# Rexroth Inline Terminal With Two Digital Inputs

**R911170524**
Edition 01

## R-IB IL 24 DI 2; R-IB IL 24 DI 2-2MBD-PAC

2 Digital Inputs
24 V DC

10/2006

### Description

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

### Features

- Connections for two digital sensors
- Connection of sensors in 2, 3, and 4-wire technology
- Maximum permissible load current per sensor: 250 mA
- Maximum permissible load current from the terminal: 0.5 A
- Diagnostic and status indicators

This data sheet is only valid in association with the application description 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. |
|---|---|---|---|
| Inline terminal with two digital inputs; without accessories; transmission speed of 500 kbps | R-IB IL 24 DI 2 | R911289286 | 1 |
| Inline terminal with two digital inputs; complete with accessories (connector and labeling field); transmission speed of 2 Mbps | R-IB IL 24 DI 2-2MBD-PAC | R911170406 | 1 |

One of the listed connectors is needed for the complete fitting of the R-IB IL 24 DI 2 terminal.

**Accessories**

| Description | Type | MNR | Pcs./Pck. |
|---|---|---|---|
| Connector with eight terminals, spring-cage connection (gray, w/o color print) | R-IB IL SCN-8 | R911291191 | 10 |
| Connector with eight terminals, spring-cage connection (gray, with color print) | R-IB IL SCN-8-CP | R911289323 | 10 |

**Documentation**

| Description | Type | MNR | Pcs./Pck. |
|---|---|---|---|
| "Automation Terminals of the Rexroth Inline Product Range" application description | DOK-CONTRL-ILSYS-PRO***-AW..-EN-P | R911317023 | 1 |

## Technical Data

| General Data | |
|---|---|
| Housing dimensions (width x height x depth) | 12.2 mm x 120 mm x 71.5 mm |
| Weight | 53 g (with connectors) |
| Operating mode | Process data mode with 2 bits |
| Connection method for sensors | 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 |
| Protection class | Class 3 according to VDE 0106, IEC 60536 |
| 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 DI 2 | 500 kbps |
| R-IB IL 24 DI 2-2MBD-PAC | 2 Mbps |

| Power Consumption | 500 kbps | 2 Mbps |
|---|---|---|
| Communications power | 7.5 V | 7.5 V |
| Current consumption from the local bus | 35 mA, maximum | 50 mA, maximum |
| Power consumption from the local bus | 0.27 W, maximum | 0.375 W, maximum |
| Segment supply voltage $U_S$ | 24 V DC (nominal value) | 24 V DC (nominal value) |
| Nominal current consumption at $U_S$ | 0.5 A (2 x 0.25 A), maximum | 0.5 A (2 x 0.25 A), maximum |

| Supply of the Module Electronics and I/O Through the Bus Coupler/Power Terminal | |
|---|---|
| Connection method | Through potential routing |

| Digital Inputs | |
|---|---|
| Number | 2 |
| Input design | According to EN 61131-2 Type 1 |
| Definition of switching thresholds | |
| Maximum low-level voltage | $U_{Lmax}$ < 5 V |
| Minimum high-level voltage | $U_{Hmin}$ > 15 V |
| Common potentials | Segment supply, ground |
| Nominal input voltage $U_{IN}$ | 24 V DC |
| Permissible range | -30 V < $U_{IN}$ < +30 V DC |
| Nominal input current for $U_{IN}$ (at 500 kbps) | 5 mA |
| Nominal input current for $U_{IN}$ (at 2 Mbps) | 3 mA, minimum |
| Current flow (at 500 kbps) | Linear in the range 1 V < $U_{IN}$ < 30 V |
| Current flow (at 2 Mbps) | See Table "Characteristic Curve (2 Mbps): Current Depending on the Input Voltage and the Ambient Temperature $T_A$" on page 3 |
| Delay time | None |
| Permissible cable length to the sensor | 30 m |
| Use of AC sensors | AC sensors in the voltage range < $U_{IN}$ are limited in application |

| Input Characteristic Curve (500 kbps) | |
|---|---|
| **Input Voltage (V)** | **Typical Input Current (mA)** |
| -30 < $U_{IN}$ < 0.7 | 0 |
| 3 | 0.4 |
| 6 | 1.0 |
| 9 | 1.7 |
| 12 | 2.3 |
| 15 | 3.0 |
| 18 | 3.7 |
| 21 | 4.4 |
| 24 | 5.0 |
| 27 | 5.7 |
| 30 | 6.4 |

