

IB IL 24 DI 32/HD (2MBD)-PAC

Inline, digital input terminal,
digital inputs: 32, 24 V DC,
connection method: 1-wire

Data sheet
6842_en_04

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1 Description

The terminal is designed for use within an Inline station.
It is used to acquire digital signals.

Features

- 32 digital inputs
- Connection of sensors in single-wire technology



IB IL 24 DI 32/HD-PAC

WARNING: Explosion hazard when used in potentially explosive areas

When using the terminal in potentially explosive areas, observe the corresponding notes.



This data sheet is only valid in association with the IL SYS INST UM E user manual.



Make sure you always use the latest documentation.

It can be downloaded from the product at [phoenixcontact.net/products](https://www.phoenixcontact.net/products).

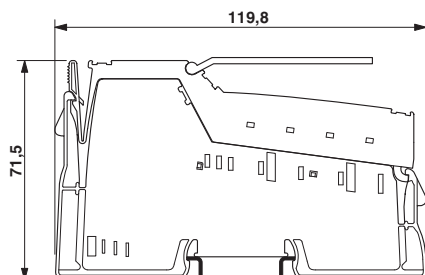
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3 Ordering data

| Description | Type | Order No. | Pcs./Pkt. |
|---|------------------------------|-----------|-----------|
| Inline, digital input terminal, digital inputs: 32, 24 V DC, connection method: 1-wire, transmission speed in the local bus: 500 kbps, degree of protection: IP20, including Inline connectors and marking fields | IB IL 24 DI 32/HD-PAC | 2862835 | 1 |
| Inline, digital input terminal, digital inputs: 32, 24 V DC, connection method: 1-wire, transmission speed in the local bus: 2 Mbps, degree of protection: IP20, including Inline connectors and marking fields | IB IL 24 DI 32/HD-2MBD-PAC | 2692885 | 1 |
| Accessories | Type | Order No. | Pcs./Pkt. |
| Inline terminal for power distribution (24 V), complete with accessories, (connector and labeling field) 24 V supply voltage is fed out from the segment circuit (US) | IB IL PD 24V-PAC | 2862987 | 1 |
| Inline terminal for power distribution (GND), complete with accessories, (connector and labeling field) connections for GND | IB IL PD GND-PAC | 2862990 | 1 |
| Connector set | IB IL DI/DO 8-PLSET | 2860950 | 1 |
| Labeling field, width: 12.2 mm (Marking) | IB IL FIELD 2 | 2727501 | 10 |
| Labeling field, width: 48.8 mm (Marking) | IB IL FIELD 8 | 2727515 | 10 |
| Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems: Laser printer, mounting type: insert, lettering field size: 62 x 10 mm (Marking) | ESL 62X10 | 0809492 | 1 |
| Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems: Laser printer, mounting type: insert, lettering field size: 62 x 46 mm (Marking) | ESL 62X46 | 0809502 | 5 |
| VARIOFACE front adapter for Inline modules, for transferring 32 (4 x 8) digital signals. (Connector/Adapter) | FLKM 14-PA-INLINE/32 | 2302777 | 1 |
| Documentation | Type | Order No. | Pcs./Pkt. |
| User manual, English, Automation terminals of the Inline product range | IL SYS INST UM E | - | - |
| Data sheet, English, INTERBUS addressing | DB GB IBS SYS ADDRESS | - | - |
| Application note, addressing of 32-channel Inline terminals | AH IB IL 24 DI/DO 32 ADDRESS | - | - |
| Application note, English, Inline terminals for use in zone 2 potentially explosive areas | AH EN IL EX ZONE 2 | - | - |

4 Technical data

Dimensions (nominal sizes in mm)



| | |
|--------------------|--------------------|
| Width | 48.8 mm |
| Height | 119.8 mm |
| Depth | 71.5 mm |
| Note on dimensions | Housing dimensions |

