circuit and overload protected outputs
- Diagnostic and status indicators



Please refer to the "Mounting and Removing Inline Block IO Modules" application note (see "Ordering Data" on page 2).



Make sure you always use the latest documentation.
It can be downloaded at www.download.phoenixcontact.com.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

Ordering Data

Product

| Description | Type | Order No. | Pcs./Pkt. |
|---|---------------------|-----------|-----------|
| Inline Block IO module for INTERBUS with 16 digital outputs; bus connection via D-SUB connectors | ILB IB 24 DO16-DSUB | 2878528 | 1 |

Accessories: Connectors

| Description | Type | Order No. | Pcs./Pkt. |
|---|---------------|-----------|-----------|
| D-SUB connector (female connector), solder connection | SUBCON 9/F-SH | 2761499 | 1 |
| D-SUB connector (male connector), solder connection | SUBCON 9/M-SH | 2761509 | 1 |

Accessories: Connectors as Replacement Item

| Description | Type | Order No. | Pcs./Pkt. |
|---|-----------------------|-----------|-----------|
| Connector for the supply (4-pos. MINI COMBICON) | FK-MCP 1,5/5-STF-3,81 | 1851258 | 50 |
| Connector for the supply (5-pos. MINI COMBICON) | FK-MCP 1,5/6-STF-3,81 | 1851261 | 50 |
| Connector for digital 4-channel or 16-channel Inline output terminals, with color print | IB IL SCN-12-OCP | 2727624 | 10 |

Accessories: Other

| Description | Type | Order No. | Pcs./Pkt. |
|---|--------------|-----------|-----------|
| Recommended end clamp; placed both to the right and left of the module to secure it on the DIN rail | CLIPFIX 35-5 | 3022276 | 50 |

Documentation

| Description | Type | Order No. | Pcs./Pkt. |
|--|----------------------------|-----------|-----------|
| "Mounting and Removing Inline Block IO Modules" application note | AH ILB INSTALLATION | 9014931 | 1 |
| "INTERBUS Addressing" data sheet | DB GB IBS SYS ADDRESS | 9000990 | 1 |
| "Addressing of 16-Channel ILB Modules" application note | AH ILB 24 DI/DO 16 ADDRESS | 9014962 | 1 |
| "General Introduction to the INTERBUS System" user manual | IBS SYS INTRO G4 UM E | 2745211 | 1 |
| "Configuring and Installing INTERBUS" user manual | IBS SYS PRO INST UM E | 2743802 | 1 |
| "Configuring and Installing the INTERBUS Inline Product Range" user manual | IB IL SYS PRO UM E | 2743048 | 1 |

Technical Data

General Data

| | |
|---|-------------------------------|
| Housing dimensions with connectors (width x height x depth) | 95 mm x 55 mm x 141 mm |
| Weight | 254 g (with connectors) |
| Operating mode | Process data mode with 1 word |
| Transmission speed | 500 kbps |
| Connection method for actuators | 2 and 3-wire technology |

