

SIRIUS Soft Starter 3RW55 MindSphere Connection

SIRIUS 3RW55 / MindSphere

https://support.industry.siemens.com/cs/ww/en/view/109815692

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Table of contents

Legal information **2**

1 Introduction **4**

1.1 Overview 4
1.2 Principle of operation 4
1.3 Components used 4

2 Useful information **6**

2.1 Basics 6
2.2 Explanation of terms 6
2.3 Alternative solutions 6

3 Engineering **7**

3.1 Hardware setup 7
3.2 Configuration 8
3.2.1 Configuring the soft starter 8
3.2.2 Activation of the OPC UA server 8
3.2.3 Creating the Software Agent in MindSphere 9
3.2.4 Installation of the Software Agent on a local Windows computer 12
3.2.5 Onboarding the MindConnect Software Agent 13
3.2.6 Connecting the data to MindSphere 15
3.2.7 Evaluation of the data in MindSphere 18

4 Appendix **24**

4.1 Service and support 24
4.2 Industry Mall 25
4.3 Links and references 25
4.4 Change documentation 25

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1 Introduction

1.1 Overview

This application example describes how you can connect your SIRIUS Soft Starter 3RW55 to the MindSphere cloud and send datapoints.

MindSphere offers many possibilities for visualizing and processing this data in different applications or sending this data to other systems.

You can also develop your own applications for evaluating your soft starters centrally within a system.

1.2 Principle of operation

Measurement, diagnostic and statistical data of the 3RW55 Soft Starter can be read out via OPC UA. The MindConnect connectivity solution used offers OPC UA as well as many other communication protocols for reading data.

This example uses the integrated OPC UA server of the soft starter's Profinet HF communications module and MindConnect Software Agent. No extra hardware is needed for this. The software is available on Windows 10 with activated Hyper-V.

MindConnect Software Agent transfers the data via HTTPS to the MindSphere cloud, where different MindSphere applications can access the data pool.

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1.3 Components used

This application example was created using these hardware and software components:

Table 1-1

Component	Quantity	Article number	Note
STEP 7 Professional V17	1	6ES7822-1AE07-0YA5	Version V17 Update 4
Soft Starter ES V17 Professional	1	3ZS1320-6CC13-0YA5	Version V17 Update 4
Soft Starter 3RW55	1	3RW5 513-*HA**	V2.1
Profinet IO HF communications module	1	3RW5 950-0CH00	V3.0
HMI Module HF	1	3RW5 980-0HF00	V3.2
MindConnect Software Agent	1		V03.06.00.09 b002
MindSphere IoT Value Plan	1		

The components listed here can be obtained from the Siemens Industry Mall.

This application example consists of the following components:

Table 1-2

Component	File name
SIRIUS 3RW5 Soft Starter at a glance	https://support.industry.siemens.com/cs/ae/en/view/109747404
Equipment Manual - SIRIUS 3RW55 Soft Starter	https://support.industry.siemens.com/cs/ae/en/view/109753752
MindConnect Getting Started	https://documentation.mindsphere.io/resources/html/getting-connected/en-US/index.html

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2 Useful information

2.1 Basics

Basic knowledge of working with PCs, automation technology, TIA Portal and the OPC UA communication protocol as well as basic knowledge of MindSphere is required.

2.2 Explanation of terms

Asset

An "asset" is a digital representation of a machine or an automation system in MindSphere. Within an asset there are so-called "aspects".

Aspects

"Aspects" are datapoints, e.g. a state variable of a machine. An aspect is always mapped to a data source of an asset. An aspect can consist of several variables. Through the use of aspect types, it is possible to create and reuse "modules".

Asset Manager

Free MindSphere tool for managing assets and aspects. In "Asset Manager", you model the structure of your machine or process using the data model (assets - aspects). Asset Manager distinguishes between templates, so-called "types", and the assets and aspects.

Fleet Manager

Free MindSphere application for visualizing assets and aspects. You use "Fleet Manager" to visualize and monitor the created assets. You monitor individual datapoints with the help of rules and can react to values outside the defined range.

Tenant

A "tenant" is a company-specific, logical environment for your data in MindSphere. A tenant is a closed system in which your data and applications are available.

2.3 Alternative solutions

There are many options for reading data from the soft starter via MindConnect. For example, you can also use a Modbus RTU or TCP communications module. Or, you can even use the application example to send data directly from an S7-1500 controller to MindSphere.

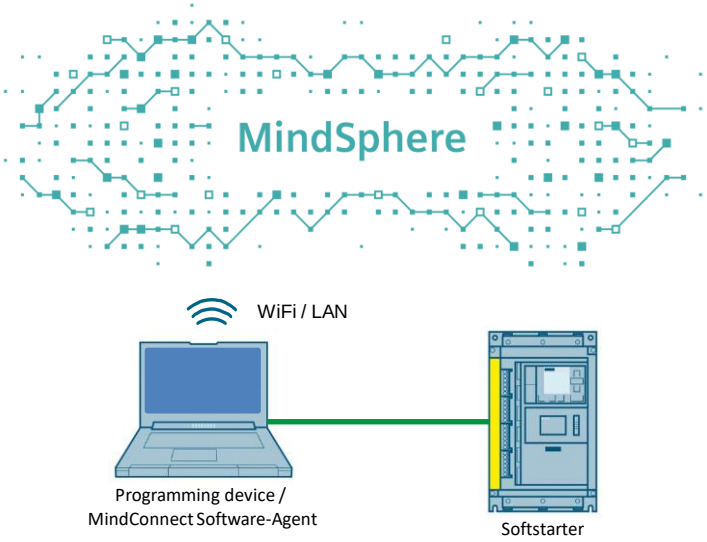
In addition, you can use a hardware-based MindConnect solution such as MindConnect Nano or MindConnect IOT2040 as a cloud gateway. The principle of operation is nearly identical.

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3 Engineering

3.1 Hardware setup

Figure 3-1

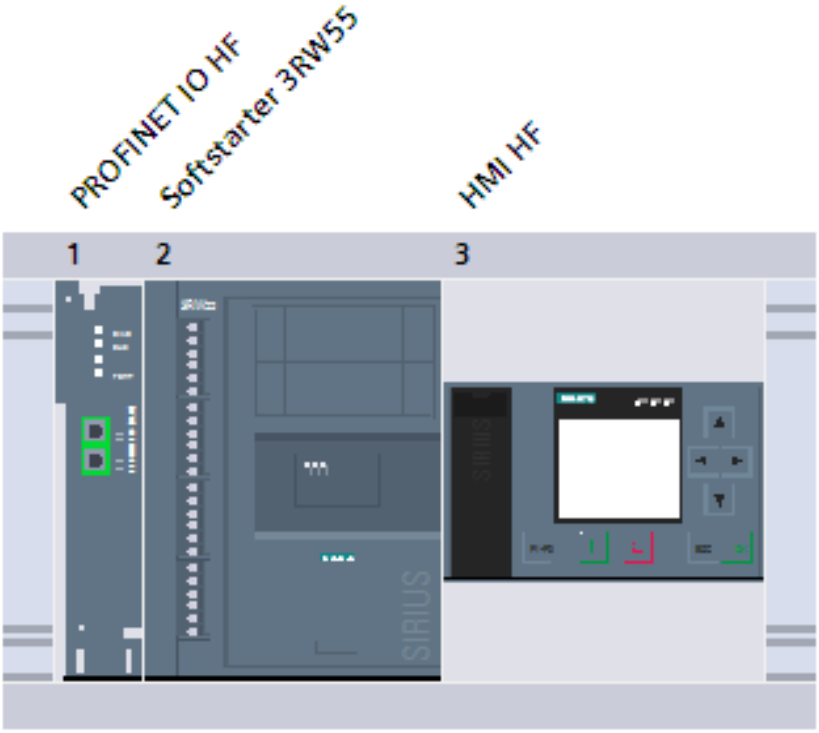


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3.2 Configuration

3.2.1 Configuring the soft starter

Figure 3-2



Assign parameters for your SIRIUS soft starter according to your use case. Refer to the equipment manual of the soft starter for help.

3.2.2 Activation of the OPC UA server

The OPC UA server functionality must be activated in order for the MindConnect element to establish a connection to the soft starter.

