

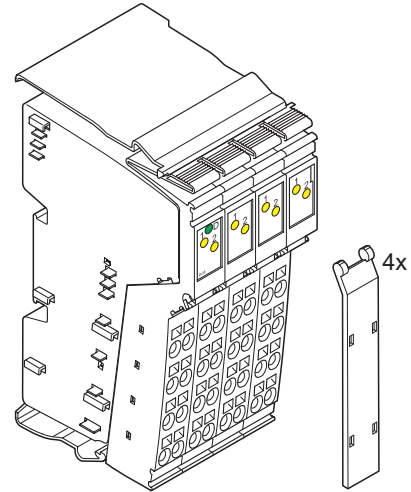
IB IL 24 DO 8 ...

Inline Terminal With Eight Digital Outputs

AUTOMATIONWORX

Data Sheet

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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 eight digital actuators
- Connection of actuators in 2, 3, and 4-wire technology
- Nominal current of each output: 0.5 A
- Total current of the terminal: 4 A
- Short-circuit and overload protected outputs
- Diagnostic and status indicators
- Approved for use within a safety-related segment circuit (not valid for IB IL 24 DO 8-PAC/SN)



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.



Please observe the notes on page 4 when using the terminal within a safety-related segment circuit.



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 the terminals listed under "Ordering Data" on page 12.

Distinguishing the Product Versions

The product versions with and without "**PAC**" only differ in the scope of supply (see "Ordering Data" on page 12). Their function and technical data are identical.

- Without PAC: Without accessories
- With PAC: Including connectors and labeling fields

The product versions with and without "**SN**" only differ with regard to the numbering of the terminal points on the different connector versions (see Figure 2 on page 3). Their function and technical data are identical.

- PAC without SN: Connectors consecutively numbered
- With PAC/SN: Connectors not consecutively numbered

The terminal functions with and without "**2MBD**" are identical. The essential difference between them is the transmission speed.

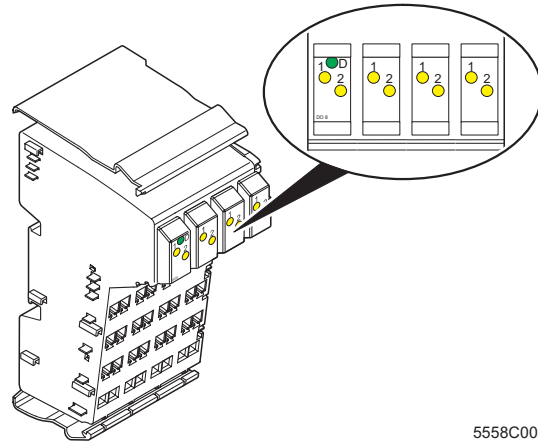
- Without 2MDB: 500 kbps
- With 2MBD: 2 Mbps

Further differing technical data are particularly identified.

For greater clarity, the designation IB IL 24 DO 8 is used throughout this document.

Local Diagnostic/Status Indicators and Terminal Point Assignment

Local Diagnostic and Status Indicators



5558C002

Figure 1 Local diagnostic and status indicators

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

Function Identification

Pink

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

Terminal Point Assignment for Each Connector

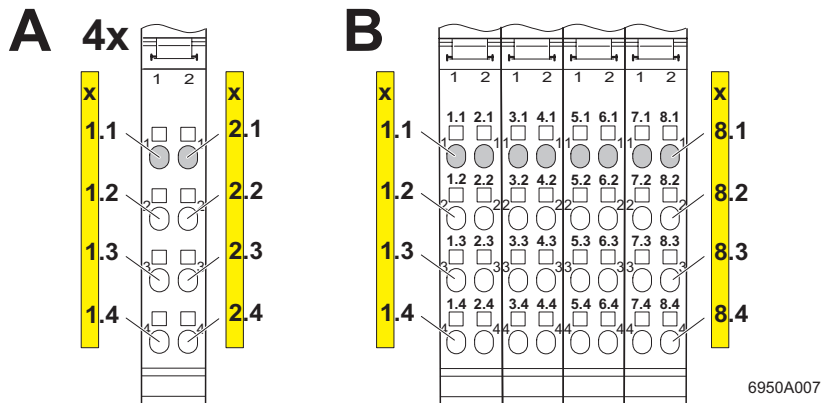


Figure 2 Terminal point numbering: individual connectors **(A)** and connector sets **(B)**

