IPN 021

S-DIAS PROFINET I/O Slave

Instruction Manual

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Translation of the Original Instructions

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S-DIAS Profinet I/O Slave Module IPN 021

with 1 Profinet I/O IN

1 Profinet I/O OUT

The S-DIAS Profinet I/O slave module IPN 021 slave module is an interface module between the S-DIAS control system and PROFINET bus.

Contents

1 Introduction

1.1 Target Group/Purpose of this Operating Manual

This operating manual contains all information required for the operation of the product.

This operating manual is intended for:

- Project planners
- Technicians
- Commissioning engineers
- Machine operators
- Maintenance/test technicians

General knowledge of automation technology is required.

Further help and training information, as well as the appropriate accessories can be found on our website www.sigmatek-automation.com.

Our support team is happily available to answer your questions.
Please see our website for our hotline number and business hours.

1.2 Important Reference Documentation

This and additional documents can be downloaded from our website or obtained through support.

1.3 Contents of Delivery

1x IPN 021

2 Basic Safety Directives

2.1 Symbols Used

The following symbols are used in the operator documentation for warning and danger messages, as well as informational notes:

DANGER

Danger indicates that death or serious injury **will occur**, if the specified measures are not taken.

⇨ To avoid death or serious injuries, observe all guidelines.

Danger indique une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

WARNING

Warning indicates that death or serious injury **can** occur, if the specified measures are not taken.

⇨ To avoid death or serious injuries, observe all guidelines.

Avertissement d'une situation dangereuse qui, faute de prendre les mesures adéquates, **entraînera** des blessures graves, voire mortelles.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

CAUTION

Caution indicates that moderate to slight injury **can** occur, if the specified measures are not taken.

⇨ To avoid moderate to slight injuries, observe all guidelines.

Attention indique une situation dangereuse qui, faute de prendre les mesures adéquates, **peut** entraîner des blessures assez graves ou légères.

⇨ Respectez toutes les consignes pour éviter des blessures graves, voire mortelles.

INFORMATION

Information

⇨ Provides important information on the product, handling or relevant sections of the documentation, which require attention.

2.2 Disclaimer

INFORMATION

The contents of this operating manual were prepared with the greatest care. However, deviations cannot be ruled out. This operating manual is regularly checked and required corrections are included in the subsequent versions. The machine manufacturer is responsible for the proper assembly, as well as device configuration. The machine operator is responsible for safe handling, as well as proper operation.

The current operating manual can be found on our website. If necessary, contact our support.

Subject to technical changes, which improve the performance of the devices. The following operating manual is purely a product description. It does not guarantee properties under the warranty.

Please thoroughly read the corresponding documents and this operating manual before handling a product.

SIGMATEK GmbH & Co KG is not liable for damages caused through, non-compliance with these instructions or applicable regulations.

2.3 General Safety Directives

The Safety Directives in the other sections of this operating manual must be observed. These instructions are visually emphasized by symbols.

INFORMATION

According to EU Directives, the operating manual is a component of a product.

This operating manual must therefore be accessible in the vicinity of the machine since it contains important instructions.

This operating manual should be included in the sale, rental or transfer of the product, or its online availability indicated.

Regarding the requirements for Safety and health connected to the use of machines, the manufacturer must perform a risk assessment in accordance with machine directives 2006/42/EG before introducing a machine to the market.

Operate the unit with devices and accessories approved by SIGMATEK only.

CAUTION

Handle the device with care and do not drop or let fall.

Prevent foreign bodies and fluids from entering the device.

The device must not be opened!

Manipulez l’appareil avec précaution et ne le laissez pas tomber.

Empêchez les corps étrangers et les liquides de pénétrer dans l’appareil.

L’appareil ne doit pas être ouvert!

If the device does not function as intended or has damage that could pose a danger, it must be replaced!

En cas de fonctionnement non conforme ou de dommages pouvant entraîner des risques, l'appareil doit être remplacé!

The module complies with EN 61131-2.

In combination with a facility, the system integrator must comply with EN 60204-1 standards.

For your own safety and that of others, compliance with the environmental conditions is essential.

Le module est conforme à la norme EN 61131-2.

En combinaison avec une équipement, l’intégrateur de système doit respecter la norme EN 60204-1.

Pour votre propre sécurité et celle des autres, le respect des conditions environnementales est essential.

2.4 Software/Training

The application is created with the software LASAL CLASS 2 and LASAL SCREEN Editor.

Training for the LASAL development environment, with which the product can be configured, is provided. Information on our training schedule can be found on our website.

3 Standards and Directives

3.1 Directives

The product was constructed in compliance with the following European Union directives and tested for conformity.

3.1.1 EU Conformity Declaration

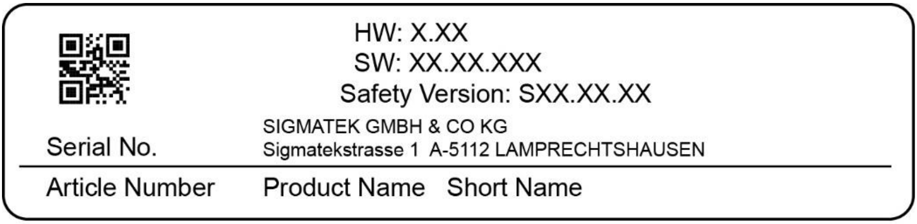
EU Declaration of Conformity

The product IPN 021 conforms to the following European directives:

- **2014/35/EU** Low-voltage Directive
- **2014/30/EU** Electromagnetic Compatibility (EMC Directive)
- **2011/65/EU** “Restricted use of certain hazardous substances in electrical and electronic equipment” (RoHS Directive)

The EU Conformity Declarations are provided on the SIGMATEK website. See Products/Downloads or use the search function and the keyword “EU Declaration of Conformity”.

4 Type Plate



HW: X.XX
SW: XX.XX.XXX
Safety Version: SXX.XX.XX

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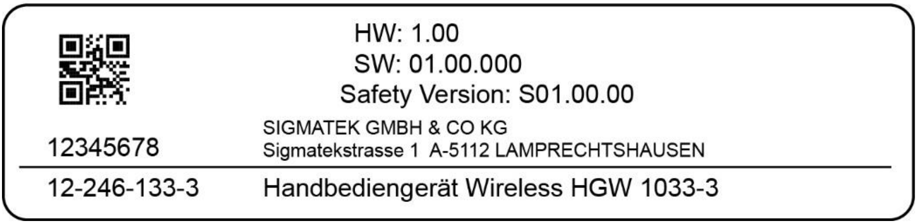
Sigmatekstrasse 1 A-5112 LAMPRECHTSHAUSEN

Serial No.

Article Number Product Name Short Name

Exemplary nameplate (symbol image)



HW: 1.00
SW: 01.00.000
Safety Version: S01.00.00

SIGMATEK GMBH & CO KG
Sigmatekstrasse 1 A-5112 LAMPRECHTSHAUSEN

12345678

12-246-133-3 Handbediengerät Wireless HGW 1033-3

HW: Hardware version
SW: Software version

5 Technical Data

5.1 Performance Data

Bus Controller	Profinet I/O (lt. Profinet I/O Specification V2.3)	
Configuration	2x shielded Tyco Mini I/O port	
Cable length	maximum of 100 m between two stations (segment length)	
Minimum cyclic time	1 ms	
Maximum input data per cycle [1]	1440	
Maximum output data per cycle [1]	1440	
Data transfer rate	100 Mbits/s Full duplex auto negotiation auto crossover	
Diagnosis	module status	per status LED and SW status
	bus function	per status LED and SW status
Supported conformity classes	Class A, Class B	
Media redundancy support	yes, the module can be used as a client in a Profinet MRP ring, but there must be at least one other client with redundancy manager (RM, MRM) functionality in the ring	
Status LEDs	yes	

[1] Maximum 1440 bytes, whereby 4 bytes are for the Profinet nodes in each direction overhead and each sub module has one byte overhead in every direction.

5.2 Electrical Requirements

Voltage supply from S-DIAS bus	+24 V	
Current consumption on the S-Dias bus (+24 V power supply)	typically 100 mA at +24 V 95 mA at +24 V 75 mA at +30 V	maximum 100 mA at +24 V 100 mA at +24 V 95 mA at +30 V

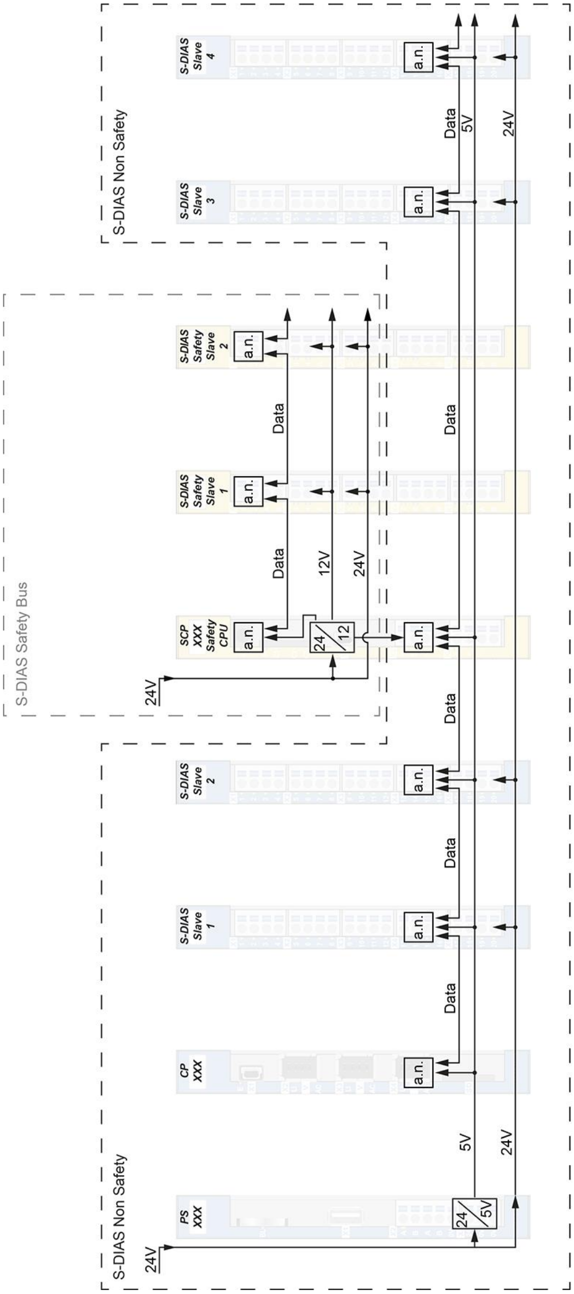
INFORMATION

If this S-DIAS module is connected to an S-DIAS supply module with several S-DIAS modules, the total current of the modules used must be determined and checked.

