miface PN

Universal Interface
Profinet IO <-> Serial Interface RS232/485/422

User Manual

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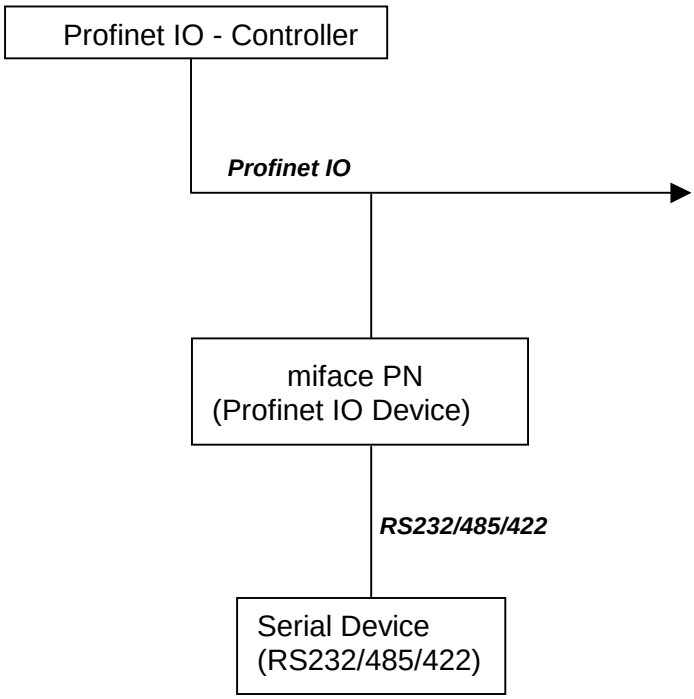
1 General

With this universal device Profinet data can be transmitted to a serial RS interface and data frames received from a serial RS interface are transferred to Profinet.

The mechanical design is laid out for top-hat rail mounting.

2 System Overview



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3 Technical Information

General

Interface 1:	2 x Profinet IO (with integrated switch)
Baud rate:	100 Mbit/s
Standards:	IEC 61158 / 61784 Profinet IO device RT (conformance class B) Profinet IO device IRT (conformance class C)
Features:	- Base: Siemens ERTEC200 - Real-time classes 1, 2 and 3 - RTA, LLDP, SNMP, MIB-II, LLDP-MIB - MRP (media redundancy) - DCP - Fast Startup - Send clock = 0.25, 0.5, 1, 2, 4 ms - Clock divider = 1…512 (RT), 1…16 (IRT) - Output data width = 0…250 bytes - Input data width = 0…250 bytes - Vendor-/Device-ID = $01CF_h$ / 0001_h
Interface 2:	RS232 or RS485 or RS422 (selectable via DIP switches)
Baud rate:	1.2 kBaud…115.2 kBaud
Data formats:	8N1, 8E1, 8O1, 7N2
Frame length:	Transmit: 1…248 characters Receive: 1…248 characters (frame end detection via timeout)
Operating voltage:	24 VDC ± 20%
Power consumption:	Approximately 100 mA (at 24 V DC)
Housing:	Aluminium profile
Housing size:	26 x 105 x 84 mm (W x H x D)
Mounting:	Top-hat rail mount to 35 mm DIN rail
Protection:	Front panel: IP 00
Operating temperature:	0…+50 °C
Storage temperature:	-25…+60 °C

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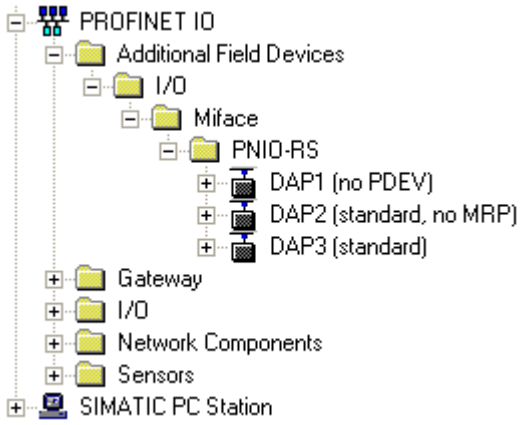
3.1 Configuration of the Profinet Controller

The Profinet controller must be configured properly in order to communicate with the Profinet device.

The following descriptions refer to the "HW Config" tool from Siemens and are intended to represent the principle. This works of course with the tools of other manufacturers.

