IB IL 24/48 DOR 2/W-XC-PAC

Inline digital output terminal, version for extreme conditions, 2 relay PDTs

Data sheet
8463_en_01

1 Description

The terminal is designed for use within an Inline station.

It has two floating relay PDTs which are independent of each other.

Thanks to special engineering measures and tests, the terminal can be used under extreme ambient conditions.

Features

- Two relay outputs
- Floating connections for 2 actuators
- Nominal current of each output: 2 A
- Total current of the terminal: 4 A
- Segment voltage U_S connected
- Diagnostic and status indicators
- Can be used under extreme ambient conditions
- Extended temperature range of -40°C ... +70°C (see “Tested successfully: use under extreme ambient conditions”)
- Painted PCBs

WARNING: Undefined system state

By default, the position of the relay contacts on the module is not defined. To prevent undesired system states, perform a complete cycle (on/off) before connecting the segment voltage.

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 from the product at phoenixcontact.net/products.

2 Table of contents

3 Ordering data

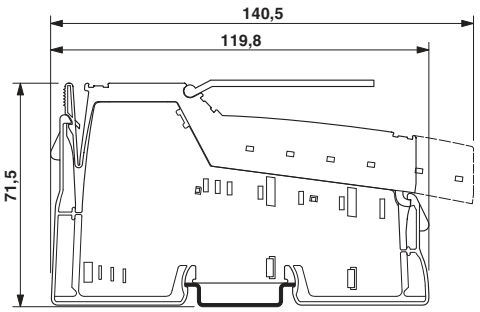
Description	Type	Order No.	Pcs./Pkt.
Inline digital output terminal, version for extreme conditions, complete with accessories (connector plug and labeling field), 2 relay PDTs, gold contact, 5 - 48 V DC, 2 A	IB IL 24/48 DOR 2/W-XC-PAC	2701214	1

Accessories	Type	Order No.	Pcs./Pkt.
Labeling field, width: 12.2 mm (Marking)	IB IL FIELD 2	2727501	10
Insert strip, Sheet, white, unlabeled, can be labeled with: Office printing systems, Plotter: Laser printer, Mounting type: Insert, Lettering field: 62 x 10 mm (Marking)	ESL 62X10	0809492	1
Connector, for digital 1, 2 or 8-channel Inline terminals (Connector/ Adapter)	IB IL SCN-8	2726337	10
Zack Marker strip, flat, Strip, white, unlabeled, can be labeled with: Plotter, Mounting type: Snap into flat marker groove, for terminal block width: 6.2 mm, Lettering field: 5.15 x 6.15 mm (Marking)	ZBF 6:UNBEDRUCKT	0808710	10
Zack Marker strip, flat, white, for terminal block width: 6.2 mm (Marking)	ZBF 6:SO/CMS	0808778	1
Flat zack marker sheet, white, for terminal block width: 6.2 mm (Marking)	ZBFM 6:SO/CMS	0803650	1
Flat zack marker sheet, Sheet, white, unlabeled, can be labeled with: Plotter, Mounting type: Snap into flat marker groove, for terminal block width: 6.2 mm, Lettering field: 5 x 5.5 mm (Marking)	ZBFM 6/WH:UNBEDRUCKT	0803618	10
Inline distance terminal, complete with accessories	IB IL DOR LV-SET-PAC	2861645	1

Documentation	Type	Order No.	Pcs./Pkt.
Application note, English, The safety-related segment circuit	AH EN IL SAFE	-	-
Data sheet, English, INTERBUS addressing	DB GB IBS SYS ADDRESS	-	-
Application note, English, Using distance terminal blocks and interference suppression measures on inductive loads	AH EN IB IL DOR	-	-

4 Technical data

Dimensions (nominal sizes in mm)



Width	12.2 mm
Height	119.8 mm
Depth	71.5 mm
Note on dimensions	Housing dimensions

General data	
Color	green
Weight	63 g (with connector)
Operating mode	Process data mode with 2 bits
Ambient temperature (operation)	-25 °C ... 55 °C (Standard) -40 °C ... 70 °C (Extended, see section “Tested successfully: use under extreme ambient conditions” in the data sheet.)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (according to DIN EN 61131-2)
Permissible humidity (storage/transport)	10 % ... 95 % (according to DIN EN 61131-2)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III, IEC 61140, EN 61140, VDE 0140-1

