

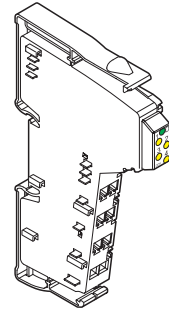
# IB IL 24 DO 4-ME

## Inline Terminal With Four Digital Outputs

Data Sheet 703600

04/2004

5557B001



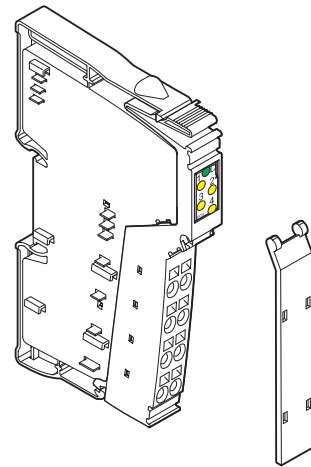
This data sheet is only valid in association with the IB IL SYS PRO UM E user manual or the Inline system manual for your bus system.

## Function

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

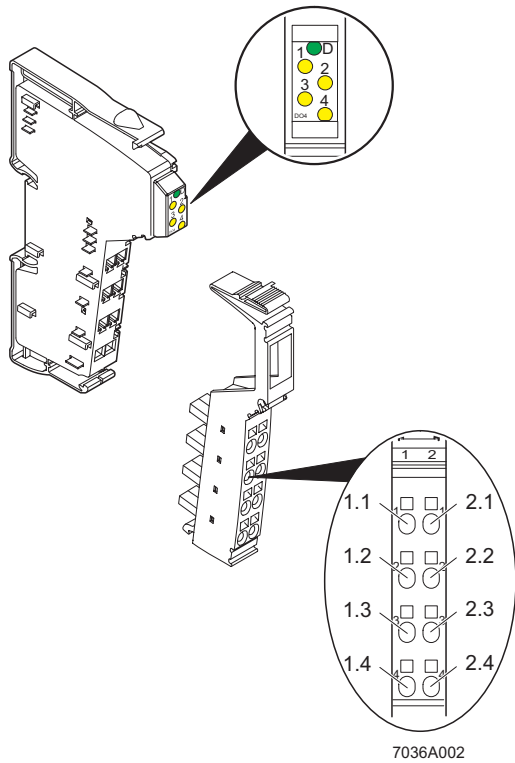
## Features

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



7036A001

Figure 1 IB IL 24 DO 4-ME terminal



### Local Diagnostic and Status Indicators

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

### Terminal Assignment

Terminal Point	Assignment
<b>1.1</b>	Signal output (OUT 1)
<b>2.1</b>	Signal output (OUT 2)
<b>1.2, 2.2</b>	Ground contact (GND) for 2 and 3-wire termination
<b>1.3, 2.3</b>	FE connection for 3-wire termination
<b>1.4</b>	Signal output (OUT 3)
<b>2.4</b>	Signal output (OUT 4)