First, the GSDML file (“GSDML-V2.2-microSYST-01CF-MifacePNIO-....xml“) has to be added to the „device catalogue“ of the configuration tool (menu item „Options/Install GSD File...“). Then, the interface is shown in the catalogue view as follows:



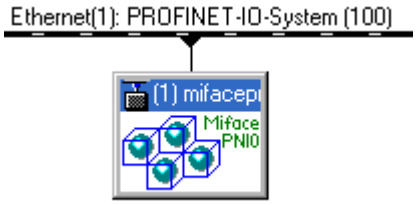
Now you can choose between 3 different „Device Access Points“:

- DAP1 (no PDEV),
  if your Profinet controller does not know a „physical device“
  (usually only with older Profinet controllers)

- DAP2 (standard, no MRP),
  if the MRP ability of the interface shall not be activated.

- **DAP3 (standard)**,
  if the MRP ability of the interface shall be activated.

„Drag“ the needed „DAP“ to your Profinet system:



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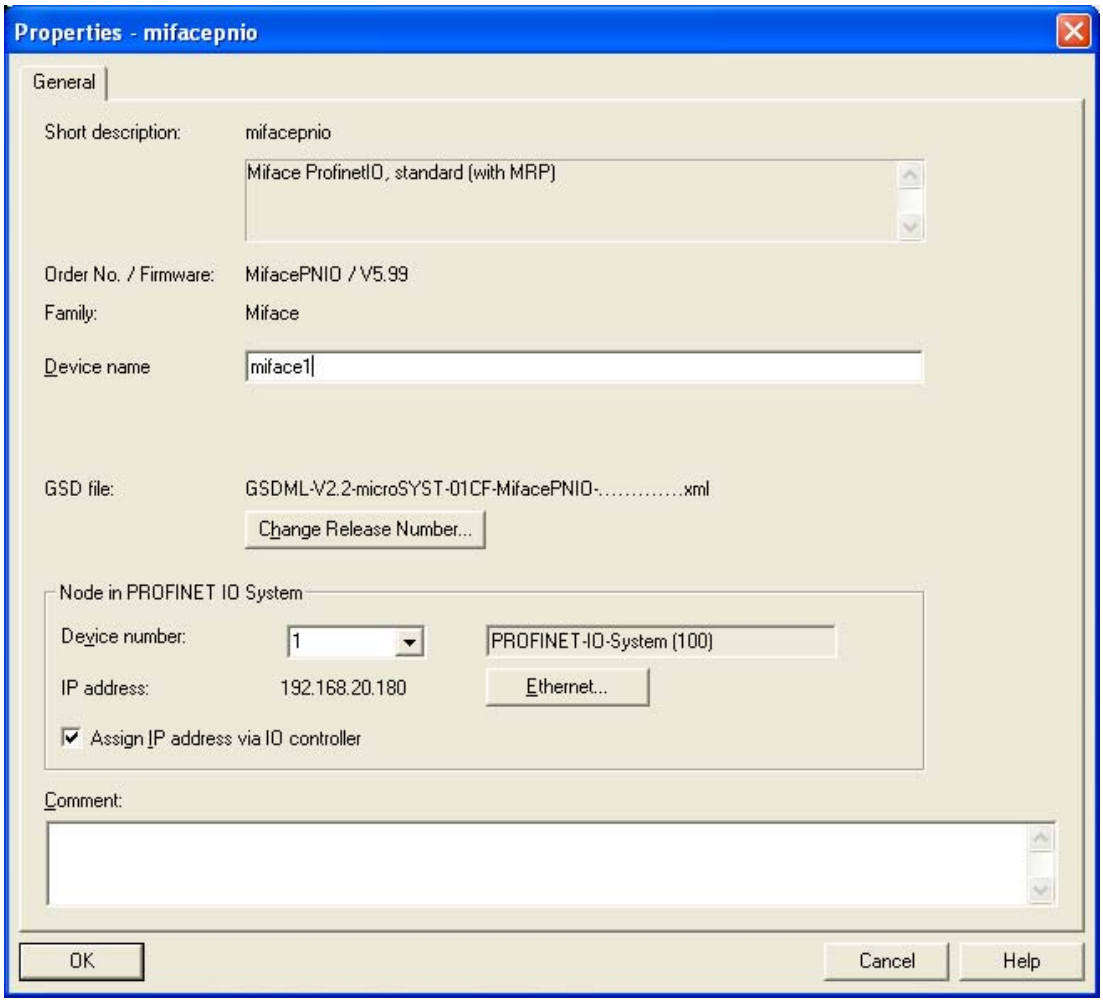
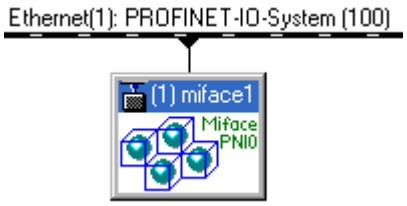
Consider a meaningful name for the device and rename the interface (here “**miface1**”) accordingly:





