Operating Instruction Manual

DTM for YOKOGAWA PROFINET IO Controller A2LP131

Configuration of YOKOGAWA Controller

Table of Contents

1   Introduction

1.1   About this Manual

This manual provides information on how to set and configure the device parameters of a PROFINET IO-Controller A2LP131 using the PROFINET IO-Controller YOKOGAWA A2LP131 DTM.

A2LP131 is the PROFINET IO Communication Module for CENTUM™ and STARDOM™ by YOKOGAWA.

"YOKOGAWA" means Yokogawa Electric Corporation.

1.1.1   Descriptions of the Dialog Panes

The table below gives an overview for the individual dialog panes descriptions:

Section	Subsection	Page
Configuration	*Overview Configuration*	18
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	Device Table	24
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Table 1: Descriptions Dialog Pages

1.1.2   List of Revisions

Rev	Date	Version	Component	Chapter	Revision
1	2018-12-04	1.1010	Yokogawa A2LP131 PROFINET IO Controller DTM	All	Created

Table 2: List of Revisions

1.1.3 Conventions in this Manual

Notes, operation instructions and results of operation steps are marked as follows:

Notes

Important: <important note you must follow to avoid malfunction>

Note: <general note>

<note, where to find further information>

Operation Instructions

1. <instruction>
2. <instruction>

or

➤ <instruction>

Results

✎ <result>

Note: The PROFINET IO specification defines the designations "Controller" instead of "Master" and "Device" instead of "Slave". In this manual "Controller" and "Device" are used with the PROFINET IO device or the DTM. In connection with general questions about the Master or the Slave functionality, the terms "Master" and "Slave" are used, as in the network configuration on the Master bus line, the „Stand-Alone-Slave", the Master diagnosis or the Master license.

Terminology used:

PROFINET IO-Controller A2LP131: "PROFINET IO-Controller"

PROFINET IO-Controller YOKOGAWA A2LP131 DTM: "PROFINET IO-Controller DTM"

1.2 Documentation Overview

The following table lists the documents for SYCON.net-SLP/YOKO for A2LP131:

Content	Document Name
General description of netFrame: Description of the output window, menus and toolbars.	SYCONnet netFrame YOKOGAWA A2LP131 OI 01 EN.pdf
General description of netDevice. Graphical network view, device catalog and the project tree. Description of ▪ menus, ▪ context menus, ▪ insert device, cut/copy/paste device, additional functions (print), delete device, ▪ symbolic name, ▪ network menu, ▪ network toolbar. Getting started/Configuration steps. How to add a device description. Working with bus lines.	SYCONnet netDevice YOKOGAWA A2LP131 OI 01 EN.pdf
Description of the configuration dialogs to configure the PROFINET IO Controller. Getting started/Configuration steps. Configuration of the master ▪ controller network settings, ▪ device table, ▪ IP address table, ▪ process data, ▪ stations timing, ▪ address table, ▪ FSU-/port-settings, ▪ controller settings	PROFINET IO Controller YOKOGAWA A2LP131 DTM OI 01 EN.pdf
Description of the configuration dialogs to configure the PROFINET IO slave. Getting started/Configuration steps. Configuration of the slave ▪ general, ▪ modules and parameters.	YOKOGAWA PROFINET IO Generic Device DTM noPROFIsafe IO 01 EN.pdf

Table 3: Documentation Overview

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- Nuclear fusion processes in nuclear power plants;

- Medical devices used for life support and

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1.6   Requirements

System Requirements

- PC with 1 GHz processor or higher

- Windows® 7 (32 bit und 64-Bit) SP1,
  Windows® 10 (32-Bit und 64-Bit),
  Windows® Server 2008, or
  Windows® Server 2016

- Administrator privilege required for installation

- Internet Explorer 5.5 or higher

- RAM: min. 512 MByte, recommended 1024 MByte

- Graphic resolution: min. 1024 x 768 pixel

- Keyboard and Mouse

- Restriction: Touch screen is not supported.

Note: If the project file is used on a further PC,

- this PC must also comply with the above system requirements,

- the device description files of the devices used in the project must be imported into the configuration software SYCON.net on the new PC,

- and the DTMs of the devices used in the project must also be installed on that further PC.

Requirements PROFINET IO-Controller DTM

To configure the PROFINET IO-Controller A2LP131 with the PROFINET IO-Controller DTM the following requirements have to be accomplished:

- Completed hardware installation of PROFINET IO-Controller A2LP131

- Installed FDT/DTM V 1.2 compliant frame application

For more information to the hardware installation, please refer to the corresponding **User Manual** of your device.

1.7   Dialog Structure of the PROFINET IO-Controller DTM

The graphical user interface of the DTM is composed of different areas and elements listed hereafter:

1. A header area containing the **General Device Information**,

2. The **Navigation Area** (area on the left side),

3. The **Dialog Pane** (main area on the right side),

4. **OK**, **Cancel**, **Apply**, **Help**,

5. The **Status Line** containing information about the DTM.
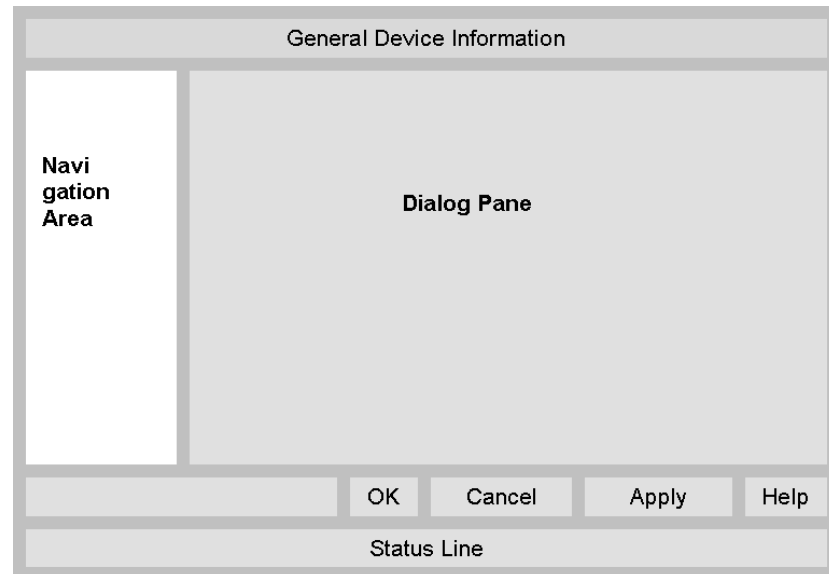
Figure 1: Dialog Structure of the PROFINET IO-Controller DTM

