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User Guide

smartLink HW-DP

dataFLOW®

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1 About this guide

1.1 Read me first

Please read this guide carefully before using the device to ensure safe and proper use. Softing does not assume any liability for damages due to improper installation or operation of this product.

This document is not warranted to be error-free. The information contained in this document is subject to change without prior notice. To obtain the most current version of this guide, visit the product website.

1.2 Target audience

This guide is intended for experienced operation personnel and network specialists responsible for configuring and maintaining field devices in process automation networks. Before installing and operating the smartLink HW-DP make sure that you have read and fully understood the safety requirements and working instructions in this guide.

1.3 Typographic conventions

The following conventions are used throughout Softing customer documentation:

Keys, buttons, menu items, commands and other elements involving user interaction are set in bold font and menu sequences are separated by an arrow	Open **Start → Control Panel → Programs**
Buttons from the user interface are enclosed in brackets and set to bold typeface	Press **[Start]** to start the application
Coding samples, file extracts and screen output is set in Courier font type	`MaxDlsapAddressSupported=23`
Filenames and directories are written in italic	Device description files are located in *C:\<Application name>\delivery\software\Device Description files*

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in damage or injury.

Note

This symbol is used to call attention to notable information that should be followed during installation, use, or servicing of this device.

Hint

This symbol is used when providing you with helpful user hints.

1.4 Document history

Document version	Changes since last version
1.00	first version
1.01	minor editorial changes
1.02	minor editorial changes
1.10	Chapter added on connecting to PROFIBUS devices via OPC UA and connecting to HART devices via FDT/DTM added.
1.10-1	Description on how to register a license added to Chapter Licensing 38.
1.20	New password rules 31 and description on how to connect to PROFIBUS devices via MQTT to plantPerfect Monitor added. Section PROFIBUS DP connector 15 added.
1.20-1	Support of HART IP RIOs updated.
1.20-2	Password description for login to user interface 27 changed.
1.20-3	Support of Pepperl+Fuchs HART IP RIO LB8105.
1.21	Description of PROFIBUS bus parameter view with project settings and effective settings added. Adaptation of guide to new features of SW Version 1.21
1.30	Support of E+H Netilion and the FieldEdge SGC500 gateway Extended HART-IP Server to additionally provide information of the remote I/O level Provide PROFIBUS network and device statistics over MQTT
1.31	The current version of the smartLink HW-DP does not support Simatic PDM. Chapter Connecting to ABB FIM 69 added.
1.32	Support of HART FDI Communication Server added. Chapter Live list 45 updated.

1.5 Related documentation and videos

See the following links for additional and related product information:

- smartLink DTM User Guide
- Tutorials available under Videos on the product website
- ABB FIM Installation and Startup
- ABB FIM product documentation (see the ABB FIM product pages (e.g. FIM Connectivity to HART-IP)

1.6 Document feedback

We would like to encourage you to provide feedback and comments to help us improve the documentation. You can write your comments and suggestions to the PDF file using the editing tool in Adobe Reader and email your feedback to support.automation@softing.com.

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- document name
- document version (as shown on cover page)
- page number

2 About smartLink HW-DP

The Softing smartLink HW-DP provides access to the communication system and connects the higher-level network structure with the field level.

The default configuration allows for a start-up in only a few minutes. In order to prevent network disruptions by unauthorized configuration changes, all configuration functions are protected by user administration.

2.1 Intended use

The smartLink HW-DP is designed to be used as a secure access point to PROFIBUS networks. Any other use is deemed non-intended use.

CAUTION

Do not use this device in hazardous areas! See Section Technical Data 8 for permissible ambient conditions.

Note

Installation and operation of the smartLink HW-DP must be performed by qualified personnel only.

2.2 Supported features

smartLink HW-DP supports the following features:

- parameter setting of HART devices connected to PROFIBUS DP networks via HART IP and FDT/DTM
- parameter setting of PROFIBUS DP devices via FDT/DTM
- provides process data, asset and diagnostic information of PROFIBUS devices via OPC UA
- provides asset and diagnostic information of PROFIBUS devices for Softing's plantPerfect Monitor

2.3 System requirements

To parametrize PROFIBUS and HART devices with your smartLink HW-DP you will need:

- 24V power supply
- PC with web browser
- Ethernet cable
- PROFIBUS cable

2.4 Technical data

Hardware	**Processor**: Intel Cyclone V SoC with dual core ARM Cortex-A9 **Status LEDs**: PWR, RUN, ERR, BUS **Real-Time Clock:** Real-time clock with buffering, setting time via browser or by NTP server
Interfaces	**Ethernet:** 1 xIEEE 802.3 10BASE-T, 100Base-TX, 1000Base-T, connector RJ4 **PROFIBUS DP:** 1 segment with RS485 physical layer, connector 90-pin sub-D socket
Supported communication protocols	HART IP, PROFIBUS DP, FDI Communication Server (OPC UA)
Supported PROFIBUS remote IOs	**Siemens:** T 200SP: 155-6BU01-0CN0 ET 200iSP: 152-1AA00-0AB0 ET 200M: 153-2BA10-0XB0 **ABB:** S800: CI801, CI840, CI840A S900: CI920N, CI920S **Pepperl+Fuchs:** LB: LB8105, LB8106, LB8109 FB: FB8206, FB8209 **R.Stahl:** iS1+: CPM 9440/15-01-11 **Turck:** BL20: BL20-E-GW-DP, BL20-GW-DPV1 excom: GDP 1.5 **WAGO:** I/O System 750: 750-333, 750-833
Supported HART IP IO modules	**Siemens**: ET 200SP: 134-6TD00-0CA1, 135-6TD00-0CA1 ET 200iSP: 134-7TD00-0AB0, 135-7TD00-0AB0, 134-7TD50-0AB0, 138-7FA00-0AB0 ET 200M: 332-8TF01-0AB0, 331-7TF00-0AB0, 331-7TF01-0AB0, 331-7TB00-0AB0, 332-8TF00-0AB0 **ABB:** S800: AI815, AO815, AI845, AO845A, AI895, AO895 S900: AI930N, AO930N **Pepperl+Fuchs:** LB: LB3002, LB3102, LB3103, LB3105, LB4002, LB4005, LB4102, LB4105, LB3005A2, LB3006A, LB3106A, LB4106A, LB7104A FB: FB3202B1, FB3202B2, FB3205B2, FB3205B3, FB3302B2, FB3305B2, FB4202B2, FB4202B3, FB4205B2, FB4205B3, FB4205C2, FB4302B2, FB7204B3, FB7304B3 **R.Stahl:** iS1+: AIM 9461/12-08-11, AOM 9466/12-08-11, AUM 9468/32-08-11 **Turck:** BL20: BL20-2AIH-I, BL20-2AOH-I excom: AIH40Ex, AOH40Ex **WAGO:** I/O System 750: 750-484, 75x-842
Supported HART-IP Applications	Emerson AMS Device Manager V14.1.1, V14.5 Endress + Hauser Netilion (FieldEdge SGC500) ABB FIM V3.01
Supported FDT Applications	PACTware, Endress + Hauser FieldCare
Dimensions (H x W x D) Weight	120 mm x 28 mm x 110 mm

Weight	about 430g
Power Supply	18 VDC ... 32 VDC; SELV/PELV power supply mandatory, typical input current: 200 mA, maximum input current: 1 A (allowing for in-rush current at switch-on)
Typical Power Loss	5 W
Operating Temperature	-40 °C ... +65 °C (see also Section Installation Positions 18)
Storage Temperature	-40 °C ... +85 °C
Relative humidity	10 % ... 95 %, non-condensing
Cooling	convection, no fan
Mounting	DIN rail 35 mm
Protection	IP20
Altitude	intended use must not exceed 2000 m in altitude
Usage location	indoor use only; no direct sunlight

2.5 Hardware interfaces

2.5.1 Real-time clock

A real-time clock (RTC) is located on the device, which is used to validate the temporal validity when using certificates. The real-time clock is buffered so that the real-time clock continues to run in the event of a brief power failure. The buffer time is limited and depends on various parameters (ambient temperature, duration of use, ...) and can range from a few hours to several days.

During the initial installation and if the power failure lasts longer than the buffer time, the RTCs are set using a browser via the web server (see corresponding section: Setting the RTC via browser).

Therefore, a problem with the validity of a certificate can indicate that the real-time clock is not set. It is recommended to use a time server in the network (NTP server), then the device automatically fetches the current time (see corresponding section: Activating the NTP server).

2.5.2 Safety precautions

CAUTION

During operation, the device's surface will be heated up. Avoid direct contact. When servicing, turn off the power supply and wait until surface has cooled down.

CAUTION

The electronic components of the smartLink HW-DP are sensitive to electrostatic discharges. Damages due to electrostatic discharge can lead to premature failure of components or intermittent faults at a later stage. Before installing the smartLink HW-DP, divert the electrostatic discharge away from your body and the tools used.

Note

Do not open the housing of the smartLink HW-DP. It does not contain any parts that need to be maintained or repaired. In the event of a fault or defect, remove the device and return it to the vendor. Opening the device will void the warranty!

2.6 Software interfaces

2.6.1 OPC UA

The smartLink HW-DP has an OPC UA server integrated. This server implements the TCP based binary OPC UA protocol and allows OPC UA clients to connect to it.

2.6.1.1 FDI communication server

The FDI communication server supports HART (FCG_TS62769-109-1) profiles.

The OPC UA server of the smartLink HW-DP complies with the OPC 30080-7 / FCG TS62769-7 specification V1.3 "FDI Communication Devices". This specification can be found on the FieldComm Group web page (www.fieldcommgroup.org) and for download on the OPC Foundation web page (www.opcfoundation.org).

An example of an FDI communication client written in Python is available at: https://github.com/SoftingIndustrial/FDICommClient.

2.7 LED status indicators

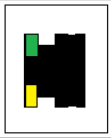
smartLink HW-DP has four device status LEDs and two RJ45 connection status LEDs on the front:

PWR = power supply - refer to next section 12
RUN = running - refer to next section 12
ERR = error - refer to next section 12
BUS = configuration - displays configuration upload - refer to next section 12

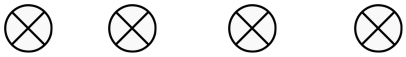
The device status LEDs are permanently on or flash in different colors and frequencies as indicated below:

Symbol	Color	Lighting
	none	off
	red	permanent
	green	permanent
	red	flashing (1 Hz)
	red	flashing quickly (5 Hz)
	green	flashing (1 Hz)
	green	flashing slowly (0.5 Hz)
	green	flashing quickly (5 Hz)
	orange (red/green)	permanent
	orange (red/green)	green permanent + red flashing (1 Hz)

The RJ45 status LEDs indicate the following behaviour:

web server port LEDS	Colour	Behaviour
	green	ON when port has an active link
	yellow	FLASHING when there is traffic on the port

2.7.1 Status LEDs startup phase

LEDs	Meaning
PWR RUN ERR BUS 	**Power Off** – check Power supply.
PWR RUN ERR BUS 	**Power On** - 24V DC power supply is ok.
PWR RUN ERR BUS 	**Start up phase** (up to 30 seconds).
PWR RUN ERR BUS 	**Start up phase finished** – check execution mode (normal or factory).

2.7.2 Status LEDs – factory mode

LEDs	Meaning
PWR RUN ERR BUS 	Device running in factory mode.
PWR RUN ERR BUS 	Firmware update is running.
PWR RUN ERR BUS 	Request to execute factory reset.
PWR RUN ERR BUS 	Device executes factory reset.
PWR RUN ERR BUS  n.a	**Software error** - reboot the device.
PWR RUN ERR BUS  n.a	**Software error** - device restarted automatically and error is reported in log file.

2.7.3 Status LEDs – normal mode

LEDs				Meaning
PWR	**RUN**	**ERR**	**BUS**	Device running in Normal mode.
		n.a.	n.a.	
PWR	**RUN**	**ERR**	**BUS**	Firmware update is running.
		n.a.	n.a.	
PWR	**RUN**	**ERR**	**BUS**	Device joined PROFIBUS and is online.
		n.a.		
PWR	**RUN**	**ERR**	**BUS**	Device is configuring for PROFIBUS or Bus error.
		n.a.		
PWR	**RUN**	**ERR**	**BUS**	**Software error** - reboot the device.
			n.a.	
PWR	**RUN**	**ERR**	**BUS**	**Software error** - device restarted automatically and error is reported in log file.
			n.a.	

3 Installation

3.1 Hardware installation

Note

With an ambient temperature above 55 °C at the place of installation it is very likely that the temperatures of connecting cables will increase if the cables are installed in an unfavourable position. In such cases, measure the temperature to ensure that the service temperature of the cables is not exceeded or use cables sustaining high temperatures of at least 90 °C.

3.1.1 Mounting and dismounting

Note

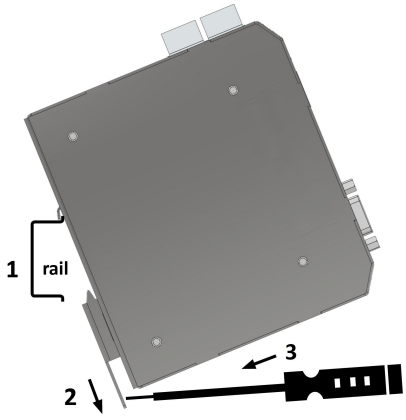
Make sure the smartLink HW-DP is mounted in such a way that the power supply can be easily disconnected. Depending on the installation position, the maximum ambient operating temperature may differ. See Section Installation positions 18 for details.

Installation and inspection

Installation and inspection must be carried out by qualified personnel only (personnel qualified according to the German standard TRBS 1203 - Technical Regulations for Operational Safety). The definition of terms can be found in IEC 60079-17.

Mounting

1. Hook the upper notch of the cut-out on the back of the device into a 35 mm DIN rail.
2. Leverage the screwdriver upwards, pull the locking bar downwards and move the device down towards the rail.
3. Press the device down towards the rail until it slides into place over the lip of the locking bar.



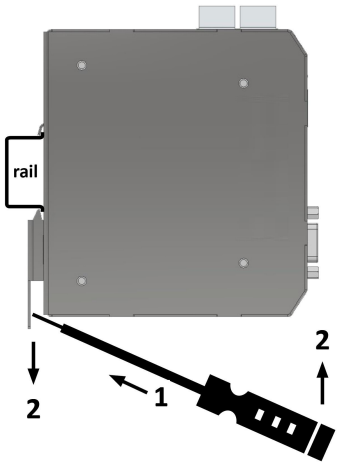
Note

Do not put stress on the system by bending or torsion.

Dismounting

1. Slide a screwdriver diagonally under the housing into the locking bar.

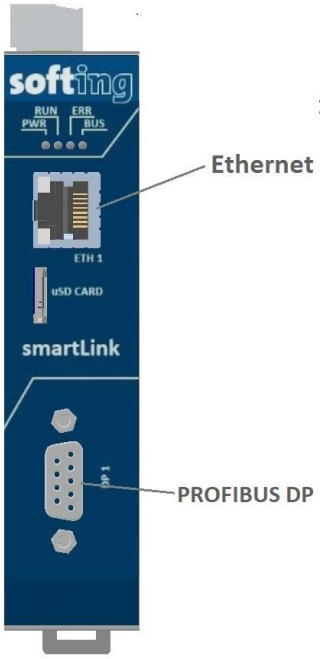
2. Leverage the screwdriver upwards, pull the locking bar down, move the device up and off the rail.

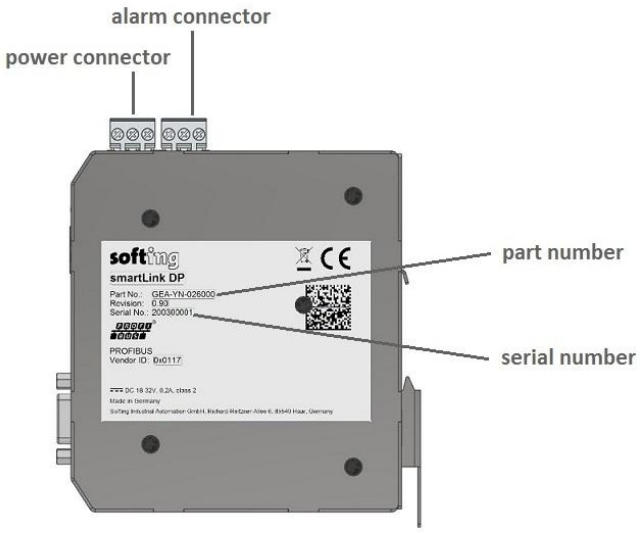


3.1.2 Connection diagrams

The following diagram shows the interfaces of the smartLink HW-DP. The device has one 10/100/1000 Base-T Ethernet port (ETH1) and one PROFIBUS DP port (DP 1) for data communication.

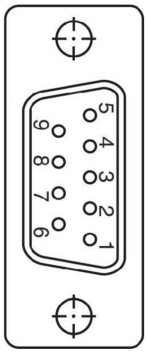
The connectors on the top are reserved for the supply voltage and alarm output. The uSD card slot is currently not supported and there deactivated in the current version.





3.1.3 PROFIBUS DP connector

Below you see the front view of the PROFIBUS DP connector (female D-Sub 9) and the function of the available signals. The connector pins are assigned according to the international standard IEC 61158-2 (Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition).



Pin	Signal	Description
1	-	optional - not in use
2	-	optional - not in use
3	RxD/TxD-P	receive / transmit data (+)
4	CNTR-P	control signal to repeater (+)
5	DGND	data ground
6	VP	voltage plus (+5Vdc for terminating resistors)
7	-	optinal - not in use
8	RxD/TxD-N	receive / transmit data (-)
9	-	optinal - not in use

3.1.4 Power and alarm connectors

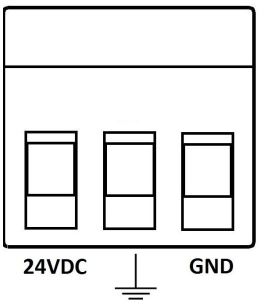
Connect the smartLink HW-DP to a 24 V DC power supply.

Note

smartLink HW-DP is intended for connection to a SELV/PELV circuitry only.

Power connector

The supply voltage (18 VDC .... 32 VDC) is connected by a 3-pole terminal block. The power supply is connected to the plug connector via flexible wires with a cross section of 0.75 to 1.5 mm². The ground connection wire must have a cross section of 1.5 mm².



Signal	Description
24VDC	24 V DC power supply
⏚	Functional earth
GND	Ground

Note

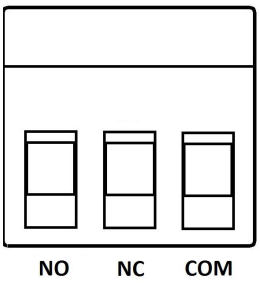
smartLink HW-DP offers reverse polarity protection in the specified DC supply voltage range (see Chapter Technical Data 8).

CAUTION

The Functional Earth (FE) connection of the device has to be connected at low inductance with the Protective Earth (PE) of the system.

Alarm connector

The alarm output has a voltage range of 0-32V. The contact can be operated with a maximum current of 0.5A. Connect the positive supply voltage with the COM terminal to avoid damage when the connector accidentally mixed up.



Signal	Description
NO	Normally Open
NC	Normally Closed
COM	Common Terminal

3.1.5 Installation positions

The smartLink HW-DP can be mounted horizontally and vertically. Depending on the installation position, different ambient operating temperatures (T_a) apply.

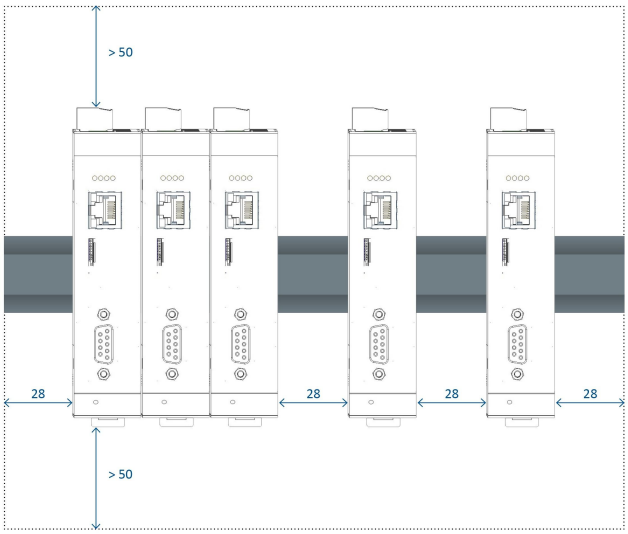
Minimum distance

Provide a minimum distance of 50 mm to the air inlet and air outlet to ensure natural convection.

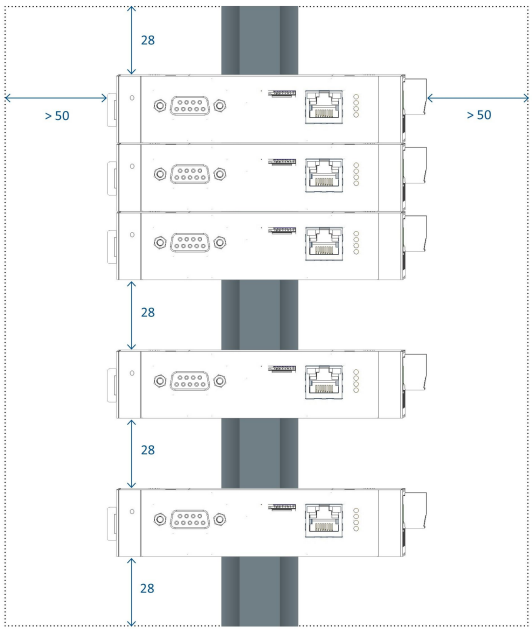
Rotated installation position

The maximum permissible ambient temperature values also apply to a 180° rotated installation position.

Horizontal installation position and maximum temperatures



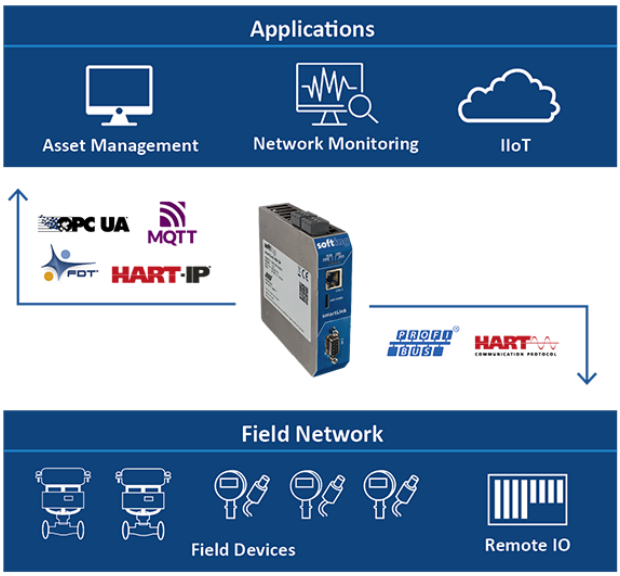
Vertical installation position and maximum temperatures



Maximum ambient temperature (T_a)	T_a - no distance	T_a at 28mm distance between devices
horizontal	60 °C	65 °C
vertical	50 °C	60 °C

3.1.6 Connecting to the network

1. Connect your PROFIBUS network to the RS485 port of your smartLink HW-DP.
2. Connect your PC running the asset management and network monitoring applications using the Ethernet port.



WARNING

Installing smartLink HW-DP while your network is in operation may cause data transfer problems if the network is in a poor electrical condition.

3.1.7 Powering up the device

Turn on the power supply. The boot process will take about 30 seconds. Refer to LED status indicators 11 for a detailed description of the LEDs and there behaviour.

3.1.8 Resetting the device

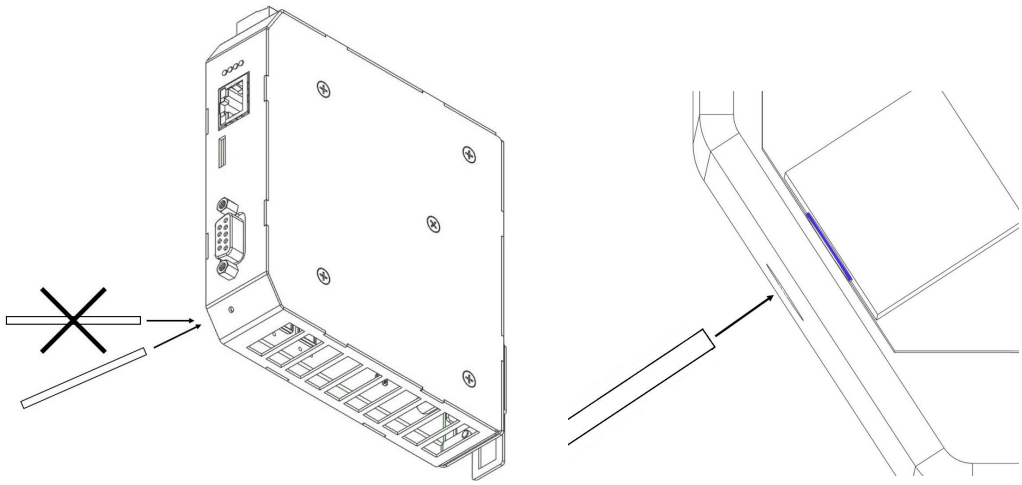
If your smartLink HW-DP is not responding, is malfunctioning or you simply cannot log on to the device because you have forgotten your login credentials you can restore the original factory conditions, remove the existing user data and clear the device settings by performing a hard reset. Licenses will not be affected by the reset and will remain on the device. However, performing a factory reset will clear your device of all parameter settings and configuration data.

Note

We recommend to press the reset button only if you wish to clear your device of all configurations or if you have attempted all other methods of troubleshooting. Remember that the a hard reset will delete all device settings and data added by the user.

3.1.8.1 How to reset the device to factory default

1. Insert the tip of a metal pin, of a pen or the end of an unwound paper clip into the hole of the reset button as shown.

