IB IL 24 DI 4 (-PAC)
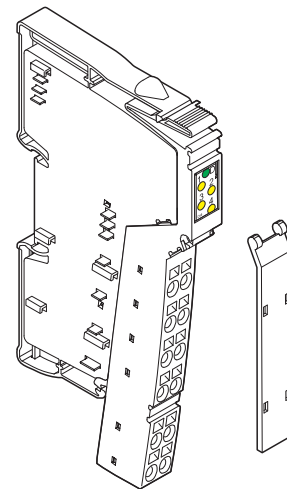
Inline Terminal With Four Digital Inputs

AUTOMATIONWORX

Data Sheet
5550_en_04

Description

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

Features

– Connections for four 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 terminal: 1.0 A
– Diagnostic and status indicators

This data sheet is only valid in association with the IL SYS INST UM E user manual or the Inline system manual for your bus system.

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.

This data sheet is valid for all products listed on the following page:

PHOENIX CONTACT

INSPIRING INNOVATIONS

Ordering Data

Products

Description	Type	Order No.	Pcs./Pkt.
Inline terminal with four digital inputs; complete with accessories (connector and labeling field)	IB IL 24 DI 4-PAC	2861234	1
Inline terminal with four digital inputs, without accessories	IB IL 24 DI 4	2726214	1

☞ One of the listed connectors is needed for the complete fitting of the IB IL 24 DI 4 terminal.

Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector for digital 4-channel or 16-channel Inline terminals, w/o color print	IB IL SCN-12	2726340	1
Connector for digital 4-channel or 16-channel Inline input terminals, with color print	IB IL SCN-12-ICP	2727611	1

Documentation

Description	Type	Order No.	Pcs./Pkt.
User manual: "Configuring and Installing the INTERBUS Inline Product Range"	IB IL SYS PRO UM E	2743048	1
User manual: "Automation Terminals of the Inline Product Range"	IL SYS INST UM E	2698737	1
Application note: "Inline Terminals for Use in Zone 2 Potentially Explosive Areas"	AH EN IL EX ZONE 2	7217	–

Technical Data

General Data

Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm
Weight	44 g (without connectors), 66 g (with connectors)
Operating mode	Process data operation with 4 bits (1 nibble)
Transmission speed	500 kbps
Connection method for sensors	2 and 3-wire technology
Ambient temperature (operation)	-25°C to +55°C
Ambient temperature (storage/transport)	-25°C to +85°C
Permissible humidity (operation/storage/transport)	10% to 95% according to DIN EN 61131-2
Permissible air pressure (operation/storage/transport)	70 kPa to 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536
Connection data for Inline connector	
Connection method	Spring-cage terminals
Conductor cross-section	0.2 mm^2 to 1.5 mm^2 (solid or stranded), 24 - 16 AWG

Interface

Local bus	Through data routing

Power Consumption

Communications power	7.5 V
Current consumption at U_L	40 mA, maximum
Power consumption at U_L	0.3 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)
Nominal current consumption at U_S	1.0 A, maximum

Supply of the Module Electronics and I/O Through Bus Coupler/Power Terminal

Connection method	Through potential routing

Digital Inputs

Number	4
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	Segment supply, ground
Nominal input voltage U_{IN}	24 V DC
Permissible range	-30 V < U_{IN} < +30 V DC
Nominal input current for U_{IN}	3 mA, minimum
Delay time	None
Permissible cable length to the sensor	30 m (to ensure conformance with EMC directive 89/336/EEC)
Use of AC sensors	AC sensors in the voltage range < U_{IN} are limited in application (corresponding to the input design).

Characteristic Curve: Current Depending on the Input Voltage and the Ambient Temperature T_A

Supply Voltage	Input Current	Input Current With t ≥ 20 s	
		For T_A = 25°C	For T_A = 55°C
18 V	3.0 mA	2.9 mA	2.5 mA
24 V	3.9 mA	3.8 mA	3.5 mA
30 V	4.5 mA	4.2 mA	3.0 mA

The current is reduced depending on the ambient temperature T_A and the number of inputs that are switched on (internal module temperature).

Power Dissipation

Formula to Calculate the Power Dissipation of the Electronics

$$P_{TOT} = 0.24\ W + \sum_{i=1}^{n} [\ U_{INi}\ x\ 0.003\ A\ ]$$

Where
P_{TOT}	Total power dissipation in the terminal
n	Number of set inputs (n = 1 to 4)
U_{INi}	Input voltage of input i
i	Index

Power Dissipation of the Housing P_{HOU}

0.6 W, maximum (within the permissible operating temperature)

Limitation of Simultaneity, Derating

No limitation of simultaneity, no derating

Safety Equipment

Overload in segment circuit	No
Surge voltage	Protective elements in the power terminal
Polarity reversal	Protective elements in the power terminal

Electrical Isolation

⚠️ To provide electrical isolation between the logic level and the I/O area it is necessary to supply the station bus coupler and the digital input terminal described here via the bus coupler or a power terminal from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted. (See also user manual.)