- A**
 - Using the IB IL 24 DO 8-PAC/SN or IB IL 24 DO 8-2MBD-PAC/SN with the supplied connectors
 - Using individual connectors (IB IL SCN-8 or IB IL SCN-8-CP)
- B**
 - Using the IB IL 24 DO 8-PAC or IB IL 24 DO 8-2MBD-PAC with the original connector set
 - Using a connector set (IB IL DI/DO 8-PLSET or IB IL DI/DO 8-PLSET/CP)

Terminal Point	Assignment
x.1	Signal output (OUT 1)
x.2	Segment voltage U_S for 4-wire termination Measuring points for the supply voltage
x.3	Ground contact (GND) for 2, 3, and 4-wire termination
x.4	FE connection for 3 and 4-wire termination

Notes on Using the Terminals Within a Safety-Related Segment Circuit

The terminals of the following hardware version and later (listed below) are approved for use within a safety-related segment circuit.

The IB IL 24 DO 8-PAC/SN terminal is not approved for use within a safety-related segment circuit.

Order No.	Order Designation	Hardware Version
500 kbps		
27 26 26 9	IB IL 24 DO 8	05
28 61 28 9	IB IL 24 DO 8-PAC	05
2 Mbps		
28 19 03 7	IB IL DO 8-2MBD	04
28 61 68 7	IB IL 24 DO 8-2MBD-PAC	04
28 78 22 7	IB IL 24 DO 8-2MBD-PAC/SN	04



The hardware version is imprinted on the side of the housing of every terminal (1 in Figure 3).

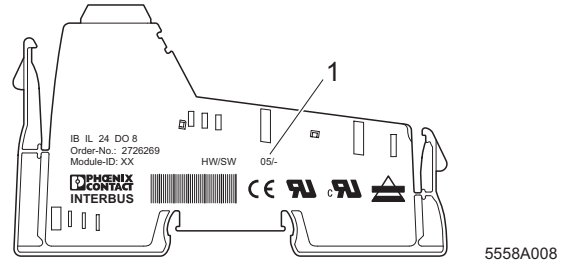


Figure 3 Imprinting on an Inline terminal



The instructions of the current data sheet of the safety terminal that opens the safety-related segment circuit must be followed to ensure that the function of the safety-related segment circuit is not affected!

Up-to-date documentation can be downloaded at www.download.phoenixcontact.com.