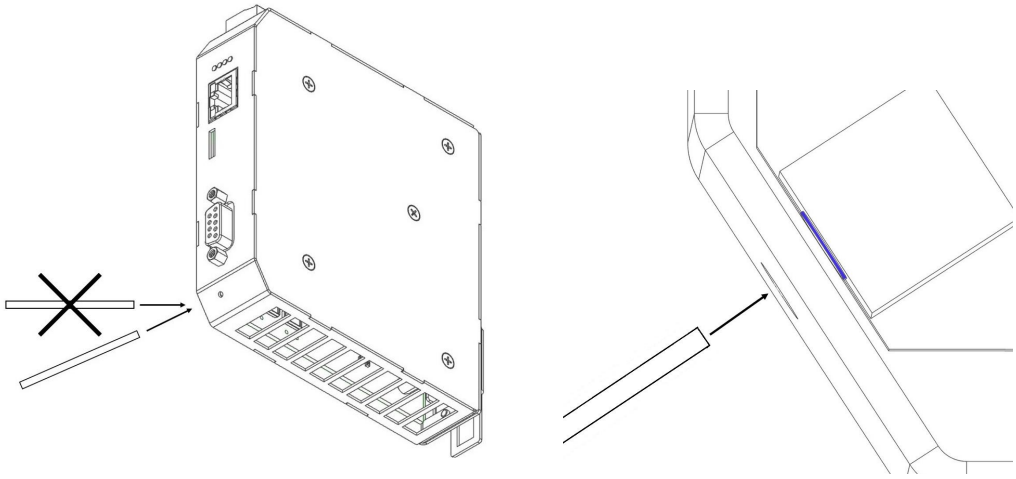


2. Press the reset button very carefully while reconnecting and powering up the device again and hold the button until the RUN LED 12 turns red and is flashing fast.
3. Release the reset button.
   The smartLink HW-DP is restarting.
4. Press the reset button and hold for about 15 seconds until the two LEDs in the middle (RUN and ERR) are flashing red.
5. Release the reset button.
   When the lights turn off (after about a minute), the smartLink HW-DP is reset and starts in factory mode. First the PWR LED turns yellow. Next the PWR LED turns from yellow to green and the LED RUN turns from red to green.
6. Now update the device with the latest firmware. See Chapter Firmware update 33 for details.

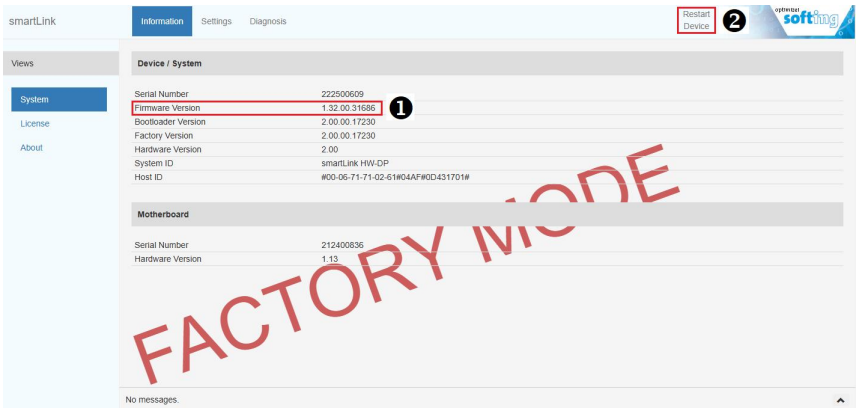
3.1.8.2 How to restart the factory firmware

The smartLink HW-DP device comes with a factory firmware that cannot be deleted or overwritten. When the device detects that the standard user firmware is faulty, it will automatically resort to the factory firmware. However, in the unlikely event that the factory firmware is flawed and the smartLink HW-DP device does not manage to load it automatically, you will have to restart it manually by performing as described below. Licenses will not be affected by the reset and will remain on the device.

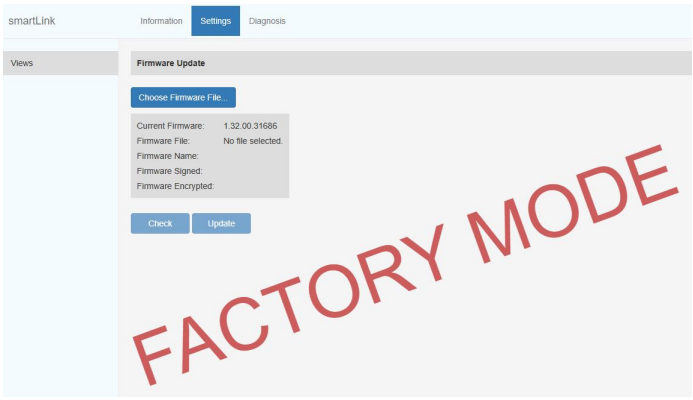
1. Disconnect the power supply from the smartLink HW-DP device.
2. Insert the tip of a metal pin, of a pen or the end of an unwound paper clip into the hole of the reset button as shown above.



3. Press the reset button very carefully while reconnecting and powering up the device again and hold the button until the RUN LED 12 turns red and is flashing fast.
4. Release the reset button.
   The smartLink HW-DP is restarting.
5. Open your Internet browser and enter the IP address of your smartLink HW-DP to access the user interface. At this point the user interface indicates that it is running in factory mode.



6. Select **Settings → Choose Firmware File...** to update the firmware of your smartLink HW-DP . See Chapter Firmware update[33] for details.



3.2 Commissioning

The smartLink HW-DP comes with an integrated web server which is used to configure the device and parameterize the connected PROFIBUS devices. The default IP address of the integrated web server is 192.168.0.10. To access the smartLink HW-DP from your PC, you either have to change the default IP address of the integrated web server to an address on your network or change the IP address on your PC network adapter to match the network address of your device (e.g. 192.168.0.1). Section 4.2[24] and Section 4.3[26] describe how to perform either of the two settings.

3.2.1 Software installation

When you install a Softing product for the first time, you will be asked if you trust the publisher. Activate the option **Always trust software from Softing AG** if you do not want to be asked in subsequent installations and select **[Install]** to start the installation.

1. Go to the smartLink HW-DP product website to download the latest software (Search and Configure, PROFIdtm and smartLink DTM)*

2. Start by downloading and installing the **Search and Configure** tool.

3. Follow the on-screen installation instructions.

4. Read the license agreement carefully.
   If you have questions, you can **[Cancel]** the installation at this point and contact us. Click **[Print]** if you want to print the license agreement to a PDF or on a printer.

5. Select **I accept the terms in the license agreement** and click **[Next]**.

6. Click **[Install]** to install the selected software application on your PC.
   While the installation is in progress, the status bar of the installation wizard shows the different steps that are being executed. If you want to abort the installation, click **[Cancel]** button. The installation wizard will undo all modifications that have been made to your computer up to this point. Otherwise, wait until the installation is completed.

7. Press **[Finish]** to complete the installation and exit the wizard.

Note
Proceed with the installation of the other software packages.

_____

* Search and Configure: discovery and IP-Configuration of smartLink HW-DP
PROFIdtm: needed for FDT-Applications (i.e. PACTware, ...) to access PROFIBUS slaves
smartLink DTM: needed for FDT-Applications (i.e. PACTware, ...) to access HART devices connected to PROFIBUS slaves.

3.2.2 Prerequisites

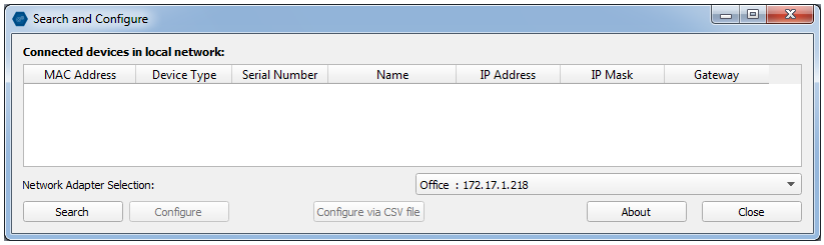
- The smartLink HW-DP is connected with a PC which runs a *Chrome* or *Firefox* browser supporting JavaScript.
- The *Search and Configure* tool is installed.

3.2.3 Changing the IP address of a smartLink HW-DP

Before you can operate the connected smartLink HW-DP you will have to change the default IP address of your device so that your PC can communicate with the integrated web server over the Local Area Network.

The following steps apply to Windows 10.

1. Click **Start → Softing → Search and Configure**.
   The application window is opened.



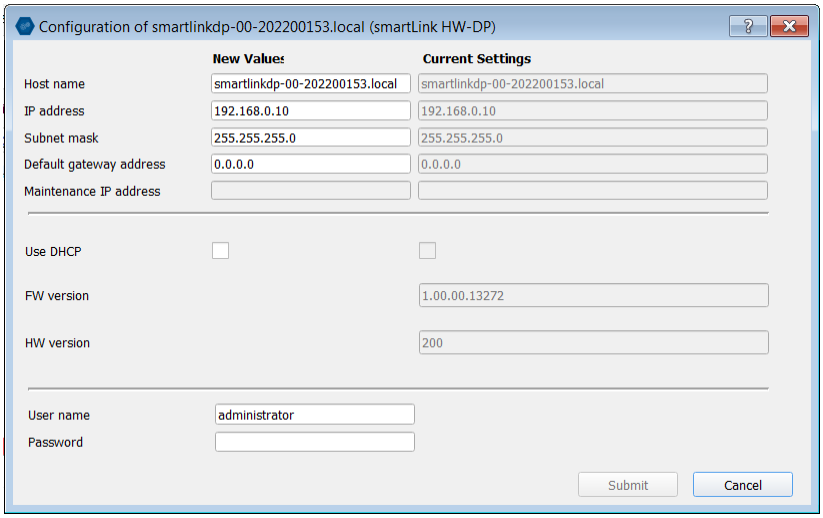
2. Click the dropdown list of the **Network Adapter Selection**.
   This selection menu shows all networks of your PC.

3. Select the network adapter which is connected to the smartLink HW-DP .

4. Click **[Search]** to start searching for connected devices.
   The search may take a moment.

5. Select the smartLink HW-DP.

6. Click **[Configure]** or double-click the device.
   The configuration window opens. Here you can change the IP settings.



Note

You may also change the hostname. However, ensure that you follow hostname specifications RFC 952 and RFC 1123.

7. Enter a dedicated IP address and subnet mask or click **Use DHCP** to obtain the IP settings from a DHCP server.

8. Enter the **password**.
   Example: **GEA-YN-026000<serialnumber>**
   The serial number can be found on the device, on the packaging and in the Search and Configure tool.

9. Click **[Submit]**.
   The changed settings are written to the device.

3.2.4 Setting the IP address of your PC

If you have not changed the IP address of the smartLink HW-DP as described in the previous Section 24 you will need to configure the IP address of your PC to access the device from your PC.

The following chapter describes how to set a static IP address in Windows 10.

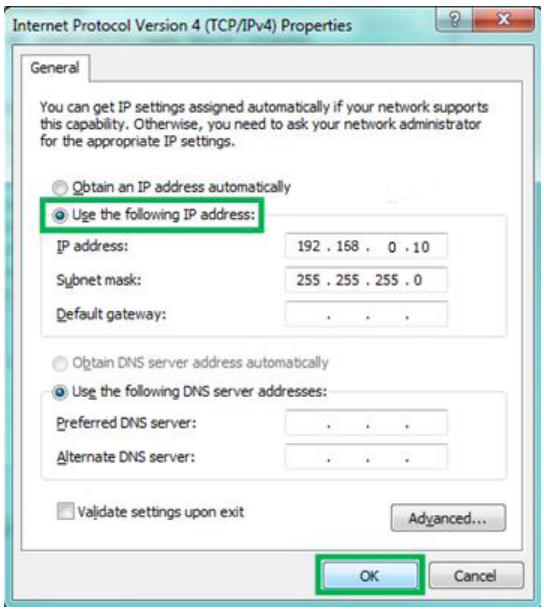
1. Click **Start → Windows System → Control Panel** from your task bar.

2. Select **Network and Internet → Network and Sharing Center**.
   A new window opens where you can view your basic network information.

3. Click on your Internet connection (either Ethernet or wireless) next to Connections under **View your active networks**.
   A new window opens.

4. Click **[Properties].**

5. Select **Internet Protocol Version 4 (TCP/IPv4)**.
   The following window opens.



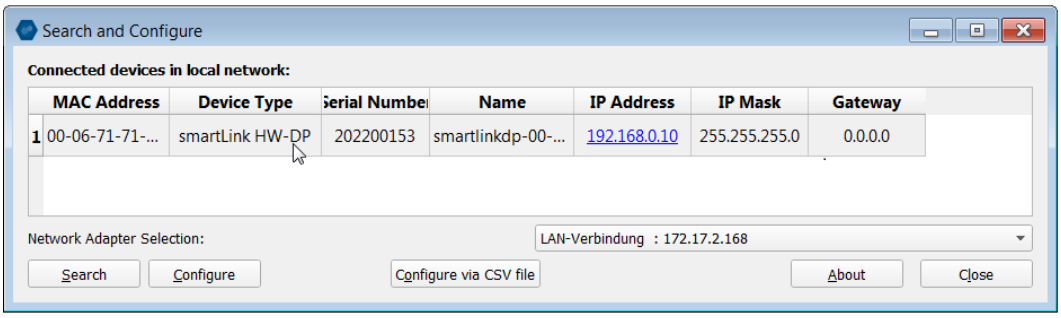
6. Select **Use the following IP address** and enter a specific IP address and Subnet mask. In our example we use the following settings:
   IP address: 192.168.0.10
   Subnet mask: 255.255.255.0

7. Click **[OK]** to confirm.

3.2.5 Login to user interface

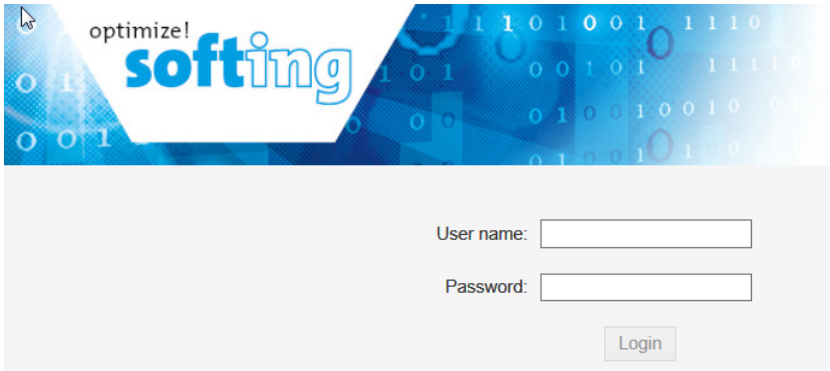
1. Open your Internet browser and enter the IP address of your smartLink HW-DP.
   The web-based interface opens with the login page.

Note
If you can't recall the IP address of your smartLink HW-DP, start the Search And Configure[24] tool and double-click the IP address to launch the login window in your web browser.



2. Enter the user name **administrator** in the user field.
3. Enter the prefix *GEA-YN-026000* followed by the serial number as the **password**.

   Example: GEA-YN-026000<serialnumber>



Note
Always use the same prefix **GEA-YN-026000** even if you find a slightly different product number printed on the package label.

3.2.6 Configuring PROFIBUS

See Section PROFIBUS[50] in Chapter *Working with the user interface* and the Video tutorial - Integrating and using Softing smartLink HW-DP for more details.

4 Working with smartLink HW-DP

The following chapter describes how to connect to the smartLink HW-DP user interface and use the tools and technologies of the Asset Management System manage (configure, parameterize, troubleshoot and maintain) field devices on your network. See also the Video tutorial Integrating and using Softing smartLink HW-DP.

Note
See Section Log in to user interface 27 for details on how to access the interface..

4.1 User interface

4.1.1 General functions

All interface windows display the following functions:

Restart Device
This function is available only when logged in as administrator or maintenance engineer and is used to restart the device remotely as instructed in this user guide or whenever required in ongoing operation.

Logout
Select this function to log out as an active user.

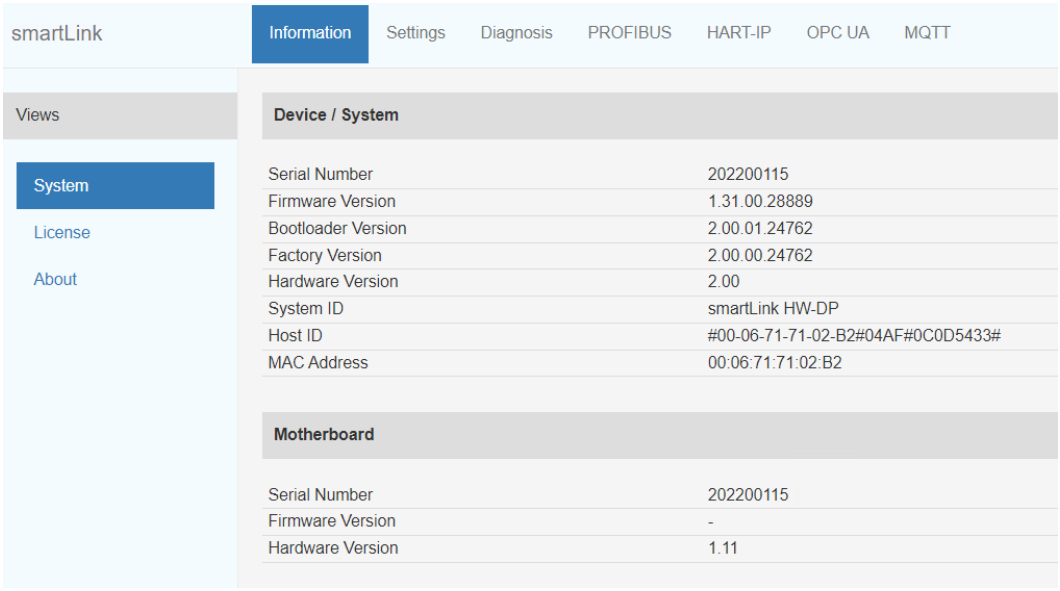
Auto logout
This default setting logs out the current user from the device if the interface has been inactive for 10 minutes.

4.1.2 Information

The **Information** window shows detailed product-related information in the menus **System**, **License** and **About**, including the type of device, the hardware version, bootloader and firmware version installed on your device.

4.1.2.1 System

Select **Information → System** to view the hardware and software details of your device.



Parameter	Meaning
Serial Number	Serial number of the device.
Firmware Version	Version of the currently running firmware.
Bootloader Version	Version number of the boot loader.
Factory Version	Version number of the factory image.
Hardware Version	Version number of the hardware.
System ID	Device type = smartLink HW-DP
Host ID	This is the ID you will need to request a license.

4.1.2.2 License

Select **Information → License** to view the licenses used by the smartLink HW-DP firmware under an open source license.

4.1.2.3 About

Select **Information → About** to show information about Softing and other useful information.

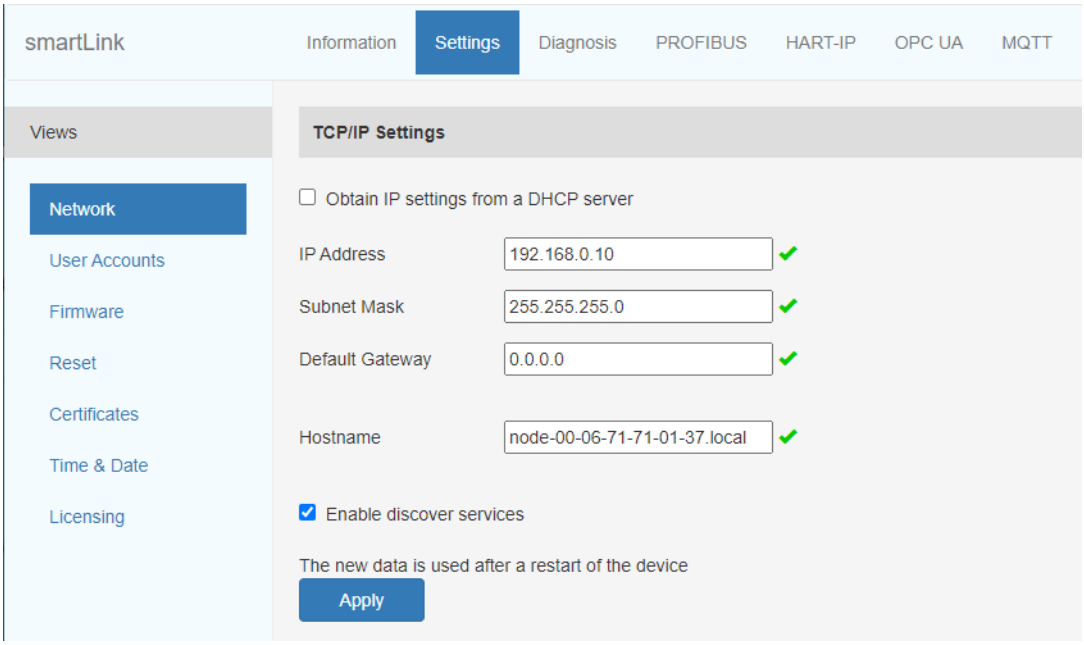
4.1.3 Settings

4.1.3.1 Network

Select **Settings → Network** to view and change the TCP/IP settings.

Note

You need to be logged in as Administrator or Maintenance 31 user to change default settings. If you change the settings you must restart the device.

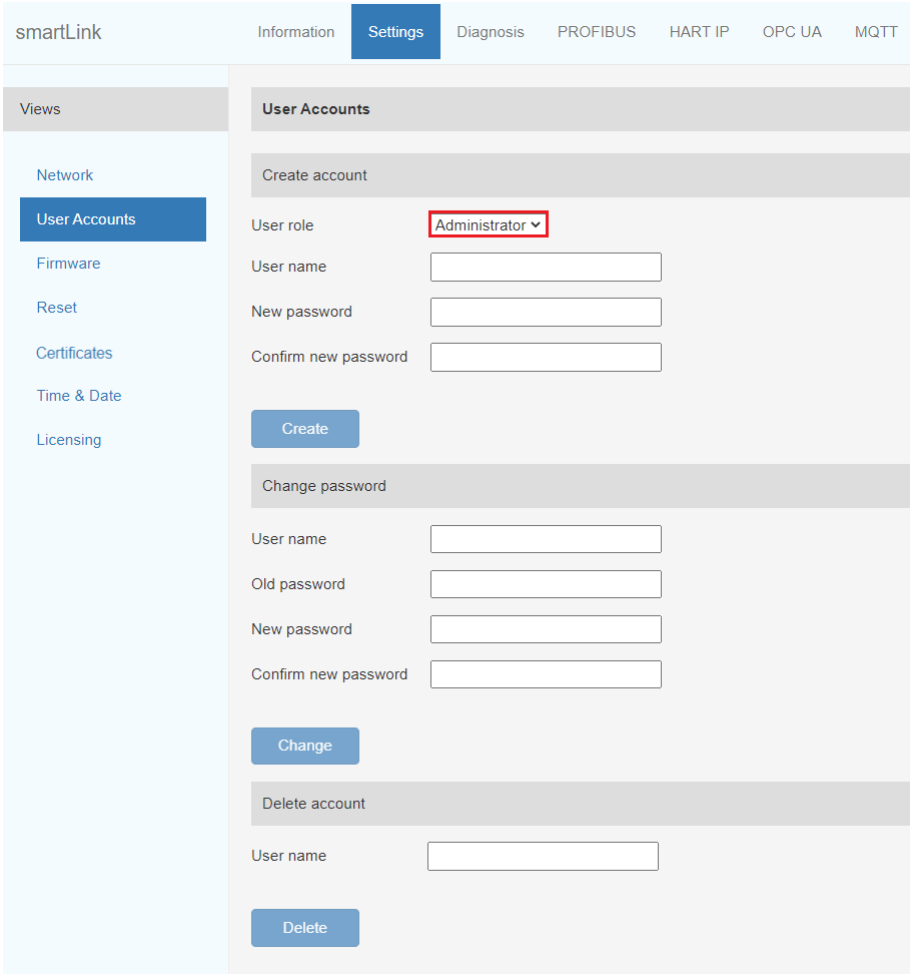


Parameter	Meaning
Obtain IP address from a DHCP server	The Dynamic Host Configuration Protocol (DHCP) is activated and the IP address is obtained from a DHCP server.
IP address	Internet Protocol (IP) address of the device used for web access.
Subnet mask	Subnet mask of the device used for web access.
Default gateway	Default gateway of the device used for web access.
Hostname	Name of the device used by a name server.
Enable discover services	Check the box to enable *Simple Service Discovery Protocol* (SSDP) *mulicast DNS* (mDNS) and *SearchAndConfigure*.
Apply	Click [Apply] to confirm changes made in this window.

4.1.3.2 User accounts

In this section you will learn how to change accounts and passwords. As **Administrator** you can create and delete user accounts and also change passwords.

1. Select **Settings → User Accounts**.



2. Select a user role in the dropdown menu, assign a user name and enter a **New password** in the corresponding fields according to the password rules.
3. Retype the password in the **Confirm new password** field and click **[Create]** to save the user and password settings.

Password rules

A password must contain between eight and 128 characters, including at least 1 lower case letter, 1 upper case letter, 1 number and 1 special character: !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~

Changing the password

1. Enter the user name of the account for which you want to change the password.
2. Enter the **Old password**.
3. Enter the **New password**.
4. Retype the password in the **Confirm new password** field and click **[Change]** to save the new password settings.

Deleting an account

1. Enter the user name of the account which you want to delete.

2. Click **[Delete]** to erase the account settings and all remove the user.

The following table shows the user roles and corresponding permissions:

Permission	Administrator	Diagnostic	Maintenance	Observer
Create and delete accounts	☑	☑		
Changing all passwords	☑	☑		
Changing own password	☑	☑	☑	☑
Configuring the device	☑	☑	☑	
Reading configuration	☑	☑	☑	☑
Reading diagnostics	☑	☑	☑	☑
Updating the firmware	☑	☑		
Resetting the device	☑	☑		
Managing certificates and security	☑	☑		
PROFIBUS capturing		☑		

Note

The user role *Diagnostic* is not required for daily operations. It is reserved for internal purposes such as troubleshooting. Softing Support may ask you to add a user with this role to obtain more details of your smartLink HW-DP.