Connection data	
Designation	Inline connector
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.08 mm² ... 1.5 mm² / 0.08 mm² ... 1.5 mm²
Conductor cross section [AWG]	28 ... 16
Stripping length	8 mm

Interface Inline local bus	
Connection method	Inline data jumper
Transmission speed	500 kBit/s

Power consumption	
Communications power U_L	7.5 V DC
Current consumption from U_L	max. 30 mA
Power consumption	0.23 W (at U_L)

Relay output	
Number of outputs	2
Connection method	Spring-cage connection
Connection method	Floating SPDT relay contact
Nominal output voltage	48 V DC
Output voltage range	5 V AC ... 30 V AC 5 V DC ... 60 V DC
Maximum output current per channel	2 A
Contact type	2 floating PDT contacts
Contact material	$AgSnO_2$, hard gold-plated
Contact resistance	75 mΩ
Switching voltage	min. 10 mV (DC) max. 30 V AC (PELV (EN 61131)) max. 60 V DC (PELV (EN 61131))
Switching current	min. 10 µA 2 A (30 V DC) 1 A (60 V DC)
Limiting continuous current	2 A (at maximum ambient temperature)
Switching capacity	60 W 62.5 VA (ohmic)
Switching frequency	1 Hz (without load) ; 1 Hz (with load)
Nominal power consumption	200 mW

Relay output	
Coil resistance	178 Ω ±10 % (at 20 °C)
Typical response time	typ. 20 ms
Bouncing time	4 ms (for on and off)
Typical release time	typ. 20 ms
Service life, electrical	10^8 cycles
Mechanical service life	2x 10^5 cycles
Common potentials	all contacts floating

Programming data (INTERBUS, local bus)	
ID code (hex)	BD
ID code (dec.)	189
Length code (hex)	2C
Length code (dec.)	44
Process data channel	2 Bit
Input address area	0 Bit
Output address area	2 Bit
Parameter channel (PCP)	0 Bit
Register length (bus)	2 Bit

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

Configuration and parameter data in a PROFIBUS system	
Required parameter data	3 Byte
Need for configuration data	4 Byte

Error messages to the higher level control or computer system

None

Electrical isolation/isolation of the voltage areas

Test section	Test voltage
Relay contact / Bus logics	1.5 kV, 50 Hz, 1 min
Contact/contact	1 kV, 50 Hz, 1 min
Contact / PE	1 kV, 50 Hz, 1 min

To achieve electrical isolation between the logic level and the I/O area, supply these areas from separate power supply units. Interconnection of the power supply units in the 24 V area is not permitted (see also user manual).

Approvals

For the latest approvals, please visit phoenixcontact.net/products.

5 Additional tables

5.1 Maximum switching current for ohmic load depending on the switching voltage

Switching voltage (V DC)	Switching current (A)
10	2.0
20	2.0
30	2.0
60	1.0

Load current I_L as a function of the switching voltage U_S

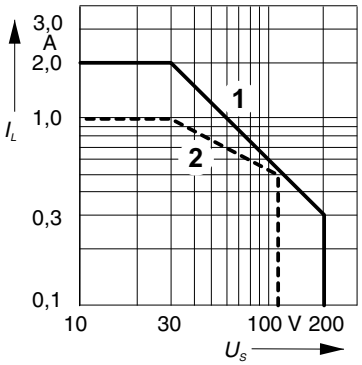


Figure 1 Load current I_L as a function of the switching voltage U_S

1 DC, ohmic load

2 AC, ohmic load

Number of operations N as a function of the load current I_L

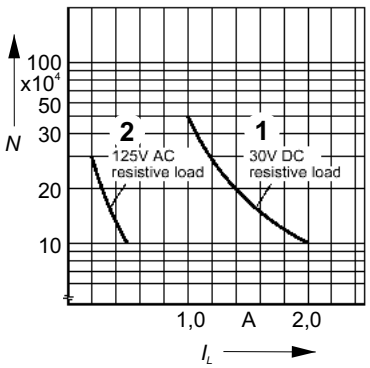


Figure 2 Number of operations N as a function of the load current I_L

1 30 V DC, ohmic load

2 125 V AC, ohmic load

5.2 Power dissipation

Formula for calculating the power dissipation of the electronics

$$P_{EL} = 0{,}23\ W + m \times 0{,}14W + \sum_{i=1}^{n} (I_{Li}^2 \times 0{,}075)$$

