

Rexroth Inline Terminal With 16 Digital Outputs

R911170536
Edition 01**R-IB IL 24 DO 16 (-2MBD)-PAC**16 digital outputs
24 V DC

02/2007



Description

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 actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 A
- Total current of the terminal: 8 A
- Short-circuit and overload protected outputs
- Diagnostic and status indicators



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.

Ordering Data

Products

Description	Type	MNR	Pcs./Pck.
Rexroth Inline Terminal with 16 digital outputs; complete with accessories (connectors and labeling fields); transmission speed of 500 kbps	R-IB IL 24 DO 16-PAC	R911170757	1
Rexroth Inline Terminal with 16 digital outputs; complete with accessories (connectors and labeling fields); transmission speed of 2 Mbps	R-IB IL 24 DO 16-2MBD-PAC	R911170415	1

Documentation

Description	Type	MNR	Pcs./Pck.
"Automation Terminals of the Rexroth Inline Product Range" application description	DOK-CONTRL-ILSYSINS***-AW..-EN-P	R911317021	1
"Configuring and Installing the Rexroth Inline Product Range for INTERBUS" application description	DOK-CONTRL-ILSYSPRO***-AW..-EN-P	R911317023	1



For additional ordering data (accessories), please refer to the product catalog at www.boschrexroth.com.

Technical Data

General Data		
Housing dimensions (width x height x depth)	48.8 mm x 120 mm x 71.5 mm	
Weight	152 g (with connector)	
Operating mode	Process data mode with 2 bytes	
Connection method for actuators	2 and 3-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	
Protection class	Class according to VDE 0106, IEC 60539	
Connection data for Inline connector		
Connection method	Spring-cage terminals	
Conductor cross section	0.2 mm ² to 1.5 mm ² (solid or stranded), 24 - 16 AWG	
Interface		
Local bus	Through data routing	
Transmission Speed		
R-IB IL 24 DO 16-PAC	500 kbps	
R-IB IL 24 DO 16-2MBD-PAC	2 Mbps	
Power Consumption		
Communications power	7.5 V DC	7.5 V DC
Current consumption at U _L	90 mA, maximum	105 mA, maximum
Power consumption at U _L	0.675 W, maximum	0.79 W, maximum
Segment supply voltage U _S	24 V DC (nominal value)	24 V DC (nominal value)
Nominal current consumption at U _S	8 A (16 x 0.5 A), maximum	8 A (16 x 0.5 A), maximum
Supply of the Module Electronics and I/O Through Bus Coupler/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 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 Ω)
Signal delay upon power up of:	
Nominal ohmic load	500 μ s, 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 (1.2 H, 50 Ω), typical
Signal delay upon power down of:	
Nominal ohmic load	1 ms, typical
Nominal lamp load	1 ms, typical
Nominal inductive load	50 ms (1.2 H, 50 Ω), typical
Switching frequency with:	
Nominal ohmic 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.

Nominal lamp 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.

Nominal inductive 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	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	3 s, approximately
Reverse voltage protection against short pulses	Protected against reverse voltages
Resistance to permanently applied reverse voltages	Protected against reverse voltages, permissible current 2 A, maximum
Validity of output data after connecting the 24 V supply voltage (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	$-15 \text{ V} \leq U_{\text{demag}} \leq -45.8 \text{ V}$ (U_{demag} = demagnetization voltage)
Single maximum energy in free running	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in the output chip

Digital Outputs (Continued)

Overcurrent circuit	0.7 A, minimum
Output current when switched off	300 μ A, 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 k Ω load resistance, typical
Inrush current with lamp load	1.5 A for 20 ms, maximum

Output Characteristic Curve When Switched On (Typical) (500 kbps and 2 Mbps)

Output Current (A)	Output Voltage Difference (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

500 kbps	2 Mbps
-----------------	---------------

Formula to Calculate the Power Dissipation of the Electronics

$$P_{TOT} = 0.19 \text{ W} + \sum_{i=1}^n (0.10 \text{ W} + I_{Li}^2 \times 0.4 \Omega)$$

$$P_{TOT} = 0.40 \text{ W} + \sum_{i=1}^n (0.10 \text{ W} + I_{Li}^2 \times 0.4 \Omega)$$

Where

 P_{TOT} Total power dissipation in the terminal i Index n Number of set outputs ($n = 1$ to 16) I_{Li} Load current of output i **Power Dissipation of the Housing P_{HOU} (500 kbps and 2 Mbps)**

2.7 W, maximum (within the permissible operating temperature)

Limitation of Simultaneity, Derating (500 kbps and 2 Mbps)

Ambient Temperature T_A	Maximum Load Current at 100% Simultaneity	Maximum Load Current at 75% Simultaneity
$-25^\circ\text{C} \leq T_A < +40^\circ\text{C}$	0.50	0.50
$+40^\circ\text{C} \leq T_A < +45^\circ\text{C}$	0.45	0.50
$+45^\circ\text{C} \leq T_A < +50^\circ\text{C}$	0.40	0.50
$+50^\circ\text{C} \leq T_A < +55^\circ\text{C}$	0.35	0.50

Safety Equipment

Overload/short circuit in the 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 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	Integrated protection against reverse voltages

Electrical Isolation/Isolation of the Voltage Areas**CAUTION**

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.

