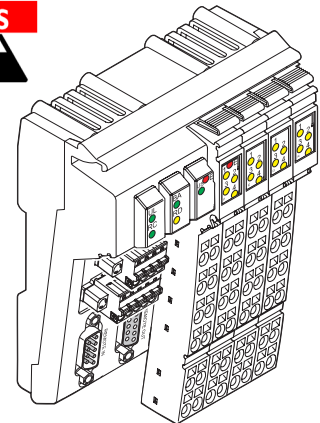


ILB IB 24 DI16-DSUB



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

AUTOMATIONWORX

Data Sheet
7118_en_02

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Description

The ILB IB 24 DI16-DSUB module is designed for use within an INTERBUS network. It is used to acquire digital signals.

INTERBUS Features

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

Input Features

- Connections for 16 digital sensors
- Connection of sensors in 2 and 3-wire technology
- Maximum permissible load current per sensor: 125 mA
- Maximum permissible load current from the sensor supply: 2.0 A
- 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 inputs; bus connection via D-SUB connectors | ILB IB 24 DI16-DSUB | 2878421 | 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 input terminals, with color print | 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 |
| "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 |

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 sensors | 2 and 3-wire technology |

Housing Dimensions

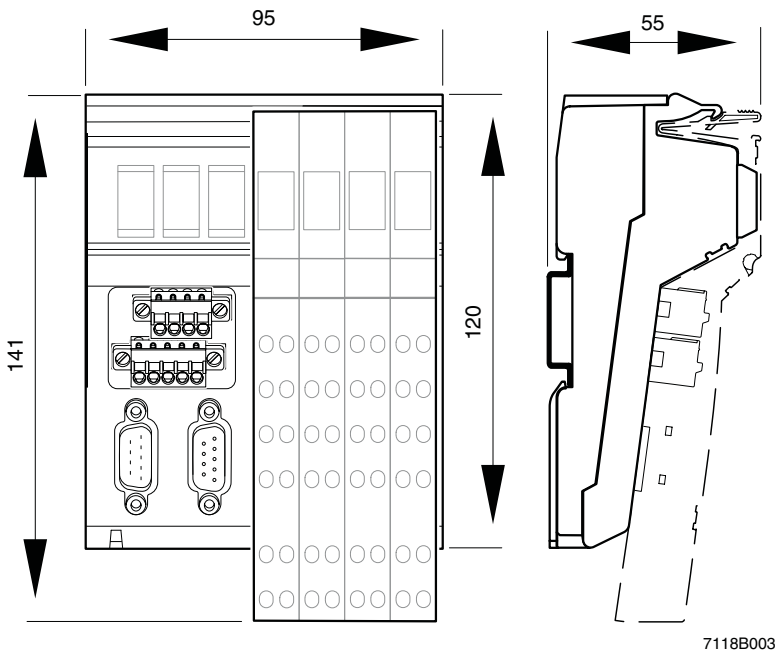


Figure 1 Housing dimensions of the module (dimensions in mm)

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 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 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 Sensor Supply; U_L and U_S)

| | |
|---|---|
| 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 | 60 mA |
| Current consumption at U _S | 4 A |
| Safety equipment for communications power | Surge protection and protection against polarity reversal |
| Safety equipment for sensor supply | Surge, overload and short-circuit protection |
| Connection | Via MINI-COMBICON connector |

Digital Inputs

| | |
|---|--|
| Number | 16 |
| 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 V |
| Minimum high-level voltage | U _{Hmin} > 15 V |
| Common potentials | Sensor supply U _S , ground |
| Nominal input voltage U _{IN} | 24 V DC |
| Permissible range | -30 V < U _{IN} < +30 V DC |
| Nominal input current for U _{IN} | 5 mA, typical |
| Current flow | Linear in the range 1 V < U _{IN} < 30 V |
| Delay time | ≤ 500 μs |
| 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

| | |
|--|--|
| $P_{TOT} = 1.44 \text{ W} + I_S^2 \times 0.06 \text{ W} + \sum_{i=1}^n 0.12 \text{ W}$ | Where P _{TOT} Total power dissipation of the module I _S Current from the sensor supply i Continuous index n Number of set inputs (n = 1 to 16) |
|--|--|