Housing Dimensions

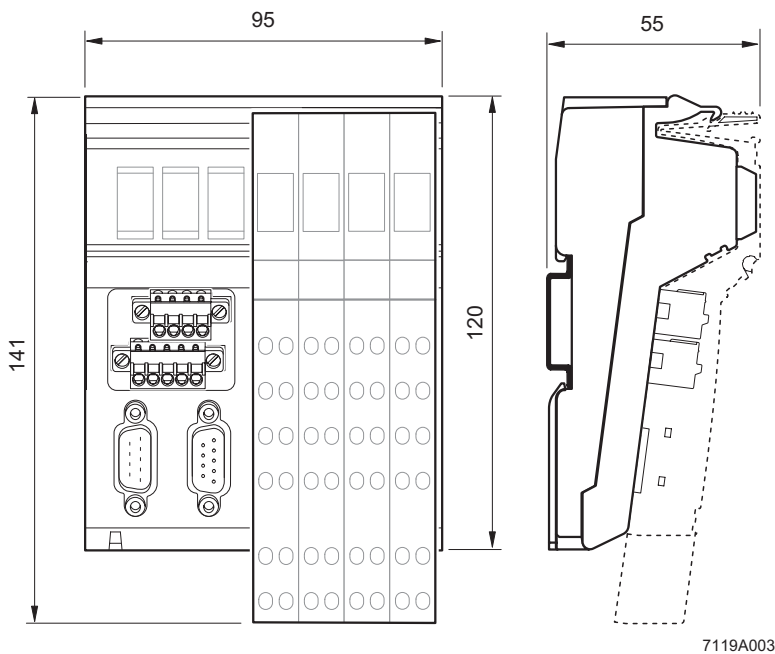


Figure 1 Housing dimensions of the module (dimensions in mm)

Ambient Conditions

| | |
|--|--|
| Regulations | Developed according to VDE 0160/EN 50178/IEC 62103, UL 508 |
| Ambient temperature (operation) | -25°C to +60°C |
| Ambient temperature (storage/transport) | -25°C to +85°C |
| Humidity (operation/storage/transport) | 10% to 95%, according to EN 61131-2 |
| Air pressure (operation) | 80 kPa to 108 kPa (up to 2000 m above sea level) |
| Air pressure (storage/transport) | 66 kPa to 108 kPa (up to 3500 m above sea level) |
| Degree of protection according to IEC 60529 | IP20 |
| Class of protection | Class 3 according to VDE 0106/IEC 60536 |
| Air and creepage distances | According to DIN VDE 0110/IEC 60664, IEC 60664A, DIN VDE 0160/EN 50178/IEC 62103 |
| Housing material | Plastic, PVC-free, PBT, self-extinguishing (V0) |
| Pollution degree according to EN 60664-1/IEC 60664-1, EN 61131-2/IEC 61131-2 | 2; condensation not permitted during operation |
| Surge voltage class | II |

Electrical Isolation/Isolation of the Voltage Areas

| Test Distance | Test Voltage |
|---|------------------------|
| Incoming remote bus / outgoing remote bus | 500 V AC, 50 Hz, 1 min |
| Incoming remote bus / I/O | 500 V AC, 50 Hz, 1 min |
| Incoming remote bus / functional earth ground | 500 V AC, 50 Hz, 1 min |
| Outgoing remote bus / I/O | 500 V AC, 50 Hz, 1 min |
| Outgoing remote bus / functional earth ground | 500 V AC, 50 Hz, 1 min |
| I/O / functional earth ground | 500 V AC, 50 Hz, 1 min |

Mechanical Requirements

| | |
|---|--|
| Vibration test, sinusoidal vibrations according to EN 60068-2-6/IEC 60068-2-6 | 5g load, 2.5 hours in each space direction |
| Shock test according to EN 60068-2-27/IEC 60068-2-27 | 25g load for 11 ms, half sinusoidal wave, 3 shocks in each space direction and orientation |
| Broadband noise according to EN 60068-2-64/IEC 60068-2-64 | 0.78g load, 2.5 hours in each space direction |

Conformance With EMC Directive 89/336/EEC**Noise Immunity Test According to 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 strength: 10 V/m |
| Fast transients (burst) | EN 61000-4-4/ IEC 61000-4-4 | Criterion B Remote bus: 2 kV Power supply: 2 kV I/O cables: 2 kV Criterion A All interfaces: 1 kV |
| Surge voltage | EN 61000-4-5 IEC 61000-4-5 | Criterion B DC supply lines: $\pm 0.5 \text{ kV} / \pm 1.0 \text{ kV}$ (symmetrical/asymmetrical) Signal lines: $\pm 0.5 \text{ kV} / \pm 0.5 \text{ kV}$ (symmetrical/asymmetrical) |
| Conducted interference | EN 61000-4-6 IEC 61000-4-6 | Criterion A Test voltage 10 V |

Noise Emission Test According to EN 61000-6-4

| | | |
|---------------------------|----------|-----------------------|
| Noise emission of housing | EN 55022 | Class B (residential) |
|---------------------------|----------|-----------------------|

