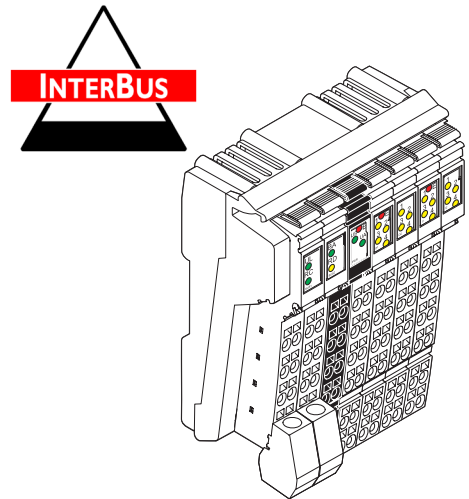


ILB IB 24 DI8 DO8



Inline Block IO Module for INTERBUS With Eight Digital Inputs and Eight Digital Outputs

AUTOMATIONWORX

Data Sheet
6892_en_04

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Description

The ILB IB 24 DI8 DO8 module is designed for use within an INTERBUS network. It is used to acquire and output digital signals.

INTERBUS Features

- Remote bus connection via Inline connector
- Transmission speed 500 kbps
- Diagnostic and status indicators

Input Features

- Connections for eight digital sensors
- Connection of sensors in 2 and 3-wire technology
- Maximum permissible load current per sensor: 250 mA
- Maximum permissible load current from the sensor supply: 2.0 A
- Diagnostic and status indicators

Output Features

- Connections for eight digital actuators
- Connection of actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 A
- Total current of all outputs: 4 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 eight digital inputs and eight digital outputs | ILB IB 24 DI8 DO8 | 2862372 | 1 |

Accessories: Connectors as Replacement Item

| Description | Type | Order No. | Pcs./Pkt. |
|--|-----------------------|-----------|-----------|
| Shield connector for INTERBUS connection (color print) | IB IL SCN-6 SHIELD-CP | 2863151 | 5 |
| Connector for the supply (color print) | ILB SCN-12-PWR IN-CP | 2863164 | 10 |
| Connector, with color print, for digital 4-channel or 16-channel Inline output terminals | IB IL SCN-12-OCF | 2727624 | 10 |
| Connector, with color print, for digital 4-channel or 16-channel Inline input terminals | IB IL SCN-12-ICP | 2727611 | 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 |
| "General Introduction to the INTERBUS System" user manual | IBS SYS INTRO G4 UM E | 2745211 | 1 |

Technical Data

General Data

| | |
|---|-------------------------------|
| Housing dimensions with connectors (width x height x depth) | 95 mm x 55 mm x 141 mm |
| Weight | 350 g (with connectors) |
| Operating mode | Process data mode with 1 byte |
| Transmission speed | 500 kbps |
| Type of sensor and actuator connection | 2 and 3-wire technology |