Activate the OPC UA server in the 3RW5 communications module via the 3RW5 HMI High-Feature panel (firmware version 3.1 and higher) in menu "Parameters > Communications module > OPC UA server“

Note There are additional ways to activate the OPC UA server functionality, which you can find in the equipment manual of the PROFINET communications module.

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3.2.3 Creating the Software Agent in MindSphere

1. Open an Internet browser on your PC (preferably Google Chrome).

2. Open the launch pad of your MindSphere tenant (https://<tenant name>.<region>.mindsphere.io/) and log in.

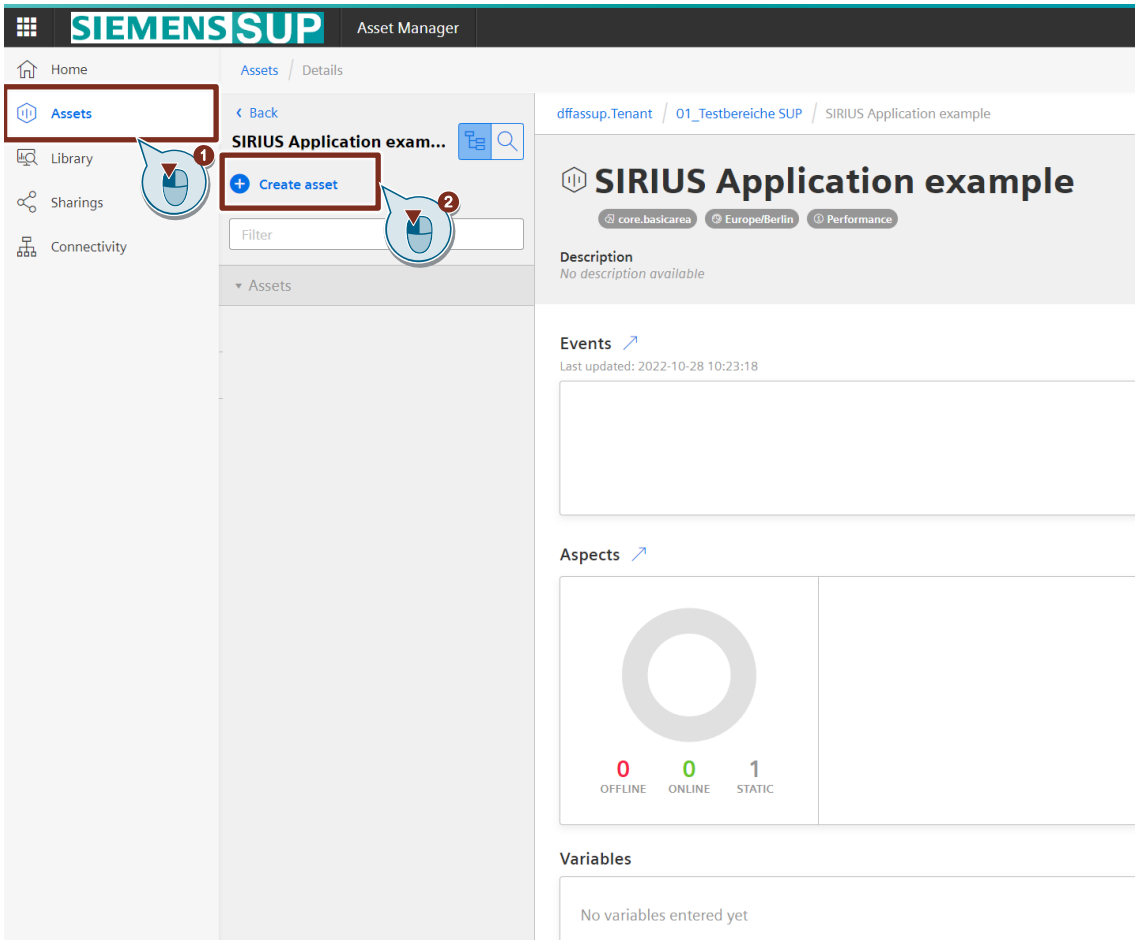
3. Start Asset Manager.

   Figure 3-3



4. Under "Assets", go to your choice of asset structure area and click "Create asset".

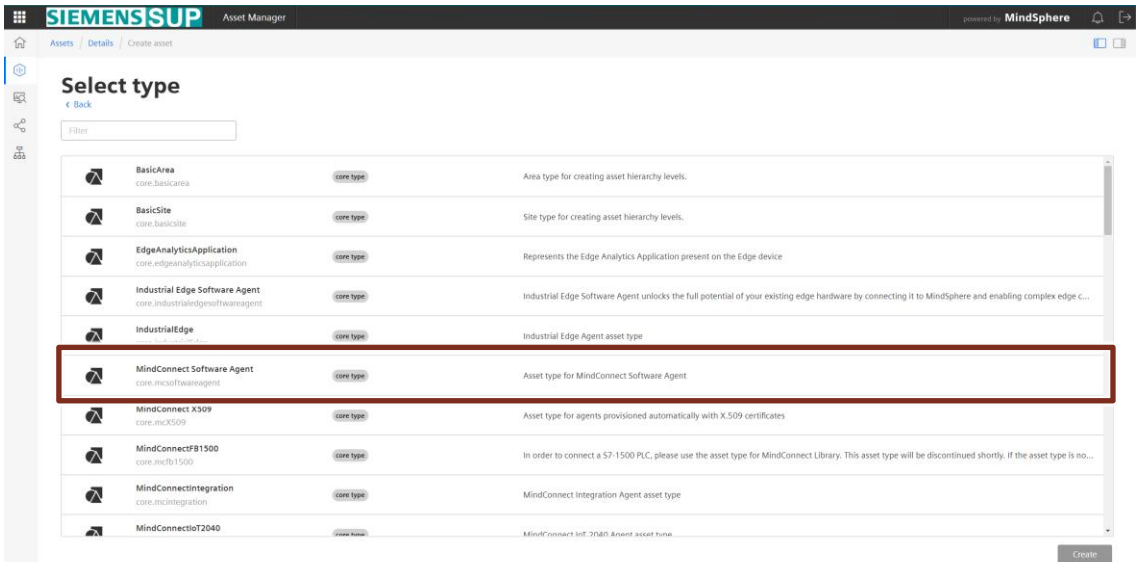
   Figure 3-4



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5. Select the type "MindConnect Software Agent".

