

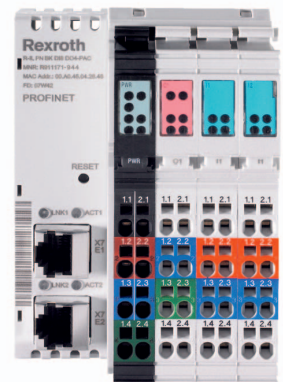
Rexroth Inline bus coupler for PROFINET with digital inputs and digital outputs

Data sheet R-IL PN BK DI8 DO4-PAC

PROFINET controller board
8 digital inputs, 24 V DC
4 digital outputs, 24 V DC, 500 mA
Modular extensions possible using Inline terminals

07 / 2014

R911328682
Edition 02



1 Description

This description applies to firmware version 2.30 or later.

The bus coupler is the link between a PROFINET network and the Inline installation system. In addition, it is used to acquire and output digital signals.

Up to 61 Inline devices can be connected at any point to an existing PROFINET network using the bus coupler.

The bus coupler and the Inline devices form one station with a maximum of 63 local bus devices. Here, the inputs and outputs of the bus coupler form the first and second local bus devices.

Features

- 2 x Ethernet twisted pair according to 802.3 with auto negotiation and auto crossover
- Transmission speed of 100 Mbps
- IP parameter setting using the PROFINET controller
- Connection to the PROFINET network via 8-pos. RJ45 socket
- Electrical isolation between Ethernet interface

and logic

- Ethernet TCP/IP (100 Base-TX, Management via SNMP)
- Connection of up to 61 other Inline devices
- Connection of a maximum of 16 PCP devices
- Protocols supported: SNMPv1, TFTP, PROFINET, LLDP, and MRP
- 8 digital inputs, 4 digital outputs
- Automatic baud rate detection on the local bus (500 kbps or 2 Mbps)
- Diagnostic and status indicators



For further information on the Rexroth Inline system, please refer to the application description of the Rexroth Inline system, material number R911317021.



Make sure you always use the latest documentation.

It can be downloaded under www.boschrexroth.com/electrics.

Here you will also find the current GSDML file.

2 Table of contents

1	Description	1
2	Table of contents	2
3	Ordering data	3
4	Technical data	3
5	Internal circuit diagram	8
6	Local status and diagnostic indicators	9
7	Diagnostic indicators for PROFINET	10
8	Connection of PROFINET, power supply, actuators, and sensors.....	10
8.1	Connecting PROFINET	10
8.2	Terminal point assignment of the Inline connectors	11
9	Connection example.....	11
10	Mapping inputs and outputs to PROFINET.....	12
11	Process data.....	12
11.1	Terminal point assignment of local outputs to the OUT process data	12
11.2	Terminal point assignment of the local inputs to the IN process data.....	12
12	Startup.....	12
13	Parameterization	13
14	Physical Device - PDev.....	13
15	Link Layer Discovery Protocol - LLDP	13
16	Device replacement.....	13
17	Applicative system redundancy for process data.....	14
18	Failsafe behavior	14
19	Acyclic PROFINET communication	14
20	Mailbox communication.....	14
21	Dynamic configuration on the local bus	14
22	Byte rotation for 16 and 32-channel Inline terminals	15
22.1	Byte rotation for R-IB IL 24 DI 16... and R-IB IL 24 DO 16...terminals	15
22.2	Byte rotation for R-IB IL 24 DI 32... and R-IB IL 24 DO 32...terminals	16

3 Ordering data

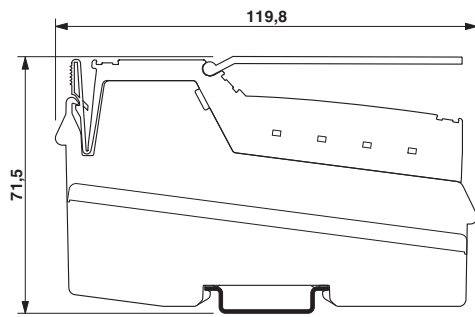
Description	Type	MNR	Pcs. / Pkt.
Rexroth Inline bus coupler for PROFINET with digital inputs and digital outputs	R-IL PN BK DI8 DO4-PAC	R911171944	1
Documentation	Type	MNR	Pcs. / Pkt.
Application description	DOK-CONTRL-ILSYSINS***-	R911317021	1
Automation terminals of the Rexroth Inline product range	AW...-EN-P		

