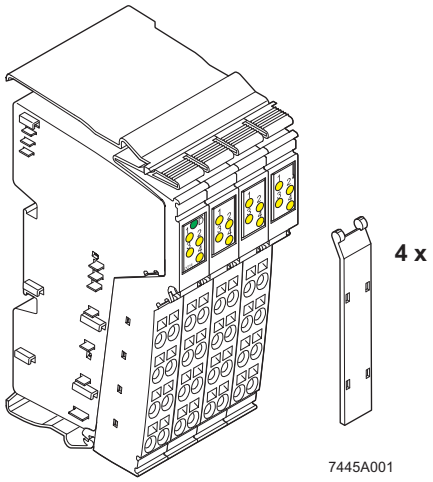
IB IL 24 DO 16-ME

Inline Terminal With 16 Digital Outputs



AUTOMATIONWORX

Data Sheet
7445_en_00

Description

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

Features

- Connections for 16 digital actuators
- Connection of actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 mA
- Total current of the terminal: 8.0 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.

A conversion table is available on the Internet at
www.download.phoenixcontact.com/general/7000_en_00.pdf.

Ordering Data

Products

Description	Type	Order No.	Pcs./Pck.
Terminal with 16 digital outputs including connectors (with consecutive numbering) and labeling fields	IB IL 24 DO 16-ME	2897253	1

Documentation

Description	Type	Order No.	Pcs./Pck.
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	2743048	1

Accessories

Description	Type	Order No.	Pcs./Pck.
Terminal for potential distribution 24 V; including connector and labeling field	IB IL PD 24V-PAC	2862987	1
Terminal for potential distribution GND; including connector and labeling field	IB IL PD GND-PAC	2862990	1

Technical Data

General Data	
Order designation (Order No.)	IB IL 24 DO 16-ME (2897253)
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 word
Transmission speed	500 kbaud
Connection method for sensors	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
Protection class	Class 3 in acc. with VDE 0106, IEC 60536

Interface	
Local bus	Via data routing
Current consumption from the local bus	90 mA, maximum

Power Consumption	
Power consumption from the local bus	0.675 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)
Nominal current consumption at U_S	8 A (16 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	16
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	8 A

Digital Outputs (Continued)

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 Ω/12 W
Lamp	12 W
Inductive	12 VA (1.2 H, 50 Ω)
Signal delay upon power up of:	
- Ohmic nominal load	500 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 (1.2 H, 50 Ω), 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 Ω), typical
Switching frequency with:	
- Ohmic nominal load	300 Hz, maximum

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

- Lamp nominal load	8 Hz, maximum

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

- Inductive nominal load	0.5 Hz (1.2 H, 50 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	3 s, approximately
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Protected against reverse voltages, permissible current 2 A, maximum
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)
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 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

$$P_{TOT} = 0.19\ W + \sum_{n=1}^{16} (0.10\ W + I_{Ln}^2 \times 0.4\ \Omega)$$

Where:

P_{TOT} = Total power dissipation in the terminal

n = Index of the number of set outputs n = 1 to 16

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

Ambient Temperature T_A	Maximum Load Current at 100% Simultaneity	Maximum Load Current at 75% Simultaneity
-25°C ≤ T_U < +40°C	0.50 A	0.50 A
+40°C ≤ T_U < +45°C	0.45 A	0.50 A
+45°C ≤ T_U < +50°C	0.40 A	0.50 A
+50°C < T_U ≤ +55°C	0.35 A	0.50 A

With 100% simultaneity, a load current of 0.4 A for each channel is permissible up to 50°C (ambient temperature range) and a load current of 0.35 A from 50°C and higher.
If a maximum of twelve channels are used simultaneously in the entire ambient temperature range (75% simultaneity, maximum) a load current of 0.5 A can be tapped.