Interface: INTERBUS

| | |
|---------------------------|--|
| Incoming remote bus | Copper cable (RS-422), connected via 9-pos. D-SUB connector; supply electrically isolated; shielding connected with a capacitor to functional earth ground |
| Outgoing remote bus | Copper cable (RS-422), connected via 9-pos. D-SUB connector; supply electrically isolated; shielding directly connected to functional earth ground |
| Recommended cable lengths | See INTERBUS system data in the IBS SYS INTRO G4 UM E user manual |

24 V Module Supply (Communications Power and Actuator Supply; U_L and U_A)

| | |
|--|---|
| Nominal value | 24 V DC |
| Tolerance | - 15%/+ 20% according to EN 61131-2 |
| Ripple | ±5% according to EN 61131-2 |
| Permissible range | 19.2 V DC to 30.0 V DC |
| Current consumption at U_L | 70 mA |
| Current consumption at U_{A1} and U_{A2} | 8 A |
| Safety equipment for communications power | Surge protection and protection against polarity reversal |
| Safety equipment for actuator supply | Surge protection |
| Connection | Via MINI-COMBICON connector |

Digital Outputs

| | |
|---|--|
| Number | 16 |
| Connection method for actuators | 2 and 3-wire technology |
| Nominal output voltage U_{OUT} | 24 V DC |
| Differential voltage at I_{nom} | ≤ 1 V |
| Nominal current I_{nom} per channel | 0.5 A |
| Total current | 2 x 4 A |
| Protection | Short-circuit and overload protection |
| Nominal load | |
| Ohmic | 48 Ω / 12 W |
| Lamp | 12 W |
| Inductive | 12 VA (1.2 H, 50 Ω) |
| Switching frequency with nominal inductive load | 0.5 Hz (1.2 H, 50 Ω), maximum |
| Overload response | Auto restart |
| Response with inductive overload | Output may be damaged |
| Reverse voltage protection against short pulses | Protected against reverse voltages |
| Resistance to permanently applied reverse voltages | Protected against reverse voltages, permissible current 2 A, maximum |
| Validity of output data after connecting the 24 V voltage supply (power up) | 1 ms, typical |
| Response upon power down | The output follows the supply voltage without delay. |
| Limitation of the voltage induced on circuit interruption | -41.0 V |
| One-time unsolicited energy | 1 J, maximum |
| Protective circuit type | Integrated free running circuit in the output chip |
| Overcurrent shutdown | 0.7 A, minimum |
| Maximum output current when switched off | 10 µA |



When not loaded, a voltage can be measured even at an output that is not set.

Typical Power Dissipation With 24 V Supply Voltage**Formula to Calculate the Power Dissipation of the Electronics**

$$P_{TOT} = 1.68 \text{ W} + \sum_{i=1}^n (0.11 \text{ W} + I_{Li}^2 \times 0.28 \text{ } \Omega)$$

Where

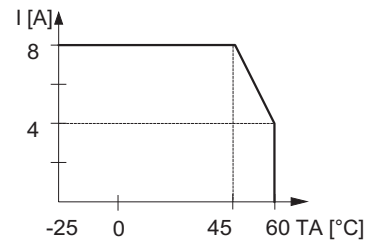
P_{TOT} Total power dissipation of the module
 i Continuous index
 n Number of set outputs ($n = 1$ to 16)
 I_{Li} Load current of output i

Limitation of Simultaneity, Derating

| Ambient Temperature (TA) | Maximum Load Current (I) at 100% Simultaneity | Maximum Load Current (I) at 50% Simultaneity |
|--------------------------|--|---|
| -25°C to +45°C | 16 x 0.5 A | 8 x 0.5 A |
| +46°C to +60°C | $I_{\text{tot}} = 8 \text{ A} - ((TA - 45^\circ\text{C}) \times 0.267 \text{ A}/^\circ\text{C})$ | 8 x 0.5 A |

With an ambient operating temperature of up to 45°C and 100% simultaneity, a load current of 0.5 A per channel is permissible.

If all four channels are used at a temperature of > 45°C, the permissible working point must be defined according to the above formula. An example can be found in the "Configuring and Installing the INTERBUS Inline Product Range" user manual IB IL SYS PRO UM E.