1.7.1   General Device Information

Parameter	Meaning
IO Device	Name of the device
Vendor	Vendor name of the device
Device ID	Identification number of the device
Vendor ID	Identification number of the vendor

Table 4: General Device Information

1.7.2 Navigation Area

The **Navigation Area** contains folders and subfolders to open the dialog panes of the DTM.
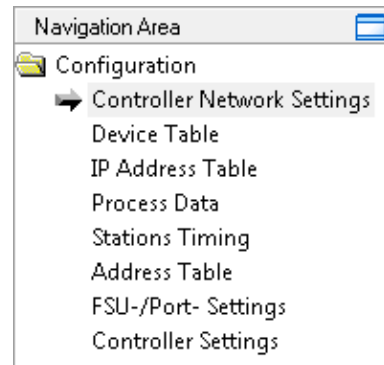

Figure 2: Navigation Area

➢ Select the required folder and subfolder.

✎ The corresponding Dialog pane is displayed.

Hide / display Navigation

	🔲	Hiding the navigation area (above right side).
🔲 Show navigation area		Opening the navigation area (below left side).

1.7.3 Dialog Panes

At the dialog pane the **Configuration** pane is opened via the corresponding folder in the navigation area.

Configuration	
Controller Network Settings	The **Controller Network Settings** pane displays general PROFINET IO-Controller information. Here you must set the name of station and the IP settings for the PROFINET IO-Controller. For further information, refer to section *Controller Network Settings* on page *21*.
Device Table	The **Device Table** displays the list of all configured PROFINET IO-Devices. Here you must set the Name of station for the PROFINET IO-Device station. For further information, refer to section *Device Table* on page *24*.
IP Address Table	The **IP Address Table** pane displays communication data of the devices associated with the PROFINET IO-Controller. Here you must make the IP settings for the PROFINET IO-Device station. For further information, refer to section *IP Address Table* on page 25.
Process Data	The **Process Data** pane serves for the PROFINET IO-Controller DTM as an external process data interface. For further information, refer to section *Process Data* on page **28**.
Stations Timing	On the **Stations Timing** pane you can select or set the station global settings. For further information, refer to section *Stations Timing* on page *29*.
Address Table	The **Address Table** pane shows a list of all dpram addresses used in the process data image. For further information, refer to section *Address Table* on page *33*.
FSU/Port Settings	The **FSU/Port Settings** pane is for information only. For further information, refer to section *FSU/Port-Settings* on page 34.
Controller Settings	At the **Controller Settings** pane device related settings can be made. These settings are fixed settings. For further information, refer to section *Controller Settings* on page *35* .

Table 5: Overview Dialog Panes

1.7.4 OK, Cancel, Apply and Help

OK, **Cancel**, **Apply** and **Help** you can use as described hereafter.

	Meaning
OK	To confirm your latest settings, click **OK**. All changed values will be applied on the frame application database. *The dialog then closes.*
Cancel	To cancel your latest changes, click **Cancel**. Answer to the safety query **Configuration data has been changed. Do you want to save the data?** by **Yes**, **No** or **Cancel**. **Yes**: The changes are saved or the changed values are applied on the frame application database. *The dialog then closes.* **No**: The changes are <u>not </u>saved or the changed values are not applied on the frame application database. *The dialog then closes.* **Cancel**: *Back to the DTM.*
Apply	To confirm your latest settings, click **Apply**. All changed values will be applied on the frame application database. *The dialog remains opened.*
Help	Please read separate PDF manual (this manual).

Table 6: OK, Cancel, Apply and Help

1.7.5 Status Bar

The **Status Bar** displays information about the current state of the DTM. The current activity, is signaled graphically via icons in the status bar.
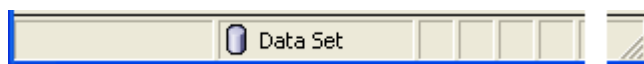

Figure 3: Status Bar

Icon / Meaning	
Data Source States	
🛢	**Data set**: The displayed data are read out from the instance data set (database).
📡	**Device**: The displayed data are read out from the device.
States of the instance Date Set	
✏	**Valid Modified**: Parameter is changed (not equal to data source).

Table 7: Status Icons

2   Safety

2.1   General Note

The documentation in the form of a user manual, an operating instruction manual or other manual types, as well as the accompanying texts have been created for the use of the products by educated personnel. Technical knowledge is presumed. The user has to assure that all legal regulations are obeyed.

2.2   Intended Use

The PROFINET IO-Controller YOKOGAWA A2LP131 DTM serves for configuration of the PROFINET IO-Controller A2LP131 devices.

2.3   Personnel Qualification

Personnel responsible for the application of the network system shall be aware of the system behavior and shall be trained in using the system.

2.4   Personal Injury

To ensure your own personal safety and to avoid personal injury, before you configure your system, you necessarily must read, understand, and comply with the safety instructions and safety messages in the manufacturer manuals of your system, the PROFINET IO-Controller A2LP131 device is connected to.

2.4.1   Mismatching System Configuration

Mismatching system configuration loaded into the device could result in faulty data mapping in the application program and thus unexpected equipment operation may cause personal injury.

2.5   Property Damage

To avoid property damage respectively device destruction and damage to your system or to your equipment, before you configure your system, you necessarily must read, understand, and comply with the safety instructions and safety messages in the manufacturer manuals of your system, the PROFINET IO-Controller A2LP131 device is connected to.

2.5.1   Mismatching System Configuration

Mismatching system configuration loaded into the device could result in faulty data mapping in the application program and thus unexpected equipment operation may cause damage of equipment.

