

Edge

Edge app Data Service for Industrial Edge

Application Manual

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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

1.1 Security information

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement - and continuously maintain - a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit:

<https://www.siemens.com/industrialsecurity> (<https://new.siemens.com/global/en/company/topic-areas/future-of-manufacturing/industrial-security.html>)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under:

<https://www.siemens.com/industrialsecurity> (<https://new.siemens.com/global/en/company/topic-areas/future-of-manufacturing/industrial-security.html>)

1.2 Note on EU General Data Protection Regulation

Data protection

Siemens observes the principles of data protection, in particular the principle of data minimization (privacy by design). For the Data Service for Industrial Edge product, this means: the product processes/stores the following personal data: The token from Industrial Edge Management to verify authentication.

No private or intimate data is processed or stored.

The above data are required for the login, the billing function and for the internal user administration (administrator can see the role and the status of other users). The storage of data is appropriate and limited to what is necessary, as it is essential to identify the authorized

operators. The data needs to be maintained manually by you and if necessary, these can also be deleted. If you need support, please contact customer support.

The above data will not be stored anonymously or pseudonymized, because the purpose (identification of the operating personnel) cannot be achieved otherwise.

The above data is protected against loss of integrity and confidentiality by state-of-the-art security measures.

1.3 Security Information for Industrial Edge Apps

Security information (assumptions/constraints) for Industrial Edge Apps is as follows:

- Only authorized internal operators will have access to Industrial Edge Device within a secure network using VPN connection.
- Perimeter firewall configuration responsibility lies with the end customer.
- The security guidelines for usage of USB Flash Drives in the shop floor area are applied accordingly.
- Creating users with appropriate access rights upon commissioning is the responsibility of the operator.
- The customer is responsible for configuring the application on the basis of the system requirements and technical capabilities of the documented App according to the Installation / User Manual such that the automation system performance is not impacted.
- The system is installed in an environment ensuring that physical access is limited to authorized maintenance personnel only. Managing unauthorized attachment of removable devices is the responsibility of the operator.
- The platform including hardware, firmware and operating system is securely configured and maintained by the operator.
- The operator is capable of protecting the environment from malware infection.
- Centralized IT security components (Active Directory, Centralized IT Logging Server) are provided and well secured by the operator and are trustworthy.
- The operator personnel accessing the system is well trained in the usage of the system and general information security aspects like password handling, removable media, etc.
- The operator is responsible for the CIA (Confidentiality, Integrity and Availability) of data stored outside the Industrial Edge Device.
- The operator is responsible for configuring the CPUs with appropriate read/write access levels (legitimization), and for configuring the Industrial Edge Apps using appropriate passwords for data collection from CPUs.
- The customer takes care about the time synchronization of Industrial Edge Management and Industrial Edge Device.

1.4 Overview of Industrial Edge

Siemens Industrial Edge is the next generation of digital automation. With Industrial Edge, you use intelligence and scalability of the cloud directly in your manufacturing - in a simple, high-performance manner and without your data leaving the manufacturing process. Industrial Edge combines local and high-performance data processing directly in automation with the advantages of the cloud: app-based data analysis, data processing and Infrastructure-as-a-Service concepts with central update functionality. In this way, you can quickly integrate apps into manufacturing and manage them with a high degree of automation.

Industrial Edge gives you the opportunity to continuously make changes to your automation components and plants, analyze large volumes of data in automation to realize innovative functions, such as preventive maintenance, and to obtain maximum flexibility and thus productivity over the entire machine life cycle.

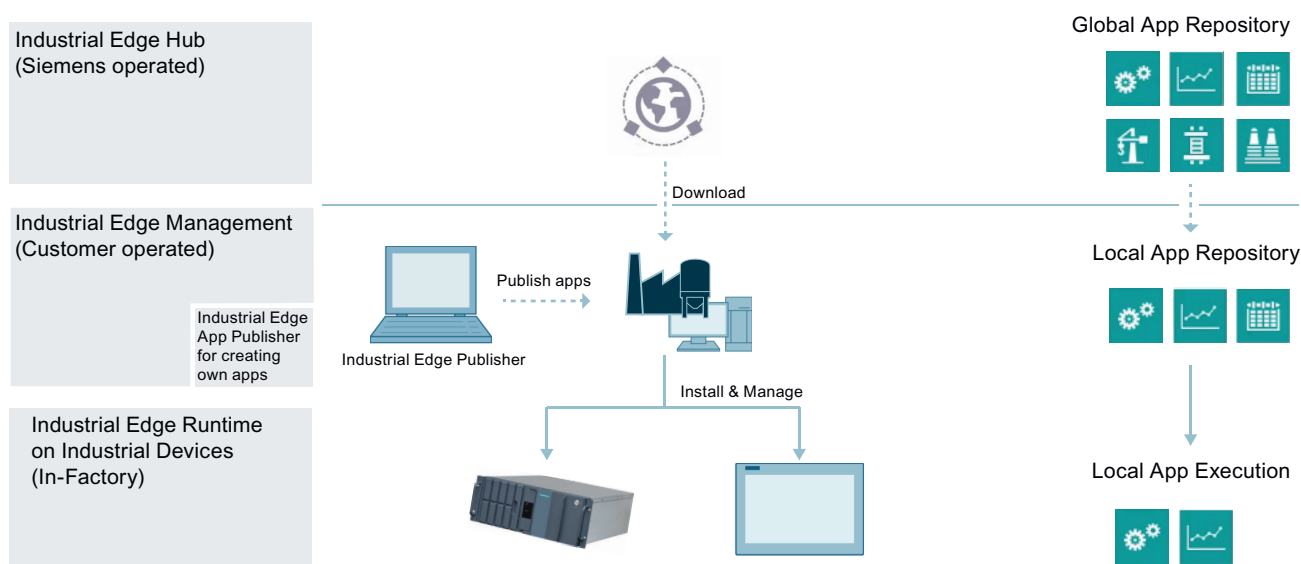
With the Industrial Edge Hub, an App Store is available to you where you can find all Siemens apps and 3rd-party apps. From here, you can manage all licenses for your apps and devices centrally and install updates for security issues, device firmware, apps and Industrial Edge Management.

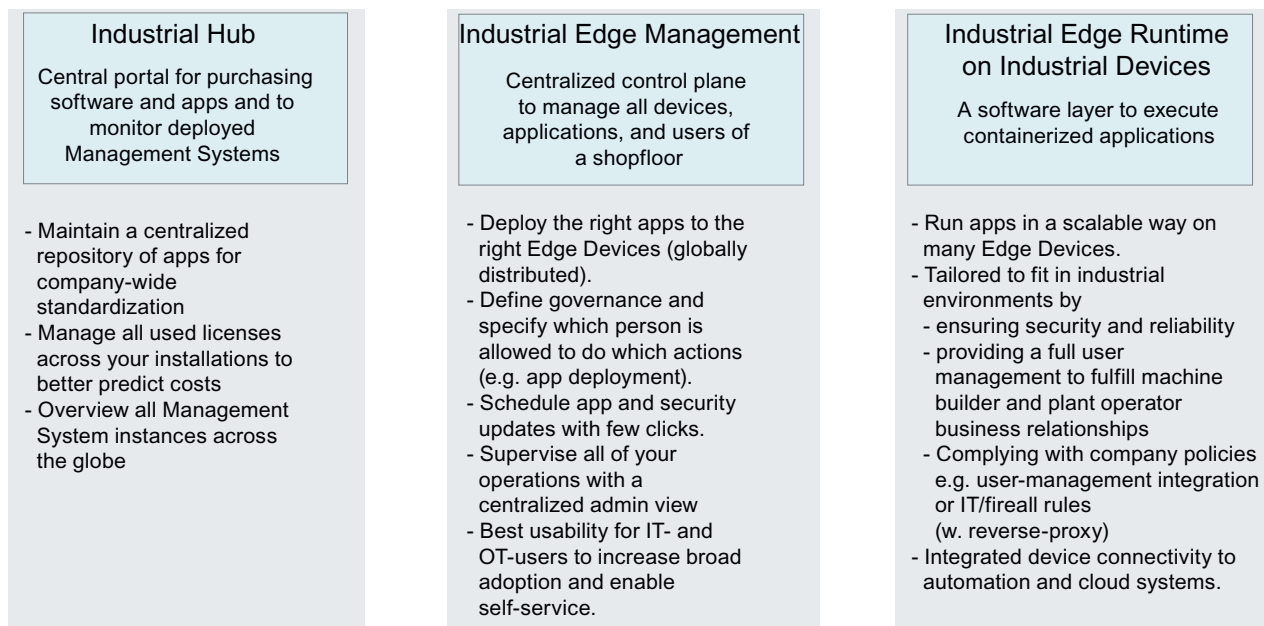
You can monitor and manage distributed Edge devices centrally in the Industrial Edge Management. In this way, new apps and software functions, for example, can be installed on all connected Edge devices company-wide. Central software management thus minimizes the workload for performing maintenance and updates on individual devices.

On the individual Industrial Edge devices, you can start and run apps and keep statistics on an Edge device, for example.

With the Industrial Edge Publisher, you can develop your own Edge apps and make them available to other users in Industrial Edge Management.

Another component of the Industrial Edge ecosystem is Industrial Edge Runtime, which is installed on Edge Devices (IED) or Unified Comfort Panels (UCP) and on which the system, including all applications, ultimately runs.