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Approvals

For the latest approvals, please visit www.download.phoenixcontact.com.

Internal Circuit Diagram

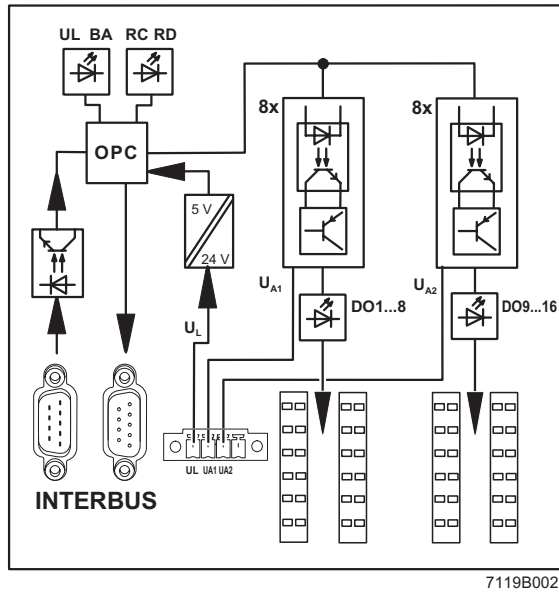


Figure 2 Internal wiring of the terminal points

Key:

| | |
|--|---|
| | LED |
| | Protocol chip (bus logic) |
| | Power supply unit with electrical isolation |
| | Optocoupler |
| | Short-circuit-proof output |

Local Diagnostic and Status Indicators

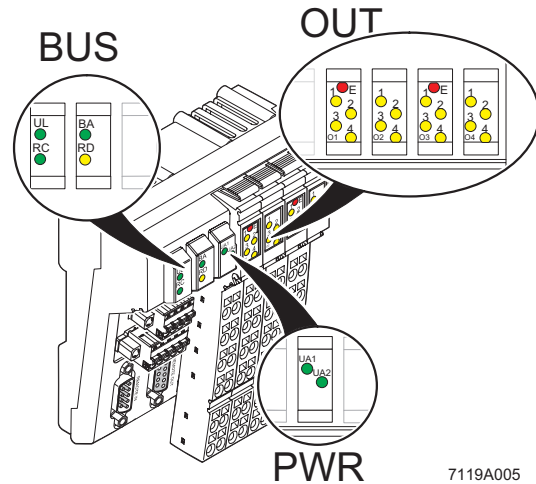


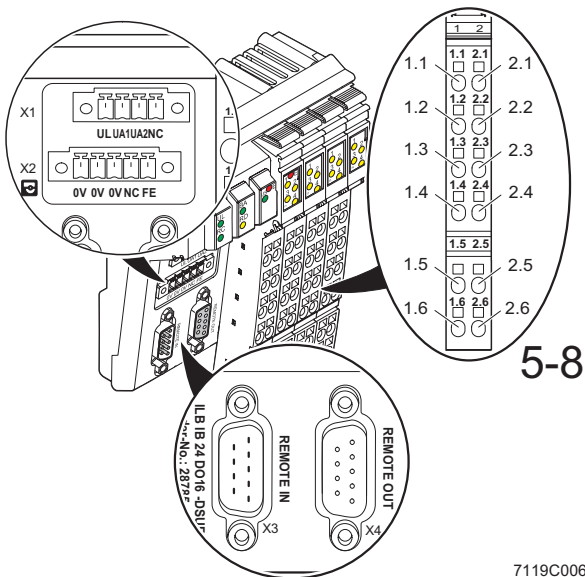
Figure 3 Diagnostic and status indicators of the ILB IB 24 DO16-DSUB module

| Designation | Color | Meaning |
|---------------|--------|---|
| BUS | | |
| UL | Green | Communications power |
| RC | Green | Remote bus cable check |
| BA | Green | Bus active |
| RD | Yellow | Outgoing remote bus disabled |
| PWR | | |
| UA1 | Green | Actuator supply 1 (connector 5 and connector 6 for actuators) |
| UA2 | Green | Actuator supply 2 (connector 7 and connector 8 for actuators) |
| OUT | | |
| E | Red | Short circuit or overload at one of the outputs |
| 1 to 4 | Yellow | Status indicators of the outputs |



If the error LED (E) of a group of eight outputs lights up (e.g., connector 5 and connector 6), this indicates that a short circuit or overload is present at one or more of the outputs in this group.