The total current of the +24 V supply cannot exceed 1.6 A!

The total current of the +5 V supply cannot exceed 1.6 A!

The specification for the current can be found in the module-specific documentation under "Electrical Requirements".



a.n. = active node

Wiring S-DIAS Safety in S-DIAS System

- each S-DIAS module is an active module (active node)
- Safety CPU is connected to the S-DIAS bus (incl. +5 V supply)
- Safety bus is independent and separated from the S-DIAS bus

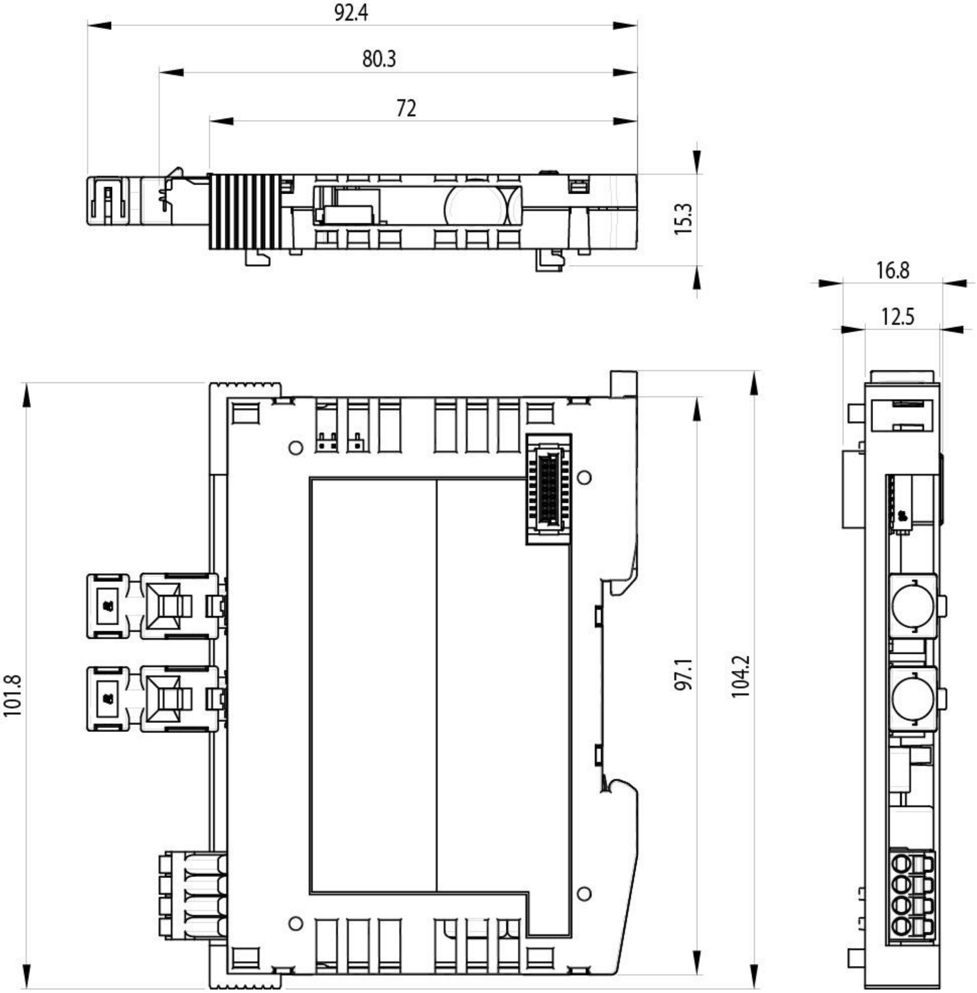
5.3 Miscellaneous

Article number	20-103-021
Standard	UL 508 (E247993)
Approbations	UL, cUL, CE, UKCA

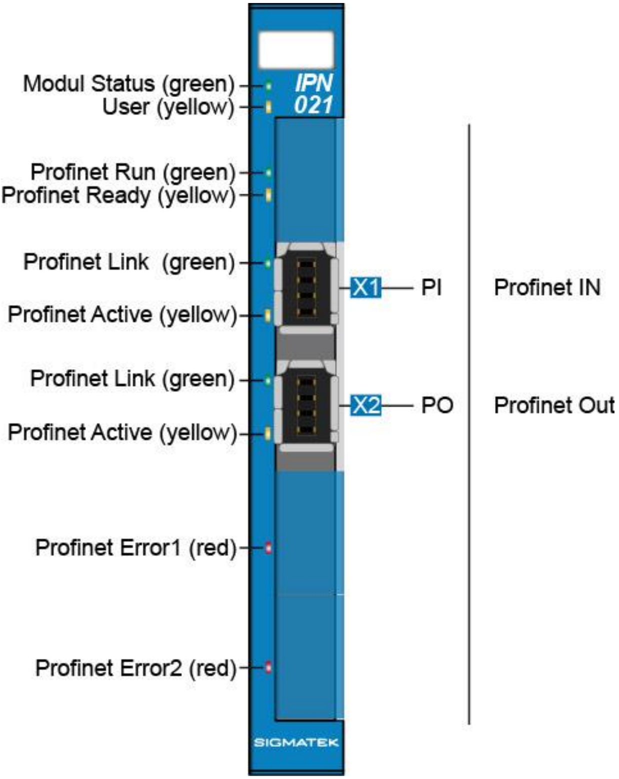
5.4 Environmental Conditions

Storage temperature	-20 ... +85 °C	
Environmental temperature	0 ... +55 °C	
Humidity	0-95 %, non-condensing	
Installation altitude above sea level	0-2000 m without derating > 2000 m up to a maximum of 5000 m with derating of the maximum environmental temperature by 0.5 °C per 100 m	
Operating conditions	pollution degree 2	
EMC resistance	in accordance with EN 61000-6-2 (industrial area)	
EMC noise generation	in accordance with EN 61000-6-4 (industrial area)	
Vibration resistance	EN 60068-2-6	3.5 mm from 5-8.4 Hz 1g from 8.4-150 Hz
Shock resistance	EN 60068-2-27	15 g
Protection type	EN 60529	IP20

6 Mechanical Dimensions



7 Connector Layout



7.1 Status LEDs

Module Status	green	ON	module active
		OFF	no supply available
		BLINKING (5 Hz)	no communication
User	yellow	ON	can be set from the application (e.g. the module LED can be set to blinking through the visualization so that the module is easily found in the control cabinet)
		OFF	
		BLINKING (2 Hz)	
		BLINKING (4 Hz)	
Profinet RN	green	ON	Profinent I/O user application runs without errors
Profinet RY	yellow	ON	Profinet I/O Bus Controller running
PROFINET IN Link	green	ON	connection between the two PHYs made
		BLINKS	PROFINET I/O IN of the primary client has no link
PROFINET IN Active	yellow	ON	Data is exchanged over the PROFINET bus
PROFINET OUT Link	green	ON	connection between the two PHYs made
		BLINKS	There is no connection between PROFINET I/O IN and the primary client.
PROFINET OUT Active	yellow	ON	Data is exchanged over the PROFINET bus
Profinet E1	red	ON	Profinet I/O system error
Profinet E2	red	ON	Profinet I/O bus error

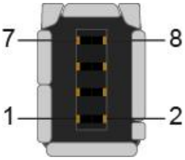
7.2 Applicable Connectors

Connectors:
X1-X2: Tyco Mini I/O Plug Type 1 Lock Extend Version (not included in delivery)

INFORMATION

The S-DIAS module cannot be connected/disconnected while voltage is applied!

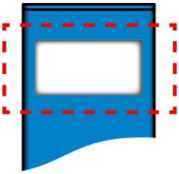
X1 Profinet I/O-IN, X2 Profinet I/O-OUT (Tyco Mini I/O)



Pin	Function
1	TX/RX+
2	Tx/Rx-
3	Rx/Tx+
4-5	n.c.
6	Rx/Tx-
7-8	n.c.

n.c. = not connected

7.3 Label Field



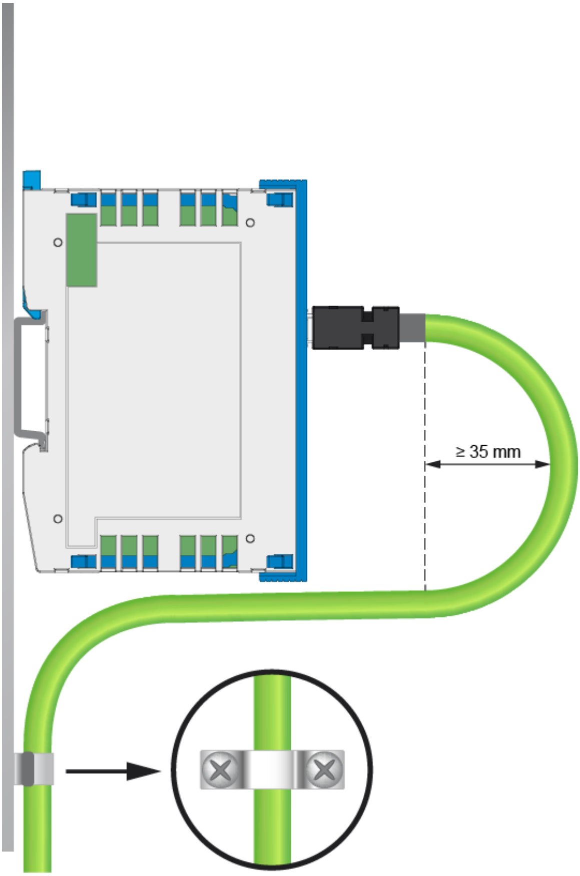
Manufacturer	Weidmüller
Type	MF 10/5 CABUR MC NE WS
Weidmüller article number	1854510000
Compatible printer	Weidmüller
Type	Printjet Advanced 230V
Weidmüller article number	1324380000

8 ESD Protection

INFORMATION

Before any device is connected to or disconnected from the IPN 021, the potential with ground should be equalized (by touching the control cabinet or ground terminal). This will allow the dissipation of electrostatic loads (caused by clothing/shoes).