Additional ordering data

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

4 Technical data

Dimensions (nominal sizes in mm)



Width	80 mm
Height	119.8 mm
Depth	71.5 mm
Note on dimensions	Specifications with connectors

General data

Color	gray
Weight	375 g (with connectors)
Ambient temperature (operation)	-25 °C ... 55 °C (observe derating)
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Permissible humidity (operation)	10 % ... 95 % (according to DIN EN 61131-2)
Permissible humidity (storage/transport)	10 % ... 95 % (according to DIN EN 61131-2)
Air pressure (operation)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Air pressure (storage/transport)	70 kPa ... 106 kPa (up to 3000 m above sea level)
Degree of protection	IP20
Protection class	III, IEC 61140, EN 61140, VDE 0140-1

Connection data

Designation	Inline connector
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.08 mm ² ... 1.5 mm ² / 0.08 mm ² ... 1.5 mm ²
Conductor cross section [AWG]	28 ... 16

Interface PROFINET

Number	2
Connection method	RJ45 socket, auto negotiation
Transmission speed	100 MBit/s (acc. to PROFINET standard)
Transmission physics	Ethernet in RJ45 twisted pair
Transmission length	max. 100 m

Interface Inline local bus

Connection method	Inline data jumper
Transmission speed	500 kBit/s / 2 MBit/s (Automatic detection, no combined system)

System limits

Amount of process data	max. 488 Byte (Max. 244 bytes IN - max. 244 bytes OUT)
IN process data for I/O modules that can be aligned	244 Byte
OUT process data for I/O modules that can be aligned	244 Byte
Number of supported devices	max. 63 (per station)
Number of local bus devices that can be connected	max. 61 (on board I/Os are two devices)
Number of devices with parameter channel	max. 16



Observe the logic current consumption of each device when configuring an Inline station! It is specified in every terminal-specific data sheet. The current consumption can differ depending on the individual terminal. The permissible number of devices that can be connected therefore depends on the specific station structure.

PROFINET

Device function	PROFINET device
Update rate	min. 1 ms (depending on the size of the bus system)

Protocols supported

Protocols supported	PROFINET, PDev, TFTP, ICMP, LLDP
---------------------	----------------------------------

Power supply for module electronics

Connection method	Spring-cage connection
Designation	Bus coupler supply U_{BC} ; Communications power U_L (7.5 V) and the analog supply U_{ANA} (24 V) are generated from the bus coupler supply.
Supply voltage	24 V DC (via Inline connector)
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 138 mA (from U_{BK}) max. 0.91 A DC (from U_{BK})
Power loss	typ. 3 W (entire device)

Power consumption**NOTE Electronics may be damaged when overloaded**

Provide external fuses for the 24 V areas U_{BK} , U_M , and U_S . The power supply unit must be able to supply four times the nominal current of the external fuse, to ensure that it trips in the event of an error.

Main circuit supply U_M	24 V DC
Supply voltage range U_M	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Power supply at U_M	max. 8 A DC (Sum of U_M + U_S)
Current consumption from U_M	max. 8 A DC
Segment supply voltage U_S	24 V DC
Supply voltage range U_S	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Power supply at U_S	max. 8 A DC (Sum of U_M + U_S)

Power consumption

Current consumption from U_S	max. 8 A DC
Communications power U_L	7.5 V DC $\pm 5\%$
Power supply at U_L	max. 0.8 A DC
I/O supply voltage U_{ANA}	24 V DC
Supply voltage range U_{ANA}	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Power supply at U_{ANA}	max. 0.5 A DC
Power loss	typ. 3 W (entire device)
Cable length	30 m (for main circuit U_M ; do not route cable through outdoor areas)

Digital inputs

Number of inputs	max. 8 (EN 61131-2 type 1)
Connection method	Inline connector
Connection method	2, 3-wire
Nominal input voltage	24 V DC
Nominal input current	typ. 3 mA
Current flow	Limited to 3 mA, maximum
Input voltage range "0" signal	-30 V DC ... 5 V DC
Input voltage range "1" signal	15 V DC ... 30 V DC
Delay at signal change from 0 to 1	typ. 5 ms
Delay at signal change from 1 to 0	typ. 5 ms
Permissible conductor length to the sensor	100 m
Protection against polarity reversal	Polarity protection diode