General data

| | |
|--|--|
| Color | green |
| Weight | 185 g (with connectors) |
| Operating mode | Process data operation with 2 words |
| Ambient temperature (operation) | -25 °C ... 55 °C |
| Ambient temperature (storage/transport) | -25 °C ... 85 °C |
| Permissible humidity (operation) | 10 % ... 95 % (non-condensing) |
| Permissible humidity (storage/transport) | 10 % ... 95 % (non-condensing) |
| Air pressure (operation) | 70 kPa ... 106 kPa (up to 3000 m above sea level) 80 kPa ... 106 kPa (up to 3000 m above sea level, in ATEX Zone 2) |
| Air pressure (storage/transport) | 70 kPa ... 106 kPa (up to 3000 m above sea level) |
| Degree of protection | IP20 |
| Protection class | III, IEC 61140, EN 61140, VDE 0140-1 |

Connection data: Inline connector

| | |
|--|---|
| Connection method | Spring-cage connection |
| Conductor cross section solid / stranded | 0.08 mm ² ... 1.5 mm ² / 0.08 mm ² ... 1.5 mm ² |
| Conductor cross section [AWG] | 28 ... 16 |
| Stripping length | 8 mm |

Connection data for UL approvals: Inline connector

| | |
|--|---|
| Connection method | Spring-cage connection |
| Conductor cross section solid / stranded | 0.2 mm ² ... 1.5 mm ² / 0.2 mm ² ... 1.5 mm ² |
| Conductor cross section [AWG] | 24 ... 16 |
| Stripping length | 8 mm |

Interface: Inline local bus

| | |
|-------------------|--------------------|
| Number | 2 |
| Connection method | Inline data jumper |

Transmission speed Inline local bus

| | |
|----------------------------|----------|
| IB IL 24 DI 32/HD-PAC | 500 kbps |
| IB IL 24 DI 32/HD-2MBD-PAC | 2 Mbps |

Communications power (U_L)

| | |
|-------------------|-------------------------------|
| Supply voltage | 7.5 V DC (via voltage jumper) |
| Current draw | max. 90 mA |
| Power consumption | max. 0.675 W |

Segment circuit supply (U_S)

| | |
|----------------------|--|
| Supply voltage | 24 V DC (via voltage jumper) |
| Supply voltage range | 19.2 V DC ... 30 V DC (including all tolerances, including ripple) |
| Current draw | max. 50 mA |


IB IL 24 DI 32/HD-PAC
WARNING – Explosion hazard when used in ATEX Zone 2

Make sure that the maximum permissible current of 4 A flowing through potential jumpers U_M and U_S (total current) is not exceeded.

Power consumption

| | |
|-------------------|--------------------------------|
| Power consumption | max. 2.16 W (Module, complete) |
|-------------------|--------------------------------|

Digital inputs

| | |
|--|------------------------|
| Number of inputs | 32 |
| Connection method | Spring-cage connection |
| Connection technology | 1-wire |
| Description of the input | EN 61131-2 type 1 |
| Nominal input voltage | 24 V DC |
| Nominal input current | typ. 2.8 mA |
| Input voltage range "0" signal | -3 V DC ... 5 V DC |
| Input voltage range "1" signal | 15 V DC ... 30 V DC |
| Delay at signal change from 0 to 1 | typ. 2 ms |
| Delay at signal change from 1 to 0 | typ. 4 ms |
| Permissible conductor length to the sensor | 30 m |
| Short-circuit and overload protection | yes |

Programming data (INTERBUS, local bus)

| | |
|-------------------------|--------|
| ID code (hex) | BE |
| ID code (dec.) | 190 |
| Length code (hex) | 02 |
| Length code (dec.) | 02 |
| Process data channel | 32 Bit |
| Input address area | 4 Byte |
| Output address area | 0 Byte |
| Parameter channel (PCP) | 0 Byte |
| Register length (bus) | 32 Bit |



For the programming data/configuration data of other bus systems, please refer to the corresponding electronic device data sheet (e.g., GSD, EDS).