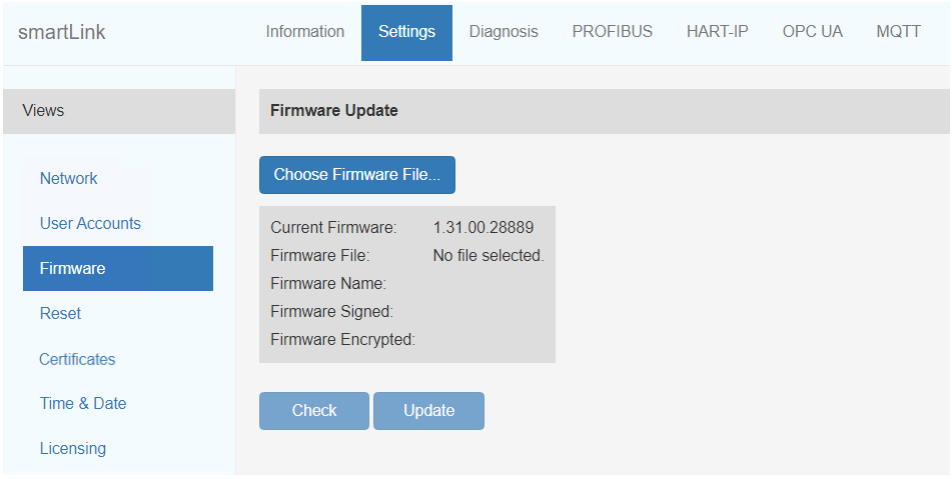
4.1.3.3 Firmware update

The device comes with pre-installed firmware (factory version) which is maintained and updated to continuously enhance the functionality of the device. To ensure that your smartLink HW-DP is running the latest firmware version check for the latest version on the product website. Bear in mind that the smartLink HW-DP cannot be downgraded to a previous version.

Note

You need to be logged in as user administrator[31] or diagnostic.

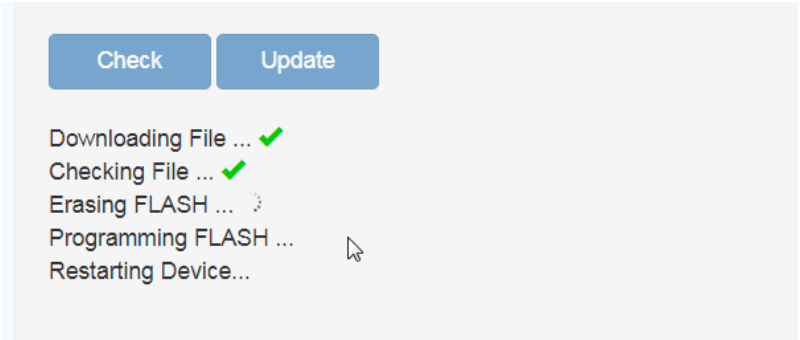
1. Download the firmware update to your computer.
   When you are downloading from the product website for the first time you will have to register yourself in a few steps.
2. Log on to the web interface of the device.
3. Select **Settings → Firmware** in the side bar navigation.
4. Click **[Choose Firmware File...]** and select the file *firmware.bin* you downloaded.



5. Click **[Update]** to install the latest firmware file and **[OK]** in the message window to confirm that you want to update the firmware. The update progress is shown beneath the update button.

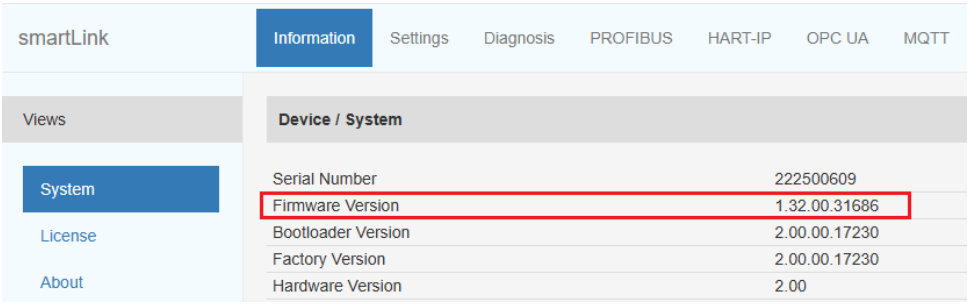
Hint

Click **[Check]** to verify if the file you have chosen is a valid firmware file.



The system performs a firmware file check. The download starts automatically. When the download is completed, the smartLink HW-DP will be rebooted. You will be prompted to log in again to the user interface. When the boot process is completed, the RUN and the PWR LED are green.

You will now see the updated firmware version shown on the device information page.



Note
If the user login page of the user interface does not open automatically, press F5 to reload the page.

Note
If you encounter a problem during the update you can always repeat it.

4.1.3.4 Reset

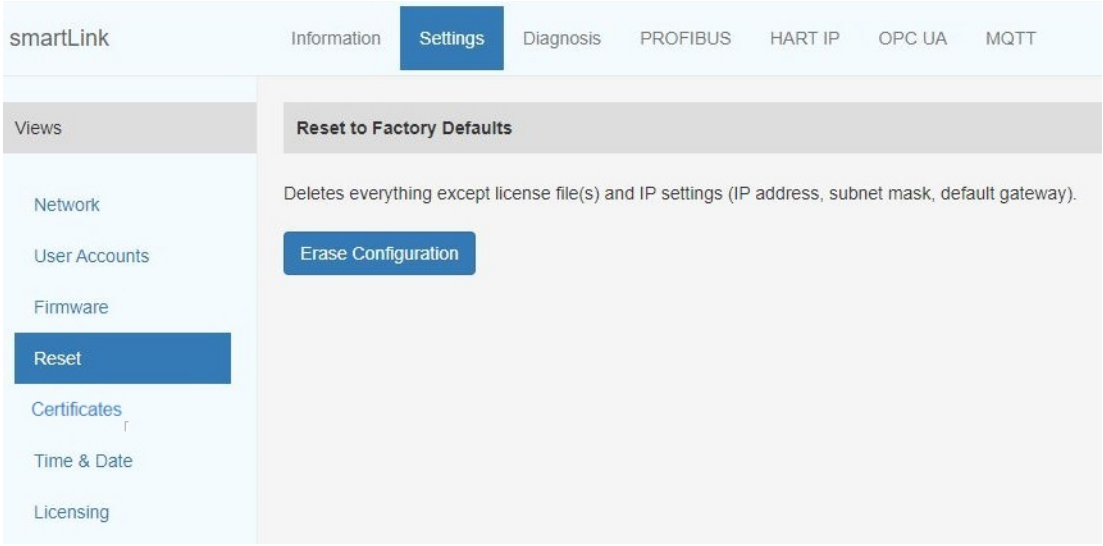
Unlike a hard reset described in chapter *Resetting the device* under *Hardware Installation*, this soft reset deletes the configuration of your smartLink HW-DP and restores the factory settings of the device.

1. Select **Settings →Reset** in the side bar navigation.

2. Select **[Erase Configuration]** to reset your device to default settings.

Note

You need to be logged in as administrator 31.



3. Click **[OK]** to confirm your selection.
Your smartLink HW-DP will be restarted with the default settings. License files and IP settings will not be deleted.

Note

The password is reset to the default password 27.

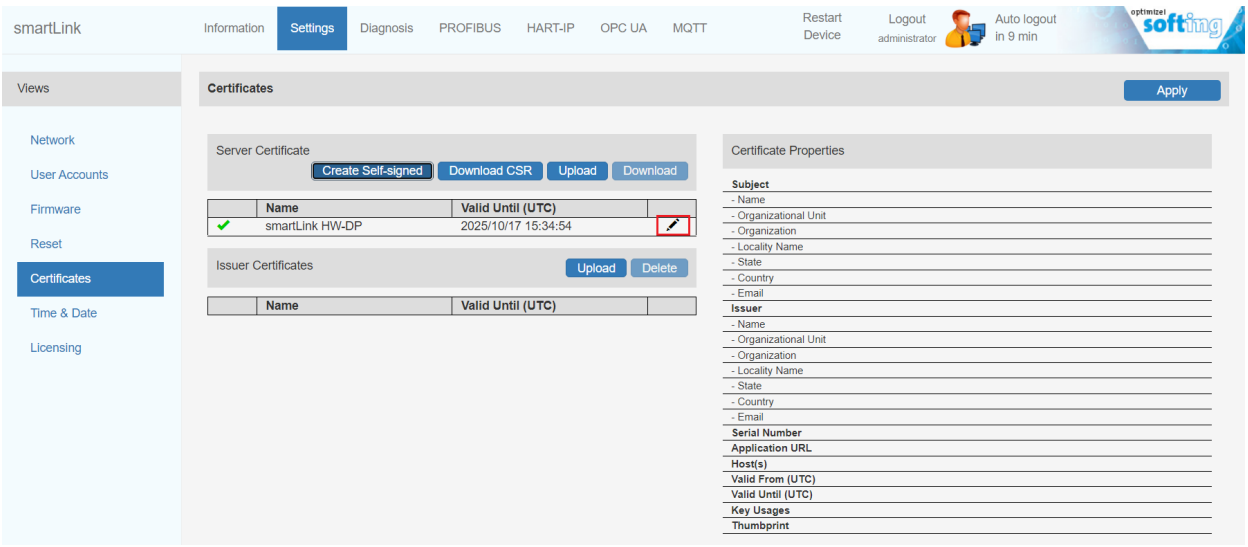
4.1.3.5 Certificates

A certificate is a digital document that is needed to identify and authenticate a website or server and to establish a secure communication (HTTPS) with the OPC UA server of the smartLink HW-DP.

Select **Settings → Certificates** to see the smartLink HW-DP X.509 server certificate and load issuer certificates which are used to validate the server certificate. The tables display the subject name and the expiration timestamp of the server and the issuer certificates. The first column either shows a checkmark indicating the certificate's status (✔ = valid, ⚠ = expired/not valid).

In the **Server Certificate** section you can create a new self-signed certificate, upload a new certificate and download the currently installed server certificate or a Certificate Signing Request (CSR). The downloaded server certificate can be passed on to the OPC UA client application to enable secure communication. The CSR can be forwarded to a Certificate Authority (CA) which may create a matching signed server certificate.

If you create a new self-signed certificate or change the existing server certificate, a pencil icon is shown in the right-most column of the server certificate list (see screenshot below). The icon indicates that the certificate settings have been changed but have not yet been applied and still need to be executed by clicking **[Apply]** in the top right corner.



In addition, intermediate issuer certificates can be uploaded to the **Issuer Certificates** section to configure a chain of trust for the issuer specified in the server or other intermediate certificates.

Note

Ensure that the clock on the smartLink HW-DP is properly set. Otherwise this could result in the creation or usage of certificates that have already expired. See **Settings → Time & date** for details.

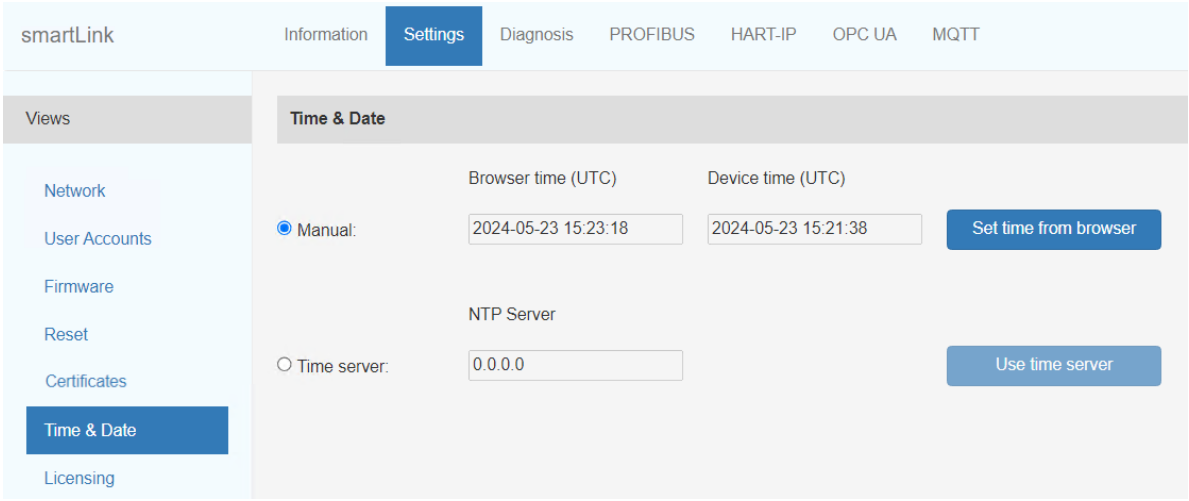
Note

Your changes are not executed immediately but have to be confirmed by clicking **[Apply]** in the top right corner of the page. This will restart the OPC UA server component of smartLink HW-DP. Any clients connected at that time will lose their connection but typically will automatically reconnect.

4.1.3.6 Time & Date

Select **Settings → Time & Date** in the side bar navigation to set the time and date of your smartLink HW-DP.

1. Click **[Set time from browser]** to synchronize the device with the PC date and time manually.
2. Click **[Use time server]** and enter the IP address of your time server to synchronize date and time automatically.



Parameter	Meaning
Browser time (UTC)	The time set on the PC.
Device time (UTC)	The time set on the smartLink HW-DP when you select **[Set time from browser]**. The device time cannot be set separately.
NTP server	IP address of a Network Time Protocol (NTP) server used for time synchronization.
Time server	The time can be set either manually or using a time server.

4.1.3.7 Licensing

You will need a license for each HART or PROFIBUS device to which you intend to connect over the network. A license is a unique key tied to the serial number of your smartLink HW-DP. It cannot be migrated or run on another device. Each HART and PROFIBUS device requires an individual license. Assuming that a license is installed and you have activated HART IP in the user interface, your HART device is automatically licensed though a system scan running constantly in the background. Similarly, a PROFIBUS device is licensed if you have activated OPC UA and/or MQTT in the user interface or if the license has been accessed from your PROFIdtm.

A license for HART Device Support is needed by any Asset Management Tool to parametrize and/or monitor HART devices. Licenses for PROFIBUS Slave Support are needed by any PROFIBUS Asset Management Tool to parametrize and/or monitor PROFIBUS slaves. They are also needed to retrieve process data and diagnosis data from PROFIBUS slaves via OPC UA. Each license is tied to a PROFIBUS slave and can be used for Asset Management and for OPC UA at the same time.

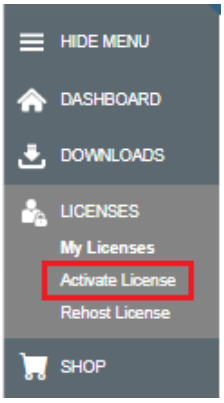
A license which is assigned to a specific device can only be reassigned to a different device, after your smartLink HW-DP has been switched off. If a HART device is removed, its license can be assigned to another HART device if necessary after deactivating and reactivating HART IP. If a PROFIBUS device is removed, its license can only be assigned to a PROFIBUS device with the same station address (it does not matter if it is the same device or a different one as only the station address counts).

If your smartLink HW-DP has no license or you wish to connect to more than one HART device than you have previously licensed, please contact Softing Support.

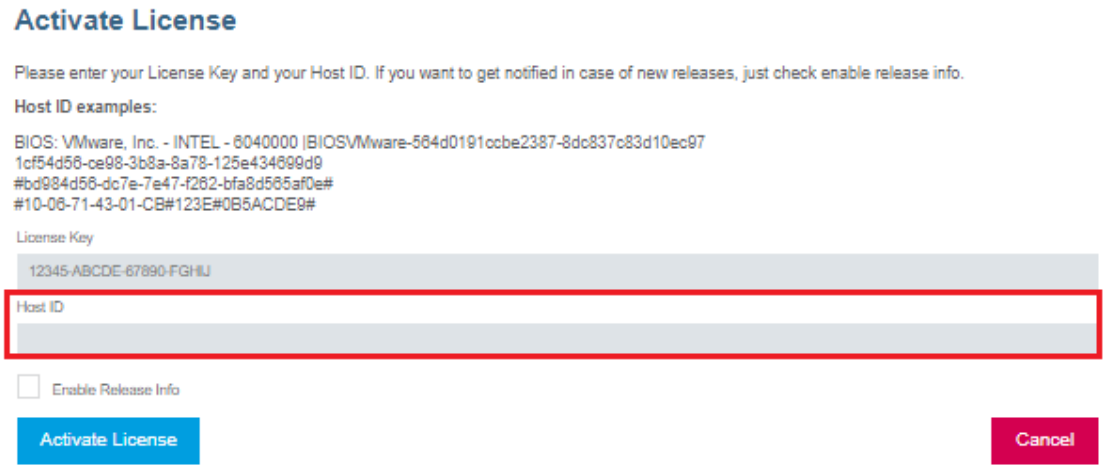
How to activate a license

1. Go to the Softing Industrial website and click the icon in the upper right corner to register yourself or select this My Softing Portal link. When you are registered and logged in you are directed to the **My Softing Dashboard**.

2. Select **Licenses →Activate License** in the side menu.



3. Enter the license key from your License Certificate in the license key input field.
You will find the license key on the certificate you have received by email.



4. Select **Information** → **System** [29].

5. Highlight and copy the Host ID from the Device/System table.

6. Paste the Host ID into the **Host ID** field of the Register License form.

7. Click **[Activate License]**.
A license file is generated.

8. Click **[Download]** to save the license file to your PC.

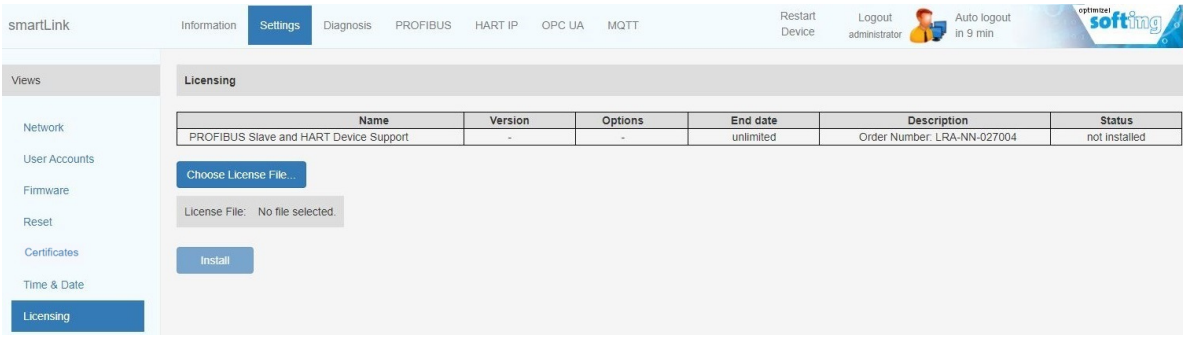
How to install a license

Note

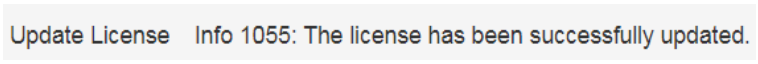
You will only need a license if you want to access more than one HART device over more than one PROFIBUS remote I/O.

To install a license file follow these steps:

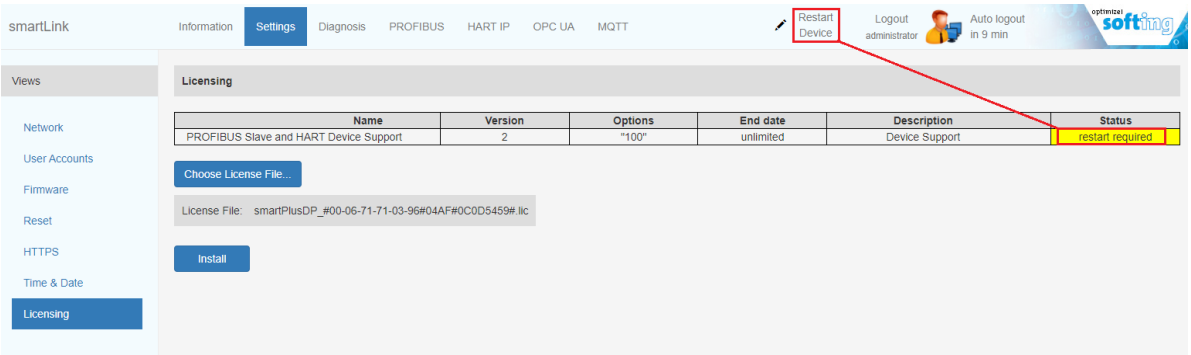
1. Select **Settings → Licensing** in the side bar navigation.



2. Click the **[Choose License File]** button.
   Windows Explorer will open.
3. Go to the directory to which you have saved the file.
4. Select the license file and click **[Open]** in Windows Explorer.
   The license file is now shown under the [Choose License File] button.
5. Click the **[Install]** button.
   When the license has been installed, the following message appears at the bottom of the window.



In the Licensing window, the table entries for HART Device Support will have changed.

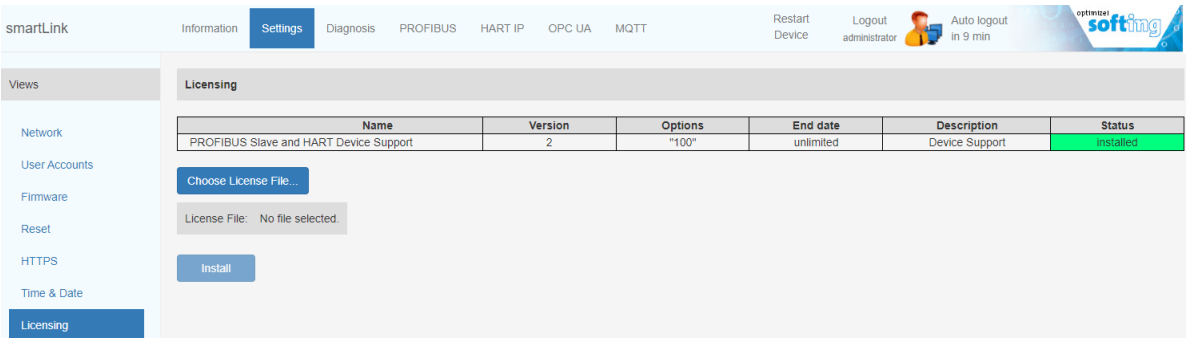


Parameter	Meaning
Version	A support number (for internal use only).
Options	Total number of supported HART devices.

End Date	The date on which the license expires. Generally all licenses are unlimited.
Description	Before a license is installed, this field displays the license order number.
Status	Before a license is installed, the field displays "not installed". When a license has been installed it shows "restart required" against a yellow background. After the device has been restarted it shows "installed" against a green background.

6. Click **Restart Device** in the top menu of the window.
The following message will appear.

7. Click **OK.**
Now the status column will show "installed" meaning the license is activated.



For details on how to save a copy of your license, see **Diagnosis** → Log File 43

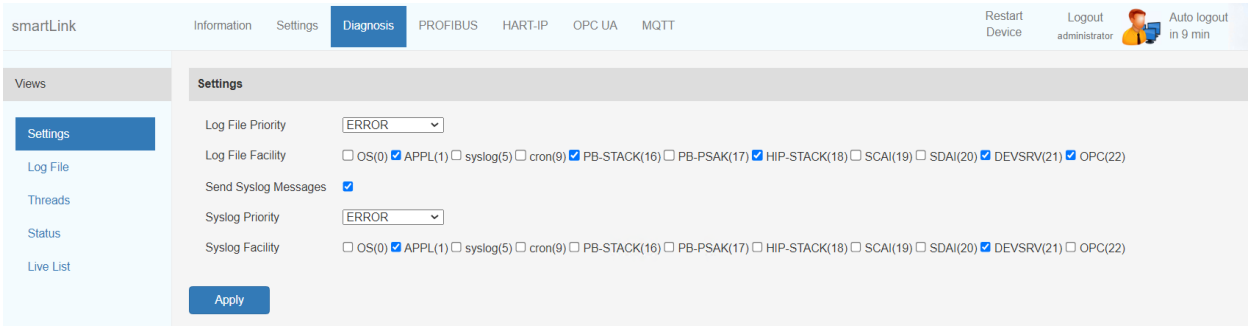
4.1.4 Diagnosis

Note

The menu **Diagnosis** with the exception of the Live List is predominantly intended for Softing support engineers helping you analyze system data.

4.1.4.1 Settings

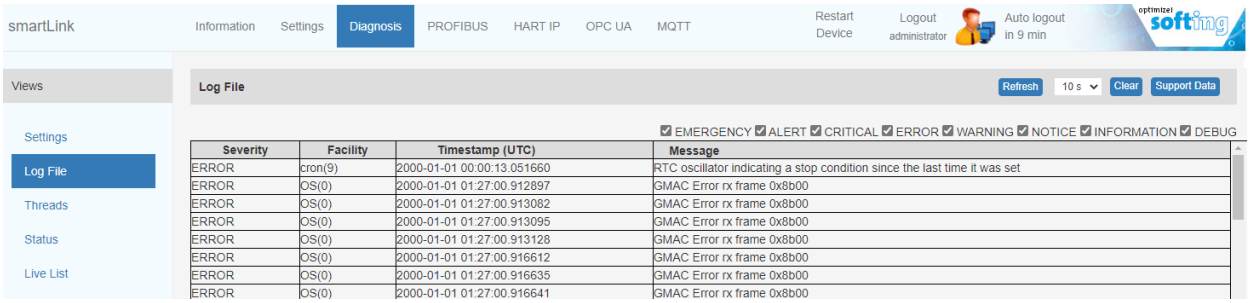
Select **Diagnosis → Settings** to view the log setting in any user role. To change the settings you must have administration rights.



Parameter	Meaning
Log File Priority	Available values: Emergency, Alert, Critical, Error, Warning, Notice, Information. All messages with the set priority or higher are logged to the log file shown under **Diagnosis → Log File**.
Log File Facility	Tick the checkbox for the protocol layer you want to write to the log file.
Send Syslog Messages	Activates logging to the network. Can be logged with wireshark, Visual Syslog Server or similar applications.
Syslog Priority	Available values: Emergency, Alert, Critical, Error, Warning, Notice, Information, Debug. All messages with the set priority or higher are logged to the network.
Syslog Facility	To activate protocol layer logging to the network, tick one or more checkboxes.
Apply	Click **[Apply]** to activate your settings. The data is written to the log file.

