Electric Drives
and Controls

Hydraulics

Linear Motion and
Assembly Technologies

Pneumatics

Service

Rexroth
Bosch Group

Rexroth Inline Terminal
With Four Digital Outputs

R911170532
Edition 01

R-IB IL 24 DO 4(-2MBD)-PAC

4 digital outputs
DC 24 V

01/2007

Description

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

Features

- Connections for 4 digital actuators
- Connection of actuators in 2 and 3-wire technology
- Nominal current per output: 0.5 A
- Total current of the terminal: 2 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./Pkt.
Rexroth Inline Terminal with four digital outputs, including accessories (connectors and labeling field) Transmission speed 500 kbps	R-IB IL 24 DO 4-PAC	R911170755	1
Rexroth Inline Terminal with four digital outputs; including accessories (connectors and labeling field) Transmission speed 2 Mbps	R-IB IL 24 DO 4-2MBD-PAC	R911170413	1

Documentation

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

☞   For further ordering data (accessories), please refer to our product catalog at www.boschrexroth.com.

Technical Data

General Data	
Housing dimensions (width x height x depth)	12.2 mm x 120 mm x 71.5 mm
Weight	66 g (with connectors)
Operating mode	Process data mode with 4 bits
Connection method for actuators	2 and 3-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 % bis 95 % according to DIN EN 61131-2
Permissible air pressure (operation/storage/transport)	70 kPa to 106 kPa (up to 3,000 m above sea level)
Degree of protection	IP20 according to IEC 60529
Class of protection	Class 3 according to VDE 0106, IEC 60536
Connection data of connector	
Connection method	Spring-cage terminals
Conductor cross-section	0.2 mm^2 to 1.5 mm^2 (solid or stranded), AWG 24 - 16

Interface	
Local bus	Through data routing

Transmission Speed	
R-IB IL 24 DO 4-PAC	500 kbps
R-IB IL 24 DO 4-2MBD-PAC	2 Mbps

Power Consumption	500 kbps	2 Mbps
Communications power	7.5 V DC	7.5 V DC
Current consumption at U_L	44 mA, maximum	65 mA, maximum
Power consumption at U_L	0.33 W, maximum	0.49 W, maximum
Segment supply voltage U_S	24 V DC (nominal value)	24 V DC (nominal value)
Nominal current consumption at U_S	2 A (4 x 0.5 A), maximum	2 A (4 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	4
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	2 A
Protection	Short-circuit; overload

☞ All four channels are thermally coupled, 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	
Ohmic nominal load	100 µs, typical
Lamp nominal load	100 ms, typical (with switching frequencies up to 8 Hz; above this frequency the lamp load responds like an ohmic load)
Inductive nominal load	100 ms (1.2 H, 50 Ω), typical
Signal delay upon power down of	
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	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.

Inductive nominal load	0.5 Hz (1.2 H, 50 Ω), maximum
Overload response	Auto restart
Response time with ohmic overload (12Ω)	3 s, approximately
Restart frequency with ohmic overload	250 Hz, approximately
Restart frequency with lamp overload	250 Hz, approximately
Response with inductive overload	Output may be damaged
Response time in the event of a short-circuit	850 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 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_{demag} ≤ -46 V (U_{demag} = demagnetization voltage)
One-time unsolicited energy	400 mJ, maximum
Protective circuit type	Integrated 45 V Zener diode in the output chip

Digital Outputs (Continued)

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 interrupted	25 mA, maximum
Switching power with ground connection interrupted	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)
(500 kbps and 2 Mbps)

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

500 kbps	2 Mbps
Formula to Calculate the Power Dissipation of the Electronics	

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

$$P_{TOT} = 0.4\ W + \sum_{i=1}^{n}\ (0.1\ W + I_{Li}^{2} \times 0.4\ \Omega)$$

Where

P_{EL} = Total power dissipation of the module
i = index
n = Number of set outputs (n = 1 to 4)
I_{Li} = Load current of output i