Housing Dimensions

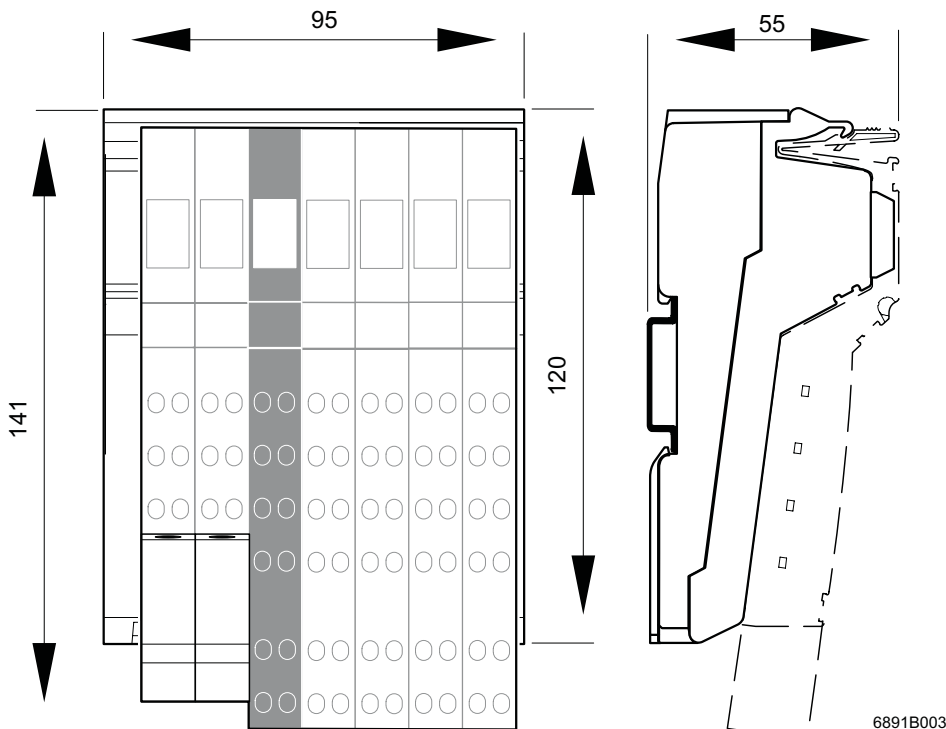


Figure 1 Housing dimensions of the module (dimensions in mm)

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: ± 0.5 kV/ ± 1.0 kV (symmetrical/asymmetrical) Signal cables: ± 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 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 with Inline shield connector; supply electrically isolated; shielding connected with a capacitor to functional earth ground |
| Outgoing remote bus | Copper cable (RS-422), connected with Inline shield 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, Sensor Supply, and Actuator Supply; U_L , U_S , 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 to 30.0 V |
| Current consumption at U_L | 80 mA |
| Current consumption at U_S | 2 A |
| Current consumption at U_A | 4 A |
| Safety equipment for communications power | Surge protection and protection against polarity reversal |
| Safety equipment for the sensor supply | Surge, overload and short-circuit protection |
| Safety equipment for the actuator supply | Surge protection |
| Connection | Via power connectors |

Digital Outputs

| | |
|---|--|
| Number | 8 |
| 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 | 1 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 supply voltage (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 | -30.0 V, approximately |
| 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.

Digital Inputs

| | |
|--|---|
| Number | 8 |
| Connection method for sensors | 2 and 3-wire technology |
| Input design | According to EN 61131-2 Type 1 |
| Definition of switching thresholds | |
| Maximum low-level voltage | $U_{Lmax} < 5 \text{ V}$ |
| Minimum high-level voltage | $U_{Hmin} > 15 \text{ V}$ |
| Common potentials | Sensor supply U_S , ground |
| Nominal input voltage U_{IN} | 24 V DC |
| Permissible range | $-30 \text{ V} < U_{IN} < +30 \text{ V DC}$ |
| Nominal input current for U_{IN} | 5 mA, typical |
| Current flow | Linear in the range $1 \text{ V} < U_{IN} < 30 \text{ V}$ |
| Delay time | $\leq 500 \text{ }\mu\text{s}$ |
| Permissible cable length to the sensor | 100 m |
| Use of AC sensors | AC sensors in the voltage range $< U_{IN}$ are limited in application |

Power Dissipation

Formula to Calculate the Power Dissipation of the Electronics

| | |
|---|---|
| $P_{TOT} = 1.7 \text{ W} + I_S^2 \times 0.06 \text{ }\Omega + \sum_{i=1}^n (0.1 \text{ W} + I_{Li}^2 \times 0.28 \text{ }\Omega) + \sum_{j=1}^m 0.12 \text{ W}$ | <p>Where</p> <p>P_{TOT} Total power dissipation of the module</p> <p>i Index</p> <p>n Number of set outputs ($n = 1$ to 8)</p> <p>I_{Li} Load current of the output i</p> <p>j Index</p> <p>m Number of set inputs ($m = 1$ to 8)</p> <p>I_S Current from the sensor supply</p> |
|---|---|