2.6   References Safety

[S1]   ANSI Z535.6-2006 American National Standard for Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials

[S4]   26514-2010 - IEEE Standard for Adoption of ISO/IEC 26514:2008 Systems and Software Engineering--Requirements for Designers and Developers of User Documentation

3   Getting started

3.1   Configuration Steps

The following overview provides to you the step sequence on how to configure a PROFINET IO-Controller A2LP131 device with PROFINET IO-Controller DTM as it is typical for many cases. At this time it is presupposed that the hardware installation was done.

The overview lists all the steps in a compressed form. For detailed descriptions of each step refer to the sections noted in the column *For detailed information see section*.

#	Step	Short Description	For detailed information see section	Page
1	Add PROFINET IO-Device in the Device Catalog	Add the Device in the Device Catalog by importing the device description file to the Device Catalog. Depending of the FDT Container. For netDevice: - **Network > Import Device Descriptions**.	*(See Operating Instruction Manual netDevice and netProject)*	-
2	Load device catalog	Depending of the FDT Container: For netDevice: - select **Network > Device Catalog**, - select **Reload Catalog**.	*(See Operating Instruction Manual netDevice and netProject)*	-
3	Insert Device(s) into the configuration	- In the Device Catalog click to the Slave. - Insert the device via drag and drop **to the Master bus line** in the network view. - Add more slaves, if needed.	*(See Operating Instruction Manual netDevice and netProject)*	-
4	Configure Device	Configure the Device. - Double click to the device icon of the Device. - The Generic Device DTM configuration dialog is displayed. In the Generic Device DTM configuration dialog: - Select **Configuration > Modules**. - Configure the PROFINET IO-Device modules. - Configure the the submodule specific parameter values and for safety modules the F-Parameters values. - Close the Generic Device DTM configuration dialog via the button **OK**.	*(See Operating Instruction Manual Generic DTM for Yokogawa PROFINET IO-Devices)*	-
5	Configure Controller For Device: Set Name of station and IP settings.	Configure the PROFINET IO-Controller. - Double click to the device icon of the Controller. In the Controller DTM configuration dialog: - Select **Configuration > Controller Network Settings**. - Set the Name of station for the Controller. - Make the IP settings for the Controller. - Possibly make further settings if required. - Select **Configuration > Device Table**, - Select the PROFINET IO-Device required. - Enter the Name of station of the PROFINET IO-Device station. - Select **Configuration > IP Address Table**. - Configure the IP settings of the PROFINET IO-Device station. - Select **Configuration > Process data**. - Set symbolic names for the configured modules or signals. - Select **Configuration > Stations Timing**. - Select the appropriate station. - Make the station global settings for each	*Configuring Device Parameters* *Controller Network Settings* *Device Table* *IP Address Table* *Process Data* *Stations Timing*	19 21 24 25 28 29

#	Step	Short Description	For detailed information see section	Page
		PROFINET IO-Device station.		
		- Close the Controller DTM config. dialog via **OK**.		-
6	Save project	Depending of the frame application. For the configuration software: - select **File > Save**.	*(See Operating Instruction Manual of the Frame Application)*	-

Table 8: Getting started - Configuration Steps

4 Configuration

4.1 Overview Configuration

Configuration Dialog Panes

The table below gives an overview for the **Configuration** dialog panes descriptions:

PROFINET IO-Controller DTM	Folder Name / Section	Page
Navigation Area	*Controller Network Settings*	21
Configuration	*Device Table*	24
Controller Network Settings	*IP Address Table*	25
Device Table	*Process Data*	28
IP Address Table	*Stations Timing*	29
Process Data	*Address Table*	33
Stations Timing	*FSU/Port-Settings*	34
Address Table	*Controller Settings*	35
FSU-/Port- Settings		
Controller Settings		
Navigation Area – Configuration		

Table 9: Descriptions of the Dialog Panes Configuration

Notice the descriptions in the section *Configuration Steps* on page 16.

4.2   Configuring Device Parameters

The following steps are required to configure the parameters of the PROFINET IO-Controller A2LP131 using the PROFINET IO-Controller DTM:

Controller Network Settings

1. Set the Name of station and the IP settings for the PROFINET IO-Controller.

➢ Select **Configuration > Controller Network Settings**.

➢ Set the Name of station and the IP settings for the PROFINET IO-Controller.

➢ Check **DCP set is activated via the network** if the settings for the Name of Station and the IP settings are to be made via the DCP protocol (if necessary via an external tool).

Note! All the PROFINET IO-Device connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller.

When the user changes the subnet for the A2LP131 Controller, a corresponding warning message is displayed.

➢ Apply all settings.

Device Table

2. Select the PROFINET IO-Devices required for communication:

➢ Select **Configuration > Device Table** in the navigation area.

➢ Select the required device/s.

3. Set the **Name of station** of the PROFINET IO-Device station.

Note: The **Name of station** displayed here must match with the Name of station set in the PROFINET IO-Device. The Name of station must be explicit in the PROFINET network. It must be a DNS compatible name.

➢ In the column **Name of station** set the network name of the PROFINET IO-Device station.

➢ Apply all settings.

IP Address Table

4. Configure the IP settings of the PROFINET IO-Device station:

➢ Select **Configuration > IP Address Table** in the navigation area.

5. Select **Mode** > **No DCP Set**.

6. Alternatively select **Mode** > **DCP Set with inherit**.

➢ Set the IP address manually in the IP Address Table pane.

Note: All the PROFINET IO-Devices connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller.

Changing of PROFINET IO-Device's IP address by changing the subnet is not allowed. When editable, last position only is changeable.

↪ The network mask and the gateway address of the PROFINET IO-Devices are applied from the Controller Network settings.

7. Or select **Mode** > **DCP Set without inherit**.

➡ Set the IP address and gateway address manually in the IP Address Table pane.

> **Note:** All the PROFINET IO-Devices connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller.
>
> Changing of PROFINET IO-Device's IP address by changing the subnet is not allowed. When editable, last position only is changeable.

