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# IL PN BK DI8 DO4 2SCRJ-PAC

**PROFINET bus coupler, 8 inputs, 24 V DC, 4 outputs, 24 V DC, 500 mA, complete with I/O connectors**



Data sheet  
7649\_en\_04

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## 1 Description

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 fiber optic connection according to SCRJ standard for polymer and HCS (PCF) fibers
- Connection to PROFINET network via SCRJ socket
- Transmission speed of 100 Mbps
- Range for 100 Mbps: 50 m with polymer fiber, 100 m with HCS fiber
- IP parameter setting using the PROFINET controller
- Electrical isolation between Ethernet interface and logic
- Ethernet TCP/IP (management via SNMP)
- Connection of up to 61 other Inline devices
- Connection of a maximum of 16 PCP devices
- Supported protocols: SNMPv1, TFTP, PROFINET, LLDP and MRP (from firmware 3.20)
- 8 digital inputs, 4 digital outputs
- Automatic baud rate detection on the local bus (500 kbps or 2 Mbps)
- Diagnostic and status indicators
- From hardware revision 03:  
Approved for use in zone 2 potentially explosive areas



**WARNING: Explosion hazard when used in potentially explosive areas**

When using the terminal in potentially explosive areas, observe the corresponding notes.



This data sheet is only valid in association with the IL SYS INST UM E user manual.



Make sure you always use the latest documentation.  
It can be downloaded from the product at [phoenixcontact.net/products](http://phoenixcontact.net/products).  
Here you will also find the current GSDML file.

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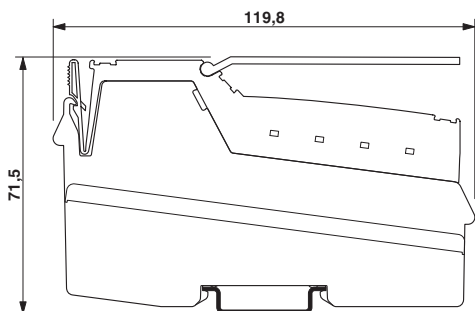
### 3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
PROFINET bus coupler, 8 inputs, 24 V DC, 4 outputs, 24 V DC, 500 mA, complete with I/O connectors	IL PN BK DI8 DO4 2SCRJ-PAC	2878379	1
Accessories	Type	Order No.	Pcs. / Pkt.
Quick mounting end clamp for NS 35/7,5 DIN rail or NS 35/15 DIN rail, with marking option, width: 9.5 mm, color: gray (Assembly)	CLIPFIX 35	3022218	50
Insert strip, Sheet, white, Unlabeled, Can be labeled with: Office printing systems, Plotter: Laser printer, Mounting type: Insert, Lettering field: 62 x 46 mm (Marking)	ESL 62X46	0809502	5
Labeling field, width: 48.8 mm (Marking)	IB IL FIELD 8	2727515	10
Insert strip, Sheet, white, Unlabeled, Can be labeled with: Office printing systems, Plotter: Laser printer, Mounting type: Insert, Lettering field: 62 x 10 mm (Marking)	ESL 62X10	0809492	1
Labeling field, width: 12.2 mm (Marking)	IB IL FIELD 2	2727501	10
End clamp, for assembly on NS 32 or NS 35/7.5 DIN rail (Assembly)	E/UK	1201442	50
Connector set, for Inline bus coupler with I/Os mounted in rows (Plug/Adapter)	IL BKDIO-PLSET	2878599	1
Inline power terminal or boost terminal, complete with accessories (plug and labeling field), 24 V DC, without fuse	IB IL 24 PWR IN/R-PAC	2861674	1
SCRJ fiber optic connector, IP20, duplex, with fast connection technology, for polymer fiber 980/1000 µm, for individual wire diameter 2.2 mm	VS-SCRJ-POF-FA-IP20	1654879	1
SCRJ fiber optic connector, IP20, duplex, with fast connection technology, for HCS fiber 200/230 µm, for individual wire diameter 2.9 mm	VS-SCRJ-HCS-FA-IP20	1654866	1
Fiber optic connector SCRJ, IP20, duplex, with fast connection technology, for PROFINET, for HCS fiber 200/230 µm, for individual wire diameter 2.2 mm	VS-SCRJ-HCS-FA-IP20-PN	1404087	1
Assembled fiber optic cable, break-out cable, HCS fiber 200/230 µm, SCRJ/IP20 on SCRJ/IP20, for installation inside control cabinets, length: 1 m	VS-PC-2XHCS-200-SCRJ/SCRJ-1	1654934	1
Assembled fiber optic cable, break-out cable, HCS fiber 200/230 µm, SCRJ/IP20 on SCRJ/IP20, for installation inside control cabinets, length: 2 m	VS-PC-2XHCS-200-SCRJ/SCRJ-2	1654947	1
Assembled fiber optic cable, break-out cable, HCS fiber 200/230 µm, SCRJ/IP20 on SCRJ/IP20, for installation inside control cabinets, length: 5 m	VS-PC-2XHCS-200-SCRJ/SCRJ-5	1654950	1
SCRJ cutting tool set, for polymer fiber, for field assembly of SCRJ/IP20 and SCRJ/IP67 Push-Pull connectors with fast connection technology, consisting of stripping tool, aramid scissors, SCRJ cutting tool, microscope, 2x SCRJ connectors IP20 (Tools)	VS-SCRJ-POF-KONFTOOL-CUT	1657096	1
SCRJ polishing tool set, for polymer fiber, for field assembly of the SCRJ connector (IP20/IP67) with fast connection technology, with stripping tool, diagonal cutter, aramid scissors, polishing materials, microscope, 2x SCRJ connector IP20 (Tools)	VS-SCRJ-POF-KONFTOOL-POLISH	1658820	1
Refilling set for VS-SCRJ-POF-KONFTOOL-POLISH, consisting of two polishing discs and a polisher (Tools)	VS-SCRJ-POF-POLISH	1656673	1
SCRJ connector set for polymer fiber, for self assembly, consisting of 2 duplex quick mounting connectors with bending protection (Plug/Adapter)	PSM-SET-SCRJ-DUP/2-POF	2708656	1
HCS assembly kit for SCRJ quick mounting connectors, including stripping blade, stripping pliers, aramide yarn scissors, fiber stripper, microscope, fiber cleaving tool for standard HCS and HCS GI fibers, and documentation (Tools)	PSM-HCS-KONFTOOL/SC-RJ	2708876	1