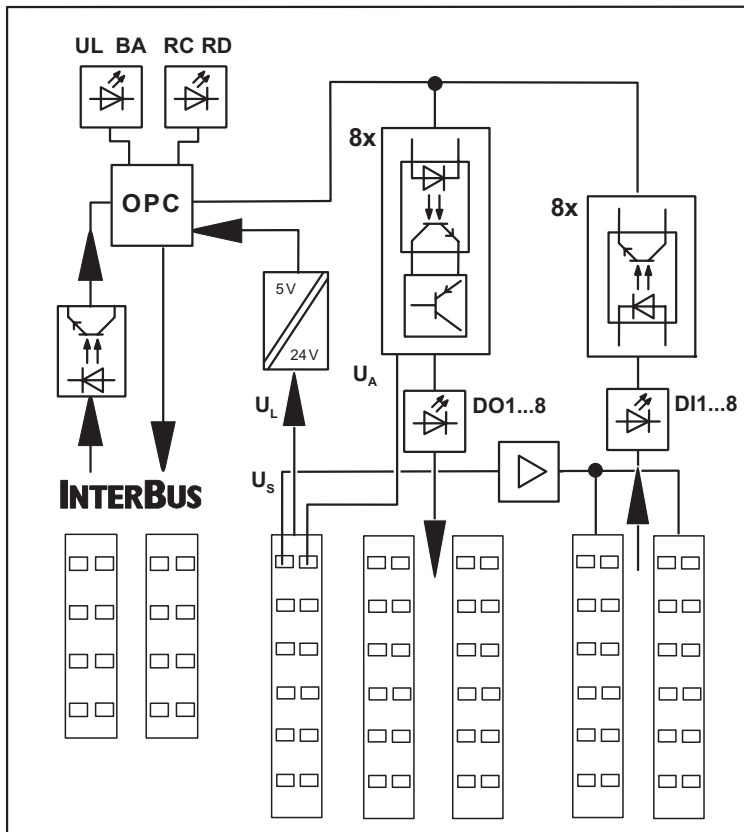
Limitation of Simultaneity, Derating

No limitation of simultaneity, no derating

Approvals

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







Internal Circuit Diagram



6892B002

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
-  Short-circuit-proof sensor supply

Local Diagnostic and Status Indicators

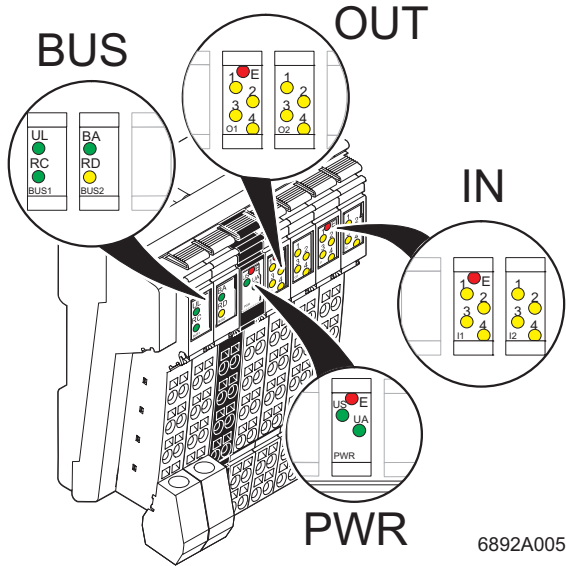


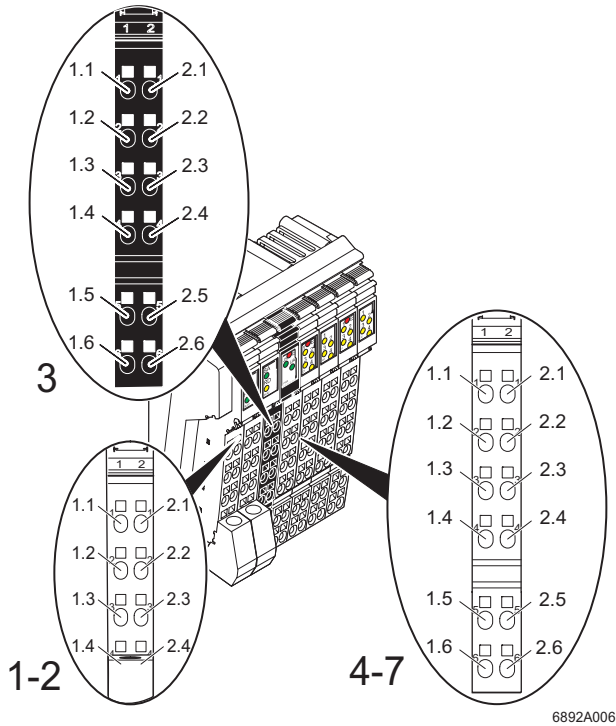
Figure 3 Diagnostic and status indicators of the ILB IB 24 DI8 DO8 module

| 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 | | |
| E | Red | Undervoltage sensor supply U_S |
| US | Green | Sensor supply (connector 6 and connector 7 for sensors) |
| UA | Green | Actuator supply (connector 4 and connector 5 for actuators) |
| OUT | | |
| E | Red | Short circuit or overload at one of the outputs |
| 1 - 4 | Yellow | Status indicators of the outputs |
| IN | | |
| E | Red | Short circuit or overload of the sensor supply |
| 1 - 4 | Yellow | Status indicators of the inputs |



If the error LED (E) of the group of eight outputs lights up (connector 4 and connector 5), this indicates that a short circuit or overload is present at one or more of the outputs in this group.