Connecting INTERBUS, the Supply, and Actuators



7119C006

Figure 4 Terminal point assignment of the connectors

Terminal Point Assignment of the MINI COMBICON Connectors for the Connection of the Supply Voltages (Connectors X1 and X2 in Figure 4 on page 8)

| Terminal Point | Assignment |
|----------------|---------------------------------|
| UL | 24 V communications power U_L |
| UA1 | 24 V actuator supply U_{A1} |
| UA2 | 24 V actuator supply U_{A2} |
| NC | Not used |

| Terminal Point | Assignment |
|----------------|-------------------------|
| 0V | GND |
| 0V | GND |
| 0V | GND |
| NC | Not used |
| FE | Functional earth ground |



The terminal points for GND (0V) can have a total current of 8 A per terminal point. The maximum current carrying capacity of 8 A must not be exceeded. If the total output current in your application is > 8 A, the module is to be supplied via a minimum of two GND terminal points (0V).



The supply points have the same ground potential. All ground supplies on a module are electrically connected with one another. The communications power is also electrically connected via all contacts. In this way it can supply all potentials with just one supply without the need for additional terminals, see "Connection example" on page 10.

Terminal Point Assignment of the INTERBUS Connectors (Connectors X 3 and X4 in Figure 4 on page 8)

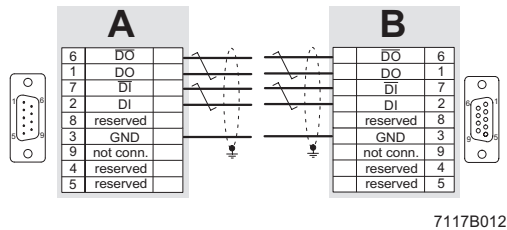


Figure 5 Assignment of the remote bus interfaces (D-SUB connector)

- A Remote OUT (outgoing remote bus)
B Remote IN (incoming remote bus)

| Assignment | Remark/Wire Color in the INTERBUS Standard Cable | |
|------------------------------|--|--------|
| DO | Receive | Green |
| DO | Receive | Yellow |
| DI | Transmit | Pink |
| DI | Transmit | Gray |
| GND | Reference potential | Brown |
| Shield (incoming remote bus) | Shield potential is connected with a capacitor to functional earth ground (FE) of the potential jumper. | |
| Shield (outgoing remote bus) | Shield potential is directly connected to functional earth ground (FE) of the potential jumper. | |



In order to assemble the connectors, proceed as described in the IBS SYS PRO INST UM E user manual.

Terminal Point Assignment of the Output Connectors (Connectors 5 to 8 in Figure 4 on page 8)

| Terminal Point | | | | Assignment |
|------------------|------------------|------------------|------------------|---|
| Connector 5 (O1) | Connector 6 (O2) | Connector 7 (O3) | Connector 8 (O4) | |
| 1.1, 2.1 | 1.1, 2.1 | 1.1, 2.1 | 1.1, 2.1 | Signal output (OUT) |
| 1.2, 2.2 | 1.2, 2.2 | 1.2, 2.2 | 1.2, 2.2 | Ground contact (GND) for 2 and 3-wire termination |
| 1.3, 2.3 | 1.3, 2.3 | 1.3, 2.3 | 1.3, 2.3 | FE connection for 3-wire termination |
| 1.4, 2.4 | 1.4, 2.4 | 1.4, 2.4 | 1.4, 2.4 | Signal output (OUT) |
| 1.5, 2.5 | 1.5, 2.5 | 1.5, 2.5 | 1.5, 2.5 | Ground contact (GND) for 2 and 3-wire termination |
| 1.6, 2.6 | 1.6, 2.6 | 1.6, 2.6 | 1.6, 2.6 | FE connection for 3-wire termination |

