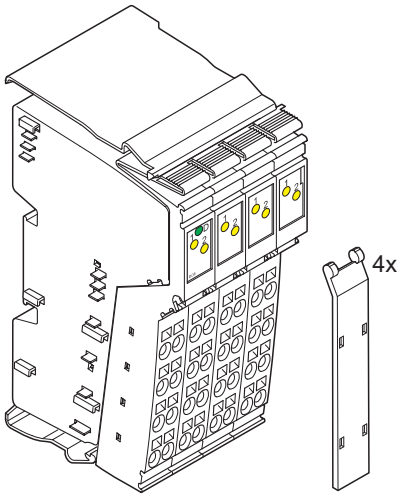
IB IL 24 DO 8 ...

Inline terminal with eight digital outputs



AUTOMATION

Data sheet
5558_en_08

1 Description

This 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 (observe the notes on page 8)

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 at www.phoenixcontact.net/catalog.
This data sheet is valid for all products listed on the following page:

2 Ordering data

Products

Description	Type	Order No.	Pcs./Pkt.
Terminal with eight digital outputs; complete with accessories (connectors consecutively numbered and labeling fields); transmission speed of 500 kbps	IB IL 24 DO 8-PAC	2861289	1
Terminal with eight digital outputs; complete with accessories (connectors not consecutively numbered and labeling fields); transmission speed of 500 kbps	IB IL 24 DO 8-PAC/SN	2862945	1
Terminal with eight digital outputs; without accessories; transmission speed of 500 kbps	IB IL 24 DO 8	2726269	1
Terminal with eight digital outputs; complete with accessories (connectors consecutively numbered and labeling fields); transmission speed of 2 Mbps	IB IL 24 DO 8-2MBD-PAC	2861687	1
Terminal with eight digital outputs; complete with accessories (connectors not consecutively numbered and labeling fields); transmission speed of 2 Mbps	IB IL 24 DO 8-2MBD-PAC/SN	2878227	1
Terminal with eight digital outputs; without accessories; transmission speed of 2 Mbps	IB IL 24 DO 8-2MBD	2819037	1

One of the listed connectors is needed for the complete fitting of the IB IL 24 DO 8 and IB IL 24 DO 8-2MBD terminals.

Accessories

Description	Type	Order No.	Pcs./Pkt.
Connector with eight spring-cage connections (green, w/o color print)	IB IL SCN-8	2726337	10
Connector with eight spring-cage connections (green, with color print)	IB IL SCN-8-CP	2727608	10
Connector set with 32 spring-cage connections (green, w/o color print)	IB IL DI/DO 8-PLSET	2860950	1
Connector set with 32 spring-cage connections (green, with color print)	IB IL DI/DO 8-PLSET/CP	2860963	1

Documentation

Description	Type	Order No.	Pcs./Pkt.
"Configuring and installing the INTERBUS Inline product range" user manual	IB IL SYS PRO UM E	2743048	1
"Automation terminals of the Inline product range" user manual	IL SYS INST UM E	2698737	1
"INTERBUS addressing" data sheet	DB GB IBS SYS ADDRESS	–	–
"Safety-related segment circuit" application note	AH EN IL SAFE	–	–

3 Technical data

General data	
Housing dimensions (width x height x depth)	48.8 mm x 119.8 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
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
Protection class	Class 3, according to EN 61131-2, IEC 61131-2
Connection data for connectors	
Connection method	Spring-cage terminals
Conductor cross-section	0.08 mm^2 to 1.5 mm^2 (solid or stranded), 28 - 16 AWG

Interface	
Local bus	Via data routing

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

Supply of the module electronics and I/O through the bus terminal/power terminal	
Connection method	Via potential routing

Power consumption	500 kbps	2 Mbps
Communications power	7.5 V	7.5 V
Current consumption from the local bus	60 mA, maximum	85 mA, maximum
Power consumption from the local bus	0.45 W, maximum	0.64 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)	24 V DC (nominal value)
Nominal current consumption at Us	4 A (8 x 0.5 A), maximum	4 A (8 x 0.5 A), maximum

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

Channels are thermally coupled in groups of four, i.e., an error 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)

Digital outputs (continued)

Signal delay upon power up of:	
Nominal ohmic load	100 µs, typical
Nominal lamp load	100 ms, typical (with switching frequencies up to 8Hz; above this frequency the lamp load responds like an ohmic load)
Nominal inductive load	100 ms, typical (1.2 H, 50 Ω)
Signal delay upon power down of:	
Nominal ohmic load	1 ms, typical
Nominal lamp load	1 ms, typical
Nominal inductive load	50 ms, typical (1.2 H, 50 Ω)
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