Limitation of Simultaneity, Derating

No limitation of simultaneity, no derating

Approvals

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

Internal Circuit Diagram

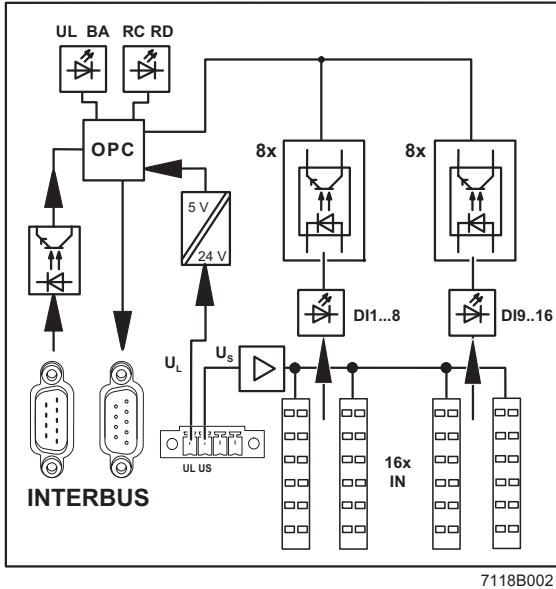







Figure 2 Internal wiring of the terminal points

Key:

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

Local Diagnostic and Status Indicators

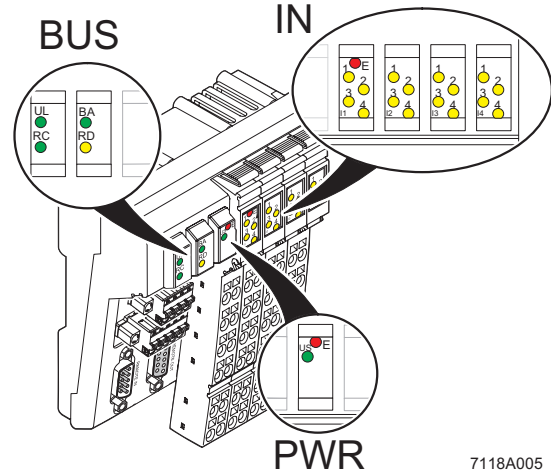


Figure 3 Diagnostic and status indicators of the ILB IB 24 DI16-DSUB module

| 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 | | |
| E | Red | Undervoltage of the sensor supply U_S |
| US | Green | Sensor supply |
| IN | | |
| E | Red | Short circuit or overload of the sensor supply |
| 1 to 4 | Yellow | Status indicators of the inputs |

Connecting INTERBUS, the Supply, and Sensors

Terminal Point Assignment of the MINI-COMBICON Connectors for the Connection of the Supply Voltages (Connectors X1 and X2 in Figure 4 on page 7).

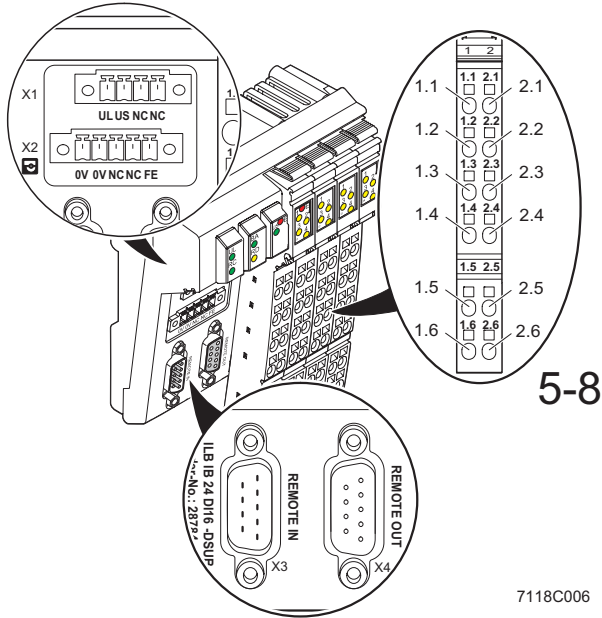


Figure 4 Terminal point assignment of the connectors

| Terminal Point | Assignment |
|----------------|---------------------------------|
| UL | 24 V communications power U_L |
| US | 24 V sensor supply U_S |
| NC | Not used |
| NC | Not used |