4.1.4.2 Log File

Select **Diagnosis → Log File** to view the log file and download a device status file including the installed licenses. You can also filter the diagnostic log by ticking and unticking the checkboxes of the different priorities. This only affects the display of the log and not the settings of the log file priority under **Diagnosis → Settings**.



Note

Click **[Support Data]** to save comprehensive device status information to a file. The information contained in this file may provide Softing Support with valuable information to address and fix potential issues.

Parameter	Meaning
EMERGENCY, ALERT, CRITICAL, ERROR, WARNING, NOTICE, INFORMATION	Tick the check boxes to set a display filter.
Clear	Click this button to delete the log file entries.
Refresh	Click this button to update the message log entries.
Support Data	Click this button to upload a collection of all available logs for support requests.

Saving a license

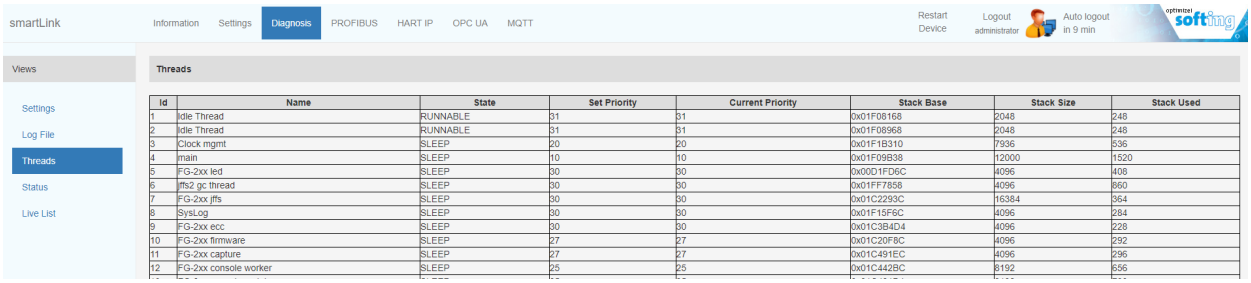
1. Click **[Refresh]** at the top to update the table contents.

2. Click **[Support Data]**.
   A zipped file containing comprehensive device status information and the installed licenses is downloaded to the PC.

3. Open the zip file to find the license key file.

4.1.4.3 Threads

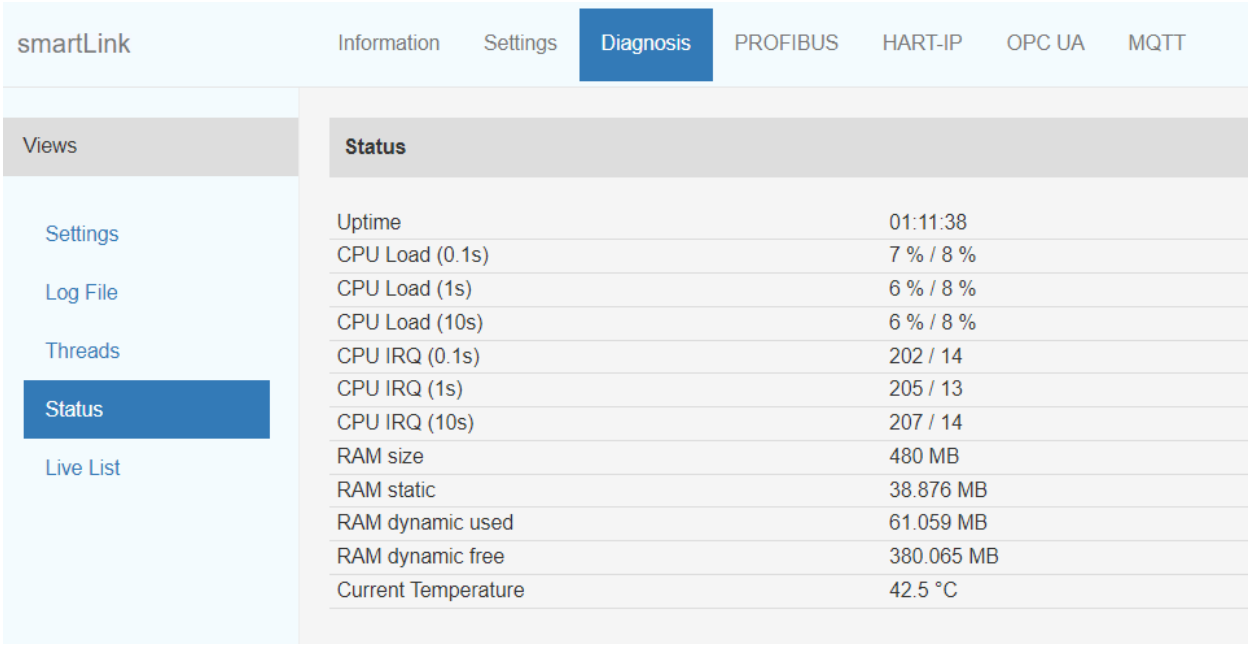
Select **Diagnosis → Threads** to view the current state of the threads. The list you will see and the details contained may not be of any use to you but helps Softing support to diagnose device and performance errors.



Id	Name	State	Set Priority	Current Priority	Stack Base	Stack Size	Stack Used
1	Idle Thread	RUNNABLE	31	31	0x01F08168	2048	248
2	Idle Thread	RUNNABLE	31	31	0x01F08968	2048	248
3	Clock mgmt	SLEEP	20	20	0x01F1B310	7936	536
4	main	SLEEP	10	10	0x01F09B38	12000	1520
5	FG-2xx led	SLEEP	30	30	0x00D1FD6C	4096	408
6	jffs2 gc thread	SLEEP	30	30	0x01FF7858	4096	860
7	FG-2xx jffs	SLEEP	30	30	0x01C2293C	16384	364
8	SysLog	SLEEP	30	30	0x01F15F6C	4096	284
9	FG-2xx ecc	SLEEP	30	30	0x01C3B4D4	4096	228
10	FG-2xx firmware	SLEEP	27	27	0x01C20F8C	4096	292
11	FG-2xx capture	SLEEP	27	27	0x01C491EC	4096	296
12	FG-2xx console worker	SLEEP	25	25	0x01C442BC	8192	656

4.1.4.4 Status

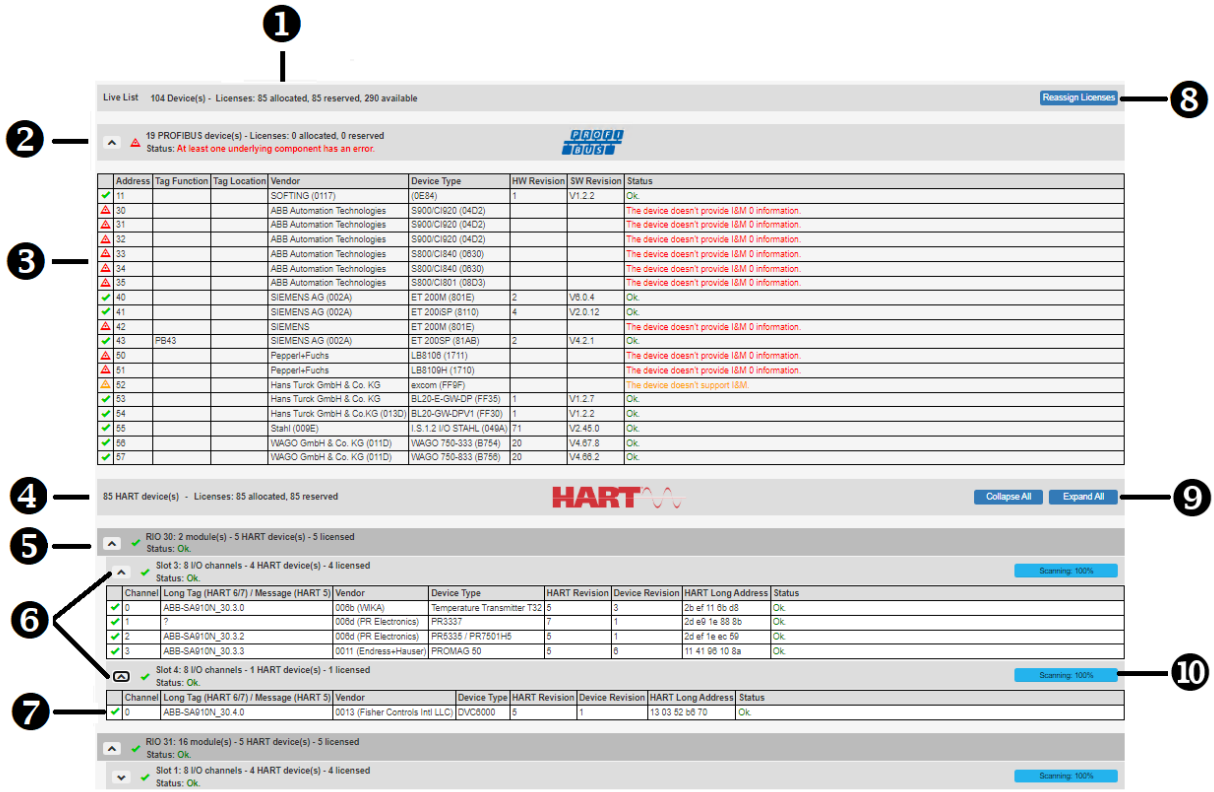
Select **Diagnosis → Status** to view the smartLink HW-DP diagnostic data.



4.1.4.5 Live List

Select **Diagnosis → Live List** to see all connected HART devices and the number of allocated, reserved and available licenses. By clicking **[Reassign Licenses]** you will re-allocate previously assigned licenses. To complete the reassigning process you will have to restart your smartLink HW-DP.

After smartLink HW-DP has finished booting, it starts scanning the PROFIBUS network for Remote IOs (RIOs) and displays a list with all active (live) HART devices. The scanning is done automatically in the background at regular intervals. For a list of status messages and required actions see chapter Troubleshooting 86.



❶ **Results of the last scan**: The general information includes the total number of detected and licensed devices and the number of remaining licenses.

- **device(s) =** number of PROFIBUS and HART devices in the PROFIBUS segment
- **allocated =** number of licenses used by a device in the live list
- **reserved =** like allocated but including devices that were deleted from the live list because they are no longer responding
- **available =** number of licenses still available

❷ **Summary of PROFIBUS scans**: This header represents the number of detected and licensed PROFIBUS devices. Device details can be viewed by clicking the arrow icon (⌄) to the left of the header text. If the PROFIBUS communication is not working correctly or an error occurred during the device scan, the Status is preceded by an error icon ⚠.

❸ **Details of PROFIBUS scans:** The table lists the characteristic device properties (identification and maintenance information - I&M 0 and I&M 1). Scanned devices with a technical error (licensing and communication) are listed with error icon ⚠ in the leftmost column and an error message displayed in Status field.

❹ **Scan summary:** This header sums up the number of detected and licensed HART devices.
- **device(s) =** number of HART devices in the PROFIBUS network
- **allocated =** number of licenses used by a device in the live list
- **reserved =** like allocated but including devices that were deleted from the live list because they are no longer responding

❺ **Summary of a Remote IO:** The header shows the total number of supported HART-capable modules found on the Remote I/O, the total number of detected and licensed HART devices across all modules and the communication status.

❻ **Details of RIO modules:** The table shows the slot number as shown in the Siemens TIA Portal, the number of I/O channels, detected and licensed HART devices, and communication status. ✔ = device is licensed and ⚠ = indicates that an error occurred during scan of the HART module (see Chapter Troubleshooting 86).
NOTE: The slot number shown in the device list may be 1 lower than that displayed in a configuration tool (Siemens TIA Portal). This behavior occurs if the value 'Module_Offset' is set to 0 in the RIO GSD file.

❼ **Details of HART device:** The table column shows all successfully scanned HART devices with additional HART information (Channel number, Long Tag / Message, Vendor, Device Type, HART Revision, Device Revision, HART Long Address, and Status.
✔ = device is licensed and ⚠ = error occurred during scan of the HART device

❽ **Reassign licenses**
By clicking **[Reassign Licenses]** you can reassign all available licenses. This will entail a restart of your smartLink HW-DP.

❾ **Collapse All**
Hides all tables with details of connected HART devices.

Expand All
Expands all tables with details of connected HART devices.

❿ **Scanning**
Indicates the scanning progress for connected HART devices.

HART table headers explained

Column Header	Meaning
Channel	Wiring position on which the HART device is connected to the module. Values are in the range 0 .. <number of module channels > - 1
Long Tag / Message	For HART devices with HART revision 6 and later, the Long Tag contained in the device is shown. For HART devices with HART revision 5 and earlier, the Message contained in the device is shown.
Vendor	This column displays in brackets the Manufacturer Identification code as a hexadecimal value. A vendor name is shown if this value can be resolved.
Device Type	This column displays in brackets the type of the HART device as a hexadecimal value. A device type name is shown if this value can be resolved.
HART Revision	The HART protocol Major Revision number.
Device Revision	This column displays in brackets the type of the HART device as a hexadecimal value. A device type name is shown if the value can be resolved.
HART Long Address	The unique long address of the HART device.
Status	Licensing state of HART device.

PROFIBUS table headers explained

Column Header	Meaning
Address	Displays the address of the PROFIBUS device.
Tag Function	Displays the Tag Function contained in the device.
Tag Location	Displays the Tag Location contained in the device.
Vendor	This column displays in brackets the manufacturer Identification code as a hexadecimal value. A vendor name is shown only if this value can be resolved.
Device Type	Displays the type of the PROFINET device as a hexadecimal value in brackets. A device type name is shown if this value can be resolved.
HW Revision	Displays the hardware revision of the PROFINET device.
SW Revision	Displays the software revision of the PROFINET device.
Status	It is either shown as "OK" (when a PROFINET device has been successfully scanned) or with a red error text describing the error detected during the scan process.

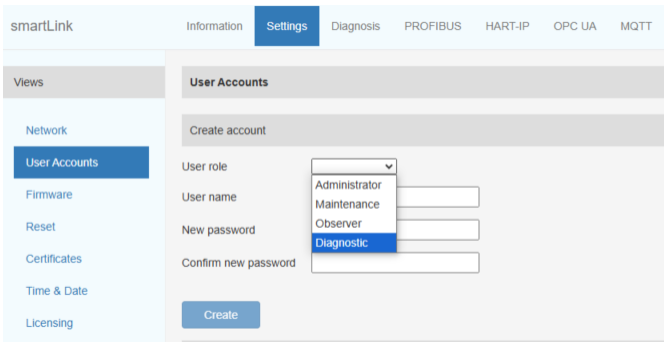
4.1.4.6 Capture

Note

The capture page is only if your are logged in as Diagnostic user.

The Capture feature allows you record PROFIBUS remote IO communication data and identify and diagnose communication errors, device malfunctioning and error misconfiguration. If you already have a Diagnostic user account log out as Administrator and log in as Diagnostic user. If you do not have a Diagnostic user account you will first need to create one.

1. Select **Settings → User Accounts**.



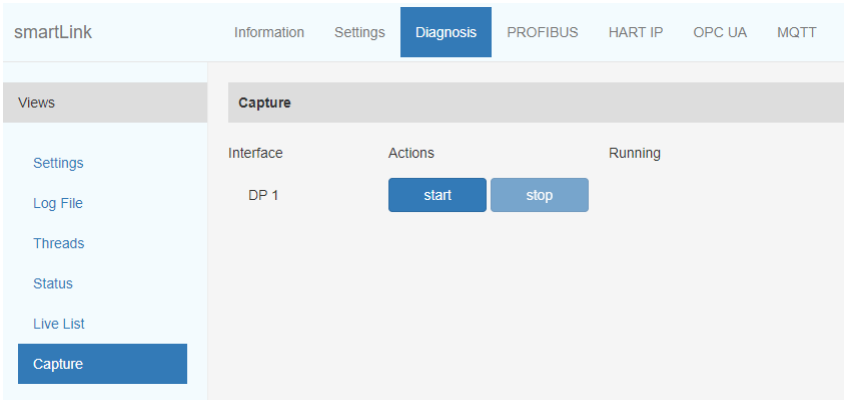
2. Select a user role **Diagnostic** in the dropdown menu, assign a **User name** and enter a **New password** in the corresponding fields according to the password rules.

3. Retype the password in the **Confirm new password** field and click **[Create]** to save the user and password settings.

Note

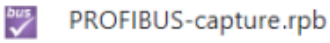
See Chapter User Accounts 31 for more details.

4. When you are logged in as Diagnostic user, Select **Diagnosis → Capture**.

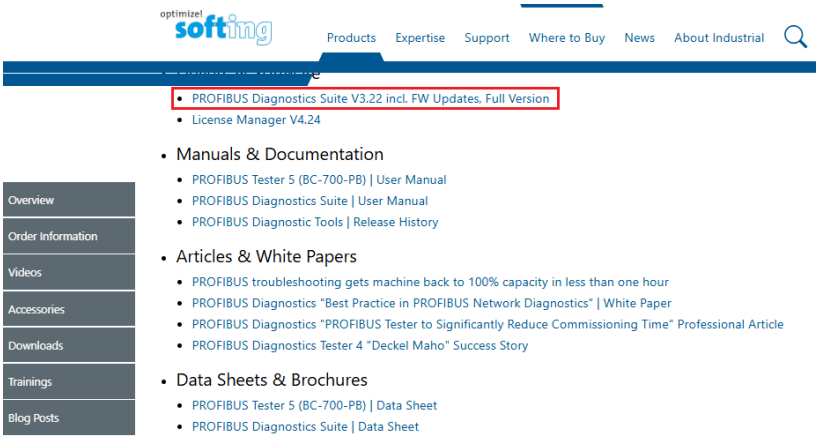


5. Click **[Start]** to record the PROFIBUS remote IO communication.

6. Click **[Stop]** to end the recording and to save the recorded data to an .rpb file in the download folder of your PC.



7. Go to the Softing PROFIBUS Tester product page and download the PROFIBUS Diagnostics Suite. This software installation is free of charge.



8. Start the PROFIBUS Diagnostics Suite and open the PROFIBUS capture.rpb file to evaluate the communication data.

Note

If you have problems, contact Softing Support.

4.1.5 PROFIBUS

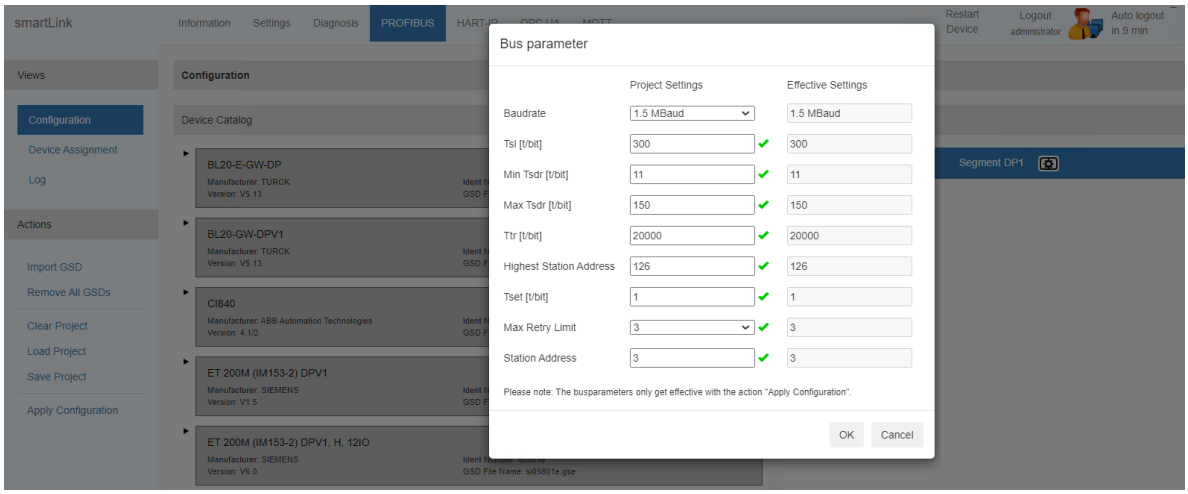
4.1.5.1 Configuration

This section describes how to configure the PROFIBUS bus parameters of the smartLink HW-DP. You need to be logged in as Administrator or Maintenance 31 User.

1. Select **PROFIBUS → Configuration**.

2. Click the **icon** ⚙ to open the PROFIBUS bus parameters window.
   The Project Settings are default settings. For each baud rate you can select from the dropdown list the smartLink HW-DP will suggest default Project Settings.

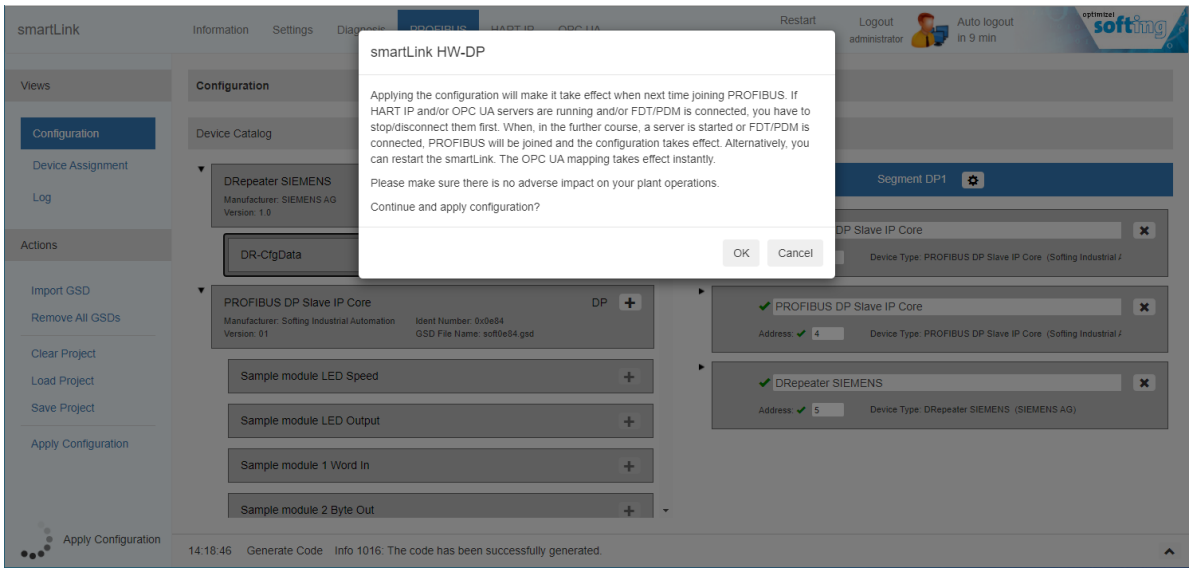
3. Set the parameters according to your network environment requirements. Ensure that the baud rate is set correctly and that the station address does not conflict with an address in the PROFIBUS network.



Terms /Abbreviations	Meaning
Project Settings	This column shows the bus parameters of the current project.
Effective Settings	This column shows bus parameters currently in use.
Baudrate	The rate at which data is transferred in a PROFIBUS communication segment. "1.5MBaud" means that segment can transfer a maximum of 1.5 megabits per second.
Tsl	**Slot Time**: This time determines the maximum time the sender waits for a response from the addressed device.
Min Tsdr	**Minimum Station Delay Responder**: The time that the slave must wait before it may respond to a request from the master. The default value is $11t_{Bit}$.
Max Tsdr	**Maximum Station Delay Responder**: The time in which the slave must respond to a request from the master. The value range is set between 60 and 800 t_{Bit}.
Ttr	**Target Rotation Time**: This time is the maximum time available for one Token rotation. In this time span, all DP masters receive the Token once.
Highest Station Address	Indicates the highest valid device address in the PROFIBUS network.
Tset	**Setup Time**: This is the time that may pass between receiving a data telegram and the respective reaction within a device.
Max Retry Limit	The total number of retries.
Station Address	This is the address of the smartLink HW-DP PROFIBUS master

4. Click **[OK]** to close the window.

5. Click **[Apply Configuration]** in the side menu



Actions	Meaning
Import GSD	Import GSD device description file to device catalog.
Remove all GSDs	Deletes all previously imported GSDs.
Clear Project	Deletes all configured devices.
Load Project	Loads a previously saved configuration.
Save Project	Saves the configuration to a file.
Apply Configuration	Activates the configuration at the PROFIBUS masters.

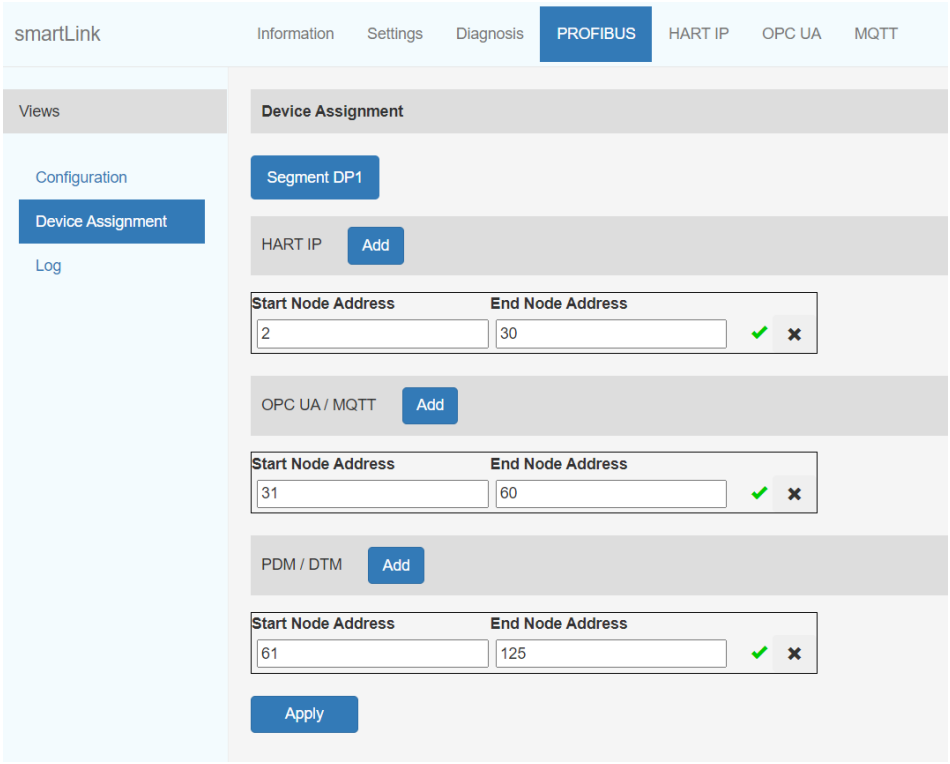
Note

To configure slave devices for an OPC UA communication you will need to select **Import GSD** under Actions in the side menu, add a device to the device catalog, import the device to the network Segment DP1 and define a device name and an address.