Configuration and parameter data in a PROFIBUS system

| | |
|-----------------------------|--------|
| Required parameter data | 1 Byte |
| Required configuration data | 4 Byte |

Error messages to the higher level control or computer system

No

Electrical isolation/isolation of the voltage areas

| Test section | Test voltage |
|---|-------------------------|
| 7.5 V supply (bus logics)/24 V supply (I/O) | 500 V AC, 50 Hz, 1 min. |
| 24 V supply (I/O) / functional earth ground | 500 V AC, 50 Hz, 1 min. |
| 7.5 V supply (bus logics) / functional earth ground | 500 V AC, 50 Hz, 1 min. |



To achieve electrical isolation between the logic level and the I/O area, supply these areas from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted (see IL SYS INST UM E user manual).

Approvals

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

5 Additional tables

5.1 Input characteristic curve

| Input characteristic curve | |
|----------------------------|------------------------------|
| Input voltage U [V] | Typical input current I [mA] |
| $-30 < U \leq 0.7$ | 0 |
| 3 | 0.46 |
| 6 | 1.87 |
| 9 | 2.66 |
| 12 | 2.70 |
| 15 | 2.73 |
| 18 | 2.76 |
| 21 | 2.78 |
| 24 | 2.81 |
| 27 | 2.83 |
| 30 | 2.86 |

5.2 Power dissipation

Formula for calculating the power dissipation of the electronics

$$P_{EL} = 0,675 \text{ W} + \sum_{i=1}^n [U_{INi} \times I_{INi}]$$

Where:

P_{EL} Total power dissipation in the terminal

i Continuous index

n Number of set inputs ($n = 1 \dots 32$)

U_{INi} Input voltage of input i

I_{INi} Input current of input i according to the input characteristic curve

Power dissipation of the housing

2.8 W, maximum (within the permissible operating temperature)

5.3 Limitation of simultaneity, derating

No limitation of simultaneity, no derating

6 Internal circuit diagram

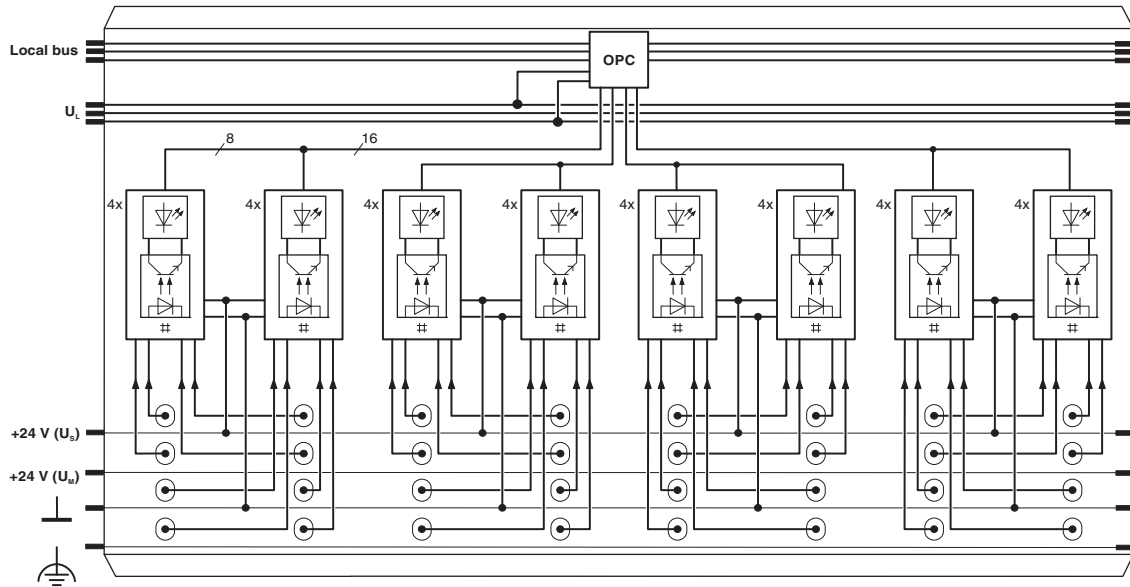


Figure 1 Internal wiring of the terminal points

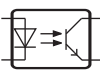
Key:



Protocol chip



LED (status indicator)



Optocoupler



Digital input



Please refer to the IL SYS INST UM E user manual for an explanation of other symbols used.

