

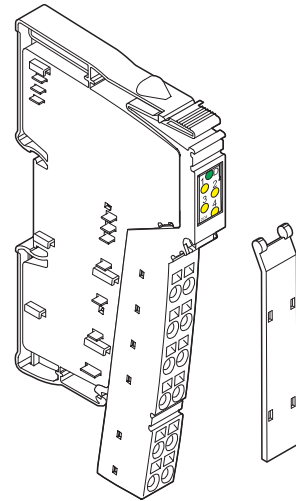
# IB IL 24 DO 4 ...

## Inline Terminal With 4 Digital Outputs

### AUTOMATIONWORX

Data Sheet  
5557\_en\_05

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### Description

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

### Features

- Connections for 4 digital actuators
- Connection of actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 A
- Total current of the terminal: 2 A.
- Short-circuit and overload protected outputs
- Diagnostic and status indicators



This data sheet is only valid in association with the IB IL SYS PRO 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](http://www.download.phoenixcontact.com).  
A conversion table is available on the Internet at  
[www.download.phoenixcontact.com/general/7000\\_en\\_00.pdf](http://www.download.phoenixcontact.com/general/7000_en_00.pdf).



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

## Ordering Data

### Products

Description	Type	Order No.	Pcs./Pkt.
Inline terminal with four digital outputs; without accessories Transmission speed 500 kbps	IB IL 24 DO 4	2726256	1
Inline terminal with four digital outputs; including accessories (connectors and labeling field) Transmission speed 500 kbps	IB IL 24 DO 4-PAC	2861276	1
Inline terminal with four digital outputs; without accessories Transmission speed 2 Mbps	IB IL 24 DO 4-2MBD	2855211	1
Inline terminal with four digital outputs; including accessories (connectors and labeling field) Transmission speed 2 Mbps	IB IL 24 DO 4-2MBD-PAC	2861988	1



One of the listed connectors is needed for the complete fitting of the IB IL 24 DO 4 and the IB IL 24 DO 4-2MBD terminals.

### Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector, without colored identification, for digital 4 or 16-channel Inline terminals	IB IL SCN-12	2726340	1
Connector, colored identification, for digital 4, or 16-channel Inline terminals	IB IL SCN-12-OCP	2727624	1

### Documentation

Description	Type	Order No.	Pcs./Pkt.
User manual: "Automation Terminals of the Inline Product Range"	IL SYS INST UM E	2698973	1
User manual: "Configuring and Installing the INTERBUS Inline Product Range"	IB IL SYS PRO UM E	2743048	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 connector), 66 g (with connector)
Operating mode	Process data mode with 4 bits
Connection method for actuators	2 and 3-wire technology
Permissible temperature (operation)	-25°C to +55°C
Permissible 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 3,000 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 of connector	
Connection method	Spring-cage terminals
Conductor cross-section	0.2 mm <sup>2</sup> to 1.5 mm <sup>2</sup> (solid or stranded), AWG 24 - 16

### Interface

Local bus	Through data routing
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**Transmission Speed**

IB IL 24 DO 4	500 kbps
IB IL 24 DO 4-PAC	500 kbps
IB IL 24 DO 4-2MBD	2 Mbps
IB IL 24 DO 4-2MBD-PAC	2 Mbps

**Power Consumption**

	500 kbps	2 Mbps
Communications power	7.5 V DC	7.5 V DC
Current consumption at $U_L$	44 mA, maximum	65 mA, maximum
Power consumption at $U_L$	0.33 W, maximum	0.49 W, maximum
Segment supply voltage $U_S$	24 V DC (nominal value)	24 V DC (nominal value)
Nominal current consumption at $U_S$	2 A (4 x 0.5 A), maximum	2 A (4 x 0.5 A), maximum

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

Connection method	Through potential routing
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**Digital Outputs**

Number	4
Nominal output voltage $U_{OUT}$	24 V DC
Differential voltage for $I_{nom}$	$\leq 1$ V
Nominal current $I_{nom}$ per channel	0.5 A
Tolerance of the nominal current	+10%
Total current	2 A
Protection	Short-circuit; overload



All four channels are thermally coupled, i.e., an error in one channel can affect the other channels.