9 Strain Relief



INFORMATION

The PROFINET cable must be mounted close to the module (e.g. using a clamp)!

No mechanical stress can be applied to the connection!

10 Assembly/Installation

10.1 Check Contents of Delivery

Ensure that the contents of the delivery are complete and intact. See chapter 1.3 Contents of Delivery.

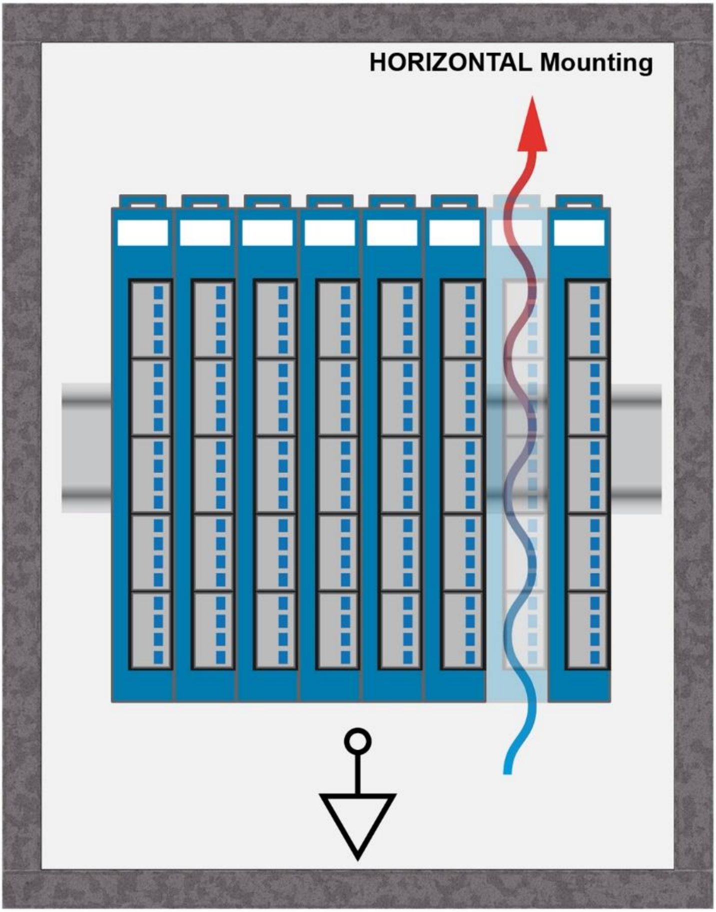
INFORMATION

On receipt and before initial use, check the device for damage. If the device is damaged, contact our customer service and do not install the device in your system.

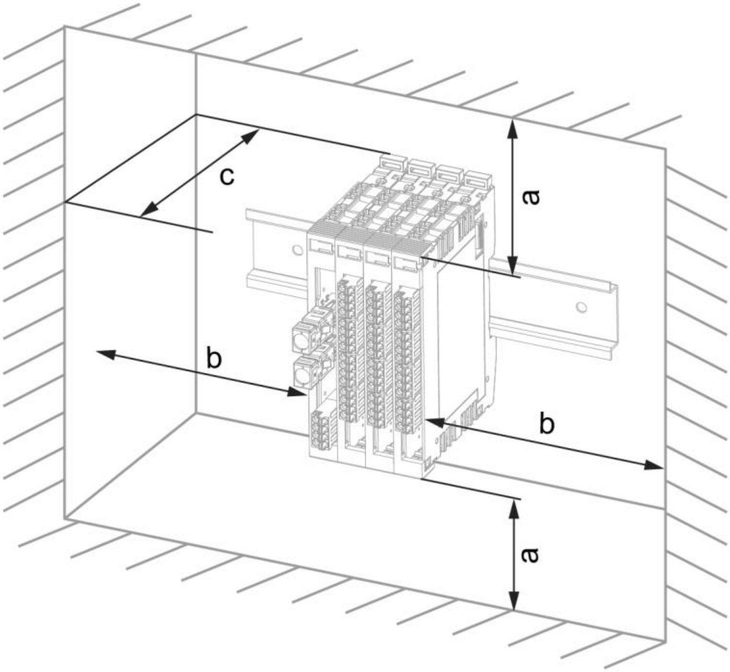
Damaged components can disrupt or damage the system.

10.2 Mounting

The S-DIAS modules are designed for installation into the control cabinet. To mount the modules a DIN-rail is required. The DIN rail must establish a conductive connection with the back wall of the control cabinet. The individual S-DIAS modules are mounted on the DIN rail as a block and secured with latches. The functional ground connection from the module to the DIN rail is made via the grounding clamp on the back of the S-DIAS modules. The modules must be mounted horizontally (module label up) with sufficient clearance between the ventilation slots of the S-DIAS module blocks and nearby components and/or the control cabinet wall. This is necessary for optimal cooling and air circulation, so that proper function up to the maximum operating temperature is ensured.



Recommended minimum distances of the S-DIAS modules to the surrounding components or control cabinet wall:



a	b	c
30 mm (1.18″)	**30 mm** (1.18″)	**100 mm** (3.94″)

a, b, c … distances in mm (inches)

11 Addressing

Address (hex)	Size (bytes)	Access Type	Description
Copy State Machine 1			
0000	4	r/w	Address register
0004	1	r/w	Status/Control 1 Bit 0 Write Enable (o = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
0005	1	r/w	Access size 1
4000	2	r	Reserved
0008	128	r/w	Data register 1
Copy State Machine 2			
0088	4	r/w	Address register 2
3 m	1	r/w	Status/Control 2 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
3 m	1	r/w	Access size 2
3 m	2	r	reserved
0090	128	r/w	Data register 2
Copy State Machine 3			
0110	4	r/w	Address register 3

0114	1	r/w	Status/Control 3 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
0115	1	r/w	Access size 3
0116	2	r	Reserved
0118	128	r/w	Data register 3
Copy State Machine 4			
0198	4	r/w	Address register 4
3 m	1	r/w	Status/Control 4 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
3 m	1	r/w	Access size 4
3 m	2	r	reserved
01A0	128	r/w	Data register 4
Copy State Machine 5			
0220	4	r/w	Address register 5
0224	1	r/w	Status/Control 5 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
0225	1	r/w	Access size 5
0226	2	r	reserved
0228	64	r/w	Data register 5

Copy State Machine 6			
0268	4	r/w	Address register 6
3 m	1	r/w	Status/Control 6 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
3 m	1	r/w	Access size 6
3 m	2	r	reserved
0270	64	r/w	Data register 6
Copy State Machine 7			
02B0	4	r/w	Address register 7
02B4	1	r/w	Status/Control 7 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
02B5	1	r/w	Access size 7
02B6	2	r	reserved
02B8	64	r/w	Data register 7
Copy State Machine 8			
02F8	4	r/w	Address register 8
02FC	1	r/w	Status/Control 8 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
02FD	1	r/w	Access size 8

02FE	2	r	reserved
0300	64	r/w	Data register 8
Copy State Machine 9			
0340	4	r/w	Address register 9
0344	1	r/w	Status/Control 9 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
0345	1	r/w	Access size 9
0346	2	r	reserved
0348	64	r/w	Data register 9
Copy State Machine 10			
0388	4	r/w	Address register 10
3 m	1	r/w	Status/Control 10 Bit 0 Write Enable (0 = Read Enable) Bit 1 Busy (readable only) Bit 2 AutoIncrement Enable Bit 3 Sync0 Start Bit 4 Sync1 Start Bit 5 IRQStart Bit 6 Address Start Bit 7 SW Start
3 m	1	r/w	Access size 10
3 m	2	r	reserved
0390	64	r/w	Data register 10

12 Supported Cycle Times

12.1 Cycle Times below 1 ms (in µs)

50	100	125	200	250	500
x	x	x	x	x	x

x= supported

12.2 Cycle Times equal to or higher than 1 ms (in ms)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

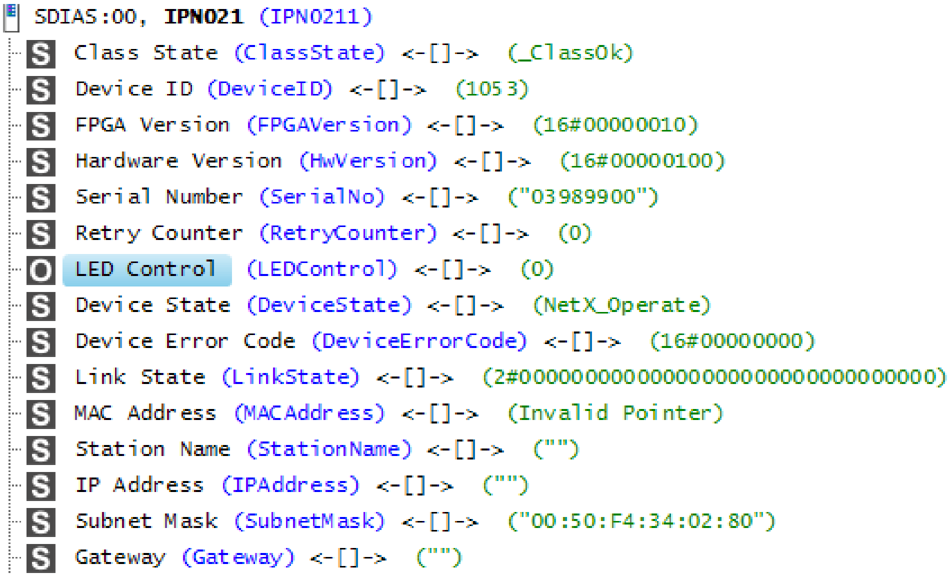
x= supported

17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

x= supported

13 Hardware Class IPN021

IPN021 Hardware Class for the S-DIAS-PROFINET Interface module IPN021



```
SDIAS:00, IPN021 (IPN0211)
 S Class State (ClassState) <-[]-> (_ClassOk)
 S Device ID (DeviceID) <-[]-> (1053)
 S FPGA Version (FPGAVersion) <-[]-> (16#00000010)
 S Hardware Version (HwVersion) <-[]-> (16#00000100)
 S Serial Number (SerialNo) <-[]-> ("03989900")
 S Retry Counter (RetryCounter) <-[]-> (0)
 O LED Control (LEDControl) <-[]-> (0)
 S Device State (DeviceState) <-[]-> (NetX_Operate)
 S Device Error Code (DeviceErrorCode) <-[]-> (16#00000000)
 S Link State (LinkState) <-[]-> (2#00000000000000000000000000000000)
 S MAC Address (MACAddress) <-[]-> (Invalid Pointer)
 S Station Name (StationName) <-[]-> ("")
 S IP Address (IPAddress) <-[]-> ("")
 S Subnet Mask (SubnetMask) <-[]-> ("00:50:F4:34:02:80")
 S Gateway (Gateway) <-[]-> ("")
```

This hardware class is used to control the IPN 021 hardware module. With this module process and service data can be exchanged with a PROFINET network. Detailed hardware information can be found in the module documentation.