Safety Equipment

Overload/short circuit in segment circuit	Electronic; with 4-channel driver
Surge voltage	Protective elements in the power terminal; protection up to 33 V DC
Polarity reversal of the supply voltage	Protective elements in the power terminal; The supply voltage must be protected. The power supply unit should be able to supply 4 times (400%) the nominal current of the fuse.
Reverse voltage	Integrated reverse voltage protection

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 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 Module/Power Terminal and I/O Terminal

- Test Distance	- Test Voltage
5 V supply outgoing 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. 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

Approvals

For current approvals please refer to www.download.phoenixcontact.com.

Local Diagnostic and Status Indicators

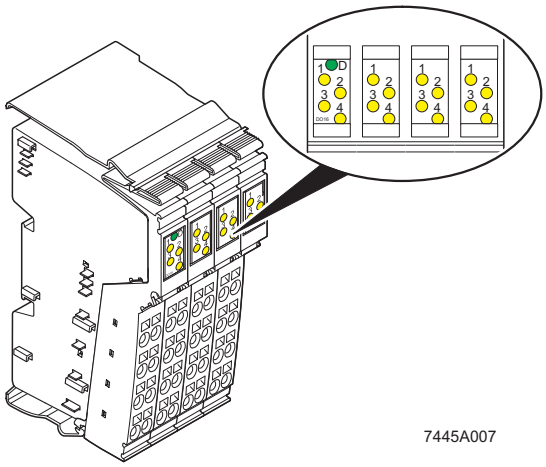


Figure 1 Local diagnostic and status indicators

Function Identification

Red

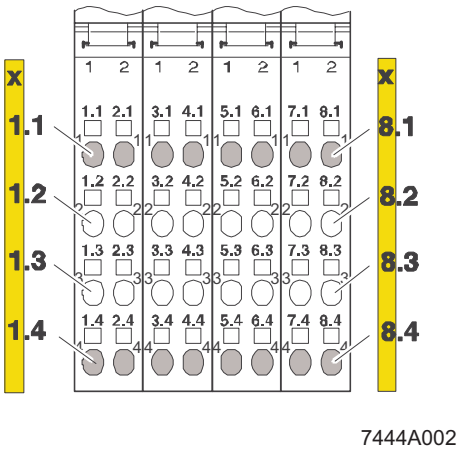


Figure 2 Terminal point numbering

Local Diagnostic and Status Indicators

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

Terminal Assignment per Connector

Terminal Point	Assignment
x.1	Signal output (OUT)
x.2	Ground contact (GND) for 2 and 3-wire termination
x.3	FE connection for 3-wire termination
x.4	Signal output (OUT)