Common Potentials

The 24 V main voltage, 24 V segment voltage, and GND have the same potential. FE is a separate potential area.

Separate Potentials in the System Consisting of Bus Coupler/Power Terminal and I/O Terminal

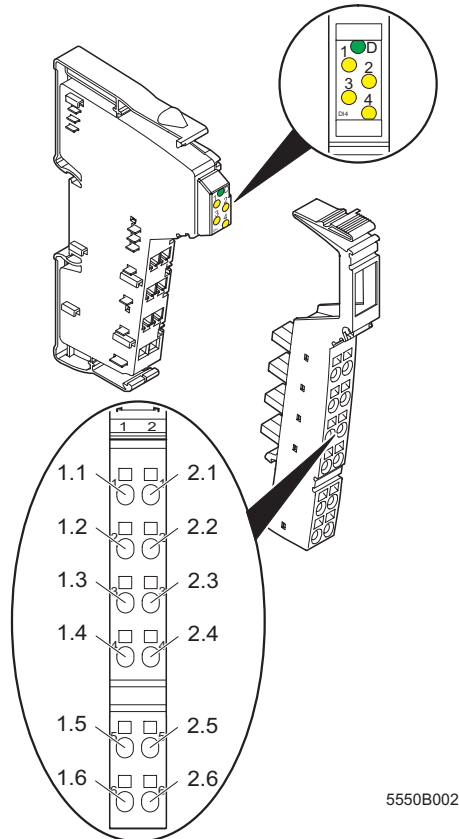| - Test Distance	- Test Voltage
5 V supply incoming remote bus / 7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
5 V supply outgoing remote bus / 7.5 V supply (bus logic)	500 V AC, 50 Hz, 1 min
7.5 V supply (bus logic) / 24 V supply (I/O)	500 V AC, 50 Hz, 1 min
24 V supply (I/O) / functional earth ground	500 V AC, 50 Hz, 1 min

Error Messages to the Higher-Level Control or Computer System

None

Approvals

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

Local Diagnostic and Status Indicators and Terminal Point Assignment

Local Diagnostic and Status Indicators

Desig.	Color	Meaning
D	Green	Diagnostics
1, 2, 3, 4	Yellow	Status indicators of the inputs

Function Identification

Light blue

Terminal Point Assignment

Terminal Point	Assignment
1.1	Signal input 1 (IN 1)
2.1	Signal input 2 (IN 2)
1.2, 2.2	Segment voltage U_S for 2 and 3-wire termination
1.3, 2.3	Ground contact (GND) for 3-wire termination
1.4	Signal input 3 (IN 3)
2.4	Signal input 4 (IN 4)
1.5, 2.5	Segment voltage U_S for 2 and 3-wire termination
1.6, 2.6	Ground contact (GND) for 3-wire termination

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Figure 1   Terminal with appropriate connector

Internal Circuit Diagram
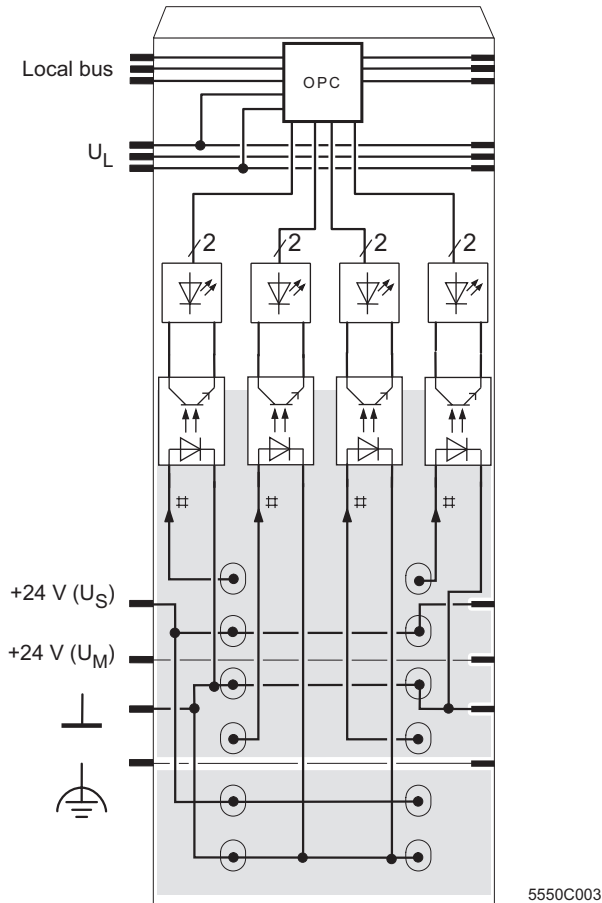
Figure 2   Internal wiring of the terminal points

Key:

OPC	Protocol chip (bus logic including voltage conditioning)
	LED (status indicators)
	Optocoupler
	Digital input
	Electrically isolated area

Other symbols used are explained in the IL SYS INST UM E user manual or in the Inline system manual for your bus system.