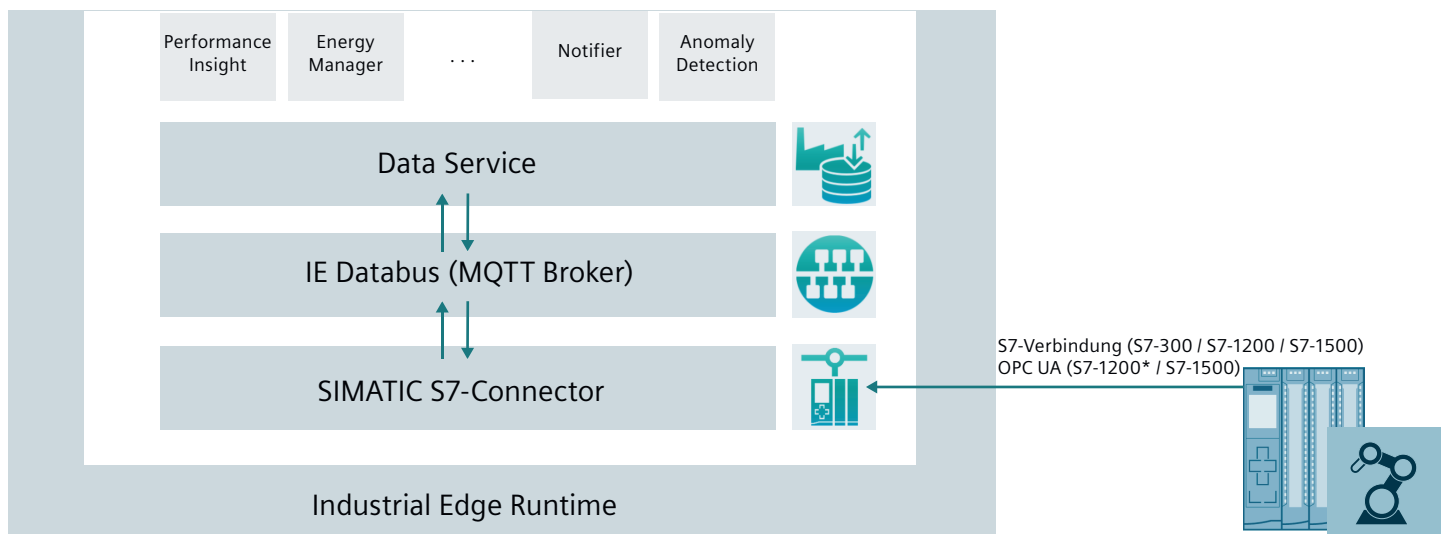


1.5 Function overview

Using the Data Service app, you connect other apps, such as the Performance Insight, to the IE Databus (MQTT Broker) or to a Unified Comfort Panel (Open Pipe). In the Data Service, you can group the data and save it for a certain time. The IE Databus receives the data directly from the plant with the aid of adapters, such as an S7 Connector.

In the Data Service, the metadata topic is read out from the IE Databus; variables can then be created based on this metadata.

You can model the structure of your industrial process using assets and aspects and divide it into logical units, for example, one asset per machine.



Definition of an asset

An asset is a digital representation of a machine or automation system with one or more automation units (e.g. PLC).

The data that describes an asset is collected and transferred. The data is then made available for further processing and evaluation.

Definition of an aspect

An aspect is a mechanism for data modeling of assets. Aspects group related data points (topics) based on their logical assignment.

Example: A machine has an "Energy consumption" aspect that contains the datapoints "Performance", "Power", "Voltage", etc. The aspect is defined in the Data Service and its name can be freely selected. An aspect can consist of several variables.

Functions of the app

The Data Service app offers the following functions:

- Create and configure assets
- Create aspects and variables for data evaluation
- Link data sources with aspects and variables

Browser recommendation

You require an HTML5-capable Internet browser to run the app.

We recommend the Google Chrome web browser. You should preferably use 1920x1080 resolution.

The app can run on any mobile device with an HTML5-enabled browser. Tablets are recommended.

Internet Explorer is no longer supported as of version 11.

Expiration date of the trial version for the Unified Comfort Panel

The trial version of the Data Service app is free of charge and expires on December 31, 2021. If you want to continue using the app, please order the appropriate license.

Installation

2.1 Validity of the documentation

Description

The "Data Service for Industrial Edge" documentation is valid for the installation of the app on an Edge device as well as on a Unified Comfort Panel (UCP).

The differences are highlighted in the respective sections.

2.2 Overview of additional documentation

Overview

The following table lists additional documents that supplement this description, some of which are available on the Internet.

Documentation	Main contents
Industrial Edge Hub (https://iehub.eu1.edge.siemens.cloud)	This page describes the functions of the Siemens Industrial Edge platform (IE Hub) and the functionalities of the Industrial Edge Management (IEM) system.
System overview (https://new.siemens.com/global/en/products/automation/topic-areas/industrial-edge/simatic-edge.html)	This page provides an overview of all Edge solutions.

2.3 System requirements

Note the following system requirements for the installation of the Edge Apps.

Software requirements

The following Internet browsers are required:

- Google Chrome, Version ≥ 72
- Firefox Version ≥ 62

Hardware requirements

- A device on which the Industrial Edge Management (IEM) is running (VM - ISO: Version 1.0.8)
- An Edge device (IED) that is compatible with Industrial Edge Management:
 - IED Model: SIMATIC IPC 227E Nanobox or Unified Comfort Panel (UCP) for example
 - IED Version: ied-os-1.0.0-34-amd64
 - Hard disk: At least 10 GB available
 - RAM: 2 GB available RAM
- The Edge device must be on board the Industrial Edge Management.
IEM, IED, and web browsers must be synchronous in the UTC time zone.

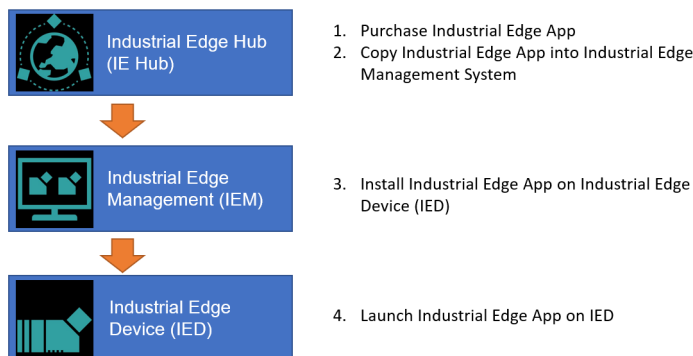
2.4 Installing Data Service on an IED via IE Hub

2.4.1 Overview of the installation process

Description

In the graphic below you can see the steps involved in the installation of an Industrial Edge app on an Industrial Edge device:

Installation process of an Industrial Edge App via Industrial Edge Hub



Note

System app

The Data Service app is a system app, which means you do not need a license. You can copy the app directly in the IE Hub from the "Library" tab to your Industrial Edge Management instance.

Additional information is available here:

1. Copying the Data Service app from the IE Hub to the IEM catalog (Page 13)
2. Installing the Data Service app on the IED (Page 15)
3. Starting the Data Service app on the IED (Page 16)

2.4.2 Copying the Data Service app from the IE Hub to the IEM catalog

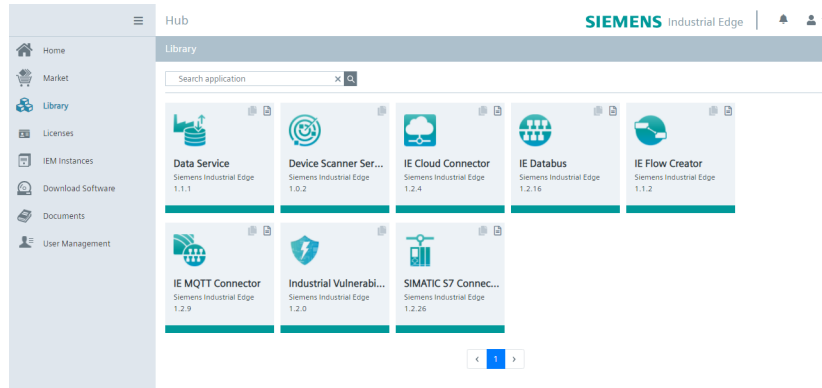
Description


An IEM instance and an Internet connection are required to copy an app into the Industrial Edge Management (IEM) catalog. With this functionality, you can copy the app directly into a catalog of one of your IEM instances.

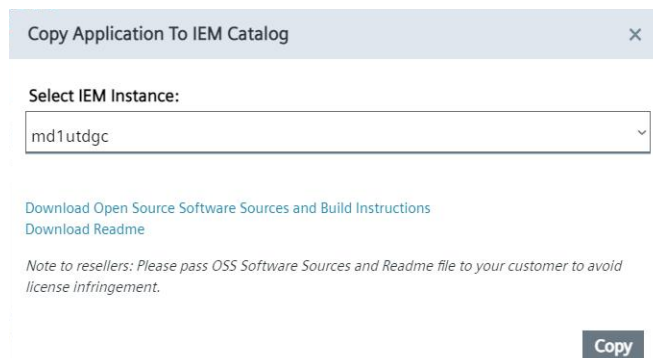
Procedure

To copy an app into the IEM catalog, follow these steps:

1. Open the "Library" tab in the Industrial Edge Hub.




2. Click the icon  in the desired app tile.
The "Copy Application to IEM catalog" dialog box opens:



The layout of the dialog box depends on whether the app contains links for Open Source Software (OSS) and for the readme. The relevant file is downloaded when you click on one of the links. If the app does not support these links, the dialog box is shown without links.

3. In the "Select IEM Instance" drop-down list, select the IEM instance to which you want to copy the app.
4. Click "Copy".
The app is copied, and a corresponding job is created. You can follow the status of the job in the status window of the corresponding IEM instance.

User documentation in the IE Hub

In the "Library" tab of the IE Hub, you can jump directly to the Siemens Industry Online Support by using the icon  in the tile of an app. There, you can download the user documentation of the respective app.

2.4.3 Installing the Data Service app on the IED

Description

You can install and start the Data Service app in the catalog of the Industrial Edge Management (IEM) instance.