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

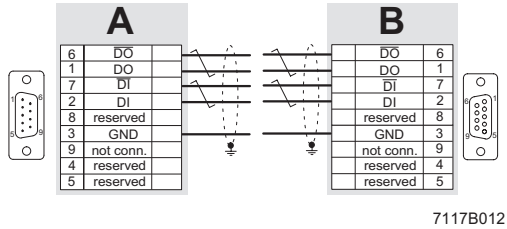


The terminal points for GND (0V) can have a total current of 8 A per terminal point. The maximum current carrying capacity of 8 A must not be exceeded.



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 9.

Terminal Point Assignment of the INTERBUS Connectors (Connectors X 3 and X4 in Figure 4 on page 7)



7117B012

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 Input Connectors (Connectors 5 to 8 in Figure 4 on page 7)

| Terminal Point | | | | Assignment |
|------------------|------------------|------------------|------------------|---|
| Connector 5 (I1) | Connector 6 (I2) | Connector 7 (I3) | Connector 8 (I4) | |
| 1.1, 2.1 | 1.1, 2.1 | 1.1, 2.1 | 1.1, 2.1 | Signal input (IN) |
| 1.2, 2.2 | 1.2, 2.2 | 1.2, 2.2 | 1.2, 2.2 | Sensor supply for 2 and 3-wire termination |
| 1.3, 2.3 | 1.3, 2.3 | 1.3, 2.3 | 1.3, 2.3 | Ground contact (GND) for 3-wire termination |
| 1.4, 2.4 | 1.4, 2.4 | 1.4, 2.4 | 1.4, 2.4 | Signal input (IN) |
| 1.5, 2.5 | 1.5, 2.5 | 1.5, 2.5 | 1.5, 2.5 | Sensor supply for 2 and 3-wire termination |
| 1.6, 2.6 | 1.6, 2.6 | 1.6, 2.6 | 1.6, 2.6 | Ground contact (GND) for 3-wire termination |

Connection Example

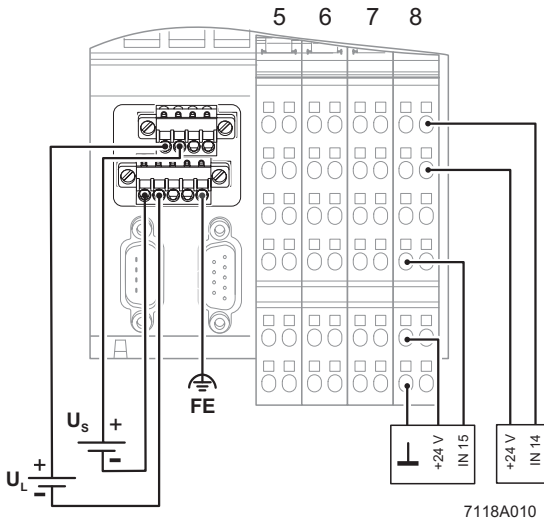


Figure 6 Connection example



The numbers above the module illustration identify the connector slots.



When connecting the sensors observe the assignment of the terminal points to the process data (see "Process Data" on page 10).



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 | 02 _{hex} (02 _{dec}) |
| Length code | 01 _{hex} |
| Process data channel | 16 bits |
| Input address area | 1 word |
| Output address area | 0 words |
| 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 IN 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 (I2) | | | | 5 (I1) | | | | 8 (I4) | | | | 7 (I3) | | | |
| | 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 (+24 V) | 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 (GND) | 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 |
|---------------------------------------|-------------------|--|
| Sensor voltage U _S too low | I/O error message | US LED is OFF E (PWR) LED is red |
| Sensor supply short circuit | I/O error message | E (IN) LED of the sensor supply is red |