Digital outputs

Number of outputs	4
Connection method	Inline connector
Connection method	2, 3-wire
Nominal output voltage	24 V DC
Maximum output current per channel	500 mA
Nominal load, ohmic	12 W
Nominal load, inductive	12 VA (1.2 H; 48 Ω)
Nominal load, lamp	12 W
Signal delay	typ. 1.2 ms
Signal delay when switching on an ohmic nominal load	max. 50 μ s (in the case of 0.5 A load)
Signal delay when switching off an ohmic nominal load	max. 250 μ s (in the case of 0.5 A load)
Maximum operating frequency with inductive nominal load	0.5 Hz (1.2 H; 48 Ω)
Reaction time with short-circuit	1,2 ms
Behavior at voltage switch-off	The output is delayed by 1.2 ms after the voltage drop.
Limitation of the voltage induced on circuit interruption	approx. -30 V
Output current when switched off	max. 10 μ A (When not loaded, a voltage can be measured even at an output that is not set.)
Behavior with overload	Auto restart
Behavior with inductive overload	Output can be destroyed
Reverse voltage resistance to short pulses	Reverse voltage proof

Digital outputs

Resistance to permanent reverse voltage	max. 2 A
Overcurrent shut-down	min. 0.7 A
Short-circuit and overload protection	Free running circuit In output driver

Fieldbus data telegram

IN process data for I/O modules that can be aligned	244 Byte
OUT process data for I/O modules that can be aligned	244 Byte

Error messages to the higher level control or computer system

Short-circuit / overload of the digital outputs	Yes
Sensor supply failure	Yes
Failure of the actuator supply	Yes

Protective circuit

Surge protection, protection against polarity reversal of the supply voltage	35 V suppressor diode
--	-----------------------

Mechanical tests

Vibration resistance in acc. with EN 60068-2-6/IEC 60068-2-6	5 g
Shock in acc. with EN 60068-2-27/IEC 60068-2-27	Operation: 25 g, 11 ms duration, semi-sinusoidal shock impulse

Conformance with EMC Directive 2004/108/EC**Noise immunity test in accordance with EN 61000-6-2**

Electrostatic discharge (ESD) EN 61000-4-2/IEC 61000-4-2	Criterion B; 6 kV contact discharge, 8 kV air discharge
Electromagnetic fields EN 61000-4-3/IEC 61000-4-3	Criterion A; Field intensity: 10 V/m
Fast transients (burst) EN 61000-4-4/IEC 61000-4-4	Criterion A; all interfaces 1 kV Criterion B; all interfaces 2 kV
Transient surge voltage (surge) EN 61000-4-5/IEC 61000-4-5	Criterion B; supply lines DC: 0.5 kV/0.5 kV (symmetrical/asymmetrical); fieldbus cable shield 1 kV
Conducted interference EN 61000-4-6/IEC 61000-4-6	Criterion A; Test voltage 10 V

Noise emission test as per EN 61000-6-4

EN 55011	Class A
----------	---------

Approvals

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

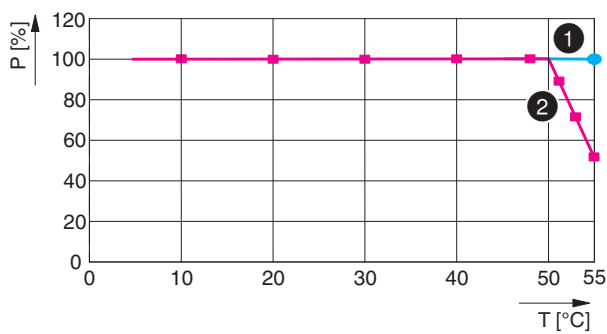
Mounting position and derating

Fig. 1 Derating with different mounting positions

Key:

- 1 Mounting on a horizontal DIN rail
- 2 Different mounting position
- P [%] Power dissipation in percent
- T [°C] Ambient temperature in °C

The specifications refer to a supply voltage of 24 V.

