

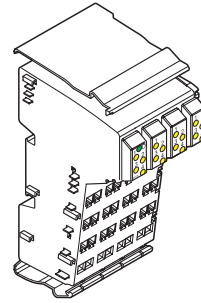
IB IL 24 DO 16 IB IL 24 DO 16-PAC

Inline Terminal With 16 Digital Outputs

Data Sheet 555902

06/2003

5559B001

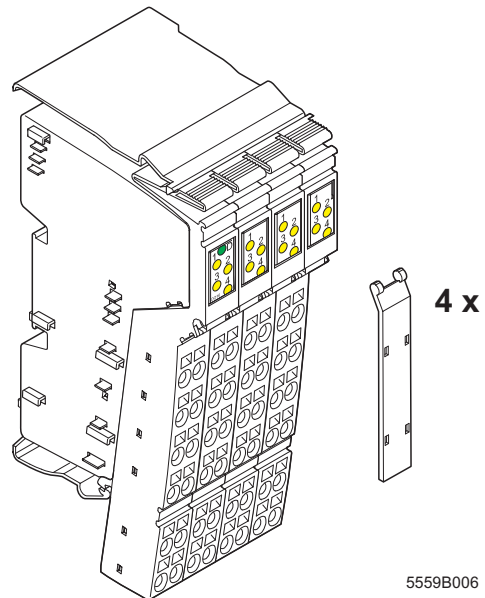


This data sheet is only valid in association with the IB IL SYS PRO UM E User Manual or the Inline System Manual for your bus system.



The item versions IB IL 24 DO 16 and IB IL 24 DO 16-PAC only differ with regard to the standard supplied with the module (see "Ordering Data" on page 13). Function and technical data are identical.

In the following, for greater clarity, we will only use the item designation IB IL 24 DO 16.



5559B006

Function

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

Features

- Connections for 16 digital actuators
- Connection of 2 and 3-wire actuators
- Nominal current per output: 0.5 A
- Total current of the terminal: 8 A
- Short circuit and overload protected outputs
- Diagnostic and status indicators

Figure 1 IB IL 24 DO 16-PAC terminal

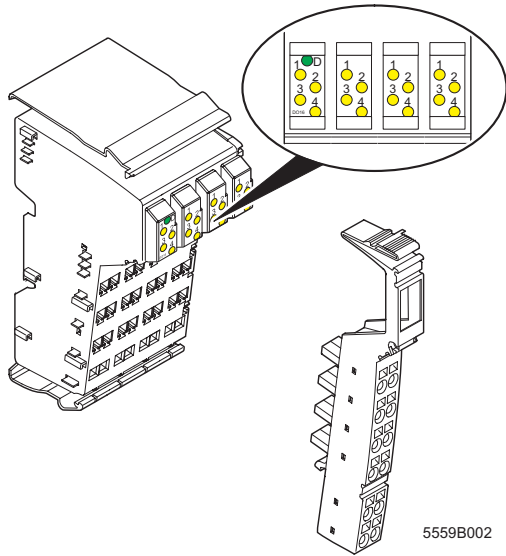


Figure 2 IB IL 24 DO 16 terminal with an appropriate connector

Local Diagnostic and Status Indicators

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

Terminal Assignment for Each Connector

Terminal Point	Assignment
1.1, 2.1	Signal output (OUT)
1.2, 2.2	Ground contact (GND) for 2 and 3-wire-termination
1.3, 2.3	FE (functional earth ground) connection for 3-wire-termination
1.4, 2.4	Signal output (OUT)
1.5, 2.5	Ground contact (GND) for 2 and 3-wire-termination
1.6, 2.6	FE connection for 3-wire-termination

