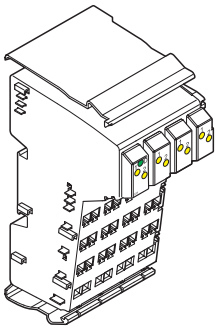
IB IL 24 DO 8
IB IL 24 DO 8-PAC

Inline Terminal With Eight Digital Outputs



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Data Sheet 555805 10/2003

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.

IB IL 24 DO 8 and IB IL 24 DO 8-PAC only differ in the scope of supply (see "Ordering Data" on page 12). Their function and technical data are identical.

For reasons of simplification the designation IB IL 24 DO 8 will be used in the following.

Please note that the numbering of the terminal points differs with regard to the different connector versions (see Figure 3)!

Please observe the notes on page 3 when using the terminals within a safety-related segment circuit.

Function

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
- Diagnostics and status indicators
- Approved for the use within a safety-related segment circuit

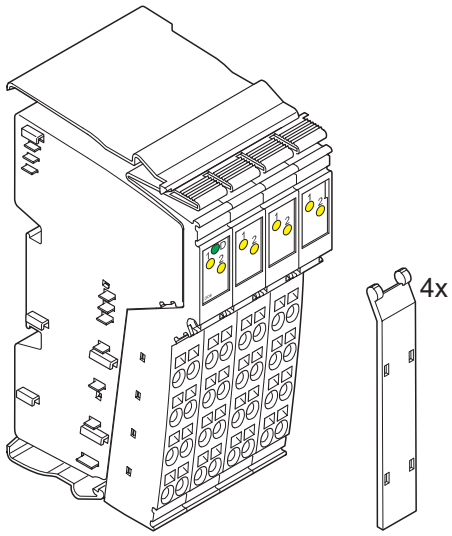

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Figure 1 IB IL 24 DO 8-PAC terminal

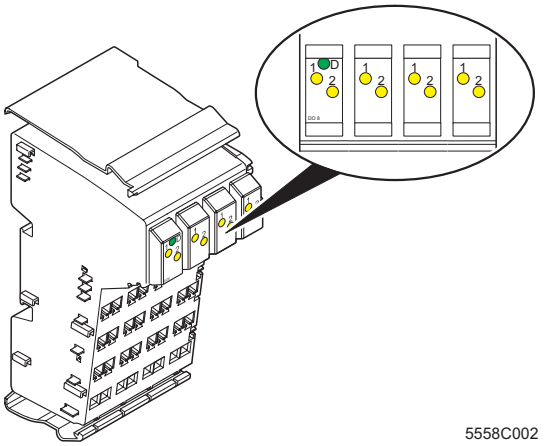

Figure 2 Local Diagnostic and Status Indicators

Function Identification

Pink

Local Diagnostic and Status Indicators

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

Terminal Point Assignment for Each

Terminal Point	Assignment
x.1	Signal output (OUT)
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

Connector

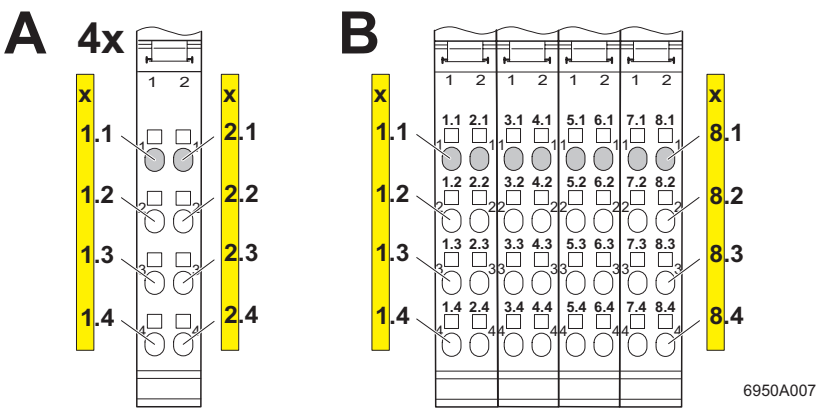

Figure 3 Terminal point numbering when using different connectors

A Using individual connectors (IB IL SCN-8 or IB IL SCN-8-CP)

B Using the IB IL 24 DO 8-PAC product with the original connector set or using connector set IB IL DI/DO 8-PLSET or IB IL DI/DO 8-PLSET/CP.

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

Both terminals of the following hardware version and later are approved for the use within a safety-related segment circuit.

Order No.	Order Designation	Hardware version
27 26 26 9	IB IL 24 DO 8	05
28 61 28 9	IB IL 24 DO 8-PAC	05

The instructions of the current IB IL 24 SAFE 1 safety terminal data sheet must be followed to ensure that the function of the safety-related segment circuit is not affected!

