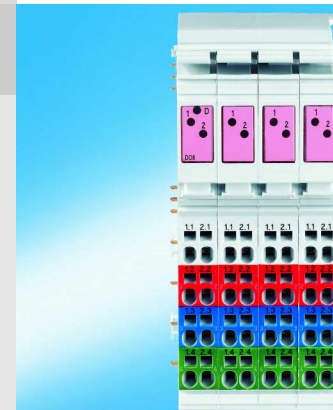**Rexroth**
Bosch Group

Rexroth Inline Terminal With Eight Digital Outputs

R911170600
Edition 02

R-IB IL 24 DO 8-2A-PAC

8 Digital Outputs 2 A
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: 2 A

- Total current of the terminal: 8 A

- Short-circuit and overload protected outputs

- Diagnostic and status indicators

- R-IB IL 24 DO 8-2A-PAC:
  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.

2 Ordering Data

Product

Description	Type	MNR	Pcs. / Pkt.
Rexroth Inline terminal with eight digital outputs; complete with accessories (connectors and labeling fields)	R-IB IL 24 DO 8-2A-PAC	R911170759	1

Documentation

Description	Type	MNR	Pcs. / Pkt.
"Automation Terminals of the Rexroth Inline Product Range" application description	DOK-CONTRL-ILSYS-INS***-AW..-EN-P	R911317023	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.

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
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 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^2 to 1.5 mm^2 (solid or stranded), 28 - 16 AWG

Interface	
Local bus	Via data routing

Power consumption	
Communications power	7.5 V DC
Current consumption at U_L	60 mA, maximum
Power consumption at U_L	0.45 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)
Nominal current consumption at U_S	8 A, maximum, as the maximum current carrying capacity of the potential jumpers must not be exceeded (theoretically: 8 x 2 A = 16 A)

Supply of the module electronics and I/O through bus coupler/power terminal	
Connection method	Through potential routing

Digital outputs	
Number	8
Nominal output voltage U_{OUT}	24 V DC
Differential voltage for I_{nom}	≤ 1 V
Nominal current I_{nom} channel per channel	2 A
Tolerance of the nominal current	+10%
Total current	8 A (at 50% simultaneity)

Digital outputs (continued)

Possible output current during short circuit	28 A, maximum for 150 µs

☞   Please take this value into account when selecting the power supply unit.

Protection	Short circuit; overload

☞   Single-chip structure, i.e.,all channels are thermally coupled.

Nominal load	
Ohmic	48 W
Lamp	48 W
Inductive	48 VA (1.2 H, 12 Ω)
Signal delay upon power up of:	
Nominal ohmic load	Approximately 50 µs, typical
Nominal lamp load	75 ms, typical (with switching frequencies up to 8 Hz; above this frequency the lamp load responds like an ohmic load)
Nominal inductive load	50 ms (1.2 H, 12 Ω), approximately
Signal delay upon power down of:	
Nominal ohmic load	500 µs, approximately
Nominal lamp load	500 µs, approximately
Nominal inductive load	150 ms (1.2 H, 12 Ω), approximately
Switching frequency with:	
Nominal ohmic load	500 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.

Nominal lamp load	500 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.

Nominal inductive load	0.3 Hz, maximum (1.2 H, 12 Ω)
Overload response	Auto restart
Response time with ohmic overload (2 Ω)	3 seconds, approximately
Restart frequency with ohmic overload	33 Hz, approximately
Restart frequency with lamp overload	33 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)	1 ms, typical
Response upon power down	The output follows the supply voltage without delay.
Limitation of the voltage induced on circuit interruption	-8.5 V, approximately
Single maximum energy in free running	1500 W
Protective circuit type	Integrated free-wheeling diode for each channel
Overcurrent shutdown	3 A, minimum
Output current when switched off	1 µA, maximum
Output voltage when switched off	1 V, maximum at 1 MΩ
Output current with ground connection interrupt	1 µA, maximum
Switching power with ground connection interrupt	0.95 µW at 1 kΩ load resistance, typical

Output characteristic curve when switched on (typical)

Output current (A)	Differential output voltage (V)
0	0
0.2	0.04
0.4	0.08
0.6	0.13
0.8	0.17
1.0	0.21
1.2	0.26
1.4	0.30
1.6	0.35
1.8	0.39
2.0	0.44

Power dissipation

Formula to calculate the power dissipation of the electronics

$$P_{EL} = 0.20\ W + \sum_{i=1}^{n} (0.06\ W + I_{Li}^2 \times 0.125\ \Omega)$$

Where:

P_{EL}	Total power dissipation in the terminal
n	Number of set outputs (n = 1 to 8)
i	Continuous index
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

Ambient temperature (TA)	Maximum load current (I) at 100% simultaneity	Maximum load current (I) at 50% simultaneity
45°C	1 A	2 A
55°C	0.75 A	1.5 A

With an ambient temperature of up to 45°C and 100% simultaneity, a load current of 1 A per channel is permissible. If only four channels are used (50% simultaneity), a load current of 2 A can be tapped.