4.1.5.2 Device assignment

The PROFIBUS network can be accessed through multiple clients in parallel. As any parallel access of the same slave may create an undefined state, each Ethernet interface of the smartLink HW-DP can be configured with a designated PROFIBUS device address range. So clients connecting to the network via smartLink HW-DP only see devices which are assigned to the interface they are using.

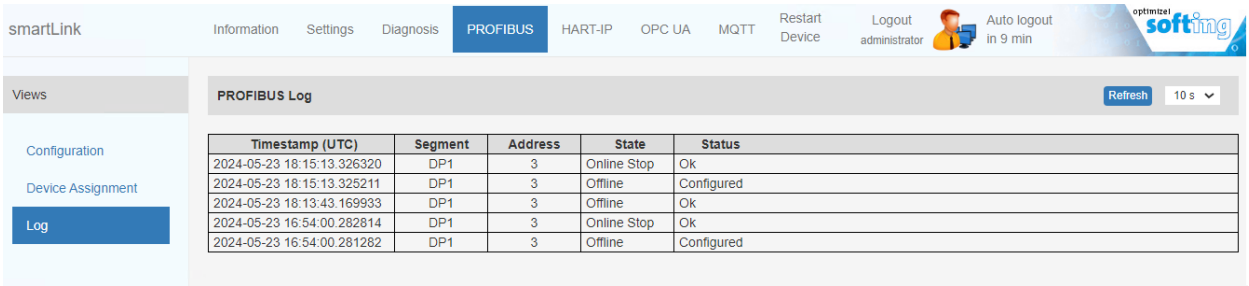
1. Select **PROFIBUS → Device Assignment**.
2. Click **[Add]** to define an address range for the PROFIBUS devices.
3. Click **[Apply]**.



Note
To add address ranges to make sure that the PROFIBUS bus parameters are set and the DP1 segment is deactivated. Overlapping address ranges are indicated by the icon .

4.1.5.3 Log

The PROFIBUS log represents the state of the PROFIBUS connection. The data helps Softing Support troubleshoot a connection problem.



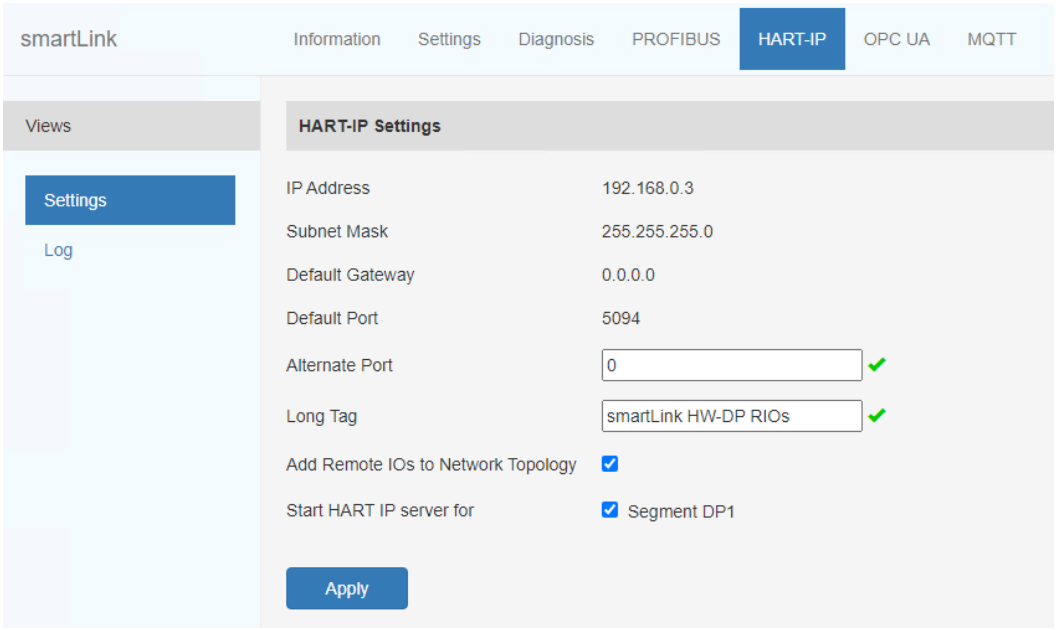
Timestamp (UTC)	Segment	Address	State	Status
2024-05-23 18:15:13.326320	DP1	3	Online Stop	Ok
2024-05-23 18:15:13.325211	DP1	3	Offline	Configured
2024-05-23 18:13:43.169933	DP1	3	Offline	Ok
2024-05-23 16:54:00.282814	DP1	3	Online Stop	Ok
2024-05-23 16:54:00.281282	DP1	3	Offline	Configured

Click **[Refresh]** to update the PROFIBUS log.

4.1.6 HART IP

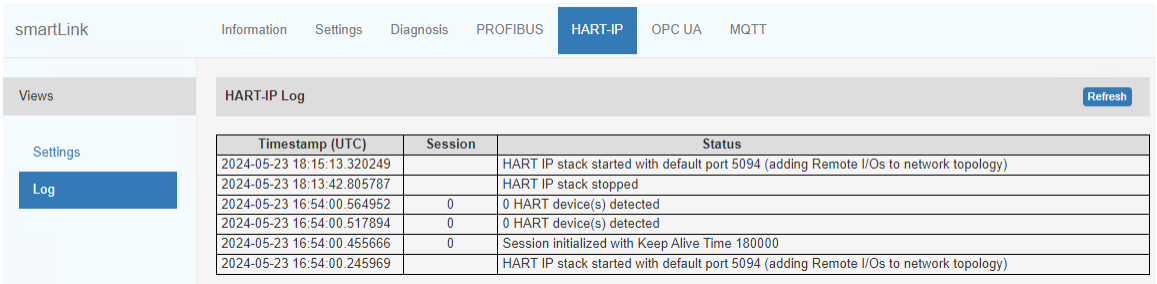
4.1.6.1 Settings

1. Select **HART IP → Settings** to see the current settings.
2. Enter an alternate **port number** if required. The communication is typically run on the default port **5094**. Set the alternate port to use a different port if the default port is already occupied by another protocol.
3. Tick the checkbox for **Add Remote IOs to Network Topology** to start the PROFIBUS slave hosting the Remote IO .
4. Tick the checkbox **Segment DP1** to start the HART IP server.
5. Click **[Apply]** to confirm and activate your settings.



4.1.6.2 Log

Select **HART IP → Log** to see details of the HART IP communication activity. This log file is typically used by Softing support for troubleshooting a problem.



Timestamp (UTC)	Session	Status
2024-05-23 18:15:13.320249		HART IP stack started with default port 5094 (adding Remote I/Os to network topology)
2024-05-23 18:13:42.805787		HART IP stack stopped
2024-05-23 16:54:00.564952	0	0 HART device(s) detected
2024-05-23 16:54:00.517894	0	0 HART device(s) detected
2024-05-23 16:54:00.455666	0	Session initialized with Keep Alive Time 180000
2024-05-23 16:54:00.245969		HART IP stack started with default port 5094 (adding Remote I/Os to network topology)

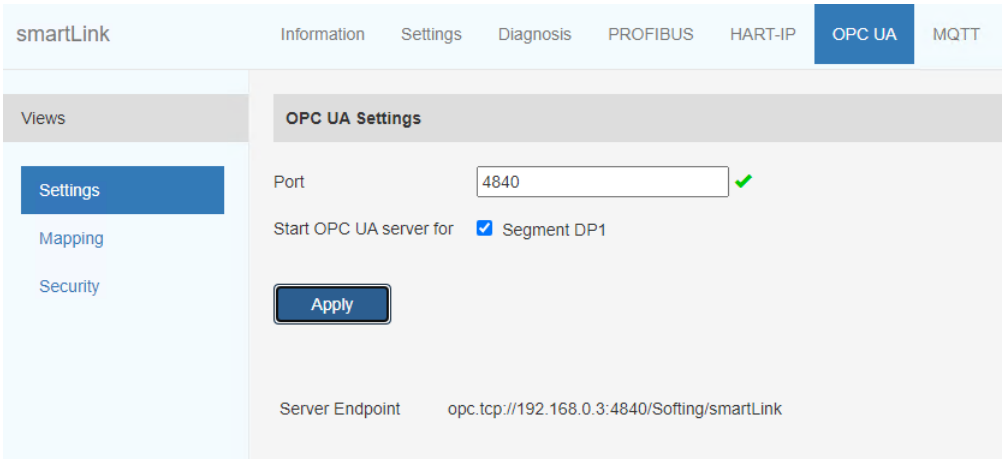
4.1.7 OPC UA

If you want to connect to PROFIBUS DP devices using OPC UA communication make sure you have installed the GSDs of the field devices and configured the field devices.

The smartLink HW-DP has a HART FDI Communication Server to enable communication with as well as configuration and parametrization of HART devices. The FDI Communication Server is automatically started when OPC UA is activated in the settings (Start OPC UA server for).

4.1.7.1 Settings

1. Select **OPC UA →Settings** to see the current settings.
2. Enter a port number or keep the default port number. The OPC UA communication is typically run on the default port **4840**. Use an alternate port if the default port is already taken by another protocol.
3. Tick the checkbox **Segment DP1** to start the OPC UA server, FDI communication and PROFIBUS.
4. Click **[Apply]** to confirm and activate your settings.

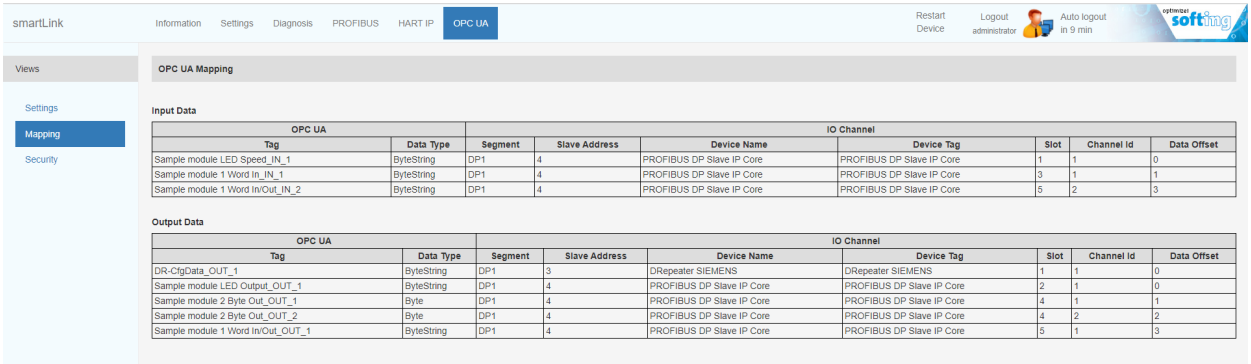


Note

The Server Endpoint shown in the screenshot above is required to establish a connection with the OPC UA client (see Chapter Connecting to OPC UA clients 79).

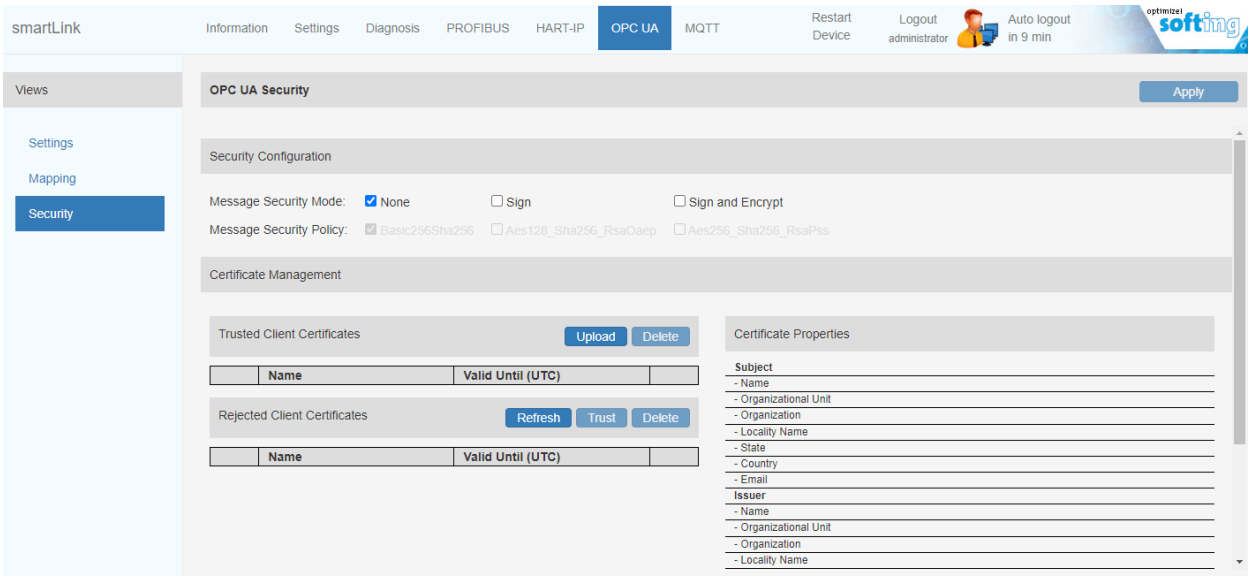
4.1.7.2 Mapping

Select **OPC UA →Mapping** to see details of the PROFIBUS to OPC UA mapping.



4.1.7.3 Security

Select **OPC UA → Security** to configure a secure communication between the smartLink HW-DP (OPC UA server) and the OPC UA client application.



In the **Security Configuration** window frame, smartLink HW-DP offers three encryption modes supported by three security policies for secure OPC UA communication:

If you have changed any of the security configuration setting, a pencil icon is shown to indicate that the settings have been changed but have not yet been applied and the changes still need to be executed by clicking **[Apply]** in the top right corner.

Message Security Modes	Meaning
None	Don't use any encryption. No certificate exchange is needed between smartLink HW-DP and a client. Be aware that communication on the network is readable by others. This might be a security risk.
Sign	Messages sent from smartLink HW-DP or the OPC UA client are signed with the private key of the sender. The receiving entity can validate the origin of the message using the public key of the sending entity. Nevertheless, messages are not encrypted.
Sign and Encrypt	Message are signed as in the Sign mode and additionally encrypted with the public key of the receiving entity. On the receiver side the message can be decrypted using its private key.

If you check **None**, no security policy must be selected. For the modes **Sign** and/or **Sign and Encrypt** at least one policy must be chosen. Although any combination of modes and policies is possible, it is recommended to restrict the configuration to the one that the OPC UA client application is expected to use. For further details see the documentation of the client application.

To establish a secure OPC UA communication smartLink HW-DP and the OPC UA client application have to exchange their public keys. For this they store a certificate of the communication partner in their Public Key Infrastructure (PKI). The OPC UA client application typically receives the public key of smartLink HW-DP by calling the OPC UA service **GetEndpoints**. Alternatively, it can be exported from smartLink HW-DP (**Settings → Certificates → Server Certificate → Download**) and imported manually in the client application. See also the OPC UA client application documentation for more information on how to store the smartLink HW-DP certificate in the **Trusted** section of its PKI.

The **Certificate Management** window frame shows all certificates that are trusted or have been rejected (as a result of a unsuccessful connection attempt from the client application). When an OPC UA client application attempts to open a secure connection to a smartLink HW-DP it submits its client certificate. smartLink HW-DP stores this certificate in the **Rejected Client Certificates** table (see screenshot above). Before a connection between the smartLink HW-DP and the client can be established you have to confirm that you trust this certificate. If the certificate is available as a file, you may upload it directly to the **Trusted Client Certificates**.

The tables include the subject name and the expiration timestamp of each certificate. The first column either shows a checkmark indicating that the certificate's status (= valid, = expired/not valid). You can upload new or delete existing client certificates to the **Trusted Client Certificates and** move client certificates from the **Rejected Client Certificates** table the **Trusted** section or simply delete them from the PKI.

Note

Your changes are not executed immediately but have to be confirmed by clicking **[Apply]** in the top right corner of the page. This will restart the OPC UA server component of smartLink HW-DP. Any clients connected at that time will lose their connection but typically will automatically reconnect..

For a detailed view of the common client certificate properties, select and highlight a certificate in either table as shown in the sceenshot above (example certificate: *ctt_appT*).

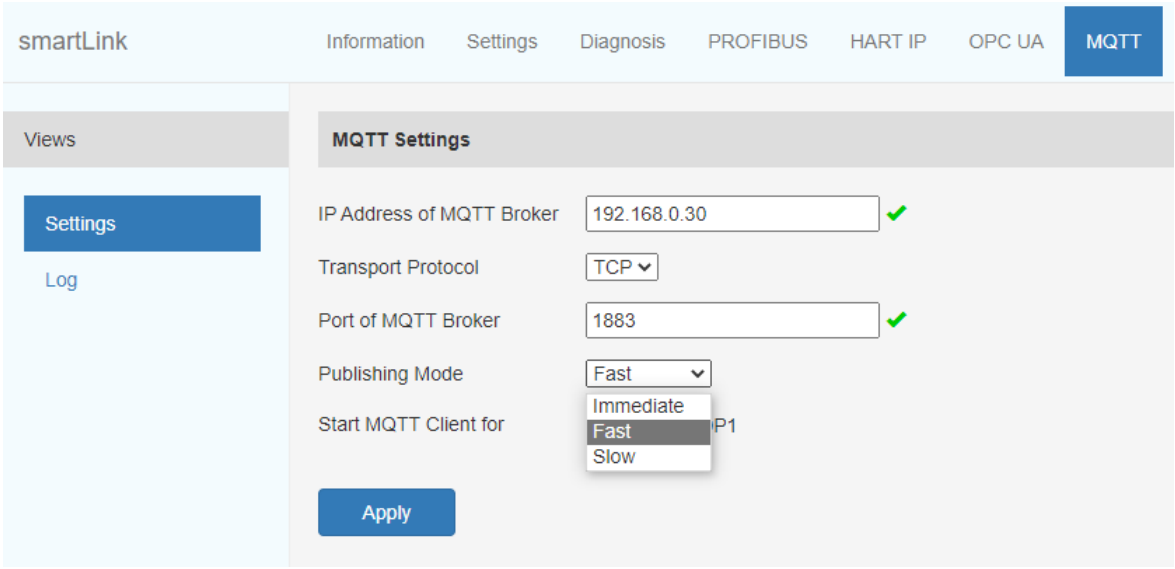
4.1.8 MQTT

MQTT is a lightweight, publish-subscribe network protocol that transports messages between devices, suitable for transmitting data to the cloud. smartLink HW-DP uses MQTT to sends asset and diagnostics data of PROFIBUS devices. You can connect arbitrary MQTT client applications to process this information.

Using Softing's **plantPerfect Monitor**, you can visualize asset and diagnostic monitoring of your PROFIBUS devices in a DP network.

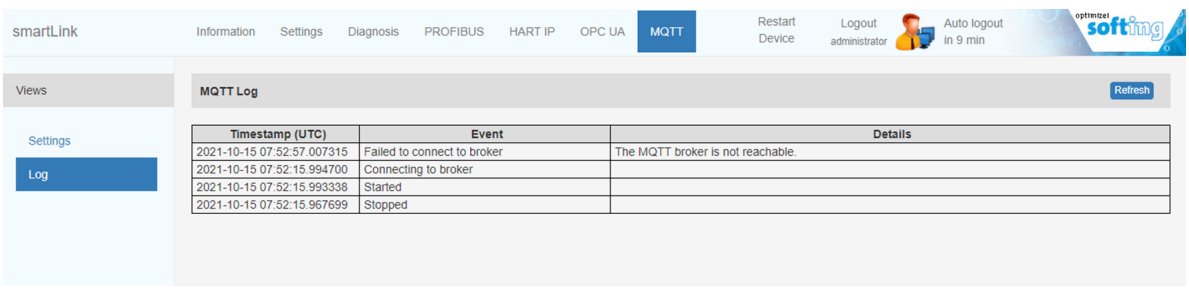
4.1.8.1 Settings

1. Select **MQTT → Settings** to see the current settings.
2. Enter the **IP address** of the MQTTbroker.
3. Select the **Transport Protocol**.
4. Enter a port number in the **Port of MQTT Broker** field or keep the default port number. The MQTT communication is typically run on the default port **1883**.
5. Select the **Publishing Mode** from the drop down menu.
6. Tick the checkbox **Segment DP1** to start the MQTT client and PROFIBUS.
7. Click **[Apply]** to confirm and activate your settings.



4.1.8.2 Log

Select **MQTT → Log** to see details of the MQTT communication activity. This log file is typically used by Softing support for troubleshooting a problem.

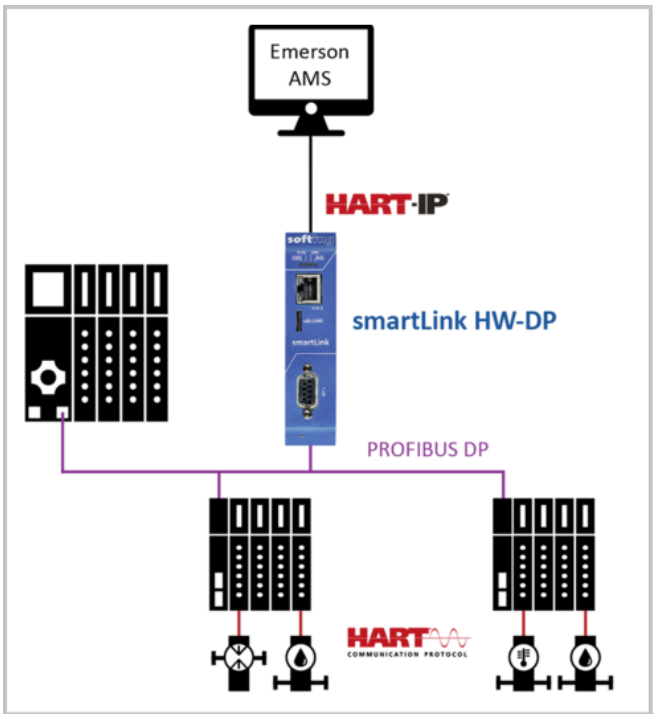


4.2 Connecting to Emerson AMS Device Manager

The Emerson AMS Device Manager is a software platform used for managing and maintaining field devices in industrial automation systems. It is part of Emerson's broader suite of asset management solutions, designed to help operators and maintenance engineers optimize the performance, reliability, and lifespan of their instrumentation and control devices. For details on how to connect your smartLink HW-DP over HART IP with an Asset Management System (AMS) see Sections HART IP 53 and PROFIBUS device assignment 52.

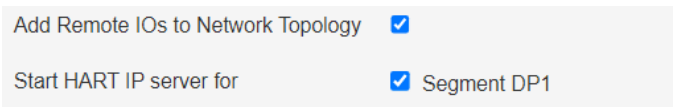
4.2.1 Using Emerson AMS

The following section describes how to configure your network using the Emerson Asset Management System. For details see also the Emerson AMS user manual.



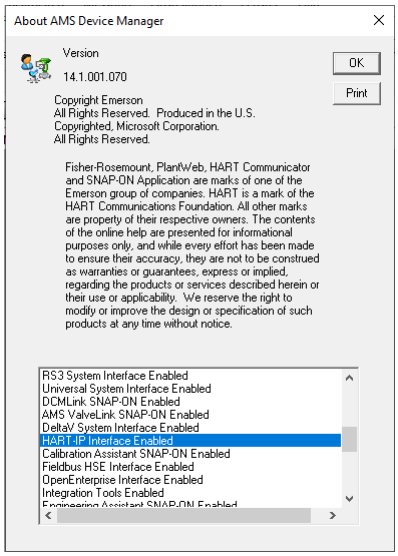
4.2.1.1 Prerequisites

- **Emerson AMS** (version 14.1 or later) is installed on your PC.
- smartLink HW-DP is properly commissioned (see Chapter Commissioning 22).
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing 38).
- Your Emerson AMS has an **Emerson HART-IP license**.
- **HART IP server** is activated for Segment DP1 (see **HART IP Settings** 53).
- **Add Remote IOs to Network Topology** is activated.



4.2.1.2 Network configuration

1. Click **Windows Start → AMS Devices Manager → About AMS Device Manager** to verify, if your AMS version supports HART-IP network components. The following window opens.

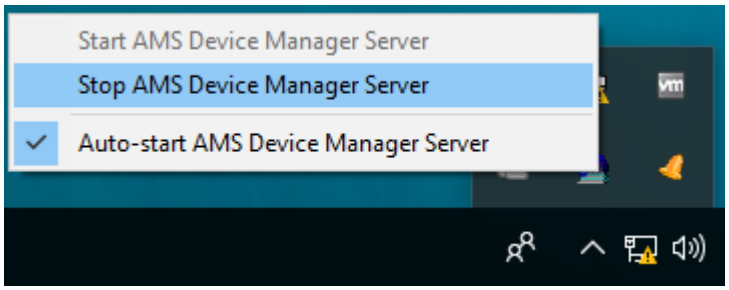


2. Scroll down in the drop-down list to see if you can find **HART-IP Interface Enabled**.

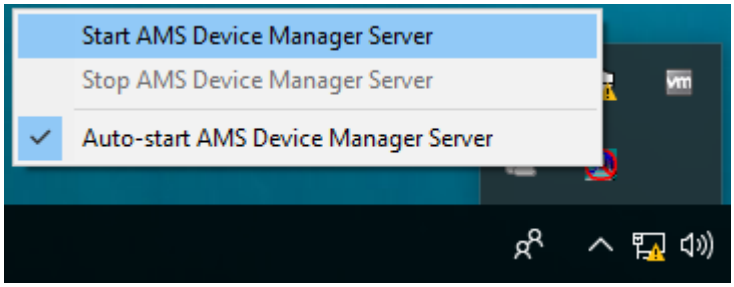
Note
You will not be able to configure HART-IP if your AMS version does not have a HART-IP license.

