

# PROFINET Master Simulator

## Manual

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## Important User Information

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# 1. Overview

## 1.1 General information

The PROFINET Master Simulator application assists you in the following tasks:

- Configuring and commissioning PROFINET devices without a PROFINET master being present.
- Configuring the IO data using the GSD of the PROFINET device, and starting the IO data exchange.
- Viewing the input data and setting the output data, either consistently or in single-bit mode (tipping mode).
- Listing alarms that have occurred and, if supported by the GSD, displaying them as text.

### ***Notes on installation:***

- During installation, you can select the used language.
- Installation progress may be very slow toward the end of the installation procedure. At this point, all components that are used in the target system are being optimized. This can - depending on the system - take a few minutes.
- You can extend the existing installation at any time by adding another license in the License Manager without having to reinstall the product.
  - ☐ Use the license manager (in the start menu of the application) to add the license.
  - ⇒ The current article number and the license information are shown in the Info dialog box of the application.
- If you use a floating license, you can also operate it without an Internet connection.

## 1.2 Menu elements in main window

| Button                                                                             | Description                                                                                                                                      |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
|   | Used to select the network interface to be used (if more than one are available).                                                                |
|   | Opens the dialog box for searching for/configuring the desired PROFINET device.                                                                  |
|   | Opens the dialog box for loading a GSD of the desired PROFINET device or an existing configuration.                                              |
|   | Opens the dialog box for compiling the modules for data exchange.                                                                                |
|   | Saves the current configuration.                                                                                                                 |
|   | Starts the data exchange between the Master Simulator and the PROFINET device with the configured data.                                          |
|   | Used to display/hide tool windows.                                                                                                               |
|   | Controls the layout of the tool windows.                                                                                                         |
|   | Displays the help file or information for the program version, depending on which subitem is selected, and can also be used to look for updates. |
|  | Used to change the language setting of the program.                                                                                              |

Tab. 1-1.

## 2. Procedure

### 2.1 General steps

Use of the PROFINET Master Simulator generally involves the following steps:

- Selection of the desired PROFINET device in the network ([<Chap. 2.2 "Selecting device">](#)).
  - ⇒ This is done via the Device Manager dialog box. All PROFINET devices found in the network are listed here. If necessary, the IP address and the PROFINET device name can be assigned.
  - ⇒ If a network interface has not yet been selected, a selection dialog appears automatically.
- Selection of the GSD XML file belonging to the device.
- Compilation of the desired IO data (modules) and necessary parameter values using the GSD.
- Start of PROFINET communication for exchanging the configured IO data.
- After a connection has been successfully set up, the input data can be viewed and the output data can be set in the PROFINET IO Data dialog box.
- Alarms that have occurred are displayed in the alarm list. Pending channel diagnostics alarms are listed in the IO data window.

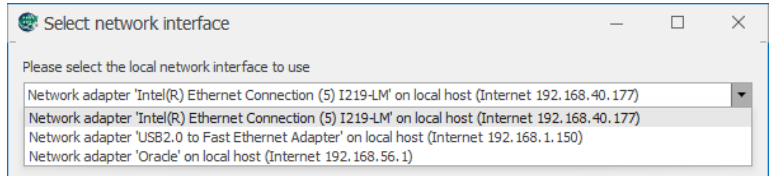
**Note**

*Bear in mind that this is only a simulator PC application which does not represent a real-time environment.*

*This means that the connection quality very much depends on the load of the PC and network. Similarly, a large volume of IO data can also have a detrimental effect on the connection.*

## 2.2 Selecting device

If the PC has more than one network interface, a dialog box for selecting the interface to be used appears first.



### **Note!**

*This dialog box lists all available network interfaces. The following conditions must be met in order to use one of these interfaces:*

- *The interface must support IPv4.*
- *The interface must be active and physically connected to a network.*
- *The interface must have a valid IPv4 configuration (IP address / subnet mask / standard gateway).*

If, for example, you connect your PC to the PROFINET device only (directly, using a network cable between the PC and device), you must set up an IP configuration manually at your PC interface. This is done via **Control Panel / Network and Sharing Center / Change Adapter Settings** (Windows 7 is used as an example here). The settings for Ipv4 can be found under the properties of the network adapters.