| Characteristic Curve (2 Mbps): Current Depending on the Input Voltage and the Ambient Temperature $T_A$ | | | |
|---|---|---|---|
| **Supply Voltage** | **Input Current** | **Input Current for t >= 20 s** | |
| | | **For $T_A$ = 25°C** | **For $T_A$ = 55°C** |
| 18 V | 3.0 mA | 2.9 mA | 2.5 mA |
| 24 V | 3.9 mA | 3.8 mA | 3.5 mA |
| 30 V | 4.5 mA | 4.2 mA | 3.0 mA |

The current is reduced depending on the ambient temperature $T_A$ and the number of inputs that are switched on (internal module temperature).

| Power Dissipation | |
|---|---|
| **Formula to Calculate the Power Dissipation of the Electronics** | |
| $P_{TOT} = 0.21\ W + \sum_{n=1}^{2} [\ U_{INn} \times \frac{U_{INn} - 1.8\ V}{4400\ \Omega}\ ]$ | $P_{TOT} = 0.375\ W + \sum_{n=1}^{2} [\ U_{INn} \times 0.003\ A\ ]$ |

Where

$P_{TOT}$ Total power dissipation in the terminal

n Index of the number of set inputs n = 1 to 2

$U_{INn}$ Input voltage of input n

| | |
|---|---|
| **Power Dissipation of the Housing $P_{HOU}$** | 0.6 W (within the permissible operating temperature) |

| Limitation of Simultaneity, Derating | |
|---|---|
| Derating | No limitation of simultaneity, no derating |

| Safety Equipment | |
|---|---|
| Overload in segment circuit | No |
| Surge voltage | Protective elements of the power terminal |
| Polarity reversal | Protective elements of the power terminal |

**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 terminal and the digital input terminal described here using the bus terminal 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 for the Rexroth Inline system, "Documentation" on page 2).

**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**

None

**Approvals**

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

## Local Diagnostic and Status Indicators and Terminal Point Assignment

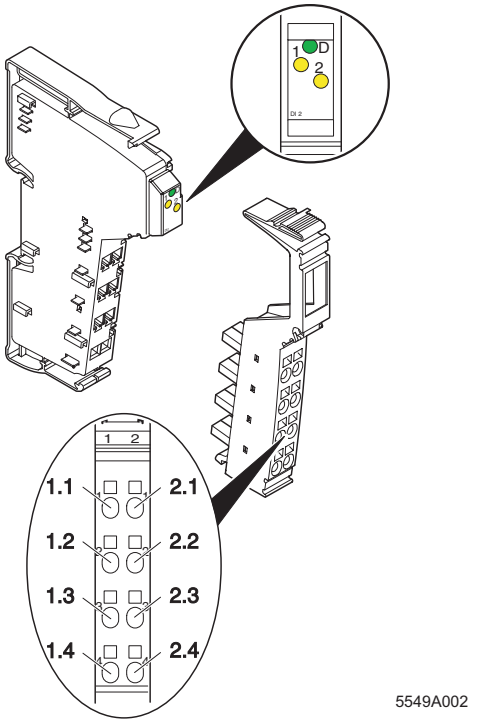


*Fig. 1 R-IB IL 24 DI 2 with an appropriate connector*

### Local Diagnostic and Status Indicators

| Des. | Color | Meaning |
|---|---|---|
| **D** | Green | Diagnostics |
| **1, 2** | Yellow | Status indicators of the inputs |

### Function Identification

Light blue

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

### Terminal Point Assignment

| Terminal Point | Assignment |
|---|---|
| **1.1, 2.1** | Signal input (IN) |
| **1.2, 2.2** | Segment voltage $U_S$ for 2, 3, and 4-wire termination |
| **1.3, 2.3** | Ground contact (GND) for 3 and 4-wire termination |
| **1.4, 2.4** | FE connection for 4-wire termination |