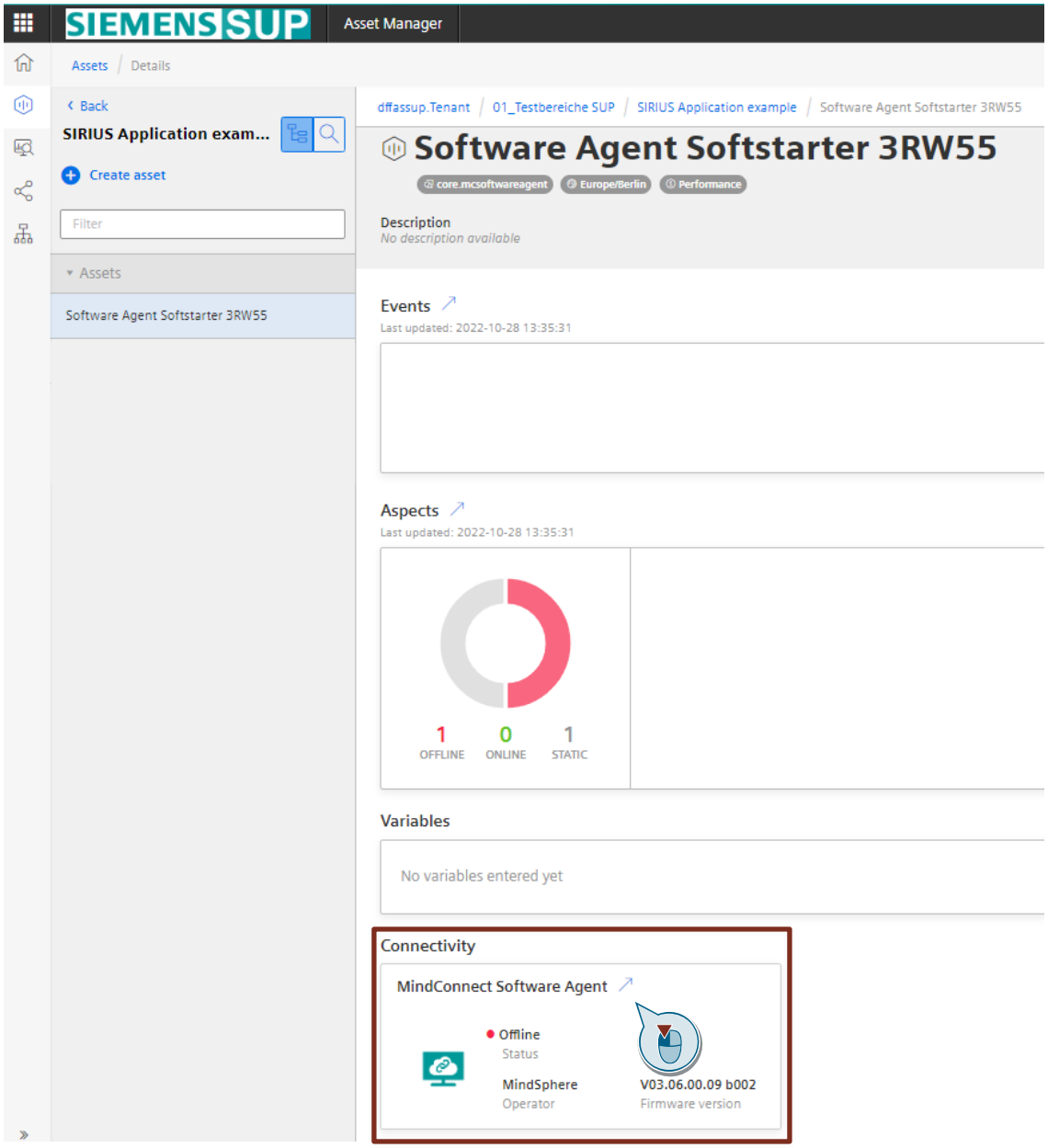
Figure 3-5



6. Assign a name and, optionally, a description and navigation data of the asset.
7. Change to the connectivity of your Software Agent.

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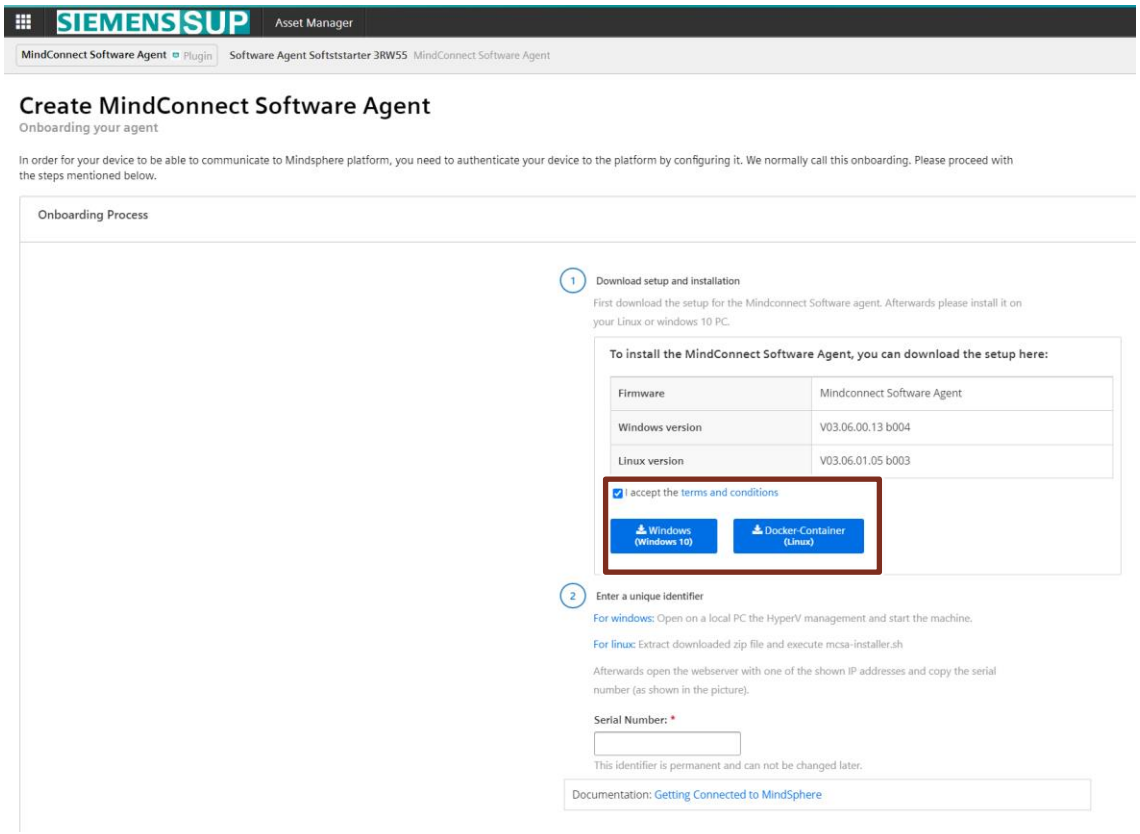
Figure 3-6



8. Download the current firmware and install this file on the computer that is to function as the Software Agent.

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Figure 3-7



3.2.4 Installation of the Software Agent on a local Windows computer

You should now have a file named "MindconnectFirmwareSetup.7z" or similar on the Software Agent computer.

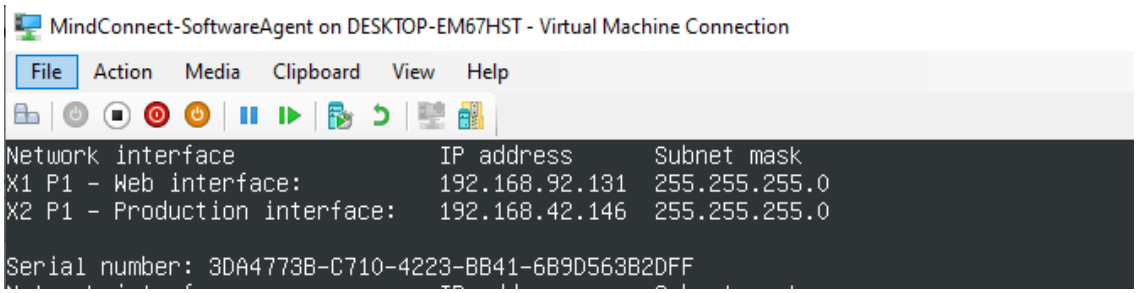
1. Activate Hyper-V on the Software Agent computer.
   a. Right-click the Windows button and select "Apps and Features".
   b. On the right under "Related settings", select the Programs and Features option.
   c. Select "Turn Windows features on or off".
   d. Select "Hyper-V" and click "OK".
   e. After the installation has finished, you are prompted to restart the computer.

Note The exact procedure can vary slightly depending on the Windows version.

2. After the restart, unpack the "MindconnectFirmwareSetup.7z" file using an archiving software.
3. Run the unpacked "Setup.exe" file to start the installation.
4. Follow the given steps.
5. Enter the network adapter via which MindConnect Software Agent communicates with MindSphere (Internet connection / web interface) and the adapter used to connect the computer to the Profinet HF communications module soft starter (production interface).
6. Once the installation has finished, restart the computer.
7. Use Windows search to find the "Hyper-V Manager" program and start it.
8. There, you should now find a virtual machine titled "MindConnect-SoftwareAgent“. Select it with a double-click.
9. Obtain the given serial number from the console window. And one of the IP addresses of the Software Agent.