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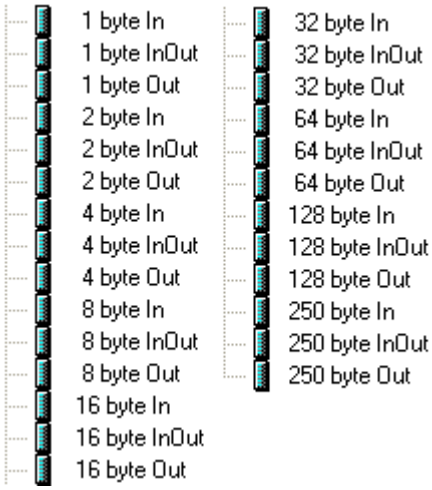
In the next step the I/O data width of the cyclic Profinet communication must be defined.

The output data width must be at least 2 bytes higher than the largest data frame, that shall be transmitted via the RS interface.
(If no RS frames have to be sent, the output data width can be set to 0.)

The input data width must be at least 2 bytes higher than the largest data frame, that shall be received via the RS interface.
(If no RS frames have to be received, the input data width can be set to 0.)

There are Profinet IO modules with a data width of 1…250 bytes available:



Adjust the necessary “total I/O data width” with any combination of the modules above (max. 4). Therefore “drag” the I/O-modules into the slots of the Profinet interface and obey that a maximum of 250 output- and 250 input-bytes are allowed.

Example: 240 bytes output, 240 bytes input

Slot	Module	Order number	I Address	Q address
0	*miface1*	*MifacePNIO*		
X1	*Interface*			
X1 P1	*Port 1*			
X1 P2	*Port 2*			
1	128 byte InOut		0...127	0...127
2	64 byte InOut		128...191	128...191
3	32 byte InOut		192...223	192...223
4	16 byte InOut		224...239	224...239

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Example: 40 bytes output, 16 bytes input

Slot	Module	Order number	I Address	Q address
0	*miface1*	*MifacePNIO*		
X1	*Interface*			
X1 P1	*Port 1*			
X1 P2	*Port 2*			
1	32 byte Out			0...31
2	8 byte Out			32...39
3	16 byte In		0...15	
4				

Do not forget to define the I/O-addresses according to your needs!

The setting “Slot X1 / IO Cycle / Update time” should be 8 ms at least (avoid unnecessary network load)!

After finishing the Profinet configuration, it must still be loaded into the Profinet controller:

-  „Station/Save and Compile“
-  „PLC/Download...“

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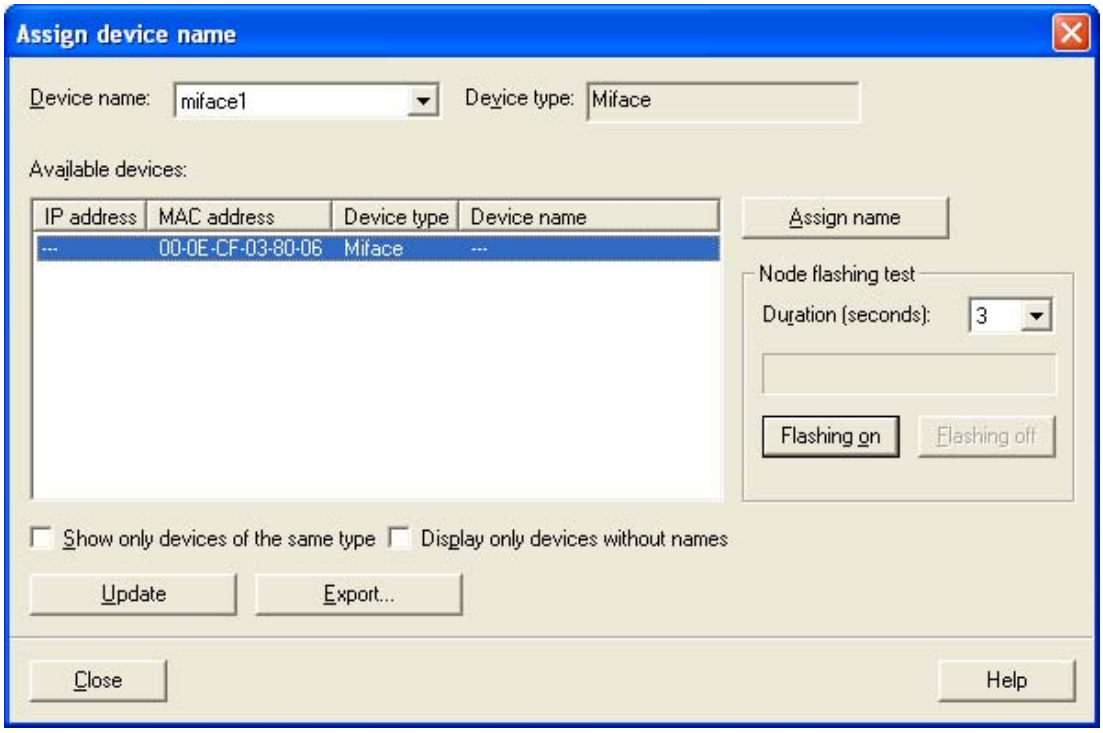
3.2 Profinet Device: Assign Name