Once you have selected a network interface, this interface will then be used by default for future connections.

The desired PROFINET device is selected in the Device Manager dialog box:

Device management

Network adapter 'USB2.0 to Fast Ethernet Adapter' on local host (192.168.1.150) :  
Subnet mask: 255.255.255.0

New search

PN Device (192.168.1.2 : 00:00:00:AA:BB:CC)

Device name: PN Device Apply

MAC address: 00:00:00:AA:BB:CC

Current settings

|                |               |          |
|----------------|---------------|----------|
| Device:        | PN Device     | Identify |
| Management IP: | 192.168.1.2   |          |
| Subnet mask:   | 255.255.255.0 |          |
| Gateway:       | 192.168.1.1   | Reset    |

New settings

|              |                 |       |
|--------------|-----------------|-------|
| IP address:  | 192.168.001.002 | Apply |
| Subnet mask: | 255.255.255.000 |       |
| Gateway:     | 192.168.001.001 |       |

OK Cancel

All found PROFINET devices are displayed in the selection list. The search is performed automatically as soon as the dialog box appears. If the list does not contain any devices (or the desired device), the search can be repeated at any time by clicking the **<New Search>** button.

A device from the list can be called to identify itself. Normally the device responds by flashing the Bus LED or similar. The device is called by clicking the **<Identify>** button.

The **<Reset>** button resets the selected device to the factory settings.



**Note!**

*This causes the device to lose its IP settings and to reset the name.*

Once a device from this list is selected, its name and/or IP configuration can be changed. If you change these values, a new search is performed automatically. If the device does not acknowledge the change, a manual search should be started.

**The following rules apply to these settings:**

- The device name must not contain any special characters and/or spaces. The entries for the IP settings must not contain any empty fields; fill empty fields with zeros (e.g.: **192 . 168 . 002 . 001** instead of **192 . 168 . 2 . 1**). There may be a delay when entering settings via the keyboard.
- Make sure that the IP configuration of the device is valid and matches the configuration of your network interface card because initiation of PROFINET communication takes place via UDP. To make things easier, the IP address and the subnet mask of the used network interface are also listed at the top in the network interface information.

**Note!**

*If you change the name or the IP configuration of the device, the device may restart so that the changes take effect (depends on the specific device). In this case, there may be a short delay before the device reappears in the list.*

**Messages if it is not possible to set up a connection to the device (error message 'Timeout' during connection setup):**

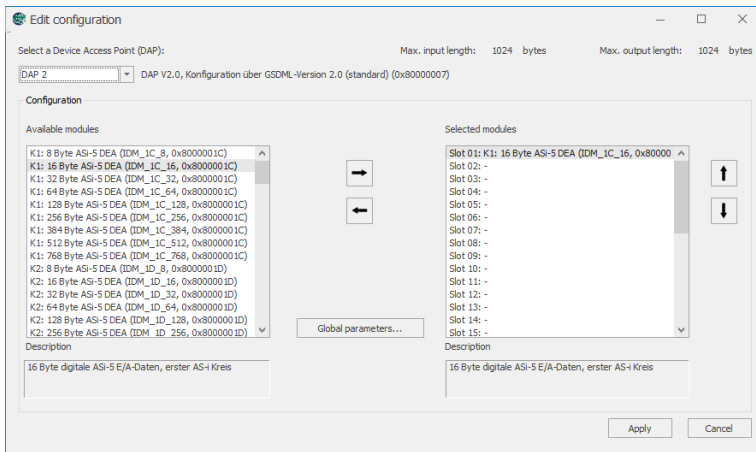
- Make sure that the subnet masks (PC and device) are identical so that the respective device can access the correct IP address in the selected network (both devices must be in the same subnet, i.e. the selected IP range and subnet mask must match).
- If the PC is connected directly to the device, the settings of the subnet masks (PC and device) must be identical.
- If the entries for the device name and/or the IP addresses are not adopted immediately, please enter them again. Delays can sometimes also occur because the device may first need to perform a restart.
- There may be problems if several IP addresses are assigned to a network adapter.