Documentation	Type	Order No.	Pcs. / Pkt.
User manual, English, Automation terminals of the Inline product range	IL SYS INST UM E	-	-
Quick Start Guide, English, for PC Worx	UM QS EN PC WORX	-	-
Quick Start Guide, English, for planning INTERBUS devices in a PROFINET network	UM QS EN PROFINET PROXY IB	-	-
User manual, English, for the Modular Managed Switch System	FL SWITCH MM HS UM E	-	-
Application note, English, Inline terminals for use in zone 2 potentially explosive areas	AH EN IL EX ZONE 2	-	-
Application note, German/English, I/O modules at bus couplers	AH IL BK IO LIST	-	-
Application note, English, Firmware update for devices supporting a TFTP firmware update	AH EN TFTP FIRMWARE UPDATE	-	-
User manual, English, PROFINET basics	UM EN PROFINET SYS	-	-

## 4 Technical data

### Dimensions (nominal sizes in mm)



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

### General data

Color	green
Weight	280 g (with male 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)	80 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

Name	Inline connectors
Connection method	Spring-cage connection
Conductor cross section solid / stranded	0.08 mm <sup>2</sup> ... 1.5 mm <sup>2</sup> / 0.08 mm <sup>2</sup> ... 1.5 mm <sup>2</sup>
Conductor cross section [AWG]	28 ... 16

### Interface PROFINET

Number	2
Connection method	SCRJ socket
Transmission speed	100 MBit/s (acc. to PROFINET standard)
Wavelength	660 nm
Laser protection	Class 1 according to DIN EN 60825-1
Transmission length incl. 3 dB system reserve	min. 50 m (Polymer fiber with F-K 980/1000 230 dB/km at 100 Mbps)

### 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
Conformance class	B
Update rate	min. 1 ms (depending on the size of the bus system)

### Power supply for module electronics

Connection method	Spring-cage connection
Name	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 plug)
Supply voltage range	19.2 V DC ... 30 V DC (including all tolerances, including ripple)
Current consumption	typ. 250 mA (from $U_{BK}$ ) max. 0.83 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 $U_M + U_S$ ; 4 A, maximum, when used in potentially explosive areas.)
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 $U_M + U_S$ ; 4 A, maximum, when used in potentially explosive areas.)
Current consumption from $U_S$	max. 8 A DC

