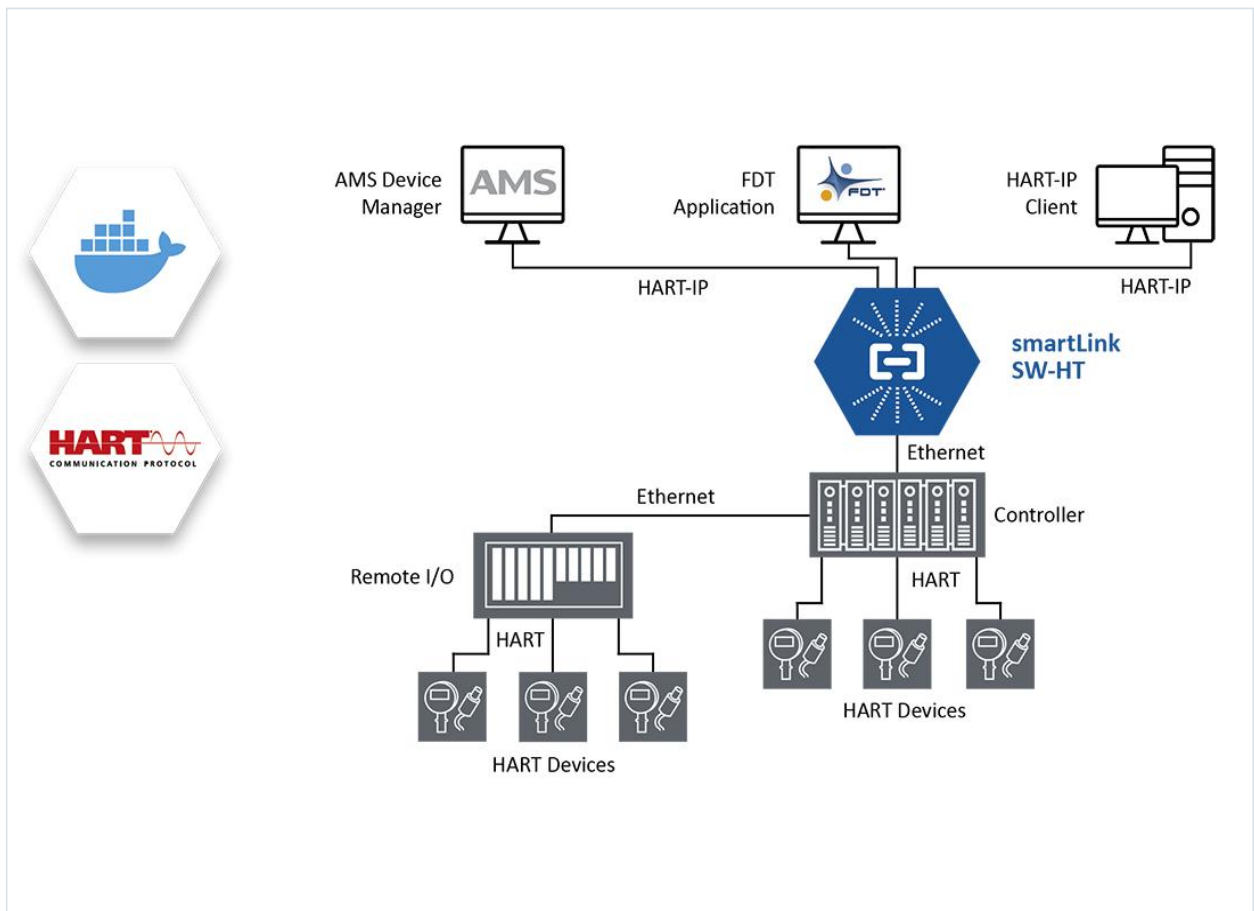**softing**

User Guide

smartLink SW-HT

Disclaimer of liability

The information contained in these instructions corresponds to the technical status at the time of printing of it and is passed on with the best of our knowledge. Softing does not warrant that this document is error free. The information in these instructions is in no event a basis for warranty claims or contractual agreements concerning the described products, and may especially not be deemed as warranty concerning the quality and durability pursuant to Sec. 443 German Civil Code. We reserve the right to make any alterations or improvements to these instructions without prior notice. The actual design of products may deviate from the information contained in the instructions if technical alterations and product improvements so require.

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OpenSource

To comply with international software licensing terms, we offer the source files of open source software used in our products. For details see https://opensource.softing.com/

If you are interested in our source modifications and sources used, please contact: info@softing.com

Scan the QR code to find the latest documentation on the product web page under Downloads.

Table of Contents

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. Any person using a smartLink SW-HT must 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

The CAUTION symbol 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.

Video

This symbol draws attention to a tutorial video on the corresponding topic.

1.4 Document history

Document version	Changes since last version
1.00	▪ first version
1.10	▪ general update to describe new features including HART-RIOs configuration and support for Allen-Bradley controller and devices
1.11	▪ HART communication for HART-IP requests over internal created HART requests prioritized ▪ CIP Path addressing to include ControlNet path added ▪ Bug fixes
1.12	▪ Support for Allen-Bradley 1715 Redundant I/O ▪ Support for additional HART modules for the 1756 ControlLogix controller, 1734 Point I/O and 1719 Ex-I/O ▪ Bug fixes
1.12-1	▪ Section VM usage scenarios□[11] added. Minor editorial changes.
1.20	▪ Support for R.Stahl IS1+ Remote IOs ▪ Bug Fixes
1.30	▪ Support for Siemens ET 200 Remote IOs added.
1.40	▪ Support for Siemens ET 200iSP remote I/Os and HART modules ▪ ET200SP HA AQ 4xI 2-/4-Wire HART ISOL ▪ Support for Turck excom remote I/Os and HART modules ▪ Support for additional HART modules for the Siemens ET 200SP HA remote I/O
1.41	▪ Support for additional modules for Siemens ET 200iSP, ET 200M and ET 200SP HA ▪ Support for R.STAHL remote I/O type 9441

1.5 Related documentation

The following links direct you to additional product information and descriptive videos.

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.

If you prefer to write your feedback directly as an email, please include the following information with your comments:

▪ document name

▪ document version (as shown on cover page)

▪ page number

2 About smartLink SW-HT

smartLink SW-HT is a software multiplexer providing access to HART communication systems and HART devices without the need for additional hardware.

2.1 Intended use

The smartLink SW-HT is designed to be used as a secure access point to HART devices. Any other use is deemed non-intended use.

2.2 Features and benefits

The smartLink SW-HT software multiplexer comes with the following features and benefits:

- simple and fast access to HART field devices connected to Allen-Bradley, Schneider Electric, R.Stahl or Siemens HART IO modules
- remote asset management, device configuration and monitoring
- transparent HART communication over open HART-IP protocol
- no additional hardware required
- easy deployment on Windows workstation
- high scalability based on the number of HART devices to access

2.3 System requirements

To parametrize HART devices with your smartLink SW-HT you will need an asset management system such as Emerson AMS Device Manager.

2.4 Technical data

Supported Controllers and Remote IOs	**Allen-Bradley:** 1715 Redundant I/O, 1719 Ex I/O, 1734 Point I/O, 1756 ControlLogix, 5580, 5570 and older series, 5094 Flex 5000 I/O **R.Stahl:** IS1+ Ex Zone 1 (9442/32-10-00, 9441/12-00-00) and Ex Zone 2 (9442/35-10-00) IS1+ Ex Zone 1 (9441/12-00-00) **Schneider Electric:** M580 controller or X80 EIO Drop adapter (BMECRA31210) **Siemens:** ET 200iSP: PROFINET IM152-1PN 6ES7152-1BA00-0AB0 (redundant) ET 200SP: PROFINET IM155-6PN (High Feature) 6ES7155-6AU01-0CN0 ET 200SP HA: PROFINET IM155-6PN 6DL1155-6AU00-0PM0 (redundant) ET 200M: PROFINET IM153-4 PN (High Feature) 6ES7153-4BA00-0XB0 **Turck:** excom GEN-3G (100004545) and GEN-N (100000129)
Supported HART IO Modules	**Allen-Bradley:** 1715 Redundant I/O: 1715-IF16, 1715-OF8I, 1719 Ex-I/O: 1719-IF4HB, 1719-CF4H, 1734 Point I/O: 1734sc-IE2CH, 1734sc-IE4CH, 1734sc-OE2CIH, 1756 ControlLogix: 1756-IF8H, 1756-IF16H, 1756-IF8IH, 1756-IF16IH, 1756-OF8IH, 1756-OF8H, 5094 Flex 5000 I/O: 5094-IF8IH, 5094-OF8IH **R.Stahl:** 9461/12-08-11, 9466/12-08-11, 9468/32-08-10, 9468/32-08-11, 9468/33-08-10, 9469/35-08-12 **Schneider Electric:** M580: BMEAHI0812 and BMEAHO0412 **Siemens:** ET 200iSP: 6ES7134-7TD00-0AB0, 6ES7134-7TD50-0AB0, 6ES7135-7TD00-0AB0, 6ES7138-7FA00-0AB0,6ES7138-7FA00-0AB0 ET 200SP: 6ES7134-6TD00-0CA1, 6ES7135-6TD00-0CA1 ET 200SP HA: 6DL1134-6TH00-0PH1, 6DL1135-6TF00-0PH1, 6DL1134-6UD00-0PK0, 6DL1135-6UD00-0PK0, 6DL1136-6AA00-0PH1, 6DL1136-6AA00-0PH1 with optional module redundancy ET 200M: 6ES7331-7TF01-0AB0, 6ES7332-8TF01-0AB0, 6ES7331-7TB10-0AB0, 6ES7332-5TB10-0AB0, 6ES7336-4GE00-0AB0, 6ES7336-4GE00-0AB0 **Turck:** AIH401EX, AOH401EX, AIH401-N, AOH401-N
Supported HART-IP Client Applications	Emerson AMS Device Manager >= V14 Softing smartLink DTM >= V1.10
Communication Protocols	HART-IP
Tested with:	Emerson AMS Device Manager V14.1.1, V14.5 (HART-IP application) Docker (Docker runtime environments) PACTware (FDT application) Endress + Hauser FieldCare (FDT application)
Minimum Hardware Requirements	Docker Container: 200 MB free disk space, 500 MB RAM Virtual Machine: VMware 3 GB free disk space, 2 GB RAM Hyper-V 5 GB free disk space, 2 GB RAM
Licensing	Node locked license for Docker container.

3 Installation

The smartLink SW-HT product can be installed in two ways. You can either use the virtual machine images for download from the [product website](#) or install the Docker image directly on a Docker enabled system.

3.1 Network architectures

This Section describes the use of smartLink SW-HT in different network architectures.

