

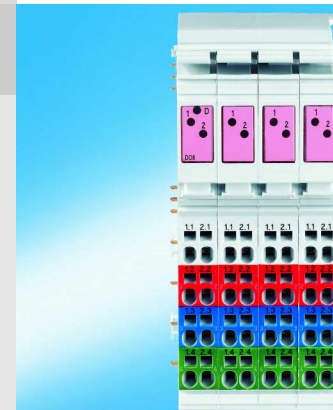
# Rexroth Inline Terminal With Eight Digital Outputs

**R911170534**  
Edition 02

## R-IB IL 24 DO 8-PAC

8 Digital Outputs  
24 V DC

06/2011



## 1 Description

This terminal is designed for use within an Inline station.

It is used to output digital signals.

### 1.1 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 application descriptions for the Rexroth-Inline system (see "[Documentation](#)" on [page 2](#)).



Make sure you always use the latest documentation.  
It can be downloaded at [www.boschrexroth.com](http://www.boschrexroth.com).

## 2 Ordering Data

### Products

Description	Type	MNR	Pcs. / Pkt.
Rexroth Inline terminal with eight digital outputs; complete with accessories (connector and labeling fields); transmission speed of 500 kbps	R-IB IL 24 DO 8-PAC	R911170756	1

### Documentation

Description	Type	MNR	Pcs. / Pkt.
"Automation Terminals of the Rexroth Inline Product Range" application description	DOK-CONTRL-ILSYSINS***-AW..-EN-P	R911317021	1
"Safety-Related Segment Circuit" application description	DOK-CONTRL-IL-SAFE*SEG*-AP..-EN-P	R911335486	1



For additional ordering data (accessories), please refer to the product catalog at [www.boschrexroth.com](http://www.boschrexroth.com).

## 3 Technical Data

General data	
Housing dimensions (width x height x depth)	48.8 mm x 119.8 mm x 71.5 mm
Weight	190 g (with connectors)
Operating mode	Process data mode with 1 byte
Transmission speed	500 kbps
Connection method for actuators	2, 3, and 4-wire technology
Ambient temperature (operation)	-25°C to +55°C
Ambient 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 3000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Class of protection	Class III according to EN 61131-2, IEC 61131-2
Connection data for Inline connectors	
Connection method	Spring-cage terminals
Conductor cross section	0.08 mm <sup>2</sup> to 1.5 mm <sup>2</sup> (solid or stranded), 28 - 16 AWG
Interface	
Local bus	Via data routing
Power consumption	
Communications power	7.5 V DC
Current consumption at U <sub>L</sub>	60 mA, maximum
Power consumption at U <sub>L</sub>	0.45 W, maximum
Segment supply voltage U <sub>S</sub>	24 V DC (nominal value)
Nominal current consumption at U <sub>S</sub>	4 A (8 x 0.5 A), maximum
Supply of the module electronics and I/O through bus coupler/power terminal	
Connection method	Via data routing
Digital outputs	
Number	8
Nominal output voltage U <sub>OUT</sub>	24 V DC
Differential voltage for I <sub>nom</sub>	≤ 1 V
Nominal current I <sub>nom</sub> per channel	0.5 A
Tolerance of the nominal current	+10 %
Total current	4 A

**Digital outputs (continued)**

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 W)

## Signal delay upon power up of:

Nominal ohmic load	100 μs, typical
Nominal lamp load	100 ms, typical (with switching frequencies up to 8 Hz; 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
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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
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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 seconds, 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 coupler 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 ≤ U <sub>demag</sub> ≤ -46 V (U <sub>demag</sub> = 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**

$$P_{EL} = 0.19 \text{ W} + \sum_{i=1}^n (0.10 \text{ W} + I_{Li}^2 \times 0.40 \Omega)$$

Where:

 $P_{EL}$  = Total power dissipation in the terminal

i = Index

n = Number of set outputs (n = 1 to 8)

 $I_{Li}$  = Load current of output i**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**WARNING****Loss of safety function in case of power feedback**

When wiring Inline terminals in the safety applications, ensure that errors are prevented in terms of feedback for:

- All connected cables supplying the device with actuator voltage, and
- The connecting cables of the actuators.

Please also take all connected loads into consideration. This means, for example, that the cables must be wired using separate cable sheaths.