### Power consumption

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

### Digital inputs

Number of inputs	8 (EN 61131-2 type 1)
Connection method	Inline plugs
Connection method	2, 3-wire
Input characteristic curve	IEC 61131-2 type 1
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	Suppressor diode

### Digital outputs

Number of outputs	4
Connection method	Inline plugs
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 $\Omega$ )
Nominal load, lamp	12 W
Signal delay	typ. 1.2 ms
Signal delay when switching on an ohmic nominal load	max. 50 $\mu$ s (In the case of 0.5 A load)
Signal delay when switching off an ohmic nominal load	max. 250 $\mu$ s (In the case of 0.5 A load)
Maximum operating frequency with inductive nominal load	0.5 Hz (1.2 H; 48 $\Omega$ )
Reaction time with short-circuit	1,2 ms
Behavior at voltage switch-off	The output follows the power supply without delay
Limitation of the voltage induced on circuit interruption	approx. -30 V
Output current when switched off	max. 10 $\mu$ 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
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

**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
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**Approvals**

For the latest approvals, please visit [phoenixcontact.net/products](http://phoenixcontact.net/products).



4.1 Mounting position and derating

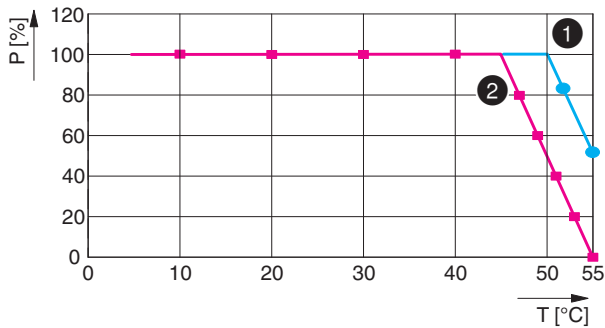


Figure 1 Derating with different mounting positions

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 V/24 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 <sub>M</sub>	24
U <sub>ANA</sub>	3
U <sub>L</sub>	32

The following results from the information given above:

- When used at 55 °C (on horizontal DIN rail)  
The bus coupler can be operated at 55 °C and 24 V when it is mounted horizontally on the DIN rail and with a maximum load 50 %.
- When used at 55 °C (different mounting position)  
The bus coupler can be operated at 55 °C and 24 V in a different mounting position, if the inputs and outputs of the bus coupler are not connected and the IB IL PWR IN/R-PAC Inline power terminal is installed directly behind the bus coupler.

4.2 Optical output power

Type of fiber	Optical output power		
	Min.	Typ.	Max.
980/1000, NA = 0.5 (POF)	-8 dBm	-4.5 dBm	-2 dBm
200/230, NA = 0.37 (HCS)	-19 dBm	-15 dBm	-11 dBm

Type of fiber	Optical receiver sensitivity	
	Min.	Typ.
980/1000, NA = 0.5 (POF)	-23 dBm	-25 dBm
200/230, NA = 0.37 (HCS)	-26.8 dBm	-29.3 dBm