Above the controller
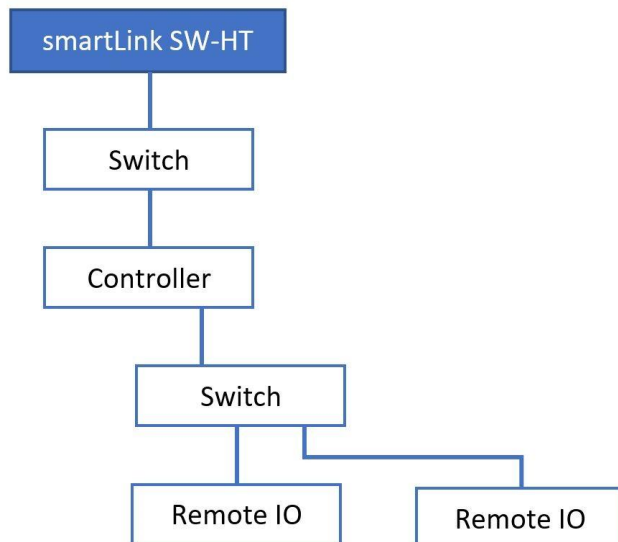
In this scenario, the smartLink SW-HT is connected to the network above the controller.

For this setup, only controllers from Allen-Bradley and Schneider Electric can be used in combination with their proprietary remote IOs. Siemens and R.Stahl remote IOs are not supported. The advantage of this architecture is that smartLink SW-HT is not part of the control network between controller and remote IOs. This allows for a clearer separation between the control and asset management which is represented by the smartLink SW-HT.

Below the controller
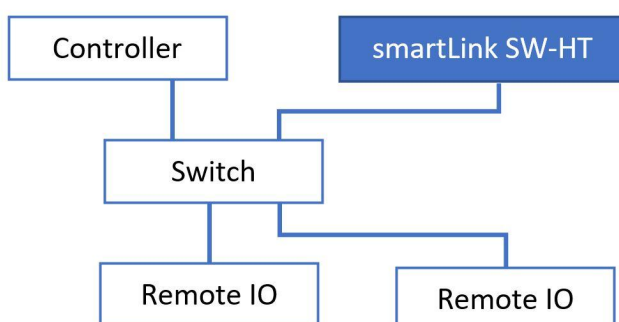
The smartLink SW-HT is connected to the control network below the controller and has direct access to the remote IOs. This direct access is needed to connect to the Siemens and R.Stahl remote IO. This setup is suited for all supported controllers and remote IOs.

3.2 Docker container

The smartLink SW-HT docker image is available on Docker Hub
(https://hub.docker.com/r/softingindustrial/smartlink-sw-ht) or as download from the product website.

You can pull the image from Docker Hub with the following command:

```
docker pull softingindustrial/smartlink-sw-ht
```

To create and configure Docker container you can use the following commands:

```
mkdir –p /var/lib/smartLinkSW-HT
docker create --name smartlink-sw-ht -p 80:80 -p 443:443 -p 5094:5094 –p
49152:49152/udp -p 49154:49154/udp -v /var/lib/smartLinkSW-
HT:/var/lib/smartLinkSW-HT --restart=always softingindustrial/smartlink-sw-
ht
```

The following ports are used by smartLink SW-HT:

Port	Service
80	HTTP Web Server
443	HTTPS Web Server
5094	HART-IP Server
49152	PROFINET Controller (UDP)
49154	PROFINET Supervisor (UDP)

These ports are mapped in the docker create call above 1:1 to the ports of the host system. Of course, you can map them to different ports on the host system by changing the first number on the -p option (example: -p 1443:443).

To disable HTTP or HTTPS you can call the docker create call without a port mapping for port 80 or 443. But please note that you need access to the Web server to configure the smartLink SW-HT.

smartLink SW-HT creates outgoing TCP connections to the controller or remote I/O devices using the default EtherNet/IP port 44818 (Schneider/Allen-Bradley), the default PROFINET ports 49152/49154 (Siemens), ports 50000/50001 (R.Stahl) and port 58554 (Turck).

The directory */var/lib/smartLinkSW-HT* is used to persist the configuration of the smartLink SW-HT container. Of course, you can store it in a different folder on the host system by changing the first folder on the -v option (example: *-v /home/xxx/sl:/var/lib/smartLinkSW-HT*).

If you have more than one network card, the communication with the ET200 RIOs has to be assigned to a network card. You must add the environment variable *PNS_INTERFACE_NAME* with the name of the interface (example: *-e PNS_INTERFACE_NAME='ens192'*).

The option –restart=always will start the container on the startup of the system or restart it on failure. With the following command you can start the container:

```
docker start smartlink-sw-ht
```

With the following command you can stop the container:

```
docker stop smartlink-sw-ht
```

With the following command you can remove the container:

```
docker rm –f smartlink-sw-ht
```

Please refer the official Docker documentation for more Details on the Docker command line.

3.3 VM usage scenarios

This Section describes typical usage scenarios of the smartLink SW-HT virtual machine.

NAT on HART-IP client machine

This is the default installation for most use cases. The VM is installed on the machine running the HART-IP client (e.g. Emerson AMS Device Manager). Using a NAT network configuration, the smartLink SW-HT software in the VM can connect to all Ethernet networks which are available on the Windows host machine. However, the HART IP server of smartLink SW-HT is only available to software running on the Windows host machine like the HART-IP client. This increases the security of the installation as the smartLink SW-HT interfaces are only available locally on the Windows host machine.
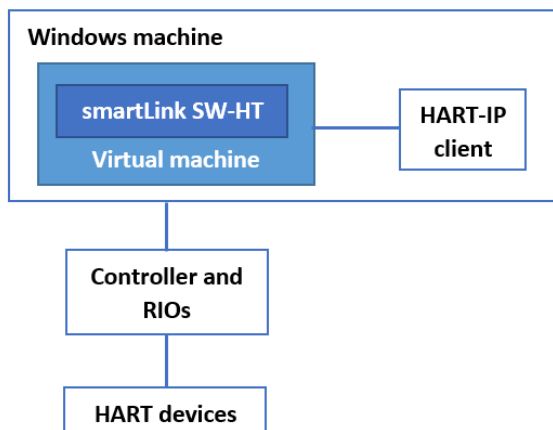
NAT for Siemens RIOs

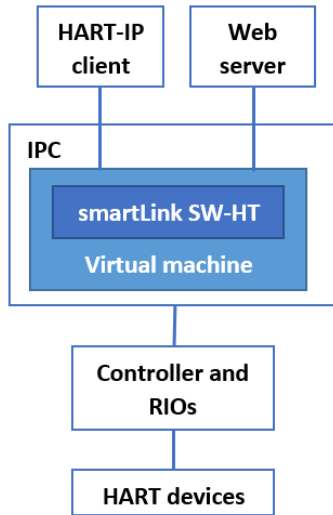You may need to adjust the firewall to use the smartLink SW-HT virtual machine with NAT for a Siemens RIO.

> **Note**
>
> The communication with the Siemens RIOs uses UDP traffic which may be blocked by the firewall.

Bridged on an IPC

A bridged network installation is required if the HART-IP server interface of the smartLink SW-HT has to be accessible from multiple machines in the network. The VM in that installation has an IP address which is accessible from the connected network.

```
┌──────────┐  ┌──────────┐
│ HART-IP  │  │   Web    │
│  client  │  │  server  │
└────┬─────┘  └────┬─────┘
┌────┼────────────┼─────────┐
│ IPC│            │         │
│ ┌──┴────────────┴──────┐  │
│ │   smartLink SW-HT    │  │
│ │                      │  │
│ │   Virtual machine    │  │
│ └──────────┬───────────┘  │
└────────────┼──────────────┘
      ┌──────┴───────┐
      │ Controller and│
      │     RIOs      │
      └──────┬───────┘
      ┌──────┴───────┐
      │ HART devices │
      └──────────────┘
```

Note

For security reasons it is recommended to disable with this installation the HTTP interface of the VM administration GUI and of smartLink SW-HT.
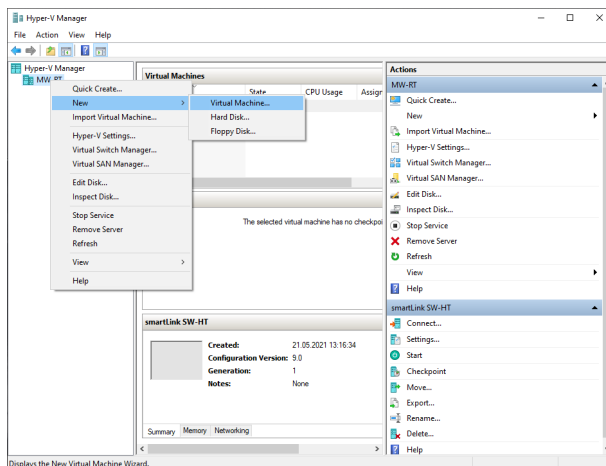
3.4 Virtual machine image

This Section describes the installation with VMware Workstation Pro, VMware Player, VMware ESXi and Hyper-V for Windows 10 Professional. The Virtual machine images should only be used if you run smartLink SW-HT on a Windows machine.

3.4.1 Hyper-V

If you are using Windows 10 Professional or another version of Windows follow these steps to install Hyper-V**:**

1. Create the **folder smartLink SW-HT** in the directory *This PC\Documents\Hyper-V\Virtual Hard Disks*.

2. Download the *smartLink_SW-HT_HyperV_V1.41.zip* file from the [product website](#) and save it in the created folder.

3. Unzip the file to the folder and delete the zip file.

4. Start the Hyper-V Manager application.

5. Select the **Action → New → Virtual Machine**.

6. Enter smartLink SW-HT as the name of your virtual machine.

7. Select the location where you want to store the VM and click **[Next]**.
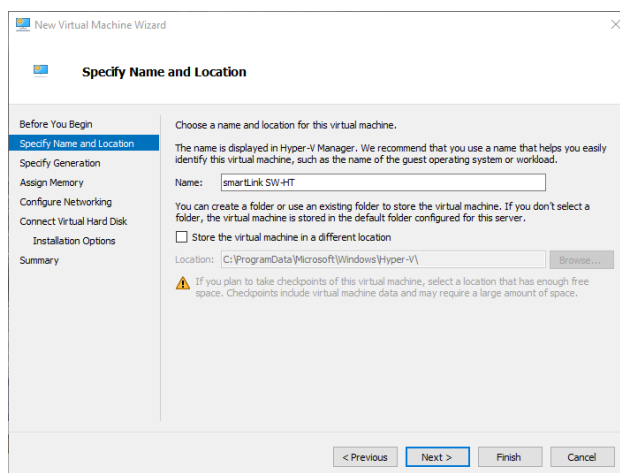
8. Choose **Generation 1** and click **[Next]**.