Where:

P_{EL}	Total power dissipation in the terminal
i	Continuous index
n	Number of set outputs (n = 1 ... 2)
m	Number of relays with controlled coil
I_{Li}	Load current of output i

Power dissipation of the housing

$P_{HOU} = 1.2\ W$ $\quad -25°C \le T_A < +25°C$

$P_{HOU} = 1.2\ W - [(T_A - 25°C) \times 0.02\ W/°C]$ $\quad +25°C < T_A \le +55°C$

Where:

P_{HOU}	Power dissipation of the housing
T_A	Ambient temperature

5.3 Limitation of simultaneity, derating

Derating when using the N/O contact			
Ambient temperature T_{amb}	Power dissipation of the housing	Maximum load current	
		100 % simultaneity	50 % simultaneity
≤ 40°C	0.9 W	2.0 A	2.0 A
≤ 55 °C	0.6 W	1.0 A	2.0 A

5.4 Air clearances and creepage distances

Air clearances and creepage distances (according to EN 50178, VDE 0109, VDE 0110)			
Isolating distance	Clearance	Creepage distance	Test voltage
Relay contact/bus logic	≥ 1.5 mm	≥ 1.5 mm	1.5 kV, 50 Hz, 1 min.
Contact/contact	≥ 1.5 mm	≥ 1.5 mm	1.0 kV, 50 Hz, 1 min.
Contact/PE	≥ 3.1 mm	≥ 3.1 mm	1.5 kV, 50 Hz, 1 min.
Relay/relay	None		

6 Tested successfully: Use under extreme ambient conditions

XC terminals have been tested successfully over 250 temperature change cycles in accordance with IEC 61131-2 in the range from -40°C to +70°C.

The following conditions were observed:

- The Inline devices for all connecting cables were connected with a minimum conductor cross section of 0.5 mm²
- The Inline station was assembled on a wall-mounted horizontal DIN rail
- Fans were used to ensure continuous movement of air in the control cabinet
- The Inline station was not exposed to vibration or shock
- The Inline station was operated with a maximum of 24.5 V (ensured by using regulated power supply units)

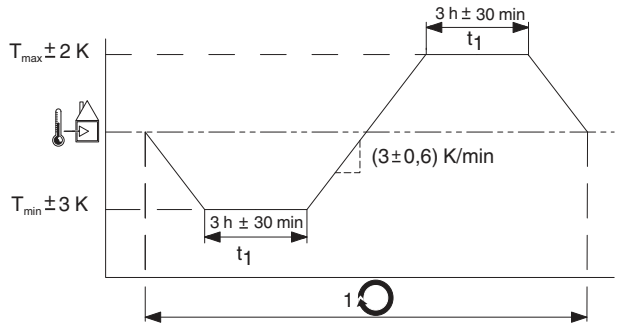


Figure 3 Temperature change cycle

Temperature in the control cabinet/ambient temperature

Cycle

WARNING:

The terminal is not approved for use in potentially explosive areas.

The terminal is not approved for use in safety technology.

7 Internal circuit diagram

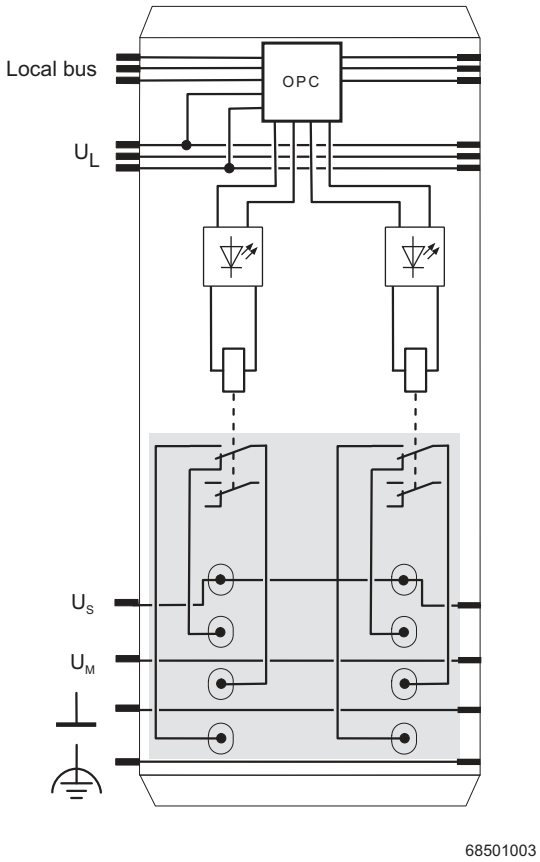


Figure 4 Internal wiring of the terminal points

Key:

OPC — Protocol chip
(Bus logic including voltage conditioning)

LED

Relay

Electrically isolated area
I/O area including relay contact isolated from the logic area including the relay coil

Explanation for other used symbols has been provided in the IL SYS INST UM E user manual.