Internal Circuit Diagram

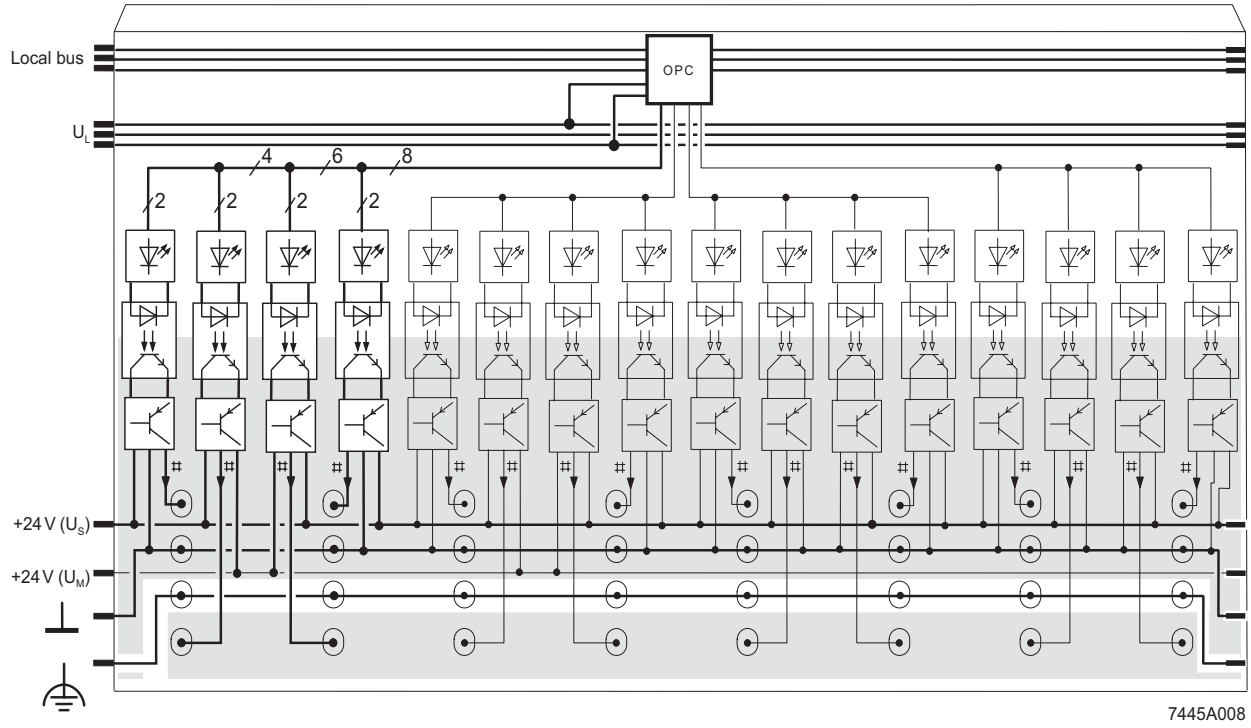


Figure 3 Internal wiring of the terminal points

Key:

OPC — Protocol chip (bus logic including voltage conditioning)

LED

Optocoupler

Digital output

Electrically isolated area

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

Connection Notes and Connection Example

When connecting the sensors, observe the assignment of the terminal points to the process data, see page 10.

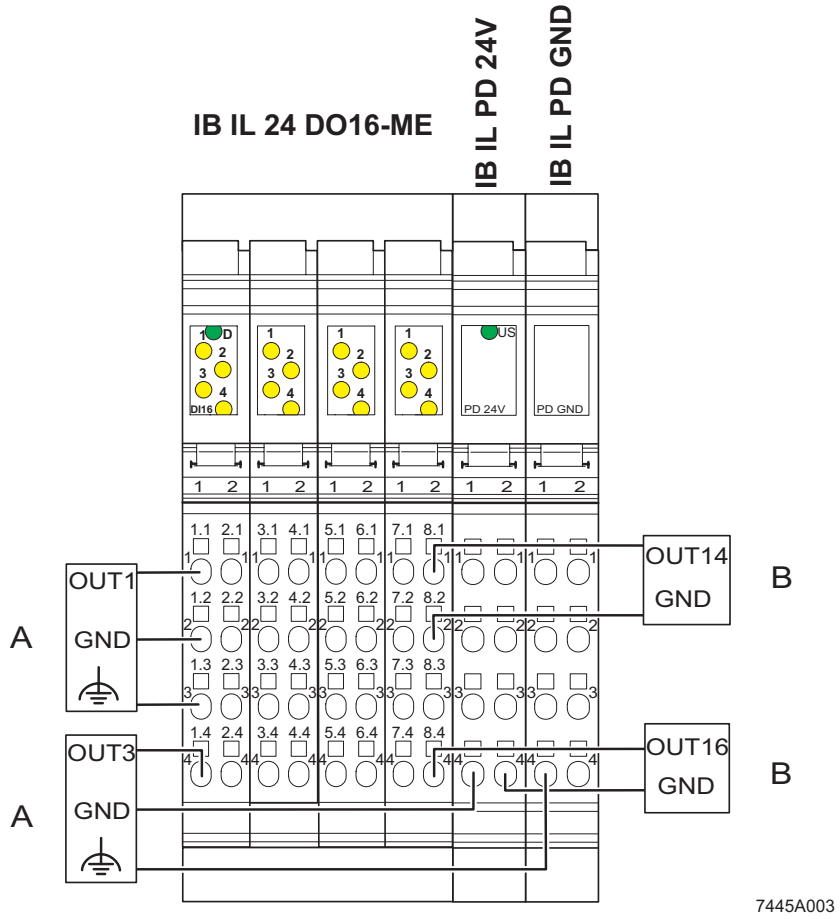


Figure 4 Typical actuator connection

A 3-wire termination

B 2-wire termination

The actuators can also be connected via external busbars. Ensure that the actuators and U_S are supplied from the same voltage supply.