7 Notes on using the terminal block in potentially explosive areas

Valid for: IB IL 24 DI 32/HD-PAC



WARNING: Explosion hazard

Please make sure that the following notes and instructions are observed.

Approval according to ATEX Directive 2014/34/EU

⊕ II 3 G Ex nA IIC T4 Gc X

Installation notes

$T_{amb} = -25\text{ °C} \dots +55\text{ °C}$

The category 3 device is designed for installation in zone 2 potentially explosive areas.

The device meets the requirements of EN 60079–0:2012 + A11:2013 and EN 60079–15:2010.

- Observe the specified conditions for use in potentially explosive areas! Also observe the requirements of EN 60079-14.
- Install the device in a suitable approved housing (with at least IP54 protection) that meets the requirements of EN 60079-15.
- Only assemble, disassemble as well as connect and disconnect cables when the power is disconnected.
- Only devices that are designed for operation in Ex Zone 2 and the conditions at the installation location may be connected to the circuits in Zone 2.
- For safe operation, lockable plug connections must have a functional interlock (e. g. locking clip, screw connection etc.). Insert the interlock. Repair any damaged connectors immediately.
- Only connect one cable per terminal point.
- Use transient protection so that short-term surge voltages do not exceed 119 V.
- The air pressure during operation must not exceed 106 kPa.
- Perform a dielectric test after installing the device in the housing.
- For all supply and signal lines connected to the station, make sure that there is a connection to ground potential.
- Make sure that the maximum permissible current of 4 A flowing through potential jumpers U_M and U_S (total current) is not exceeded.
- When using the device in potentially explosive areas, observe the specifications in the application note AH DE IL EX ZONE 2 (German) / AH EN IL EX ZONE 2 (English).

8 Terminal point assignment

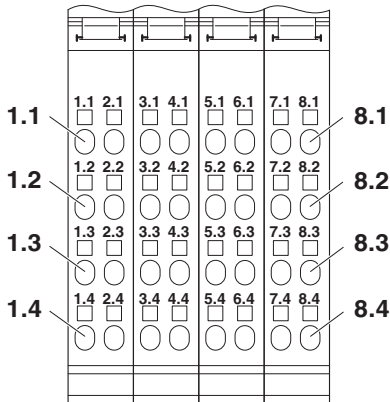


Figure 2 Terminal point assignment

| Terminal point | Assignment |
|----------------|----------------------------|
| 1.1 / 2.1 | Signal input (IN01 / IN02) |
| 1.2 / 2.2 | Signal input (IN03 / IN04) |
| 1.3 / 2.3 | Signal input (IN05 / IN06) |
| 1.4 / 2.4 | Signal input (IN07 / IN08) |
| 3.1 / 4.1 | Signal input (IN09 / IN10) |
| 3.2 / 4.2 | Signal input (IN11 / IN12) |
| 3.3 / 4.3 | Signal input (IN13 / IN14) |
| 3.4 / 4.4 | Signal input (IN15 / IN16) |
| 5.1 / 6.1 | Signal input (IN17 / IN18) |
| 5.2 / 6.2 | Signal input (IN19 / IN20) |
| 5.3 / 6.3 | Signal input (IN21 / IN22) |
| 5.4 / 6.4 | Signal input (IN23 / IN24) |
| 7.1 / 8.1 | Signal input (IN25 / IN26) |
| 7.2 / 8.2 | Signal input (IN27 / IN28) |
| 7.3 / 8.3 | Signal input (IN29 / IN30) |
| 7.4 / 8.4 | Signal input (IN31 / IN32) |

9 Connection notes and examples



When connecting the sensors observe the assignment of the terminal points to the process data.