9. Enter **2048 MB** in the **Startup memory** input field, disable **Use dynamic memory** and click **[Next]**.

10. Choose **Default Switch** from the **Connection** dropdown and click **[Next]**.

11. Select the radio button **Use an existing hard disk** and **[Browse]** to the location of the extracted **Debian.vhdx** file an click **[Finish].**

Now you are ready to start the virtual machine and use smartLink SW-HT. If you want to access the Linux console you have to connect to the virtual machine by selecting **Connect**… in the Action menu.

3.4.2   VMware Workstation / Player

Note

smartLink SW-HT supports only V10 or later of VMware Workstation Pro and VMware Player.

1. Create the folder *smartLink SW-HT* in the directory *This PC\Documents\Virtual Machines*.

2. Download the the latest software version contained in the *smartLink_SW-HT_VMwareV1.41.zip* file from the Softing download area and store it in the created folder.

3. Unzip the contents of the zip file to the folder.
    Then delete the zip file.

4. Start the VMware Workstation Pro or VMware Workstation Player application.
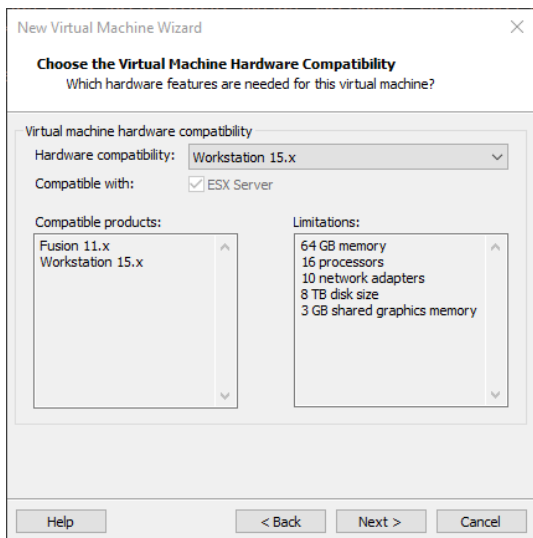
Workstation Pro

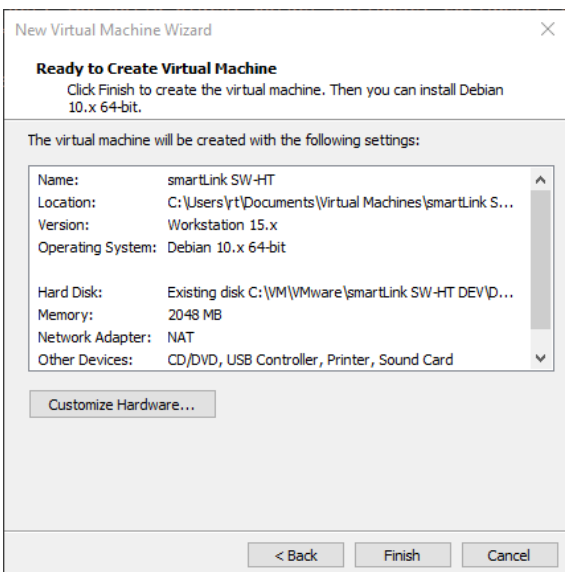If you are using **Workstation Pro:**

1. Select **File → New Virtual Machine**.

2. Select **Custom (advanced)** and click **[Next]**.
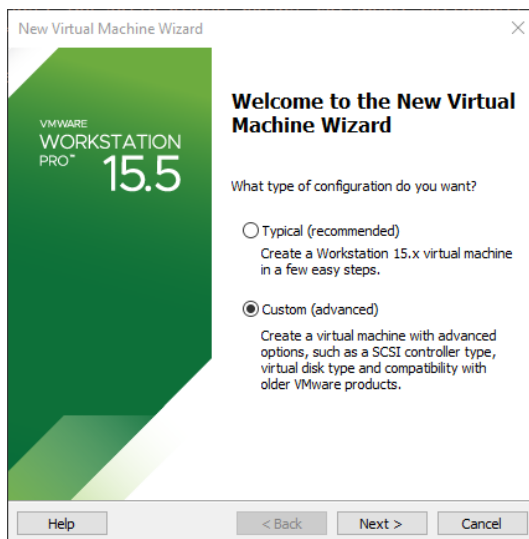
3. Select the hardware compatibility and click **[Next]**.

4.   Select the Guest Operating System Installation and accept the option **I will install the operating system later**.

5.   Select **Linux → Debian 10.x 64-bit** as your guest operating system.
     If you cannot select the Debian 10 take the highest Debian number with 64 bit.

6.   Enter the smartLink SW-HT as the name of your virtual machine and click **[Next]**.

7.   Enter **1** for **Number of Processors**, and **1** for **Number of cores per processor** and click **[Next]**.

8.   Enter **2048 MB** for **Memory for this virtual machine**.

9.   Select **Use network address translation (NAT) → LSI Logic → SCSI** in the next three setup wizards.

10. Select **Use an existing virtual disk** in the Select a disk window.

11. Select the extracted **Debian.vmdk** file in the Select a disk window.

12. Check the summary of your settings and click **[Finish]** if you want set up a virtual machine based on these entries.
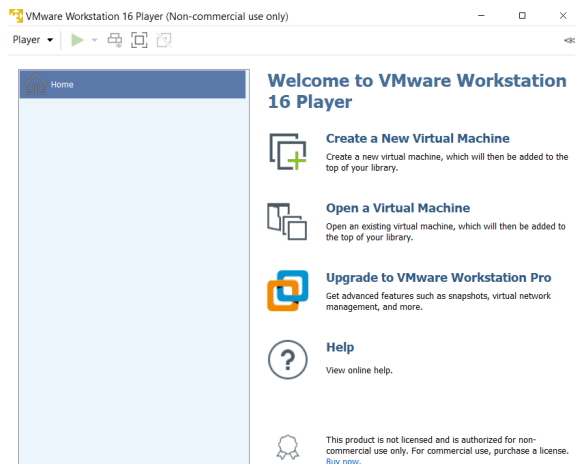
Workstation Player

If you are using **Workstation 16 Player:**

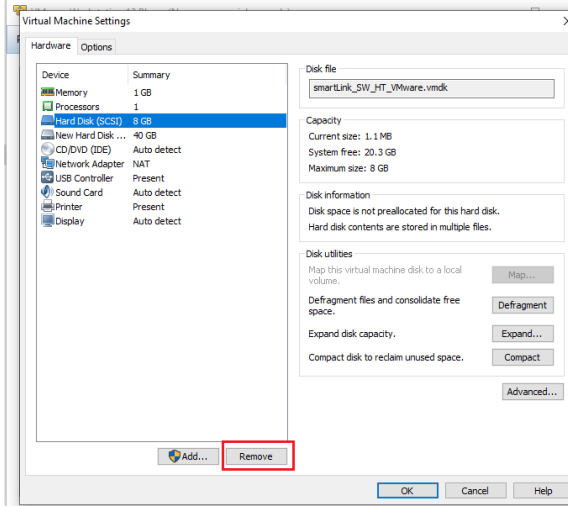1. Select **Create a New Virtual Machine**.

2. Choose **I will install the operating system later** and click **[Next]**.

3. Select **Linux → Other Linux 5.x kernel 64-bit**.
    If you cannot select version 5.x take the highest number with 64 bit and click **[Next]**.

4. Enter the smartLink SW-HT as the name of your virtual machine, select the path where the smartLink SW-HT .vmdk file is located and click **[Next]**.

5. Enter 20 GB as the **maximum disk size** and select **Store virtual disk as a single file**.

6. Check the summary of your settings and click **[Finish]** if you want set up a virtual machine based on these entries.
    The newly created virtual machine opens.

    Select **Edit virtual machine settings**.
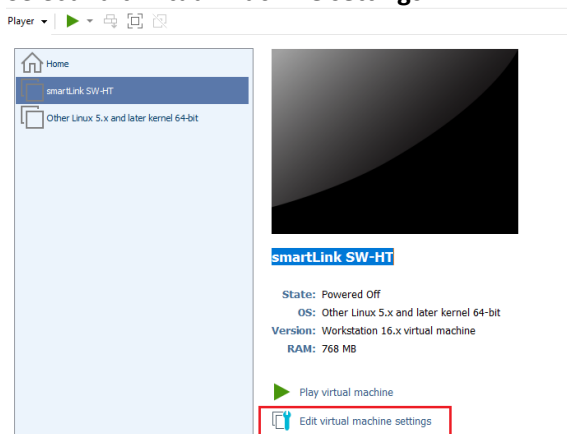
7. Click **[Add..]** in the Add Hardware wizard.

8. Select **Hard Disk → SCSI → Use an existing virtual disk → Browse**.

9. Select the extracted **Debian.vmdk** file and click **[Finish]**.

10. After linking to the smartLink SW-HT virtual hard disk remove the default hard disk.

	Note
	Now you are ready to power on the virtual machine and use smartLink SW-HT.

3.4.3 VMware ESXi

1. Connect to the administration web page of your ESXi server.

2. Select the **Storage** menu in the navigator and open the **Datastores** tab.

3. Create a directory named *smartLink SW-HT* for one of your datastores and a *temp* sub-directory in your smartLink SW-HT.
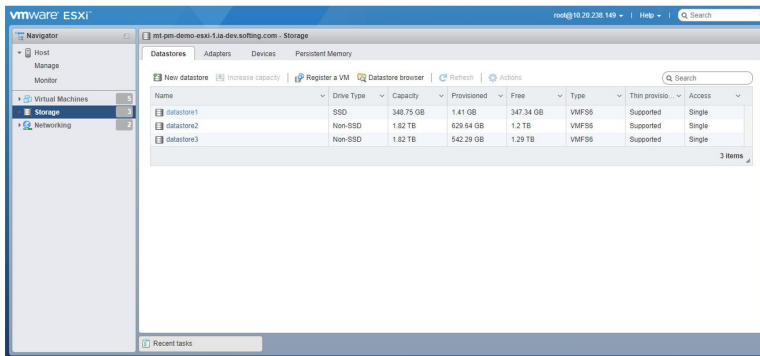
4. Download the latest software version contained in the *smartLink_SW-HT_VMwareV1.41.zip* file from the Softing download page and upload the contained *.vdmk* files to the created folder.

5. Select the *Debian.vmdk* file in the *temp* folder and right-click your mouse to copy and paste it to the *smartLink SW-HT* folder.

> **ℹ Note**
>
> This copy action in the Datastore browser is needed to convert the disk file to the correct format.