Function Identification

Pink

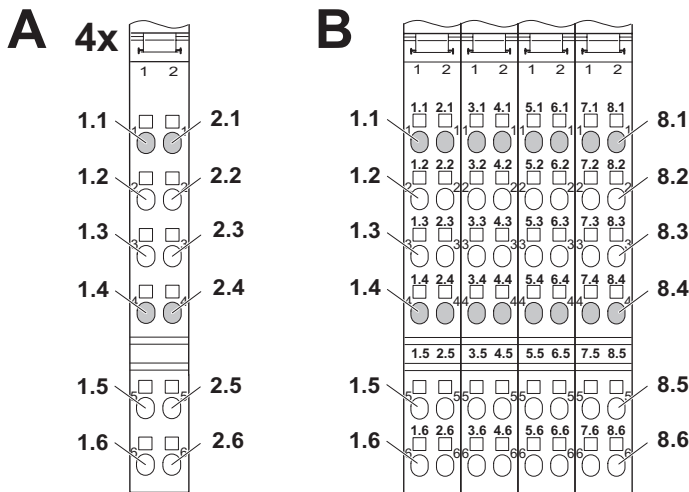
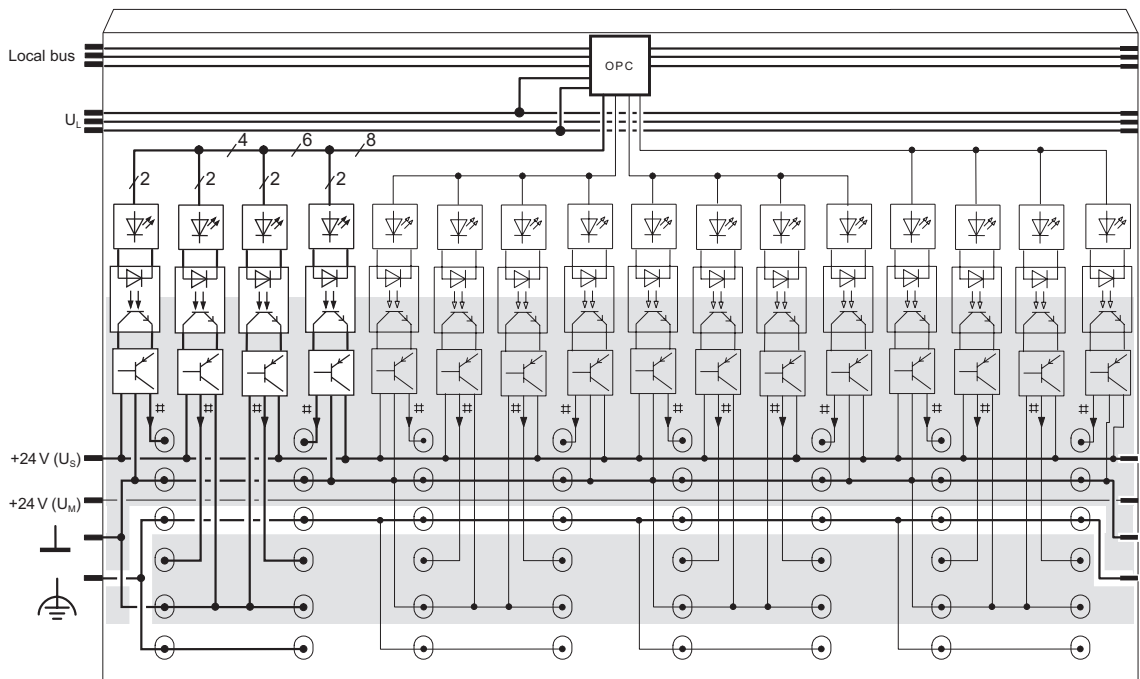


Figure 3 Terminal point numbering when using individual connectors (A) and when using a connector set (B)







Internal Circuit Diagram



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Figure 4 Internal wiring of the terminal points

Key:

-  Protocol chip (bus logic including voltage conditioning)
 -  LED (status indicators)
 -  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 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 5).