When you are working with a voltage from the upper voltage range (e.g., 30 V), the percentage values increase. In this case, multiply the percentage values with 1.25 ($30\text{ V}/24\text{ V} = 1.25$).

The various bus coupler functions have different percentage shares of the power dissipation.

Please refer to the percentage shares in the following table.

Function	Percentage shares of power dissipation in %
Inputs	25
Outputs	16
U_M	24
U_{ANA}	3
U_L	32

The following results from the information given above:

- When used at 55°C (on horizontal DIN rail)
When mounted on a horizontal DIN rail, you can operate the bus coupler at 55°C and 24 V without any limitation.
- When used at 55°C (different mounting position)
With a different mounting position, you can operate the bus coupler at 55°C and 24 V with a maximum load of 50%.

5 Internal circuit diagram

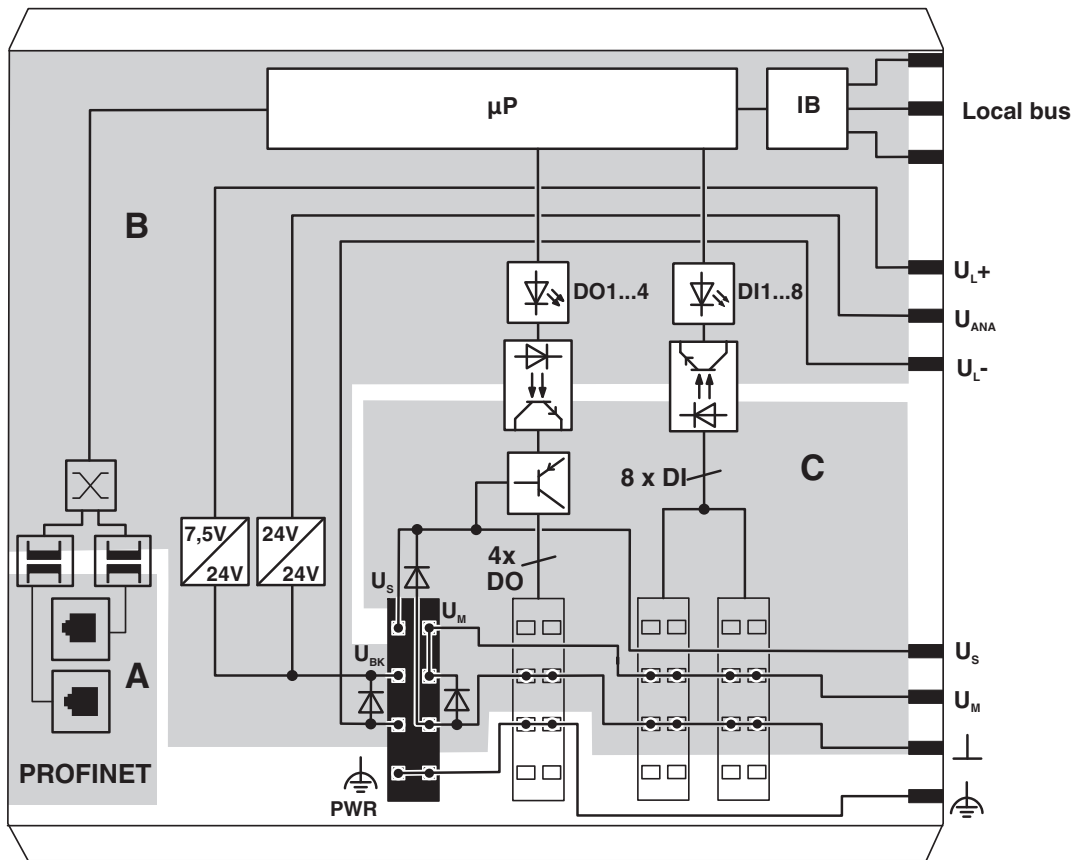









Fig. 2 Internal wiring of connections

Key:

	Microprocessor
	Protocol chip
	LED
	Optocoupler
	PNP transistor
	Ethernet switch
	Transmitter with electrical isolation

The gray areas in the basic circuit diagram represent the electrically isolated areas:

A: PROFINET interface

B: Logic

C: I/O



Other symbols used are explained in the application description for the Rexroth Inline system, material number R911317021.