6. Select the *temp* folder and right-click to delete it.
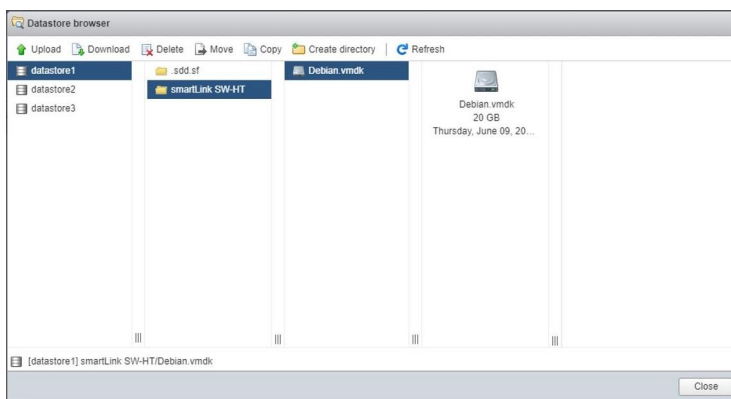
7. Select the *Host* menu in the navigator and click **[Create/Register VM]** to create the virtual machine.
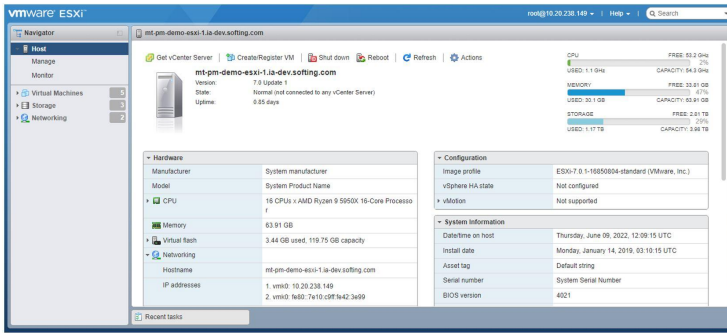
8. Select **[Create a new virtual machine]** and click **[Next]**.
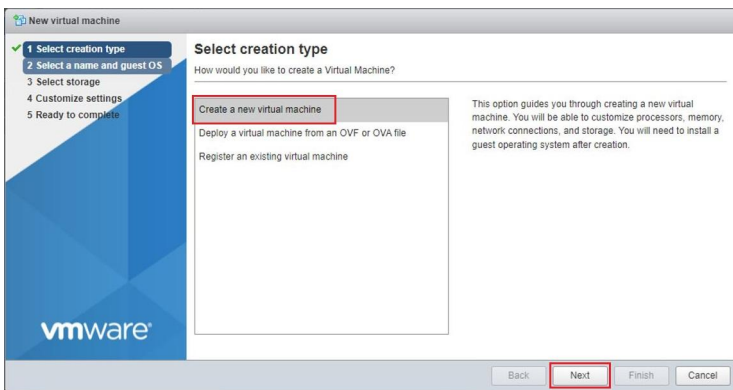
9. Insert *smartLink SW-HT* as name, select **Linux** and **Debian GNU/Linux 9 (64-bit)** in the dropdown menus and press **[Next]**.
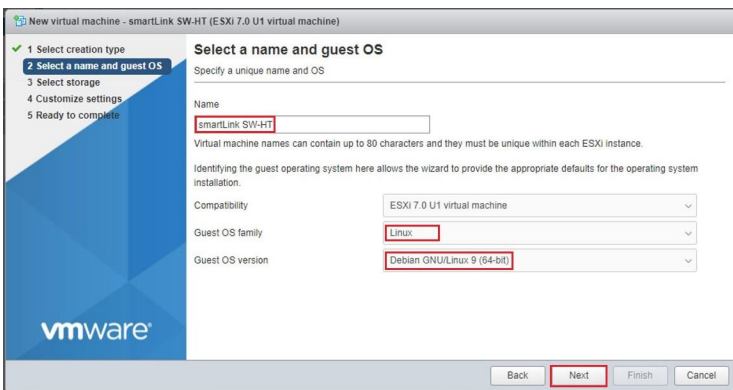
10. Select the datastore to which you copied the disk files previously and click **[Next]**.
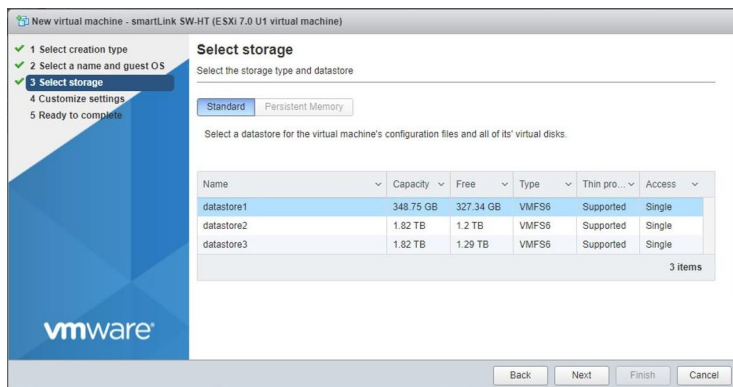
11. Press the ⊗ icon to remove **Hard disk 1**.
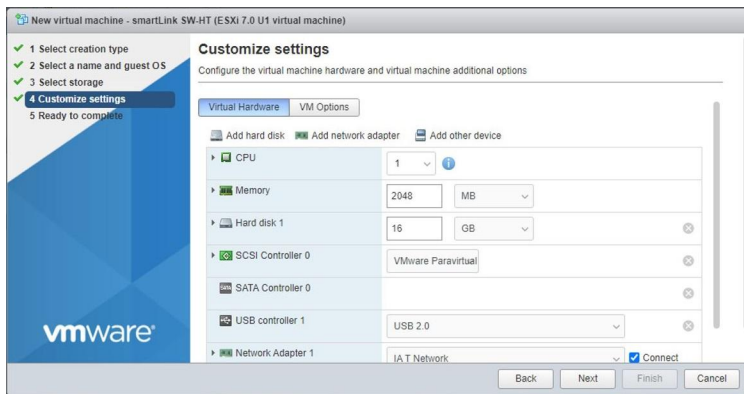
12. Select **Add hard disk → Existing hard disk** and select the copied *Debian.vmdk* in the datastore browser dialog.
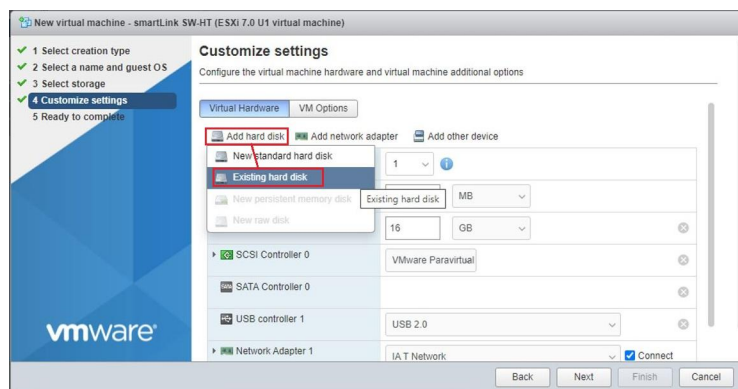
13. Now you have the **New Hard disk** in the settings. Ensure that the **Controller location** is set to **SCSI (0:0)**.
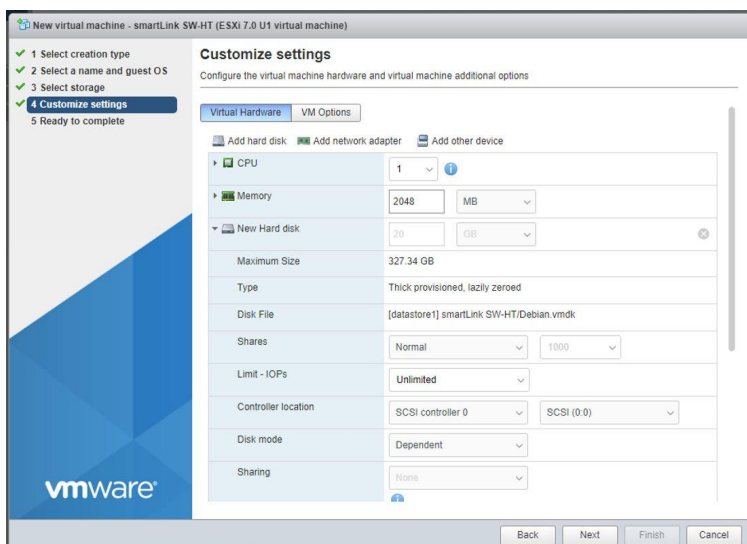
14. Press **[Next]** and **[Finish]** to complete the installation.

3.4.4   Good to know

- **After VM import**
  After the import of the VM you should change the default passwords and the host name in the user interface of the virtual machine.

Default User	Default Password
root	Softing1!
softing	Softing1!

- **Finding the hostname or IP address of your smartLink SW-HT**
  The IP address and hostname are printed in the Linux console window on startup. If you installed the Hyper-V VM and are using the Default Switch you can use the hostname *smartlink-sw-ht.mshome.net* to access the IP interfaces of smartLink SW-HT.

- **Accessing smartLink SW-HT outside of the VM host**
  To get access to the interfaces of smartLink SW-HT from outside the host running the VM you must change the network type of the VM.

  VMware
 Change the network connection in the Network Adapter settings to **Bridged**.

  Hyper-V
  Create a new virtual switch which is connected to an external network. Change the virtual switch in the Network Adapter settings to this switch.

- **Adding a second network card**
  To add a second network card you first have to add it to the VM in the settings of VMware or Hyper-V and connect it to the correct network. In addition, you must configure the network settings in the user interface of the virtual machine.

- **Starting smartLink SW-HT with Windows system**

  Hyper-V
  Select *Always start this virtual machine automatically* in the *Automatic Start Action* of the virtual machine settings.

4 Configuration

smartLink SW-HT comes with an integrated web server which is used to configure the software.
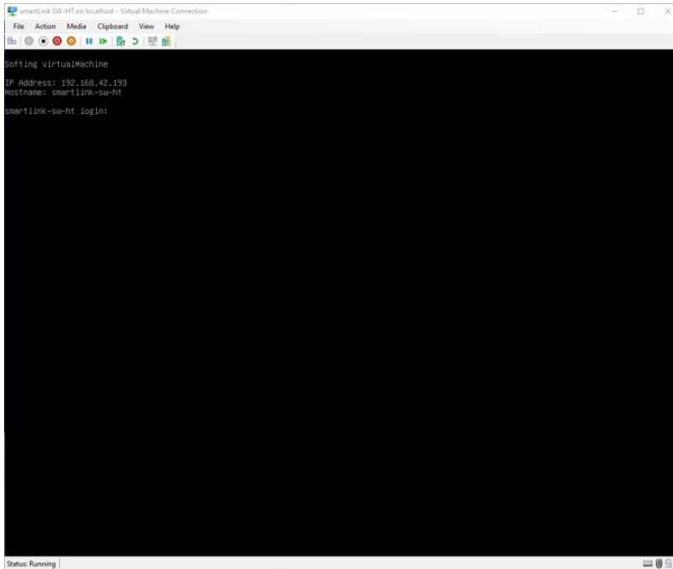
4.1 Prerequisites

- smartLink SW-HT is connected to the supported Allen-Bradley, Siemens, Schneider Electric, R.Stahl or Turck automation equipment.