The Profinet device must be assigned (one time) the device name, which also was chosen in the Profinet controller configuration ("**miface1**" in the example above).

For this, connect the device to the Profinet network and establish its power supply.

Start the tool for setting the device name:

- Mark(click) the concerned device in the bus overview
- Select the menu item „PLC/Ethernet/Assign Device Name...“
- Mark(click) the line with the corresponding device (see MAC-address)
- Click „Assign name“
- Close window



Tip: If you want to find the device of the marked line, you can click on „Flashing on“. The LED 1 (green) of the corresponding interface starts to blink then.

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3.3 Start of Profinet Communication

After power-on of the device, the connection between the Profinet controller and the Profinet device is established automatically (this can last up to approximately 10 seconds). To let this happen, the PN controller must be correctly configured and the PN device must have the matching name.

The LED 2 (red) of the interface goes out, as soon as the Profinet connection is established.

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3.4 Send Data Frame (Profinet Output -> Serial Interface)

Profinet Output Data					
Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**...**	**Byte n**
Toggle byte	Frame length	Frame byte 1	Frame byte 2		Frame byte (n-2)

In order to transmit a frame via the serial interface, the individual frame bytes must be entered at the Profinet side in output bytes 3 through n. **After** the frame length has been entered (output byte 2), the toggle byte (output byte 1) must be changed in order to start transmission.

The toggle byte is not checked again until the current frame has been transmitted over the serial interface. Transmission duration can be estimated based upon frame length and baud rate.

Example:

Transmission of two frames (“AB” and “CD”) one after the other in rapid succession to the RS interface.

	Output (hex)			
Procedure	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**
1. Start of the Profinet communication	00	00	00	00
2. Enter frame data	00	02	41 (’A’)	42 (’B’)
3. Transmit frame (’AB’) to interface	01	02	41 (’A’)	42 (’B’)
4. Wait for transmission (*)	01	02	41 (’A’)	42 (’B’)
5. Enter data for next frame	01	02	43 (’C’)	44 (’D’)
6. Transmit next frame (’CD’)	02	02	43 (’C’)	44 (’D’)
7. Wait for transmission (*)	02	02	43 (’C’)	44 (’D’)

(*) Frame transmission time = frame length x character transmission time
character transmission time = *bz* / baud rate
bz = 10 at data format „8N1“ and „7N2“
bz = 11 at data format „8E1“ or „8O1“

Example: Frame length = 20 characters, data format 8N1, 9600 baud
=> frame transmission time = 20 x (10 / 9600) s = 21 ms

Moreover, the additional delay caused by the Profinet communication (for example IO cycle duration) must be considered!

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3.5 Receive Data Frame (Serial Interface -> Profinet Input)

Profinet Input Data					
Byte 1	**Byte 2**	**Byte 3**	**Byte 4**	**...**	**Byte n**
Toggle byte	Frame length	Frame byte 1	Frame byte 2		Frame byte (n-2)

Each time a frame has been received via the serial RS interface (frame end recognized by means of timeout), received data bytes are entered as input bytes 3 through n, and the frame length is entered as input byte 2. Finally the toggle byte is increased by 1.

Thus only the toggle byte needs to be monitored at the Profinet controller side. As soon as it changes, data of the received frame can be read out.