↪ The manually set values are applied. The Controller sets the IP address, network mask and gateway address to the PROFINET IO-Device station.

➡ Apply all settings.

Process Data

8. Set the process data:

➡ Select **Configuration > Process Data** in the navigation area.

➡ Set symbolic names for the configured modules or signals.

➡ Apply all settings.

Stations Timing

9. Make the Station global settings for each selected PROFINET IO-Device station.

➡ Select **Configuration > Stations Timing** in the navigation area.

➡ Adjust the values for **Updating time** manually.

➡ Adjust the values for **Watchdog time** manually.

➡ Check if there are notes or warnings in the Info pane and adapt your configuration accordingly.

➡ Apply all settings.

Close Master DTM Configuration Dialog

10. Click **OK** in order to close the Controller DTM configuration dialog and to store your configuration.

Further Information

For more information refer to the sections *Controller Network Settings* on page 21, *Device Table* on page 24, *IP Address Table* on page 25, *Process Data* on page 28, *Stations Timing* on page *29*, *Address Table* on page 33, *FSU/Port-Settings* on page 34and *Controller Settings* on page 35.

4.3   Controller Network Settings

The **Controller Network Settings** dialog page shows the current **Name of station** and the IP settings of the PROFINET IO-Controller which can be changed here.

By using the **Accept DCP Set via Network** option, the controller network settings can be set via the DCP protocol (if necessary using an external tool). By using the **Overwrite Name of Station of devices based on topology information** option, station names can be subsequently assigned to devices.

➢ Select **Configuration > Controller Network Settings** in the navigation area.

➢ The **Controller Network Settings** is displayed.

Figure 4: Configuration > Controller Network Settings

Parameter	Meaning	Range of Value / Value
Name of station (editable)	Network name of the PROFINET IO-Controller station. The Name of station can be edited here. It must be DNS compatible. For invalid inputs a red exclamation mark and an error message will appear. For information on the approved marks, see section *Name encoding* on page 37.	1 - 63 characters
Description (editable)	Symbolic Name of the PROFINET IO-Controller DTM.	

Parameter	Meaning	Range of Value / Value
Accept DCP Set via Network	*Case 1*: If **Accept DCP Set via Network** is checked, the settings for the Name of Station and the IP settings of the PROFINET IO-Controller device are made via the DCP protocol. This can be made via an external tool which can send DCP commands. As soon as a DCP command is sent in *case 1*, settings made in the **Controller Network Settings** window are overwritten. **Important!** The Name of Station and the IP settings of the PROFINET IO-Controller device can be set via the DCP protocol only if the PROFINET IO-Controller device is in operating mode 'Network Up'. The Name of Station set via an external tool ("name baptism" of PROFINET devices), must be synchronized manually with the device. I. e., the "name baptism" is not made via the configuration download in the configuration software SYCON.net. *Case 2*: If **Accept DCP Set via Network** is unchecked, the Name of Station settings and the IP settings made in the **Controller Network Settings** window are used.	Checked, unchecked Default: unchecked
IP Settings of the PROFINET IO-Controller Station (editable)		
IP Address	IP address of the PROFINET IO-Controller station. **Note!** All the PROFINET IO-Device connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller. When the user changes the subnet for the PROFINET IO-Controller A2LP131, a corresponding warning message is displayed.	valid IP Address Default: 192.168.0.1
Network Mask	Network mask of the PROFINET IO-Controllerstation.	valid Network Mask
Gateway Address	Gateway address of the PROFINET IO-Controller station.	valid Gateway Address

Table 10: Controller Network Settings Pane Parameters

➢ Set the Name of station and the IP settings for the PROFINET IO-Controller.

➢ Check **DCP set is activated via the network** if the settings for the Name of Station and the IP settings are to be made via the DCP protocol (via an external tool).

Important! The Name of Station and the IP settings of the PROFINET IO-Controller device can be set via the DCP protocol only if the PROFINET IO-Controller device is in operating mode 'Network Up'.

4.3.1 Example - Changing Subnet (Controller Network Settings)

Note! All the PROFINET IO-Device connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller.

When the user changes the subnet for the A2LP131 Controller, a corresponding warning message is displayed.

Figure 5: Example - Changing Subnet (Controller Network Settings)

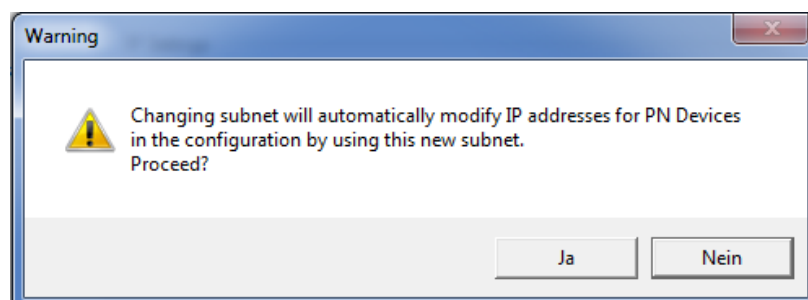If you enter a changed value to the first three positions of the IP address, the following warning message appears:

Figure 6: Example - Changing Subnet (Controller Network Settings)

Figure 7: Example - Changing Subnet (Controller Network Settings)

4.4 Device Table

The **Device Table** dialog pane shows the list of all PROFINET IO-Devices configured in the PROFINET IO-Controller configuration.

Follow the steps described hereafter:

Set the **Name of station** of the PROFINET IO-Device station.

Note: The **Name of station** displayed here must match with the Name of station set in the PROFINET IO-Device. The Name of station must be explicit in the PROFINET network. It must be a DNS compatible name.

➢ In the column **Name of station** set the network name of the PROFINET IO-Device station.