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Figure 3-8

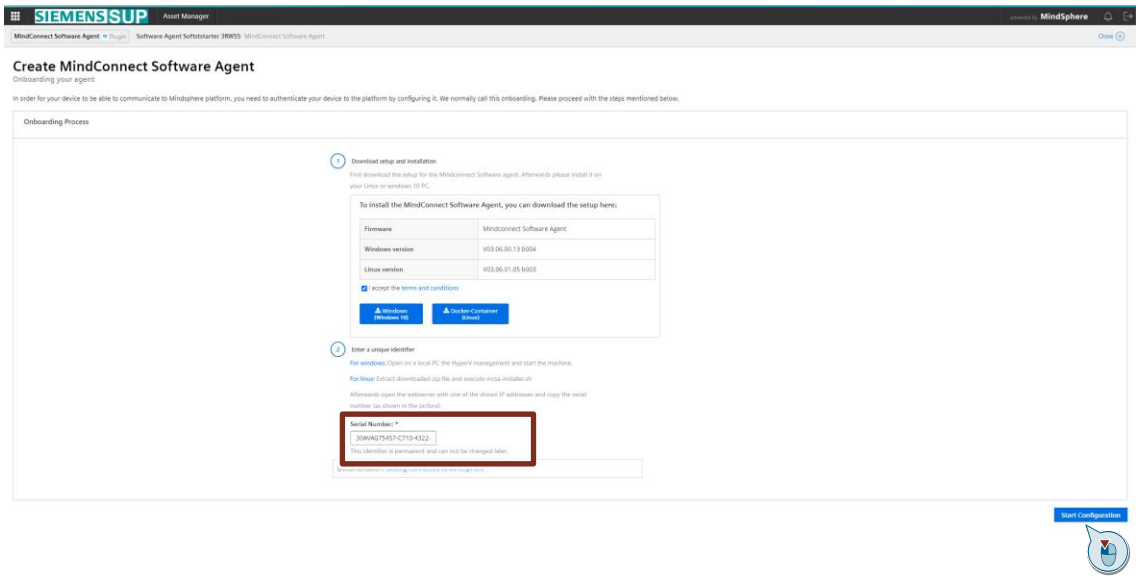


10. Your MindConnect Software Agent has now been successfully installed on your computer.

3.2.5 Onboarding the MindConnect Software Agent

1. Change back to the agent configuration of the Asset Manager of your MindSphere tenant.
2. Enter the serial number from the MindConnect Software Agent console window under "Serial number" in the MindConnect Software Agent configuration, and click "Start Configuration".

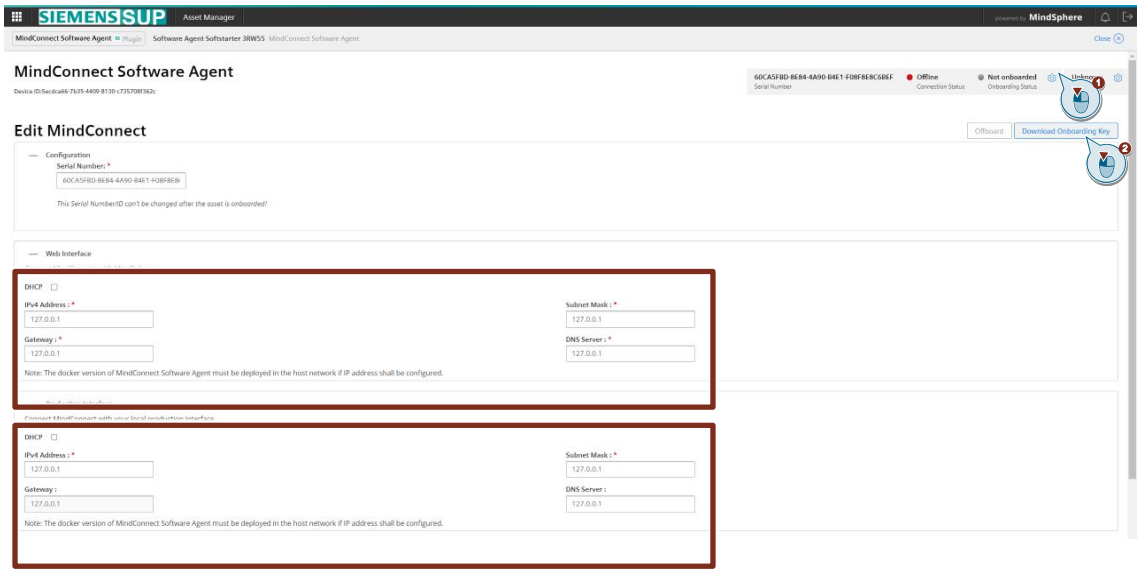
Figure 3-9



3. Configure the network interfaces of your MindConnect Software Agent based on your configuration and then download the connection key.

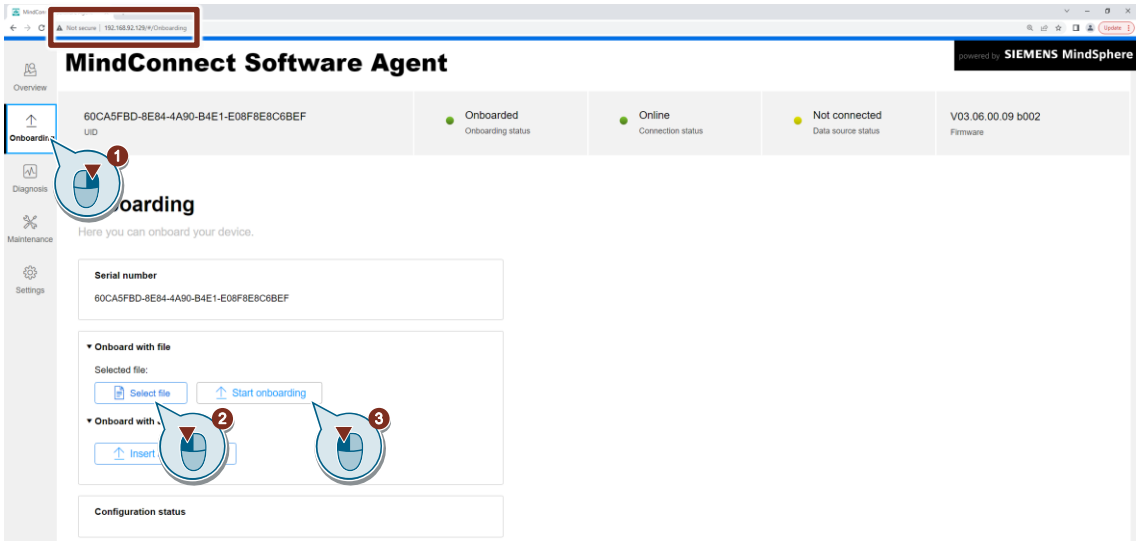
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Figure 3-10



4. Return to your computer on which MindConnect Software Agent is installed. Also transfer the connection key (ConBox_<...>.cfg) to the connector computer.
5. Open a web browser (e.g. Google Chrome) there and enter one of the two IP addresses from the console window of MindConnect Software Agent.
6. The web server of MindConnect Software Agent should now have opened.
7. Select "Onboarding" on the left, and load the previously loaded configuration file into the agent using "Select file". Then select "Start onboarding".

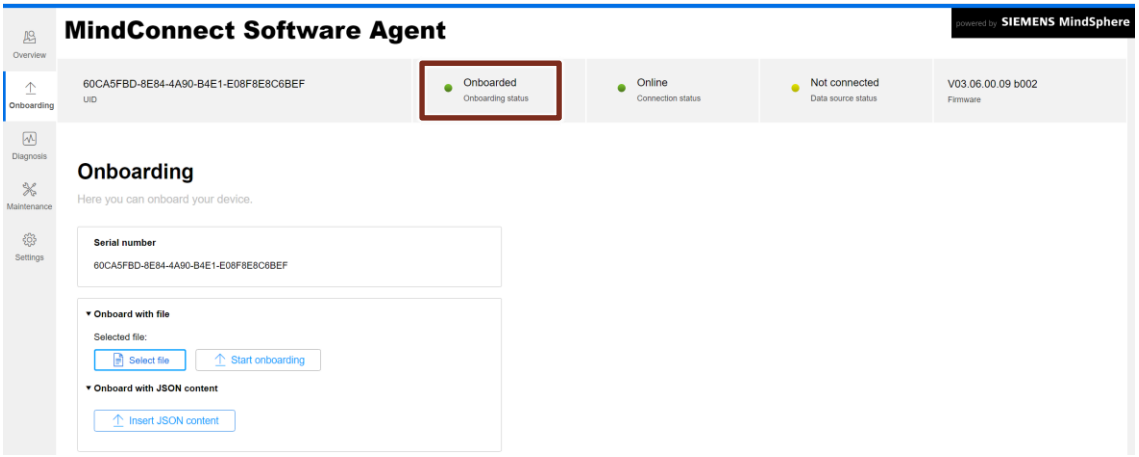
Figure 3-11



8. After a short time, the Software Agent should have "onboarded" to MindSphere.
   You have now successfully connected your agent to MindSphere!
   This is apparent from the "Onboarding status" status display.