- smartLink SW-HT is connected with a PC which runs a Chrome, Edge or Firefox browser supporting JavaScript.

4.2 smartLink SW-HT user interface

1. Open your Internet browser and enter the IP address of the smartLink SW-HT.

   Note
   If you are using VM images and you can't recall the IP address, open the VM console window to get the IP address.

2. Enter **administrator** in the user field and enter **SLadmin!1** in the password field.

   The web-based interface opens with the information page.

4.2.1 General functions

All interface windows display these functions:

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

Auto logout
This default setting logs out the current user from the web server if it has been inactive for 10 minutes.

4.2.2 Information

The **Information** window shows product-related information. See the pages **System**, **License** and **About** for details.

4.2.2.1 System

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

Parameter	Meaning
Software Version	Version number of the software
System ID	Device model
Host ID	This is the ID you will need to request a licence.

4.2.2.2 License

Select **Information → License** to view the licenses used by the gateway firmware under an open source license.

4.2.2.3 About

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

4.2.3 Settings

4.2.3.1 User accounts

In this section you will learn how to change accounts and passwords.

1. Select **Settings → User Accounts**.
    As **administrator** you can create and delete user accounts and also change passwords.

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

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	Maintenance	Observer
Create and delete accounts	☑		
Change all passwords	☑		
Change own password	☑	☑	☑
Configuring gateway	☑	☑	
Reading configuration	☑	☑	☑
Reading diagnostics	☑	☑	☑

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 SW-HT.

4.2.3.2 HTTPS

If you access the device on an HTTPS connection, make sure a trusted certificate is used. You can check easily if the IP address of your gateway is secured by a certificate. Most web browsers typically display a padlock icon in the address bar to indicate that a secured HTTP connection is used. Click on the icon to find out which type of security and certificate is used.

Note

You need to be logged in as [administrator][25] to change the HTTPS settings.

Parameter	Meaning
Choose private key file…	Install the private key file, containing the private key, generated simultaneously with the certificate signing request.
Choose server certificate file…	Install the server certificate file.
Choose Intermediate Certificate Files…	Optional for installing necessary intermediate certificate files.
Apply	Click button to activate your settings.

Note

If you change the settings you must restart the gateway.

Note

If you are experiencing problems with certificates, please update your web browser first with the most recent version before contacting Softing support.

Note

As your web browser might use cached data, please refresh the browser after rebooting the gateway.

Generating a self-signed certificate

To generate a self-signed certificate for the HTTPS server login to the console of the VM follow these steps:

1. **Enter** ./generate-HTTPS-cert.sh

2. **Restart** the VM by entering: systemctl reboot

3. **Open** the Chrome browser and connect to the URL *https://<IP address of the VM>*.
   A security exception is shown in the browser.

4. **Save** the certificate as a file and install the certificate file in the Trusted Root Certification Authorities store of your Windows Explorer. Next time you restart the browser and open the URL you will be able to connect without an exception.

4.2.3.3 Licensing

A license is needed for each HART device to which you wish to connect. It is tied to the host ID of your Docker container and cannot be migrated to another instance of the smartLink SW-HT.

If your smartLink SW-HT has no license or you wish to connect to more HART devices than you have licenses available, please contact Softing Support.

Note

If you are installing a new Virtual Machine (VM) or you are moving your VM to another workstation, the existing smartPlus HT license will expire.

How to register 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 page.

2. Click **[Register License]**.

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. Paste the host ID you into the Host ID field of the My Softing page.

5. Click **[Register License]**.
   A license file is generated.

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

How Emerson customers can register a license

Send an email with the following details to Emerson Support at: emailregistrationsystems@emerson.com

- Your customer information

- System ID of AMS installation.

- HOST ID of your smartLink SW-HT. Select **Information** → **System** in the user interface for details.
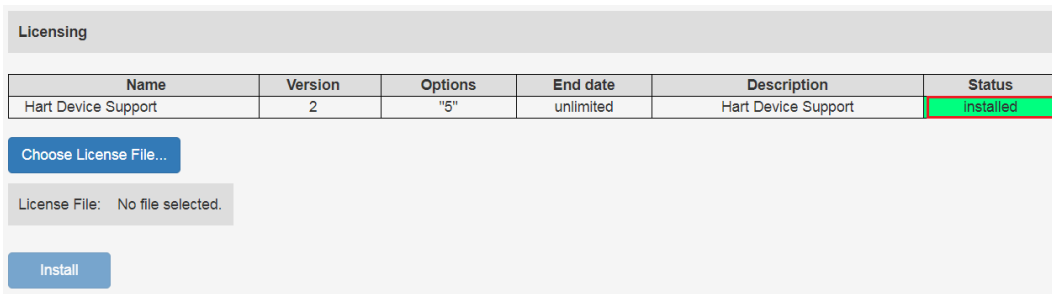
How to install a license

1. Select **Settings → Licensing** in the side bar navigation.
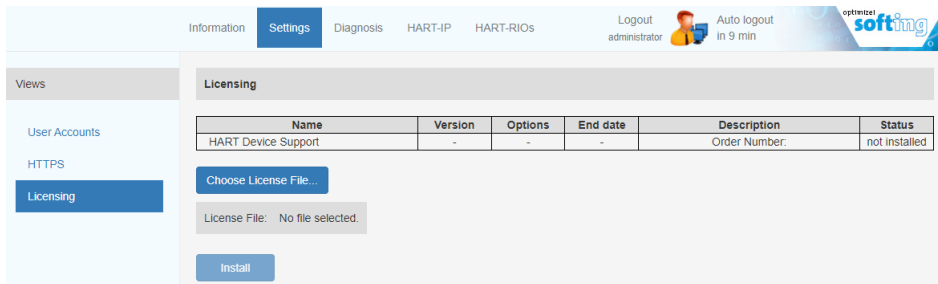
2. Click the **[Choose License File**] button.
   Windows Explorer will open.

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.

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

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 display the order number for a license for this specific gateway.
Status	Licenses are granted to HART devices "on-the-fly". Before a license is installed, the field displays "not installed". When a license has been granted the Status field changes green and reads "installed".

4.2.4 Diagnosis

4.2.4.1 Settings

Select **Diagnosis → Settings** to view and adapt the settings of the smartLink SW-HT logging feature. The settings can be viewed in any role. To change the settings you must have administration rights.

Parameter	Meaning
Log File Priority	Available values: Emergency, Alert, Critical, Error, Warning, Notice, Information, Debug. All messages with the set priority or higher are logged. The log file is 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 additional debug logging and sends the information to the IP address defined in the Syslog Server. Can be logged with wireshark, Visual Syslog Server or similar.
Syslog Server	IP address to where syslog messages are sent.
Apply	Click button to activate your settings.

4.2.4.2   Log File

Select **Diagnosis → Log File** to view the log file or to create support data in case you are facing problems. You can also filter the log file by ticking and unticking the checkboxes of the different priorities. This only affects the display of the log file and not the setting of the log file priority under **Diagnosis → Settings**.

> **Note**
> If you are facing problems with your smartLink SW-HT, use the button **[Support Data]** to create a support file. The information contained in this file helps Softing Support address and fix potential issues.

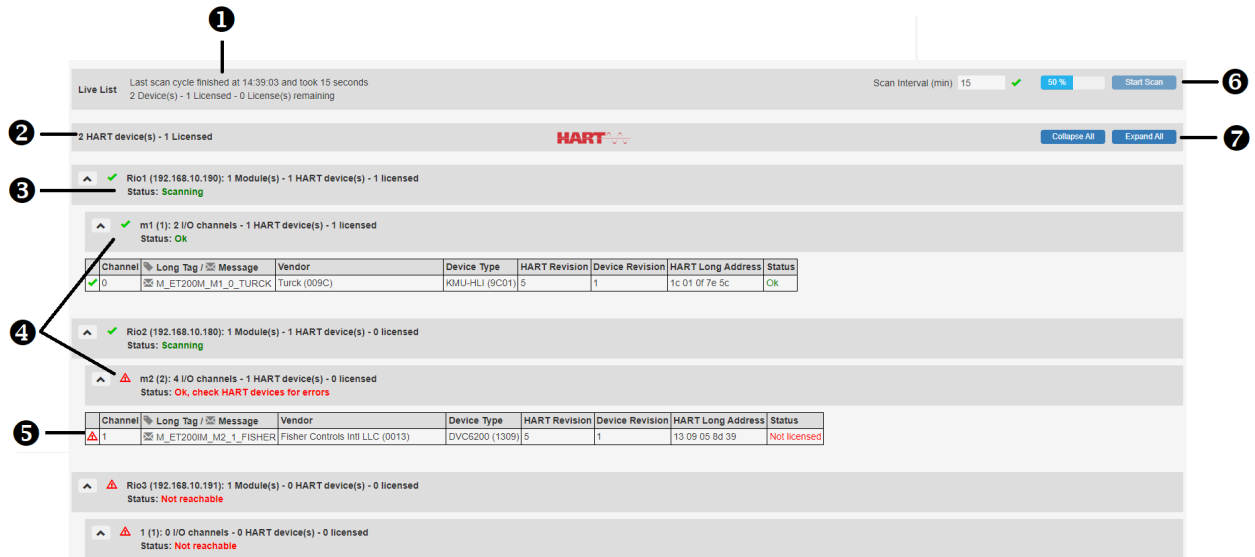| Parameter	Meaning
EMERGENCY; ALERT, CRITICAL, ERROR, WARNING, NOTICE, INFORMATION, DEBUG	Tick the check boxes to set a display filter.
Clear	Click this button to delete the log file entries.
Refresh	Click this button to update the message log entries.
Support Data	Click this button to upload a collection 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 zip file containing all data including the licenses of the device data is created.

3. Open the zip file to find the license key file for this gateway.

4.2.4.3   Live List

Select **Diagnosis → Live List** to see the HART devices connected to HART modules and Remote I/O (RIOs). See the topology diagram on the cover page of this guide for details.

❶	**Results of the last scan**: The general information includes the timestamp and the duration of the last completed scan, the total number of detected and licensed HART devices and the number of remaining licenses.
❷	**HART protocol header**: This area shows the number of detected and licensed HART devices.
❸	**HART protocol RIO header:** This area presents the name and number HART I/O modules and HART devices detected on the network., along with the available HART licenses .
❹	In this area you see the general details of a configured RIO, the name and the number of configured HART I/O modules and detected and licensed HART devices connected to the configured HART I/O modules is shown. With the exception of Schneider Electric RIOs the IP address is shown. In case of redundant RIOs the IP address of the RIO is shown which is currently used for communication. If the communication to both IP addresses fails both IP addresses are shown. The RIOs are sorted alphabetically by configured name. The Status details are explained in a separate table below.
❺	Table containing the detected HART devices. For more details about the information displayed in each column see table below.
❻	**Scan Interval (min)** This field determines the interval cycle time the smartLink SW-HT uses to rescan the configured IO modules for HART devices. **Progress bar** Indicates the progress of the scan process (50% in the example above). **Start Scan** By pressing this button a live list scan is started. The button is disabled, when a scan is running or if you do not have [permissions](#)☐[25] .
❼	**Collapse All** Collapse the live list view to display RIOs only. Modules and HART device panes are hidden but can manually be expanded. **Expand All** Expand the live list view to display all RIOs, modules and HART devices.