8 Special features of the terminal

See also the information in the AH EN IB IL DOR application note.

8.1 Switching a voltage equal to the segment voltage

The potential U_S is available at terminal points 1.1 and 1.2.

If you insert a jumper between 1.1 and 1.3 or 2.1 and 2.3, you connect the segment voltage potential to the main contact of the relevant relay and can therefore switch the connected load in a **non-isolated** manner.

If you do not insert a jumper, you can switch the load in a **floating** manner.

8.2 Switching a voltage unequal to the segment voltage

Different DC voltages

Distance terminals are not required.

Only **floating** switching of the load is permitted. Do not, therefore, attach any jumpers to the connector.

If the switch contact potentials and the segment circuit potential are two different DC circuits, Phoenix Contact recommends establishing a ground connection between the two power supply units.

Switching an AC voltage within a DC segment circuit

Place distance terminals in front of and behind the relay terminal block.

The distance terminals interrupt the potential jumpers. As a result, no segment voltage is present at terminal points 1.1 and 2.1. It is only possible to switch the connected load in a **floating** manner.

9 Local status and diagnostic indicators

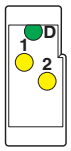


Figure 5 Local status and diagnostic indicators

Designation	Color	Meaning
D	Green	Diagnostics (bus and logic voltage)
1 ... 2	Yellow	Status of the outputs (relay has picked up)

Function identification

Pink

Housing/connector color

Green housing

Green, unprinted connector

10 Terminal point assignment

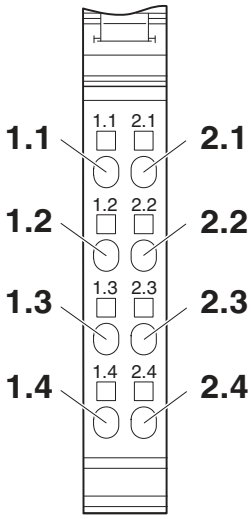


Figure 6 Terminal point assignment

Terminal point	Assignment	
1.1 / 2.1	Segment voltage U_S	
1.2	Relay N/C contact	Relay 1
1.3	Relay main contact	Relay 1
1.4	Relay N/O contact	Relay 1
2.2	Relay N/C contact	Relay 2
2.3	Relay main contact	Relay 2
2.4	Relay N/O contact	Relay 2

11 Connection notes and examples

NOTE: Damage to the electronics

Use the terminal within the PELV range (EN 61131) up to a maximum of 30 V AC or 60 V DC.

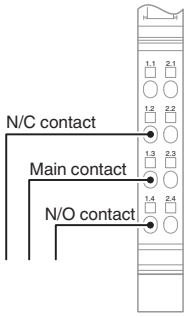


Figure 7 Actuator connection; floating connection

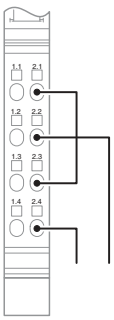


Figure 8 Actuator connection; non-isolated connection

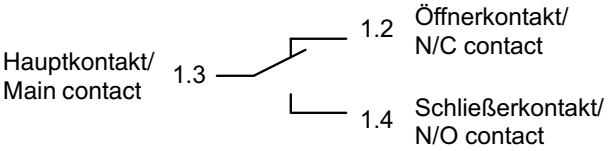


Figure 9 Output relay contacts

12 Process data

Assignment of the terminal points to the output process data

(Byte.Bit) view	0.1	0.0	N/O contact 2 (contact 2.4)	N/O contact 1 (contact 1.4)
Possible bit combinations	0	0	open	open
	0	1	open	closed
	1	0	closed	open
	1	1	closed	closed
Status indicator	LED		2	1

The LED lights up if the corresponding N/O contact is closed.

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.