13.1 Allgemein

<table>
<tr><td><b>Class State</b></td><td>State</td><td>This server displays the current status of the hardware class.</td></tr>
<tr><td><b>Device ID</b></td><td>State</td><td>On this server, the Device ID of the hardware module is displayed.</td></tr>
<tr><td><b>FPGA Version</b></td><td>State</td><td>FPGA version of the module in the format 16#XY (e.g. 16#10 = Version 1.0).</td></tr>
<tr><td><b>Hardware Version</b></td><td>State</td><td>Hardware version of the module in the format 16#XXYY (e.g 16#0120 = Version 1.20)</td></tr>
<tr><td><b>Serial No</b></td><td>State</td><td>On this server, the serial number of the hardware module is displayed.</td></tr>
<tr><td><b>Retry Counter</b></td><td>State</td><td>This server will increment if a transfer fails.</td></tr>
<tr><td><b>LED Control</b></td><td>Output</td><td>With this server the application LED of the S-DIAS module can be controlled in order to find the module faster.
<table>
<tr><td>0</td><td>LED off</td></tr>
<tr><td>1</td><td>LED on</td></tr>
<tr><td>2</td><td>blinks slowly</td></tr>
<tr><td>3</td><td>blinks fast</td></tr>
</table></td></tr>
<tr><td><b>Device State</b></td><td>State</td><td>Shows the hardware class status:
<table>
<tr><td>NetX_Reset</td><td>The hardware class waits until the PROFINET device is ready.</td></tr>
<tr><td>NetX_Initialisation</td><td>The hardware class waits for communication readiness of the PROFINET device.</td></tr>
<tr><td>NetX_Configuration</td><td>The hardware class makes configuration settings on the PROFINET component.</td></tr>
<tr><td>NetX_ConfigError</td><td>When configuring the module an error has occurred.</td></tr>
<tr><td>NetX_PreOp</td><td>The cyclic data exchange runs from the class part, but it is still waiting for the first cyclic data from the PROFINET side, before switching in the Operate mode.</td></tr>
<tr><td>NetX_Operate</td><td>Here the same thing happens as in PreOp mode, with this condition the user is informed that data are now available from the remote station.</td></tr>
<tr><td>NetX_ComStopped</td><td>The communication was already running, but the PROFINET block reports that the Operate state was canceled. A re-initialization can be triggered by the Reinitialize() method.</td></tr>
</table></td></tr>
<tr><td><b>Device Error Code</b></td><td>State</td><td>If the PROFINET device detects a communication error, the error code can be read here. The meaning of the error codes can be found in the header file NetXProfiNetErrorCodes.h, which is appended to the NetXProfiNetInterface class.</td></tr>
<tr><td><b>Link State</b></td><td>State</td><td>Displays the link status of the two PROFINET ports bit-coded (1 means link available).
<table>
<tr><td>Bit 0</td><td>Status of Uplink (PROFINET IN)</td></tr>
<tr><td>Bit 1</td><td>Status of Downlink (PROFINET OUT)</td></tr>
</table></td></tr>
<tr><td><b>MAC Address</b></td><td>State</td><td>Shows the MAC address stored in the module.</td></tr>
<tr><td><b>Station Name</b></td><td>State</td><td>Shows the modules station name.
This string can be modified and is retentive. If the change at runtime should be included in the configuration, the methods UpdateStringsInConfig() and Reinitialize() must be called after the strings have been adjusted.</td></tr>
</table>

IP Address	State	Shows the IP address of the module. This string can be modified and is retentive. If the change at runtime should be included in the configuration, the methods UpdateStringsInConfig() and Reinitialize() must be called after the strings have been adjusted.
Subnet Mask	State	Shows the subnet mask of the module. This string can be modified and is retentive. If the change at runtime should be included in the configuration, the methods UpdateStringsInConfig() and Reinitialize() must be called after the strings have been adjusted.
Gateway	State	Shows the Gateway settings of the module. This string can be modified and is retentive. If the change at runtime should be included in the configuration, the methods UpdateStringsInConfig() and Reinitialize() must be called after the strings have been adjusted.
Required	Property	This client is active by default, which means that the S-DIAS hardware module at this position is mandatory for the system and can under no circumstances be disconnected or return an error. Otherwise, the entire hardware deactivated. If the hardware module is missing or removed, an S-DIAS error is triggered. If his client is initialized with 0, the hardware module located in this position is not mandatory. This means that it can be inserted or removed at any time. However, which components identified as "not required" should be selected with regard to the safety of the system.
PDO Read Size	Property	Defines the number of bytes that are sent to this unit by the bus master in real time. The necessary PROFINET sub-modules are automatically created from the class. Once the AddSubModule method is called, the client values for PDO size are ignored. It is necessary that in the PROFINET master the same configuration is present. The automatic creation begins with the largest sub-module, as often as possible, and then reduces it gradually to the preset size. Example with a size of 823 Bytes: 6x sub-module with 128 Bytes 0x sub-module with 64 Bytes 1x sub-module with 40 Bytes 0x sub-module with 32 Bytes 0x sub-module with 16 Bytes 1x sub-module with 8 Bytes 1x sub-module with 4 Bytes 1x sub-module with 2 Bytes 1x sub-module with 1 Bytes

<table>
<tr><td><b>PDO Write Size</b></td><td>Property</td><td>Defines the number of bytes to be sent to the bus master by the device in real time.
The necessary PROFINET sub-modules are automatically created from the class.

Once the AddSubModule method is called, the client values for PDO size are ignored. It is necessary that in the PROFINET master the same configuration is present. The automatic creation begins with the largest sub-module, as often as possible, and then reduces it gradually to the preset size.

Example with a size of 823 Bytes:
6x sub-module with 128 Bytes
0x sub-module with 64 Bytes
1x sub-module with 40 Bytes
0x sub-module with 32 Bytes
0x sub-module with 16 Bytes
1x sub-module with 8 Bytes
1x sub-module with 4 Bytes
1x sub-module with 2 Bytes
1x sub-module with 1 Bytes</td></tr>
<tr><td><b>PDO Cycle Time</b></td><td>Property</td><td>This setting defines in how many milliseconds the transmission of the complete PDO data should be completed. This allows the bus load to be reduced without changing the bus cycle time. For example, for a 16 ms Profinet cycle time you could select 8 ms.
0 (default) means everything is always transferred</td></tr>
<tr><td><b>Size Mailbox Access</b></td><td>Property</td><td>To set the size of a mailbox access as an initial value. The maximum size for an access are 128 bytes and the minimum size are 40 bytes. The set size must have an even value.
e.g.:<table>
<tr><td>0</td><td>128 Byte (maximum size)</td></tr>
<tr><td>32</td><td>40 Byte (the minimum value)</td></tr>
<tr><td>64</td><td>64 Byte</td></tr>
<tr><td>99</td><td>100 Byte (the next possible value)</td></tr>
<tr><td>180</td><td>128 Byte (the maximum value)</td></tr>
</table></td></tr>
<tr><td><b>Endian Swap Mode</b></td><td>Property</td><td>Mode for endian conversion (used for reading and writing data), which is necessary in most cases because SIGMATEK works with little endian and Siemens S7, e.g. with big endian byte order.<table>
<tr><td>0</td><td>No endian conversion</td></tr>
<tr><td>1</td><td>Endian conversion by the hardware class (increases the realtime load dependent on the number / size of the PDO data). If sub-modules were added by AddSubModule, the conversion takes place according to the applied sub-modules. At sub-modules greater than 4 bytes the module memory is swapped in single 4-byte blocks.</td></tr>
<tr><td>2</td><td>Like 1, except that the swap is limited to blocks of 2 bytes (instead of 4 bytes). With 10 bytes, for example, five 2-byte swaps are therefore performed.</td></tr>
</table></td></tr>
</table>

Auto Config	Property	Setting whether the PROFINET stack should be re-initialized as soon as an uplink is detected to the bus master. 0: No automatic re-initialization. The user can trigger this with the Reinitialize() method. 1: Once an uplink is detected, the PROFINET stack is re-initialized.

13.1.1 Communication Interfaces

ALARM	Downlink	With this downlink the corresponding alarm class can be placed via the hardware editor.

13.2 Global Methods

The following methods can be called via the ProfiNetIF server.

13.2.1 GetPDOSizes

Returns the size of the cyclic real-time reading and writing data. The parameter names can be seen from the perspective of SIGMATEK Application (Read PDO means cyclic data from the bus master to IPN021).

Transfer parameters	Type	Description
pReadPDOSize	^UDINT	On the content of the pointer, the configured total size of the read data is written. If this information is not needed, NIL can be transferred.
pWritePDOSize	^UDINT	On the content of the pointer, the configured total size of the read data is written. If this information is not needed, NIL can be transferred.
Return parameters	**Type**	**Description**
retcode	DINT	0: successfully executed. The pointer contents have been filled with the corresponding data -1: invalid pointer (no one of both pointer is valid)

13.2.2 GetPDOData

If the Device State has the value NetX_Operate, real-time data can be collected using this method, which were sent by the bus master.

Transfer parameters	Type	Description
pTargetMem	PVOID	The current PDO data from the bus master are copied to this memory. With GetPDOSizes the size can be determined before to ensure that the transferred memory is large enough.
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Mutex error -2 Invalid pointer

13.2.3 SetPDODat

If the Device State has the value NetX_Operate, real-time data can be transferred, which are then sent to the bus master.