The following table explains the content of the different columns of a HART device table:

Table column	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.

Status messages explained

In the areas ❸ and ❹ and in the last table column (see above) you will see a status message.

The following table explains the various status messages. The letters behind the status message in the left column refer to the component for which the message is created by the system: (**R** = RIO, **M** = Module , **D** = HART device)

| Status	Meaning
Scanning (R/M)	A scan has been started to identify connected HART devices.
Not reachable (R/M)	smartLink SW-HT: could not establish a connection to a RIO or module. Possible causes: ▪ Wrong IP address in configuration ▪ Wrong slot number in configuration ▪ RIO or module type is unknown to smartLink SW-HT ▪ Connection issue between smartLink SW-HT to the RIO or module
Remote I/O station type not supported (R)	The identified RIO is not supported. Please verify the configured IP address and check the list of supported RIOs. (see Chapter Technical Data□8)
Redundant Head module (<name>) not reachable (R)	The redundant communication module referenced in the status message is not responding. This issue must be solved to provide redundancy. Possible causes: ▪ Wrong IP address in configuration ▪ Communication module missing or broken ▪ Connection issue between smartLink SW-HT and communication module
I/O module type not supported (M)	The identified module is not supported. Please verify the configured IP address and the list of supported RIOs. (see Chapter Technical Data□8)
Redundant I/O module (<slot number>) not reachable (M)	The redundant HART I/O module referenced in the status message is not responding. This issue must be solved to provide redundancy. Possible causes: ▪ Wrong slot in configuration ▪ HART I/O module missing or broken
CIP Error ... (M)	smartLink SW-HT received an error regarding Ethernet IP / CIP communication. Possible causes: ▪ RIO / module on bridged network cannot be connected or identified (for RIOs and modules connected over a Ethernet bridge module)
Not licensed (D)	Not enough licenses available on smartLink SW-HT. Please contact Softing Sales to acquire additional licenses.
Ok (R/M/D)	▪ RIO or module was successfully scanned. ▪ HART device has been assigned a license

> **Note**
>
> If a HART device is missing from the live list , check wiring of the HART device and check if the channel is enabled for HART communication. For this you have to use the Engineering tool for the respective Remote I/O station type as recommended by its manufacturer.

4.2.5 HART-IP

4.2.5.1 Settings

Select **HART-IP** → **Settings** to view and change the long tag name.

Based on the HART specification, you can use up to 32 ISO Latin 1 characters.
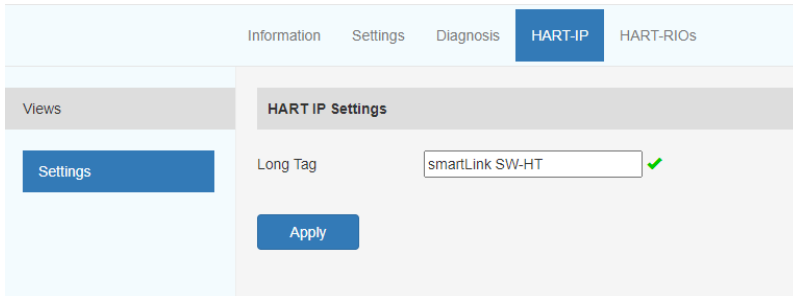
4.2.6 HART-RIOs

4.2.6.1 Schneider Electric

> **Note**
> If you wish to change the configuration of the HART-RIOs you must log on under administrator or maintenance . The user role observer just allows you to view the configuration.

1. Select **HART-RIOs**.

2. Select **Views → Schneider Electric** in the side menu.
   This page allows you to view and change the names and IP addresses of the modules. The maximum number of RIOs is 255. The maximum number of modules per RIO is 254.

   Each RIO is shown by its name and the number of configured modules. RIO names must be unique. All fields must have entries. Incorrect entries are marked with a warning ⚠ icon. To see the related error message move the mouse pointer over the icon.

3. Click **[Apply]** to confirm your changes. Otherwise the changes will be lost when you close the window, select another view or log out.

Parameter	Meaning
Name	Name of the RIO. This value must not be empty and must be unique within the list of RIOs.
Module name	Name of the module. This value must not be empty.
IP Address	IPv4 address

> **Note**
> You must close all DTM connections from the Schneider Electric Control Expert software to the HART modules to be able to connect with the smartLink SW-HT. The modules support only one connection.

4.2.6.2   Allen-Bradley

Note
If you wish to change the configuration of the HART-RIOs you must log on under administrator or maintenance . The user role observer just allows you to view the configuration.

1.   Select **HART-RIOs**.

2.   Select **Views → Allen-Bradley** in the side menu.
This page allows you to view and change the names and IP addresses / IP address paths (CIP Paths) of Allen Bradley Remote IOs (RIOs) as well as the module names and slots. The maximum number of RIOs is 255. The maximum number of modules per RIO is 254.

Each RIO is shown by its name, IP address and the number of configured modules. RIO names and IP addresses must be unique. All fields must have entries. Incorrect entries are marked with a warning ⚠ icon. To see the related error message move the mouse pointer over the icon.

3.   Click **[Apply]** to confirm your changes. Otherwise the changes will be lost when you close the window, select another view or log out.
When the data is applied, the sorting of the page may change. The RIOs are sorted by name, the modules by slot.

CIP Path
The CIP path is built as comma separated value consisting of **IPv4 addresses** and **slot number(s)** of the communication modules: *<ip>[,<slot>,<ip>][,<slot>,<ip>]… like 192.168.1.10,3,145.22.11.37,5,178.22.71.212*

This path is a three level CIP path to the RIO at 178.22.71.212 via the communication module of station 192.168.10.3 at slot 3 and the communication module of station 145.22.11.37 at slot 5.

The CIP path can include ControlNet segments. Instead of *[,<slot>,<ip>]* you can have *[,<slot>, <ControlNet address>] like 192.168.1.10,5,14*. In this case the slot is the slot number of the ControlNet bridge module.

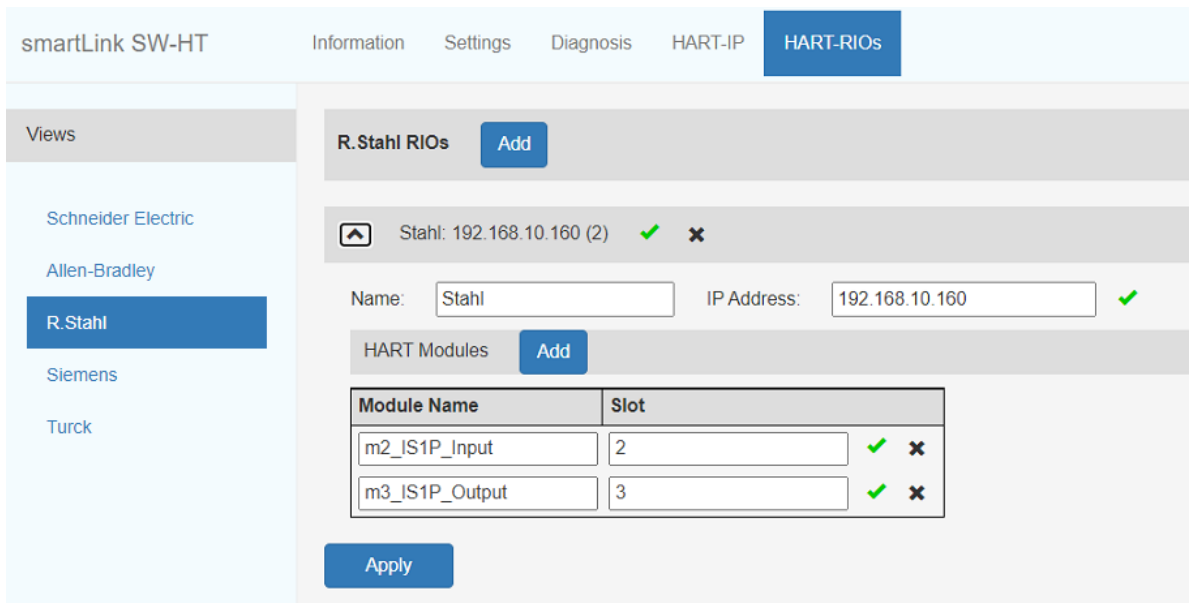| Parameter	Meaning
Name	Name of the RIO. This value must not be empty and must be unique within the list of RIOs.
IP Address Path	IPv4 address of RIO or CIP Path to RIO.
Module name	Name of the module. This value must not be empty.
Slot	Slot number of the module in the range [1..255]. The value must be unique within the modules.

4.2.6.3   R.Stahl

> **Note**
> If you wish to change the configuration of the HART-RIOs you must log on under administrator or maintenance. The user role observer just allows you to view the configuration.

1. Select **HART-RIOs**.

2. Select **Views → R.Stahl** in the side menu.
    This page allows you to view and change the names and IP addresses of R.Stahl Remote IOs (RIOs) as well as the module names and slots. The maximum number of RIOs is 255. The maximum number of modules per RIO is 254.

    Each RIO is shown by its name, IP address and the number of configured modules. RIO names and IP addresses must be unique. All fields must have entries. Incorrect entries are marked with a warning ⚠ icon. To see the related error message move the mouse pointer over the icon.

3. Click **[Apply]** to confirm your changes. Otherwise the changes will be lost when you close the window, select another view or log out.
    When the data is applied, the sorting of the page may change. The RIOs are sorted by name, the modules by slot.

Parameter	Meaning
Name	Name of the RIO. This value must not be empty and must be unique within the list of RIOs.
IP Address	IPv4 address of RIO.
Module name	Name of the module. This value must not be empty.
Slot	Slot number of the module. The value must be unique within the modules.

4.2.6.4 Siemens

Note

If you wish to change the configuration of the HART-RIOs you must log on under administrator or maintenance. The user role observer just allows you to view the configuration.

1. Select **HART-RIOs**.

2. Select **Views → Siemens** in the side menu.
   This page allows you to view and change the names and IP addresses of Siemens Remote IOs (RIOs) as well as the module names and slots. The maximum number of RIOs is 255. The maximum number of modules per RIO is 254.

   Each RIO is shown by its type, name, IP address and the number of configured modules. RIO names and IP addresses must be unique. All fields must have entries. Incorrect entries are marked with a warning ⚠ icon. To see the related error message move the mouse pointer over the icon.

3. Tick the check box in the **Redundant** column if you have redundant HART modules with 2 slots and enter the first slot in the the **Slot** field.