If all eight channels are used, the permissible working point must be defined according to the above formula. For an example, please refer to the "Configuring and Installing the Rexroth-Inline Product Range for INTERBUS" DOK-CONTRL-IL-SYSPRO***-AW..-EN-P application description.
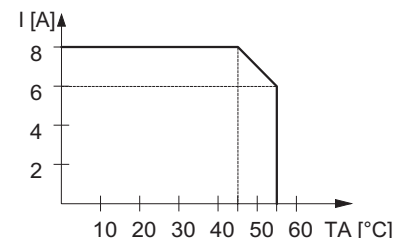
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⚠ **WARNING**

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
Surge voltage	Protective elements of the power terminal
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 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	- 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 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.

4   Internal Basic Circuit Diagram

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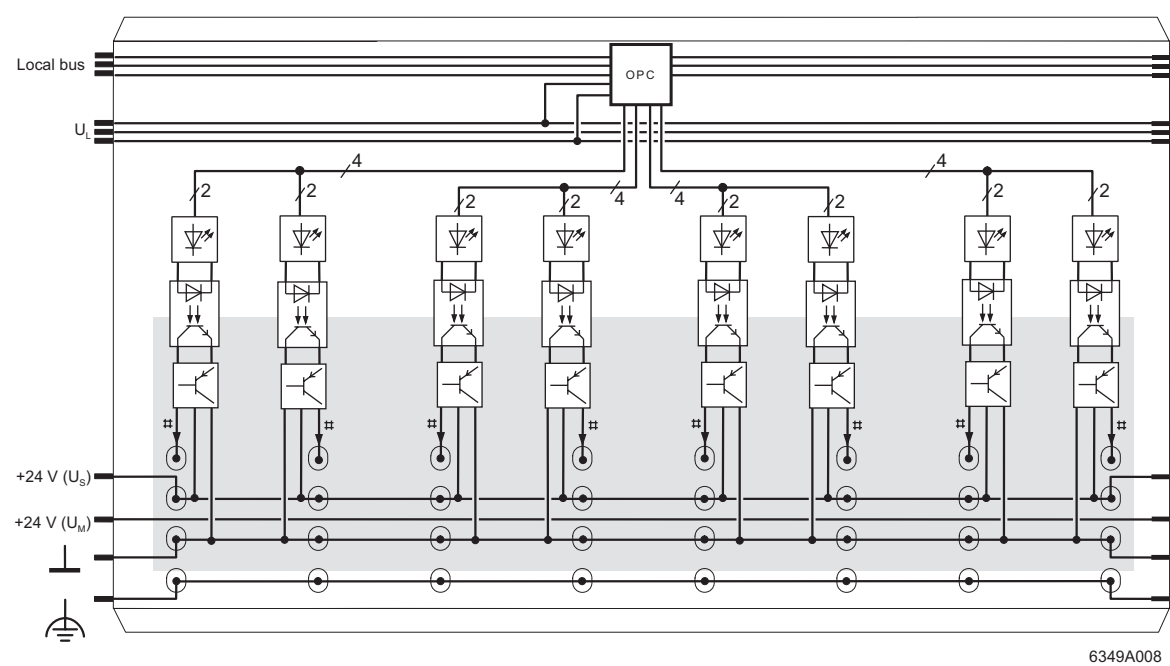
Fig. 1   Internal wiring of the terminal points

Key:

OPC	Protocol chip (bus logic including voltage conditioning)
LED symbol	LED
Optocoupler symbol	Optocoupler
Transistor symbol	Transistor
Digital output symbol	Digital output
Shaded area	Electrically isolated area

☞   Other symbols used are explained in the application descriptions for the Rexroth Inline system or the application description for your bus system.