Figure 2 IB IL 24 DO 4-ME

# Internal Circuit Diagram

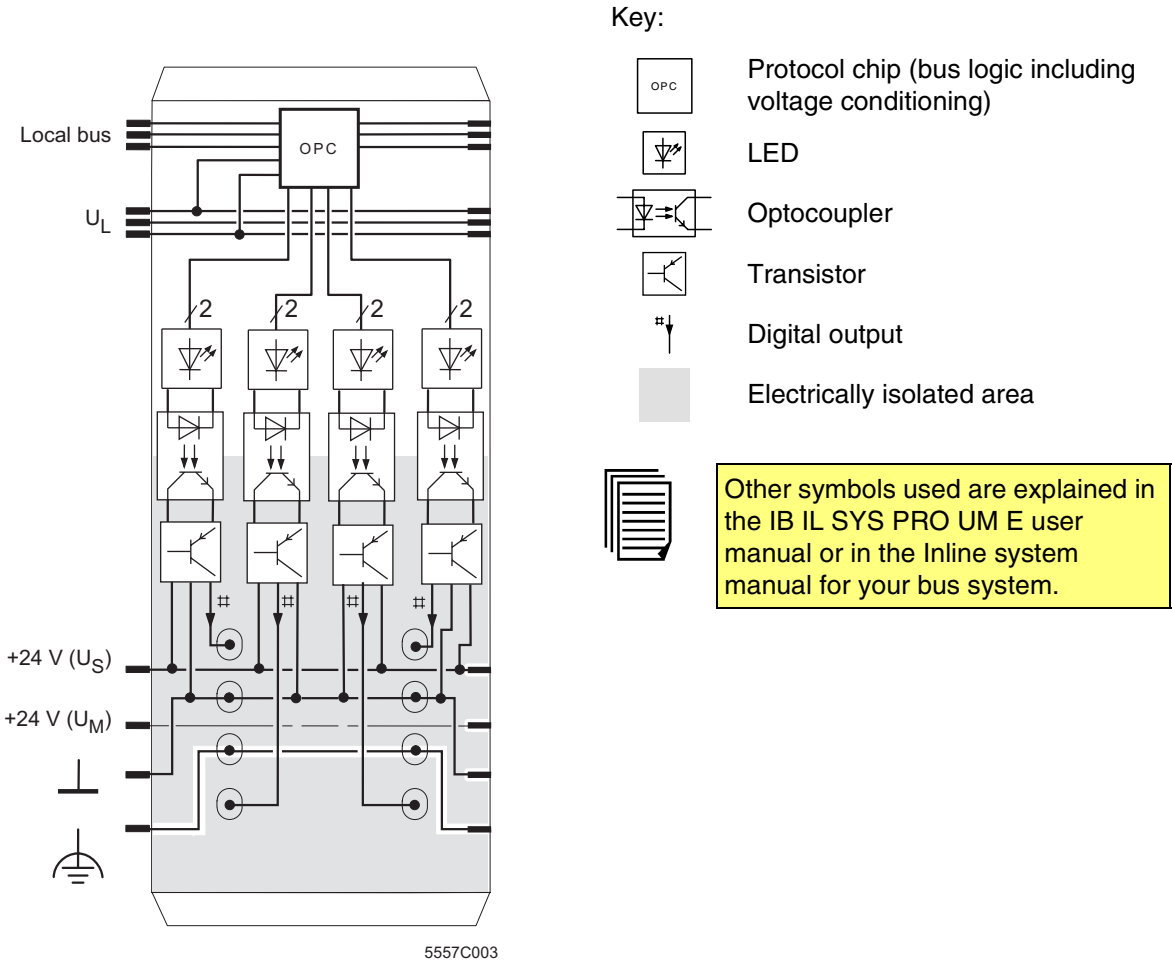


Figure 3 Internal wiring of the terminal points

## Connection Example



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

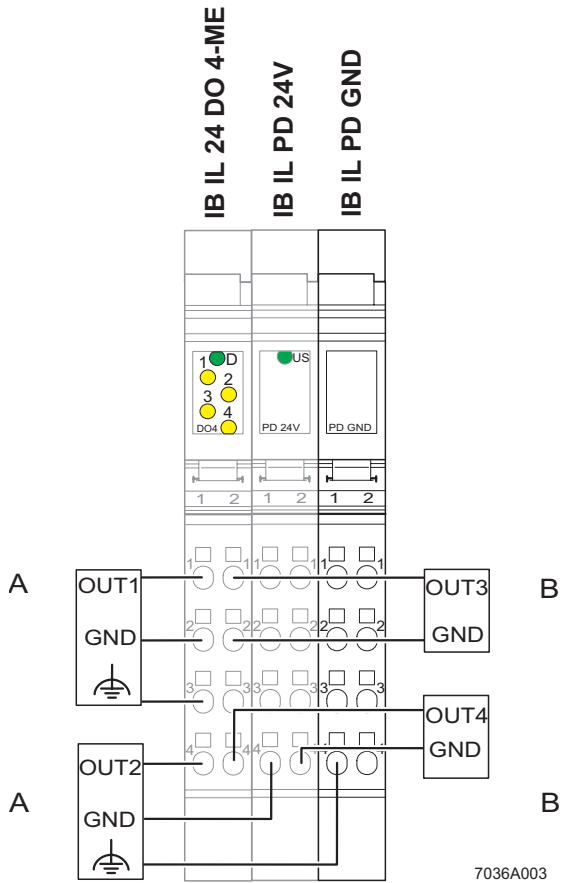


Figure 4 Typical connection of actuators

A 3-wire termination

B 2-wire termination

The actuators can also be connected via external bus bars. 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 bus bars.