Transfer parameters	Type	Description
pNewWrData	PVOID	The data on which the pointer points are sent to the bus master.
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Mutex error -2 Invalid pointer

13.2.4 AddSubModule

This method must be called in an init phase and defines a PROFINET sub-module. The configuration of the PROFINET slaves IPN021 by the user class must match the configuration in the PROFINET master. To easily transfer a linear memory as a PDO, it is recommended to use the clients PDOReadSize and PDOWriteSize.

Once this method is called, the client values and PDOReadSize PDOWriteSize are no longer used!
If Endian swap is active, the transferred bytes are "swapped" in accordance with the module definition (at sub-modules larger than 4 bytes the module memory is “swapped” in 4-byte blocks). By using the clients instead of this method, time can be saved in the real-time.
If read or write sub-modules are first created, does not matter, because the HW Class always creates the inputs first and then the outputs. This is important for creating the sub-modules in the Siemens software.

Transfer parameters	Type	Description
usModuleSize	USINT	Size of sub-module to be added. Possible values are: 1, 2, 4, 8, 16, 32, 40, 64, 128
bDataToMaster	BOOL	Specifies whether this sub-module is to be sent to the master or the master to the IPN021. TRUE Sub-module is sent to the bus master FALSE Sub-module is sent to the IPN021
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Too late to add sub-modules (must be done in an init phase) -2 Invalid module size -3 Failed to allocate memory for the submodule configuration -4 Too many sub-modules (maximum of 251 is valid for both directions) -5 Too many bytes in this direction (1440 bytes maximum)

13.2.5 InstallCallback

Through this method a callback can be installed, whereby requests or notifications are forwarded to the user class by the bus master.
Using see example.

Transfer parameters	Type	Description
pThis	pVirtualBase	This-Pointer of the object to be called
pFunction	PVOID	Pointer to the function to be called at the callback
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Invalid pointer -2 Callback has already been installed

13.2.6 SendReadAnswer

With this method it can be answered delayed to a read request. This is useful if for the corresponding request data must be obtained from other sources before.
If the delayed answer does not follow the request within 3 seconds, the bus master runs in a timeout.

Transfer parameters	Type	Description
pReadData	PVOID	Pointer to the answer data
udReadLength	UDINT	Length of the answer data (must not be greater than the read length transferred, as these can be seen as a maximum for this request).
hdReturnCode	HDINT	Return value for the bus master 0 Successfully executed ≠0 All other values can be looked up in the Profinet development environment, if required.
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Too late to respond to this request (already more than 3 seconds elapsed) -2 Answer size too big (with asynchronous accesses a maximum of 1024 bytes can be transferred) -3 Invalid pointer

13.2.7 SetProcessAlarm

Triggers a process alarm on Profinet.

Transfer parameters	Type	Description
udAlarmHandle	UDINT	The user can assign any value here, which he receives again at the callback with the response data for the assignment of the alarm.
uiUserStructId	UINT	Here, a structure ID can be selected, indicating the importance of the alarm data.
uiAlarmDataLen	UINT	Length of alarm data behind pAlarmData
pAlarmData	PVOID	Pointer to user-specific alarm data
udSubModuleNo	UDINT	Optional parameter (default value: 0) Process alarms are always linked with sub-modules that are sent to the bus master. With this parameter one of these sub-modules can be selected (starting with 0).
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Another request of the same type is already running -2 Invalid pointer -3 Alarm data too large (maximum 1024 Bytes allowed) -4 No PDO data are sent to the bus master -5 Sub-module number to high

13.2.8 AddDiagnosisAlarm

Adds a diagnostic alarm that can be triggered later.

Transfer parameters	Type	Description
uiChannelNum	UINT	Added channel number for the diagnostic alarm. User-specific channel numbers from 0x0000 to 0x7FFF and the number 0x8000 for the sub-module itself are supported.
uiChannelProp	UINT	The structure of this bit field for the channel characteristics is explained in the header file "NetXProfiNetInterface.h", which is appended to the class NetXProfiNetInterface.
uiChannelErrorType	UINT	A list of possible error types can also be found in the header file "NetXProfiNetInterface.h"
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Another request of the same type is already running -2 Invalid channel number

13.2.9 SetDiagnosisAlarm

Triggers a previously added diagnostic alarm.

Transfer parameters	Type	Description
udAlarmHandle	UDINT	The user can assign any value here, which he receives again at the callback, with the response data for the assignment of the alarm.
udDiagHandle	UDINT	Here, the handle is used, that was transferred via AddDiagnosisAlarm at the Callback in the Index parameter, after creation of the diagnosis alarm.
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Another request of the same type is already running

13.2.10 RemoveDiagnosisAlarm

Removes a previously added diagnosis alarm.

Transfer parameters	Type	Description
udDiagHandle	UDINT	Here, the handle is used, that was transferred via AddDiagnosisAlarm at the Callback in the Index parameter, after creation of the diagnosis alarm.
Return parameters	**Type**	**Description**
retcode	DINT	0 Successfully executed -1 Another request of the same type is already running

13.2.11 UpdateStringsInConfig

If StationName, IPAddress, SubnetMask or Gateway are changed at runtime and a new configuration of the PROFINET slaves is required, this method must be called first to update the modified string in the configuration data. Afterwards the configuration can be performed again using the Reinitialize method.

13.2.12 Reinitialize

This method triggers a reconfiguration of the PROFINET slaves and can be used when one of the strings, described above, have changed or problems in communication occur that cannot be resolved otherwise.

13.3 To be noticed

The size of the data transferred in the Profinet packet must not exceed 1440 and is calculated as follows:
ReadDataProfinet = 4 Byte Header + Number of ReadSubModules + Number of WriteSubModules + Sum of the ReadUseData
WriteDataProfinet = 4 Byte Header + Number of ReadSubModules + Number of WriteSubModules + Sum of the WriteUseData

13.4 Example: Using Callbacks

The following code examples each use an object channel to the NetXProfiNetInterface with "ToProfinet". This class is integrated into the IPN021 class and connected externally via the ProfiNetIF server.

To install a callback (e.g. for asynchronous read and write requests from the PROFINET bus master), the following call is used:

```
ToProfinet.InstallCallback(pThis:=this,
pFunction:=#CallBackFunc());
```

Prerequisite for the correct functioning of the call is the declaration of the method, which should look like this:

```
FUNCTION GLOBAL CallBackFunc
  VAR_INPUT
    pThis : ^TestClass; // Statt TestClass den Namen ihrer Klasse
einfügen
    Cmd : UDINT;
    Index : UDINT;
    pLength : ^UDINT;
    pData : pVoid;
    pStatus : ^HDINT;
  END_VAR

  pThis^.CallBack(Cmd, Index, Length, pData, pStatus);

END_FUNCTION
```

To handle the callbacks in this example, the class method callback is used. By calling the pThis object pointer the class variables can automatically be used in the method.

So the code might look like in the method:

```
FUNCTION GLOBAL TestClass::CallBack
  VAR_INPUT
    Cmd : UDINT;
    Index : UDINT;
    pLength : ^UDINT;
    pData : pVoid;
    pStatus : ^HDINT;
END_VAR

  case Cmd of
```

```
    PROFINETX_CMD_READ:

(*
This command occurs when the bus master performs an asynchronous
read command.

Command-specific description of the remaining parameters:
Index:
Free to be used by the two communicating applications to differ
read news.

pLength:
Pointer to maximum length of the data to be read. If fewer data are
available, the number of bytes actually read is returned to this
memory.

pData:
Pointer to the memory to which the response data should be copied.

pStatus:
On the content of this memory, the return code is returned.
0 = successfully executed
PROFINETX_STATE_ANSWER_LATER = the response data are submitted
within the next 3 seconds via the SendReadAnswer() method.
Other possible return values can be looked up in the Profinet
development environment for the parameter status of the RDREC
block.
*)


    PROFINETX_CMD_WRITE:
(*
This command appears when the bus master performs an asynchronous
write command

Command-specific description of the remaining parameters:
Index:
Free to be used by the two communicating applications to differ
write messages.

pLength:
Pointer to the length of the data to be written.

pData:
Pointer to the memory with the data to be written.
```

```
pStatus:
On the content of this memory, the return code is returned.


0 = successfully executed
Other possible return values can be looked up in the Profinet
development environment at the parameter status of the WRREC block.
*)


    PROFINETX_CMD_ADD_DIAG_ALARM_RESULT:
(*
This command appears in response to AddDiagnosisAlarm()

Command-specific description of the remaining parameters:
Index:
On this parameter, the diagnostics handle is returned. It is used
to identify the diagnostic alarm in the calls SetDiagnosisAlarm()
and RemoveDiagnosisalarm().

pLength:
Pointer to the length of the data behind pData. At this command
always 4.

pData:
Pointer to the memory with the error code of the Profinet module.
0 = OK, other error codes can be looked up in the header file
NetXProfiNetErrorCodes.h.

pStatus:
is not used in this command
*)

PROFINETX_CMD_REMOVE_DIAG_ALARM_RESULT:
(*
This command comes in response to RemoveDiagnosisAlarm()

Command-specific description of the remaining parameters:
Index:
On this parameter, the diagnostic handle is returned, which already
was transferred when calling RemoveDiagnosisalarm().

pLength:
Pointer to the length of the data behind pData. At this command
always 4.
```