## 2.3 Data selection using GSD

The desired modules for data exchange can be chosen from the selected GSD file using the **Edit Configuration** dialog box. One of the available device access points (DAP) must first be selected. The available modules can then be added to or removed from the selection using the arrow buttons.

The order in which the modules to be used are displayed in the list on the right can be changed using the vertical arrow buttons. This moves the selected module up or down in the list. The order in the list determines the order of the data and the PROFINET slot number of the modules. The slot numbers are assigned consecutively, starting with 1, during connection setup (slot 0 is reserved for the DAP).

When selecting the DAPs and the modules, refer to the specifications from the device manufacturers. It is often the case that only certain DAPs and/or modules can be selected for a device. This is the most frequent cause if a 'PROFINET, Connect' error message appears during connection setup.



The **<General Parameters>** button in the middle of the window is used to set the parameter data of the selected DAP.

Double-clicking a selected module (on the right side) opens the dialog box for entering the parameter data of this module. A module may sometimes require special start parameters that are passed from the master to the device during connection setup. The start parameters to be set can be found in the respective manual from the device manufacturer. The special start parameters for PROFI-safe settings for modules are given below.

The source address can be freely defined.

The target address must be identical to the PROFI-safe address set in the device.

The watchdog timeout can be increased if necessary if faults are reported during PROFI-safe operation. Indications for this type of fault are reported via the corresponding alarms.

Set parameter

Parameter set: F\_Parameter

|               |            |                    |                                       |               |
|---------------|------------|--------------------|---------------------------------------|---------------|
| F_SIL         | SIL3       | Value : SIL3       | Allowed values : SIL1 SIL2 SIL3 NoSIL | Data type : - |
| F_CRC_Length  | 3-Byte-CRC | Value : 3-Byte-CRC | Allowed values : 3-Byte-CRC           | Data type : - |
| F_Block_ID    | 1          | Value : 1          | Allowed values : 0..7                 | Data type : - |
| F_Source_Add  |            | Value :            | Allowed values : 1..65534             | Data type : - |
| F_Dest_Add    |            | Value :            | Allowed values : 1..65534             | Data type : - |
| F_WD_Time     | 150        | Value : 150        | Allowed values : 1..65535             | Data type : - |
| F_Par_CRC     | 31615      | Value : 31615      | Allowed values :                      | Data type : - |
| F_Par_Version |            | Value :            | Allowed values :                      | Data type : - |
| F_Par_CRC     | 0          | Value : 0          | Allowed values :                      | Data type : - |

Parameter set:

Defaults Close

The completed configuration is saved by clicking the <Save> button.



### Note!

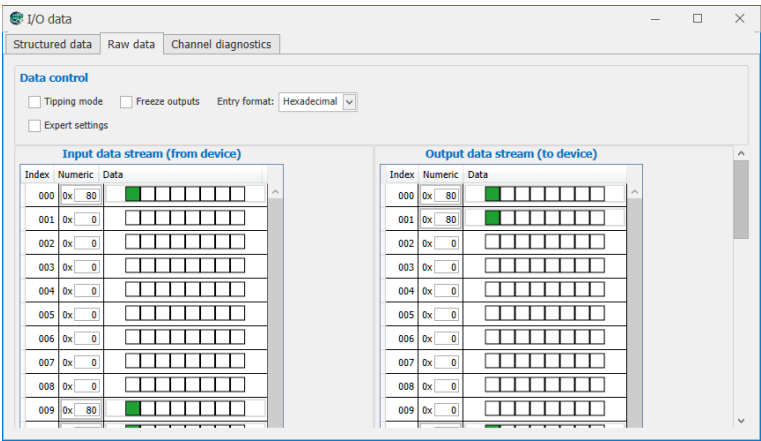
When the configuration is saved, two files with the selected name but different file extensions are created:

- One file has the extension **.pngsdm1**. It contains the basic device description file.
- The second file with the extension **.pncfg** contains the compiled configuration. If the configuration is moved to a different storage location, both files must always be moved together!

- If a module offers the option of configuring submodules, double-clicking on the module opens a corresponding dialog to configure the submodules.
- The procedure is the same as configuring the modules:
  - The submodules can be transferred to the subslots from left to right.
  - Submodule parameters can in turn be edited by double-clicking on a submodule on the right-hand side (if available).