Requirement

- You must be logged into the Industrial Edge Management (IEM).
- The Data Service app was copied to the catalog. You can find additional information here: Copying the Data Service app from the IE Hub to the IEM catalog (Page 13)

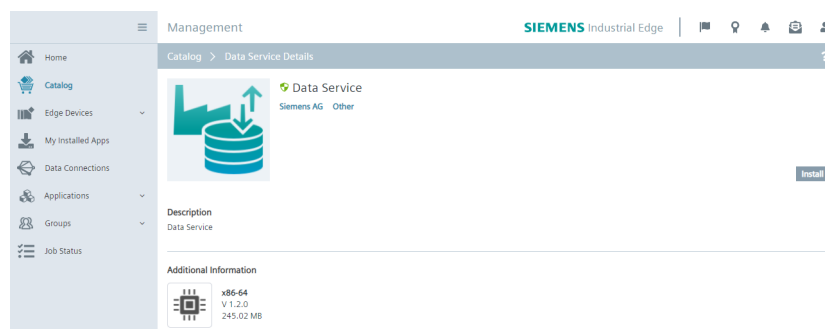
Procedure

To install the Data Service app, follow these steps:

1. Open the "Catalog" tab.

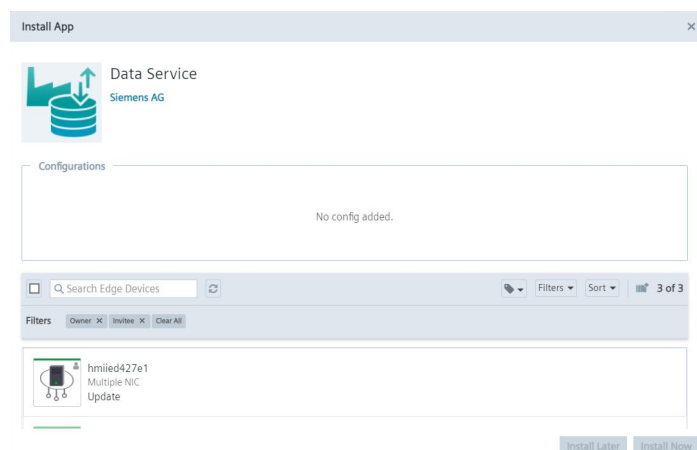
2. Click on the "Data Service" tile.

The following dialog box opens:



3. Click "Install".

The "Install App" dialog window is displayed.



2.4 Installing Data Service on an IED via IE Hub

4. You can see a table with all associated IEDs. Select one or more IEDs on which you want to install the app:



5. You have two options to continue:
 - Click "Install Later" to schedule the date and time of the installation.
 - Click "Install Now" to install the app immediately.When you click "Install Now", you will receive the following message:
6. Click "Allow".
The installation of the apps is started on the selected IEDs.



Result

The Data Service app is listed in the "My Installed App" tab.

2.4.4 Starting the Data Service app on the IED

After you have installed the Data Service app on the IED, the app is displayed in the "Industrial Edge Management" in the "My Installed Apps" view.

Requirement

The app must be installed on the Industrial Edge Device (IED).

Procedure

To start the Data Service app, follow these steps:

1. Open the start page of the IED by entering the following URL address:
"https:\\[IP address of the IED]"
2. Log in with "Username" and "Password":

Sign in

Username (Email)
|

Password

Sign in

[Sign up](#)
[Verification Code](#)
[Certificate](#)

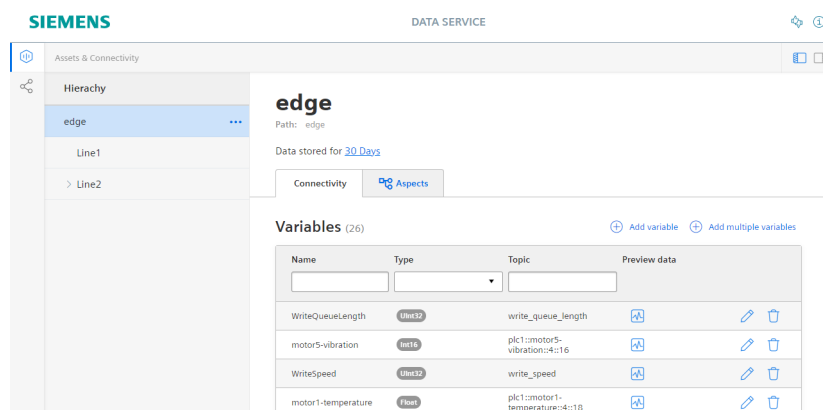
3. Open the "Apps" tab:



4. Click the Data Service tile to open the app in the browser.

Result

The Data Service app is opened in the browser:



2.5 Installing the Data Service app on a panel

2.5.1 Downloading and installing the Data Service app

Description

You can install and start the Data Service app on your Unified Comfort Panel (UCP) by downloading the APP files from the Siemens Industry Mall and transferring them to your panel.

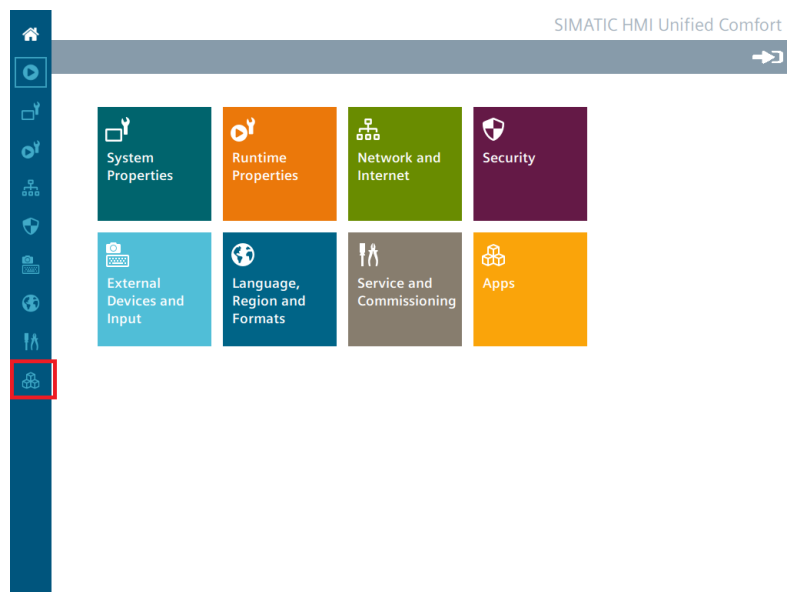
Requirement

- You need the APP files of the Data Service app
With the Data Service app, you model the structure of your industrial process using assets and aspects and create the database for the Performance Insight app, for example.

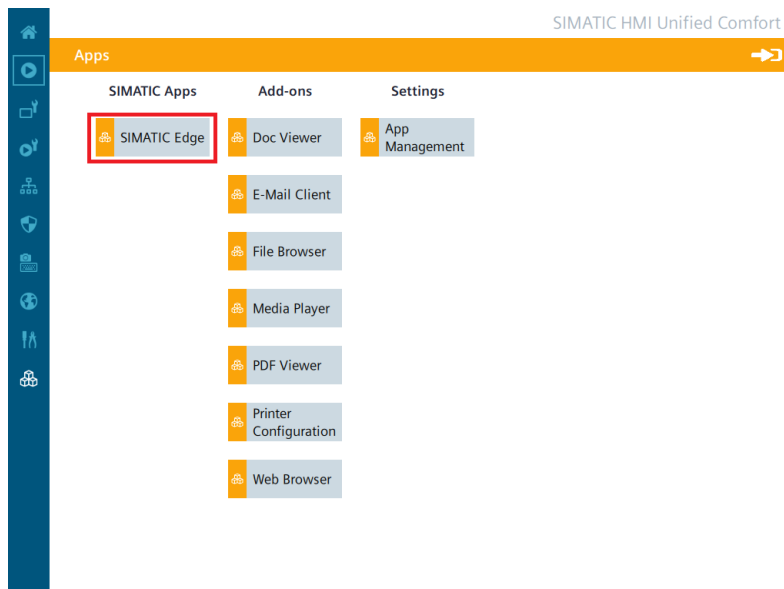
Procedure

To install the Data Service app on your panel, follow these steps:

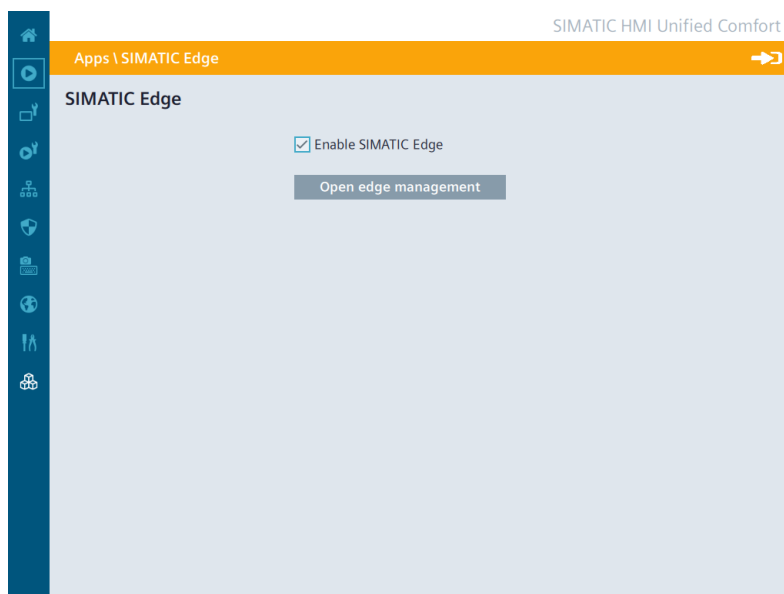
1. Download the app files from the Siemens Industry Online Support (SIOS).
2. Unzip the downloaded ZIP package.
3. Transfer the "DataService.x.app" file to your panel, for example, by using a USB flash drive.
4. Click the "Apps" tab or tile on your panel:



5. Click "SIMATIC Edge" under "SIMATIC Apps":



6. Select the "Enable SIMATIC Edge" option and click on "Open edge management":

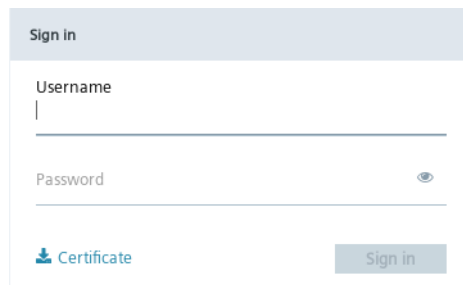


7. Log into the Industrial Edge Management by clicking "Sign in":



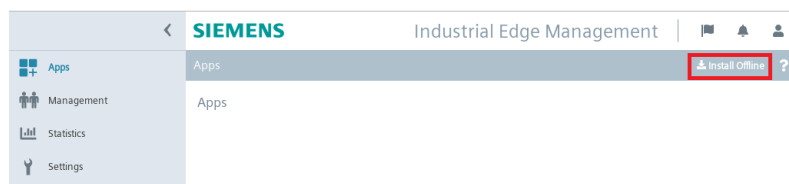
2.5 Installing the Data Service app on a panel

8. Log in with "Username" and "Password":



The image shows a 'Sign in' form. At the top is a header 'Sign in'. Below it are two input fields: 'Username' and 'Password'. The 'Password' field has an eye icon to its right. Below the 'Username' field is a 'Certificate' link with a small icon. At the bottom right is a 'Sign in' button.