	Activate	Index /	Name of station	Device	Description	
Device Table						
▶	☑	1	scalance-x208pro	SCALANCE X208PRO V5.2	Switch for Industial Ethernet (PROFINET IO device)	SIEMENS
	☑	2	wago-750-340	750-340 V01.02.xx (FW 03)	Finely-graduated modular distributed I/O device, protection type IP2	WAGO Kontakttechnik
	☑	3	simocodeprovpn2	SIMOCODE pro V PN	Motor Management Sytem SIMOCODE pro V PN	SIEMENS
	☑	4	unnamed	R0S2.3		SIEMENS

Figure 8: Configuration > Device Table

Parameter	Meaning	Range of Value / Value
Activate	**Activate** checkbox is checked: process memory in the controller is reserved for this device and the controller makes a data exchange on the bus to this device.	Default: checked, not changeable
Index (editable)	About the index it is possible to set an user-defined sequence for the devices configured in the PROFINET IO-Controller.	1 … 999
Name of station (editable)	Network name of the PROFINET IO-Device station. The Name of station is set here. In the PROFINET IO-Device-DTM it is only displayed or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device. The Name of station set here must match with the Name of station set in the PROFINET IO-Device. The PROFINET IO-Controller uses the Name of station to identify the PROFINET IO-Device via the PROFINET network and to build up communication. The Name of station must be unique in the PROFINET network. It must be a DNS compatible name. For invalid inputs a red exclamation mark and an error message will appear.	Unique network name of the device according to the PROFINET specification (PNO document 2722). 1 - 63 characters
Device	The name of the physical device. Name for the device that is stored non-volatile on the device.	
Description	The symbolic name of the device.	
Vendor	Name of the vendor of the device.	

Table 11: Device Table Pane Parameters

4.5 IP Address Table

In the **IP Address Table** you can configure the mode, how the PROFINET IO-Devices get the IP address, network mask and gateway address settings.

➢ Select **Configuration > IP Address Table** in the navigation area.

Name of station	Mode	IP address ∕	Network mask	Gateway address
scalance-x208pro	DCP SET with Inherit	192.168.0.2	255.255.255.0	0.0.0.0
wago-750-340	DCP SET with Inherit	192.168.0.3	255.255.255.0	0.0.0.0
simocodeprovpn2	DCP SET with Inherit	192.168.0.4	255.255.255.0	0.0.0.0
unnamed	DCP SET with Inherit	192.168.0.5	255.255.255.0	0.0.0.0

Figure 9: Configuration > IP Address Table (example for Mode: DCP SET with inherit)

Parameter	Meaning	Range of Value / Value
Name of station	Network name of the PROFINET IO-Device station. The Name of station is set in the **Device Table** in the PROFINET IO Controller DTM. Here it is only displayed (refer to section *Device Table* on page 24) or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device.	1 - 63 characters
IP Settings of the PROFINET IO Device Station		
Mode	**DCP SET with inherit**: The network mask and the gateway address are taken from the Controller Network Settings.The PROFINET IO-Controller sets the IP address, network mask and gateway address. *This is the default setting.* **DCP SET without inherit**: The network mask is taken from the Controller Network Settings. The user can assign the IP settings manually. The PROFINET IO-Controller sets the IP address, network mask and gateway address. **No DCP SET:** The PROFINET IO-Controller does not set the IP address, network mask and gateway address.	DCP Set with inherit (default), DCP Set without inherit, No DCP SET
IP Address (editable, if Mode is "DCP SET with inherit" or "DCP SET without inherit")	IP address of the PROFINET IO-Device station. If Mode is "DCP SET with inherit" or "DCP SET without inherit", the IP address of the PROFINET IO-Device station is set here in the **IP Address Table**. **Note!** All the PROFINET IO-Devices connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller. Changing of PROFINET IO-Device's IP address by changing the subnet is not allowed. When editable, last position only is changeable. In the PROFINET IO-Device DTM the IP address is only displayed. The PROFINET IO-Controller transmits the IP address of the PROFINET IO-Device during startup via the PROFINET network to the PROFINET IO-Device and thereby configures the PROFINET IO-Device.	valid IP Address
Network Mask	Network mask of the PROFINET IO-Device station The network mask is taken from the Controller Network Settings. In the PROFINET IO-Device DTM the Network mask is only displayed. The PROFINET IO-Controller transmits the Network mask of the PROFINET IO-Device during startup via the PROFINET network to the PROFINET IO-Device and thereby configures the PROFINET IO-Device.	valid Network Mask

Parameter	Meaning	Range of Value / Value
Gateway Address (editable, if Mode is "DCP SET without inherit")	Gateway address of the PROFINET IO-Device station If Mode is "DCP SET without inherit", the Gateway address of the PROFINET IO-Device station is set here in the **IP Address Table**. In the PROFINET IO-Device DTM the Gateway address is only displayed. The PROFINET IO-Controller transmits the Gateway address of the PROFINET IO-Device during startup via the PROFINET network to the PROFINET IO-Device and thereby configures the PROFINET IO-Device.	valid Gateway Address

Table 12: IP Address Table Pane Parameters

Proceed as follows:

1. Select **Mode** > **DCP Set with inherit**.

➢ Set the IP address manually in the IP Address Table pane.

↪ The network mask and the gateway address of the PROFINET IO-Devices are applied from the Controller Network settings.

↪ The Controller sets the IP address, network mask and gateway address to the the PROFINET IO-Devices.

2. Alternatively select **Mode** > **DCP Set without inherit**.

➢ Set the IP address and gateway address manually in the IP Address Table pane.

Figure 10: Configuration > IP Address Table (example for Mode: DCP SET without inherit)

↪ The manually set values are applied. The Controller sets the IP address, network mask and gateway address to the PROFINET IO-Device station.

➢ Apply all settings.

3. Or select **Mode** > **No DCP Set**.

↪ The Controller does not assign the IP address, network mask and gateway address to the PROFINET IO-Devices. The devices get these settings from other source. The corresponding columns in the IP Address Table are greyed out.

Figure 11: Configuration > IP Address Table (example for Mode: No DCP SET)

4.5.1 Example - Changing IP Address (IP Address Table)

Note: All the PROFINET IO-Devices connected to the PROFINET IO-Controller shall be in the subnet of the PROFINET IO-Controller.

Changing of PROFINET IO-Device's IP address by changing the subnet is not allowed. When editable, last position only is changeable.