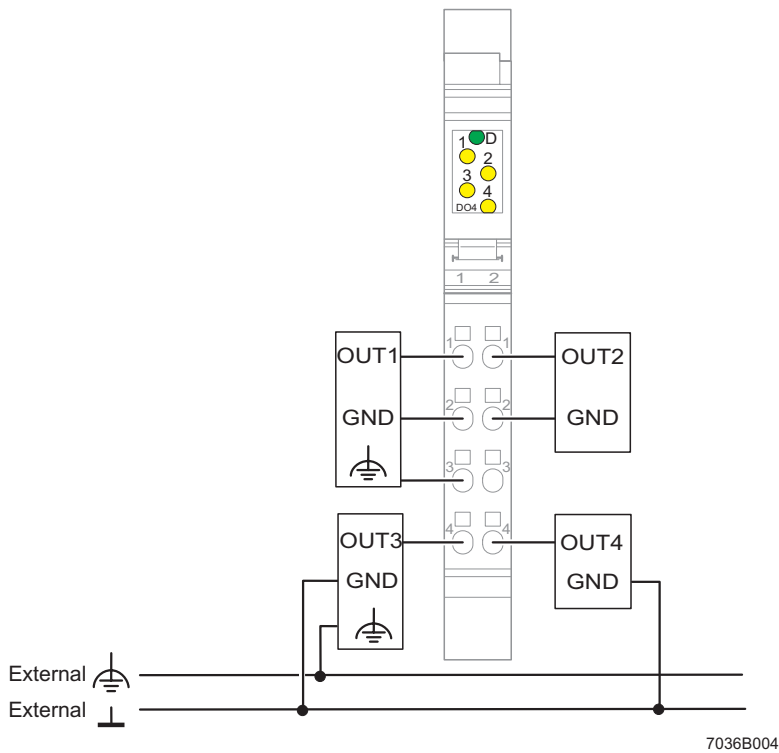


Figure 5 Typical connection of actuators when using external bus bars

## Programming Data/ Configuration Data

### 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 (GSD, EDS).

## Process Data





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

### 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

## Technical Data



General Data	
Order Designation	IB IL 24 DO 4-ME
Order No.	28 63 93 1
Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm (0.480 x 4.724 x 2.815 in.)
Weight	44 g (without connectors)
Operating mode	Process data mode with 4 bits (1 nibble)
Transmission speed	500 kbaud
Type of actuator connection	2 and 3-wire technology
Permissible temperature (operation)	-25°C to +55°C (-13°F to +131°F)
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 2000 m [6562 ft.] above sea level)
Permissible air pressure (storage/transport)	70 kPa to 106 kPa (up to 3000 m [9843 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
Current consumption from the local bus	44 mA, maximum
Power consumption from the local bus	0.33 W, maximum
Segment supply voltage $U_S$	24 V DC (nominal value)
Nominal current consumption at $U_S$	2 A (4 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	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, typical (1.2 H, 50 $\Omega$ )



<b>Digital Outputs (Continued)</b>	
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 (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	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)
Single maximum energy in free running	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in the output chip

<b>Digital Outputs (Continued)</b>	
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 with ground connection interrupted	100 mW at 1 kΩ load resistance, typical
Inrush current with lamp load	1.5 A for 20 ms, maximum

<b>Output Characteristic Curve When Switched On (Typical)</b>	
<b>Output Current (A)</b>	<b>Differential Output Voltage (V)</b>
0	0
0.1	0.04
0.2	0.08
0.3	0.12
0.4	0.16
0.5	0.20

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



<b>Limitation of Simultaneity, Derating</b>			
<b>Ambient Temperature (TA)</b>	<b>Maximum Load Current at</b>		
	<b>100% Simultaneity</b>	<b>75% Simultaneity</b>	<b>50% Simultaneity</b>
≤35°C (95°F)	0.5 A	0.5 A	0.5 A
≤45°C (113°F)	0.375 A	0.5 A	0.5 A
≤55°C (131°F)	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 (95°F) (ambient temperature range), a load current of 0.375 A between 35°C and 45°C (95°F and 113°F), and a load current of 0.25 A up to 55°C (131°F).

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 four channels are used, the permissible working point must be defined according to the above formula. An example can be found in the "Configuring and Installing the INTERBUS Inline Product Range" user manual IB IL SYS PRO UM E.

<b>Safety Equipment</b>	
Overload/short circuit in the segment circuit	Electronic; with 4-channel driver
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	
	<p>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 input terminal via 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.)</p>
Common Potentials	
<p>The 24 V main voltage, 24 V segment voltage, and GND have the same potential. FE is a separate potential area.</p>	
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
	<p>An error message is generated when an output is short circuited and switched on. In addition, the diagnostic LED (D) on the terminal flashes at 2 Hz (medium) under these conditions.</p>
Operating voltage out of range	No

## Ordering Data

Description	Order Designation	Order No.
Terminal with four digital outputs; including connector and labeling field; pack of 4	IB IL 24 DO 4-ME	28 63 93 1
"Configuring and Installing the INTERBUS Inline Product Range" user manual	IB IL SYS PRO UM E	27 43 04 8
<b>Accessories</b>		
Terminal for potential distribution 24 V; including connector and labeling field	IB IL PD 24V-PAC	28 62 98 7
Terminal for potential distribution GND; including connector and labeling field	IB IL PD GND-PAC	28 62 99 0



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It can be downloaded at [www.phoenixcontact.com](http://www.phoenixcontact.com).

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