Ensure that the Inline system ground is reference for at least the ground when using external busbars.

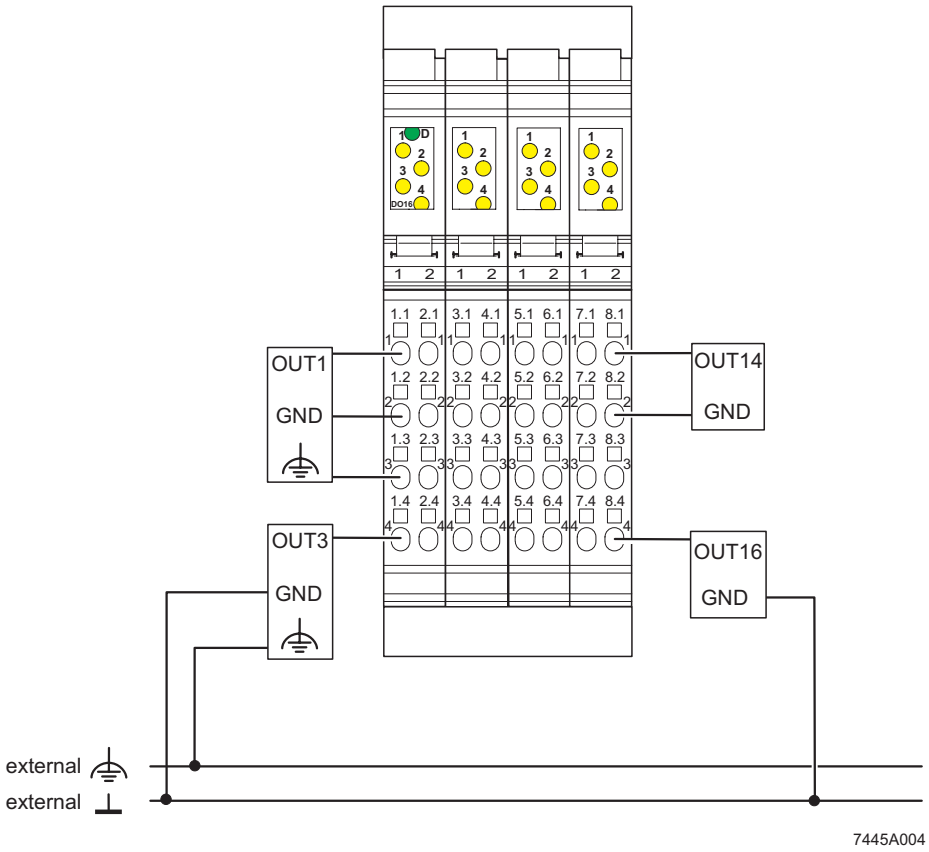


Figure 5 Typical connection of sensors when using external busbars

Programming Data/Configuration Data

INTERBUS

ID code	BD_{hex} (189_{dec})
Length code	01_{hex}
Process data channel	16 bits
Input address area	0 bits
Output address area	2 bytes
Parameter channel (PCP)	0 bits
Register length (bus)	2 bytes

Other Bus Systems

For the programming 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 the DB GB IBS SYS ADDRESS data sheet, Order No. 9000990.

For the assignment of the illustrated (byte.bit)-view to control systems of **other bus systems**, please refer to the AH IB IL 24 DI/DO 16 ADDRESS document, Order No. 9014124.

Assignment of the Terminal Points to the OUT Process Data

The following table applies to the IB IL 24 DO 16-ME terminal with the original connector set.

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(Byte.bit) view	Byte	Byte 0								Byte 1							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Module	Slot	4				3				2				1			
	Terminal point (signal)	**8.4**	**7.4**	**8.1**	**7.1**	**6.4**	**5.4**	**6.1**	**5.1**	**4.4**	**3.4**	**4.1**	**3.1**	**2.4**	**1.4**	**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
Status indicator	Slot	4				3				2				1			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1