NOTE: Malfunction

Please note that the terminal must be provided with supply voltage U_S , as it is used internally as the auxiliary voltage.



NOTE: Malfunction

The sensors and U_S must be supplied from the same voltage supply.

The easiest way to meet this requirement is to use the IB IL PD 24V-PAC terminal (four terminals for 32 sensors). Wire the 24 V sensor connections to these terminals. In this way, they are supplied from the potential jumper U_S of the Inline station.

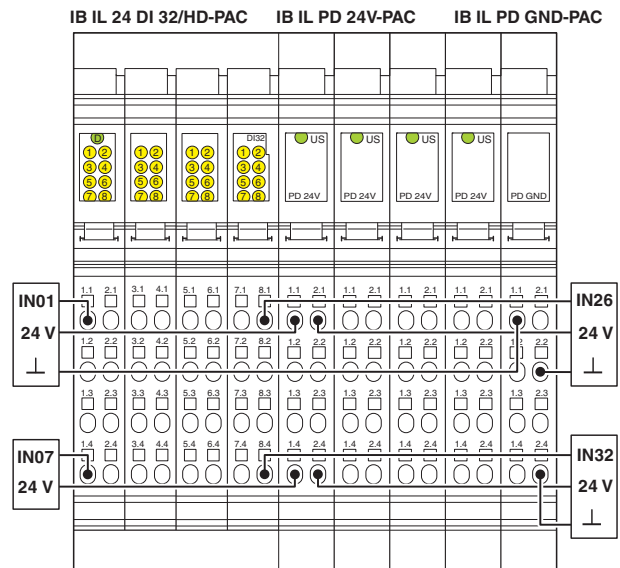


Figure 3 Typical connection of sensors when terminals for potential distribution are used



The slot numbering corresponds to the connector marking of the recommended connector set IB IL DI/DO 8-PLSET or the original connectors of the PAC version.

The sensors can also be connected via external busbars. Ensure that the sensors and U_S are supplied from the same voltage supply.