Falling below or exceeding the operating voltage

No

Approvals

For the latest approvals, please visit www.boschrexroth.com.

Local Diagnostic and Status Indicators and Terminal Point Assignment

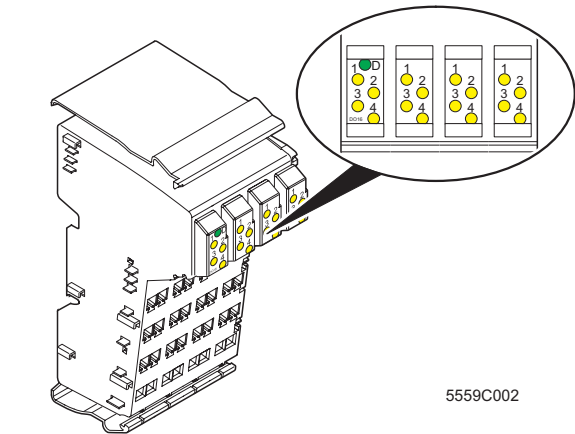


Fig. 1 Diagnostic and status indicators

Local Diagnostic and Status Indicators

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

Function Identification

Pink
2 Mbps: White stripe in the vicinity of the D LED

Terminal Point Assignment for Each Connector

Terminal Point	Assignment
x.1	Signal output (OUT)
x.2	Ground contact (GND) for 2 and 3-wire termination
x.3	FE connection for 3-wire termination
x.4	Signal output (OUT)
x.5	Ground contact (GND) for 2 and 3-wire termination
x.6	FE connection for 3-wire termination

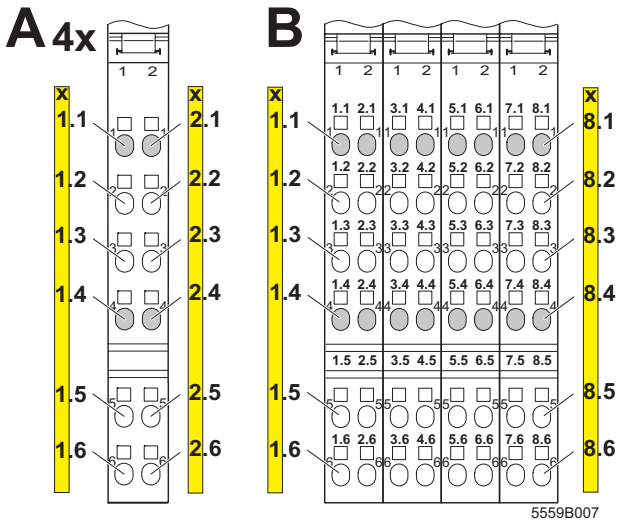
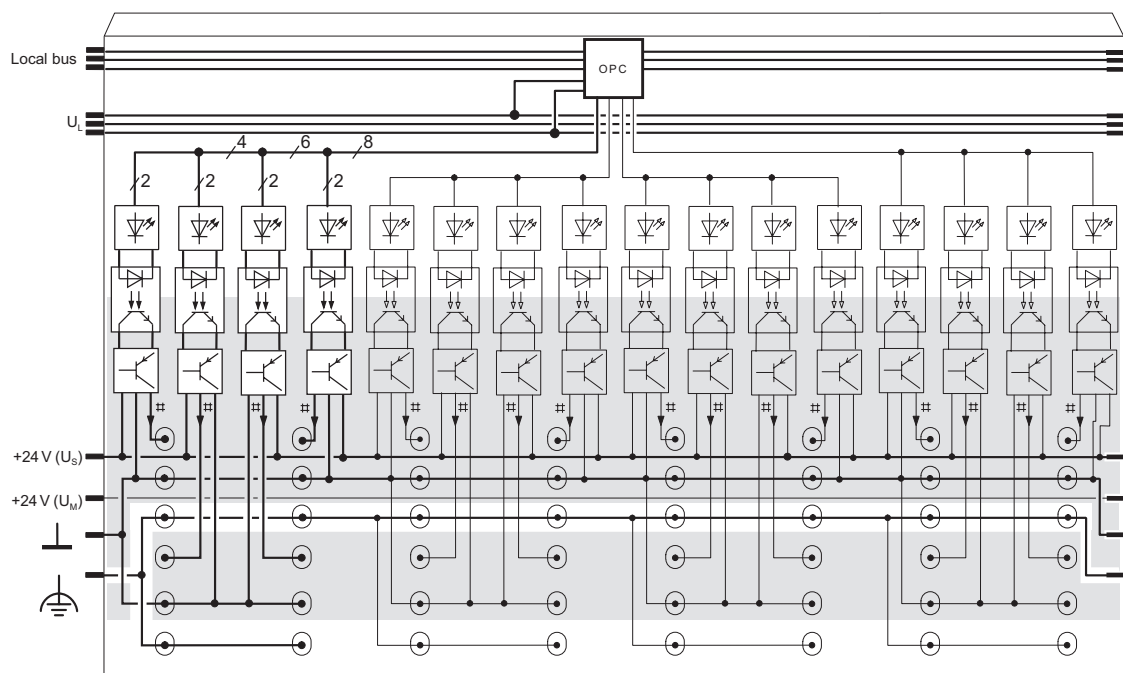