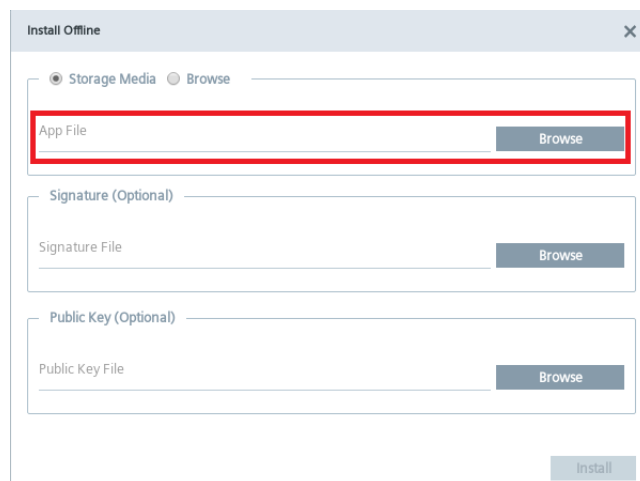
9. Click "Install Offline":



The "Install Offline" window opens.

10. You have the following two options for selecting the APP files:

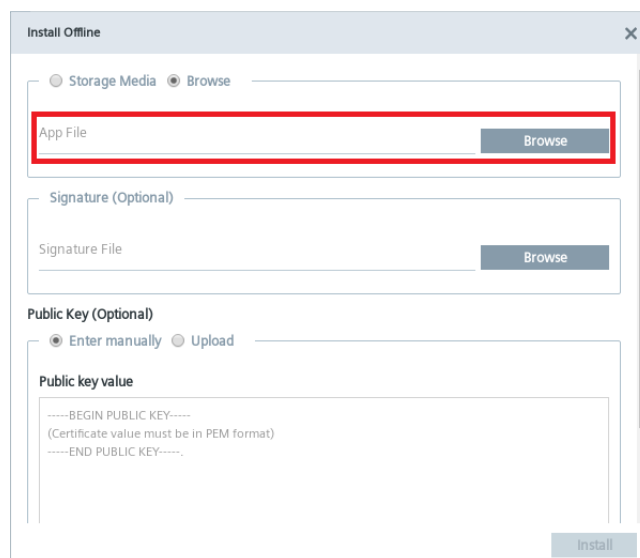
- If the files on the storage medium, for example a USB stick, then select "Storage Media" and click "Browse" in the "App File" area:



The screenshot shows the 'Install Offline' dialog box. At the top, there are two radio buttons: 'Storage Media' (which is selected) and 'Browse'. Below this, there are three sections. The first section is 'App File', which has a text input field and a 'Browse' button; this entire section is highlighted with a red rectangle. The second section is 'Signature (Optional)', with a 'Signature File' input field and a 'Browse' button. The third section is 'Public Key (Optional)', with a 'Public Key File' input field and a 'Browse' button. At the bottom right of the dialog is an 'Install' button.

The storage area on the storage medium opens and you can select the required APP file.

- If you have copied the files on the storage medium, for example a USB stick, to the system storage on the panel, then select "Browse" and click "Browse" in the "App File" area:



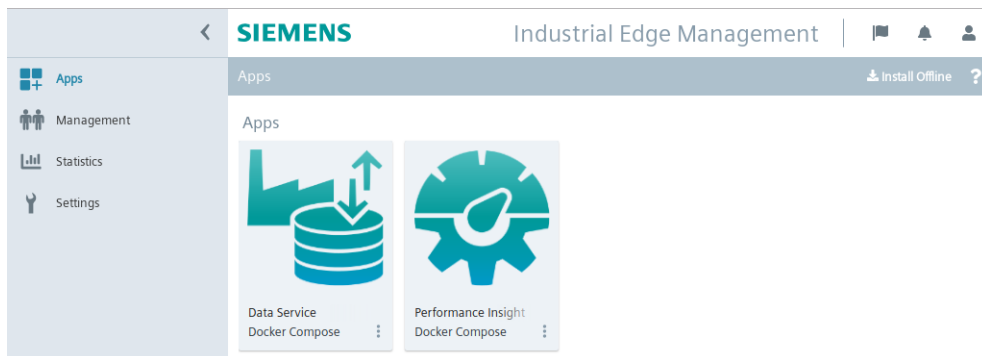
The screenshot shows the 'Install Offline' dialog box. At the top, there are two radio buttons: 'Storage Media' and 'Browse' (which is selected). Below this, there are three sections. The first section is 'App File', which has a text input field and a 'Browse' button; this entire section is highlighted with a red rectangle. The second section is 'Signature (Optional)', with a 'Signature File' input field and a 'Browse' button. The third section is 'Public Key (Optional)', which has two radio buttons: 'Enter manually' (selected) and 'Upload'. Below these is a 'Public key value' input field with placeholder text: '-----BEGIN PUBLIC KEY-----', '(Certificate value must be in PEM format)', and '-----END PUBLIC KEY-----'. At the bottom right of the dialog is an 'Install' button.

The system storage of the panel opens and you can select the required APP file.

11. Click "Install".

Result

The Data Service app is installed on the panel:



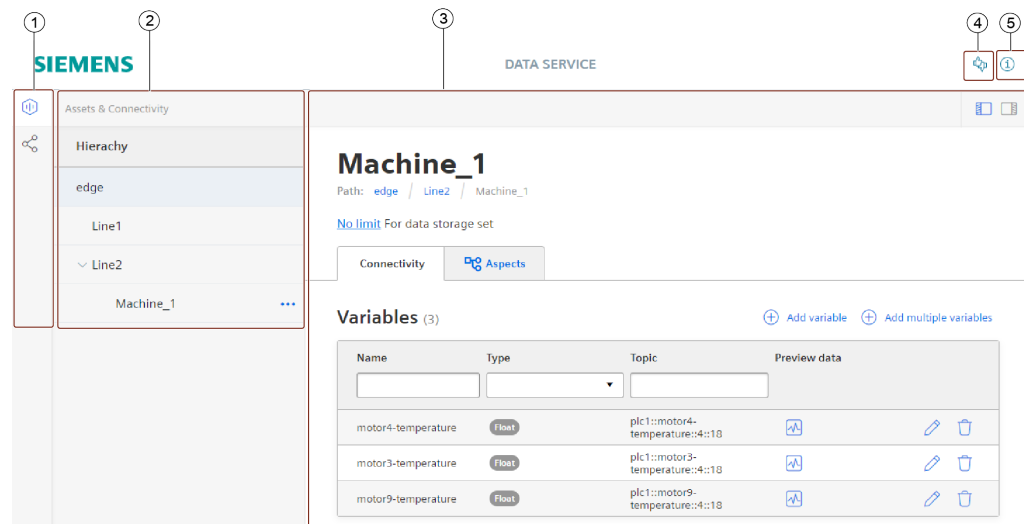
Structure of the app

Dashboard

The interface of the Data Service app is divided into the following areas:

- (1) Navigation area:
 - Assets & Connection
 - Adapter
- (2) Selection list
- (3) Detail view
- (4) Give feedback
- (5) Further information on the Data Service app

You operate the Data Service by selecting an asset in the selection list, for example, and creating, editing and deleting variables in the "Connectivity" tab:



Note

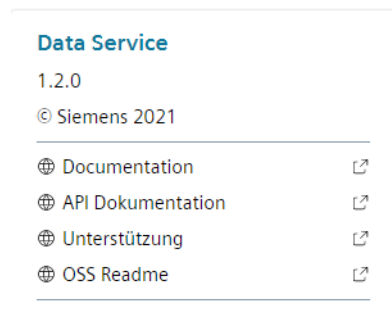
Difference from the view on a panel

On a panel, the topic of the variable is, for example, named as follows:

- plc1::motor4-temperature::4:18 => EITankLevel

Version of the app

Click on the ⓘ icon in the title bar to view the version, copyright, and links to documentation and to the Industry Online Support:



Quality codes

Description

The quality code measures the quality of the connection from a CPU via the adapter to the respective app, for example, Data Service. When the quality is bad, that is, it has a BAD_... quality code, the value is <> Not equal to True.

For the Data Service app, this means that a value with Quality Code <> Not equal to TRUE is passed on to other apps, such as Performance Insight, but it is ignored in the app. This value is then not taken into account for the calculation of KPIs, for example.

The following table is based on the OPC UA standard and shows the quality codes possible for OPC UA and S7:

Quality code (hex)	Quality code (dec)	Quality	Description
0x00000000	0	GOOD	Good quality, all values could be read.
0x00BA0000	12189696	GOOD_INCOMPLETE	Good quality, but the values may be incomplete. A least 1 value could be read.
0x002F0000	3080192	GOOD_OVERLOAD	Sampling has slowed down due to resource constraints.
0x40920000	1083310080	UNCERTAIN_INITIAL_VALUE	Uncertain initial value Quality of the value is worse than usual. It might still be possible to use the value.

The quality code has the binary 8-bit structure QQSSSSL. Digits 1 and 2 (QQ) of the quality code define the quality of the value. Digits 3 to 6 (SSSS) of the quality code specify the sub-status of the quality. Digits 7 and 8 (LL) are optional and define possible limits.