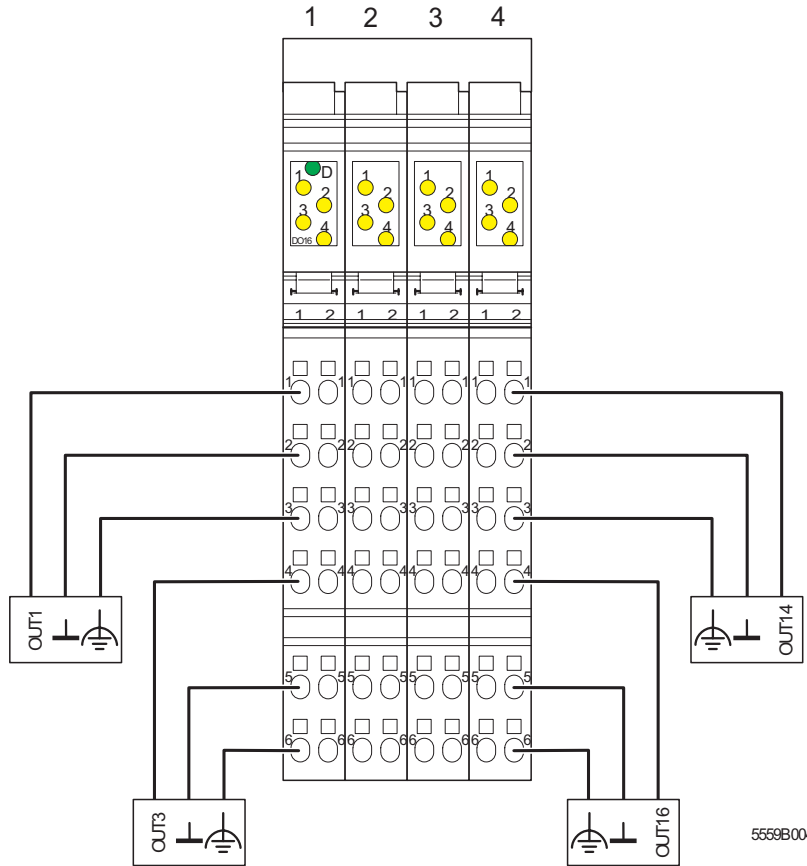


Figure 5 Typical actuator connections 3-wire termination

The numbers shown above the module indicate the connector slot.

Programming Data/Configuration Data

INTERBUS

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

Other bus systems



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

Process Data



Please refer to the data sheet DB GB IBS SYS ADDRESS, Part No. 90 00 99 0, for the assignment of the shown (byte.bit) view to your **INTERBUS** control or computer system.

For the assignment of the illustrated (byte.bit) view for control systems of **other bus systems**, please refer to document AH IB IL 24 DI/DO 16 ADDRESS, Part No. 90 14 12 4.

Assignment of the Terminal Points to the OUT Process Data



The following table applies for IB IL 24 DO 16-PAC terminal with the original connector set and when using the connector sets IB IL DI/DO 16-PLSET and IB IL DO 16-PLSET/OCP (see also Figure 3 on page 2, part B).



(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
Terminal	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 (GND)	8.5	7.5	8.2	7.2	6.5	5.5	6.2	5.2	4.5	3.5	4.2	3.2	2.5	1.5	2.2	1.2
	Terminal point (FE)	8.6	7.6	8.3	7.3	6.6	5.6	6.3	5.3	4.6	3.6	4.3	3.3	2.6	1.6	2.3	1.3
Status indication	Slot	4				3				2				1			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1



The following table applies when using the connectors IB IL SCN-12 or IB IL SCN-12-OCP (see also Figure 3 on page 2, part A).

(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
Terminal	Slot	4				3				2				1			
	Terminal point (signal)	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1	2.4	1.4	2.1	1.1
	Terminal point (GND)	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2	2.5	1.5	2.2	1.2
	Terminal point (FE)	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3	2.6	1.6	2.3	1.3
Status indication	Slot	4				3				2				1			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1

Technical Data

General Data	
Order designation (Order No.)	IB IL 24 DO 16 (27 26 27 2) IB IL 24 DO 16-PAC (28 61 29 2)
Housing dimensions (width x height x depth)	48.8 mm x 120 mm x 71.5 mm (1.921 x 4.724 x 2.815 in.)
Weight	130 g (without connector)
Operating mode	Process data operation with 1 word
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 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	IP 20 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	90 mA, maximum
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
Protection	Short-circuit; overload



Channels are thermally coupled in groups of 4, 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: OFF to ON	
- Ohmic nominal load	500 μ s, typical
- Lamp nominal load	100 ms (with switching frequencies up to 8 Hz; above this frequency the lamp load responds like an ohmic load), typical
- Inductive nominal load	100 ms (1.2 H, 50 Ω), typical