Connecting INTERBUS, the Supply, Actuators, and Sensors



6892A006

Figure 4 Terminal point assignment of the connectors

Terminal Point Assignment of INTERBUS Connectors (Connectors 1 and 2 in Figure 4)

| Terminal Point | Assignment | Remark/Wire Color in the INTERBUS Standard Cable | |
|--|------------|---|----------|
| Connector 1 (BUS 1) Incoming Remote Bus | | | |
| 1.1 | DO1 | Receive | Green |
| 2.1 | DO1 | Receive | Yellow |
| 1.2 | DI1 | Transmit | Pink |
| 2.2 | DI1 | Transmit | Gray |
| 1.3 | F-GND | Reference potential | Brown |
| 2.3 | | | Not used |
| 1.4, 2.4 | Shield | Shield potential is connected with a capacitor to functional earth ground (FE) of the potential jumper. | |
| Connector 2 (BUS 2) Outgoing Remote Bus | | | |
| 1.1 | DO2 | Transmit | Green |
| 2.1 | DO2 | Transmit | Yellow |
| 1.2 | DI2 | Receive | Pink |
| 2.2 | DI2 | Receive | Gray |
| 1.3 | R-GND | Reference potential | Brown |
| 2.3 | | | Not used |
| 1.4, 2.4 | Shield | Shield potential is connected directly to functional earth ground (FE) of the potential jumper. | |

**Terminal Point Assignment of the Power Connector
(Connector 3 in Figure 4 on page 9)**

| Terminal Point | Assignment |
|--------------------------|---------------------------------|
| Connector 3 (PWR) | |
| 1.1 | 24 V sensor supply U_S |
| 2.1 | 24 V actuator supply U_A |
| 1.2, 2.2 | 24 V communications power U_L |
| 1.3, 2.3 | GND |
| 1.4, 2.4 | FE |
| 1.5, 2.5 | 24 V communications power U_L |
| 1.6, 2.6 | GND |



The terminal points for GND and U_L can have a total current of 8 A per terminal point. The maximum current carrying capacity of 8 A must not be exceeded.



The supply points have the same ground potential. All ground supplies on a module are electrically connected with one another. They are jumpered via the power connector and the module, see "Connection example" on page 11.

**Terminal Point Assignment of Output Connectors
(Connectors 4 and 5 in Figure 4 on page 9)**

| Terminal Point | | Assignment |
|------------------|------------------|---|
| Connector 4 (O1) | Connector 5 (O2) | |
| 1.1, 2.1 | 1.1, 2.1 | Signal output (OUT) |
| 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 | FE connection for 3-wire termination |
| 1.4, 2.4 | 1.4, 2.4 | Signal output (OUT) |
| 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 | FE connection for 3-wire termination |

**Terminal Point Assignment of Input Connectors
(Connectors 6 and 7 in Figure 4 on page 9)**

| Terminal Point | | Assignment |
|------------------|------------------|--|
| Connector 6 (I1) | Connector 7 (I2) | |
| 1.1, 2.1 | 1.1, 2.1 | Signal input (IN) |
| 1.2, 2.2 | 1.2, 2.2 | Segment voltage U_S for 2 and 3-wire termination |
| 1.3, 2.3 | 1.3, 2.3 | Ground contact (GND) for 3-wire termination |
| 1.4, 2.4 | 1.4, 2.4 | Signal input (IN) |
| 1.5, 2.5 | 1.5, 2.5 | Segment voltage U_S for 2 and 3-wire termination |
| 1.6, 2.6 | 1.6, 2.6 | Ground contact (GND) for 3-wire termination |