**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 application description.)

**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 coupler/power terminal and I/O terminal****- Test distance**

5 V supply incoming remote bus/7.5 V supply (bus logic)

5 V supply outgoing remote bus/7.5 V supply (bus logic)

7.5 V supply (bus logic)/24 V supply (I/O)

24 V supply (I/O)/functional earth ground

**- Test voltage**

500 V AC, 50 Hz, 1 min.

500 V AC, 50 Hz, 1 min.

500 V AC, 50 Hz, 1 min.

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.

Operating voltage out of range

No

**Approvals**

For the latest approvals, please visit [www.boschrexroth.com](http://www.boschrexroth.com).

4 Internal Basic Circuit Diagram

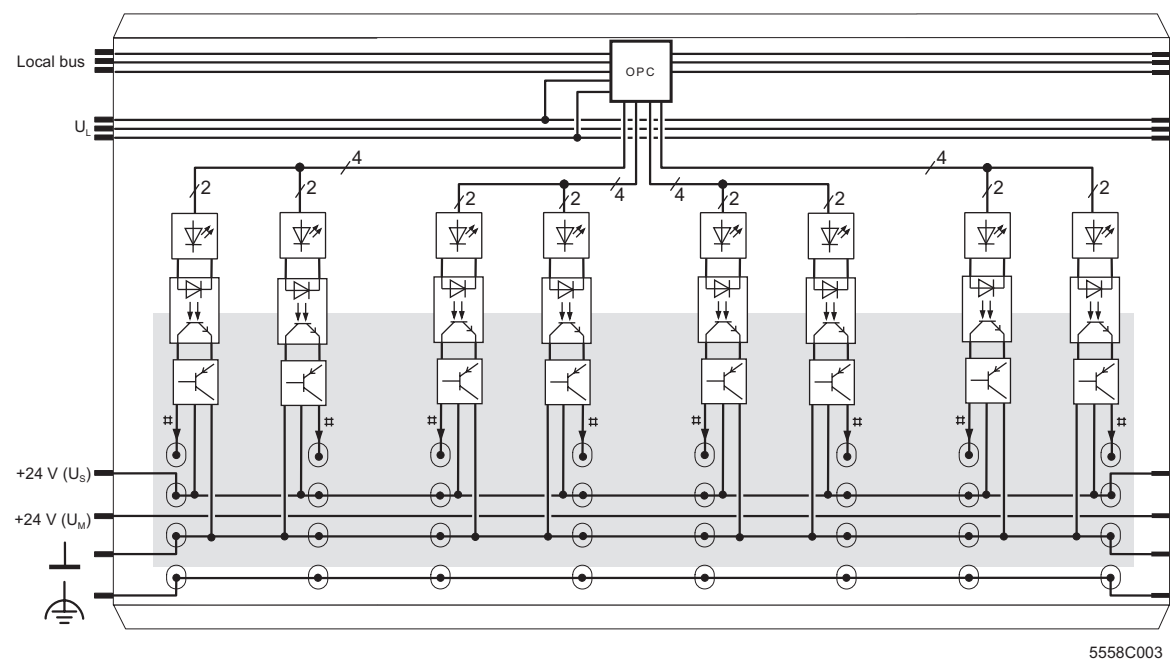




Fig. 1 Internal wiring of the terminal points


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
Protocol chip (bus logic including voltage conditioning)




LED




Optocoupler




Transistor



Digital output

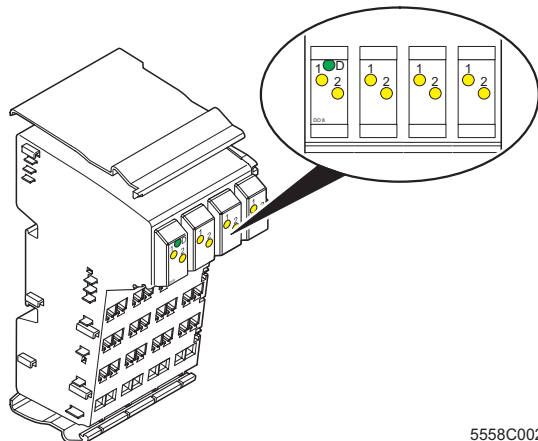


Electrically isolated area



Other symbols used are explained in the application descriptions for the Rexroth Inline system (see ["Documentation" on page 2](#)).