2.4 IO data exchange

With active PROFINET communication between the PROFINET Master Simulator and the device, the cyclic input and output data can be viewed and changed in the **I/O Data** window.



The window contains two tabs, each presenting the data in a different way:

- 1. Structured data based on the data types described in the GSD
- 2. Sequential listing of raw data(see the section <I/O data (raw data)>).
- 3. Channel diagnostics (see the section <Channel diagnostics>).

I/O data (raw data)

The individual bytes of input data (to the Master Simulator) are displayed in the left list. The output data (to the device) is displayed in the right list. In both lists, the bytes with the IOPS/IOCS are shown with a gray background. These bytes cannot be changed. They are set automatically by the PROFINET stack. There are other bytes that may also be protected (e.g. PROFIsafe trailer).

The output data can be changed (with the exception of the mentioned metadata) either by clicking the boxes for the corresponding bits in the **Data** column or by entering a numerical value in the **Numerical** column.



**Note!**

*A change made to the selected output byte is always adopted (and transferred) immediately. If you initially want to set a certain value or change multiple bytes consistently, set the check mark for **Freeze outputs**. The changes will then not be adopted in the transmit buffer until the check mark is removed again.*

Tipping mode can also be activated (set the check mark for **Tipping mode**). An individual bit in the output data can now be set for exactly as long as you keep the corresponding switch pressed using the mouse.

**Note!**

*When tipping mode is started, the output values are set to 0. When tipping mode is ended, the previously active values are restored.*

The values of the output data can also be changed using the respective numerical input field. The input format of the data can be toggled between hexadecimal and decimal in the data control.

**Expert settings**

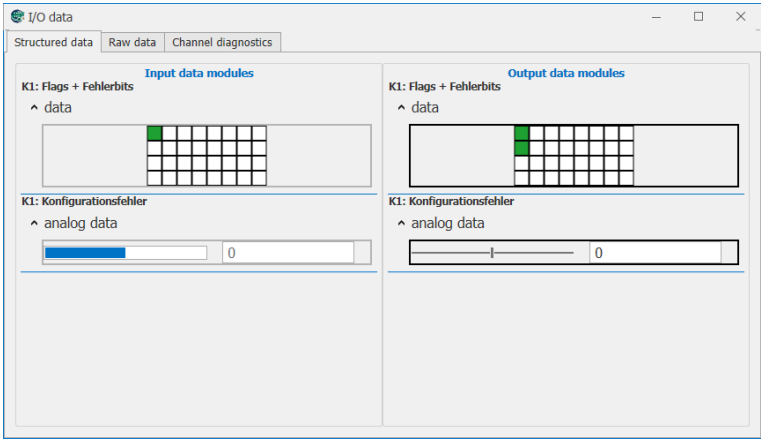
If you set this check mark, the additional **Text** column appears in the data tables. It shows the current values in hex format and, if interpretable, as ASCII characters.

In addition, you can toggle between the "byte" and "word" display format. In the case of the "word" format, it is also possible to switch the endianness of the display between "Big Endian" and "Little Endian".

**Note!**

*The set display format relates only to the interpretation in the user interface. The underlying cyclic data stream is always byte-wise for PROFINET, and related data is transferred in the Big Endian format in the case of PROFINET. For most application cases, the byte-wise approach is sufficient or the structured data view is recommended.*