This documentation is available for download at www.phoenixcontact.com.

The hardware revision is imprinted on the side of the housing of every terminal (1 in Figure 4).

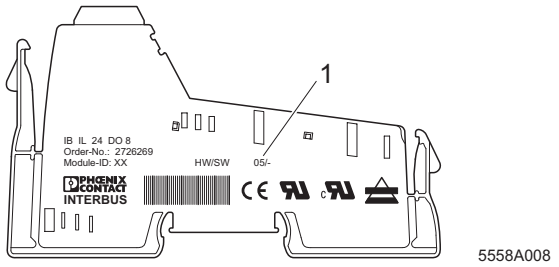

Figure 4 Imprinting on an Inline terminal

Internal Circuit Diagram

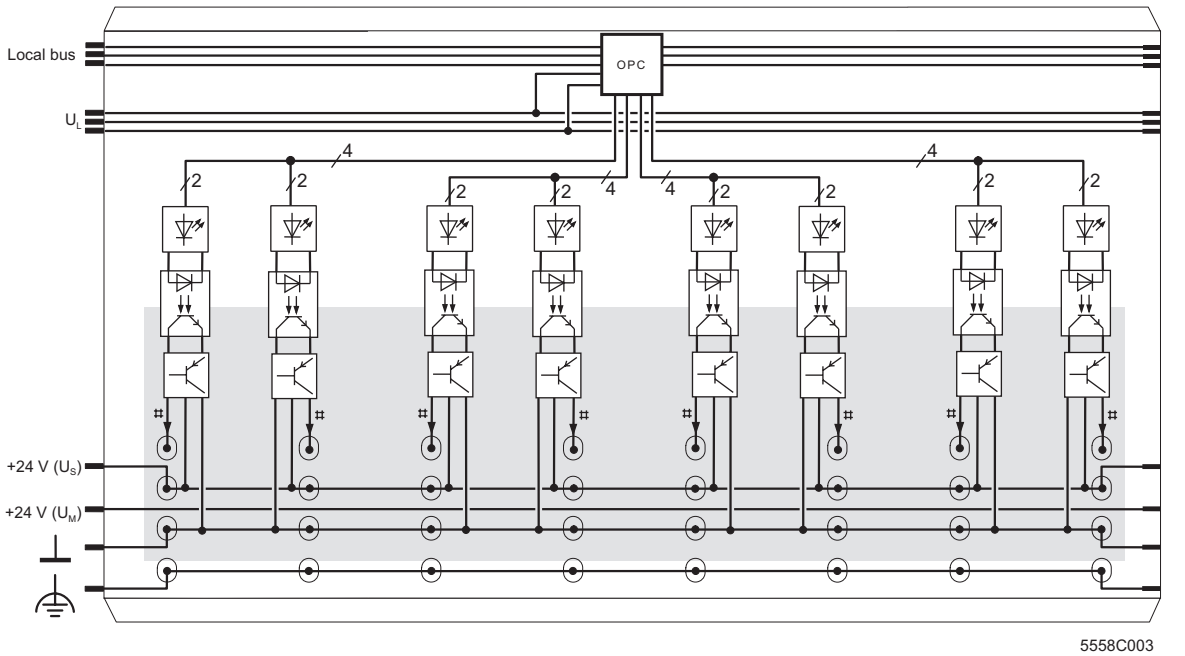

Figure 5 Internal wiring of the terminal points

Key:

OPC — Protocol chip (bus logic including voltage conditioning)

LED

Optocoupler

Transistor

Digital Output

Electrically isolated area

Other symbols are explained in the IB IL SYS PRO UM E User Manual or in the Inline-Systems Manual for your bus system.

Connection Example

When connecting the actuators observe the assignment of the terminal points to the process data (see page 6).