6 Local status and diagnostic indicators

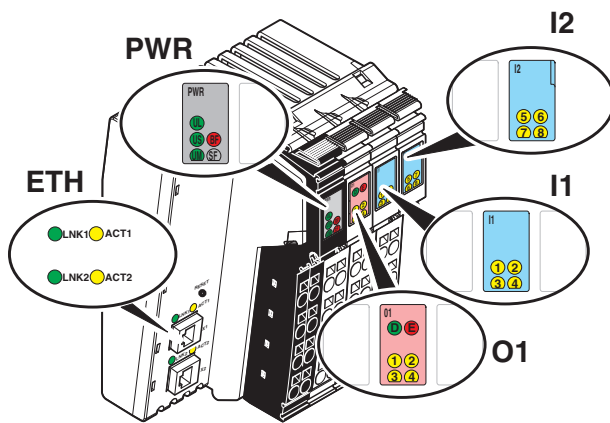


Fig. 3 Local status and diagnostic indicators

Designation	Color	Meaning	State	Description
LNK 1/2	green	Link port 1/2	ON	Connection via Ethernet to a module via port 1/2 established
			Flashing	PROFINET module identification ("flashing")
			OFF	No connection established via port 1/2
ACT 1/2	yellow	Activity port 1/2	ON	Transmission or reception of Ethernet telegrams at port 1/2
			OFF	No transmission or reception of Ethernet telegrams at port 1/2
BF	red	Communication error (BusFail)	ON	No link status available
			Flashing	Link status available, no communication connection to the PROFINET controller
			OFF	A PROFINET controller has established an active communication connection to the PROFINET device.
SF	red	System failure (PROFINET)	ON	PROFINET diagnostics available
			OFF	PROFINET diagnostics not available
UL	green	U_{Logic}	ON	24 V bus coupler supply/7.5 V communications power present
			OFF	24 V bus coupler supply/7.5 V communications power not present
US	green	$U_{Segment}$	ON	24 V segment circuit supply present
			OFF	24 V segment circuit supply not present
UM	green	U_{Main}	ON	24 V main circuit supply/internal communications power present
			OFF	24 V main circuit supply/internal communications power not present
D	green	Diagnostics	ON	Data transmission active within the station
			Flashing	Data transmission not active within the station
E	red	Error	ON	I/O error, short-circuit/overload of outputs
			OFF	No I/O error
1 ... 4	yellow	O1	ON/OFF	Output is set/not set.
1 ... 8	yellow	I1, I2	ON/OFF	Input is set/not set.

7 Diagnostic indicators for PROFINET

States during operation

LED	Meaning
SF OFF/BF flashing	PROFINET device is waiting for communication with the PROFINET controller.
SF OFF/BF OFF	PROFINET controller was able to establish communication without errors.

States in the event of an error

LED	Meaning	Measure/remedy in the event of an error
SF OFF/BF flashing	The logic communication connection has been interrupted. The PROFINET controller can no longer be accessed.	Check the connection between the PROFINET controller and the PROFINET device. Make sure that the PROFINET device name of the PROFINET device is identical with the configuration.
SF OFF/BF flashing	The PROFINET device is not assigned a PROFINET device name.	Assign the PROFINET device name using the relevant tool.
SF OFF/BF ON	The physical communication path has been interrupted. The PROFINET controller can no longer be accessed.	Restore the physical connection between the PROFINET controller and the PROFINET device.
SF ON/BF OFF	Diagnostic data is available.	Read the diagnostic message using the relevant tool.
SF flashing/ BF flashing	Hardware watchdog has been triggered.	

8 Connection of PROFINET, power supply, actuators, and sensors

8.1 Connecting PROFINET

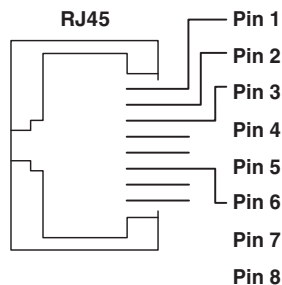


Fig. 4 Pin assignment of the Ethernet socket (RJ45)

Connect PROFINET to the bus coupler via an 8-pos. RJ45 connector.