Fig. 2 Terminal point numbering when using individual connectors (A) and when using a connector set or the PAC version with the original connector set (B)







Internal Circuit Diagram




5559B003

Fig. 3 Internal wiring of the terminal points

Key:

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

Connection Example



When connecting the actuators observe the assignment of the terminal points to the process data (see [page 9](#)).

CAUTION

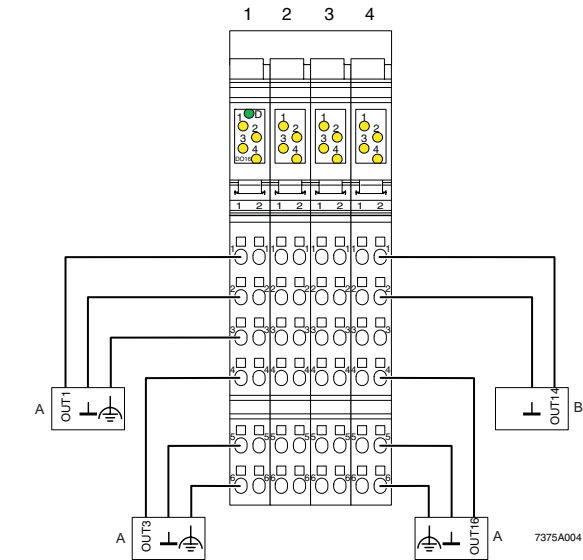


Fig. 4 Typical actuator connection

A: 3-wire termination

B: 2-wire termination


The numbers above the module illustration indicate the connector slots.

Programming Data/Configuration Data

Local Bus

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

Process Data

Assignment of the Terminal Points to the OUT Process Data



The following table applies when using the PAC version with the original connector set.

(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
Assignment	Slot	2				1				4				3			
	Terminal point (signal)	4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1	8.4	7.4	8.1	7.1	6.4	5.4	6.1	5.1
	Terminal point (GND)	4.5	3.5	4.2	3.2	2.5	1.5	2.2	1.2	8.5	7.5	8.2	7.2	6.5	5.5	6.2	5.2
	Terminal point (FE)	4.6	3.6	4.3	3.3	2.6	1.6	2.3	1.3	8.6	7.6	8.3	7.3	6.6	5.6	6.3	5.3
Status indicator	Slot	2				1				4				3			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1



The following table applies when using R-IB IL SCN-12-OCP individual connectors.

(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
Assignment	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 indicator	Slot	2				1				4				3			
	LED	4	3	2	1	4	3	2	1	4	3	2	1	4	3	2	1

Notes:

DOK-CONTRL-
ILDO16*****-KB01-EN-P

Bosch Rexroth AG
Electric Drives and Controls
P.O.Box 13 57
97803 Lohr, Germany
Bgm.-Dr.-Nebel-Str. 2
97816 Lohr, Germany
Tel. +49-(0) 93 52 - 40-50 60
Fax. +49-(0) 93 52 - 40-49 41
service.svc@boschrexroth.de
www.boschrexroth.com

All rights reserved. No part of this document may be reproduced or stored, processed, duplicated or circulated using electronic systems, in any form or by any means, without the prior written authorization of Bosch Rexroth AG, Electric Drives and Controls. Violations shall give rise to claims for damages. The data specified above only serve to describe the product. They do not indicate any specific condition or suitability for a certain application. The information provided does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to natural wear and aging.

Reprint forbidden - subject to modifications