Editing assets

5.1 Creating assets

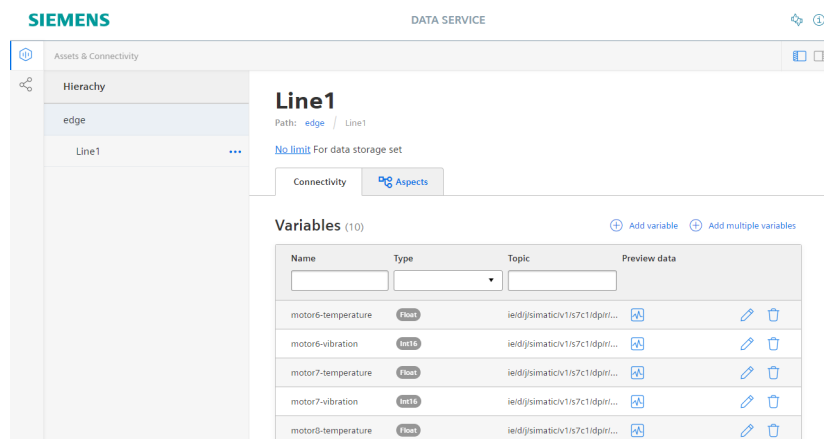
Description

In the "Hierarchy" tab, you can create assets and their child assets.

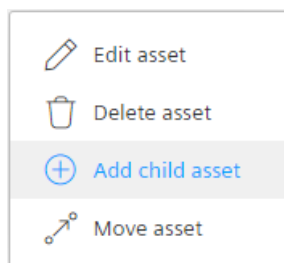
Procedure

To create an asset, follow these steps:

1. Click the three dots (ellipsis) in the corresponding row in the selection list:



2. Select "Add child asset" in the selection window that opens:



3. A dialog box is displayed:

Add asset

Name *

Enter asset name

Optional description field

* Required

Cancel Add asset

4. Fill in the "Name" field of the new asset.
5. Click "Add Asset".

Result

The new asset appears at the correct position in the hierarchy:

Hierarchy	
edge	
Line1	
Line2	...

Note

Difference from the view on a panel

On a panel, the topic of the variable is, for example, named as follows:

- Variable2 => EITankLevel
 - Variable6 => EITemperature
-

5.2 Moving assets

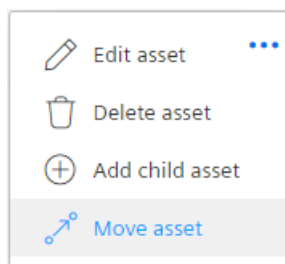
Description


In the "Hierarchy" tab, you can move assets and their child assets in the hierarchy.

Procedure

To move an asset, follow these steps:

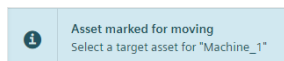
1. Select the asset you want to move. In the example below, "Machine_1".
2. Click on the three dots (ellipsis) in the corresponding row of the selection list.
3. Select "Move asset" in the selection window that opens:







4. All assets to which you can move the selected asset are marked with this blue arrow :

Hierarchy	
edge	
▼ Line1	
Machine_1	
Line2	 ...

5. A blue information box appears at the bottom left, indicating that the asset can be moved.



6. Select the target asset and click the blue arrow:

Hierarchy	
edge	
▼ Line1	
Machine_1	
Line2	 ...

Result

The moved asset is displayed in the desired position:

Hierarchy	
edge	
Line1	
▼ Line2	...
Machine_1	

5.3 Renaming assets

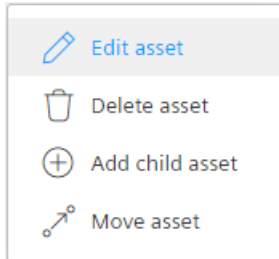
Description

In the "Hierarchy" tab, you can rename assets and their child assets.

Renaming an asset

To rename an asset, follow these steps:

1. Click on the three dots (ellipsis) in the corresponding row of the selection list.
2. Select "Edit asset" in the selection window that opens:



3. A dialog box is displayed.
4. Edit the name or the description of the asset.
5. Click "Update asset".

5.4 Deleting assets

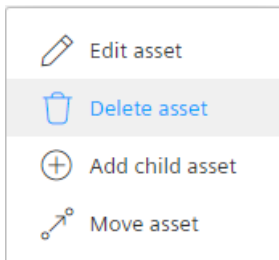
Description

In the "Hierarchy" tab, you can delete assets and their child assets.

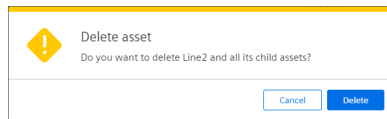
Procedure

To delete an asset, follow these steps:

1. Click on the three dots (ellipsis) icon in the corresponding row of the selection list, e.g. "Line1".
2. Select "Delete asset" in the selection window that opens.



3. A warning is displayed.
If you select an asset with child assets, then the child assets are also deleted.



4. Click "Delete".

5.5 Setting the data storage

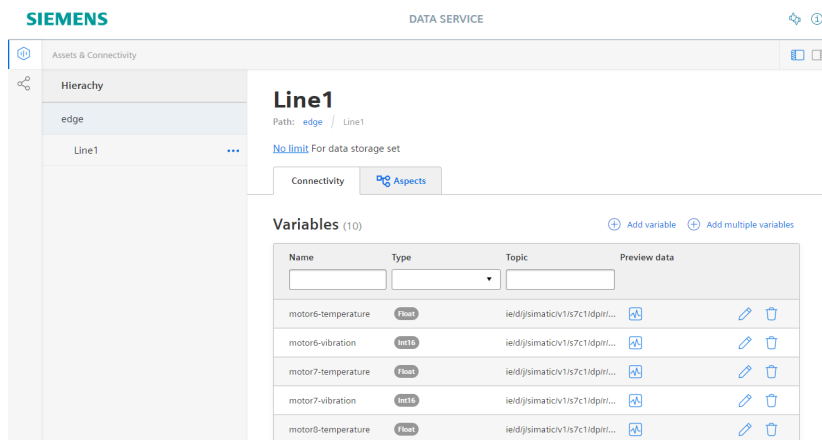
Description

In the "Hierarchy" tab, you can set the data storage period individually for each asset. The data is deleted from the memory after this time.

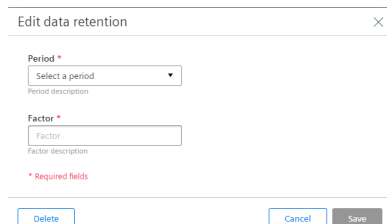
Procedure

To set the data storage of an asset, follow these steps:

1. Select the corresponding row in the selection list. In the example below, "Line1".



2. Click the limit information in the second row of the detail view. In the example "No limit".
The "Edit data retention" dialog box is displayed:



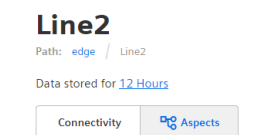
3. Select a time period. The following options are available: Second, minute, hour, day, week, month, quarter and year.

5.5 Setting the data storage

4. Write the desired number in the "Factor" input field.
5. Save the setting.

Result

The limit information in the detail view is changed. In the example below, "12 Hours".



Edit adapter

6.1 Overview

Description

Using the adapters, you can, for example, transfer measured value series of selected data points from an automation system to the Industrial Edge Runtime of the respective Industrial Edge Device (IED). The Industrial Edge Runtime sends this data to the Industrial Edge Databus (IE Databus). You can then use the data collected via the IE Databus and Data Service for your Industrial Edge apps, such as Performance Insight, or other applications.








For this purpose, the Data Service subscribes to the metadata of the PROFINET IO Connector, for example, to know the possible tags that the adapter provides. After reading the metadata, the Data Service offers the available tags when creating a variable. The Data Service stores all created variables and makes them available to other apps as a database.



The following adapters are available by default:

- Ethernet IP Connector
- HMIRuntime-Adapter (Unified Comfort Panel)
- Modbus TCP Connector
- Profinet IO Connector
You can find more information about the documentation here: PROFINET IO Connector (<https://support.industry.siemens.com/cs/ww/en/view/109793251>)
- SIMATIC S7 Connector
You can find more information about the documentation here: SIMATIC S7 Connector (<https://support.industry.siemens.com/cs/document/109795606/simatic-s7-connector-configurator?dti=0&pnid=28189&lc=en-WW>)
- System Info
The System Info adapter offers the following variables, among other things:
 - TotalHeapSize
 - TotalAvailableSize
 - UsedHeapSize
 - WriteQueueLength
 - WriteQueueValueCount
 - WriteSpeed
 - WriteInsertCount
 - WriteRequestCount
 - DatabaseSize


Status and connection of the adapters

You can see from the icons whether an adapter is connected or not:

Adapters	
Ethernet IP Connector	
HmiRuntime	
Modbus TCP Connector	
Profinet IO Connector	
SIMATIC S7 Connector	
System Info	

Symbol	Meaning
	The adapter is connected to the IE Databus or the topic. This means metadata has been received via the metadata topic.
	The adapter has no connection.

Adding self-developed adapters

You can use the icon  to add adapters you have developed yourself.

Note

User name and password

The user name and password must be configured in the MQTT broker, or in the IE Databus, and then entered in the adapter.

MQTT adapter

The Ethernet IP Connector, Modbus TCP Connector, Profinet IO Connector, SIMATIC S7 Connector and System Info adapters use the "Message Queue Telemetry Transport" (MQTT) protocol. The connection to an MQTT broker must be configured.

You can find more information about the MQTT broker based on a function block in the TIA Portal here: MQTT Publisher for SIMATIC S7 Connector (<https://support.industry.siemens.com/cs/ww/en/view/109748872>)

HMTIRuntime adapter (Open Pipe Path)

SIMATIC HMI WinCC Unified Open Pipe is an openness concept based on pipe technology for connecting the Data Service to WinCC Unified RT. Compared to Openness RT (ODK), SIMATIC HMI WinCC Unified Open Pipe provides a limited amount of functionality. As a result, the connection code can be written in any programming language that supports pipe technology. Even batch access to the pipe is possible. The available commands let you communicate with WinCC Unified RT using variables and alarms.

For more information, see the WinCC Unified Open Pipe Manual (<https://support.industry.siemens.com/cs/ww/en/view/109778823>)


6.2 Add adapter (self-developed)

Description

In the "Adapter" tab, you can also add self-developed adapters based on the MQTT protocol.