Nominal load	
Ohmic	48 $\Omega$ / 12 W
Lamp	12 W
Inductive	12 VA (1.2 H, 50 $\Omega$ )
Signal delay upon power up of	
Ohmic nominal load	100 $\mu$ s, typical
Lamp nominal load	100 ms, typical (with switching frequencies up to 8 Hz; above this frequency the lamp load responds like an ohmic load)
Inductive nominal load	100 ms (1.2 H, 50 $\Omega$ ), typical
Signal delay upon power down of	
Ohmic nominal load	1 ms, typical
Lamp nominal load	1 ms, typical
Inductive nominal load	50 ms (1.2 H, 50 $\Omega$ ), typical
Switching frequency with	
Ohmic nominal load	300 Hz, maximum



This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software and the control or computer system used.

Lamp nominal load	300 Hz, maximum
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This switching frequency is limited by the selected data rate, the number of bus devices, the bus structure, the software and the control or computer system used.

Inductive nominal load	0.5 Hz (1.2 H, 50 $\Omega$ ), maximum
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Digital Outputs (Continued)	
Overload response	Auto restart
Response time with ohmic overload (12Ω)	3 s, approximately
Restart frequency with ohmic overload	250 Hz, approximately
Restart frequency with lamp overload	250 Hz, approximately
Response with inductive overload	Output may be damaged
Response time in the event of a short-circuit	850 ms, approximately
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Up to 2 A DC
Resistance to permanently applied surge voltage	No
Validity of output data after connecting the 24 V voltage supply (power up)	5 ms, typical
Response upon power down	The output follows the supply voltage without delay.
Limitation of the voltage induced on circuit interruption	$-15\text{ V} \leq U_{\text{demag}} \leq -46\text{ V}$ ( $U_{\text{demag}}$ = demagnetization voltage)
One-time unsolicited energy	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in the output chip
Overcurrent shutdown	0.7 A, minimum
Output current when switched off	300 μA, maximum
Output voltage when switched off	2 V, maximum
Output current with ground connection interrupted	25 mA, maximum
Switching power with ground connection interrupted	100 mW at 1 kΩ load resistance, typical
Inrush current with lamp load	1.5 A for 20 ms, maximum

Output Characteristic Curve When Switched On (Typical)	
(500 kbps and 2 Mbps)	
Output Current (A)	Differential Output Voltage (V)
0	0
0.1	0.04
0.2	0.08
0.3	0.12
0.4	0.16
0.5	0.20

**Power Dissipation**

500 kbps	2 Mbps
<b>Formula to Calculate the Power Dissipation of the Electronics</b>	
$P_{\text{TOT}} = 0.19\text{ W} + \sum_{i=1}^n (0.10\text{ W} + I_{\text{Li}}^2 \times 0.4\ \Omega)$	$P_{\text{TOT}} = 0.4\text{ W} + \sum_{i=1}^n (0.1\text{ W} + I_{\text{Li}}^2 \times 0.4\ \Omega)$
<p>Where</p> <p><math>P_{\text{EL}}</math> Total power dissipation of the module</p> <p><math>i</math> index</p> <p><math>n</math> Number of set outputs (<math>n = 1</math> to <math>4</math>)</p> <p><math>I_{\text{Li}}</math> Load current of output <math>i</math></p>	
<b>Power dissipation of the housing <math>P_{\text{HOU}}</math></b>	
0.6 W, maximum (within the permissible operating temperature)	

Limitation of Simultaneity, Derating			
Ambient Temperature (TA)	Maximum load current at		
	100% Simultaneity	75% Simultaneity	50% Simultaneity
≤35°C	0.5 A	0.5 A	0.5 A
≤45°C	0.375 A	0.5 A	0.5 A
≤55°C	0.25 A	0.33 A	0.5 A

With 100% simultaneity, a load current of 0.5 A for each channel is permissible up to 35°C (ambient temperature range), a load current of 0.375 A between 35°C and 45°C and a load current of 0.25 A up to 55°C .

If a maximum of two channels are operated in the permissible ambient temperature range (50% simultaneity), a load current of 0.5 A can be tapped.

If all 4 channels are used, the permissible working point must be defined according to the above formula. An example can be found in the IB IL SYS PRO UM E user manual.