There must be sufficient time between the frames, so that the RS receive timeout can expire and evaluation at PN controller side can be finished in time!

Example:
Two frames (“Hallo” and “Welt”) are received via the RS interface.

	Input (hex)						
Procedure	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**	**Byte 6**	**Byte 7**
1. Initialisation of Profinet communication	00	00	00	00	00	00	00
2. Receive frame (’Hallo’)	01	05	48 (’H’)	61 (’a’)	6C (’l’)	6C (’l’)	6F (’o’)
3. Receive frame (’Welt’)	02	04	57 (’W’)	65 (’e’)	6C (’l’)	74 (’t’)	XX

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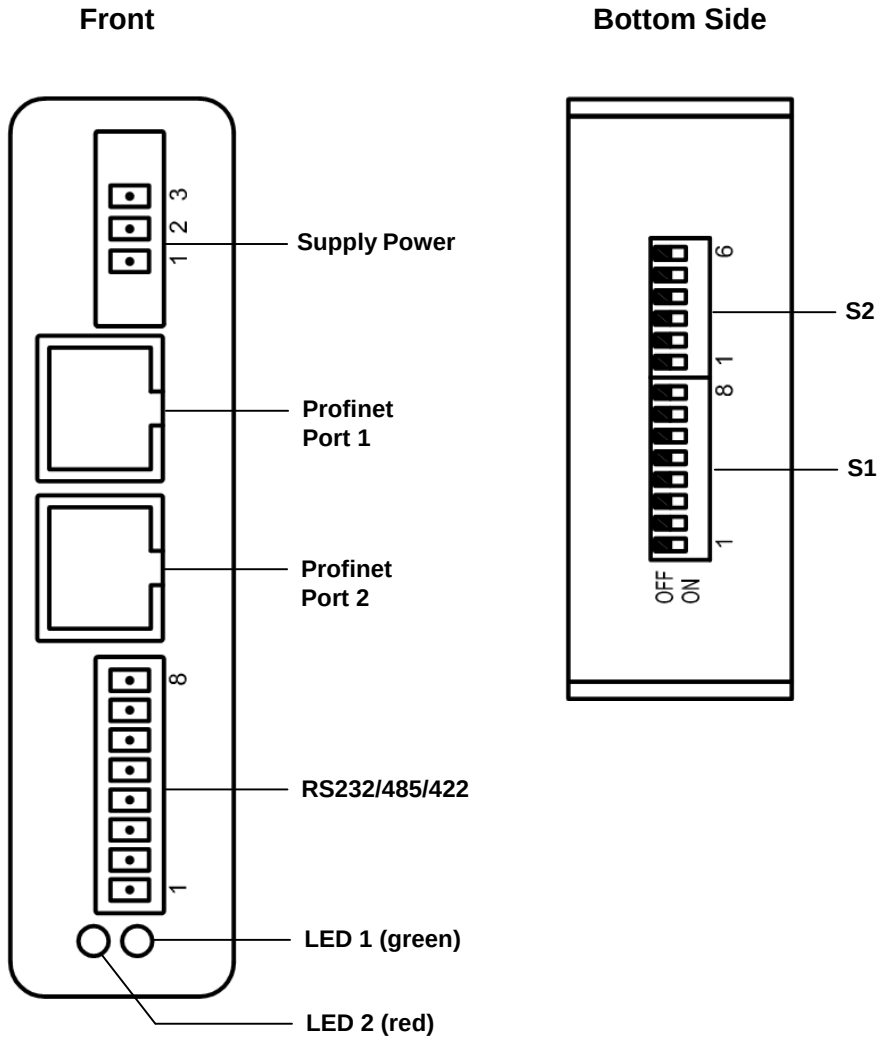
4 Connector Pin Assignments



4.1 LEDs

LED 1, RUN (green)	Normal: Normal with DCP signalling: Hardware error:	On Blinking Off
LED 2, ERROR (red)	No Profinet connection: Cyclic Profinet communication runs:	On Off

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4.2 Connectors

Supply Power

Pin	Assignment
1	+24 VDC
2	GND
3	PE

Profinet (Port1, Port2)

Pin	Assignment
1	Tx +
2	Tx -
3	Rx +
4	n.c.
5	n.c.
6	Rx -
7	n.c.
8	n.c.