Figure 12: Example - Changing IP Address (IP Address Table)

Figure 13: Example - Changing IP Address (IP Address Table)

4.6   Process Data

For the PROFINET IO-Controller DTM the **Process Data** pane serves as an external process data interface, e. g. for data transfer to a PLC unit. The process data pane lists the PROFINET IO-Devices connected to the PROFINET IO-Controller, as well as the configured modules or input or output signals of the devices. This makes the fieldbus structure visible.

For the configured modules or signals names can be set (Column *Tag*).

Figure 14: Process Data

Column	Symbol	Meaning
Type	device*	Device labeling* provided by the hardware followed by the device's Name of station in pointy brackets
	module, submodule I/O signal	Description of the modules or input or output signals configured to the device (not editable)
Tag	device*	Symbolic name* of the device
	module, submodule I/O signal	Symbolic name for the modules or for the input or output signals configured to the device (editable)
	warning	Duplicate tag names for signals within one submodule are not allowed.
* Depending on the protocol, either the device name or the symbolic name can be edited via the device symbol context menu.		

Table 13: Process Data

If duplicate tag names occur on the same level, a message appears:
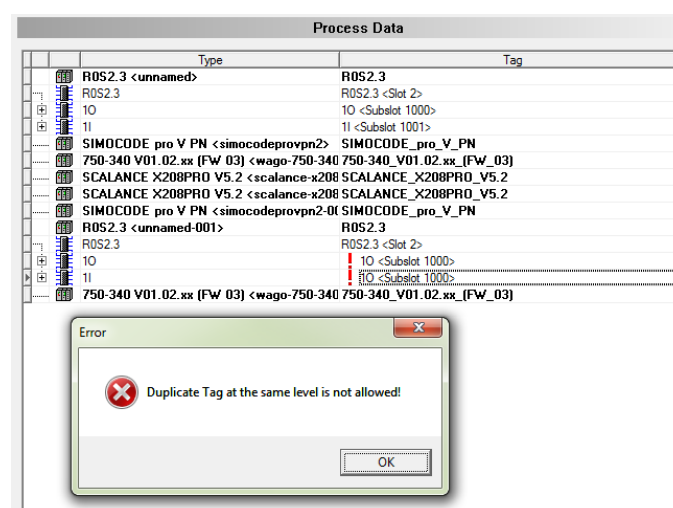
Figure 15: Process Data – asure tag name uniqueness check on module level

4.7 Stations Timing

In the dialog pane **Station Timing** for each selected PROFINET IO-Device station you can make the Station global settings 'Updating time' and 'Watchdog time'.

➢ Select **Configuration > Stations Timing** in the navigation area.

Stations Timing

Station global settings

Name of station	RT mode	Updating Time [...]	Send-Cloc...	Watchdog Time [...]
▶scalance-x208pro	Unsynchronized (RT	128.0	4.0	384.0
wago-750-340	Unsynchronized (RT	16.0	1.0	48.0
simocodeprovpn2	Unsynchronized (RT	16.0	4.0	48.0
unnamed	Unsynchronized (RT	16.0	4.0	48.0

Figure 16: Configuration > Stations-Timing, Example

If applicable, in the table devices with

- not supported isochronous submodules (column "RT mode")
- send-clock values leading to restriction of maximum allowed devices

are indicated. The corresponding details are given in the "Info" pane beneath the table.

In the "Info" pane the following is displayed:

- number of devices configured,
- if applicable, explanation on isochronous submodules not supported by A2LP131,
- if applicable, explanation on restriction of maximally allowed devices.

Figure 17: Configuration > Stations-Timing, Example with warnings

| Parameter	Meaning	Range of Value / Value
Station global Settings		
Name of station	Network name of the PROFINET IO-Controller station. Under **Name of station** all devices are displayed, which are connected to the PROFINET IO-Controller. The corresponding name of station is set in the **Device Table** in the PROFINET IO Controller DTM (refer to section *Device Table* on page 24) or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device.	1 - 63 characters
RT mode	'Unsynchronized (RT)' as a *fixed setting* means that RT (= Real-Time) is used. The data exchange from the PROFINET IO-Controller with this PROFINET IO-Device is not synchronized. I. e., this device does not support a synchronized (isochronous) real-time communication. If a device has configured isochronous submodules not supported by A2LP131, such a device is marked with an exclamation point. ! Unsynchronized (RT For more refer to the description of the Info area.	*Fixed:* Unsynchronized (RT)
Updating time [ms]	Eligible (total) cycle time of the device to exchange data. **RT mode = RT:** For each unsynchronized device, a value for 'Updating time' can be chosen. There is no dependence on other variables.	RT mode **RT**: Min. value is device dependent, refer to the "MinDeviceInterval" definition in GSDML; Max. value: 512 ms

Parameter	Meaning	Range of Value / Value
Send-Clock [ms]	Minimum send clock value is 1 ms. For each Updating time value a corresponding Send-Clock value is displayed. This value is not editable. If the configuration includes devices with configured Send-Clock value 1.00 ms and the number of devices exceeds the limit of 64, a warning symbol (triangle) is displayed for all such devices with configured Send-Clock value 1.00 ms. 16.0 ⚠ 1.0 For more refer to the description of the Info area.	1 ms, 2 ms, 4 ms
Watchdog Time [ms]	Time, after which a device or the controller reports the absence of cyclic telegrams and passes over to the error state. The value must be an integer multiple of the cycle time (updating time). Watchdog Time default value is threefold of the Updating Time. **Note!** The max. Watchdog Time is calculated as follows: [Max. value of Updating Time] x [Max. value of DataHoldFactor]. By following added constraint: It shall be equal or less than 1,92 s. The actual max. value for the Watchdog Time is device dependent: • The DataHoldFactor ranges supported by a Device shall be considered (not stated in the GSDML). • As per [4], DataHoldFactor range 0x0003 – 0x00FF is mandatory for all devices, whereas the ranges 0x0001 – 0x0002 and 0x0100 – 0x1E00 are optional. The YOKOGAWA PROFINET IO Controller A2LP131 DTM does not state which optional ranges are supported by the individual devices. For this info, the user shall consult the device operating instruction manual provided by the device manufacturer.	Min. value: [Min. value of updating Time] x 1 (factor 1) Max. value in general: 1,92 s = 1920 ms; Actual max value: device dependent. (Refer to [4], chapter "Coding of the field DataHoldFactor")
Info		
	Under Info the following is indicated:	
	The number of devices in the configuration Example Info 128 devices in the configuration.	
	⚠ Warnings for Send-Clock (respectively Updating Time) settings leading to the restriction of max allowed devices. "Due to the configured send-clock value of 1.00 ms, maximum 64 devices are allowed! Reduce the number or devices to 64 or set the updating time for all devices so that the minimum send-clock is higher than 1.00 ms to possibly allow more devices in the config if required so." For more, refer to section *Stations Timing Values and Maximum Allowed Devices* on page 32. In the Station global settings table all such devices with configured Send-Clock value 1.00 ms are marked with a warning symbol.	Number of allowed devices: For send-clock value = 1.00 ms: max. 64 devices; For send-clock values > 1.00 ms: max. 128 devices
	❗ Notes according to configuration of devices with isochronous submodules not supported: "Device has configured isochronous submodule(s) not supported by A2LP131. Remove such submodule(s) or the entire device from the configuration." In the Station global settings table the corresponding devices are marked in the RT mode column with an exclamation point.	