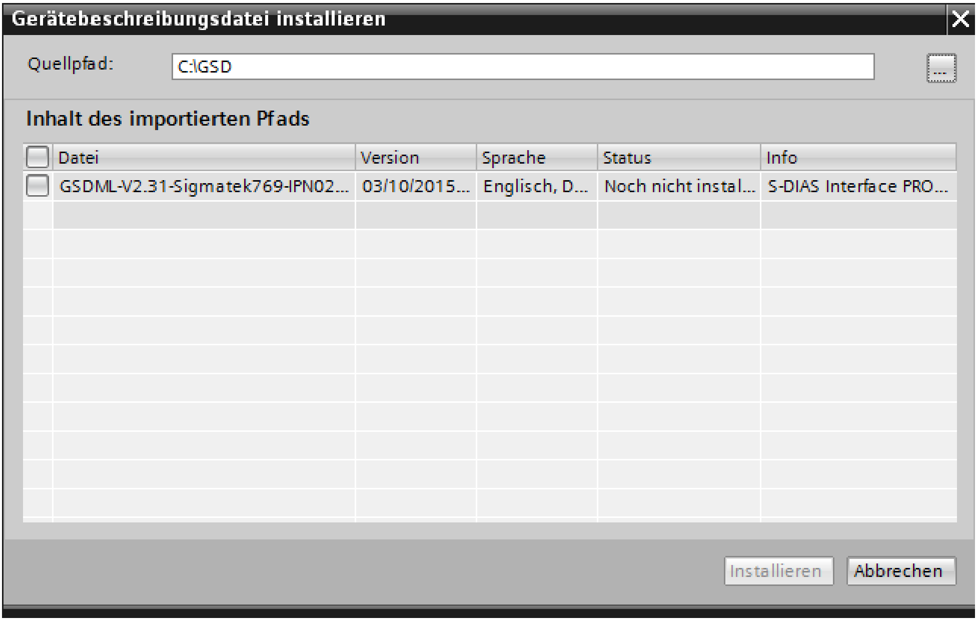
```
pData:
Pointer to the memory with the error code of the Profinet module.
0 = OK, other error codes can be looked up in the header file
NetXProfiNetErrorCodes.h.


pStatus:
is not used in this command
*)


    PROFINETX_CMD_SET_DIAG_ALARM_RESULT:
(*
This command comes in response to SetDiagnosisAlarm()

Command-specific description of the remaining parameters:
Index:
On this parameter, the alarm handle is returned, which already was
transferred when calling SetDiagnosisAlarm().


pLength:
Pointer to the length of the data behind pData. At this command
always 4.

pData:
Pointer to the memory with the error code of the Profinet module.
0 = OK, other error codes can be looked up in the header file
NetXProfiNetErrorCodes.h.

pStatus:
Pointer to return code of bus master or NIL if a timeout has
occurred.
0 = successfully executed
Other possible return values can, for example, be looked-up in the
Profinet development environment at the parameter status of the
RDREC block.
*)


    PROFINETX_CMD_SET_PROCESS_ALARM_RESULT:
(*
This command appears in response to SetProcessAlarm()

Command-specific description of the remaining parameters:
Index:
In this parameter, the alarm handle is returned, which was
transferred at the call of SetProcessAlarm().
```

```
pLength:
Pointer to the length of the data behind pData. At this command
always 4.


pData:
Pointer to the memory with the error code of the Profinet module.
0 = OK, other error codes can be looked up in the header file
NetXProfiNetErrorCodes.h.

pStatus:
Pointer to the return code of the bus master or NIL if a timeout
has occurred.
0 = successfully executed
Other possible return values can, for example, be looked-up in the
Profinet development environment of the parameter status of the
RDREC block.
*)


    PROFINETX_CMD_NEW_PDO_READ_DATA_ARRIVED:
(*
This command indicates that new PDO read data have arrived from the
Profinet module. It is recommended here to set a flag and then to
query it later in its own processing and pick up the new data.

In this command no parameter is used.
*)


    PROFINETX_CMD_INTERNAL_COM_ERR: // for analysis
(*
This command appears when the NetX module has detected an error.

In case of errors there should also be paid attention to the
debugger trace messages in the output window, because important
information on any error sources are displayed there.

Command-specific description of the remaining parameters:
Index:
Command which is related to the error. The commands are defined in
the Defines Sections of NetXProfiNetInterface and NetX51Base.
16#1F16 for example, has indicated that the sub-module definitions
do not match with those of the bus master.

pLength:
Pointer to the length of the data behind pData. At this command
always 4.
```

```
pData:
Pointer to the memory with the error code of the Profinet module.
0 = OK, other error codes can be looked up in the header file
NetXProfiNetErrorCodes.h.
pStatus:
is not used in this command
*)
  end_case;

END_FUNCTION
```

13.5 Using the GSD File with TIA (Siemens Design Environment)

- **GSD file (required by the Profinet master):**
  - ZipFile attached to the IPN021 class, unzip to desired folder
  - Install file as described in the TIA help under ***Install GSD File***.
  - Example (with TIA):



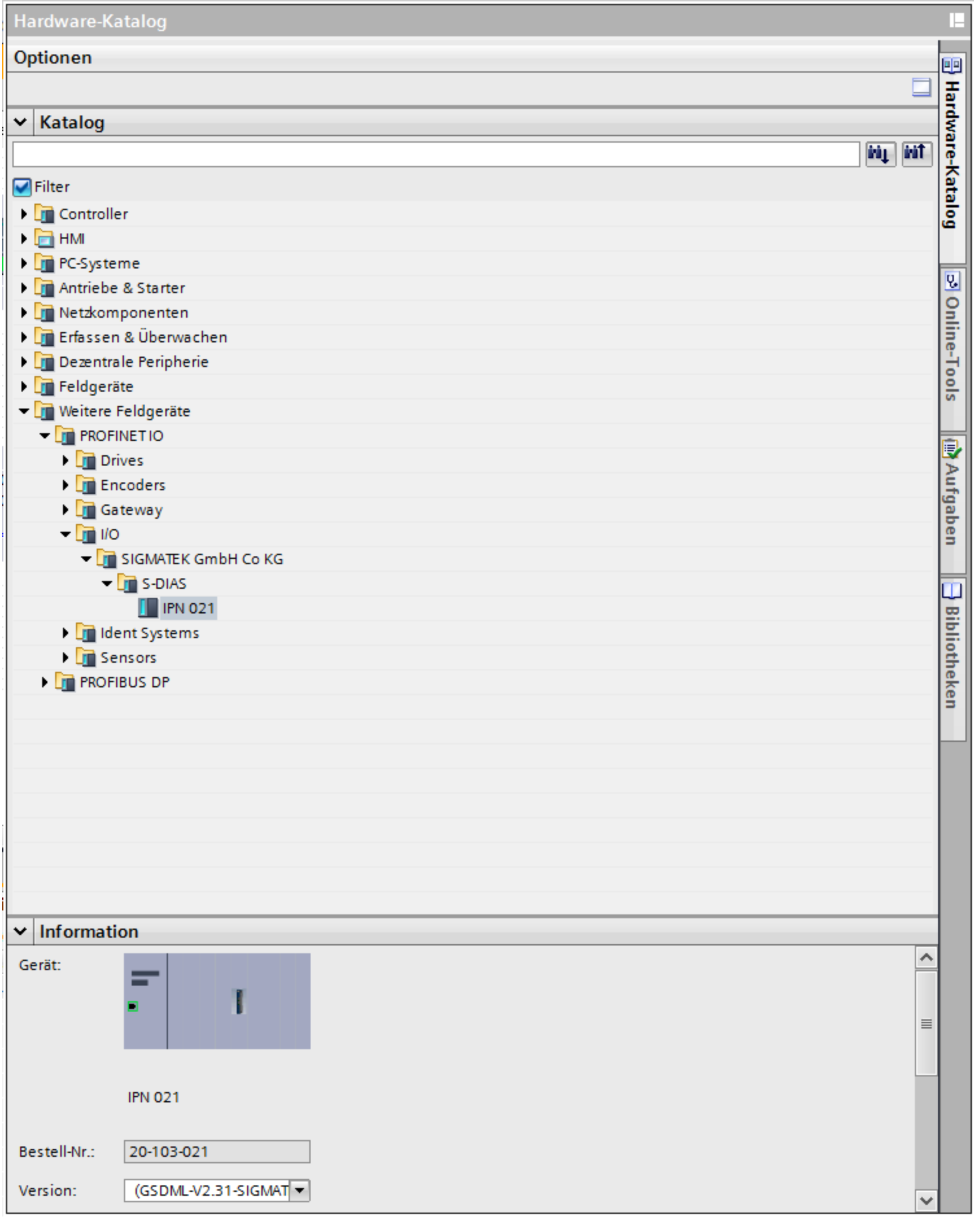
Gerätebeschreibungsdatei installieren

Quellpfad: C:\GSD

Inhalt des importierten Pfads

□	Datei	Version	Sprache	Status	Info
□	GSDML-V2.31-Sigmatek769-IPN02...	03/10/2015...	Englisch, D...	Noch nicht instal...	S-DIAS Interface PRO...

- **IPN 021 found in the device catalog:** Additional field devices/PROFINET IO/I/O/Sigmatek GmbH Co KG/S-DIAS/



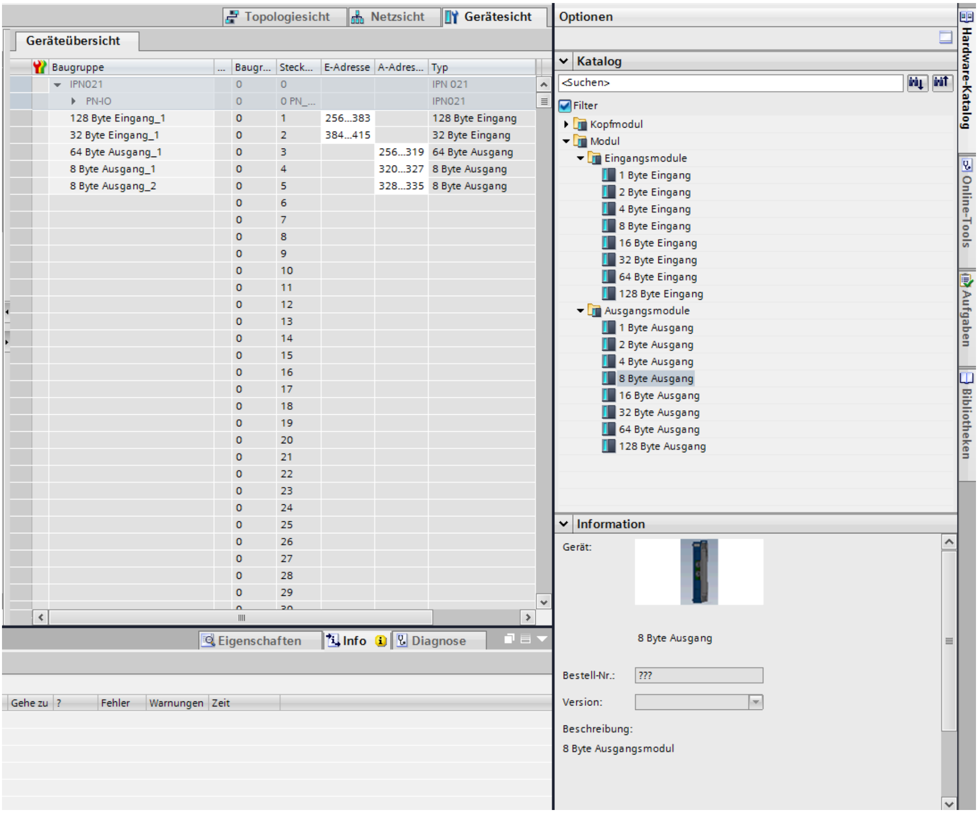
Gerät: IPN 021

Bestell-Nr.: 20-103-021

Version: (GSDML-V2.31-SIGMAT

- **Insert Input and output modules**

Always create first the inputs and then the outputs, because the HW-class creates the sub-modules also in this order (regardless of the AddSubModule() calls)