## Internal Circuit Diagram

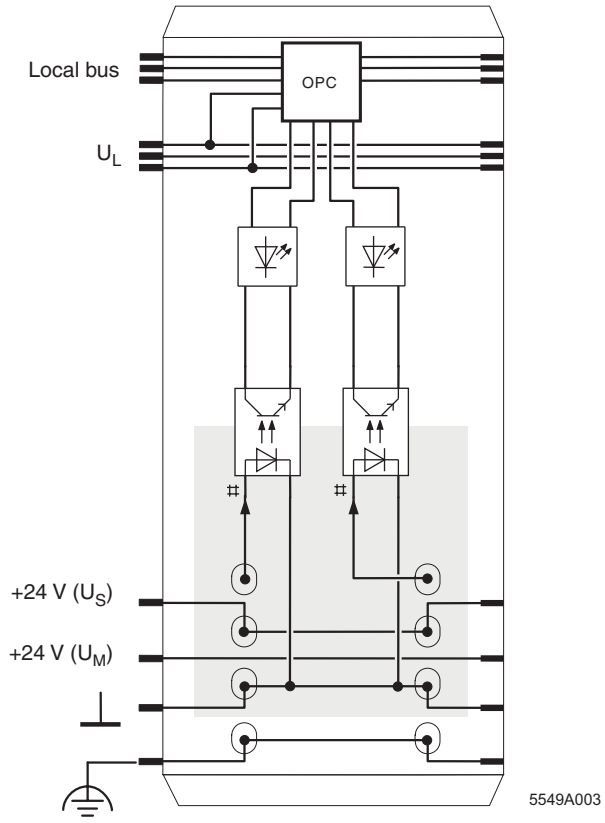


*Fig. 2 Internal wiring of the terminal points*

Key:

| | |
|---|---|
| OPC | Protocol chip (bus logic including voltage conditioning) |
| | LED |
| | Optocoupler |
| | Digital input |
| | Electrically isolated area |

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

## Connection Example

**CAUTION**

When connecting the sensors observe the assignment of the terminal points to the process data (see page 6).

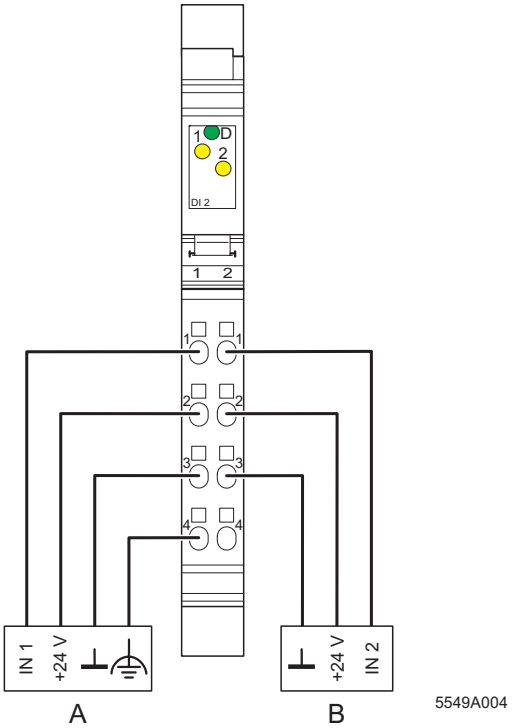


*Fig. 3 Typical sensor connections*

A 4-wire termination
B 3-wire termination

## Programming Data/Configuration Data

### Local Bus

| | |
|---|---|
| ID code | $BE_{hex}$ ($190_{dec}$) |
| Length code | $C2_{hex}$ |
| Process data channel | 2 bits |
| Input address area | 2 bits |
| Output address area | 0 bits |
| Parameter channel (PCP) | 0 bits |
| Register length (bus) | 2 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 IN Process Data

| (Byte.bit) view | Byte.bit * | x.1 | x.0 |
|---|---|---|---|
| Module | Terminal point (signal) | 2.1 | 1.1 |
| | Terminal point (+24 V) | 2.2 | 1.2 |
| | Terminal point (GND) | 2.3 | 1.3 |
| | Terminal point (FE) | 2.4 | 1.4 |
| Status indicator | LED | 2 | 1 |

*: Bytes are assigned using the fieldbus-specific configuration tool. The bit assignment may vary when the Inline terminals are packed in a byte. Please refer to the fieldbus station descriptions.

DOK-CONTRL-ILDI2******-KB01-EN-P

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