10 Application examples

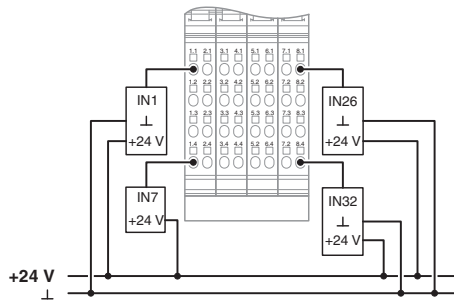


Figure 4 Example of a connection of sensors when using external busbars

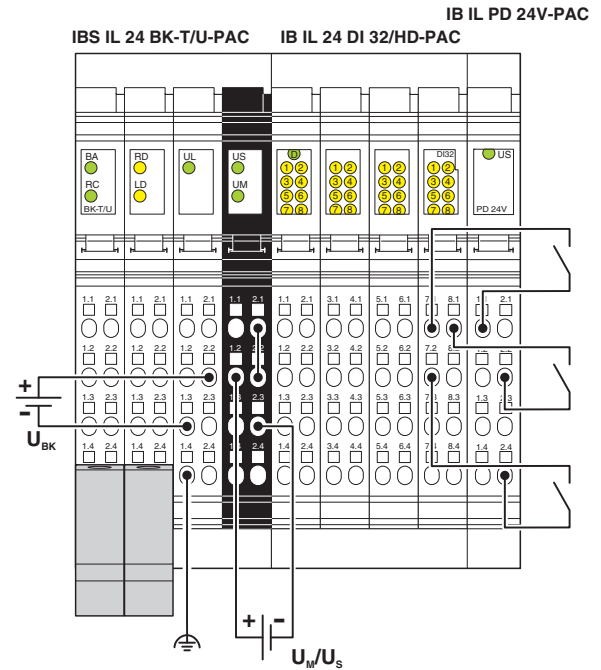


Figure 5 Connection of sensors when using the IB IL PD 24V-PAC terminal

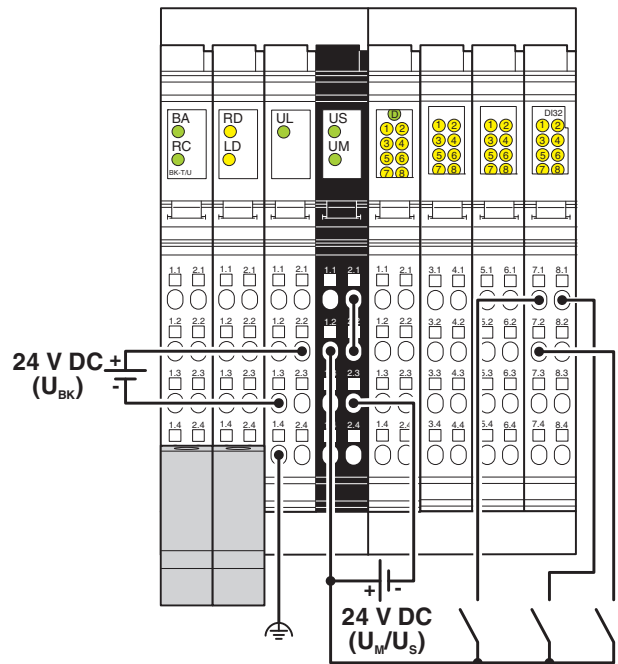


Figure 6 Connection of sensors when using external busbars

11 Local diagnostic and status indicators

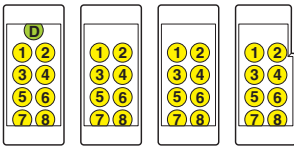


Figure 7 Local diagnostic and status indicators

| Designation | Color | Meaning |
|---------------------------|--------|-------------------------------------|
| D | Green | Diagnostics (bus and logic voltage) |
| For each connector | | |
| 1 ... 8 | Yellow | Status of the inputs |

Function identification

Light blue

2 Mbps: White stripe in the vicinity of the D LED

12 Process data

Assignment of the terminal points to IN process data

| (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 |
| Assignment | Slot | 4 | | | | | | | | 3 | | | | | | | |
| | Signal | IN32 | IN31 | IN30 | IN29 | IN28 | IN27 | IN26 | IN25 | IN24 | IN23 | IN22 | IN21 | IN20 | IN19 | IN18 | IN17 |
| | Terminal point (signal) | 8.4 | 7.4 | 8.3 | 7.3 | 8.2 | 7.2 | 8.1 | 7.1 | 6.4 | 5.4 | 6.3 | 5.3 | 6.2 | 5.2 | 6.1 | 5.1 |
| Status indicator | LED | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

| (Word.bit) view | Word | Word 1 | | | | | | | | | | | | | | | |
|------------------|-------------------------|--------|------|------|------|------|------|------|------|--------|------|------|------|------|------|------|------|
| | Bit | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| (Byte.Bit) view | Byte | Byte 2 | | | | | | | | Byte 3 | | | | | | | |
| | Bit | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Assignment | Slot | 2 | | | | | | | | 1 | | | | | | | |
| | Signal | IN16 | IN15 | IN14 | IN13 | IN12 | IN11 | IN10 | IN09 | IN08 | IN07 | IN06 | IN05 | IN04 | IN03 | IN02 | IN01 |
| | Terminal point (signal) | 4.4 | 3.4 | 4.3 | 3.3 | 4.2 | 3.2 | 4.1 | 3.1 | 2.4 | 1.4 | 2.3 | 1.3 | 2.2 | 1.2 | 2.1 | 1.1 |
| Status indicator | LED | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |



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

For the assignment of the illustrated (byte.bit) view to controllers for other bus systems, please refer to document AH IB IL 24 DI/DO 32 ADDRESS.