Power dissipation of the housing P_{HOU}	0.6 W, maximum (within the permissible operating temperature)

Limitation of Simultaneity, Derating

Ambient Temperature (TA)	Maximum load current at		
	100% Simultaneity	75% Simultaneity	50% Simultaneity
≤35°C	0.5 A	0.5 A	0.5 A
≤45°C	0.375 A	0.5 A	0.5 A
≤55°C	0.25 A	0.33 A	0.5 A

With 100% simultaneity, a load current of 0.5 A for each channel is permissible up to 35°C (ambient temperature range), a load current of 0.375 A between 35°C and 45°C and a load current of 0.25 A up to 55°C .

If a maximum of two channels are operated in the permissible ambient temperature range (50% simultaneity), a load current of 0.5 A can be tapped.

If all 4 channels are used, the permissible working point must be defined according to the above formula. An example can be found in the "Configuring and Installing the Rexroth Inline Product Range for INTERBUS" application description DOK-CONTRL-ILSYSPRO***-AW..-EN-P.

Safety Equipment

Overload/short-circuit in segment circuit	Electronic; with 4-channel driver
Surge voltage	Protective circuits of the power terminal; Protection up to 33 V DC
Polarity reversal of the supply voltage	Protective circuits 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	Protection up to 2 A DC

Electrical Isolation

| ⚠️ **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 using 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. |

| Falling below or exceeding the operating voltage | No |

Approvals

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

Local Diagnostic/Status Indicators and Terminal Point Assignment
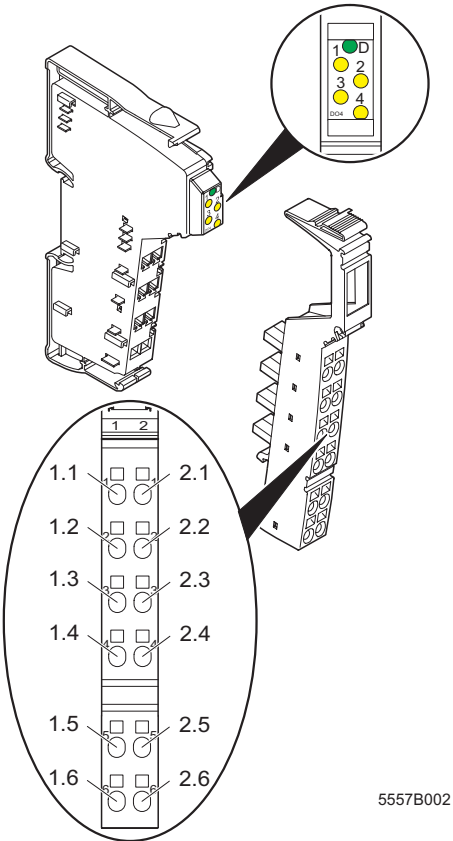
Fig. 1   *The terminal with the appropriate connector*

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 D LED

Terminal Assignment

Terminal Point	Assignment
1.1	Signal output (OUT 1)
2.1	Signal output (OUT 2)
1.2, 2.2	Ground contact (GND) for 2 and 3-wire termination
1.3, 2.3	FE connection for 3-wire termination
1.4	Signal output (OUT 3)
2.4	Signal output (OUT 4)
1.5, 2.5	Ground contact (GND) for 2 and 3-wire termination
1.6, 2.6	FE connection for 3-wire termination