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, 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 protection 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 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	$-15\ V \leq U_{demag} \leq -46\ V$ (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
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 interrupt	25 mA, maximum
Switching power with ground connection interrupt	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

500 kbps	$P_{EL} = 0.19\ W + \sum_{n=1}^{8} (0.10\ W + I_{Ln}^2 \times 0.40\ \Omega)$
2 Mbps	$P_{EL} = 0.46\ W + \sum_{n=1}^{8} (0.10\ W + I_{Ln}^2 \times 0.40\ \Omega)$

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)

Limitation of simultaneity, derating

Derating	No limitation of simultaneity, no derating

Protective equipment

Overload/short circuit in the segment circuit	Electronic; with two 4-channel drivers
Surge voltage	Protective elements of the power terminal Protection up to 33 V DC
Polarity reversal of the supply voltage	Protective elements of the power terminal The supply voltage must be protected. The power supply unit should be able to supply four 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 coupler and the digital output 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 terminal/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 shorted and switched on. In addition, the diagnostic LED (D) flashes on the terminal at 2Hz (medium) under these conditions.

Operating voltage out of range	No

Approvals

For the latest approvals, please visit www.phoenixcontact.net/catalog.

4 Internal basic circuit diagram

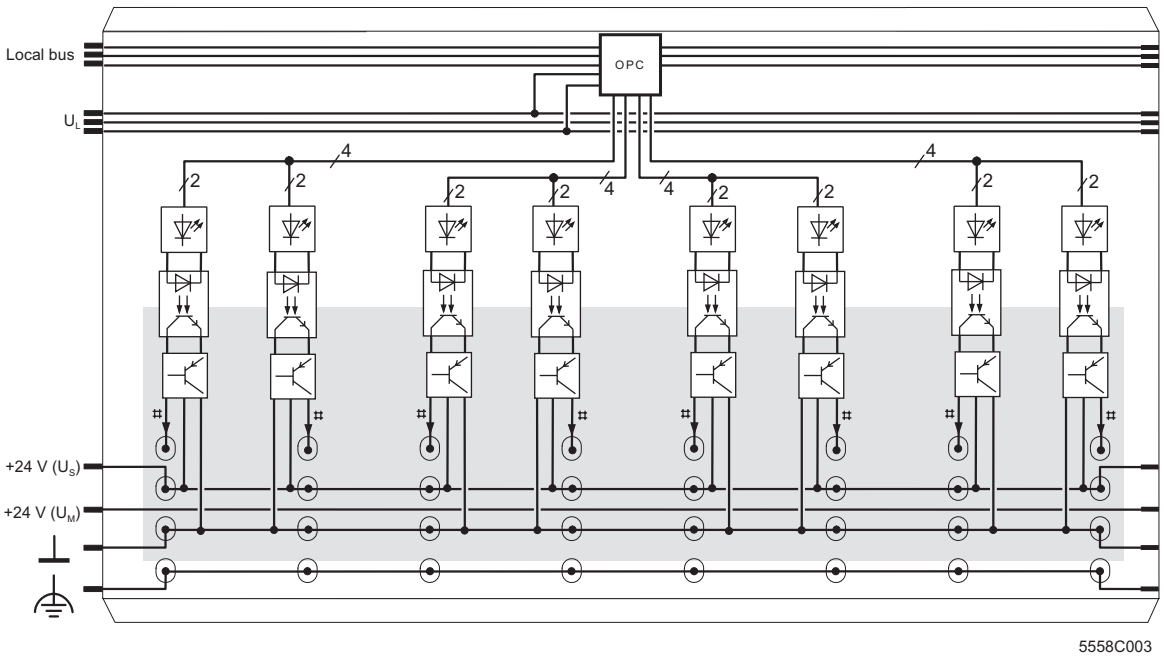


Figure 1 Internal wiring of the terminal points

Key:

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

Other symbols used are explained in the IL SYS INST UM E user manual.