3. Click **[OK]**.

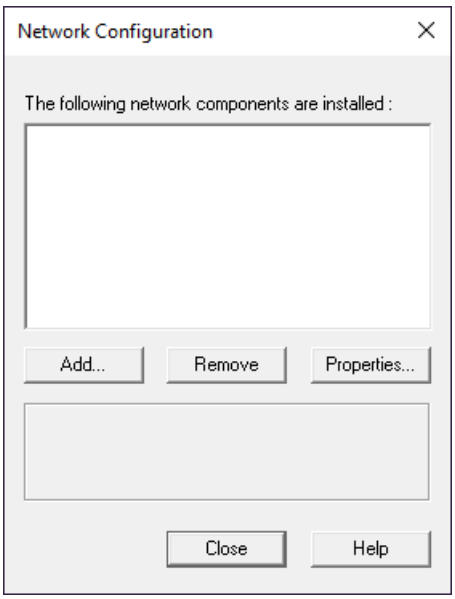
4. Right-click the icon at the bottom of your screen and to stop the AMS Device Manager Server.



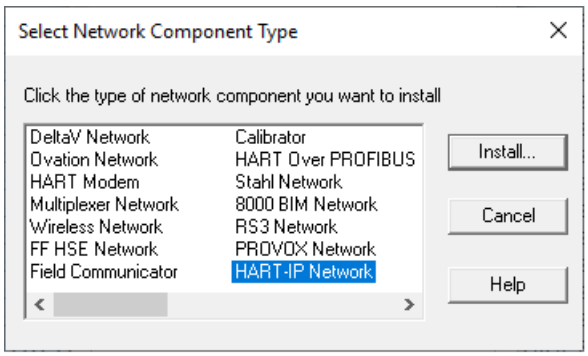
5. Right-click the icon at the bottom of your screen and to start the AMS Device Manager Server again.



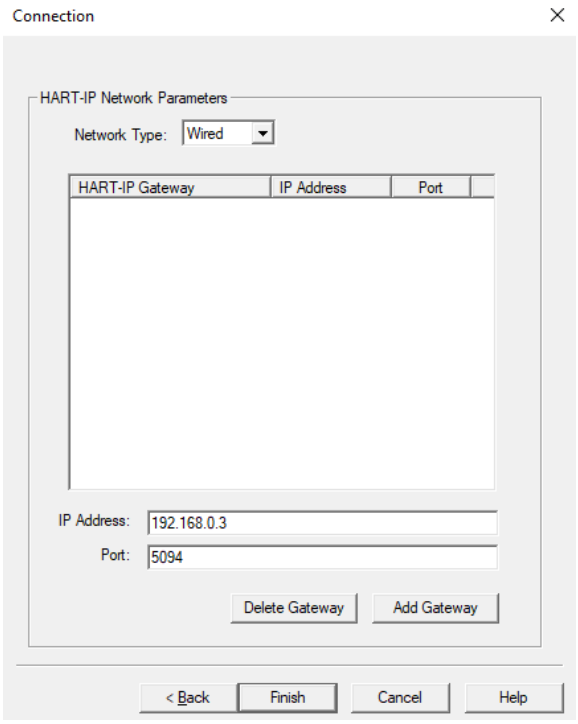
6. Click **Windows Start → AMS Devices Manager → Network Configuration**.
The AMS network configuration window opens.



7. Click **[Add]**.
8. Select the component **HART-IP Network** from the list.
9. Click **[Install...]** and follow the wizard on-screen instructions.

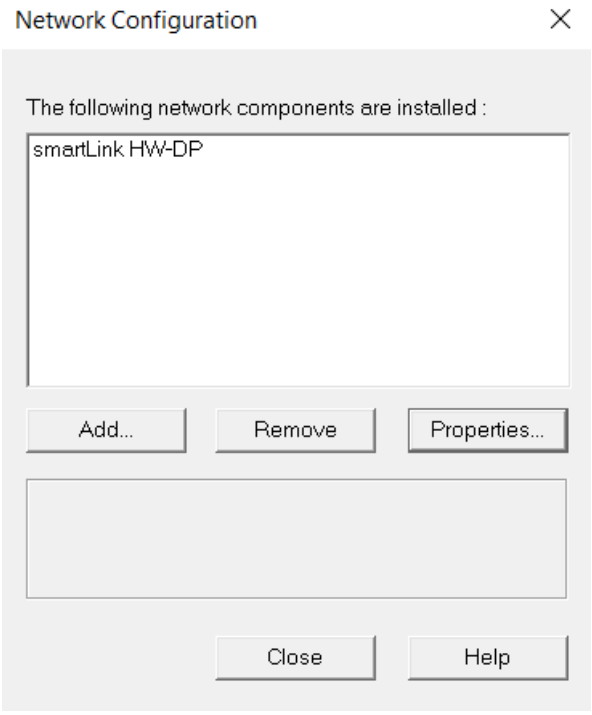


10. Click **[Next]** in the HART-IP Network Wizard and follow further instructions
11. Enter a unique network name.
12. Enter the IP address of your smartLink HW-DP.
    Keep the default port 5094.



13. Click **[Add Gateway]**.
    The added gateway is shown with the corresponding IP address.

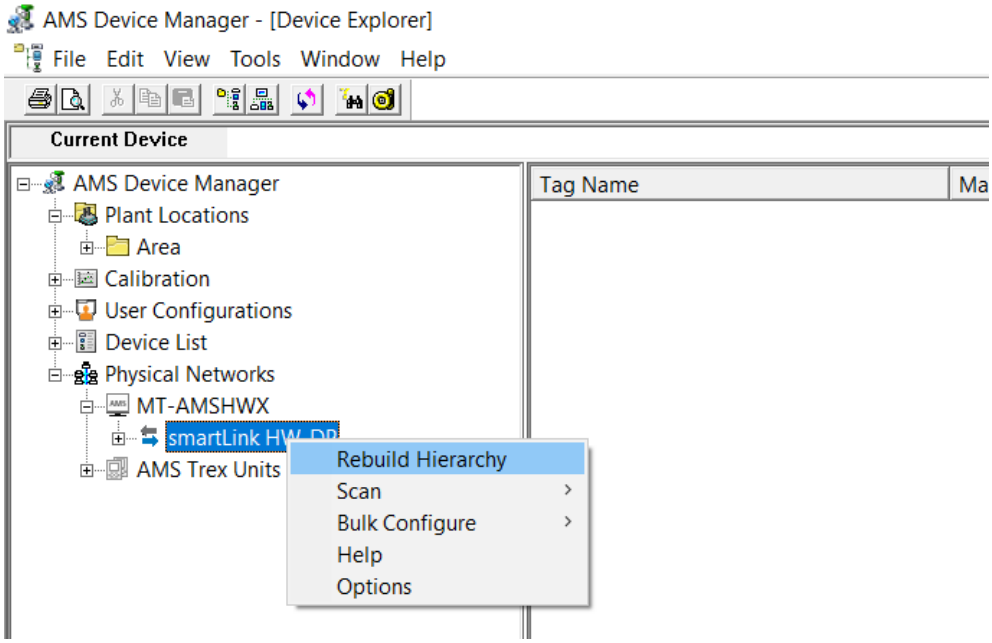
14. Click **[Finish]**.
    Your smartLink HW-DP is now shown as available network component with the name and the corresponding IP address you entered.



15. Click **[Close]**.

4.2.1.3 AMS Device Manager

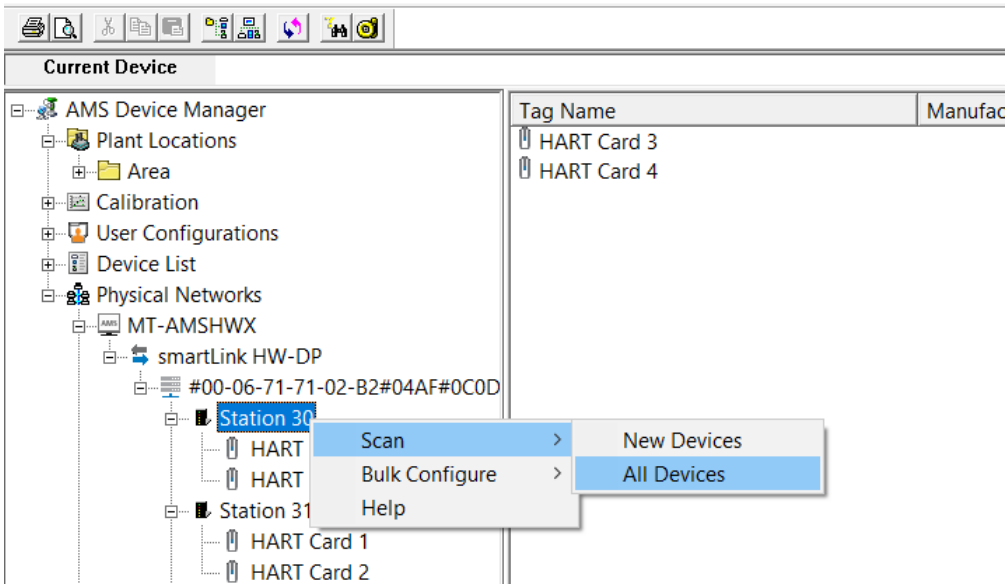
1. Click **Windows Start → AMS Device Manager → AMS Device Manager**.
   The AMS device manager window opens.



2. Right-click your smartLink HW-DP and select **Rebuild Hierarchy**.

Note
The PROFIBUS slaves are displayed in AMS DM as **Station X** where **X** corresponds to the PROFIBUS address of the PROFIBUS slave. The HART IO modules of the PROFIBUS slaves are displayed in AMS as **HART Card X** where **X** corresponds to the slot number of the HART IO module.

3. Right-click a Station and select **Scan → All Devices** see all the HART devices connected to this HART IO module.



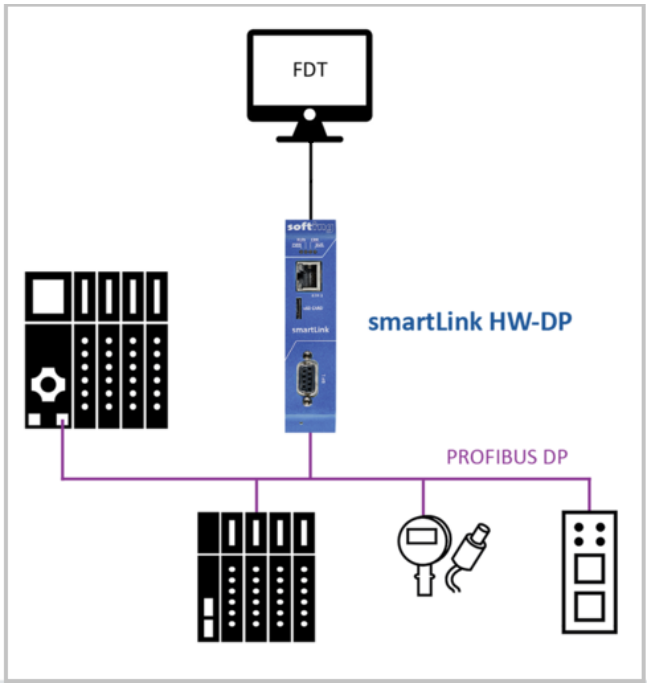
4.3 Connecting to an FDT frame application

An FDT frame application is a software environment providing a communication platform for different field device tools (FDT) from different manufactures. It basically acts as the central communication hub, allowing users to view and manage field devices from different manufacturers within the same system.

To manage the information of these devices, the FDT frame application uses Device Type Manager (DTMs). These are software components provided by device manufacturers They allow you to handle the communication between a field device and the FDT frame application and access a field device similar to a device driver. A DTM contains the complete logic (data and functions) of the field device. Using DTMs the same device setting procedures can be used in any FDT environment.

4.3.1 PROFIBUS

This section describes the access of PROFIBUS devices through an FDT frame application.

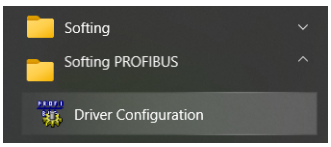


4.3.1.1 Prerequisites

- Your smartLink HW-DP is properly commissioned (see Chapter Commissioning 22).
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing 38).
- An FDT frame application (such as PACTware) is installed.
- PROFIdtm is installed (available in the Downloads section of the product website)
- Universal PROFIBUS Driver V5.47.4 is installed (available in the Downloads section of the product website)

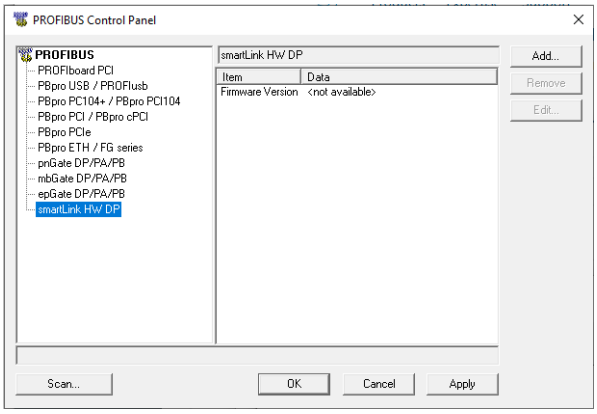
4.3.1.2 Introducing smartLink HW-DP to the PROFIBUS driver (for PROFIdtm)

1. Click the Windows **Start** button to open the start menu.
2. Select **Softing PROFIBUS → Driver Configuration** to configure the PROFIBUS driver.

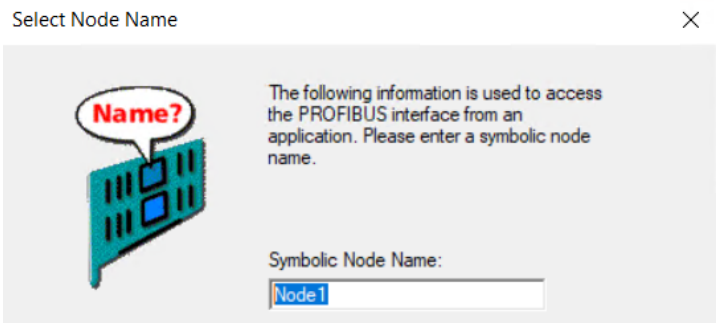


3. Allow Windows **User Account Control** (UAC) to modify settings.
The PROFIBUS Control Panel is opened.

4. Select the smartLink HW-DP and click **[Add...]**.

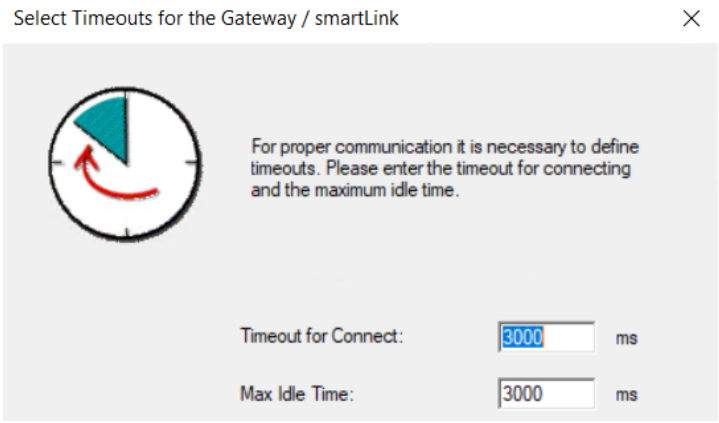


5. Enter a symbolic name in the new window and click **[Next]**.

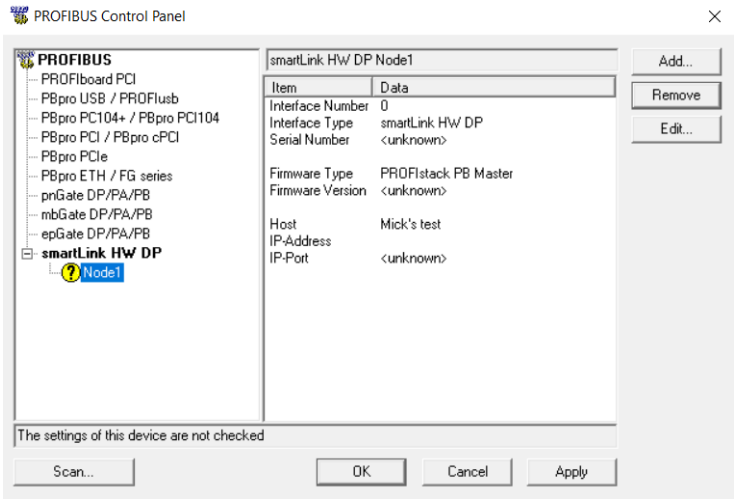


6. Enter a smartLink HW-DP name or IP address or name and click **[Next]**.

7. If required, change the timeout settings (Timeout for Connect and Max Idle Time).
In most cases default settings can be used.



8. Click **[Finish]**.
The configuration wizard is closed. In the Control Panel the node name is shown on the left side underneath the smartLink HW-DP. The question mark on a yellow background means that the connection to the smartLink HW-DP has not yet been tested.

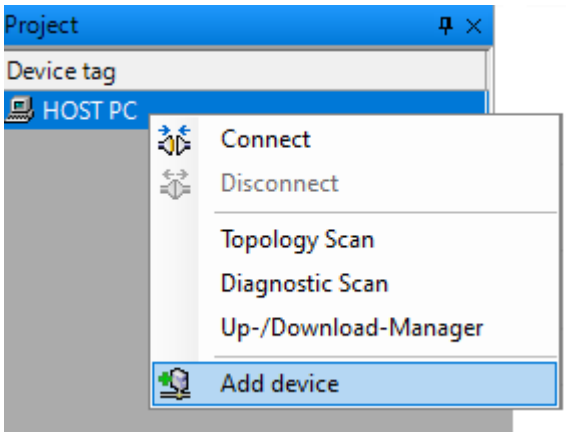


9. Confirm your settings with **[Apply]** and **[OK]**.
The PROFIBUS Control Panel tests the connection to the smartLink HW-DP. After a short while, the yellow question mark is replaced by a green check mark. If a red cross appears instead, check the network cables and the IP settings of your PC and the smartLink HW-DP. Ensure that the PC and the smartLink HW-DP are on the same IP subnet.
10. Continue with Chapter Accessing PROFIBUS devices with PACTware 65.

4.3.1.3 Accessing PROFIBUS devices with PACTware

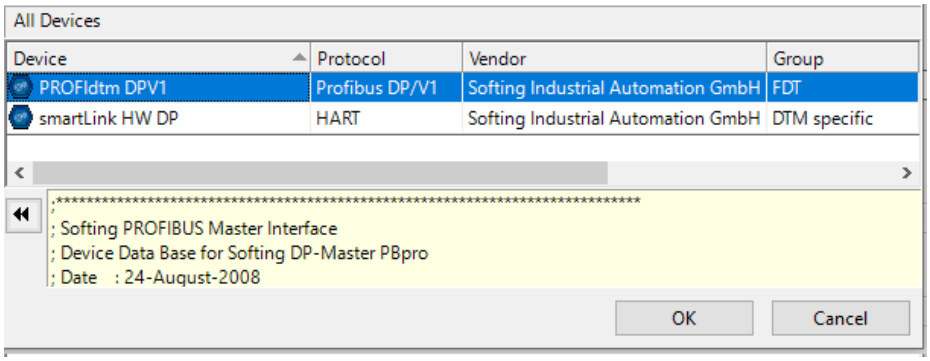
The following chapter briefly outlines how to access PROFIBUS devices using Softing PROFIdtm with the FDT frame application PACTware. For a detailed description of the PROFIdtm functionality, please read the corresponding manual.

1. Start PACTware.
2. Create a new Project and save the project.
3. Right-click **Host PC → Add Device** in the device tag column of the project view.



A new window appears with the available devices.

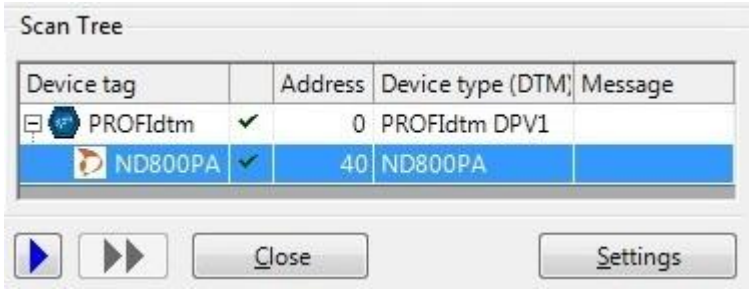
4. Select **PROFIdtm DPV1** from the list and confirm with **[OK]**.
   The device is displayed in the project view.



Note
Before starting a topology scan ensure that suitable Device DTMs are installed for the connected PROFIBUS devices.

5. Open the PROFIdtm user interface and select the correct Node (Node0).
6. Right-click **PROFIdtm** and select **Topology Scan**.
7. Click the arrow in the scan window to start the topology scan.

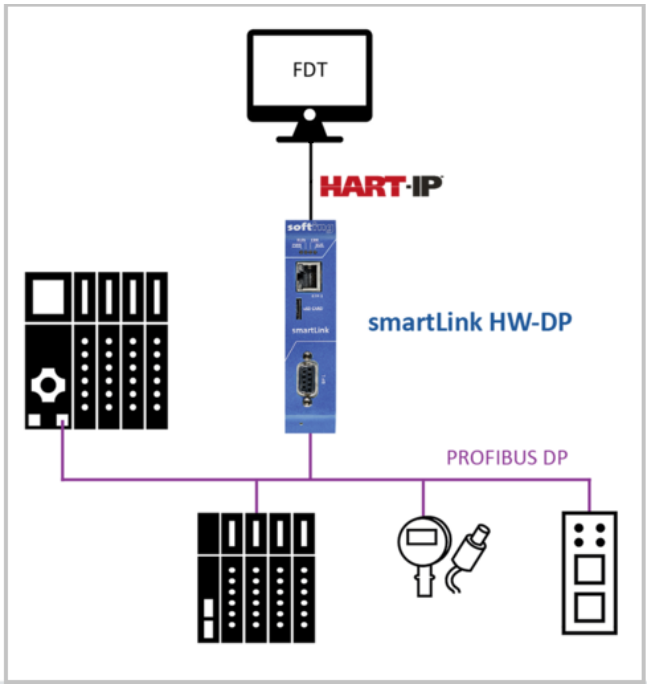
PROFIdtm and the detected PROFIBUS devices are displayed in the scan window.



8. Close the scan window. The detected PROFIBUS device has been added to the project view.

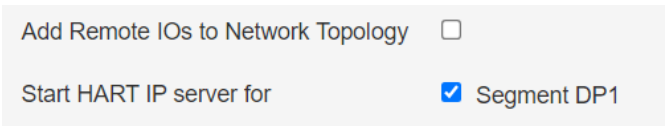
4.3.2 HART

For details on how to set HART device parameters see the smartLink DTM User Guide for details. You will find this document in the Downloads area Manuals and Documentation of the smartLink HW-DP product page.



4.3.2.1 Prerequisites

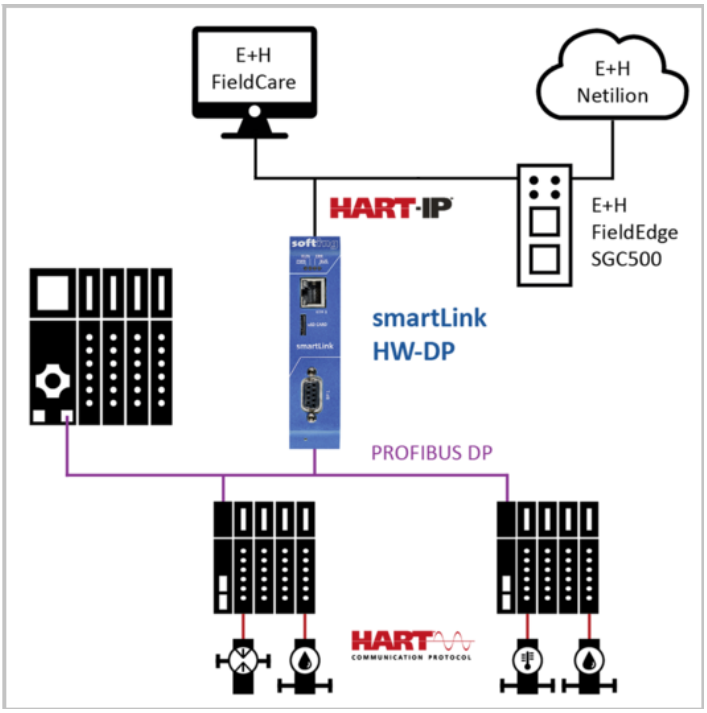
- Your smartLink HW-DP is properly commissioned (see Chapter Commissioning 22).
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing 38).
- An FDT frame application (such as PACTware 4.1) is installed.
- The latest smartLink DTM is installed is installed.
- **HART IP server** is activated for Segment DP1 (see **HART IP Settings** 53).
- The option **Add remote RIOs to Network Topology** is deactivated.



4.4 Connecting to Endress+Hauser Netilion

Netilion is a cloud-based IIoT ecosystem from Endress+Hauser designed to enhance the management and optimization of industrial processes. It connects the physical and digital world via the combination of IIoT devices and digital communication components, and provides comprehensive management of these components to help users keep track of their status, maintenance needs, and performance.

To connect the smartLink HW-DP to Netilion you need to go through the FieldEdge SGC500. It is this edge device which permanently connects the field network through the smartLink HW-DP to the Netilion cloud. The diagram below shows how the smartLink HW-DP connects upwards on HART IP to the Endress+Hauser network and downwards over a PROFIBUS Remote IO to HART field network.