Only one twisted pair cable with an impedance of 100 Ω may be connected to each Ethernet interface in RJ45 format. The data transmission speed is 100 Mbps. The 100Base-TX port of the bus coupler is able to detect a pair of incorrectly connected receive cables (RD+/RD-) and to correct them using the auto polarity correction function.

For the pin assignment, please refer to the following table:

Pin	Assignment
1	TxD + (transmit data +)
2	TxD - (transmit data -)
3	RxD+ (receive data +)
4	Reserved
5	Reserved
6	RxD- (receive data -)
7	Reserved
8	Reserved



Auto crossover

Both Ethernet interfaces are provided with the auto crossover function.



Shielding

The shielding ground of the connected twisted pair cables is electrically connected with the socket. When connecting network segments, avoid ground loops, potential transfers, and voltage equalization currents via the braided shield.



Observe bending radii
The housing dimensions specified under "Dimensions" refer to the bus coupler with I/O connectors without Ethernet connection. When installing the bus coupler in a control box, observe the bending radii of the cables and the connectors used. If required, use angled RJ45 connectors to maintain these bending radii.

8.2 Terminal point assignment of the Inline connectors

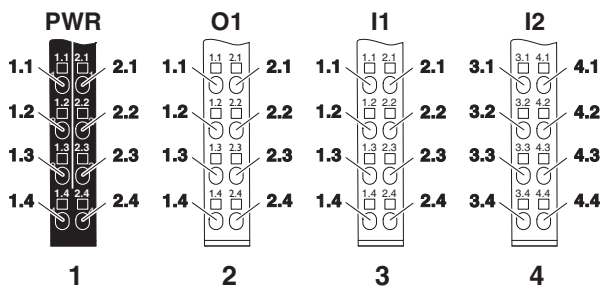


Fig. 5 Terminal point assignment

Terminal point assignment of the power plug PWR (1)

Terminal point	Assignment	Terminal point	Assignment
1.1	U_S	2.1	U_M
1.2	U_{BK}	2.2	U_M
1.3	GND U_{BK}	2.3	GND U_M, U_S
1.4	Functional earth ground (FE)	2.4	Functional earth ground (FE)

NOTE Malfunction

The module is designed exclusively for SELV operation according to IEC 950/EN 60950/VDE 0805.



For information on the power supplies, please refer to the application description of the Rexroth Inline system, material number R911317021.



Terminal points 1.3 and 2.3 on the connector can be jumpered if the same reference potential is to be used for the communications power and the segment voltage.

Terminal point assignment of the output plug O1 (2)

Terminal point	Assignment	Terminal point	Assignment
1.1	OUT1	2.1	OUT2
1.2	GND	2.2	GND
1.3	FE	2.3	FE
1.4	OUT3	2.4	OUT4

Terminal point assignment of the input plug I1 (3)

Terminal point	Assignment	Terminal point	Assignment
1.1	IN1	2.1	IN2
1.2	U_M	2.2	U_M
1.3	GND	2.3	GND
1.4	IN3	2.4	IN4

Terminal point assignment of the input plug I2 (4)

Terminal point	Assignment	Terminal point	Assignment
3.1	IN5	4.1	IN6
3.2	U_M	4.2	U_M
3.3	GND	4.3	GND
3.4	IN7	4.4	IN8

9 Connection example

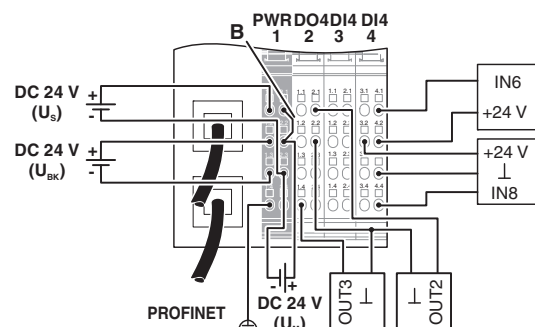


Fig. 6 Connection example

10 Mapping inputs and outputs to PROFINET

The module uses the following input and output data words:

Slot	Data length
Slot 0	-
Slot 1	4 words IN/4 words OUT (local bus master)
Slot 2	1 byte OUT (DO4)
Slot 3	1 byte IN (DI8)