Connection Example

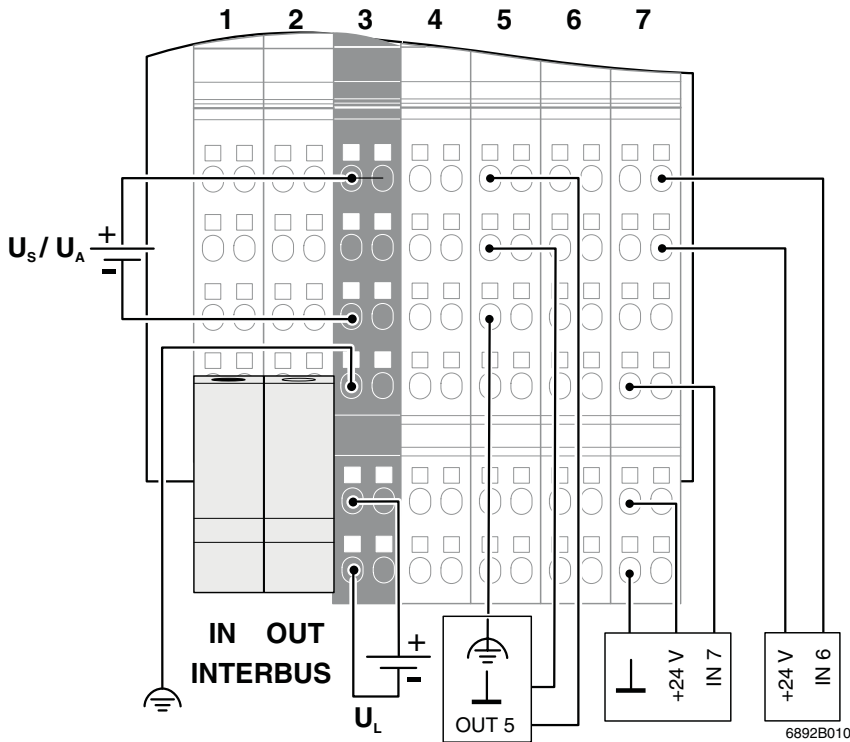


Figure 5 Connection example



The numbers above the module illustration identify the connector slots.



When connecting the actuators and sensors, observe the assignment of the terminal points to the process data (see page 12).



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 | 03 _{hex} (03 _{dec}) |
| Length code | 81 _{hex} |
| Process data channel | 8 bits |
| Input address area | 1 byte |
| Output address area | 1 byte |
| Parameter channel (PCP) | 0 byte |
| Register length (bus) | 1 byte |

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.

Assignment of Terminal Points to the OUT Process Data Byte (Slots 4 and 5)

| (Byte.bit) view | Byte | Byte 0 | | | | | | | |
|------------------|--------------------------------|--------|-----|-----|-----|--------|-----|-----|-----|
| | Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Module | Slot | 5 (O2) | | | | 4 (O1) | | | |
| | Terminal point (signal) | 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 |
| | Terminal point (FE connection) | 2.6 | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 |
| Status indicator | Slot | 5 (O2) | | | | 4 (O1) | | | |
| | LED | 4 | 3 | 2 | 1 | 4 | 3 | 2 | 1 |

Assignment of Terminal Points to the IN Process Data Byte (Slots 6 and 7)

| (Byte.bit) view | Byte | Byte 0 | | | | | | | |
|------------------|-------------------------|--------|-----|-----|-----|--------|-----|-----|-----|
| | Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Module | Slot | 7 (I2) | | | | 6 (I1) | | | |
| | Terminal point (signal) | 2.4 | 1.4 | 2.1 | 1.1 | 2.4 | 1.4 | 2.1 | 1.1 |
| | Terminal point (24 V) | 2.5 | 1.5 | 2.2 | 1.2 | 2.5 | 1.5 | 2.2 | 1.2 |
| | Terminal point (GND) | 2.6 | 1.6 | 2.3 | 1.3 | 2.6 | 1.6 | 2.3 | 1.3 |
| Status indicator | Slot | 7 (I2) | | | | 6 (I1) | | | |
| | LED | 4 | 3 | 2 | 1 | 4 | 3 | 2 | 1 |

Diagnostics

Error Table With Diagnostic Data and Status Indicators

| Error Type | Diagnostic Data | Status Indicators |
|-----------------------------------|-------------------|--|
| Sensor voltage U_S too low | I/O error message | US LED is off E (PWR) LED is red |
| Short circuit of sensor supply | I/O error message | E (IN) LED of the sensor supply is red |
| Actuator supply U_A too low | No response | UA LED is off |
| Short circuit of a digital output | I/O error message | E (OUT) LED is red |

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