Internal Circuit Diagram

5557C003
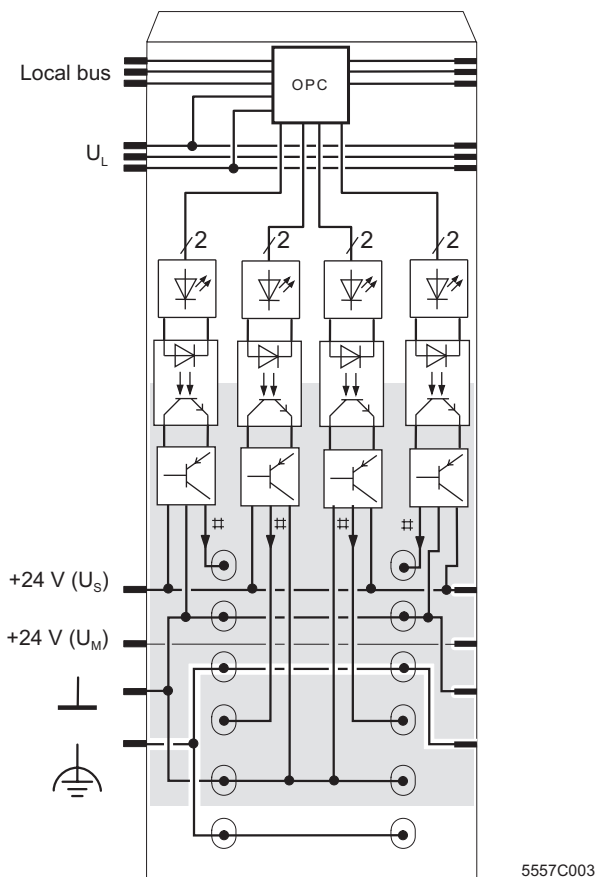
Fig. 2   Internal wiring of the terminal points

Key:

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

☞   Other symbols used are explained in the Rexroth Inline application descriptions (see "Documentation" on page 2).

Connection Example

⚠ **CAUTION**   When connecting the actuators observe the assignment of the terminal points to the process data (see page 8).

5557A004
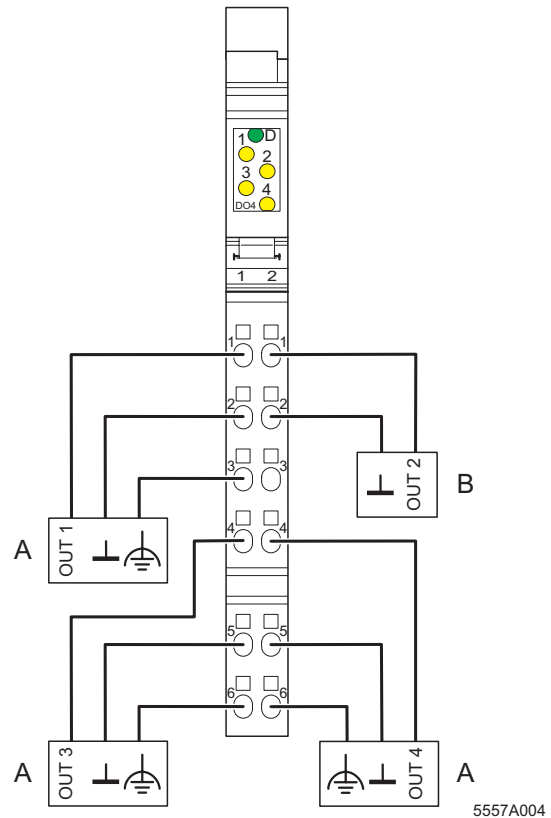
Fig. 3   Typical actuator connection
    A: 3-wire termination
    B: 2-wire termination

Programming Data/Configuration Data

Local Bus

ID code	BD$_{hex}$ (189$_{dec}$)
Length code	41$_{hex}$
Process data channel	4 bits
Input address area	0 bits
Output address area	4 bits
Parameter channel (PCP)	0 bits
Register length (bus)	4 bits

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

(Byte.bit) view	Byte.bit	0.3	0.2	0.1	0.0
Assignment	Terminal point (signal)	2.4	1.4	2.1	1.1
	Terminal point (GND)	2.5	1.5	2.2	1.2
	Terminal point (FE)	2.6	1.6	2.3	1.3
Status indicator	LED	4	3	2	1