11 Process data

11.1 Terminal point assignment of local outputs to the OUT process data

Byte	0							
Bit	7	6	5	4	3	2	1	0
Slot	Not used				2 (O1)			
Terminal point (signal)					2.4	1.4	2.1	1.1
Terminal point (GND)					2.2	1.2	2.2	1.2
Terminal point (FE)					2.3	1.3	2.3	1.3
Status indicator, LED					4	3	2	1

11.2 Terminal point assignment of the local inputs to the IN process data

Byte	0							
Bit	7	6	5	4	3	2	1	0
Slot	4 (I2)				3 (I1)			
Terminal point (signal)	4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1
Terminal point (GND)	4.3	3.3	4.3	3.3	2.3	1.3	2.3	1.3
Terminal point (24 V)	4.2	3.2	4.2	3.2	2.2	1.2	2.2	1.2
Status indicator, LED	8	7	6	5	4	3	2	1

12 Startup



Make sure you always use the latest version of the GSDML file and the latest documentation for the bus coupler. The latest files can be downloaded at www.boschrexroth.com/electrics.

Default upon delivery/default settings

By default upon delivery, the following functions and features are available:

PROFINET name: No name assigned
IP parameters: None
Module designation: R-IL PN BK DI8 DO4-PAC

Vendor ID: 011F_{hex}
Device ID: 2A02_{hex}

Reset button

The reset button is on the front of the bus coupler.

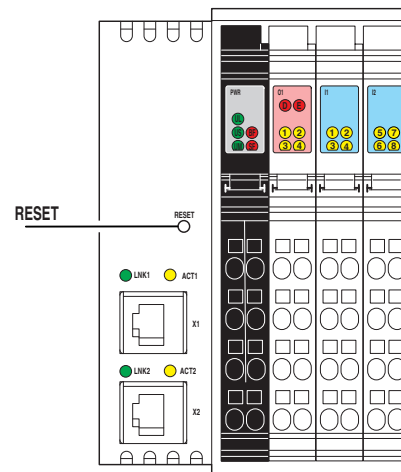


Fig. 7 Reset button

The bus coupler is restarted by pressing the reset button. The outputs of the Inline station are reset. The process image of the inputs is not re-read.

Firmware started

Once you have supplied the bus coupler with power or pressed the reset button, the firmware is started. After completion of the firmware boot process the BF LED is either on or flashing.

13 Parameterization

Parameterization of the PROFINET devices in IndraWorks requires at least IndraWorks Version 11. Install the GSDML file in IndraWorks, menu item:

Extras...Device database.

From IndraWorks Version 12, the GSDML file is already installed in the system.



Make sure you always use the latest version of the GSDML file and the latest documentation for the bus coupler. The latest files can be downloaded at www.boschrexroth.com/electrics.

Parameter

Slot 0: Diagnostic alarms

- PROFINET alarm behavior
 - Local bus diagnostics
 - I/O diagnostics
 - Indicate return of local module
- Local bus settings
 - Automatic start after local bus error
 - Automatic start delay

Slot 1: there are four input data words and four output data words.

Word	Input data	Output data
1	Diagnostic status register	Standard function start register
2	Diagnostic parameter register	Standard function parameter register
3	Extended diagnostic parameter register	Reserved
4	Standard function status register	Reserved

Diagnostic alarms

PROFINET enables the PROFINET device to store diagnostic information together with the error location and error type.

An incoming alarm informs the PROFINET controller that diagnostic information has been stored. The alarms are only transmitted if they have been enabled via parameters during startup.

When the diagnostic information has been removed, an outgoing alarm is transmitted to the controller.

If at least one piece of diagnostic information is stored, the SF LED is on. If no diagnostic information is present, the SF LED is off.

Substitute value behavior

In the event of an local bus error or a device error of the bus coupler, all Inline station outputs (including analog outputs) are set to "0".

14 Physical Device - PDev

The module supports all devices of the PDev according to PROFINET.

PDev is a description of Ethernet interfaces and their features standardized in PROFINET. This includes, for example, the IP and MAC address, diagnostic and neighboring information, and parameterization settings.

15 Link Layer Discovery Protocol - LLDP

The device supports LLDP according to IEEE 802.1 AB and thus enables topology detection of devices that also have LLDP activated.