Table 14: Parameters in the 'Stations Timing' Pane

4.7.1 Configuring Updating Time or Watchdog Time

Note: Watchdog default value is threefold of the Updating Time.

1. Adjust the values for **Updating Time** manually.

Figure 18: Configuration > Stations Timing > 'Updating time' to be adjusted, Example

2. Adjust the values for **Watchdog Time** manually.

Figure 19: Configuration > Stations-Timing > 'Watchdog' to be adjusted, Example

3. Check if there are notes or warnings in the Info pane and adapt your configuration accordingly.

4. Apply all settings or complete the configuration via **OK**.

4.7.2 Stations Timing Values and Maximum Allowed Devices

In general, 128 PROFINET IO-RT-Devices are supported in the configuration. Depending on the send-clock value, there maybe a restriction for the allowed maximum number of PROFINET IO-Devices to 64 devices. When there is a device with

- send-clock < 2 ms (i.e. 1 ms), 64 devices maximally are allowed.

When such a restriction applies, the following error message will be reported:

*"Due to the configured send-clock value of **1.00 ms**, maximum **64** devices are allowed! Reduce the number or devices to 64 or set the updating time for all devices so that the minimum send-clock is higher than **1.00 ms** to **possibly** allow more devices in the config if required so."*

Note: "**possibly**" because a device may only support one send-clock value and changing the updating time may have no effect for the send-clock value. Further, multiple updating time values may correspond to the same send-clock value.

4.8   Address Table

The **Address Table** dialog pane shows a list of all addresses used in the process data image. The displayed addresses refer to the used PROFINET IO-Controller.

The **Address Table** displays which input module respectively output module (respectively sub module) is assigned to which address in the process data image. The start address of the input module respectively output module (respectively sub module) is displayed each time.

To display the address data:

➢ Select **Configuration > Address Table** in the navigation area.

Figure 20: Configuration > Address Table

Display Mode

➢ Use the **Display Mode** drop-down list to select data display mode decimal or hexadecimal.

Figure 21: Configuration > Address Table - Display Mode

4.9   FSU/Port-Settings

The **FSU/Port Settings** pane is for information and to set the MAU Type.

By the **MAU Tpye** for each PROFINET IO Device and for each port is to be set, whether the Device should establish the connection automatically or whether fixed parameters are to be used.

➢ Select **Configuration > FSU/Port-Settings**.

➢ Select **MAU Type**.

Figure 22: FSU/Port-Settings

Parameter	Meaning	Range of Value / Value
Name	The symbolic name of the PROFINET IO-Device station.	
Name of station	Network name of the PROFINET IO-Device station. The Name of station is set in the **Device Table** in the PROFINET IO Controller DTM. Here it is only displayed (refer to section *Device Table* on page 24) or otherwise it must be set directly in the configuration tool of the PROFINET IO-Device.	1 - 63 characters
MAU Type	The **MAU-Type** (MAU = Medium Attachment Unit) defines the physical settings (PHY) on the PROFINET IO-Device. For each port at the device the MAU type must be set separately. „*AUTO*": For this default setting, the connection between adjacent Devices is negotiated automatically. It may take 2-3 seconds for the physical connection is established. „*100BASETXFD*" [4]: For this setting, the connection between adjacent Devices is fixed with 100 MBit /Fullduplex.	*AUTO*, *100BASETXFD*

Table 15: FSU/Port-Settings

4.10 Controller Settings

At the **Controller Settings** pane device related settings can be made. These settings are fixed settings.

Figure 23: Configuration > Controller Settings

4.10.1 Start of Bus Communication

Figure 24: Master Settings > Start of Bus Communication

Controlled by application: the application program must activate the data exchange on the bus. This is the default setting and is not changeable.

4.10.2 Application Monitoring

Figure 25: Controller Settings > Application Monitoring

The **Watchdog time** determines the time within which the device watchdog must be re-triggered from the application program while the application program monitoring is activated. By default the watchdog time value equals to 1000 ms. This is the default setting and is not changeable.

4.10.3   Port Settings

For port 1 must be configured, whether the PROFINET IO-Controller device should establish the connection automatically (setting: „*AUTO*") or whether fixed parameters are to be used (setting: „*100BASETXFD*").
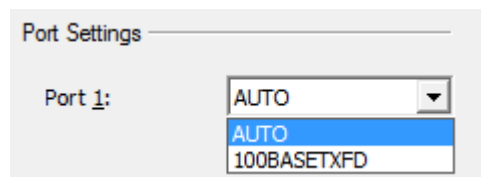

Figure 26: Controller Settings > Port Settings

Parameter	Meaning	Range of Value / Value
Port Settings Port 1	**Port Settings** is to be set for Port 1 of the PROFINET IO-Controller. „*AUTO*": For this setting, the connection between adjacent Devices is negotiated automatically. It may take 2-3 seconds for the physical connection is established. This is the default setting. „*100BASETXFD*" [4]: For this setting, the between connection adjacent Devices is fixed with 100 MBit /Fullduplex.	*AUTO (default), 100BASETXFD*

Table 16: Parameters Port Settings

> **Note:** The setting options under **Port Settings** for client specific variants of the configuration software can differ from the setting options displayed here.