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Figure 3-12

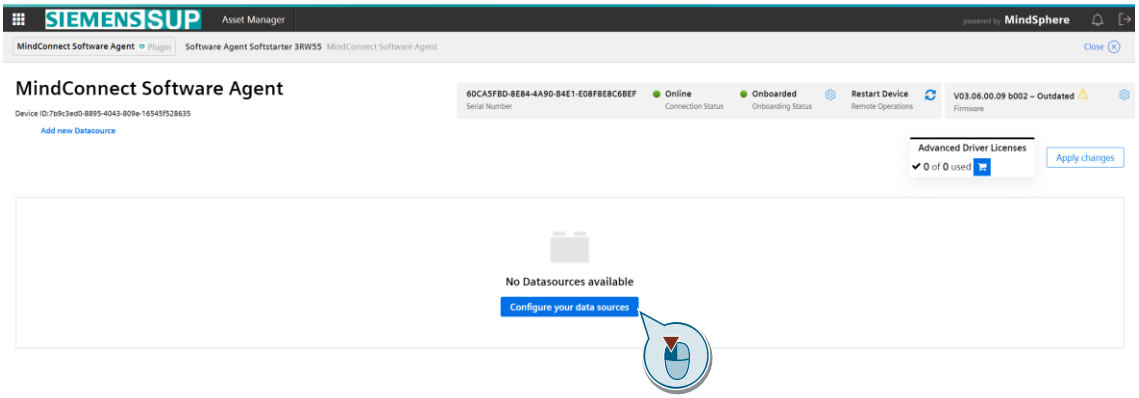


3.2.6 Connecting the data to MindSphere

So that data can also be read by your Software Agent and sent to MindSphere, you must configure this in MindSphere.

1. Change back to the agent configuration in MindSphere. There, you can now configure your data source.

Figure 3-13



2. Select "Add new Datasource" and complete the information in the popup window:

Table 3-1

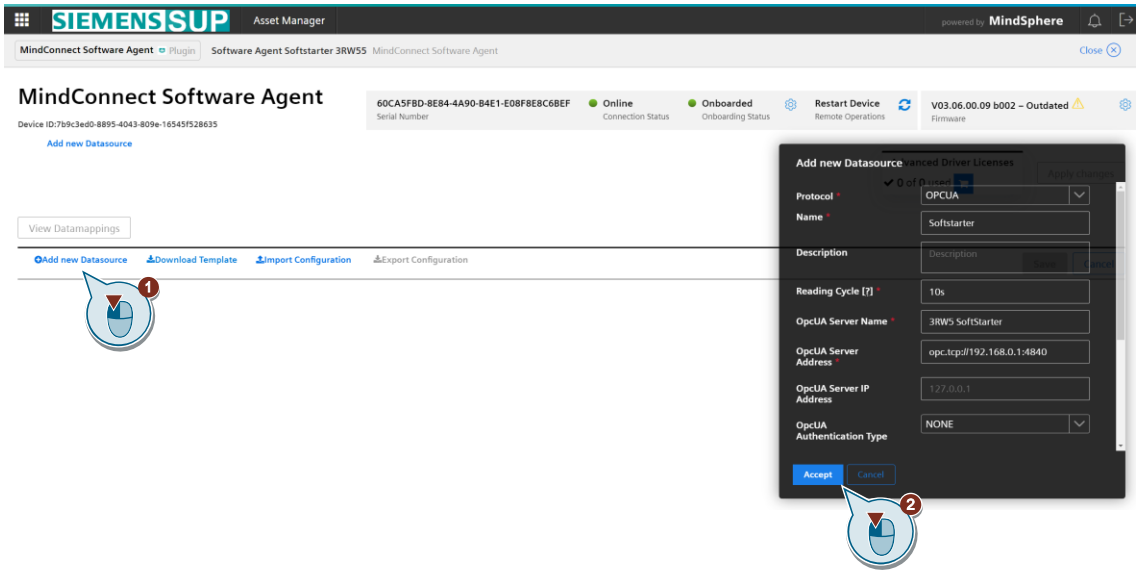
	Field	Input
1.	Protocol	OPCUA
2.	Name	Softstarter (can be freely assigned)
3.	Description	*optional*
4.	Reading Cycle	10s (*can be freely assigned*)
5.	OpcUA Server Name	3RW5 SoftStarter
6.	OpcUA Server Address	opc.tcp//<IP address>:4840
7.	OpcUA Server IP Address	*optional*
8.	OpcUA Authentication Type	NONE
9.	OpcUA Security Mode	NONE
10.	OpcUA Events Activate	*empty*

Confirm with "Accept".

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CAUTION	**Unsecure connection between MindConnect Software Agent and soft starter** Use "NONE" security mode for test purposes only. For productive operation, use a secure connection between the OPC UA client and OPC UA server.

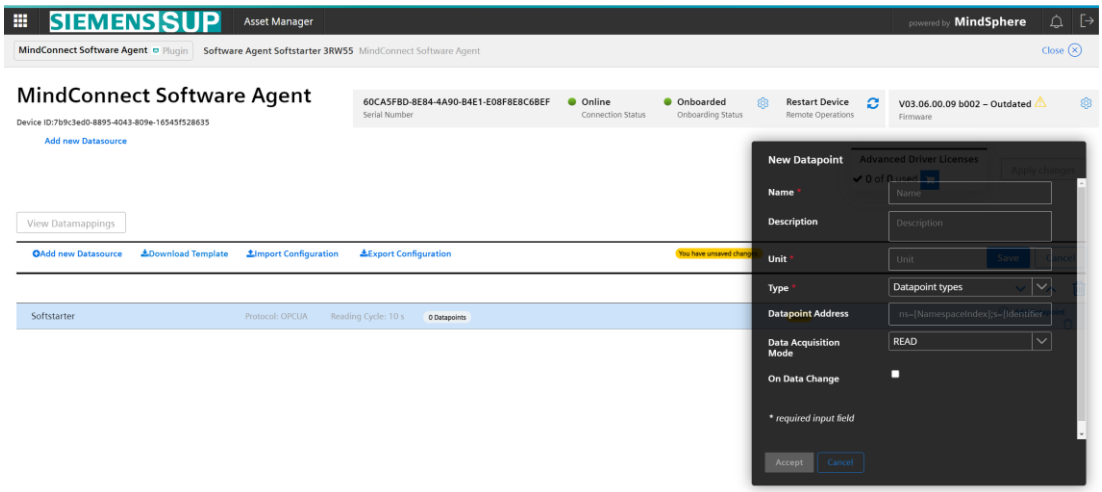
Figure 3-14



Note The IP address of the OPC UA server corresponds to the IP address of the Profinet HF communications module configured in TIA Portal!

3. Now add datapoints to your data source using "Add Datapoint".
   The table below names some values as an example. These can be adapted to your use case.