4. Click **[Apply]** to confirm your changes. Otherwise the changes will be lost when you close the window, select another view or log out.

   When the data is applied, the sorting of the page may change. The RIOs are sorted by name, the modules by slot.

Parameter	Meaning
Type	ET 200M, ET 200SP, ET 200SP HA non-redundant: (one communication head module) ET 200SP HA redundant (two communication head modules)
Name	Name of the RIO. This value must not be empty and must be unique within the list of RIOs.
IP Addresses	IPv4 address of RIO. For RIO type *ET 200SP HA redundant* you must specify addresses for each communication head module.
Module name	Name of the module. This value must not be empty.
Slot	Slot number of the module. The value must be unique within the modules.
Redundant	Redundant I/O HART modules in slots n and n+1 (for ET 200SP HA only)

4.2.6.5   Turck

Note
If you wish to change the configuration of the HART-RIOs you must log on under administrator or maintenance . The user role observer just allows you to view the configuration.

Note
Make sure that you are using the latest Turck firmware. Otherwise you may not be able to use parallel HART communication.

1. Select **HART-RIOs**.

2. Select **Views → Turck** in the side menu.
    This page allows you to view and change names and IP addresses of Turck Remote IOs (RIOs) as well as the module names and slots. The maximum number of RIOs is 255. The maximum number of modules per RIO is 254.

    Each RIO is shown by its type, name, IP address and the number of configured modules. RIO names and IP addresses must be unique. All fields must have entries. Incorrect entries are marked with a warning ⚠ icon. To see the related error message move the mouse pointer over the icon.

3. Click **[Apply]** to confirm your changes. Otherwise the changes will be lost when you close the window, select another view or log out.
    When the data is applied, the sorting of the page may change. The RIOs are sorted by name, the modules by slot.

Parameter	Meaning
Type	Turck excom (one communication head module)
Name	Name of the RIO. This value must not be empty and must be unique within the list of RIOs.
IP Address	IPv4 address of RIO.
Module name	Name of the module. This value must not be empty.
Slot	Slot number of the module. The value must be unique within the modules.

4.3 Virtual machine GUI administration

4.3.1 Login

1. Open your Internet browser and enter the following URL: http://< IP address of the smartLink SW-HT>:5000.

> **Note**
>
> If you are using VM images and you can't recall the IP address, open the VM console window to get the IP address.

2. Enter root in the user field and enter Softing1! in the password field.
    The credentials you have to enter here are the Linux login credentials of the VM.

> **Note**
>
> You will have to change the default passwords for root user and Softing user.

4.3.2 Network

1. Select **Settings → Network** to open the change the host name in the **Hostname** input field.

2. Click **[Save]** to confirm the new host name.

3. Select **DHCP** in the **Type** dropdown and enter the required details the input fields below.

4. Click **[Save]** to confirm your changes.

4.3.3 Change password

1. Select **Settings → Change Password** to change the root password.

2. Enter a **New Password** in the password field **For User Root** and repeat the password in the

3. Confirm **New Password** field.

4. Click **[Save]** to confirm your changes.

5. Enter a **New Password** in the password field **For User Softing** and repeat the password in the

6. Confirm **New Password** field.

7. Click **[Save]** to confirm your changes.

4.3.4   Update

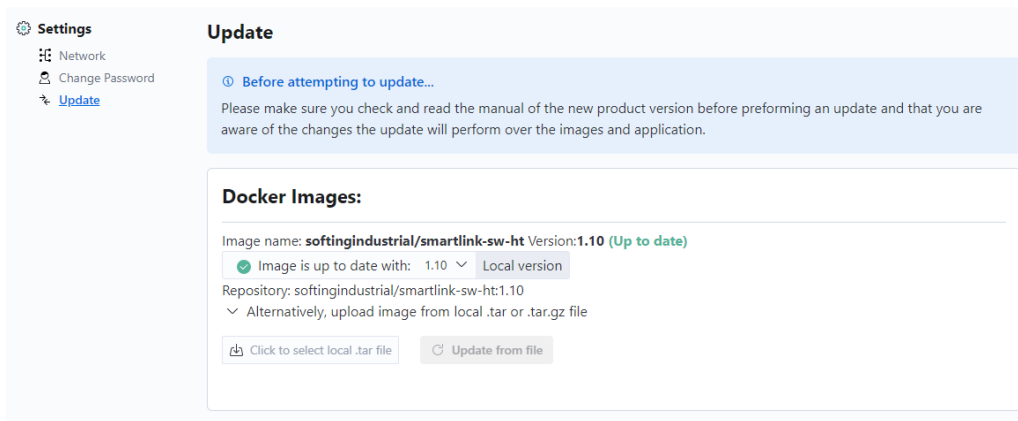1. Select **Settings → Update** to open the Update window.

Update from Docker Hub

2. Select the version you wish to update from the Update tags available list.

3. Click **[Update**] to execute the update.

Update from local file

4. Click **[Click to select local .tar file]**.

5. Select the docker image file.

6. Click **[Update from file]** to execute the update.

> ![Note icon]
>
> **Note**
>
> If you don't have an Internet connection to Docker Hub the Update tags available list shows the string "No connection to docker hub". In that case you can only update from file.

4.4   Virtual machine console administration

Disable/Enable HTTP VM administration GUI

Note

The HTTP VM administration GUI is enabled by default.

1. Call the following command to disable the HTTP VM administration GUI login as root to the VM console:
    ```
    /home/softing/disable-admin-gui.sh
    ```

2. Call the following command to enable it:
    ```
    /home/softing/enable-admin-gui.sh
    ```

Note

If you are not using a NAT network in the VM we recommend to disable the HTTP VM administration GUI. The HTTP VM administration GUI gives you administrative access to the VM.

Disable/Enable HTTP port of the configuration GUI

Note

The HTTP port is enabled by default.

1. Call the following command to disable the HTTP port login as root to the VM console:
    ```
    /home/softing/disable-HTTP.sh
    ```

2. Call the following command to enable it:
    ```
    /home/softing/enable-HTTP.sh
    ```

Note

If you are not using a NAT network in the VM we recommend to disable the HTTP port. The HTTP communication is not encrypted and therefore allows sniffing the communication.

Disable/Enable SSH server

1. To disable the SSH server login as root to the VM console call the following command:
    ```
    systemctl disable ssh
    systemctl stop ssh
    ```

2. To enable it you have to call the command:
    ```
    systemctl enable ssh
    systemctl start ssh
    ```

By default, the SSH server is disabled

Note

If you are not using a NAT network in the VM we recommend to disable the SSH server. The SSH server gives you remote access to the VM.

Change keyboard layout

The VMs are configured for an English keyboard by default and can be changed in these steps:

1. Edit the file */etc/default/keyboard* and change the locale in the XKBLAYOUT line.

2. Login to the VM console as root and enter: `nano /etc/default/keyboard`

3. Enter `setupcon` to change the locale to XKBLAYOUT="de" for a German keyboard layout.

# 5 Connecting with Emerson AMS Device Manager

The following chapter describes how to connect with the Emerson Asset Management System (AMS) to configure, parameterize, troubleshoot and maintain the HART field devices. See the Emerson AMS user manual for details on how to use the AMS. Changes to settings and values of HART device (such as names and units) connected to the network are automatically displayed in the <u>Live List</u>[33] in the smartLink SW-HT user interface.

5.1 Preparations

- You must have Emerson AMS (version 14.1 or later) installed on your PC.

- Your Emerson AMS must have an Emerson HART-IP license.

5.2 Network configuration

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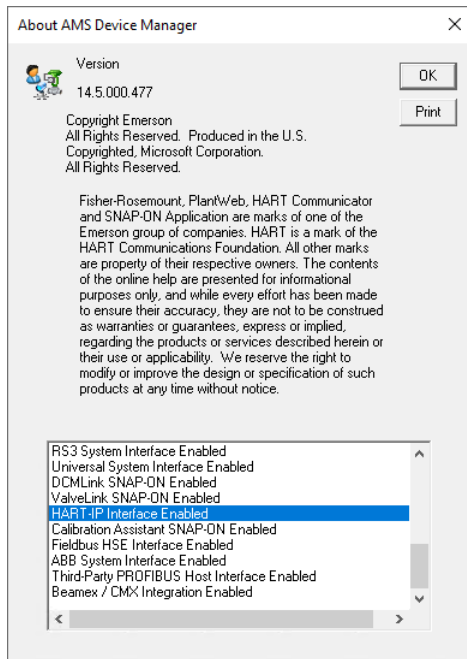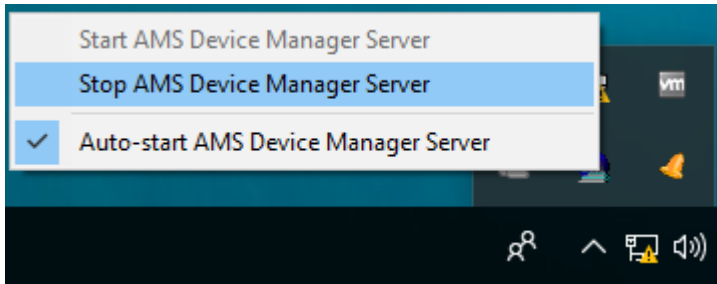

2. Scroll down in the drop-down list to see if you can find **HART-IP Interface Enabled**.
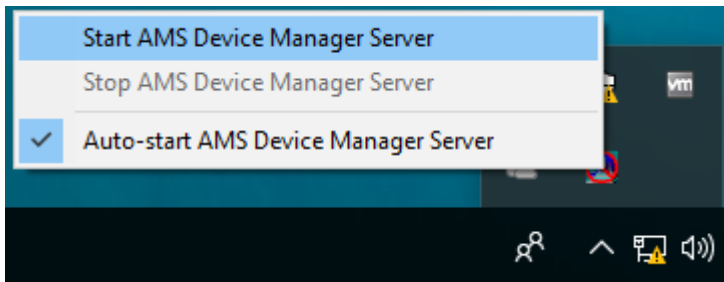
> **Note**
>
> You will not be able to configure HART-IP if your AMS version does not have a HART-IP licence.

3. Click **[OK]**.

4. Right-click the ⚙ icon at the bottom of your screen and select **Stop the AMS Device Manager Server**.

5. Wait a second.
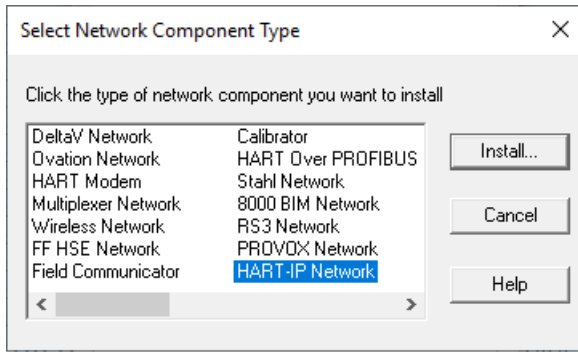
6. Now right-click the icon at the bottom of your screen again and select **Start the AMS Device Manager Server**.