Internal Circuit Diagram

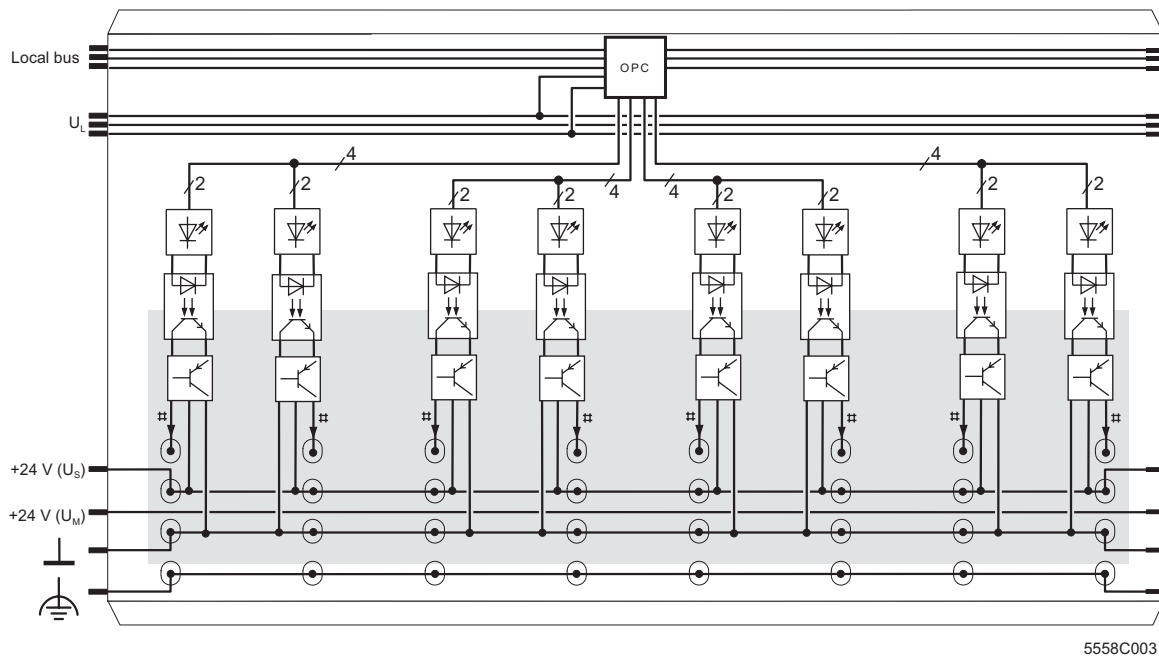
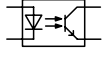


Figure 4 Internal wiring of the terminal points

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.

Connection Example



When connecting the actuators observe the assignment of the terminal points to the process data (see page 7).

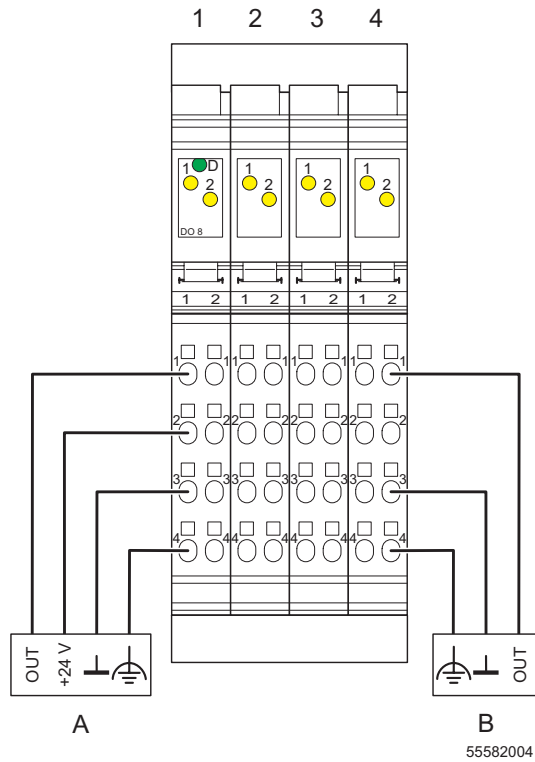


Figure 5 Typical actuator connection

- A 4-wire termination
- B 3-wire termination

The numbers above the module illustration identify the connector slots.

Programming Data/Configuration Data

INTERBUS

ID code	BD _{hex} (189 _{dec})
Length code	81 _{hex}
Process data channel	8 bits
Input address area	0 bytes
Output address area	1 byte
Parameter channel (PCP)	0 bytes
Register length (bus)	1 byte

Other Bus Systems



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

Process Data



For the assignment of the illustrated (byte.bit) view to your **INTERBUS** control or computer system, please refer to data sheet DB EN IBS SYS ADDRESS, Order No. 90 00 99 0.

Assignment of the Terminal Points to the OUT Process Data



The following table applies to the IB IL 24 DO 8-PAC and IB IL 24 DO 8-2MBD-PAC terminals with the original connector set and when using the IB IL DI/DO 8-PLSET and IB IL DI/DO 8-PLSET/CP connector sets (see also Figure 2 on page 3, detail B).