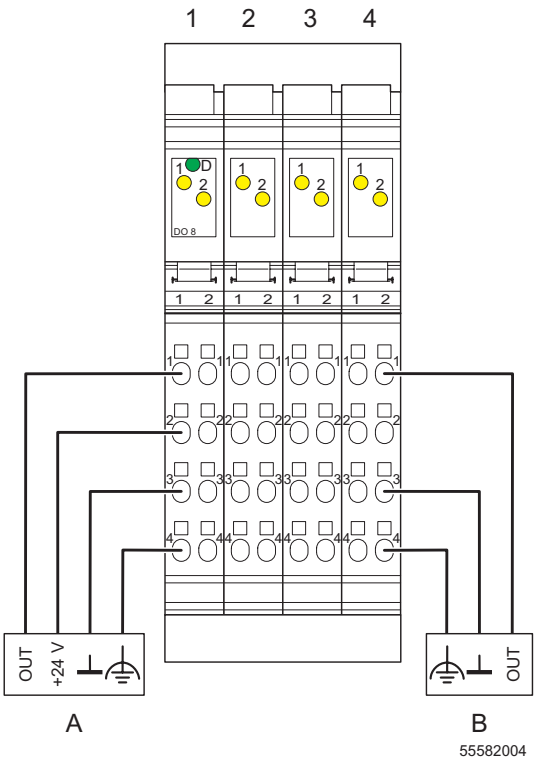

Figure 6 Typical connection of actuators

A 4-wire termination

B 3-wire termination

The numbers shown above the module indicate 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 byte
Output address area	1 byte
Parameter channel (PCP)	0 byte
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 for your **INTERBUS** control or computer system, please refer to data sheet DB GB IBS SYS ADDRESS, Part No. 90 00 99 0.

Assignment of the Terminal Points to the OUT Process Data

The following table is valid for the IB IL 24 DO 8-PAC 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 3 on page 2, Figure 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 is valid when using IB IL SCN-8 or IB IL SCN-8-CP connectors (see also Figure 3 on page 2, Figure 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	
Order designation (Order no.)	IB IL 24 DO 8-PAC (28 61 28 9) IB IL 24 DO 8 (27 26 26 9)
Housing dimensions (width x height x depth)	48.8 mm x 120 mm x 71.5 mm (1.921 in. x 4.724 in. x 2.815 in.)
Weight	130 g (without connectors)
Operating mode	Process data mode with 1 byte
Transmission speed	500 kbaud
Type of actuator connection	2, 3, and 4-wire technology
Permissible temperature (operation)	-25°C to +55°C (-13°F to +131F)
Permissible temperature (storage/transport)	-25°C to +85°C (-13°F to +185°F)
Permissible humidity (operation)	75% on average, 85% occasionally

In the range from -25°C to +55°C (-13°F to +131°F) appropriate measures against increased humidity (>85%) must be taken.

Permissible humidity (storage/transport)	75% on average, 85% occasionally

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 2,000 m [9,843 ft.] above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3,000 m [9,843 ft.] 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

Power Consumption	
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

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 may 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	
- Ohmic nominal load	100 µs, 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, typical (1.2 H, 50 Ω)

Digital Outputs (Continued)	
Signal delay upon power down of	
- Ohmic nominal load	1 ms, typical
- Lamp nominal load	1 ms, typical
- Inductive nominal load	50 ms, typical (1.2 H, 50 Ω)
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
 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, maximum (1.2 H, 48 Ω)
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 endurance against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Up to 2 A DC
Resistance to polarity reversal of the supply voltage	Protective elements in 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 w/o delay.
Limitation of the voltage induced on circuit interruption	$-15\ V \leq U_{demag} \leq -46\ V$ (U_{demag} = demagnetization voltage)
Single maximum energy in free running	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in the output chip

Digital Outputs (Continued)	
Overcurrent shutdown	At 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: 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)	
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

$$P_{TOT} = 0.19\ W + \sum_{n=1}^{8} (0.10\ W + I_{Ln}^2 \times 0.4\ \Omega)$$

Where

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

Power dissipation of the housing P_{HOU}	2.7 W, maximum (within the permissible operating temperature)

Limitation of Simultaneity, Derating	
Derating	No limitation of simultaneity, no derating

Safety Equipment	
Overload/short circuit in the 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 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	Protected against reverse voltages 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 /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	
Short circuit/overload of an output	Yes

An error message is generated when an output is short circuited and switched on. The diagnostic LED (D) flashes on the terminal at 2 Hz (medium) under these conditions.

Operating voltage out of range	No

Ordering Data

Description	Order Designation	Order No.
Terminal with eight digital outputs Connector (with consecutive numbering) and labeling fields included	IB IL 24 DO 8-PAC	28 61 28 9
Terminal with eight digital outputs	IB IL 24 DO 8	27 26 26 9
Four of the listed connectors or one connector set are neededfor the complete fitting of the IB IL 24 DO 8 terminal.		
I/O connector with eight terminals, spring-cage technology (green, w/o color print); pack of 10	IB IL SCN-8	27 26 33 7
I/O connector with eight terminals, spring-cage technology (green, with color print); pack of 10	IB IL SCN-8-CP	27 27 60 8
Connector set with 32 connections, spring-cage technology (green, w/o color print)	IB IL DI/DO 8-PLSET	28 60 95 0
Connector set with 32 connections, spring-cage technology (green, with color print)	IB IL DI/DO 8-PLSET/CP	28 60 96 3
User Manual "Configuring and Installing the INTERBUS Inline Product Range"	IB IL SYS PRO UM E	27 43 04 8
Data sheet for the IB IL 24 SAFE 1 safety terminal.	DB GB IB IL 24 SAFE 1	90 04 91 3

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