Connection Example

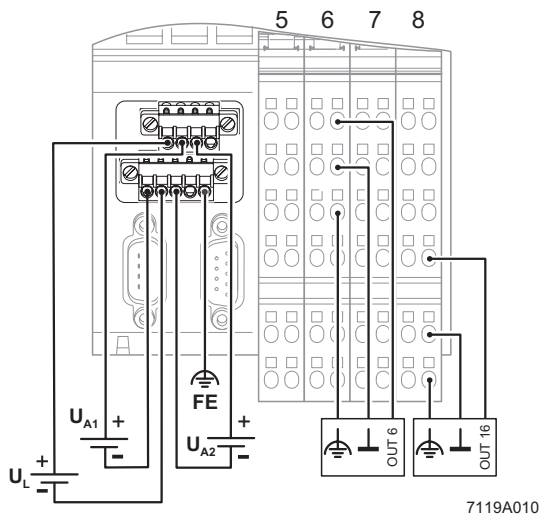


Figure 6 Connection example



The numbers above the module illustration identify the connector slots.



When connecting the actuators observe the assignment of the terminal points to the process data (see "Process Data" on page 11).



The module has an FE spring (metal clip) on the bottom of the electronics base. This spring creates an electrical connection to the DIN rail. Use grounding terminals to connect the DIN rail to protective earth ground. The module is grounded when it is snapped onto the DIN rail.

To ensure reliable functional earth grounding of the module even when the DIN rail is dirty or the metal clip is damaged, Phoenix Contact also recommends grounding the module via one of the FE terminal points.

Programming Data

| | |
|-------------------------|--|
| ID code | 01 _{hex} (01 _{dec}) |
| Length code | 01 _{hex} |
| Process data channel | 16 bits |
| Input address area | 0 words |
| Output address area | 1 word |
| Parameter channel (PCP) | 0 words |
| Register length (bus) | 1 word |

Process Data



For the assignment of the illustrated (byte.bit) view to your control or computer system, please refer to the DB GB IBS SYS ADDRESS data sheet.

Please refer to the application note for addressing 16-channel ILB modules.

The documentation can be downloaded at www.download.phoenixcontact.com.

Assignment of the Terminal Points to the OUT Process Data Word (Slots 5 to 8)

| (Word.bit) view | Word | Word 0 | | | | | | | | | | | | | | | |
|------------------|-------------------------|--------|-----|-----|-----|--------|-----|-----|-----|--------|-----|-----|-----|--------|-----|-----|-----|
| | Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| (Byte.bit) view | Byte | Byte 0 | | | | | | | | Byte 1 | | | | | | | |
| | Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Module | Slot | 6 (O2) | | | | 5 (O1) | | | | 8 (O4) | | | | 7 (O3) | | | |
| | Terminal point (signal) | 2.4 | 1.4 | 2.1 | 1.1 | 2.4 | 1.4 | 2.1 | 1.1 | 2.4 | 1.4 | 2.1 | 1.1 | 2.4 | 1.4 | 2.1 | 1.1 |
| | Terminal point (GND) | 2.5 | 1.5 | 2.2 | 1.2 | 2.5 | 1.5 | 2.2 | 1.2 | 2.5 | 1.5 | 2.2 | 1.2 | 2.5 | 1.5 | 2.2 | 1.2 |
| | Terminal point FE | 2.6 | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 |
| Status indicator | Slot | 6 | | | | 5 | | | | 8 | | | | 7 | | | |
| | LED | 4 | 3 | 2 | 1 | 4 | 3 | 2 | 1 | 4 | 3 | 2 | 1 | 4 | 3 | 2 | 1 |

Diagnostics

Error Table With Diagnostic Data and Status Indicators

| Error Type | Diagnostic Data | Status indicators |
|--|-------------------|---|
| Actuator supply U_{A1} or U_{A2} too low | No response | UA1 and UA2 LEDs are off |
| Short circuit of a digital output | I/O error message | LED E of the affected output group is red |