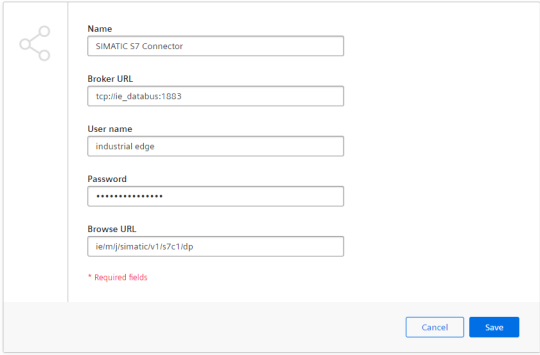
Procedure

To add an adapter, follow these steps:

1. Click the "Adapter" tab.
2. Click on the  icon.
The following view opens:

Add adapter

Settings for the adapter




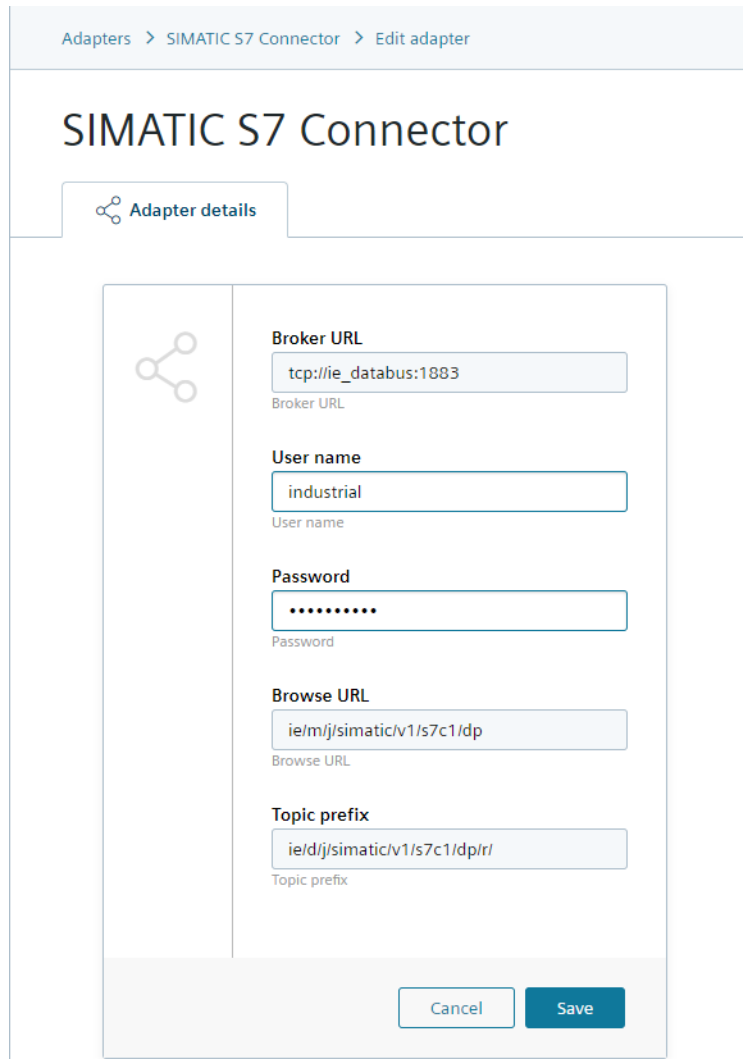
3. Enter the name.
4. Enter the broker URL for data transfer via IE Databus. (MQTT Broker)
5. Enter the user name and password.

Note

User name and password

The user name and password must be configured in the MQTT broker, or in the IE Databus, and then entered in the corresponding adapter and in the Data Service, respectively.

6. Enter the browse URL.
This is the storage of the metadata; the Data Service needs the information on which tags in which topic are provided by the adapter.
The information in the "Browse URL" field must match the topic that was configured in the adapter.
7. Click "Save".
8. Click the  icon in the detail view.
The following view opens:




The screenshot shows the 'SIMATIC S7 Connector' adapter configuration page. The breadcrumb trail at the top is 'Adapters > SIMATIC S7 Connector > Edit adapter'. The main title is 'SIMATIC S7 Connector'. Below it is a tab labeled 'Adapter details' with a share icon. The form contains five input fields, each with a label, a value, and a smaller label below it: 'Broker URL' with value 'tcp://ie_databus:1883', 'User name' with value 'industrial', 'Password' with value '.....', 'Browse URL' with value 'ie/m/j/simatic/v1/s7c1/dp', and 'Topic prefix' with value 'ie/d/j/simatic/v1/s7c1/dp/r/'. At the bottom right are 'Cancel' and 'Save' buttons.

Adapters > SIMATIC S7 Connector > Edit adapter

SIMATIC S7 Connector

Adapter details



Broker URL
tcp://ie_databus:1883
Broker URL

User name
industrial
User name

Password
.....
Password

Browse URL
ie/m/j/simatic/v1/s7c1/dp
Browse URL

Topic prefix
ie/d/j/simatic/v1/s7c1/dp/r/
Topic prefix

Cancel Save


9. Enter the desired "Broker URL".
10. Enter the user name and password and save the setting.

Result

The "SIMATIC S7 Connector" adapter has been added and the connection is activated:

SIMATIC S7 Connector

Settings for the adapter



	Status
	ACTIVE
	Connection
	CONNECTED
	tcp://ie-databus:1883
	Broker URL
industrial	
User name	

Password	
ie/mj/simatic/v1/s7c1/dp	
Browse URL	

6.3 Activating of deactivating an adapter (default)

Description

In the "Adapter" tab, you can activate or deactivate existing adapters.

6.3 Activating or deactivating an adapter (default)

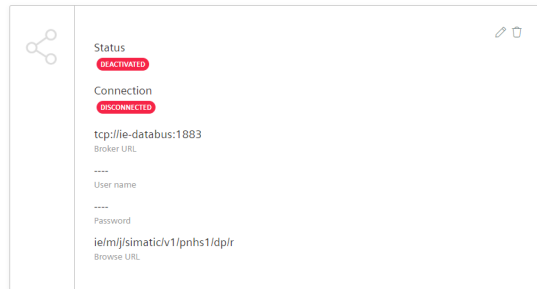
Procedure

To activate an adapter, follow these steps:

1. In the "Adapter" tab, click on the desired adapter, e.g. Profinet IO Connector.

Profinet IO Connector


Settings for the adapter



The screenshot shows the settings for the Profinet IO Connector. On the left is a sidebar with a network icon. The main area displays the following information:

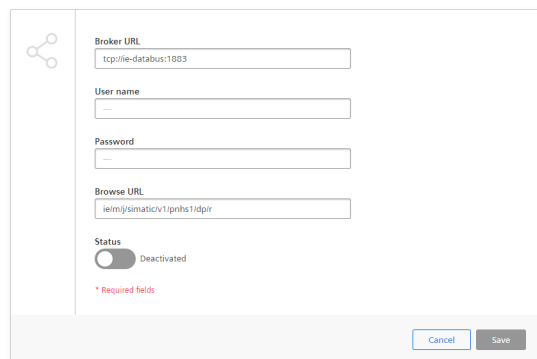
- Status:** DEACTIVATED (in a red box)
- Connection:** DISCONNECTED (in a red box)
- Broker URL:** tcp://ie-databus:1883
- User name:** (empty field)
- Password:** (empty field)
- Browse URL:** ie/mjsimaticv1/pnhs1dpl/r

In the detail view, the adapter is displayed with the status "DEACTIVATED" and the connection "DISCONNECTED".

2. Click on the  icon.
The following view opens:

Profinet IO Connector

Settings for the adapter



The screenshot shows the settings form for the Profinet IO Connector. It contains the following fields and controls:

- Broker URL:** Input field containing "tcp://ie-databus:1883".
- User name:** Input field.
- Password:** Input field.
- Browse URL:** Input field containing "ie/mjsimaticv1/pnhs1dpl/r".
- Status:** A toggle switch labeled "Deactivated".
- * Required fields:** A red asterisk indicating required fields.
- Buttons:** "Cancel" and "Save" buttons at the bottom right.

3. Enter the broker URL for data transfer via IE Databus. (MQTT Broker)
4. Enter the user name and password.

Note

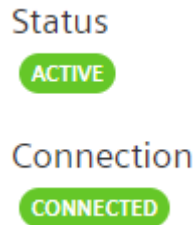
User name and password

The user name and password must be configured in the MQTT broker, or in the IE Databus, and then entered in the corresponding adapter and in the Data Service, respectively.

5. Enter the browse URL.
This is the storage of the metadata; the Data Service needs the information on which tags in which topic are provided by the adapter.
The information in the "Browse URL" field must match the topic that was configured in the adapter.
6. At the "Status", move the slider to the right to activate the adapter.
7. Click "Save".

Result

The adapter is now activated, and the status of the adapter is displayed in green:



Once the Data Service has successfully received the adapter metadata, the connection turns green, and you can select the appropriate tags when creating variables to save the data.


6.4 Deleting an adapter

Description

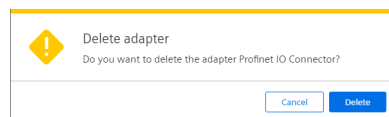
In the "Adapter" tab, you can delete adapters that already exist.

Procedure

To delete an adapter, follow these steps:

1. In the "Adapter" tab, click on the desired adapter, e.g. Profinet IO Connector.
2. Click the  icon in the upper right-hand corner.

The following view appears:



3. Click "Delete".

6.5 Assigning the HMIRuntime adapter (Unified Comfort Panel)

Description

SIMATIC HMI WinCC Unified Open Pipe is an openness concept based on pipe technology for connecting the Data Service to WinCC Unified RT. Compared to Openness RT (ODK), SIMATIC HMI WinCC Unified Open Pipe provides a limited amount of functionality. As a result, the connection code can be written in any programming language that supports pipe technology. Even batch access to the pipe is possible. The available commands let you communicate with WinCC Unified RT using variables and alarms.

6.5 Assigning the HMIRuntime adapter (Unified Comfort Panel)

For more information, see the WinCC Open Pipe documentation (<https://support.industry.siemens.com/cs/ww/en/view/109778823>).