### Safety Equipment

Overload/short-circuit in segment circuit	Electronic; with 4-channel driver
Surge voltage	Protective circuits of the power terminal; Protection up to 33 V DC
Polarity reversal of the supply voltage	Protective circuits of the power terminal; It is necessary to protect the voltage supply. The power supply unit should be able to supply 4 times (400%) the nominal current of the fuse.
Reverse voltage	Protection up to 2 A DC

### 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 output terminal described here using 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

5 V supply incoming remote bus / 7.5 V supply (bus logic)
5 V supply outgoing remote bus / 7.5 V supply (bus logic)
7.5 V supply (bus logic) / 24 V supply (I/O)
24 V supply (I/O) / functional earth ground

#### - Test Voltage

500 V AC, 50 Hz, 1 min
500 V AC, 50 Hz, 1 min
500 V AC, 50 Hz, 1 min
500 V AC, 50 Hz, 1 min

### Error Messages to the Higher-Level Control or Computer System

Short-circuit/overload of an output	Yes
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An error message is generated when an output is short circuited and switched on. In addition, the diagnostic LED (D) flashes on the terminal at 2 Hz (medium) under these conditions.

Falling below or exceeding the operating voltage	No
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### Approvals

For the latest approvals, please visit [www.download.phoenixcontact.com](http://www.download.phoenixcontact.com).

## Local Diagnostic/Status Indicators and Terminal Point Assignment

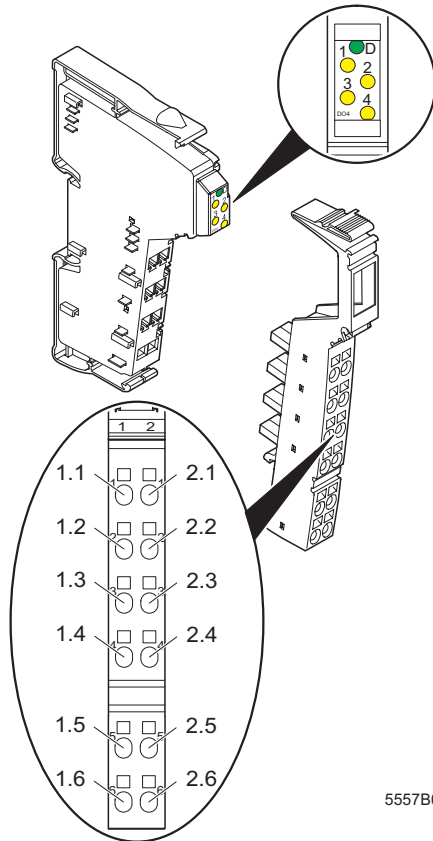


Figure 1 The terminal with the appropriate connector

## Local Diagnostic and Status Indicators

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

## Function Identification

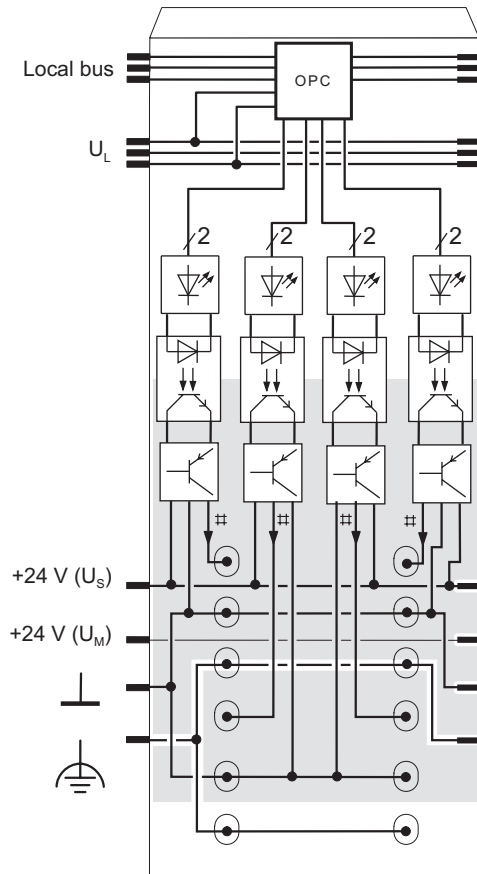
Pink

2 Mbps: white stripe in the vicinity of D LED







## Terminal Assignment

Terminal Point	Assignment
1.1	Signal output (OUT 1)
2.1	Signal output (OUT 2)
1.2, 2.2	Ground contact (GND) for 2 and 3-wire termination
1.3, 2.3	FE connection for 3-wire termination
1.4	Signal output (OUT 3)
2.4	Signal output (OUT 4)
1.5, 2.5	Ground contact (GND) for 2 and 3-wire termination
1.6, 2.6	FE connection for 3-wire termination