5 Local diagnostic and status indicators and terminal point assignment

5.1 Local diagnostic and status indicators

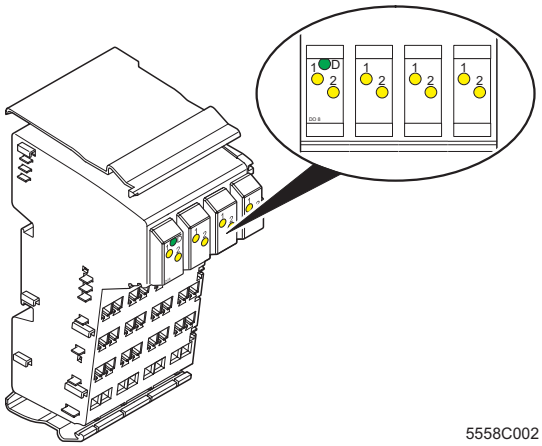


Figure 2 Local diagnostic and status indicators

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

5.2 Function identification

Pink

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

5.3 Terminal point assignment for each connector

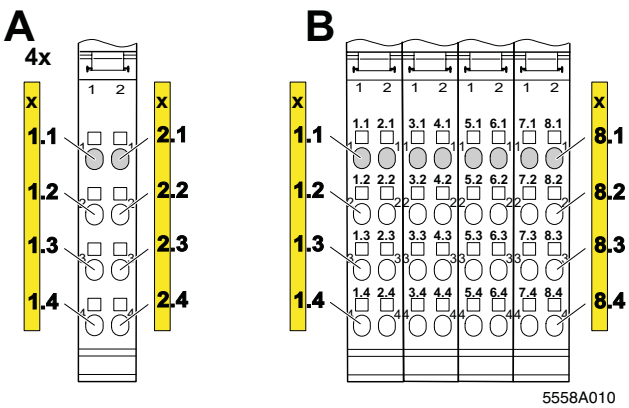


Figure 3 Terminal point numbering: individual connectors (A) and connector sets (B)

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)
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

6 Connection example

When connecting the actuators observe the assignment of the terminal points to the process data (see page 9).

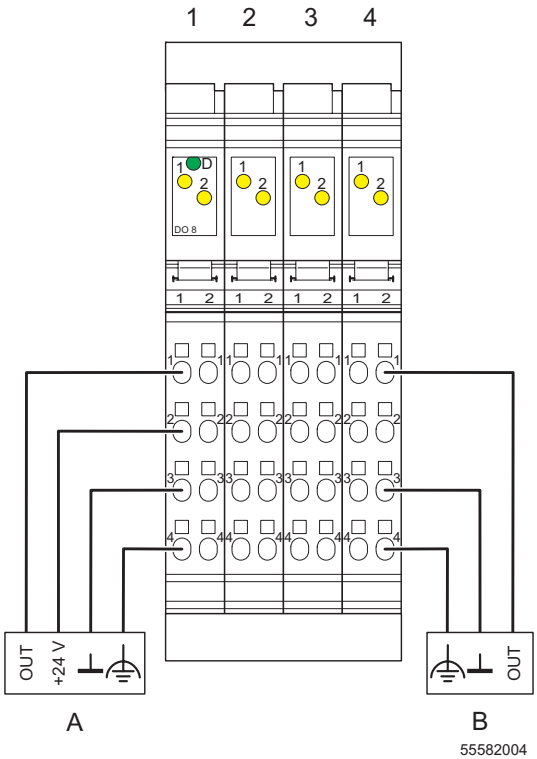


Figure 4 Typical connection of actuators

A 4-wire termination

B 3-wire termination

The numbers above the module illustration identify the connector slots.

7 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.

Order No.	Order designation	Hardware version
2861289	IB IL 24 DO 8-PAC	05
2862945	IB IL 24 DO 8-PAC/SN	07
2726269	IB IL 24 DO 8	05
2861687	IB IL 24 DO 8-2MBD-PAC	04
2878227	IB IL 24 DO 8-2MBD-PAC/SN	04
2819037	IB IL DO 8-2MBD	04

The hardware version is marked on the side of the housing of every terminal (1 in Figure 5).

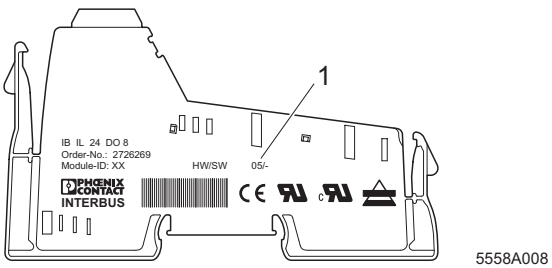


Figure 5 Labeling on an Inline terminal

The instructions in the current documentation for the safety terminal used and from the AH EN IL SAFE application note must be observed to ensure that operation of the safety-related segment circuit is not adversely affected.

The latest documentation can be downloaded at www.phoenixcontact.net/catalog.

8 Programming data/ configuration data

8.1 Local bus (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

8.2 Other bus systems

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

9 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.

Assignment of the terminal points to 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 3 on page 7, 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 3 on page 7, 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