5 Local Diagnostic and Status Indicators
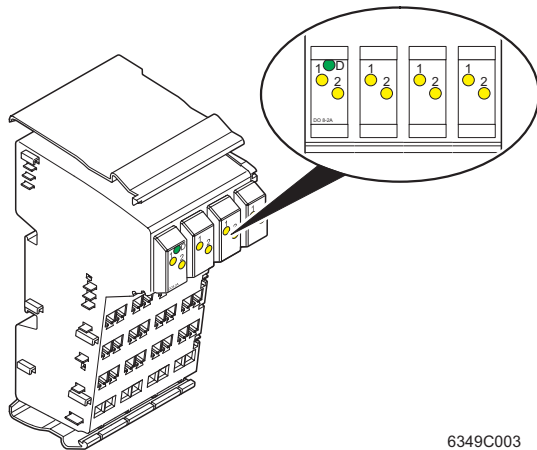
Fig. 2   Local diagnostic and status indicators

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

Function identification
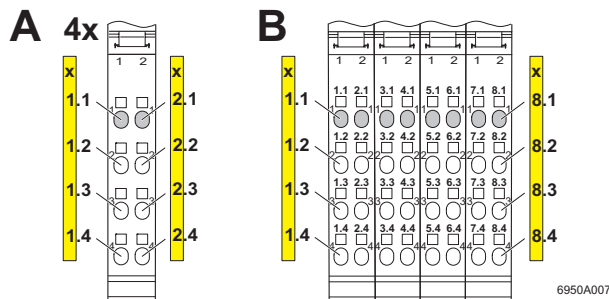
Pink

6 Terminal Point Assignment

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

CAUTION

Observe the current carrying capacity

The maximum current carrying capacity of the potential jumpers U_M and U_S is 8 A. Simultaneous full load operation of all outputs is therefore not permitted.

Additional restrictions may apply when using certain supply terminals. Please refer to the information in the terminal-specific data sheets.

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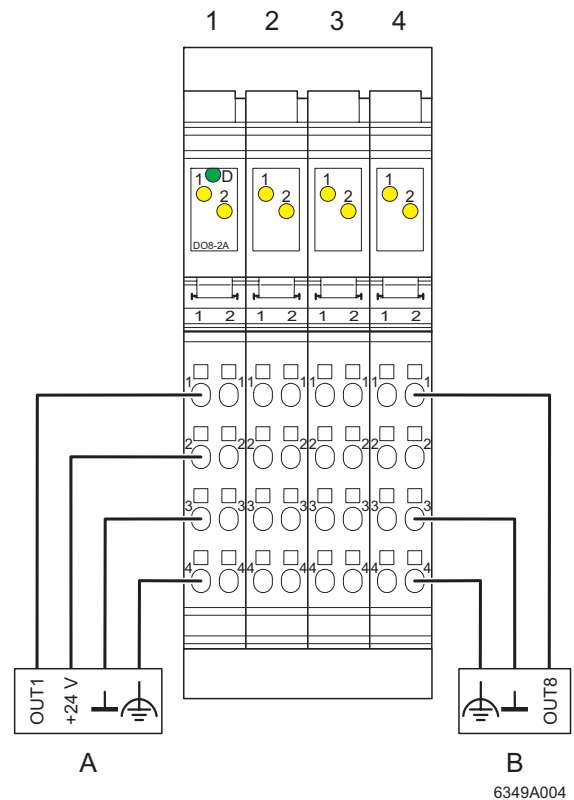

Fig. 4   Typical connection of actuators

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 R-IB IL 24 DO 8-2A-PAC terminal of the following revision index and later is approved for use within a safety-related segment circuit.

MNR	Type	Revision index
R911170759	R-IB IL 24 DO 8-2A-PAC	GA1

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

R-IB IL 24 ...-PAC
Part No.: R911xxxxxx-GA1
Module ID: XXX
FD: XXXXXX

1   81801001
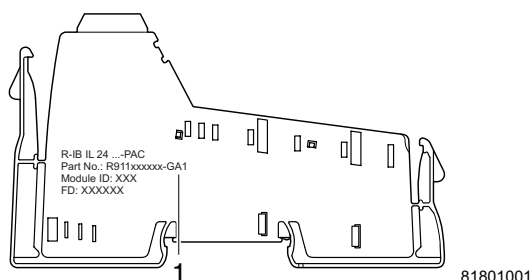
Fig. 5   Labeling on an Inline terminal

☞ 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.

9 Programming Data/ Configuration Data

9.1 Local Bus

ID code	BD_{hex} (189_{dec})
Length code	81_{hex}
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
Assignment	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 indicator	Slot	4		3		2		1	
	LED	2	1	2	1	2	1	2	1

Reprint forbidden - subject to modifications

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