Digital Outputs (Continued)	
Signal delay: ON to OFF	
- 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 bus 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 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)	Approximately 3 s
Restart frequency at ohmic overload	Approximately 400 Hz
Restart frequency at lamp overload	Approximately 400 Hz
Response after inductive overload	Output can be destroyed
Response time after short-circuit	Approximately 3 s
Reverse voltage endurance against short pulses	Yes
Strength against permanently applied reverse voltages	Yes Maximum permissible current 2 A
Validity of output data after connection of 24 V power supply (power up)	5 ms, typical
Response upon US power down	The output follows the power supply without delay.
Limitation of the demagnetization voltage induced on circuit interruption	$-15 \text{ V} \leq U_{\text{demag}} \leq -45.8 \text{ V}$ (U_{demag} = demagnetization voltage)
Single maximum energy in free running	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in output chip



Digital Outputs (Continued)	
Overcurrent shutdown	Minimum at 0.7 A
Output current when switched off	300 μ A, 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 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	
<p>Formula to calculate the power dissipation of the electronics</p> $P_{\text{tot}} = 0.19 \text{ W} + \sum_{n=1}^{16} (0.10 \text{ W} + I_{L_n}^2 \times 0.4 \Omega)$	
<p>With</p> <p>P_{tot} Total power dissipation of the terminal</p> <p>n Index of the number of set outputs $n = 1$ to 16</p> <p>I_{L_n} Load current of the output n</p>	
Power dissipation of the housing P_{HOU}	2.7 W, maximum (within the permissible operating temperature)

Concurrent Channel Derating		
Ambient temperature T_U	Maximum load current at 100% simultaneity	Maximum load current at 75% simultaneity
$-25^{\circ}\text{C} (-13^{\circ}\text{F}) \leq T_U < +40^{\circ}\text{C}$ (104°F)	0.50 A	0.50 A
$+40^{\circ}\text{C} (104^{\circ}\text{F}) \leq T_U < +45^{\circ}\text{C}$ (113°F)	0.45 A	0.50 A
$+45^{\circ}\text{C} (113^{\circ}\text{F}) \leq T_U < +50^{\circ}\text{C}$ (122°F)	0.40 A	0.50 A
$+50^{\circ}\text{C} (122^{\circ}\text{F}) < T_U \leq +55^{\circ}\text{C}$ (131°F)	0.35 A	0.50 A
<p>With 100% simultaneity, a load current of 0.4 A for each channel is permissible up to 50°C (122°F) (ambient temperature range). Above 50°C (122°F) a load current of 0.35 A is permissible. If a maximum of twelve channels are operated in the permissible ambient temperature range at the same time (75% simultaneity, maximum), a load current of 0.5 A can be tapped.</p>		

Safety Equipment	
Overload/short-circuit in segment circuit	Electronic; with four 4-channel drivers
Surge voltage	Protective elements of the power terminal; Protection up to 33 V DC
Polarity reversal of voltage supply	Protective elements 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	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 bus terminal and the digital output terminal using the bus terminal or a power terminal from separate power supply units. Interconnection of the 24 V power supplies is not allowed! (See also the User Manual.)
Common Potentials	
24 V main power, 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. Also, the diagnostic LED (D) flashes on the terminal at 2 Hz under these conditions.
Operating voltage out of range	No


Ordering Data


Description	Order Designation	Order No.
Terminal with 16 digital outputs including connectors and labeling fields	IB IL 24 DO 16-PAC	28 61 29 2
Terminal with 16 digital outputs	IB IL 24 DO 16	27 26 27 2
 <p>Four of the listed connectors or one connector set are/is needed for the complete fitting of the terminal IB IL 24 DO 16.</p>		
Connector with 12 terminals using the spring-cage method (green, without color print); pack of 10	IB IL SCN-12	27 26 34 0
Connector with 12 terminals using the spring-cage method (green, with color print); pack of 10	IB IL SCN-12-OCP	27 27 62 4
Connector set with 48 terminals using the spring-cage method (green, without color print)	IB IL DI/DO 16-PLSET	28 60 97 6
Connector set with 48 terminals using the spring-cage method (green, with color print)	IB IL DO 16-PLSET/OCP	28 60 99 2
“Configuring and Installing the INTERBUS Inline Product Range” User Manual	IB IL SYS PRO UM E	27 43 04 8



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