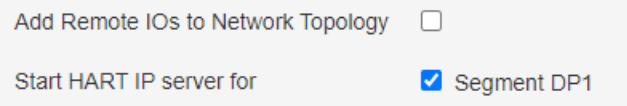


The data read from the HART devices in the field network is stored in the Netilion Cloud. Here it can be accessed and processed by Netilion Services or Netilion Connect. Using the Netilion Services application, the transmitted data is processed through the IoT service platforms Netilion Analytics, Netilion Health, Netilion Library and Netilion Value. For more details see: https://netilion.endress.com

Using the Netilion Connect API, the transmitted data can be retrieved directly via a REST JSON API and integrated into a user application. For more details see:
https://developer.netilion.endress.com/discover

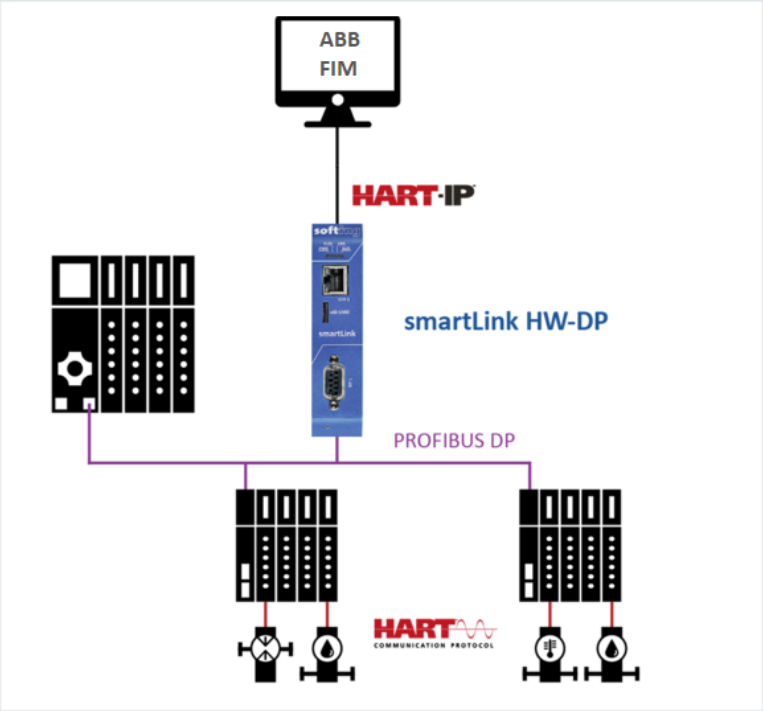
4.4.1 Prerequisites

- Your smartLink HW-DP is properly commissioned (see Chapter Commissioning[22]).
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing[38]).
- You have unchecked the box **Add Remote IOs to Network Topology and** checked the box **Start HART IP Server for** in the **HART IP Settings**[53] of the smartLink HW-DP user interface.



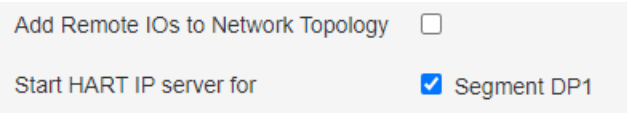
4.5 Connecting to ABB FIM

ABB Field Information Manager (FIM) is a device management tool based on FDI technology. This chapter describes how to set up a local or remote connection to a HART-IP communication server to configure, commission, diagnose and maintain your HART field devices via smartLink HW-DP. For more details on how to manage your network assets in FIM see the ABB Ability™ Field Information Manager User Guide.



4.5.1 Prerequisites

- Your smartLink HW-DP is properly commissioned (see Chapter Commissioning 22).
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing 38).
- You have unchecked the box **Add Remote IOs to Network Topology** and checked the box **Start HART IP Server for** in the **HART IP Settings** 53 of the smartLink HW-DP user interface.

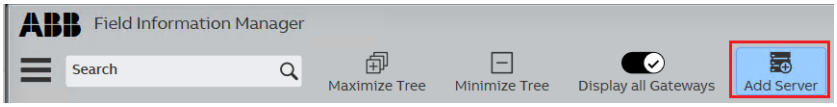


4.5.2 Configuring the Thorsis HART-IP FDI Communication Server

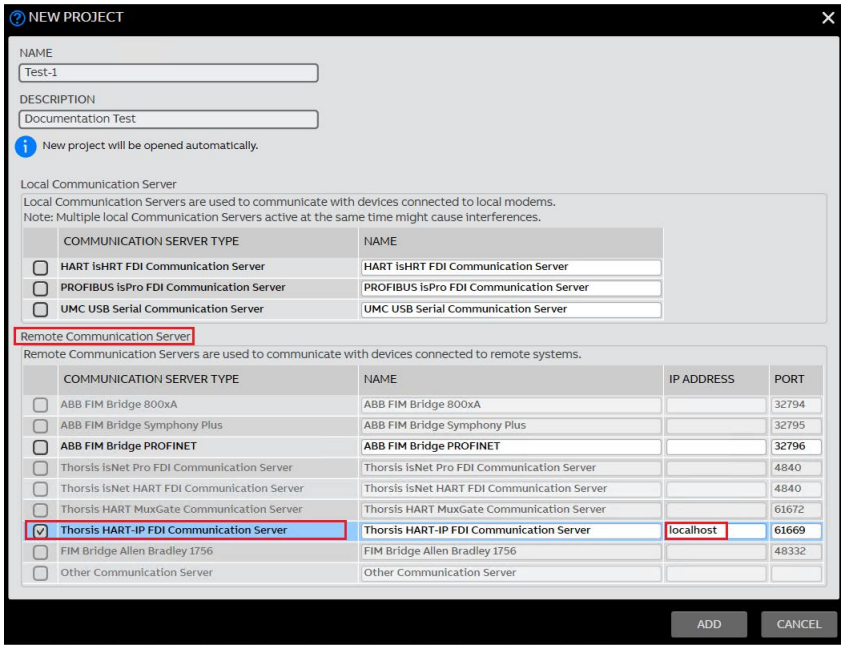
This chapter describes how to set up the **Thorsis HART-IP FDI Communication Server** to get access to HART devices.

1. Double-click the **ABB FIM** icon to start the application.

2. Select **Add Server** in the banner menu.
When you start the application for first time you need to connect a FIM server.

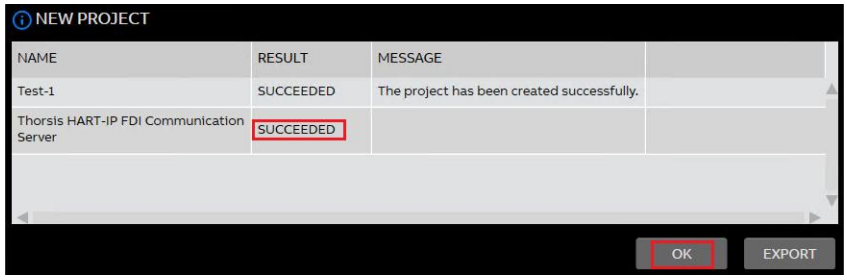


The **ADD COMMUNICATION SERVER** popup window appears. Here you are prompted to select and add a **Remote Communication Server**.

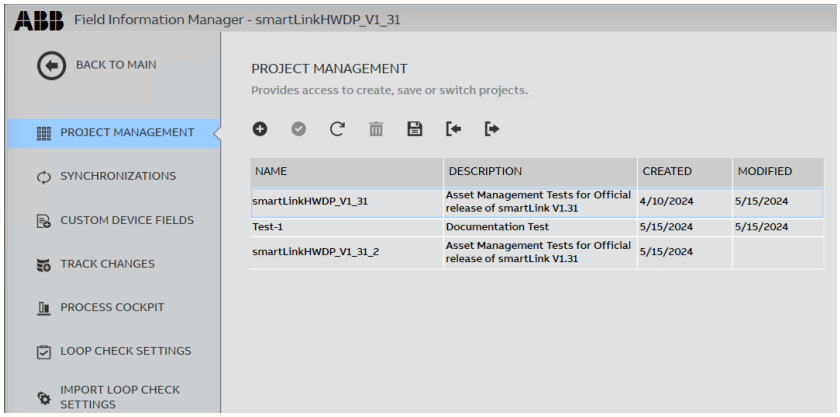


3. Select the communication server type **Thorsis HART-IP FDI Communication Server** and enter the IP address, hostname or localhost of your PC where ABB FIM is installed.

4. Click **[ADD]** to continue.
A new window appears. Here you see in the **Result** column if the selected communication server has been added successfully.



5. Click **[OK]** to continue.
The Project Management window appears displaying all existing projects.



6. Click the **arrow icon** in the top left corner to return to the main menu.

Note

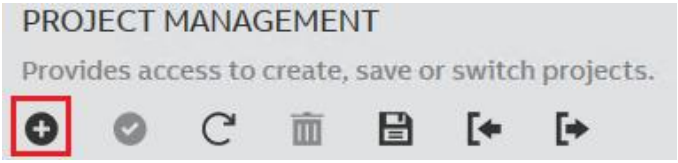
Repeat Step 2 if the connection to the communication server failed. Make sure you enter a correct IP address, hostname or localhost.

4.5.3 Managing projects

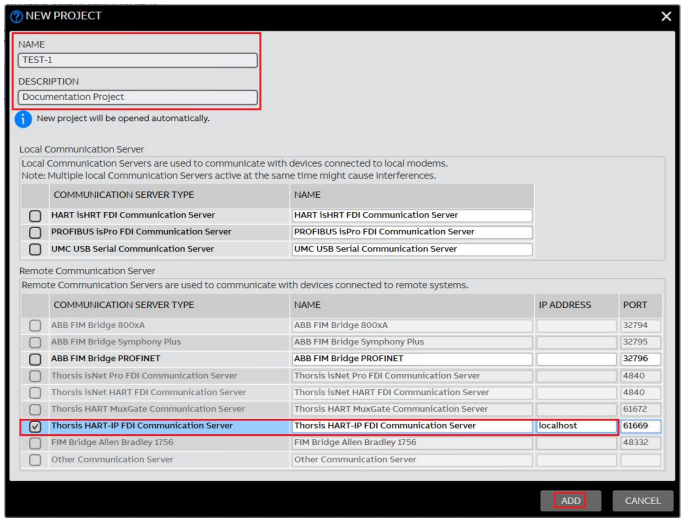
This chapter describes how you can create a new project or import an existing network management project in FIM for the connected smartLink HW-DP.

4.5.3.1 Creating a project

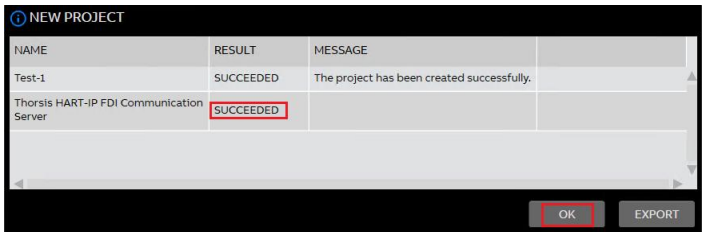
1. Click the burger icon in the top left corner.
2. Select the **PROJECTS** menu to create a project.
3. Click the plus icon at the top of the window.



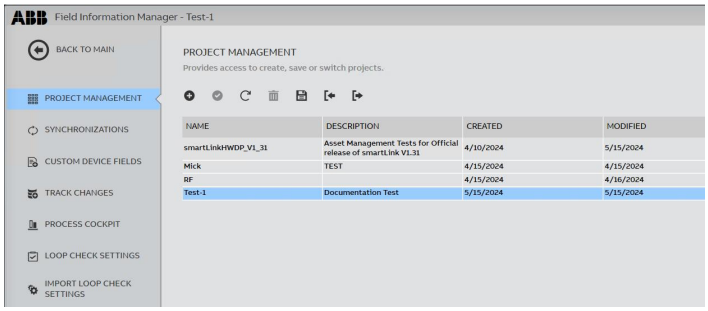
The **New Project window** appears.



4. Enter a **Name** and a **Description** in the top two rows.
5. Tick the checkbox for **Thorsis HART-IP FDI Communication Server** and enter the localhost, computer name or the IP address of the server in the **IP ADDRESS** field.
6. Click **[ADD]** to continue. A **NEW PROJECT** window appears. In this window, the result and message line next to your project name shows if the project has been added successfully.
7. Click **[OK]** to continue.



The Project Management window appear displaying all existing projects.

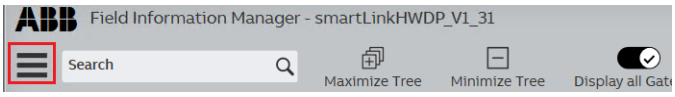


8. Click the **arrow icon** in the top left corner to return to the main menu.

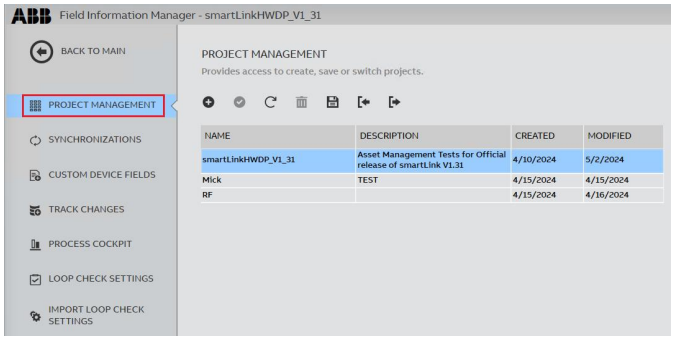
4.5.3.2 Importing a smartLink HW-DPproject

Note
Follow the instructions below to import a previously created project.

1. Click the burger **Menu** icon in the top left corner.

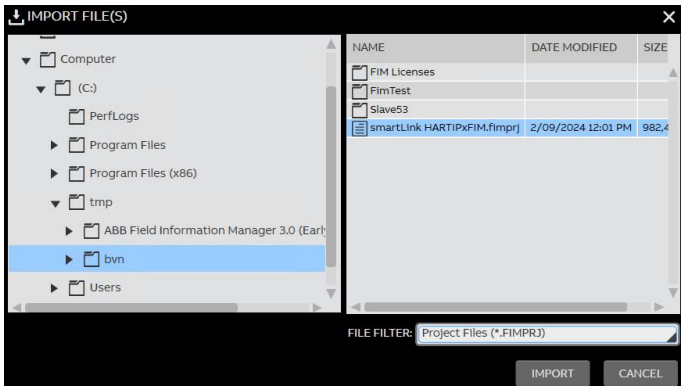


2. Select **Projects** from the side menu.
The following window appears.



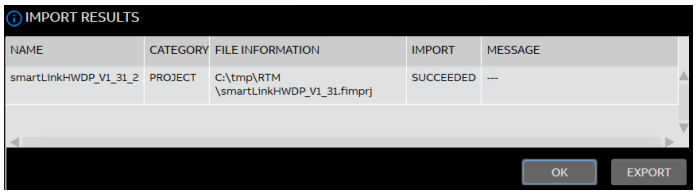
3. Click the left arrow icon .

4. Select a project file ( ) and click **[Import]**.

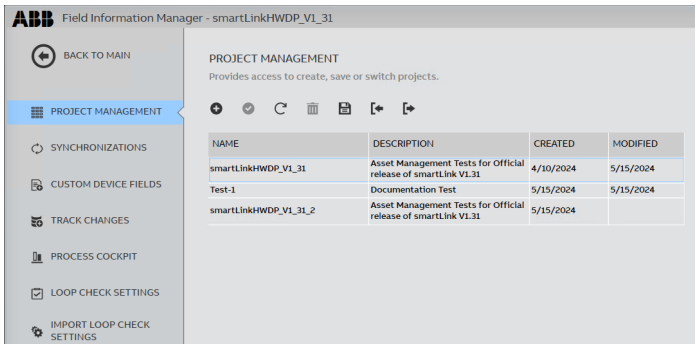


Note
If the import fails, make sure the project has been created with the correct major and minor version. See the ABB FIM User Guide for more details.

5. When the project file has been successfully imported click **[OK]**.



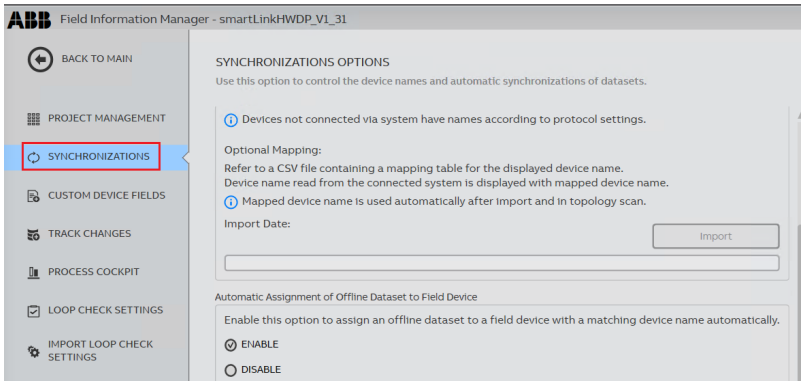
The Project Management window appear displaying all existing projects.



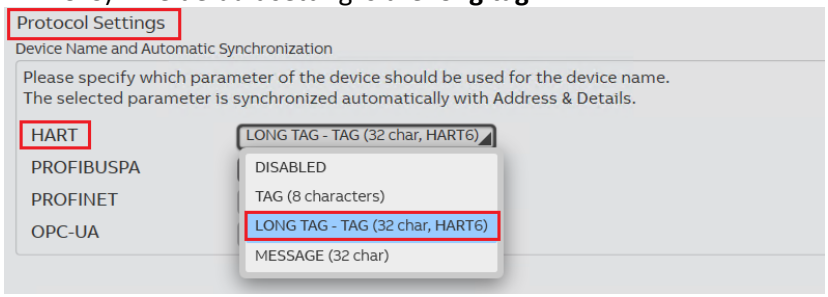
6. Click the **arrow icon** in the top left corner to return to the main menu.

4.5.4 Selecting HART protocol settings

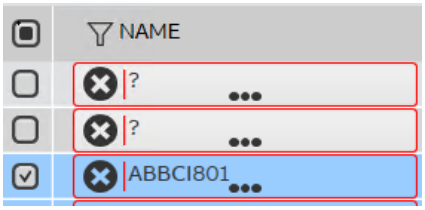
1. Click the burger icon in the top left corner.
2. Select **PROJECTS** in the side menu.
   The following window appears.
3. Select **SYNCHRONIZATION** in the side menu.



4. Scroll to the bottom of the window.
5. Under **Protocol Settings**, select a parameter from the dropdown list (TAG, LONG TAG, MESSAGE) that should be used to name the **HART devices** in the FIM device list (see option LIST ALL DEVICES). The default setting is the **long tag**.



Note
Long tags are only supported by HART devices type 6 onwards (HART 6, HART 7). If a HART device does not support long tags, the device list in FIM shows the device name with a question mark.

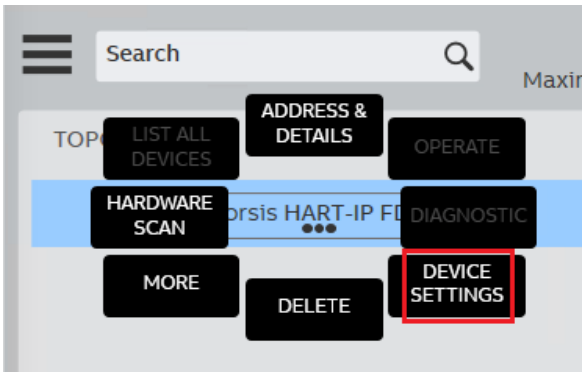


6. When you have changed the default long tag setting to tag or message, click **[Accept]** to confirm.

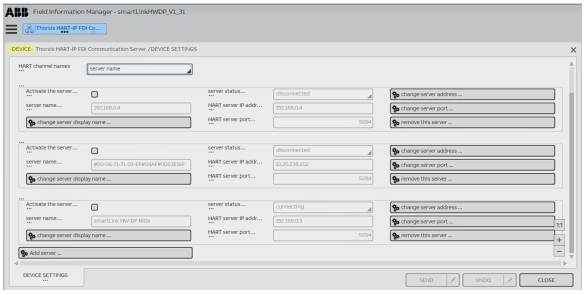
4.5.5 Scanning for smartLink HW-DP devices

Adding smartLink HW-DP as a HART-IP server under the Thorsis HART-IP FDI Communication Server

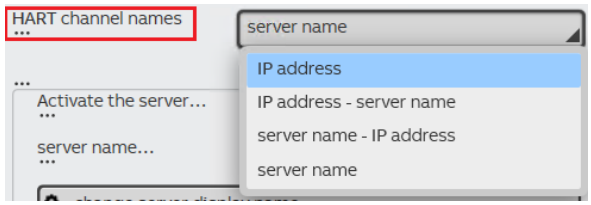
1. Click the ellipsis icon ••• in the **Thorsis HART-IP FDI Communication Server** device tile.
   A new widget appears.



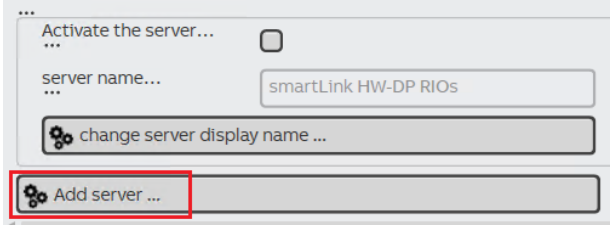
2. Select the option **Device Settings**.
   The Device Settings widget appears.



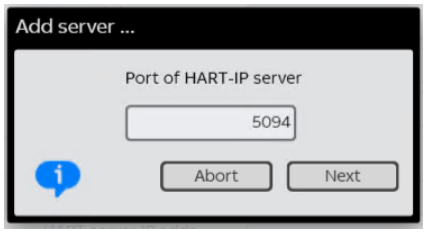
3. Select how you want the HART-IP server to be represented in the FIM topology view (HART channel names). The default is set to the host ID of the smartLink HW-DP unless you have defined a custom long tag in the HART IP → Settings**.**

4. 

5. Click **[Add Server...]**

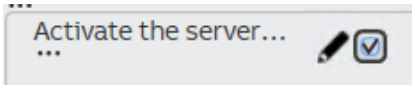


6. Enter the IP address and port number of the HART-IP server (smartLink HW-DP).
   See Section HART IP Settings 53 for details.



Note
If you are using an alternate port number for the HART-IP server, make sure to use the correct number.

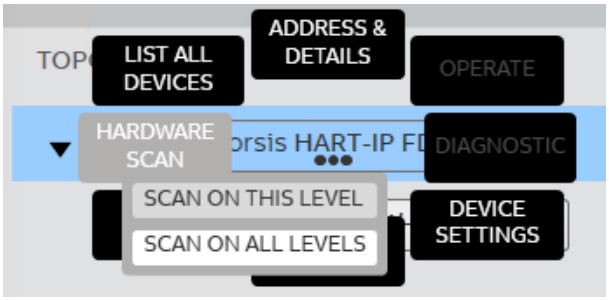
7. Tick the **Activate the Server...** checkbox.



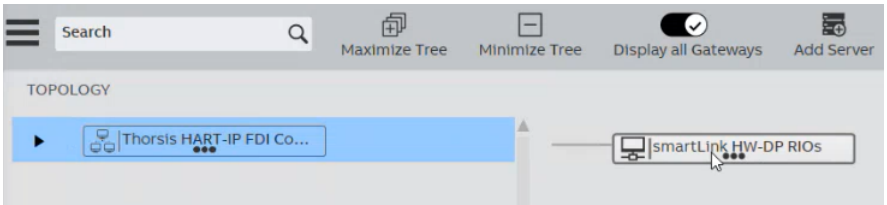
8. Click **[Send]** and wait until the status field shows **connected**.
9. Click **[Close]**.

Establishing a connection to smartLink HW-DP as a HART-IP server

1. Click the ellipsis icon ••• in the **Thorsis HART-IP FDI Communication Server** device tile.
   A new widget appears.
2. Select the option **Hardware Scan → Scan On this Level** (if you have more than one HART-IP server) or Scan on all levels (if you are using only one HART-IP server).

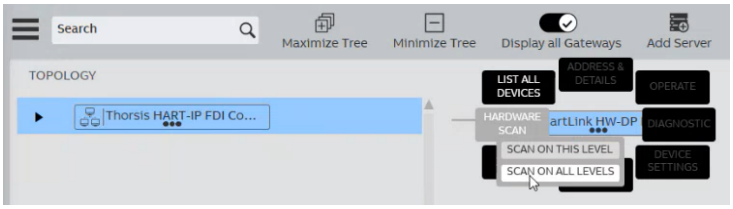


When the scan is completed successfully (see the progress bar at the bottom of the screen),the smartLink HW-DP HART-IP server (or multiple servers where available) is shown in the **FIM Topology View**. The connected HART-IP server is now communicating with the FIM client.

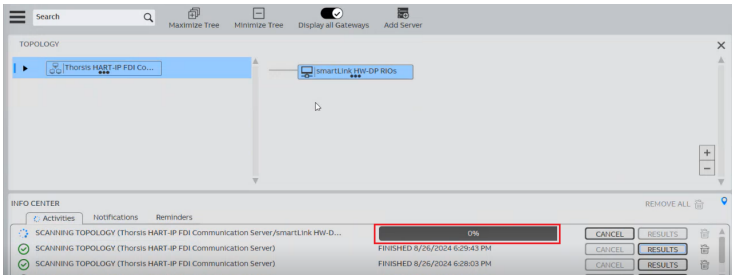


4.5.6 Scanning for HART devices

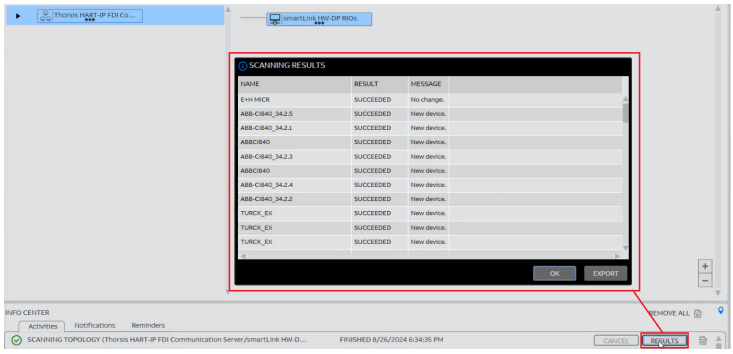
1. Open the **FIM Topology View**.
2. Click the ellipsis icon ••• in the **smartLink HW-DP** device tile.
3. Select the option **Hardware Scan → Scan On this Level** (if you have more than one HART-IP server) or Scan on all levels (if you are using only one HART-IP server).