Connection Example

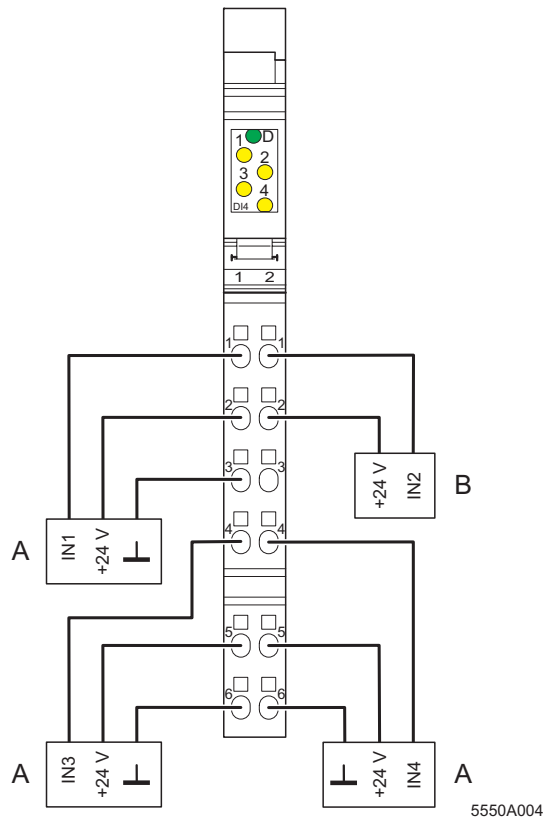When connecting the sensors, observe the assignment of the terminal points to the process data (see page 8).

Figure 3   Typical sensor connections

A   3-wire termination
B   2-wire termination

Notes on Using the Terminal in Potentially Explosive Areas

Approval According to EC Directive EG-RL 94/9 (ATEX) 〈Ex〉 **II 3G EEx nAC IIC T4 U**

This Inline terminal conforms to standard EN 50021 and can be installed in a Zone 2 potentially explosive area. This Inline terminal is a Category 3 item of equipment.

UL Approval

This Inline terminal of the indicated hardware version or later is suitable for use in Class I, Division 2, Groups A, B, C, D.

> Before using an Inline terminal in a Zone 2 potentially explosive area, check that the terminal has been approved for installation in this area.
>
> For a list of terminals approved for use in Zone 2 potentially explosive areas, please refer to the AH EN IL EX ZONE 2 application note.
>
> Check the labeling on the Inline terminal and the packaging (see Figure 4).
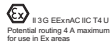
Figure 4   Labeling example of terminals for use in potentially explosive areas

> **Ensure that the following points and instructions are observed before startup.**
> 1. When working on the Inline terminal, always switch off the supply voltage.
> 2. The Inline terminal must only be installed, started up, and maintained by qualified personnel.
> 3. Install the Inline terminals in a control cabinet or metal housing with a minimum of IP54 protection according to EN 60529.
> 4. The Inline terminal must not be subjected to any mechanical or thermal strain, which exceeds the limits specified in the product documentation.
> 5. The Inline terminal must not be repaired by the user. Repairs may only be carried out by the manufacturer. The Inline terminal must be replaced by an approved terminal of the same type.
> 6. Only Category 3G equipment may be connected to Inline terminals in Zone 2.
> 7. Observe all applicable standards (e.g., EN 60079) and national safety and accident prevention regulations for installing and operating equipment.

Restrictions

> When using terminals in potentially explosive areas, observe the technical data and limit values specified in the corresponding documentation (user manual, data sheet, package slip).

> **Restrictions regarding the Inline system**
>
> The **maximum permissible current** flowing through the potential jumpers U_M and U_S (total current) is limited to **4 A** when using the Inline terminal in potentially explosive areas.

Programming Data/Configuration Data

Local Bus (INTERBUS)

ID code	BE_{hex} (190_{dec})
Length code	41_{hex}
Input address area	4 bits
Output address area	0 bits
Parameter channel (PCP)	0 bits
Register length (bus)	4 bits

Other Bus Systems

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

Process Data

☞ 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, Order No. 9000990.

Assignment of the Terminal Points to the IN Process Data

(Byte.bit) view	Byte.Bit	0.3	0.2	0.1	0.0
Module	Terminal point (signal)	2.4	1.4	2.1	1.1
	Terminal point (+24 V)	2.5	1.5	2.2	1.2
	Terminal point (GND)	2.6	1.6	2.3	1.3
Status indicator	LED	4	3	2	1