Figure 3-15

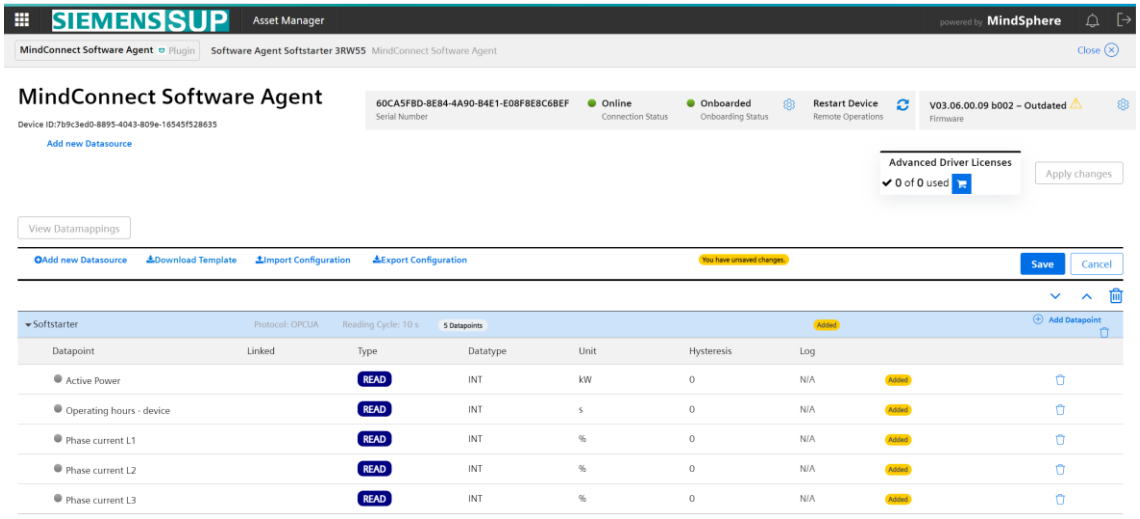


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Table 3-2

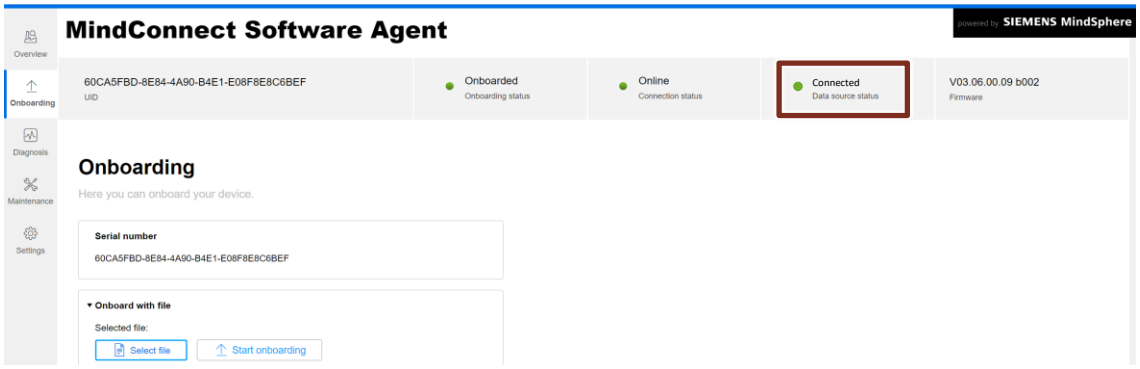
	Name	Description	Unit	Type	Datapoint address
11.	Active power	*optional*	kW	int	ns=2;i=51
12.	Operating hours - device	*optional*	s	int	ns=2;i=88
13.	Phase current L1	*optional*	%	int	ns=2;i=34
14.	Phase current L2	*optional*	%	int	ns=2;i=35
15.	Phase current L3	*optional*	%	int	ns=2;i=36

Figure 3-16



4. Save your configuration and load it to your device using "Apply changes".
5. In the web server of your MindConnect Software Agent, you should now see that a data source has been connected.

Figure 3-17



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3.2.7 Evaluation of the data in MindSphere

MindSphere is defined by a type-instance system. This means that, in order to display and evaluate data, you first define your data model using an asset type. This includes the data which the asset is to contain an instance of.

You can then instantiate these type as often as needed and thus save yourself the effort of having to redefine the data model.

The data model of this instance must then be mapped with the data of the MindConnect element in order to evaluate the data.

1. Create aspects suitable for the soft starter data gathered by you.
   a. In Asset Manager, change to the "Library" > "Aspect Types" tab.
   b. Create aspects using "Add aspect".
   c. Assign a name for your aspect. (e.g. Phase current & General)
   d. Define variables suitable for your selected soft starter data using the "Add variable" button in the "Variables" tab.

Figure 3-18 Aspect Phase current

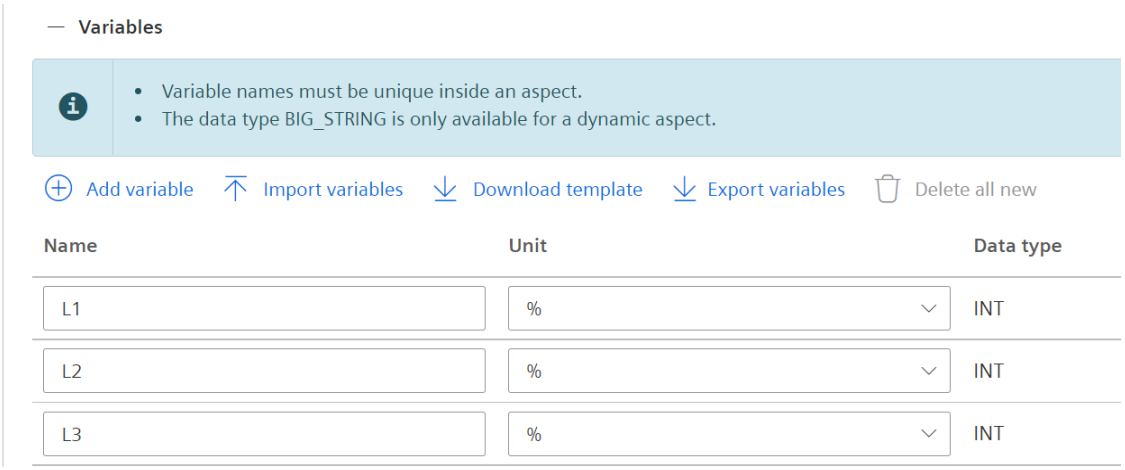
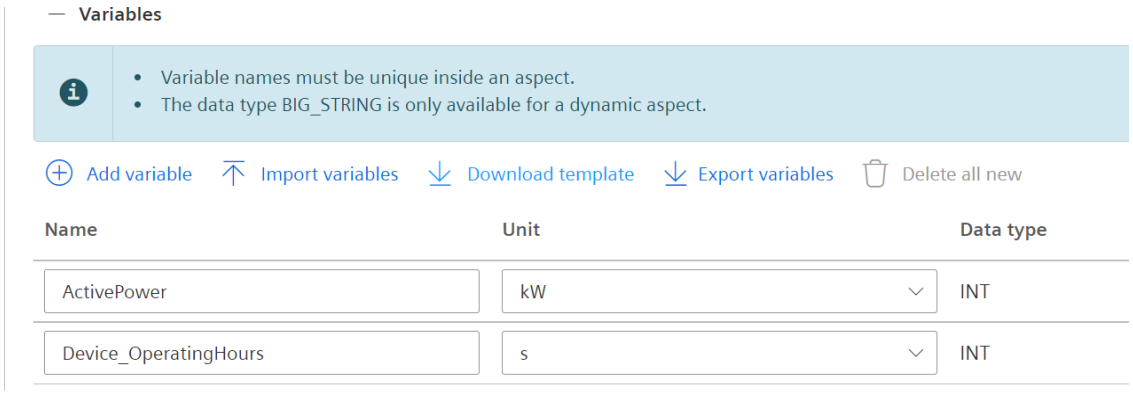