(Byte.bit) view	Byte	Byte 0							
	Bit	7	6	5	4	3	2	1	0
Assignment	Slot	4		3		2		1	
	Terminal point (signal)	8.1	7.1	6.1	5.1	4.1	3.1	2.1	1.1
	Terminal point (+24 V)	8.2	7.2	6.2	5.2	4.2	3.2	2.2	1.2
	Terminal point (GND)	8.3	7.3	6.3	5.3	4.3	3.3	2.3	1.3
	Terminal point (FE)	8.4	7.4	6.4	5.4	4.4	3.4	2.4	1.4
Status indicator	Slot	4		3		2		1	
	LED	2	1	2	1	2	1	2	1



The following table applies to the IB IL 24 DO 8-PAC/SN and IB IL 24 DO 8-2MBD-PAC/SN terminals with the original connector set and when using the IB IL SCN-8 or IB IL SCN-8-CP connectors (see also Figure 2 on page 3, detail A).

(Byte.bit) view	Byte	Byte 0							
	Bit	7	6	5	4	3	2	1	0
Assignment	Slot	4		3		2		1	
	Terminal point (signal)	2.1	1.1	2.1	1.1	2.1	1.1	2.1	1.1
	Terminal point (+24 V)	2.2	1.2	2.2	1.2	2.2	1.2	2.2	1.2
	Terminal point (GND)	2.3	1.3	2.3	1.3	2.3	1.3	2.3	1.3
	Terminal point (FE)	2.4	1.4	2.4	1.4	2.4	1.4	2.4	1.4
Status indicator	Slot	4		3		2		1	
	LED	2	1	2	1	2	1	2	1

Technical Data

General Data

Housing dimensions (width x height x depth)	48.8 mm x 120 mm x 71.5 mm
Weight	130 g (without connectors)
Operating mode	Process data mode with 1 byte
Connection method for actuators	2, 3, and 4-wire technology
Permissible temperature (operation)	-25°C to +55°C
Permissible temperature (storage/transport)	-25°C to +85°C
Permissible humidity (operation)	75% on average, 85% occasionally



In the range from - 25°C to + 55°C appropriate measures against increased humidity (> 85%) must be taken.

Permissible humidity (storage/transport)	75% on average, 85% occasionally
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For a short period, slight condensation may appear on the outside of the housing if, for example, the terminal is brought into a closed room from a vehicle.

Permissible air pressure (operation)	80 kPa to 106 kPa (up to 2000 m above sea level)
Permissible air pressure (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

Interface

Local bus	Through data routing
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Transmission Speed

IB IL 24 DO 8	500 kbps
IB IL 24 DO 8-PAC	500 kbps
IB IL 24 DO 8-PAC/SN	500 kbps
IB IL DO 8-2MBD	2 Mbps
IB IL 24 DO 8-2MBD-PAC	2 Mbps
IB IL 24 DO 8-2MBD-PAC/SN	2 Mbps

Power Consumption (500 kbps)

Communications power	7.5 V DC
Current consumption from the local bus	60 mA, maximum
Power consumption from the local bus	0.45 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)
Nominal current consumption at U_S	4 A (8 x 0.5 A), maximum

Power Consumption (2 Mbps)

Communications power	7.5 V DC
Current consumption from the local bus	85 mA, maximum
Power consumption from the local bus	0.64 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)
Nominal current consumption at U_S	4 A (8 x 0.5 A), maximum

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

Connection method Through potential routing

Digital Outputs

Number	8
Nominal output voltage U_{OUT}	24 V DC
Differential voltage for I_{nom}	≤ 1 V
Nominal current I_{nom} per channel	0.5 A
Tolerance of the nominal current	+10%
Total current	4 A
Protection	Short-circuit; overload



Always 4 channels are thermally coupled, i.e. an error case in one channel can affect the other channels.

Nominal load

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

Nominal lamp 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.