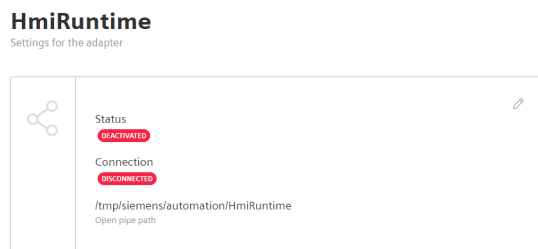
The Data Service connects to the pipe by name:


- Under Windows: "\\.\pipe\HmiRuntime"
- Under Linux: "/tmp/HmiRuntime"

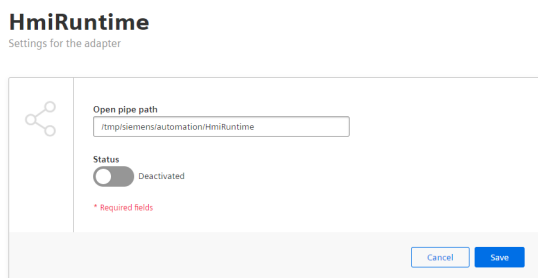
Procedure

To assign an HMIRuntime adapter, follow these steps:

1. In the "Adapter" tab, click the HMIRuntime adapter:



2. Click on the  icon:



3. Enter the corresponding open pipe path.
4. Move the slider to the right to activate the HMIRuntime adapter.
5. Click "Save".

Result

As soon as the pipe is open, you can send single line commands that must end with a line break ("
" or "
"). The response is returned using the same pipe instance.

Adding and editing variables

7.1 Adding a variable

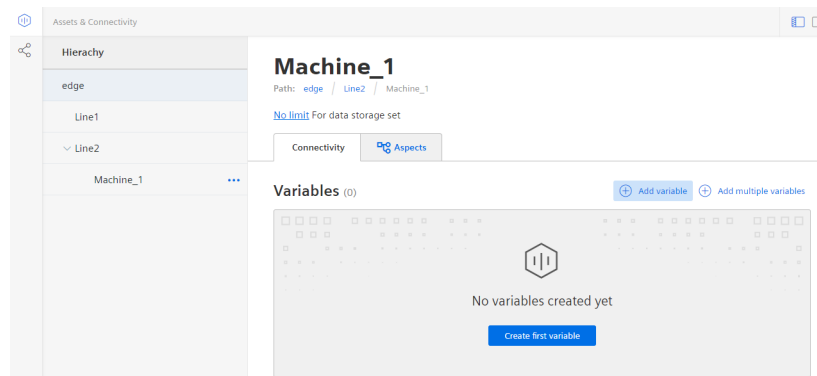
Description

You can add new variables in the Data Service and link them to the desired tag or topic (data point) provided by an adapter.

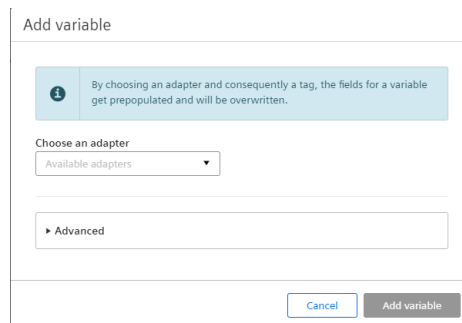
Procedure

To add a variable, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.



3. Click "Add variable" in the detail view.
The "Add variable" dialog box is displayed:




4. Select an adapter.

7.1 Adding a variable

5. Select a tag or topic.

Under "Advanced" you can display all information about the selected tag or topic that was transferred from the MQTT broker via metadata:

Add variable

 By choosing an adapter and consequently a tag, the fields for a variable get prepopulated and will be overwritten.

Choose an adapter
SIMATIC S7 Connector

Choose a tag
plc1/motor1-temperature

▼ Advanced

plc1::motor1-temperature-4-18

motor1-temperature

Float

Tag
plc1::motor1-temperature::4::18
This tag will be used in tag definition.

Name *
motor1-temperature
This is the name of the tag that is shown later in the applications.

Data type *
Float
This is the data type of the variable.

Unit
Unit
This is the unit of the variable that is shown later in the applications.

Cancel

Add variable

Note

Data types

By default, the data type for a variable is transmitted via the metadata. You can change the default data type. Make sure that an implicit conversion is possible. Smaller data type can be converted to larger data type.

Implicit conversion:

It is only possible to implicitly convert the data type from the topic to the Data Service if no data loss occurs.

The following data types are available for selection: Bool, Integer (Signed und Unsigned; integers), Float (REAL; floating-point numbers), Double (LREAL; floating-point numbers), String (string), Date (time), TimeSpan (interval)

6. Fill in the "Unit" field.

7. Click "Add variable".



















Result

The new variable is displayed in the detail view:

Machine_1
 Path: [edge](#) / [Line2](#) / Machine_1
[No limit](#) For data storage set

Connectivity **Aspects**

Variables (6) [Add variable](#) [Add multiple variables](#)

Name	Type	Topic	Preview data
<input type="text"/>	<input type="text"/>	<input type="text"/>	
motor2-vibration	Int16	plc1::motor2-vibration::4::16	  
motor2-temperature	Float	plc1::motor2-temperature::4::18	  
motor1-vibration	Int16	plc1::motor1-vibration::4::16	  
motor3-temperature	Float	plc1::motor3-temperature::4::18	  
motor1-temperature	Float	plc1::motor1-temperature::4::18	  
motor3-vibration	Int16	plc1::motor3-vibration::4::16	  

Note

Difference from the view on a panel

On a panel, the topic of the variable is, for example, named as follows:

- plc1::motor2-vibration::4::16 => EITankLevel

7.2 Adding a variable (Unified Comfort Panel)

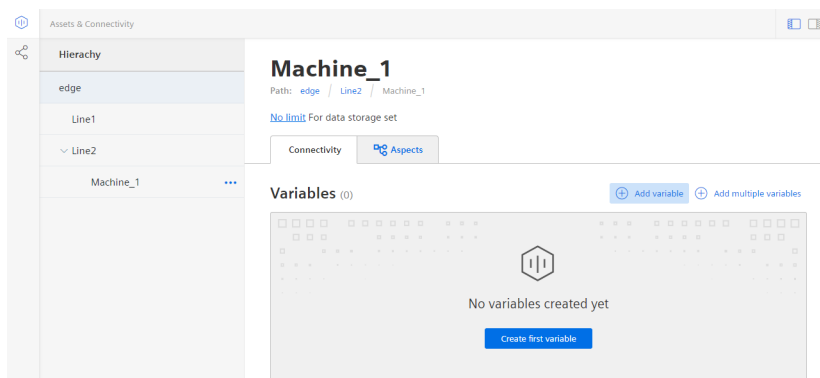
Description

You can add new variables in the Data Service.

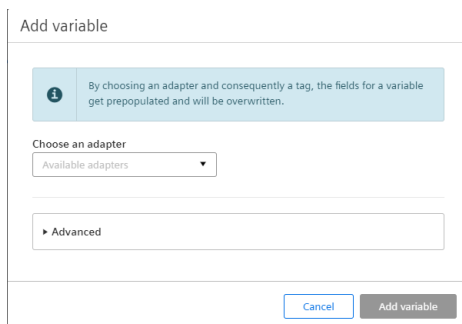
Procedure

To add a new variable, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.



3. Click "Add variable" in the detail view.
The "Add variable" dialog box is displayed:



4. Select the "HMIRuntime" adapter.

Add variable

By choosing an adapter and consequently a tag, the fields for a variable get prepopulated and will be overwritten.

Choose an adapter

HmiRuntime

▼ Advanced

Tag

Tag

This tag will be used in tag definition.

Name *

Name

This is the name of the tag that is shown later in the applications.

Data type *

Data type

This is the data type of the variable.

Unit

Unit

This is the unit of the variable that is shown later in the applications.

Cancel Add variable

5. Fill in the appropriate information for the variable: Tag, name, data type and unit.

6. Click "Add variable".

7.3 Adding multiple variables at the same time

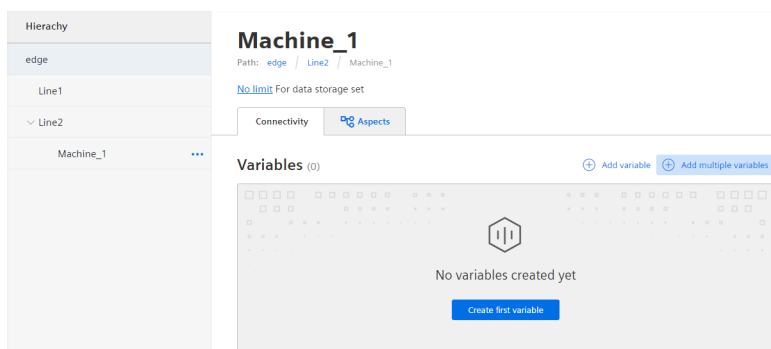
Description

You can also add multiple variables at the same time.

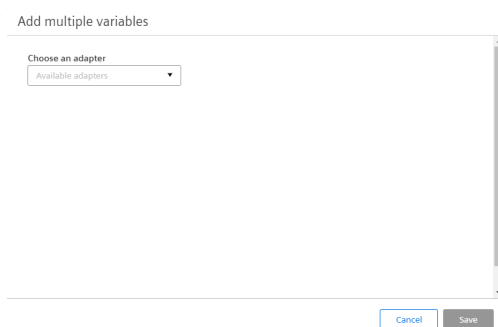
Procedure

To add multiple variables at the same time, follow these steps:

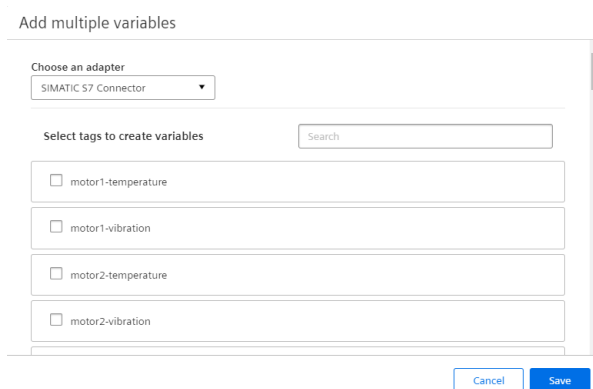
1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.