## 5 Internal circuit diagram

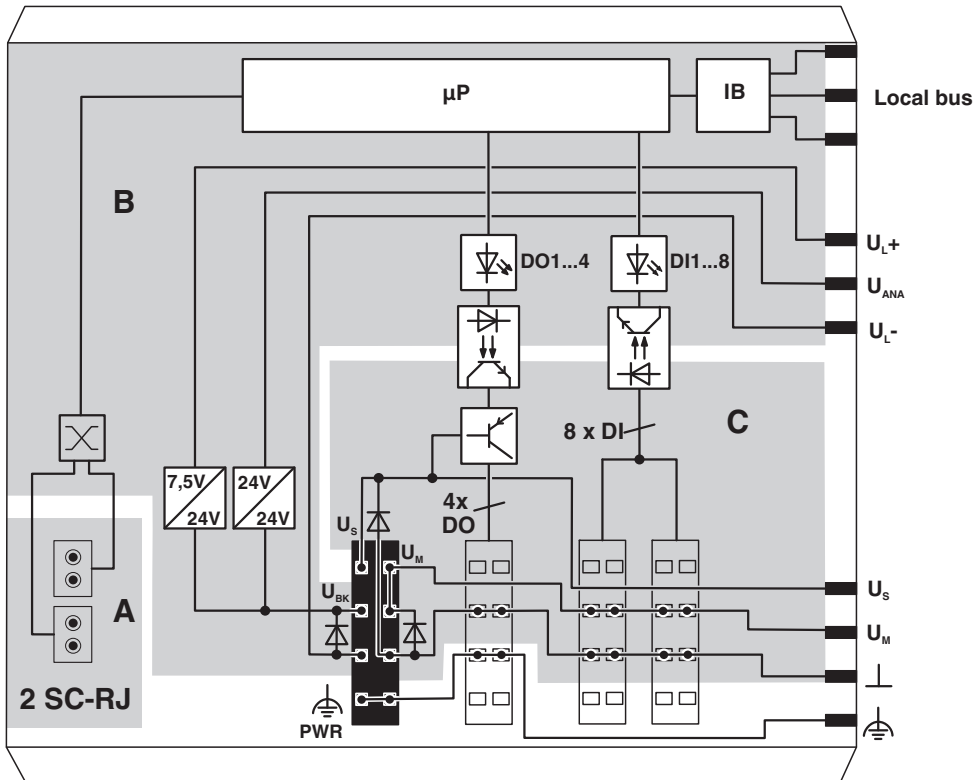








Figure 2 Internal wiring of connections

Key:

-  Microprocessor
-  Protocol chip
-  LED
-  Optocoupler
-  PNP transistor
-  Ethernet switch

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

A: Ethernet interface

B: Logic

C: I/O



Explanation for other used symbols has been provided in the IL SYS INST UM E user manual.

## 6 Local status and diagnostic indicators

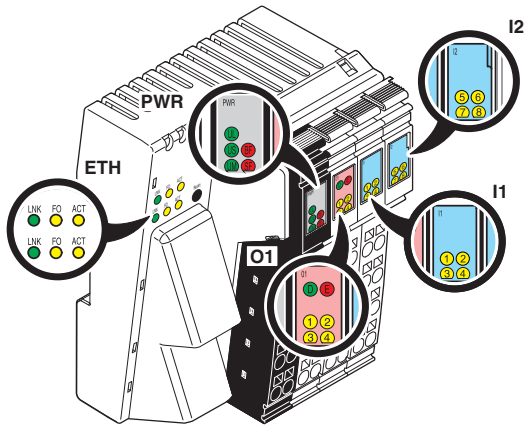


Figure 3 Local status and diagnostic indicators

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
FO 1/2	yellow	Status of the fiber optic path:	ON	Receiving power under 0 dB; the "Maintenance demanded" message is triggered.
			Flashing	Borderline receiving power; the "Maintenance required" message is triggered.
			OFF	Receiving power is OK
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 ( <b>B</b> us <b>F</b> ail)	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	<b>U</b> <sub>Logic</sub>	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	<b>U</b> <sub>Segment</sub>	ON	24 V segment circuit supply present
			OFF	24 V segment circuit supply not present
UM	green	<b>U</b> <sub>Main</sub>	ON	24 V main circuit supply/internal communications power present
			OFF	24 V main circuit supply/internal communications power present
D	green	Diagnostics	ON	Data transmission active within the station
			Flashing	Data transmission not active within the station

Designation	Color	Meaning	State	Description
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 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

Connect PROFINET to the bus coupler via an SCRJ plug.

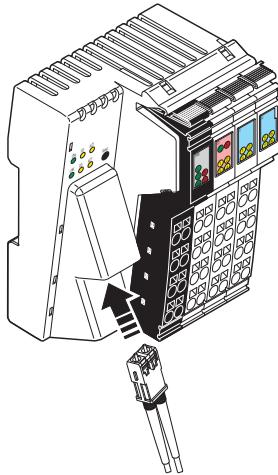


Figure 4 Connecting PROFINET via SCRJ plug



**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.

8.2 Terminal point assignment of the Inline plugs

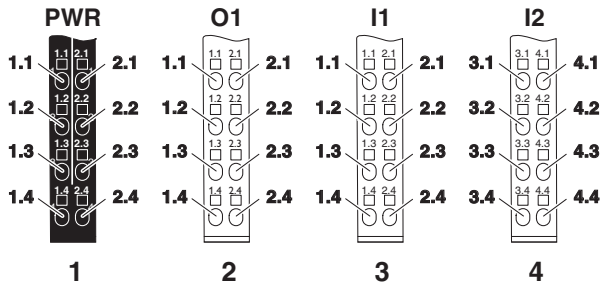


Figure 5 Terminal point assignment

Terminal point assignment of the power connector (1)

Terminal point	Assignment	Terminal point	Assignment
1.1	U <sub>S</sub>	2.1	U <sub>M</sub>
1.2	U <sub>BK</sub>	2.2	U <sub>M</sub>
1.3	GND U <sub>BK</sub>	2.3	GND U <sub>M</sub> , U <sub>S</sub>
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 IL SYS INST UM E user manual.