RS232/485/422

Pin	RS232	RS485	RS422
1	RxD		
2	TxD		
3	GND	GND	GND
4		Rx/Tx +	Rx +
5		Rx/Tx -	Rx -
6			Tx +
7			Tx -
8	PE	PE	PE

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4.3 Switches

DIP Switch S1

Baud rate	DIP 1	DIP 2	DIP 3
1200	OFF	OFF	OFF
2400	ON	OFF	OFF
4800	OFF	ON	OFF
9600	ON	ON	OFF
19200	OFF	OFF	ON
38400	ON	OFF	ON
57600	OFF	ON	ON
115200	ON	ON	ON

Data format	DIP 4	DIP 5
8 / N / 1	OFF	OFF
8 / E / 1	ON	OFF
8 / O / 1	OFF	ON
7 / N / 2	ON	ON

Receive timeout	DIP 6
short	OFF
long	ON

The receive timeout specifies the time, after a receive data frame is considered to be finished and to be reported to Profinet (duration after the last received byte). The interval of the single data frame bytes among each other must not exceed this time, otherwise the frame end would be identified too early.

Baud rate [Bit/s]	Receive timeout (approx.) [ms]	
	short	long
1200	29	200
2400	16	100
4800	9	50
9600	6	25
19200	4	13
38400	3	10
57600	3	10
115200	3	10

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RS422/485 - Mode	DIP 7
RS485	OFF
RS422	ON

In RS485 mode, the receiver it deactivated during transmission.
In RS422 mode, the receiver is always active.

PN-IP-Test	DIP 8
Off	OFF (= normal, do not change!)
On	ON (only for production test)

Note:
The DIP switch settings of S1 are read in only once during a restart (reset).

DIP Switch S2

RS Interface Selection	DIP1	DIP2	DIP3	DIP4	DIP5	DIP6
RS232	ON	OFF	OFF	OFF	OFF	OFF
RS485 without bus termination	OFF	ON	ON	ON	OFF	OFF
RS485 with bus termination	OFF	ON	ON	ON	ON	ON
RS422 without RX bus termination	OFF	ON	OFF	OFF	OFF	OFF
RS422 with RX bus termination	OFF	ON	OFF	OFF	ON	ON

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5 Appendix

5.1 Declaration of EC-Conformity

EG-Konformitätserklärung
Declaration of EC-Conformity

Produktbezeichnung: **miface PN**
Product: Interface Profinet I/O - RS

Hersteller:
Manufacturer: microSYST Systemelectronic GmbH
Zur Centralwerkstätte 10
D-92637 Weiden

Das bezeichnete Produkt stimmt mit der folgenden Europäischen Richtlinie überein: We herewith confirm that the above mentioned product meets the requirements of the following standard:		**Die Übereinstimmung des bezeichneten Produktes mit den Vorschriften der Richtlinie wird nachgewiesen durch die vollständige Einhaltung folgender Normen:** The correspondance of the above mentioned product with these requirements is proved by the fact that these products meet with the following single standards:
Nummer	**Bezeichnung**	**Europäische Norm**
2004/108/EG	**Elektromagnetische Verträglichkeit (EMV)**	EN61000-6-2:2006
		EN61000-6-3:2007

Weiden, den 25.Oktober 2010

ppa. H. Kilian

Harald Kilian

Prokurist
Authorized Signatory

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5.2 Guarantee

The device is guaranteed for the duration specified in the “General Terms and Conditions” regarding manufactured products and services rendered for the electrical industry against defects which existed at the time the device was delivered to the buyer.

The device is subject to technical change without notice. Errors and omissions are accepted. No claims can be honored for the shipment of a new product. The buyer is required to make notification of defects within 2 weeks after identification of such. Non-observance of notification requirements is equated with acceptance of the defect.

Defects and their symptoms must be described as accurately as possible in order to allow for reproducibility and elimination. The buyer must provide for access to all required and/or useful information regarding defects at no charge, as well as to the affected devices, and must make all of the required data and machine time available free of charge.

The guarantee does not cover defects, which result from non-observance of the prescribed conditions of use, or from improper handling.

If the device has been placed at the disposal of the buyer for test purposes and has been purchased subsequent to such testing, both parties agree that the product is to be considered “used” and that it has been purchased “as is”. No guarantee claims may be made in such cases.

The “General Terms and Conditions” regarding manufactured products and services rendered for the electrical industry apply as well.

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5.3 Versions Overview

Version	Date	Comment
1.00	4-4-12	Nickl, Kreuzer: Document created

Certified per **DIN EN ISO 9001:2008**.

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