4.10.4   Module Alignment

The **Module Alignment** defines the addressing mode of the process data image. The addresses (offsets) of the process data are always interpreted as byte addresses. The default setting is **Byte boundaries** and this setting is not changeable.
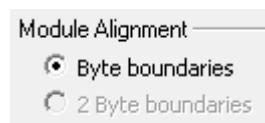

Figure 27: Controller Settings > Module Alignment

5 Appendix

5.1 User Rights

User-rights are set within the FDT-container.

Note: Administrator rights are always used.

5.2 Name encoding

The name is an OctetString with 1 to 240 octets. A name can contain one or more labels separated by a dot [.].

The definition of IETF RFC 5890 and the following syntax applies:

- 1 or more labels, separated by [.]

- Total length is 1 to 240

- Label length is 1 to 63

- Labels consist of [a-z0-9-]

- Labels do not start with [-]

- Labels do not end with [-]

- Labels do not use multiple concatenated [-] except for IETF RFC 5890

- The first label does not have the form "port-xyz" or "port-xyz-abcde" with a, b, c, d, e, x, y, z = 0..9, to avoid wrong similarity with the field AliasNameValue

- Station names do not have the form a.b.c.d with a, b, c, d = 0...999

5.3 References

[1]   Device Type Manager (DTM) Style Guide, Version 1.0 ; FDT-JIG - Order No. <0001-0008-000>

[2]   Application Layer protocol for decentralized periphery and distributed automation, Technical Specification for PROFINET, Version 2.3Ed2MU2, February 2015, Order No: 2.722, PROFIBUS Nutzerorganisation e.V., Karlsruhe

[3]   RFC 4836; ("Request For Comments"; http://tools.ietf.org/rfc/rfc4836.txt)

[4]   PN-AL-protocol_2722_V23Ed2MU4_Mar17.pdf, PI, Order No.: 2.722

5.4   List of Figures

5.5   List of Tables

5.6   Glossary

DCP

Discovery and Configuration Protocol.

The Discovery and basic Configuration Protocol (DCP) is a protocol for identifying and configuring devices which is defined within the PROFINET specification.

DNS

Domain Name Service.

DTM

Device Type Manager.

The Device Type Manager (DTM) is a software module with graphical user interface for the configuration or for diagnosis of device.

Ethernet

A networking technology used both for office and industrial communication via electrical or optical connections. It has been developed and specified by the Intel, DEC and XEROX. It provides data transmission with collision control and allows various protocols. As Ethernet is not necessarily capable for real-time application, various real-time extensions have been developed (Industrial Ethernet, Real-Time Ethernet).

FDT

Field Device Tool

FDT specifies an interface, in order to be able to use DTM (Device Type Manager) in different applications of different manufacturers.

Gateway Address

The IP address of a Gateway

GSDML

GSDML = Generic Station Description Markup Language.

IP

Internet Protocol.

IP belongs to the TCP/IP family of protocols and is defined in RFC791. It is based on layer 3 of the ISO/OSI 7 layer model of networking.

It is a connectionless protocol, i.e. you do not need to open a connection to a computer before sending an IP data packet to it. Therefore IP is not able to guarantee that the IP data packets really arrive at the recipient. On IP level neither the correctness of data nor the consistence and completeness are checked.

IP defines special addressing mechanisms, see IP Address.

IP Address

Address within IP (the Internet Protocol, part of TCP/IP).

An IP address is an address identifying a device or a computer within a network using the IP protocol. IP addresses are defined as a 32 bit number. Usually, for ease of notation the IP address is divided into four 8 bit numbers which are represented in decimal notation and separated by points:

a.b.c.d

where a.b.c.d are each integer values between 0 and 255.

Example: 192.168.30.15

However, not all combinations are allowed, some are reserved for special purposes.

The IP address 0.0.0.0 is defined as invalid.

MAC-ID

MAC = Media Access Control

A MAC-ID is on delivery a unique (physical) Ethernet address of the device.

MAC-IDs are defined as a 48 bit number. Usually, for ease of notation the MAC-ID address is divided into six 8 bit numbers which are represented in hexadecimal notation and separated by "minus"-signs (-):

A-B-C-D-E-F

where A-B-C-D-E-F are each integer values between 0 and 0XFF=255.

Example: 00-02-A2-20-91-18

MAU

Medium Attachment Unit

Module

Hardware or logical component of a physical device.

Name of station

The **Name of station** is defined by the DNS compatible device name in the GSD file. It can be modified according to the DNS name specification. If the PROFINET IO device does use the name baptism the **Name of station** is set by the PROFINET IO-Device.

Network Mask

Bit mask for separation between network part and device part in IP addresses in the network protocol IPv4.

The network part must be the identical for all devices of the corresponding network, while the device part is different.

This is used to specify whether the device searchs for a given IP address in its own network (device part) or can reach the IP address in other networks via router (network part).

See also https://en.wikipedia.org/wiki/IPv4_subnetting_reference

Example: 255.255.255.0 (network part 255 255 255, device part 0)

PROFINET

A communication system for Industrial Ethernet designed and developed by PROFIBUS & PROFINET International (PI). It uses some mechanisms similar to those of the PROFIBUS field bus.

PROFINET IO

PROFINET IO (Input - Output) has been created for the connection of decentralized peripherals to a controller.

PROFINET IO Controller

A PROFINET control unit responsible for the defined run-up of an I/O subsystem and the cyclic or acyclic data exchange.

PROFINET IO Device

A PROFINET field device that cyclically receives output data from its PROFINET IO-Controller and responds with its input data.

Submodule

Hardware or logical component of a module.

5.7 Contacts

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