## 5 Local Diagnostic and Status Indicators



5558C002

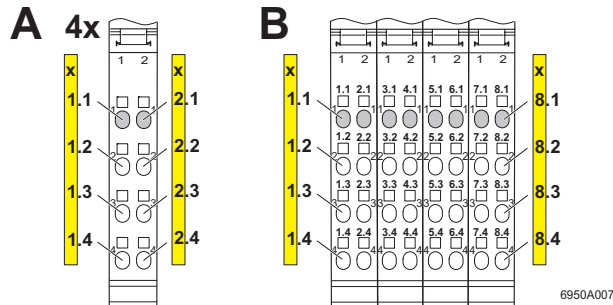
Fig. 2 Local diagnostic and status indicators

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

### Function identification

Pink

## 6 Terminal Point Assignment



6950A007

Fig. 3 Terminal point numbering

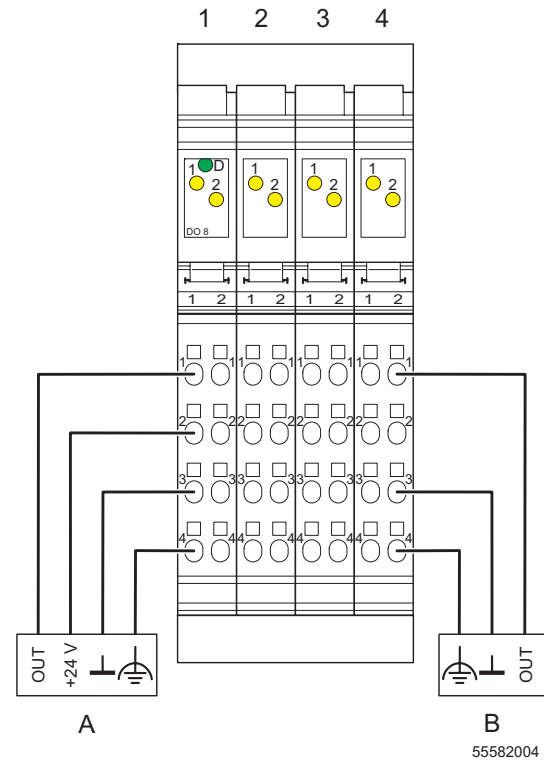
- A**
- Using individual connectors
- B**
- Using the original connector set
  - Using a connector set

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

## 7 Connection Example



When connecting the actuators observe the assignment of the terminal points to the process data (see [page 8](#)).



55582004

Fig. 4 Typical connection of actuators

A: 4-wire termination

B: 3-wire termination

The numbers above the module illustration identify the connector slots.

## 8 Notes on Using the Terminals Within a Safety-Related Segment Circuit

The terminal of the following revision index and later is approved for use within a safety-related segment circuit.

MNR	Type	Revision index
R911170756	R-IB IL 24 DO 8-PAC	GA1



The revision index is marked on the side of the housing of every terminal (1 in Fig. 5).

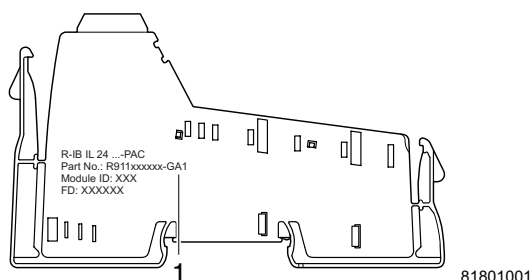


Fig. 5 Labeling on an Inline terminal



The instructions in the current documentation for the safety terminal used and from the DOK-CONTRL-IL-SAFE\*SEG\*-AP..-EN-P application description must be observed to ensure that operation of the safety-related segment circuit is not adversely affected. The current documentation is available for download at [www.boschrexroth.com](http://www.boschrexroth.com).

## 9 Programming Data/ Configuration Data

### 9.1 Local Bus

ID code	BD <sub>hex</sub> (189 <sub>dec</sub> )
Length code	81 <sub>hex</sub>
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

### 9.2 Other Bus Systems



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

## 10 Process Data

**Assignment of the terminal points to OUT process data (when using the original connector set)**

(Byte.bit) view	Byte	Byte 0							
	Bit	7	6	5	4	3	2	1	0
Assign- ment	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 in- dicator	Slot	4		3		2		1	
	LED	2	1	2	1	2	1	2	1