Terminal points 1.3 and 2.3 on the plug 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 connector (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 connector (3)

Terminal point	Assignment	Terminal point	Assignment
1.1	IN1	2.1	IN2
1.2	U <sub>M</sub>	2.2	U <sub>M</sub>
1.3	GND	2.3	GND
1.4	IN3	2.4	IN4

Terminal point assignment of the input connector (4)

Terminal point	Assignment	Terminal point	Assignment
3.1	IN5	4.1	IN6
3.2	U <sub>M</sub>	4.2	U <sub>M</sub>
3.3	GND	4.3	GND
3.4	IN7	4.4	IN8

9 Connection example

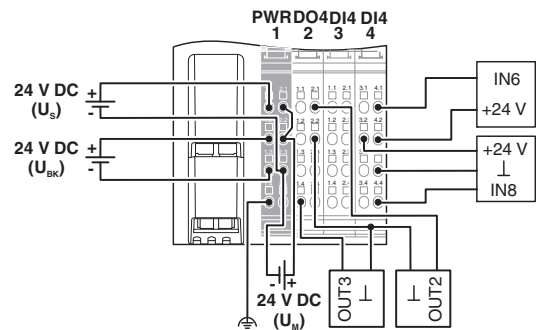


Figure 6 Connection example

10 Connection note

The bus coupler does not support auto negotiation. The bus coupler is set to 100 Mbps and full duplex. If the FL SWITCH MM HS switch is to be used with the FL IF 2POF SCRJ-D plug-in module, please observe: that communication can take place, configure the port on the switch that is used for the bus coupler to 100 Mbps and full duplex only.

## 11 Notes on using the terminal block in potentially explosive areas



### WARNING: Explosion hazard

Please make sure that the following notes and instructions are observed.

### Approval according to EC directive 94/9/EC

Ⓢ II 3 G Ex nA IIC T4 Gc X

### Installation notes

- This Inline terminal is a category 3 device and is suitable for installation in the potentially explosive areas of zone 2.  
The device meets the requirements of EN 60079-0:2009 and EN 60079-15:2010.
- The Inline terminal must only be installed, operated, and maintained by qualified personnel.
- Please follow the installation instructions given in the IL SYS INST UM E user manual and the package slip.
- When installing and operating the device, the applicable safety directives (including national safety directives), accident prevention regulations, as well as general technical regulations, must be observed.
- For the safety data, please refer to the corresponding documentation (user manual, data sheet, package slip) and the certificates (declaration of conformity and other approvals, if applicable).
- Access to the circuits inside the Inline terminal is not permitted. Do not repair the Inline terminal by yourself but replace it with a terminal of the same type. Repairs may only be performed by the manufacturer. The manufacturer is not liable for damage resulting from noncompliance.
- The IP20 degree of protection (EN 60529) of the device is intended for a clean and dry environment.
- Do not subject the Inline terminal to mechanical strain and/or thermal loads, which exceed the limits specified in the product documentation.
- The Inline terminal is not designed for use in atmospheres with a danger of dust explosions. If dust is present, install the device in suitable, approved housing. Please note the surface temperature of the housing.

### Installation in zone 2

- Observe the specified conditions for use in potentially explosive areas.
- Install the device in a suitable approved housing (with at least IP54 degree of protection) that meets the requirements of EN 60079-15. Observe the requirements of EN 60079-14.
- In potentially explosive areas, only snap the Inline terminal onto or off the rail and connect the cables when the power is switched off.
- Connect the DIN rail to the protective earth ground.
- In zone 2, only connect devices to the supply and signal circuits that are suitable for operation in potentially explosive areas of zone 2 and the conditions at the installation location.

### Restrictions/limit values

- Only Inline terminals that are approved for use in potentially explosive areas may be assembled on this Inline terminal.**  
Before using an Inline terminal in a zone 2 potentially explosive area, check whether it has been approved for installation within this area.  
For a list of terminals that are approved for the potentially explosive areas of zone 2, please refer to the AH EN IL EX ZONE 2 application note.
- Please ensure that the **supplies of  $U_M$  and  $U_S$**  at the bus coupler do not exceed **4 A**.
- Please make sure that the **maximum permissible current of 4 A** flowing through potential jumpers  $U_M$  and  $U_S$  (total current) is not exceeded when using the Inline terminals in potentially explosive areas.
- Also ensure that the **maximum permissible current of 0.8 A** flowing through potential jumper  $U_L$  is not exceeded.