3. Click "Add multiple variables" in the detail view.
The "Add multiple variables" dialog box is displayed:



4. Select an adapter.
All tags or topics provided by the adapter are displayed:



You can also search for variables in the "Search" field.

5. Select all the tags you want.

6. Click "Save".
The "Add multiple variables" dialog box is displayed with all selected tags:

Add multiple variables

Select tags to create variables9 of 9 created

motor1-temperature✓

motor2-temperature✓

motor3-temperature✓

motor4-temperature✓

motor5-temperature✓

motor6-temperature✓

motor7-temperature✓

motor8-temperature✓

motor9-temperature✓

Accept

7. Click "Accept".

Result

The added variables are displayed in the detail view:

Machine_1

Path: edge / Line2 / Machine_1

No limit For data storage set

ConnectivityAspects

Variables (9)

Add variable

Add multiple variables

Name	Type	Topic	Preview data
motor2-temperature	Float	plc1::motor2-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor6-temperature	Float	plc1::motor6-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor8-temperature	Float	plc1::motor8-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor7-temperature	Float	plc1::motor7-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor1-temperature	Float	plc1::motor1-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor9-temperature	Float	plc1::motor9-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor3-temperature	Float	plc1::motor3-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor4-temperature	Float	plc1::motor4-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>
motor5-temperature	Float	plc1::motor5-temperature::4::10	<div><div></div><div></div></div> <div><div></div><div></div></div>

7.4 Displaying the variables preview

Description

Using the variables preview, you can immediately check whether data is transmitted from the IE Databus.

Procedure



















To display the preview, follow these steps:


1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.

Machine_1
 Path: [edge](#) / [Line2](#) / [Machine_1](#)
[No limit](#) For data storage set

Connectivity **Aspects**

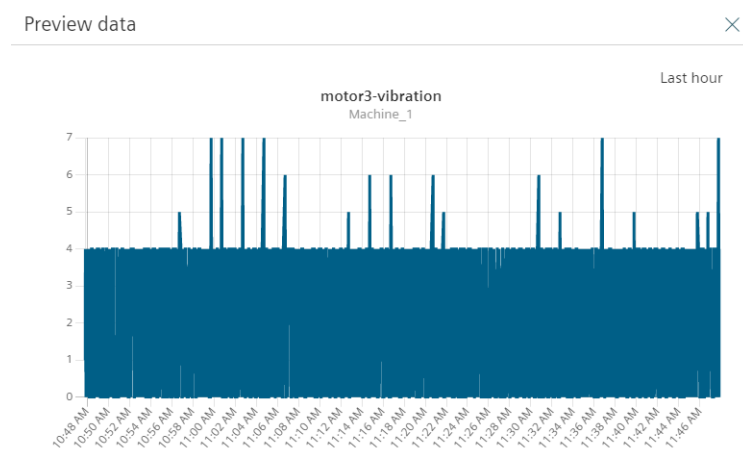
Variables (6) [Add variable](#) [Add multiple variables](#)

Name	Type	Topic	Preview data
motor2-vibration	Int16	plc1::motor2-vibration::4::16	  
motor2-temperature	Float	plc1::motor2-temperature::4::18	  
motor1-vibration	Int16	plc1::motor1-vibration::4::16	  
motor3-temperature	Float	plc1::motor3-temperature::4::18	  
motor1-temperature	Float	plc1::motor1-temperature::4::18	  
motor3-vibration	Int16	plc1::motor3-vibration::4::16	  

3. Click the  icon in the line of the desired variable.

Result

The preview of the variable "motor3-vibration" is displayed:




7.5 Editing a variable

Description

In the detail view, you can edit already created variables.

Procedure

To edit a variable, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.
All created variables are displayed.
3. Click the  icon in the line of the corresponding variable you want to change.
The "Edit variable" dialog box opens.
4. For example, change the assignment to the adapter, the name of the variable, or other settings.
5. Click "Edit variable".

Result

The settings of the variable have been changed accordingly.


7.6 Deleting a variable

Description

You can delete variables that have already been created in the detail view.

Procedure

To delete a variable, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.
All created variables are displayed.
3. Click the  icon in the line of the corresponding variable you want to delete.

Result

The variable is deleted.

Adding and editing aspects

8.1 Add aspect

Description

In the "Hierarchy" tab, you can add new aspects for the selected asset and assign variables accordingly.

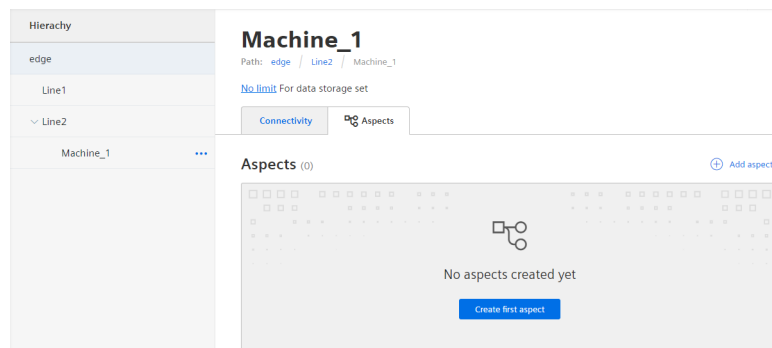
Requirement

At least one variable has already been created for the asset.

Procedure

To add an aspect, follow these steps:

1. Select an asset in the selection list.
2. Click the "Aspects" tab in the detail view.



3. Click "Add aspect" or "Create first aspect". The "Add aspect" dialog box is displayed:

Add aspect

Name *

This is the name of the aspect, that is shown later in the applications.

Choose variables *

Choose one or more variables for this aspect.

4. Enter a name.

8.2 Editing an aspect

- Select one or more of the available variables in the "Choose variables" drop-down list. Each variable can be assigned to only one aspect.

Note**No available variables**

If you cannot select any variables, you have not created variables for this asset yet.

- Click "Add aspect".

Result

The new aspect "Heating" is displayed in the detail view with all selected variables:

Connectivity		Aspects
Aspects (1)		
+ Add aspect		
▼ Heating (5)		
Name	Type	Topic
motor6-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor7-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor8-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor9-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor10-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...

8.2 Editing an aspect

Description

In the "Hierarchy" tab, you can rearrange the assignment of variables to aspects.

In the example, the "motor6-10-temperature" variables are assigned to the "Heating" aspect:

Connectivity		Aspects
Aspects (1)		
+ Add aspect		
▼ Heating (5)		
Name	Type	Topic
motor6-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor7-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor8-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor9-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...
motor10-temperature	Float	ie/d/j/simaticv1/s7c1/dp/irplc1/defa...

Note**Difference from the view on a panel**

On a panel, the topic of the variable is, for example, named as follows:

- motor6-temperature => ElTemperature

Procedure

To assign a variable to another aspect, follow these steps:

1. In the detail view, click the  icon next to the new aspect you want. The "Edit aspect" dialog box is displayed:

Edit aspect

Name *

Heating_New

This is the name of the aspect, that is shown later in the applications.

Choose variables *

Available variables

- motor4-temperature
- motor3-temperature
- motor9-temperature
- motor6-temperature
- motor7-temperature
- motor8-temperature

Cancel Edit aspect





2. Select the variable you want to reassign. In the example, it is the variable motor6-temperature.
3. Click "Edit aspect".

Result

The variable motor6-temperature was moved from the "Heating" aspect to the "Heating_New" aspect:

Connectivity Aspects

Aspects (2) + Add aspect

Name	Type	Topic
▼ Heating (4)  		
motor9-temperature	Float	plc1::motor9-temperature:4:18
motor7-temperature	Float	plc1::motor7-temperature:4:18
motor8-temperature	Float	plc1::motor8-temperature:4:18
motor10-temperature	Float	plc1::motor10-temperature:4:19
▼ Heating_New (1)  		
motor6-temperature	Float	plc1::motor6-temperature:4:18

Note

Assignment of variables

Each variable can only be assigned to one aspect within an asset or subasset.


8.3 Deleting an aspect

Description

In the detail view, you can delete aspects that have already been created.

Procedure

To delete an aspect, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click the "Aspects" tab.
All created variables are displayed.
3. Click the  icon in the row of the corresponding aspect you want to delete.

Result

The aspect has been deleted.

Data Service OpenAPI specification

Description

The Data Service OpenAPI specification is a standard for describing REST-compliant application programming interfaces (API). With the OpenAPI you can connect your self-developed app with the Data Service and access the interfaces of the Data Service.

The routes for the Data Service can be found in the title bar under "API Documentation" by clicking the ⓘ icon.

The routes remain stable or compatible for at least 1 year. When a route is changed in such a way that existing interfaces have to be adapted (breaking change), this is announced in the OpenAPI specification in the description of the route (deprecated). You have one year to adapt your routes accordingly.

Industrial Edge App Publisher

You can find additional information on how to integrate your user-developed app in Industrial Edge Management here: Industrial Edge App Publisher (<https://support.industry.siemens.com/cs/us/en/view/109780392>)

Procedure

To establish a connection to the Notifier via the OpenAPI, follow these steps:

1. You can retrieve information, for example, by calling the "getTimeSeries" method.
2. Additional routes can be found in the OpenAPI specification.

Improving performance

Description

With the following configuration examples, we can ensure the highest possible performance of the Data Service app:

Write performance

The Data Service app V 1.2 supports 5,000 changes per second. Changes means that a write operation takes place in the database. In the worst case, only one value is written per write operation.

The following scenarios are therefor possible:

- 5,000 variables with a write cycle of 1 s ($5,000 * 1,000/1,000 = 5,000$ changes)
- 500 variables with a write cycle of 100 ms ($500 * 1,000/100 = 5,000$ changes)
- 50 variables with a write cycle of 10 ms ($50 * 1,000/10 = 5,000$ changes)
- etc.

If the values are sent from the adapter in packets, more data can be processed. For example, an adapter sends the values of a variable in packets of 1,000 every second. This means that there is only one write operation per second.

Read performance

The read performance is influenced by many factors. Two examples provide a guide value here:
A variable with a 1 ms write cycle is to be queried over one hour. 1 ms in 1 h = 3.6 million values.

- Aggregated query (e.g. average) = 10 seconds load time
- Raw data query = 30 seconds load time