Baugruppe	...	Baugr...	Steck...	E-Adresse	A-Adres...	Typ
IPN021		0	0			IPN 021
PN-IO		0	0 PN_...			IPN021
128 Byte Eingang_1		0	1	256...383		128 Byte Eingang
32 Byte Eingang_1		0	2	384...415		32 Byte Eingang
64 Byte Ausgang_1		0	3		256...319	64 Byte Ausgang
8 Byte Ausgang_1		0	4		320...327	8 Byte Ausgang
8 Byte Ausgang_2		0	5		328...335	8 Byte Ausgang
		0	6			
		0	7			
		0	8			
		0	9			
		0	10			
		0	11			
		0	12			
		0	13			
		0	14			
		0	15			
		0	16			
		0	17			
		0	18			
		0	19			
		0	20			
		0	21			
		0	22			
		0	23			
		0	24			
		0	25			
		0	26			
		0	27			
		0	28			
		0	29			

Gehe zu	?	Fehler	Warnungen	Zeit

- Kopfmodul
- Modul
  - Eingangsmodule
    - 1 Byte Eingang
    - 2 Byte Eingang
    - 4 Byte Eingang
    - 8 Byte Eingang
    - 16 Byte Eingang
    - 32 Byte Eingang
    - 64 Byte Eingang
    - 128 Byte Eingang
  - Ausgangsmodule
    - 1 Byte Ausgang
    - 2 Byte Ausgang
    - 4 Byte Ausgang
    - 8 Byte Ausgang
    - 16 Byte Ausgang
    - 32 Byte Ausgang
    - 64 Byte Ausgang
    - 128 Byte Ausgang

Gerät:

8 Byte Ausgang

Bestell-Nr.: ???

Version:

Beschreibung:

8 Byte Ausgangsmodul

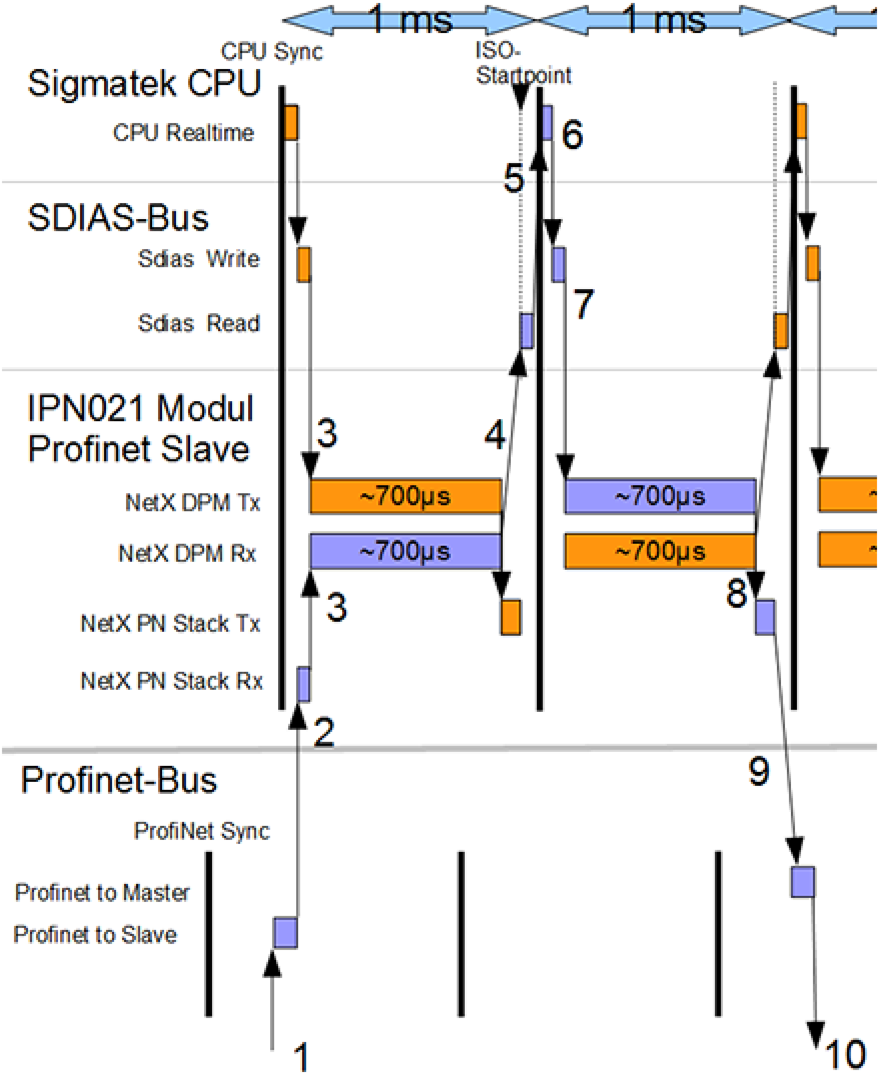
13.6 IPN and Profinet Bus Time Characteristics

In the time diagrams below, the transmission route for a query/answer transmission from the Profinet master to the SIGMATEK CPU and back are shown for the best and worst case respectively. The Profinet bus and IPN 021 module are not synchronous with one another. The time point for transmission in the Profinet bus can thereby be offset. Because the copy time for the dual-port memory from the NetX chip is between 0.7 and a maximum of 1 ms, the transmission time can also vary. When the NetX chip needs 1 ms for copying, the hardware class cannot be set so that the DPM buffer is reenabled in the same cycle. The transmission thereby needs one cycle longer!
For the Profinet sync, a cyclic time of 1 ms is assumed. This is determined by the Profinet master and can vary from cycle to cycle.

13.6.1 Detail View of IPN021 Timing on the Local S-DIAS Bus

13.6.1.1 Timing in Best Case

For the best case, a copy time of 700 µs for the NetX chip is assumed. So that the dual-port memory (DPM) is exchanged during each cycle, the isochronous start time (value setting "IsoStartPoint" to the SdiasPLC hardware class) on the local S-DIAS bus must be set as high as possible. With a cyclic time of 1 ms it an ISO start point of 95%, 950 µs remain for copying the DPM; minus the real-time value and the S-DIAS write access. The realtime value (debugger variable "_RealAverageTime") plus the S-DIAS write time ("IsoWrTaskDuration" to the SdiasPLC hardware class) must therewith be under 250 µs. If copying the DPM takes longer, the receiving the data is delayed by 1 cycle respectively (worst case, illustrated between point 3.4 and 7.8). Copying the DPM starts with point 3.7 and ends with point 4.8. The data packet route is marked in violet.

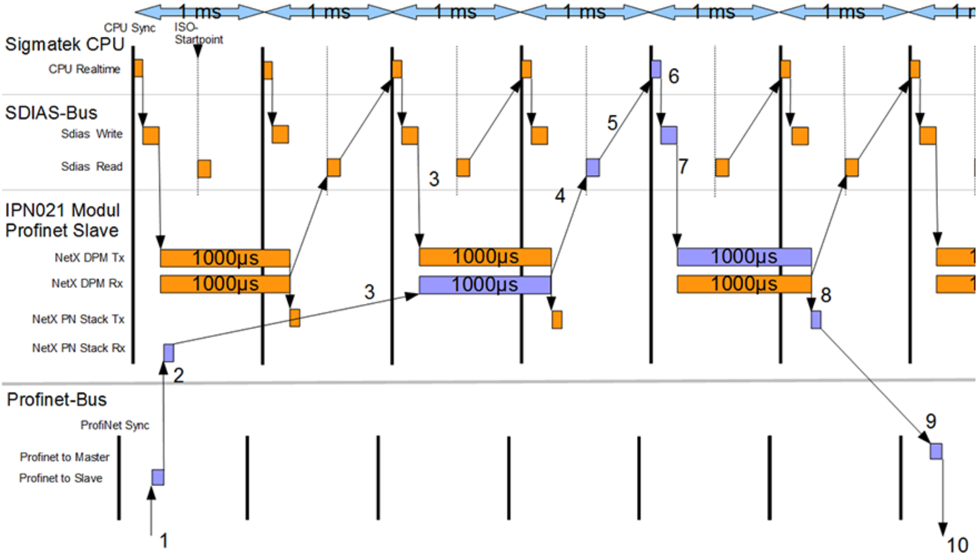

1 ms
1 ms
CPU Sync
ISO-Startpoint
Sigmatek CPU
CPU Realtime
SDIAS-Bus
Sdias Write
Sdias Read
IPN021 Modul Profinet Slave
NetX DPM Tx
NetX DPM Rx
NetX PN Stack Tx
NetX PN Stack Rx
Profinet-Bus
ProfiNet Sync
Profinet to Master
Profinet to Slave
~700µs
~700µs
~700µs
~700µs
1
2
3
3
4
5
6
7
8
9
10

1. The data from the Profinet master are sent over the Profinet bus.
2. These data are sent from the Profinet bus in the NetX Profinet stack.
3. As soon as the dual-port memory is released via inverting the handshake flag by the hardware class, the data are copied from the NetX chip. The NetX chip requires therefore, 700-1000 µs.
4. After the DPM is copied, it is released by the NetX chip via setting the answer handshake flag.
5. At the ISO start time, the data are read to the local S-DIAS bus and are then available with the next CPU sync.
6. The handshake flag and answer handshake flag are the same and the data therewith valid. These can now be processed by the application. Afterwards, the handshake flag for releasing the DPM is inverted and the answer data written to the S-DIAS bus.
7. When handshake flag is inverted, the the NetX chip starts the DPM copy process.
8. After the DPM is copied, it is released by the NetX chip via setting the answer handshake flag.
9. The slave to master data are located in the Profinet stack of the NetXchip and are sent over the Profinet but at a time point specified by the Profinet master.
10. The data can be received and processed by the Profinet master.