Nominal inductive load	0.5 Hz (1.2 H, 48 Ω), maximum
Overload response	Auto restart
Response time with ohmic overload (12 Ω)	3 s, approximately
Restart frequency with ohmic overload	400 Hz, approximately
Restart frequency with lamp overload	400 Hz, approximately
Response with inductive overload	Output may be damaged
Response time in the event of a short circuit	400 ms, approximately
Reverse voltage protection against short pulses	Protected against reverse voltages

Digital Outputs (Continued)	
Resistance to permanently applied reverse voltages	Up to 2 A DC
Resistance to polarity reversal of the supply voltage	Protective elements in the bus terminal or power terminal
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_{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 k Ω load resistance, typical
Inrush current with lamp load	1.5 A for 20 ms, maximum

Output Characteristic Curve When Switched On (Typical)

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

Formula to Calculate the Power Dissipation of the Electronics

500 kbps

$$P_{\text{EL}} = 0.19 \text{ W} + \sum_{n=1}^8 (0.10 \text{ W} + I_{\text{Ln}}^2 \times 0.40 \Omega)$$

2 Mbps

$$P_{\text{EL}} = 0.46 \text{ W} + \sum_{n=1}^8 (0.10 \text{ W} + I_{\text{Ln}}^2 \times 0.40 \Omega)$$

Where

P_{EL}	Total power dissipation in the terminal
n	Index of the number of set outputs $n = 1$ to 8
I_{Ln}	Load current of output n

Power Dissipation of the Housing P_{Hou}	2.7 W, maximum (within the permissible operating temperature)
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Limitation of Simultaneity, Derating

Derating	No limitation of simultaneity, no derating
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Safety Equipment

Overload/short circuit in segment circuit	Electronic; with two 4-channel drivers
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/Isolation of the Voltage Areas



To provide electrical isolation between the logic level and the I/O area, it is necessary to supply the station bus terminal and the digital output terminal described here using the bus terminal 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 the IB IL SYS PRO UM E 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 Terminal/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.

Operating voltage out of range	No
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Ordering Data

Terminals

Description	Order Designation	Order No.	Pcs./Pkt.
Transmission Speed 500 kbps			
Terminal with eight digital outputs; without accessories	IB IL 24 DO 8	27 26 26 9	1
Terminal with eight digital outputs; including accessories (connectors consecutively numbered and labeling fields)	IB IL 24 DO 8-PAC	28 61 28 9	1
Terminal with eight digital outputs; including accessories (connectors not consecutively numbered and labeling fields)	IB IL 24 DO 8-PAC/SN	28 62 94 5	1
Transmission Speed 2 Mbps			
Terminal with eight digital outputs; without accessories	IB IL DO 8-2MBD	28 19 03 7	1
Terminal with eight digital outputs; including accessories (connectors consecutively numbered and labeling fields)	IB IL 24 DO 8-2MBD-PAC	28 61 68 7	1
Terminal with eight digital outputs; including accessories (connectors not consecutively numbered and labeling fields)	IB IL 24 DO 8-2MBD-PAC/SN	28 78 22 7	1

Connectors

Description	Order Designation	Order No.	Pcs./Pkt.
 Four of the listed connectors or one connector set are needed for the complete fitting of the IB IL 24 DO 8 and IB IL DO 8-2MBD terminals.			
Connector with eight spring-cage connections (green, w/o color print)	IB IL SCN-8	27 26 33 7	10
Connector with eight spring-cage connections (green, with color print)	IB IL SCN-8-CP	27 27 60 8	10
Connector set with 32 spring-cage connections (green, w/o color print)	IB IL DI/DO 8-PLSET	28 60 95 0	1
Connector set with 32 spring-cage connections (green, with color print)	IB IL DI/DO 8-PLSET/CP	28 60 96 3	1

Documentation

Description	Order Designation	Order No.
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	27 43 04 8
"Automation Terminals of the Inline Product Range" user manual	IL SYS INST UM E	26 98 73 7
Data sheet for the IB IL 24 SAFE 1 (-PAC) safety terminal	DB EN IB IL 24 SAFE 1 (-PAC)	90 04 91 3