## 12 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)

## 13 Process data

### 13.1 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

### 13.2 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

## 14 Startup

### 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:	IL PN BK DI8 DO4 2SCRJ
Vendor ID:	00B0 <sub>hex</sub>
Device ID:	000E <sub>hex</sub>

### Reset button

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

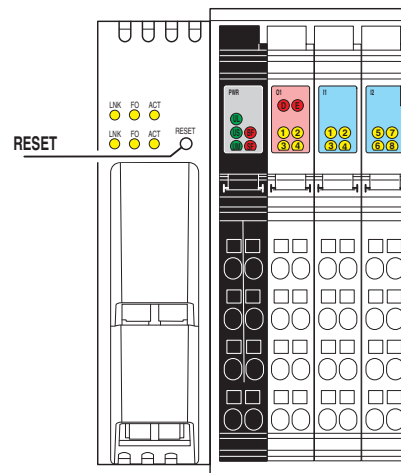


Figure 7 Reset button

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.



**Documentation**



How to assign the PROFINET names and the IP address as well as how to startup a device within a PROFINET system is described in the following documents:

- "PC WORX" quick start guide
- "Configuring INTERBUS devices in a PROFINET network using the example of STEP 7" quick start guide

For the order designations, please refer to the ordering data.

The documentation can be found on the Internet at [phoenixcontact.net/products](http://phoenixcontact.net/products).

**15 Parameterization**

**PC Worx**

Parameterization of the PROFINET devices in PC Worx requires at least PC Worx version 5.0. An online data sheet of the device with important technical data and a configuration file are integrated into PC Worx. If several versions of the configuration file are available, make sure that you are working with the file version that corresponds to the firmware/hardware version being used.

**Other tools**

The PROFINET device is parameterized using the configuration tool of the PROFINET controller. Please integrate the corresponding GSDML file of the bus coupler into the relevant software tool (STEP 7/HW Config, ...).



Make sure you always use the latest version of the FDCML/GSDML file and the latest documentation for the bus coupler. The latest files and documentation can be found on the Internet at [phoenixcontact.net/products](http://phoenixcontact.net/products).

**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: -

**PC Worx:** All registers are mapped to system variables.

**Step 7:** There are four words of input data and four words of output data.

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

## 16 Firmware update

In order to update the firmware of the bus coupler, the device must be provided with a firmware container via a TFTP server. You can use any TFTP server, e.g., Factory Manager.



The TFTP FIRMWARE UPDATE application note describes how to update the firmware using the Factory Manager. This document can be found on the Internet at [phoenixcontact.net/products](http://phoenixcontact.net/products).



When updating to firmware version 3.20, the device name and all IP addresses stored in the retentive memory will be lost.

## 17 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.



Device replacement is possible for Phoenix Contact PROFINET controllers from firmware version 3.0 onwards.

## 18 Applicative system redundancy for process data



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

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

Parallel PCP services are not supported. This means, if a second IO controller tries to access a PCP device while there is another IO 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.

## 19 Failsafe behavior

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.

## 20 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<sub>hex</sub>) using the "Control Active Configuration" firmware service (0713<sub>hex</sub>). 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.

## 21 Byte rotation for 16 and 32-channel Inline terminals with a SIMATIC® S7 controller

To adapt the data format of the 16 and 32-channel Inline terminals to the data format of a SIMATIC® S7 controller, you can rotate the I/O data arrangement with device parameters.

This adaptation can only be made once and is then valid for all DI16/DO16 and all DI32/DO32 terminals.

### 21.1 Byte rotation for IB IL 24 DI 16... and IB IL 24 DO 16... terminals

#### Default

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(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
Slot		4				3				2				1			
Terminal point		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

#### Rotated

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(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
Slot		2				1				4				3			
Terminal point		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

**21.2 Byte rotation for IB IL 24 DI 32... and  
IB IL 24 DO 32... terminals**

**Default**

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(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
Slot		4								3							
Terminal point		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

(Word.bit) view	Word	Word 1															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(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
Slot		2								1							
Terminal point		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

**Rotated**

(Word.bit) view	Word	Word 0															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(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
Slot		1								2							
Terminal point		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

(Word.bit) view	Word	Word 1															
	Bit	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
(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
Slot		3								4							
Terminal point		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