Advantages of using LLDP:

- Improved error location detection
- Improved device replacement
- More efficient network configuration

The following information is received by or sent to neighbors, as long as LLDP is activated:

- The device sends its own management and connection information to neighboring devices.
- The device receives management and connection information from neighboring devices.

16 Device replacement

Devices can be replaced without having to reconfigure them within the PROFINET network. The station name and address are assigned by the control system to the newly added PROFINET bus coupler using the neighborhood detection function.

17 Applicative system redundancy for process data



Applicative system redundancy is only provided for process data but not for parameter data.

Acyclic communication allows two PROFINET controllers (primary and backup) to communicate with the same bus coupler.

Parallel PCP services are not supported. This means, if a second PROFINET controller tries to access a PCP device while there is another PROFINET controller with a service pending, the second service request is rejected by the bus coupler.

With regard to communication, no distinction is made between the "primary" (process controlling) and the "backup" controller.

18 Failsafe behavior

In the event of a network failure, previously determined I/O values are output.

If PROFINET communication fails, all output process data is set to zero. The local bus continues to run using these values.



Substitute values are not parameterized.

19 Acyclic PROFINET communication

The bus coupler enables acyclic access to intelligent local bus devices (PCP devices) using PROFINET (IL_PNIOWriteRecord function block, IL_PNIOWriteRecord function block).

20 Mailbox communication

The bus coupler supports acyclic mailbox communication. This means specific PLC blocks allow acyclic transmission of firmware services (e. g., Read-Value, PCP, etc.) from the control system to the PROFINET device or PCP device with the IL_PNIOWriteRecord and IL_PNIOWriteRecord PROFINET services.

21 Dynamic configuration on the local bus

Dynamic configuration is the specification and configuration of a maximum configuration. Any subgroup of this maximum configuration can be operated.

A maximum local bus configuration can be specified here. In this configuration, individual local bus devices can be inactivated in the configuration frame (switch code 0004_{hex}) using the "Control Active Configuration" firmware service (0713_{hex}). The device may not remain in the data ring and must be jumpered manually.

Jumpering the devices does not change the position of process data.

Dynamic configuration is only possible through the application.

22 Byte rotation for 16 and 32-channel Inline terminals

To adapt the data format of the 16 and 32-channel Inline terminals to the data format, you can rotate the I/O data arrangement with device parameters. This can only be carried out once and is then valid for all DI16/DO16 and all DI32/DO32 terminals.

22.1 Byte rotation for R-IB IL 24 DI 16... and R-IB IL 24 DO 16...terminals

Default

(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
Assign- ment	Slot	2				1				4				3			
	Terminal point (sig- nal)	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

Rotated

(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
Assign- ment	Slot	4				3				2				1			
	Terminal point (sig- nal)	8.4	7.4	8.1	7.1	6.4	5.4	6.1	5.1	4.4	3.4	4.1	3.1	2.4	1.4	2.1	1.1

22.2 Byte rotation for R-IB IL 24 DI 32... and R-IB IL 24 DO 32...terminals**Default**

(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
Assign- ment	Slot	1								2							
	Terminal point (sig- nal)	2.4	1.4	2.3	1.3	2.2	1.2	2.1	1.1	4.4	3.4	4.3	3.3	4.2	3.2	4.1	3.1

(Byte.Bit) view	Byte	Byte 2								Byte 3							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assign- ment	Slot	3								4							
	Terminal point (sig- nal)	6.4	5.4	6.3	5.3	6.2	5.2	6.1	5.1	8.4	7.4	8.3	7.3	8.2	7.2	8.1	7.1

Rotated

(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
Assign- ment	Slot	4								3							
	Terminal point (sig- nal)	8.4	7.4	8.3	7.3	8.2	7.2	8.1	7.1	6.4	5.4	6.3	5.3	6.2	5.2	6.1	5.1

(Byte.Bit) view	Byte	Byte 2								Byte 3							
	Bit	7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0
Assign- ment	Slot	2								1							
	Terminal point (sig- nal)	4.4	3.4	4.3	3.3	4.2	3.2	4.1	3.1	2.4	1.4	2.3	1.3	2.2	1.2	2.1	1.1