Figure 3-19 Aspect General

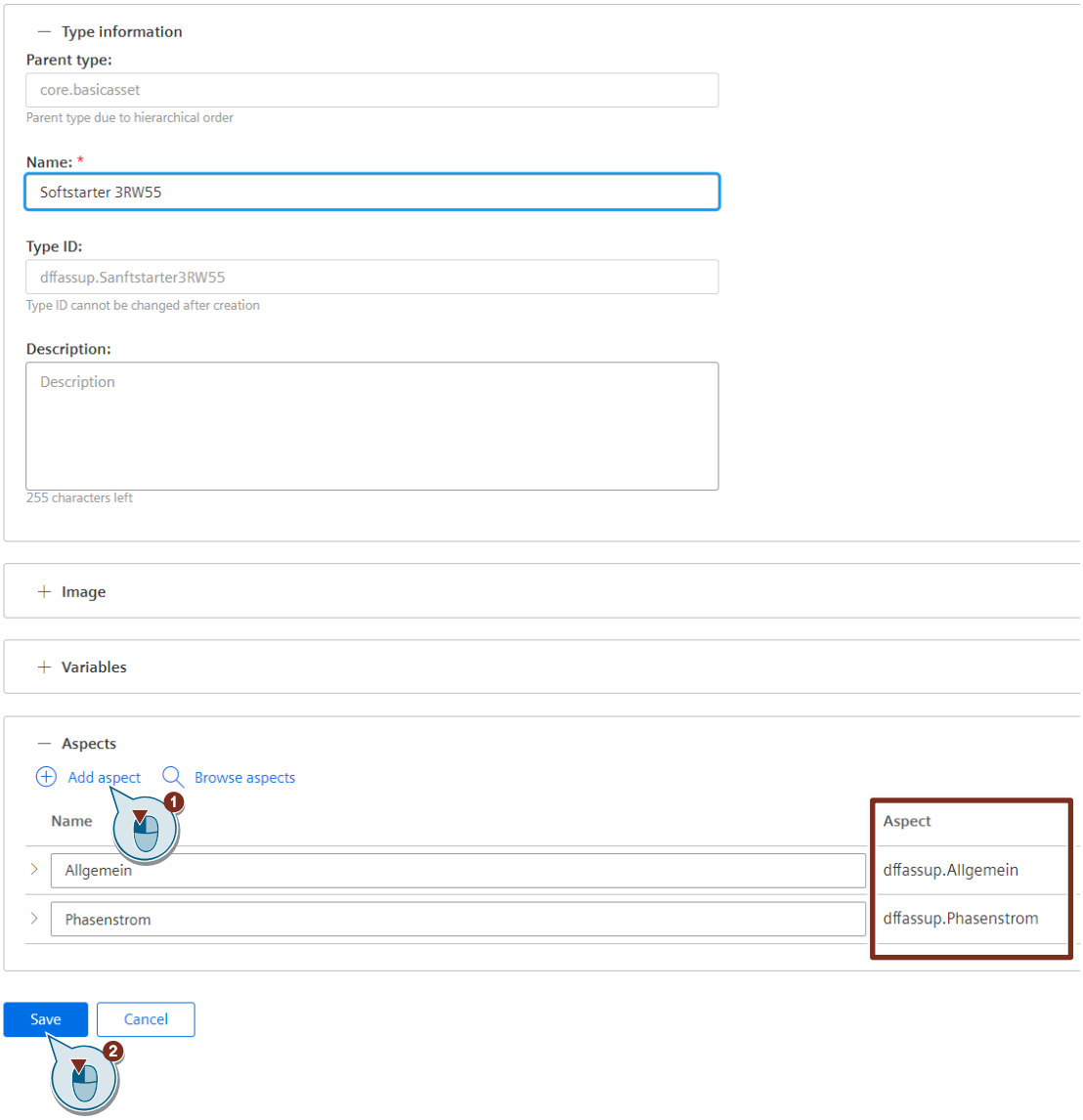


Note The units and data types must match those defined in the MindConnect element!

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2. Create an asset type and assign it the appropriate aspects.
   a. In Asset Manager, change to the "Library" > "Asset Types" tab.
   b. Create an asset type using "Add type".
   c. Assign a name for your asset type (e.g. Soft Starter 3RW55)
   d. Add your created aspects to the type using "Add aspect" in the "Aspects list" tab, and save your types.

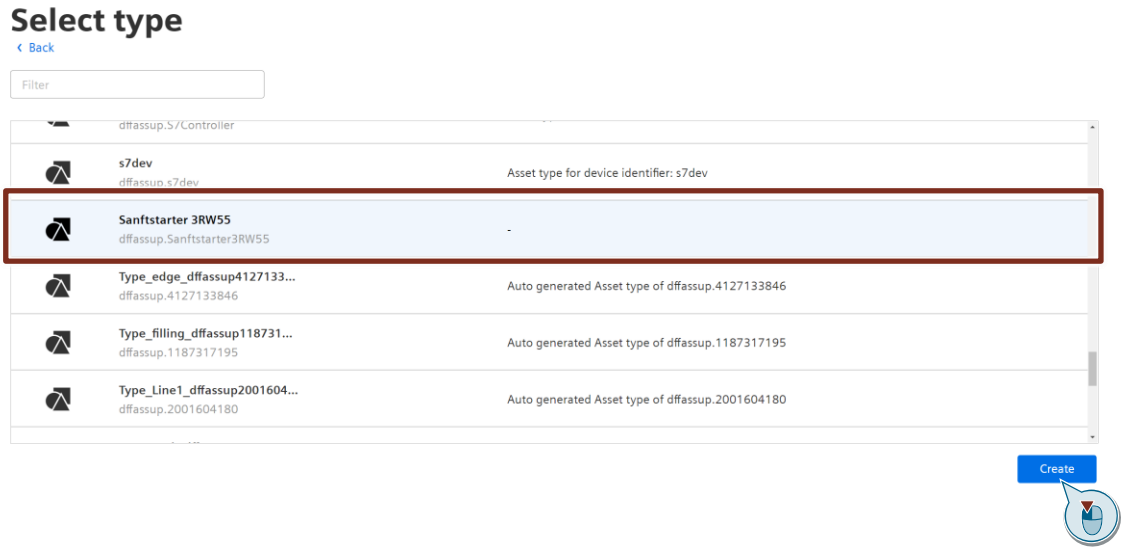
Figure 3-20



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3. You have now created your types for the soft starter and must now create an instance of this type.
   a. For this, return to the "Assets" tab in Asset Manager.
   b. Navigate through the asset tree to place the asset at a suitable location for it.
   c. Select "Add asset".
   d. Find your asset type in the list and select it.

Figure 3-21

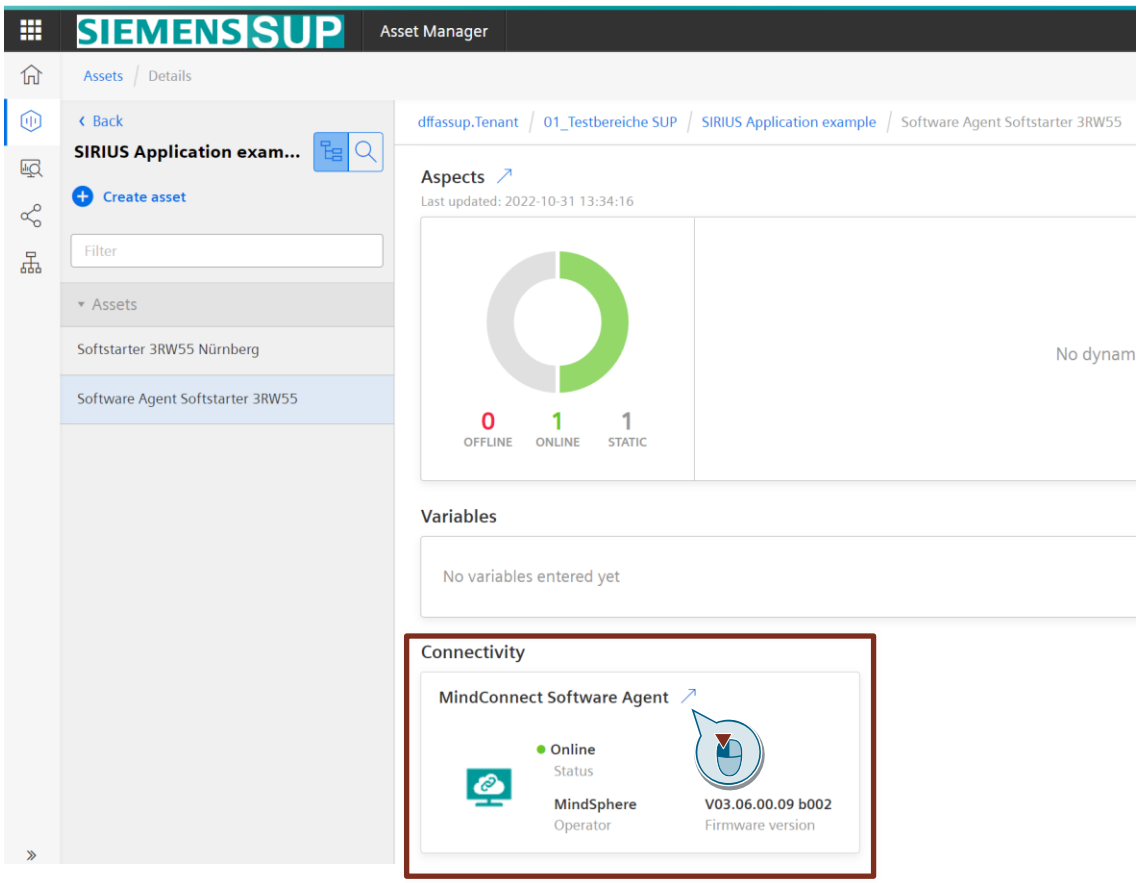


   e. Assign a name and optionally a description as well as the location of your asset and save it.