### Internal Circuit Diagram



Key:

-  Protocol chip (bus logic including voltage conditioning)
-  LED
-  Optocoupler
-  Transistor
-  Digital Output
-  Electrically isolated area



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

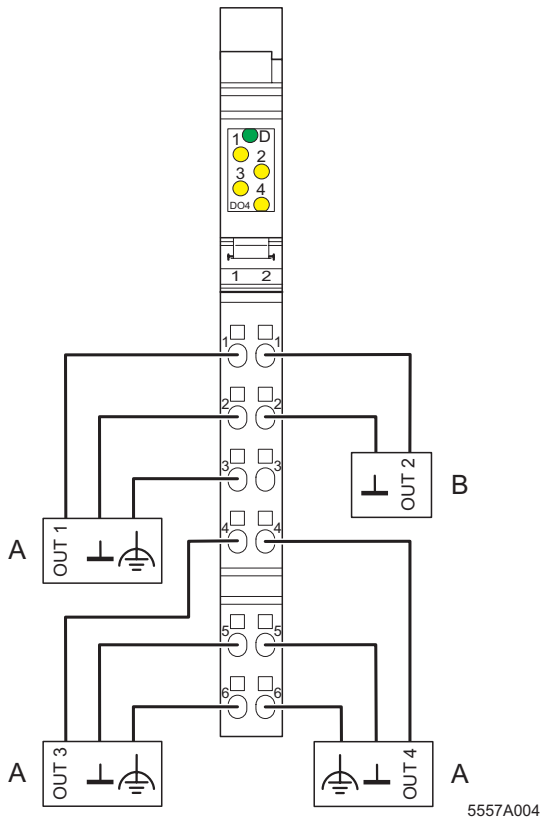
5557C003

Figure 2 Internal wiring of the terminal points

## Connection Example



When connecting the actuators observe the assignment of the terminal points to the process data (see page 10).



5557A004

Figure 3 Typical actuator connection

A: 3-wire termination

B: 2-wire termination



## Notes on Using the Terminal in Potentially Explosive Areas

### Approval in acc. with EG-RL 94/9 (ATEX) 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. These Inline terminals are Category 3 items of equipment.

### UL Approval

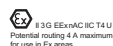
These Inline terminals for the indicated hardware version or later are suitable for use in Class I, Division 2, Groups A, B, C, D.



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 that are approved for the potentially explosive areas of Zone 2, 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).



Potential rating 4 A maximum  
for use in Ex areas

IBx IL xx xx x  
Order-No.: xxxxxxxx  
Module-ID: xx HW/FW XX/-



Phos. Cont. Free For High Temp.  
UL 120, 2, Ex nAC IIC T4  
UL 120, 2, Ex nAC IIC T4  
UL 120, 2, Ex nAC IIC T4

5561B001

Figure 4 Example labeling of terminals for use in potentially explosive areas



**Before startup, ensure that the following points and instructions are observed.**

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 specialist personnel.
3. Install the Inline terminals in a control cabinet or metal housing. The minimum requirement for both items is 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 is to be replaced by an approved terminal of the same type.
6. During operation, only Category 3G equipment must 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 potential jumpers  $U_M$  and  $U_S$  (total current) is limited to **4 A** when using the Inline terminals in potentially explosive areas.

## Programming Data/Configuration Data

### Local Bus (INTERBUS)

ID code	BD <sub>hex</sub> (189 <sub>dec</sub> )
Length code	41 <sub>hex</sub>
Process data channel	4 bits
Input address area	0 bits
Output address area	4 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

### Assignment of the Terminal Points to the OUT Process Data

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



The assignment of the (Byte.Bit) view (shown here) to your INTERBUS control system or your computer system, please refer to the data sheet DB GB IBS SYS ADDRESS, Part No. 9000990.