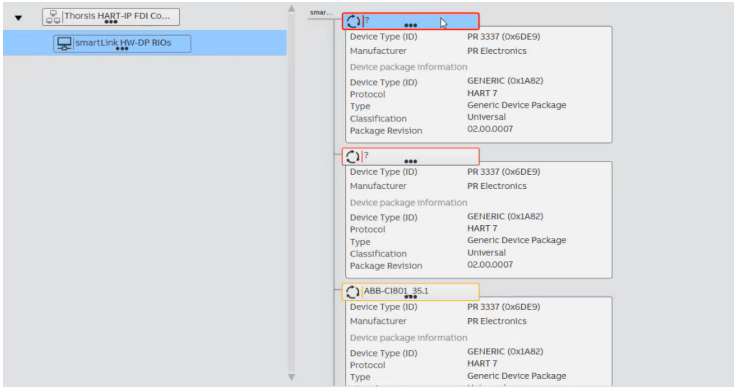
4. Wait for the scan to finish. The progress bar shows the scan status in percentage completed.



5. When the scan is completed, click**[Results]** to show all HART-IP devices.



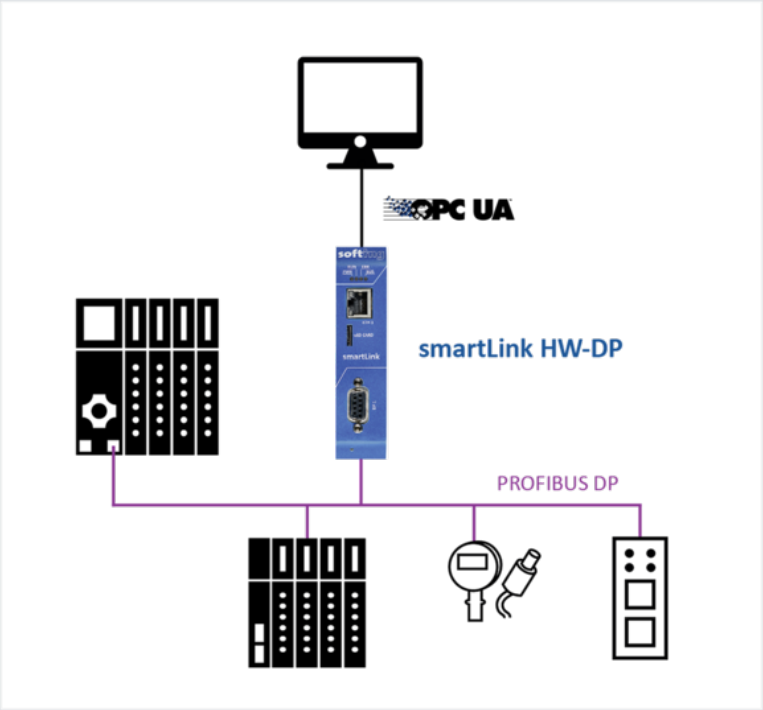
6. Click **[OK]** to close the list.
7. Double-click the **smartLink HW-DP** device tile.
A list of all HART-IP devices is shown below the **smartLink HW-DP** device tile.



4.6 Connecting to an OPC UA client

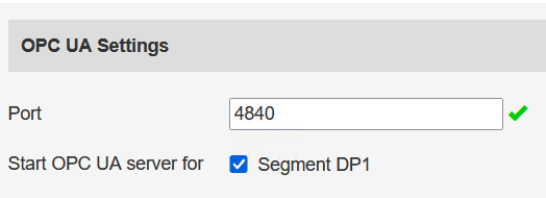
OPC UA (*Open Platform Communications Unified Architecture*) is a machine-to-machine communication protocol for industrial automation, enabling different devices and software applications to interact seamlessly, regardless of the manufacturer, operating system, or programming language. An OPC UA client is a software application or device that connects to an OPC UA server to access and exchange data within an industrial automation system.

Note
For details on how to connect your smartLink HW-DP with an OPC UA Client see Sections OPC UA 54 and PROFIBUS device assignment 52.



4.6.1 Prerequisites

- Your smartLink HW-DP is properly commissioned (see Chapter Commissioning 22)
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing 38)
- You have checked the box **Start OPC UA Server for** in the **OPC UA Settings** 54 of the smartLink HW-DP user interface.



4.6.2 Data type conversion

smartLink HW-DP converts PROFIBUS data types to OPC UA data types. Simple data types like Integer16 are mapped to the corresponding OPC UA data types (Int16). All multi-byte data types are converted from big endianness used by PROFIBUS to little endianness used by OPC UA. More complex, structured data types are split up to multiple OPC UA variables. Some data types require additional calculation like scaling. See the following mapping table for an exact description on how PROFIBUS data types are converted to OPC UA data types.

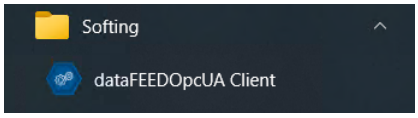
PROFIBUS data type	OPC UA variable name suffix	OPC UA data type	conversion
Boolean		Boolean	0 -> False; !0 -> True
Integer8		Sbyte	-
Integer16		Int16	big -> little endian
Integer32		Int32	big -> little endian
Integer64		Int64	big -> little endian
Unsigned8		Byte	-
Unsigned16		UInt16	big -> little endian
Unsigned32		UInt32	big -> little endian
Unsigned64		UInt64	big -> little endian
Float32		Float	big -> little endian
Float64		Double	big -> little endian
VisibleString		String	ISO 8859-1 -> String
OctetString		ByteString	-
UnicodeString8		String	-
F message trailer with 4 octets	_status	Byte	-
	_crc	ByteString	-
F message trailer with 5 octets	_status	Byte	-
	_crc	UInt32	big -> little endian
TimeStamp	_status	UInt16	big -> little endian
	_seconds	UInt64	big -> little endian (SecondsHigh << 32) + SecondsLow
	_nanoseconds	UInt32	big -> little endian
TimeStampDifference	_status	UInt16	big -> little endian
	_seconds	UInt64	big -> little endian (SecondsHigh << 32) + SecondsLow
	_nanoseconds	UInt32	big -> little endian
TimeStampDifferenceShort		Int64	big -> little endian
Float32+Status8	_value	Float	big -> little endian
	_status	Byte	-
Float64+Unsigned8	_value	Double	big -> little endian
	_status	Byte	-

PROFIBUS data type	OPC UA variable name suffix	OPC UA data type	conversion
Unsigned8+Unsigned8	_value	Byte	-
	_status	Byte	-
OctetString2+Unsigned8	_value	ByteString	-
	_status	Byte	-
Unsigned16_S	_value	UInt16	big -> little endian Input >> 2 (zero-padding shift)
	_status	Byte	Input & 3
Integer16_S	_value	Int16	big -> little endian Input >> 2 (sign-preserving shift)
	_status	Byte	Input & 3
Unsigned8_S	_value	Byte	Input >> 2 (zero-padding shift)
	_status	Byte	Input & 3
OctetString_S	_value	ByteString	Input [0 to (Input.length / 3)]
	_status	ByteString	Input [(Input.length / 3) to Input.length]
N2		Float	big -> little endian (float(Input-Integer16) / 0x4000) * 100
N4		Double	big -> little endian (double(Input-Integer32) / 0x40000000) * 100
V2		ByteString	-
L2		ByteString	-
R2		Float	big -> little endian float(Input-Unsigned16)
T2		Float	big -> little endian float(Input-Unsigned16)
T4		Double	big -> little endian double(Input-Unsigned32)
D2		Float	big -> little endian float(Input-Unsigned16) / 16384
E2		Float	if (Input-Unsigned16 & 0x8000) -(float(Input-Unsigned16 & 0x7fff) / 0x80) else float(Input-Unsigned16 & 0x7fff) / 0x80
C4		Double	big -> little endian double(Input-Unsigned32) / 10000
X2		Float	big -> little endian float(Input-Unsigned16)
X4		Double	big -> little endian double(Input-Unsigned32
Unipolar2.16		Float	big -> little endian (float(Input-Unsigned16) / 0x4000) * 100

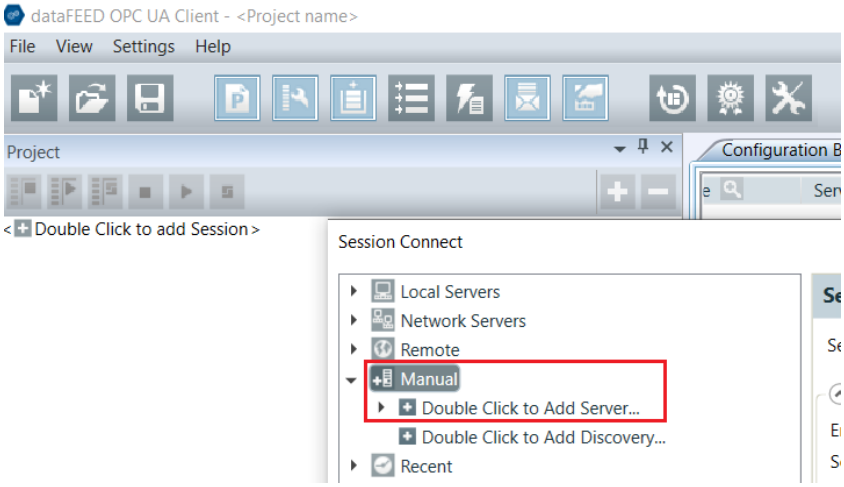
4.6.3 Accessing asset data and process values

The following chapter briefly outlines how to access asset data and process values of PROFIBUS devices using the Softing dataFEED OPC UA client. For a detailed description of the PROFIdtm functionality, please read the corresponding dataFEED OPC Suite User Manual.

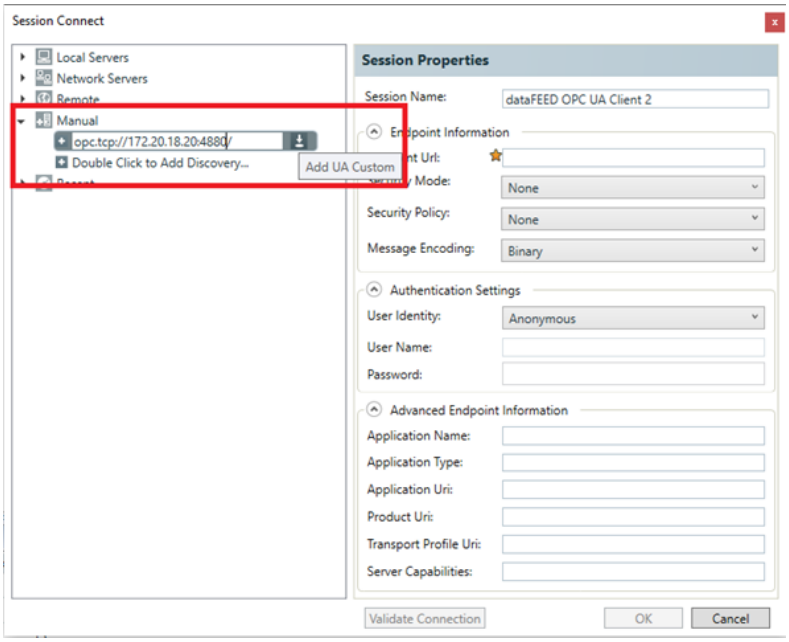
1. Click the Windows **Start** button to open the start menu.
2. Select **Softing → dataFEEDOpcUa Client** to start the application.



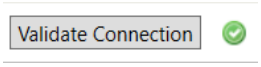
3. Double-click **Double-Click to add session** under Project.
4. Select **Manual →Double Click to Add Server...**



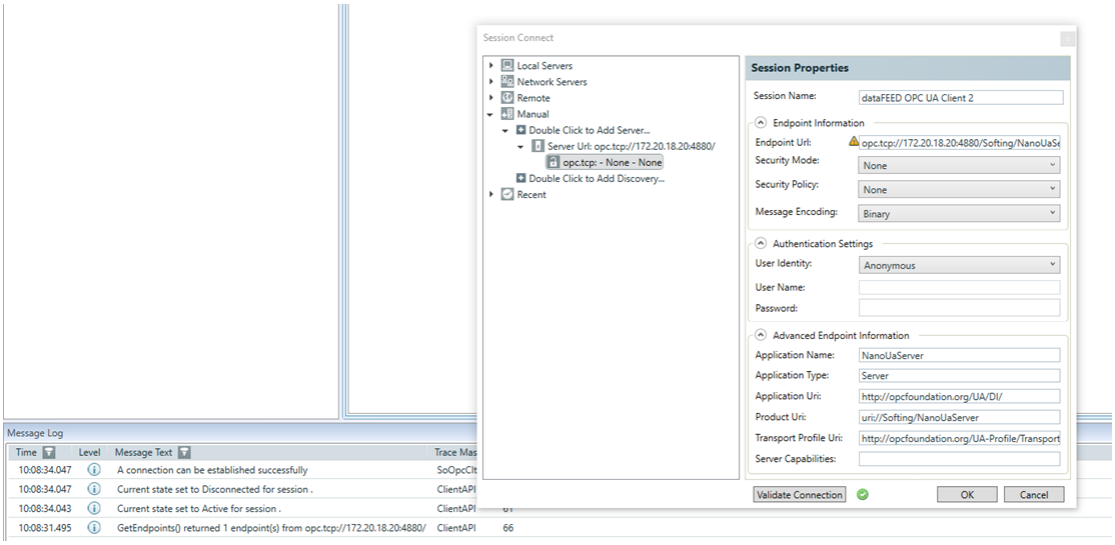
5. Copy the server endpoint from the **OPC UA →Settings** window.
6. Enter the URL (example: opc.tcp://172.20.18.20:4880/).



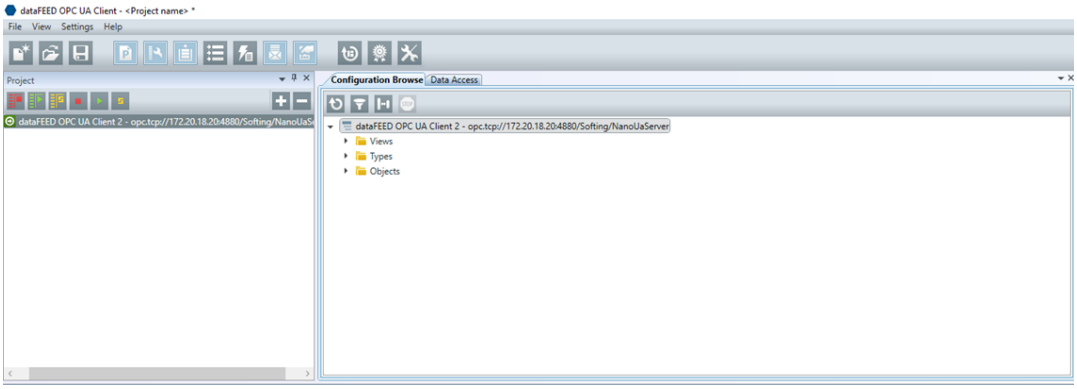
7. Click **[Validate Connection]** at the bottom of this window.



You now have established a successful OPC UA connection.



8. Click **[OK]** to close the window.
You will see the established connection in the **Configuration Browse** window.



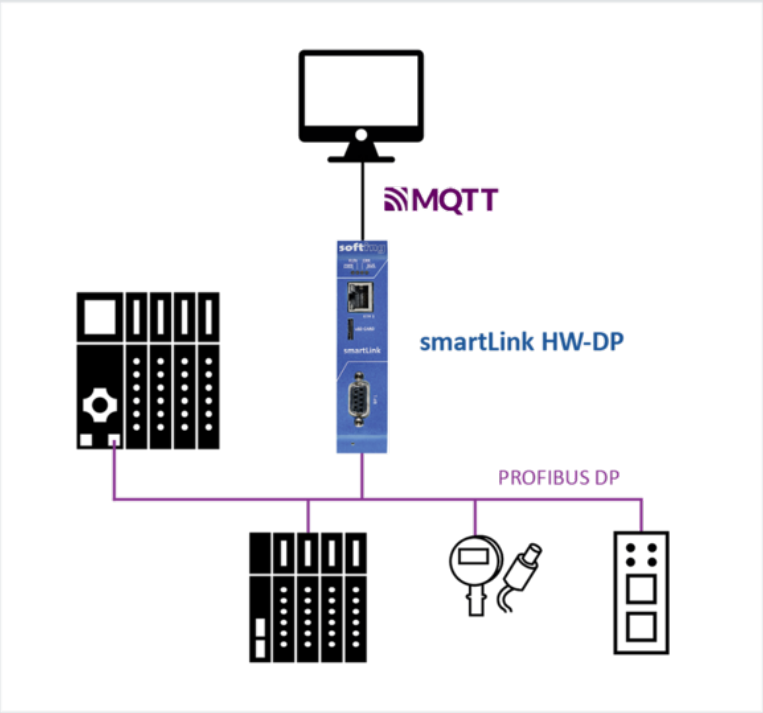
Note
For more information on working the dataFEED OPC UC client, see the dataFEED OPC Suite User Manual, available for download from the product website.

4.7 Connecting to plantPerfect Monitor

plantPerfect Monitor is a web-based tool designed to monitor the health and performance of industrial communication networks.

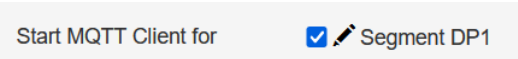
Note

For details on how to connect your smartLink HW-DP to the Softing plantPerfect Monitor, see the Section MQTT[57] and the plantPerfect Monitor user[52] guide available for download from the plantPerfect Monitor product website.



4.7.1 Prerequisites

- Your smartLink HW-DP is properly commissioned (see Chapter Commissioning[22])
- Your smartLink HW-DP has sufficient licenses available (see Chapter Licensing[38])
- **plantPerfect Monitor** is installed.
- You have checked the box **Start MQTT Server for** in the **MQTT Settings**[57] of the smartLink HW-DP user interface

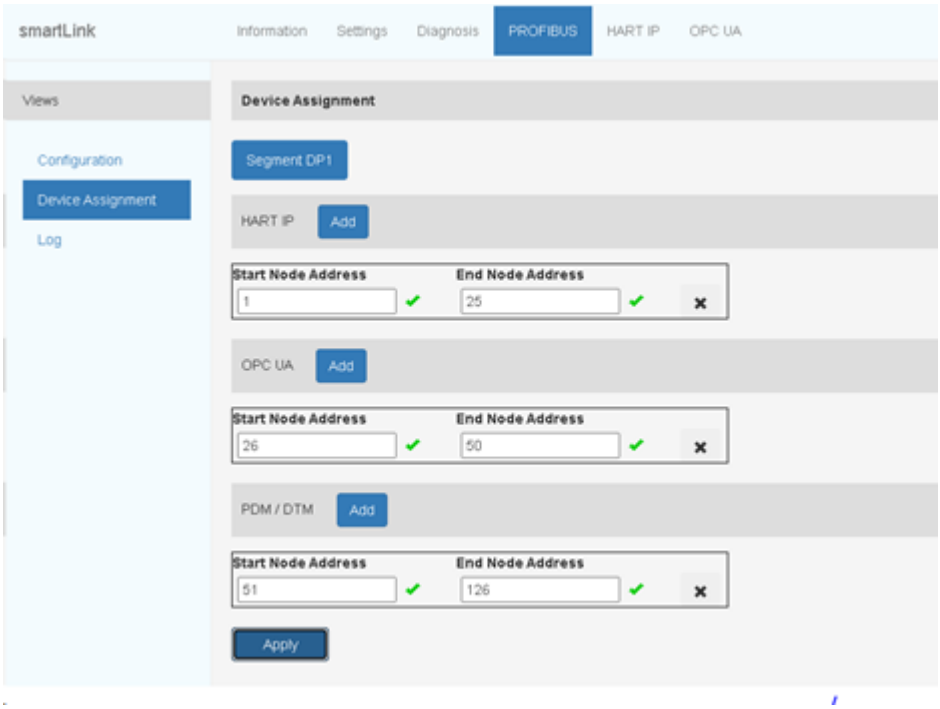


4.8 Defining address spaces

To use the protocols above, PROFIBUS address spaces have to be defined for each one.

Due to the unique nature of each protocol simultaneous read and write requests to the devices can inflict each other. It is therefore not recommended to use more than one protocol in each address space.

However, if overlapping protocol spaces and the use of more protocols at the same time are necessary it should be treated with utmost caution and knowledge about the risks for the system since the communication status is not clearly defined anymore and errors or communication fails can occur.



5 Troubleshooting

This chapter describes all status messages generated by the smartLink HW-DP. They are typically show in the live list (select **Diagnosis → Live List** in the user interface).

The table below lists for each status message a possible cause if required an action to solve any related problem.

Status	Possible Cause	Solution/Required Action
At least one underlying component has an error.	One or more of the detected device on the network has a problem.	Action required on device level (see device specific status message).
The device denied the request to connect.	The device is currently under heavy load and refuses connections from additional class 2 masters.	Close all other master class 2 connections.
All acyclic communication resources of the device are occupied.	The device has no free resources left to connect to a class 2 master.	Close all other master class 2 connections
The device doesn't support acyclic communication.	The device is not capable of connecting to a master class 2.	The device cannot be used to access underlying HART devices.
The device does not respond to C2 services.	The device is currently under heavy load or there are problems on the bus.	Check PROFIBUS for signal quality or interfering signals.
The device has aborted the connection.	The device is currently under heavy load or there are problems on the bus	Check PROFIBUS for signal quality or interfering signals.
A connection to the device cannot be established.	The device is currently under heavy load or there are problems on the bus	Check PROFIBUS for signal quality or interfering signals.
The device doesn't support I&M.	Old device that is not capable of delivering I&M data.	No action required.
The device doesn't provide I&M 0 information.	Old device that is not capable of delivering I&M data.	No action required.
The PROFIBUS master configuration has not yet been generated.	The smartLink as C2 Master is not configured with PROFIBUS parameters.	Configure PROFIBUS parameters in the web server and apply the configuration
Set HART IP Settings. Warning 1061: The HART IP Settings have been successfully set. Note: There are warnings.	The smartLink as C2 Master is not configured with PROFIBUS parameters.	Configure PROFIBUS parameters in the web server and apply the configuration.
Set OPC UA Settings. Warning 1061: The HART IP Settings have been successfully set. Note: There are warnings	The smartLink as C2 Master is not configured with PROFIBUS parameters.	Configure PROFIBUS parameters in the web server and apply the configuration.
Set MQTT Settings. Warning 1061: The HART IP Settings have been successfully set. Note: There are warnings	The smartLink as C2 Master is not configured with PROFIBUS parameters.	Configure PROFIBUS parameters in the web server and apply the configuration.

Status	Possible Cause	Solution/Required Action
The master station address is occupied by another station.	The smartLink as C2 Master configured with an address which is used by a different slave in the PROFIBUS network.	Assign an unused PROFIBUS address to smartLink (0 or 2 recommended).
Bus disturbance detected.	The smartLink has detected a bus disturbance in the PROFIBUS network.	Check for any physical disturbance in the network or any remote IO causing this issue.

6 Declaration of conformity

This device is compliant with EC directive 2014/30/EG, "Electromagnetic Compatibility" (EMC directive) and meets the following requirements:

- EN 55011 Industrial, scientific and medical (ISM) devices - radio disturbance - limits and methods of measurement
- EN 55032 Electromagnetic compatibility of multimedia equipment (MME) and interference emission
- EN 61000-6-4 Electromagnetic compatibility (EMC); Part 6-4: generic standard – emission for industrial environments
- EN 61000-6-2 Electromagnetic compatibility (EMC); Part 6-2: generic standard - immunity for industrial environments

Note
To fulfill the EMC requirements, the other components of your installation (DC adapter, Industrial Ethernet devices, etc.) also have to meet the EMC requirements. A shielded cable must be used. In addition, the cable shield must be grounded properly.

CAUTION
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures!

CE
The CE marking indicates conformity with the above standards in a Declaration of Conformity which can be requested from Softing Industrial Automation GmbH.

RoHS
This product is compliant the Restriction of Hazardous Substances under Directive 2002/95/EC.

FCC
This equipment has been tested and found to comply with the limits for a Class A digital device, under part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

VCCI
This Class A product conforms to the regulations of Voluntary Control Council for Interference (VCCI) by Information Technology Equipment.

WEEE
Electrical and electronic equipment must be disposed of separately from normal waste at the end of its operational lifetime in compliance with Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC. Packaging material and worn components shall be disposed of according to the regulations applicable in the country of installation.

7 Glossary

Abbreviations	Definition
AMS	Asset Management System is the process of operating and maintaining physical network infrastructure assets (devices and components).
DHCP	Dynamic Host Configuration Protocol
DIN	Deutsches Institut für Normung
DTM	Device Type Manager
DP	Decentralized Peripherals
ETH	Ethernet
Ex	Explosion protection
FDT	Field Device Tool
GND	Ground
GSD	General Station Description (a file containing the manufacturer's device data base)
HART®	Highway Addressable Remote Transducer: HART® is a bi-directional communication protocol used in many factory automation and control systems providing data access between intelligent field instruments and host systems.
HART-IP	Refers to HART at Ethernet speed. The FieldComm Group developed HART-IP to allow users to take advantage of available Ethernet infrastructure at Level 2 and Level 3 of the plant network.
HTTPS	Hypertext Transfer Protocol Secure
I/O	Input/Output
IP	Internet Protocol
IIoT	Industrial Internet of Things
MQTT	Message Queuing Telemetry Transport
NTP	Network Protocol Time
OPC UA	Open Platform Communications Unified Architecture
PA	Process Automation
PB	PROFIBUS
PLC	Programmable Logic Controller
RDL	Redundancy Link
RIO	Remote Input/Output unit
RPP	Reverse Polarity Protection 17
SSDP	Simple Service Discovery Protocol
T	Temperature
TCP	Transmission Control Protocol
URL	Uniform Resource Locator: a unique identifier of a resource which can be located on the Internet (also referred to as web address).

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