In the best case, the transmission requires 2 cycles.

13.6.1.2 Timing in Worst Case

For the worst case, a duration of 1 ms for copying the DPM is assumed. The ISO start time with 50% was selected (value setting "IsoStartPoint to the SdiasPLC hardware class). The Handshake flag for releasing the DPM is transferred over the S-DIAS bus during the next read process. The data are therewith available in the Sigmatek CPU one cycle later. Due to the unfavorable time point at which the data is sent over the Profinet bus, a delay in the transmission is generated (can be see in point 1-3). Copying the DPM begins with point 3.7 and ends with point 4.8. The data packet route is marked in violet.

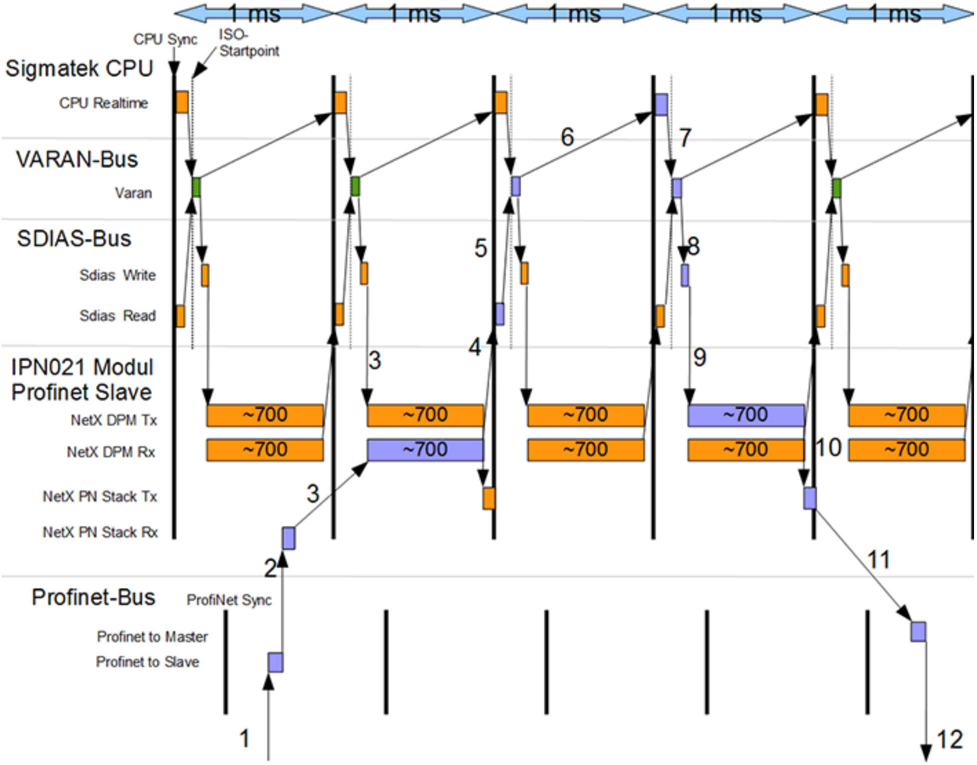


The process is the same as in the best case.
Because the dual-port memory is locked in point two after receiving the data from the Profinet bus, the data can only be accepted during the next copy process.
In the time diagram above, the transmission requires 6 cycles.

13.6.2 Detail View of S-DIAS Timing behind VARAN

13.6.2.1 Timing in Best Case

For the best case, a copy time of 700 µs for the NetX chip is assumed. Since the transfer of the handshake bit over the VARAN bus requires an extra cycle, the dual-port memory (DPM) can at best, be exchanged every second cycle. The isochronous start point (setting value "IsoStartPoint" in the VaranManager1-3 hardware class) on the VARAN bus must be set as low as possible. With a cyclic time of 1 ms with an ISO start point of 5%, 950 µs remain for copying the DPM; minus the real-time value and the S-DIAS write access behind VARAN. The VARAN ISO time ("IsoVaranTime" in the VaranManager hardware class) and the S-DIAS write time ("IsoWrTaskDuration" to the VI02x hardware class) must be under 250 µs. If copying the DPM takes longer, the receiving the data is delayed by 1 cycle respectively (worst case, illustrated between point 3.4 and 9.10). Copying the DPM begins with point 3.9 and ends with point 4.10. The data packet route is marked in violet.

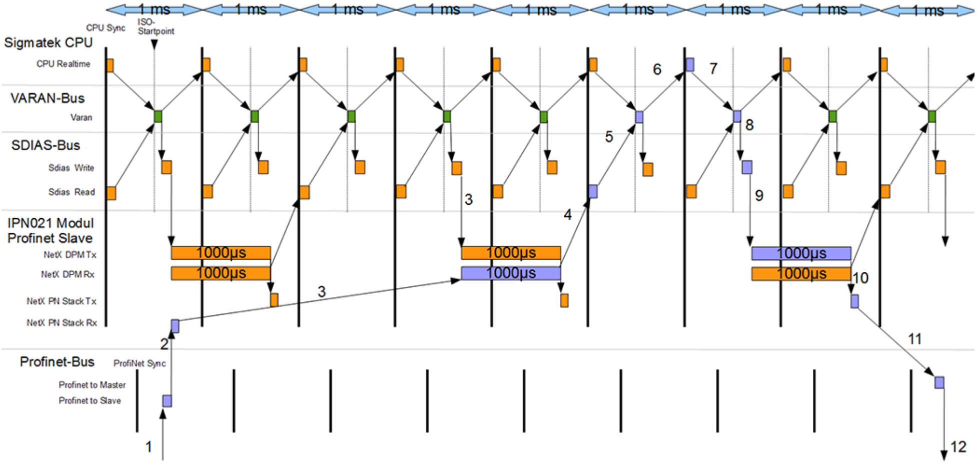


1. The data from the Profinet master are sent over the Profinet bus.
2. These data are sent from the Profinet bus in the NetX Profinet stack.
3. As soon as the dual-port memory is released via inverting the handshake flag by the hardware class, the data are copied from the NetX chip. The NetX chip requires therefore, 700-1000 µs.
4. After the DPM is copied, it is released by the NetX chip via setting the answer handshake flag.
5. For the CPU sync, the data are read on the S-DIAS bus behind VARAN.
6. At the Iso start point, the data are sent over the VARAN bus and are then available with the next CPU sync.
7. The handshake flag and answer handshake flag are the same and the data therewith valid. These can now be processed by the application. Afterwards, the handshake flag for releasing the DPM is inverted and the answer data sent over VARAN.
8. After the data were transmitted over the VARAN bus, the S-DIAS write process is run.
9. When handshake flag is inverted, the the NetX chip starts the DPM copy process.
10. After the DPM is copied, it is released by the NetX chip via setting the answer handshake flag.
11. The slave to master data are located in the Profinet stack of the NetXchip and are sent over the Profinet but at a time point specified by the Profinet master.
12. The data can be received and processed by the Profinet master.

In best case, the transmission requires 4 cycles.

13.6.2.2 Timing in Worst Case

For the worst case, a duration of 1 ms for copying the DPM is assumed. The ISO start time with 50% was selected (value setting "IsoStartPoint to the VaranManger 1-3 hardware class). The Handshake flag for releasing the DPM is transferred over the S-DIAS bus during the next read process. The data are therewith available in the SIGMATEK CPU one cycle later. Due to the unfavorable time point at which the data is sent over the Profinet bus, a delay in the transmission is generated (can be see in point 1-3). Copying the DPM begins with point 3.9 and ends with point 4.10. The data packet route is marked in violet.



The process is the same as in the best case.

Because the dual-port memory is locked in point two after receiving the data from the Profinet bus, the data can only be accepted during the next copy process.

In the diagram above, the transmission takes 8 cycles.

14 Transport/Storage

INFORMATION

This device contains sensitive electronics. During transport and storage, high mechanical stress must therefore be avoided.

For storage and transport, the same values for humidity and vibration as for operation must be maintained!

Temperature and humidity fluctuations may occur during transport. Ensure that no moisture condenses in or on the device, by allowing the device to acclimate to the room temperature while turned off.

When sent, the device should be transported in the original packaging if possible. Otherwise, packaging should be selected that sufficiently protects the product from external mechanical influences. Such as cardboard filled with air cushioning.

15 Storage

INFORMATION

When not in use, store the operating panel according to the storage conditions. See chapter 14.

During storage, ensure that all protective covers (if available) are placed correctly, so that no contamination, foreign bodies or fluids enter the device.

16 Maintenance

INFORMATION

During maintenance as well as servicing, observe the safety instructions from chapter 2 Basic Safety Directives.

16.1 Service

This product was constructed for low-maintenance operation.

16.2 Repair

INFORMATION

In the event of a defect/repair, send the device with a detailed error description to the address listed at the beginning of this document.

For transport conditions, see chapter 14 Transport/Storage.

17 Disposal

INFORMATION

Should you need to dispose of the device, the national regulations for disposal must be followed.

The device appliance must not be disposed of as household waste.

Documentation Changes

Change date	**Affected page(s)**	**Chapter**	**Note**
23.03.2015	3 5	1.1 Performance Data 1.3 Miscellaneous	Changed minimum cyclic time Changed Certification
07.05.2015	3	1.1 Performance Data	* Added note
21.01.2016	4	1.3 Miscellaneous	Standard changed
25.01.2016	3	1.2 Electrical Requirements	Graphics added
28.04.2016	13	6 Mounting	Graphics distances
17.08.2017	6	1.4 Environmental Conditions	Pollution Degree added
18.10.2017	10 13	3.3 Label Field 6 Mounting	Added chapter Graphic replaced
14.11.2019	18	8 Supported Cycle Times	Chapter added
28.02.2020	18	8 Supported Cycle Times	Text adapted
08.09.2020	20	9 Hardware Class IPN021	Chapter added
04.11.2020	13	6 Mounting	Expansion functional ground connection
24.06.2021	4	1.1 Performance Data 1.3 Miscellaneous	Supported conformity classes and Media redundancy support added Certifications removed
06.12.2022	7	1.3 Miscellaneous	UKCA conformity
26.07.2023		Document	General chapters added, design