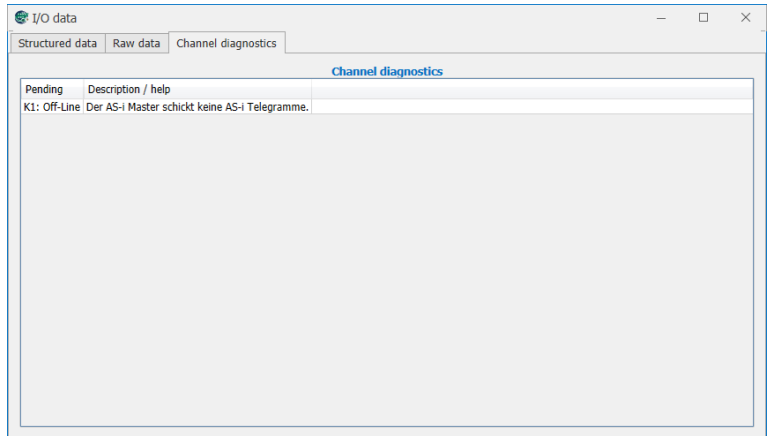
*I/O data in structured view*



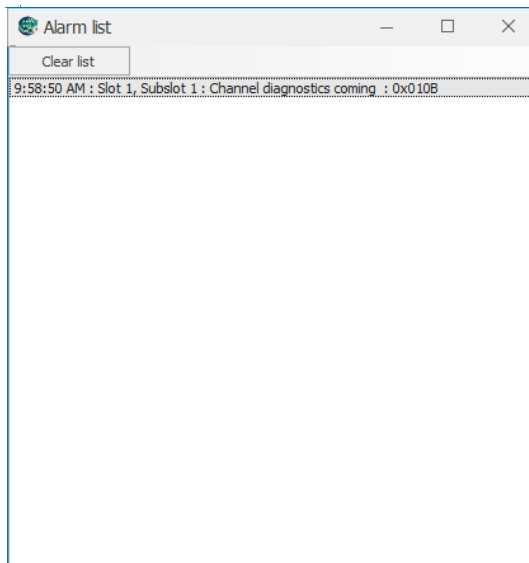
In this view, corresponding input/output elements are displayed for the most common data types and filled with the values from the data stream. The modules integrated via the GSD are each listed with their title and their data elements with description. If a module does not have any data in one direction (transmit/receive direction), "(no process data)" appears after the title. This view does not show the metadata of the cyclic data stream; you see only the actual process data.

## Channel diagnostics

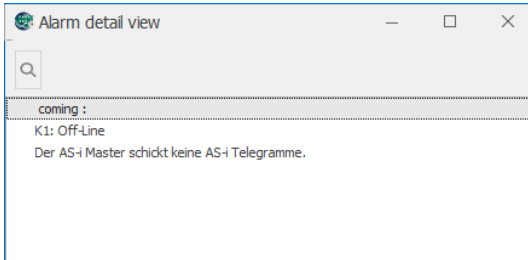
A list of all pending channel diagnoses is displayed in the **Channel diagnostics** tab.



All received PROFINET alarms are shown in a list in the **Alarm list** tool window. Double-clicking one of these entries displays a separate window containing a more detailed description of the alarm (if a description matching the alarm ID was found in the used GSD).



For user-specific alarms, it is possible to register as an observer for the alarm concerned using the <**Magnifier**> button in the detail window. This window is then updated with the data of the alarm as soon as another alarm with this ID occurs.

**Note!**

*PROFINET alarms that are not described in the GSD are also shown in the alarm list. In this case, only the four-byte status code can be displayed. Here, an indication of the cause of the alarm can be found either in the PROFINET specification or in the device description.*

## 2.5 Acyclic parameters

If a PROFINET connection exists, acyclic parameters can be exchanged with the device (RecordData CR).

The type and form of data are given in the respective device documentation.

Generally speaking, the parameter requests require the slot, subslot and index in order to identify the parameter. Parameter requests are either a read or write operation. For write operations, the bytes to be sent are given as a list of hex values, in the form "00 00 00 ...", each separated by a space.

Parameter request

Response timeout: 1000 [\*10 ms]

Request

Slot: 0

Subslot: 1

Index (hex): 7FFF

Data length: 8192

Operation

☒ write

☐ Auto readback after 500 [ms]

☐ read

Data to send (hex, space-separated)

00 00 00

Received data (hex)

-

Received data (ASCII)

Request Continuous request Stop

Clicking the **<Request>** button executes the operation. Any response bytes are output as a byte list and, where possible, as text. Clicking the **<Continuous request>** button executes the set operation cyclically. Do not confuse this cyclic request with cyclic data exchange! The application only submits a new request when the previous request has been completed.

### 3. License information

**Note!**

*The complete list of third-party licenses can be found in the application in the info dialog (application information) via the link **<Display third-party licenses>***

#### ***PcapDotNet, a .NET wrapper library for WinPcap, License information***

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