7. Click **Windows Start → AMS Devices Manager → Network Configuration**.
   The AMS network configuration window opens.
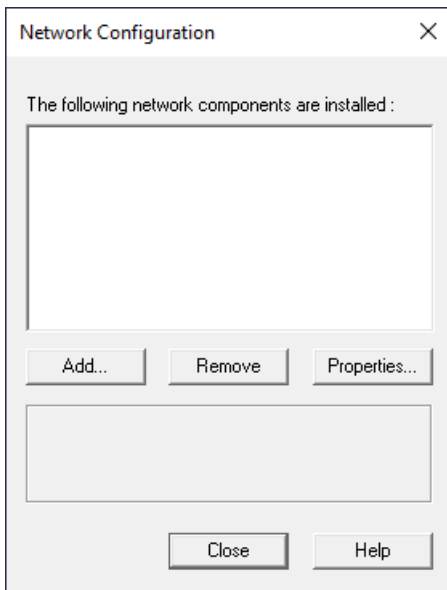
8. Click **[Add]**.

9. Select the component **HART-IP Network** from the list.

10. Click **[Install...]** and follow the wizard on-screen instructions.

11. Enter a unique name in the Network Name input field and click **[Next]**.

12. Enter the IP address of your smartLink SW-HT.
    Keep the default port 5094.
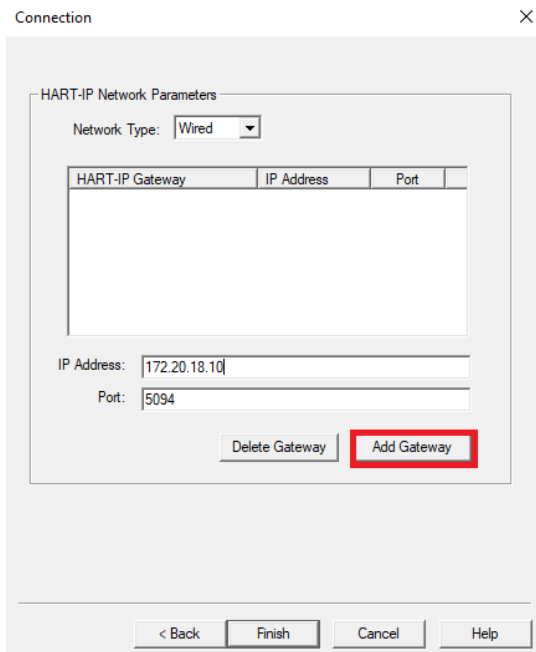
13. Click **[Add Gateway]**.
    The added gateway is shown with the corresponding IP address.

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

15. Click **[Close]**.

5.3   AMS Device Manager

1. Click **Windows Start → AMS Device Manager → AMS Device Manager**.
   The AMS device manager window opens.
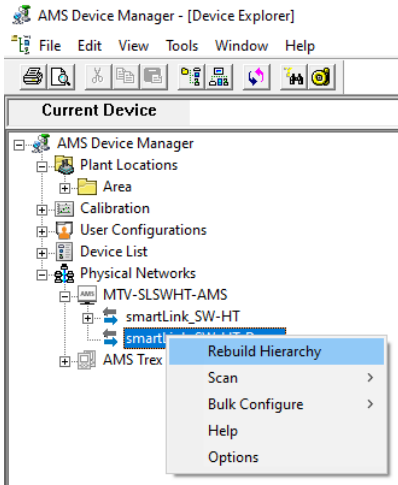
2. Right-click a smartLink SW-HT and select **Rebuild Hierarchy**.
   The device returns the configured HART IO modules as HART Cards.

3. Right-click a smartLink SW-HT and select **Scan → All Devices** to identify connected HART devices.
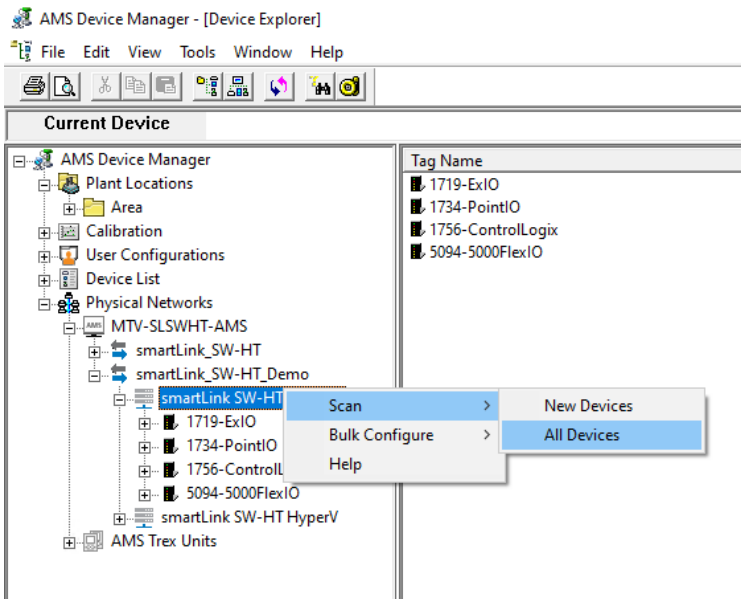
4. When the scan has finished you can continue configuring the HART Devices. Follow the instructions in the Emerson AMS manual.

6   Connecting with FDT/DTM

PACTware is an FDT frame application which allows you to see your field devices in a graphical user interface. To manage the information of your devices, PACTware uses a Device Type Manager (DTM) within the frame application. Using a DTM you can access a field device similar to a device driver. It contains the complete logic (data and functions) of the field device.

The device setting procedures for DTMs are the same in any FDT environment. See the smartLink DTM User Guide for details. You will find this document in the Downloads area Manuals and Documentation of the smartLink SW-HT product page.

> **Note**
>
> The HTTPS interface must be enabled and a certificate for HTTPS must be set to use the DTM, since the DTM uses the HTTPS REST interface of the smartLink SW-HT.

7 Performance

The table below shows the average duration in seconds for a HART request on different modules as per performance tests. The HART-IP requests were sent to a HART device with commands that do not have a request payload (0, 1, 3, 7, 8, 12, 13, 14, 16, 20, 48). We measured the time that elapsed until a response was received from the smartLink SW-HT. The values measured varied by the type of HART device tested and its data acquisition. Therefore, the values can only be regarded as a rough estimate. In addition, response times were noticed to increase considerably for parallel requests sent on the same RIO and/or module.

Allen Bradley Module	Duration in sec
1715-IF16	3.5
1715-OF8I	3.7
1719-IF4HB	1.2
1719-CF4H	1.2
1734sc-IE2CH	1.0
1734sc-IE4CH	1.3
1734sc-OE2CIH	1.5
1756-IF8H	2.7
1756-IF16H	1.1
1756-IF8IH	1.3
1756-IF16IH	1.4
1756-OF8IH	1.5
1756-OF8H	2.3
5094-IF8IH	1.1
5094-OF8IH	1.2

Schneider Module	Duration in sec
BMEAHI0812	1.2
BMEAHO0412	1.2

R.Stahl	Duration in sec
9468/33-08-10	1.0

Siemens	Duration in sec
ET 200SP AI 4xI 2-wire 4 -20mA HART (6ES7134-6TD00-0CA1)	3.9
ET 200SP AQ 4xI HART HF (6ES7135-6TD00-0CA1)	1.8
ET200M SM 331, 2AE, 0/4 - 20mA HART (6ES7331-7TB10-0AB0)	1.0
ET200M SM 332, 2AA, 0/4 - 20mA HART (6ES7332-5TB10-0AB0)	1.1
ET200M SM 331, 8AE, 0/4 - 20mA HART (6ES7331-7TF01-0AB0)	2.4
ET200M SM 332, 8AA, 0/4 - 20mA HART (ES7332-8TF01-0AB0)	2.1
ET200M SM 336, F-AI 6x, 0/4-20 mA HART(6ES7336-4GE00-0AB0)	1.9
ET200SP HA AI 16xI 2-wire HART HA (6DL1134-6TH00-0PH1)	1.4
ET200SP HA AQ 8xI HART HA (6DL1135-6TF00-0PH1)	1.2
ET200SP HA AQ 4xI 2-/4-Wire HART ISOL (6DL1134-6UD00-0PK0)	1.4
ET200SP HA, F-AI 8x, 2-/4-wire HART (6DL1136-6AA00-0PH1)	2.5
ET200iSP 4AI HART, 2DMU (6ES7134-7TD00-0AB0)	1.8
ET200iSP 4AI HART, 4DMU (6ES7134-7TD50-0AB0)	2.4
ET200iSP 4AO HART, 4-20 mA (6ES7135-7TD00-0AB0)	2.4
ET200iSP 4F-AI HART Ex (6ES7138-7FA00-0AB0)	2.2

Turck	Duration in sec
AIH40Ex	2.4
AOH40Ex	2.3
AIH401-N	2.4
AOH401-N	2.3

7.1 Recommendations

The Allen Bradley module types "5094 Flex 5000 I/O" do not provide a polling mechanism to retrieve the responses of requests to the underlying HART devices. The response to the HART request is held back until the module has retrieved the requested data from the HART device. This may take a second or two. Communication via Ethernet is blocked during this time, which means that no other HART requests are processed by smartLink SW-HT. Therefore, we recommend establishing a direct connection to the "5094 Flex 5000 I/O" device and not via an Ethernet IP module. Otherwise, communication to all RIOs on this Ethernet IP module will be blocked.

The Allen Bradley modules 1756-IF8H and 1756-OF8H handle parallel HART requests on the different channels sequentially (i.e. one HART request at a time). This means that parallel HART IP requests on different channels on one of these modules will take a multiple of the usual time. Therefore, we recommend not to use these modules for HART devices where you need a short update cycle.

Due to the non-parallelization of the HART requests on the different channels of the 1756-IF8H and 1756-OF8H modules, a system consisting only of these modules represents the system with the lowest number of HART requests per minute. In this scenario, smartLink SW-HT supports up to 1500 HART devices. A system with more HART devices should be distributed across several smartLink SW-HT to improve the performance.

8 Glossary

Terms & Abbreviations	Definition
DHCP	Dynamic Host Configuration Protocol
DIN	Deutsches Institut für Normung
ETH	Ethernet
FDT	Field Device Tool
HART	Highway Addressable Remote Transducer
HTTPS	Hypertext Transfer Protocol Secure
I/O	Input/Output
IP	Internet Protocol
Long Tag	A 32 character ISO Latin 1 string used to identify a field device
PLC	Programmable Logic Controller
RIO	Remote Input/Output unit
Slave	A passive device that communicates only in response to a message from a master.

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