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4. You now have an asset that reflects that data model of your soft starter.
   In order for this data to now be populated, you only have to complete the mapping. Change back to the configuration of your MindConnect agent.

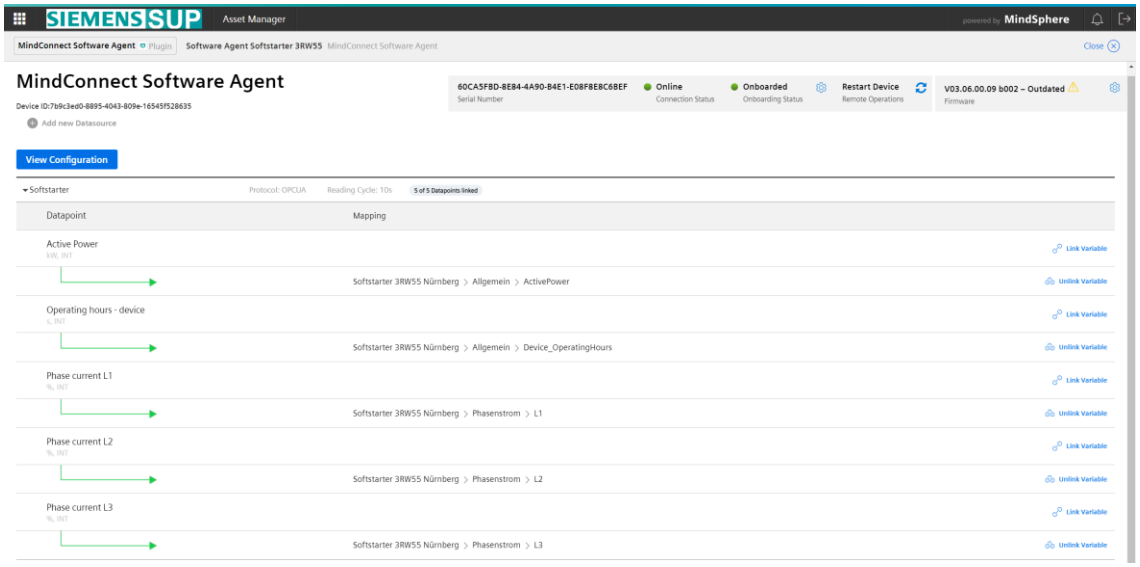
   Figure 3-22



   a. Select the "View Configuration" option.
   b. Now link the variables using the "Link Variable" button.
   c. In the popup, select the options "Change" > "Back" to change to your asset instance in the asset tree. (This applies only if your asset instance is on the same level with the MindConnect element in the asset tree. If the position is different, move further through the tree to find your asset instance).
   d. Select your asset instance with "Accept".
   e. Now select the appropriate variable with "Link Variable".
   f. Repeat these steps for each variable.

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Figure 3-23

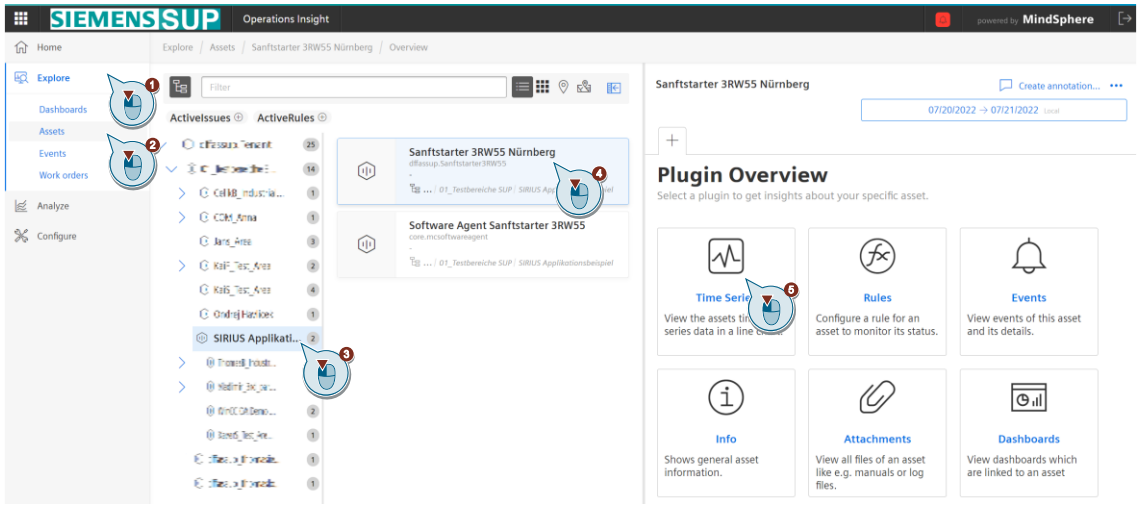


You have now successfully completed all the steps needed to display and evaluate the data of your soft starter in MindSphere.

For this, you can use the MindSphere application Operations Insight, for example.

1. To do this, go back to your MindSphere launch pad and start the Operations Insight application.
2. There, go to the "Explore" > "Assets" tab and navigate to your soft starter asset.
3. Now select the "Time Series" tile under "Plugin Overview".

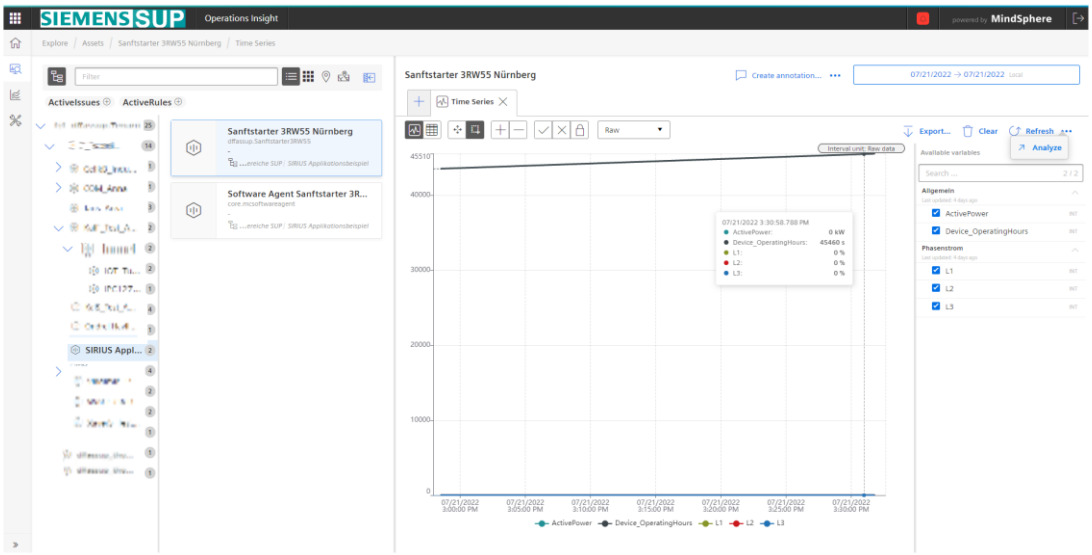
Figure 3-24



4. Here, you can now select and graphically display the datapoints you defined.

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Figure 3-25



Note

You can use this data for further calculations with various other applications such as Performance Insight and Visual Flow Creator.

With the MindSphere application Notifier, you can also push notifications directly to your smartphone once an alarm threshold is reached.

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4 Appendix

4.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:

support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts.

Please send queries to Technical Support via Web form:

siemens.com/SupportRequest

SITRAIN – Digital Industry Academy

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:

siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:

support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" APP. The app is available for iOS and Android:

support.industry.siemens.com/cs/ww/en/sc/2067

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4.2 Industry Mall



The Siemens Industry Mall is the platform on which the entire siemens Industry product portfolio is accessible. From the selection of products to the order and the delivery tracking, the Industry Mall enables the complete purchasing processing – directly and independently of time and location:
mall.industry.siemens.com

4.3 Links and references

Table 4-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the Entry page of the application example https://support.industry.siemens.com/cs/ww/en/view/109815692
\3\	Link to the overview of the SIRIUS 3RW5 Soft Starter https://support.industry.siemens.com/cs/ww/en/view/109747404

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4.4 Change documentation

Table 4-2

Version	Date	Modifications
V1.0	01/2023	First version