

Edge

Edge app Data Service for Industrial Edge V1.4

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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Legal information

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/cert> (<https://www.siemens.com/cert>).

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

1.3 Security Information for Industrial Edge Apps

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.

What's new in Data Service?

2.1 What's new in Data Service V1.4?

All important new features of the Data Service are summarized here. For more details on the individual topics, refer to the documentation.

Data Service modes

As of version 1.4, there are two modes for the Data Service:

- Stand-alone Data Service
All functions including user interface available
- Integrated Data Service in IIH (Industrial Information Hub)
The Data Service no longer has its own user interface. Data retention for assets and variables can now be set directly in the IIH.

For additional information on the integration in the IIH, click here: [Integrating Data Service into the IIH \(Page 80\)](#)

Connectivity Suite Connectors

The Data Service now supports Connectivity Suite connectors in addition to MQTT connectors.

System information dashboard

In the System Information dashboard, you can view the information from the System Info connector.

You can find additional information here: [Display system information \(Page 83\)](#)

Setting aggregation for variables

When creating a variable, you can set an aggregation and significantly improve performance in the Data Service by pre-calculating the data.

Pre-calculated aggregations are taken into account when querying the data. This decisively shortens the duration of the query. For example, the aggregations API queries the last month with aggregation "Sum".

For this, the aggregation is calculated from the raw data as needed (at 1 ms cycle = 2 628 000 000 data points). However, if pre-calculated aggregations have been configured on the variable, the aggregation can be calculated from them (e.g. 1h aggregation configured = 730 data points).

For additional information on creating an aggregation, click here: [Adding a variable \(Page 53\)](#)

General

Performance improvements

Anomaly Detection compatibility

The Anomaly Detection app (V1.0, V1.1 and future versions) is only compatible with the standalone Data Service. When the Data Service is integrated into the IIH, it is no longer compatible with Anomaly Detection.

Only with Data Service V1.5 will Anomaly Detection be compatible in IIH mode.

2.2 What's new in Data Service V1.3?

All important new features of the Data Service are summarized here. For more details on the individual topics, refer to the documentation.

Newly added

- Pre-defined aspect types
- Create aspects from aspect types
- Backing up and restoring data
You can save the configuration and time series data in the Data Service (connector connections, asset structure, variables, aspects, etc.) and restore it to another IED, for example, or save a backup of your configuration.
Additional information is available here:
Data backup (Page 75)
Restoring data (Page 76)
- Display variable preview as a diagram
 - Automatic update
 - Select aggregation
 - Select periodYou can find additional information here: Displaying the variables preview (Page 63)
- Better status/debug information
 - Show variable error
 - Show connector errors
 - Show connection status of the variables
- Create variables without connector
- Data retention for each variable
You can find additional information here: Setting data retention for an individual variable (Page 51)

Improvements

- No more data gap after zooming in the preview diagram
- No missing variable information in "Add multiple variables" dialog
- Documentation of the System Info connector

2.3 What's new in Data Service V1.2?

All important new features of the Data Service are summarized here. For more details on the individual topics, refer to the documentation.

Newly added

- New aggregations:
 - StandardDeviation
 - Variance
 - Count (number of data points)
 - First
- Custom connectors
- Adding multiple variables at the same time
- "String" data type is supported

Improvements

- Improved calculation algorithm
- Values with "Bad" quality code are no longer included in the calculation.

Installing Data Service

3.1 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
The Google Chrome and Microsoft Edge browsers are supported. We recommend the Google Chrome web browser. You should preferably use a resolution of 1920x1080.
- Firefox Version ≥ 62

Internet Explorer is no longer supported as of version 11.

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

Hardware requirements

- A device on which Industrial Edge Management (IEM) is running.
 - An Industrial Edge Device (IED) that is compatible with Industrial Edge Management:
 - IED Model: e.g. SIMATIC IPC 227E Nanobox, SIMATIC IPC 427E or Unified Comfort Panel (UCP)
 - 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.

3.2 Buying an app

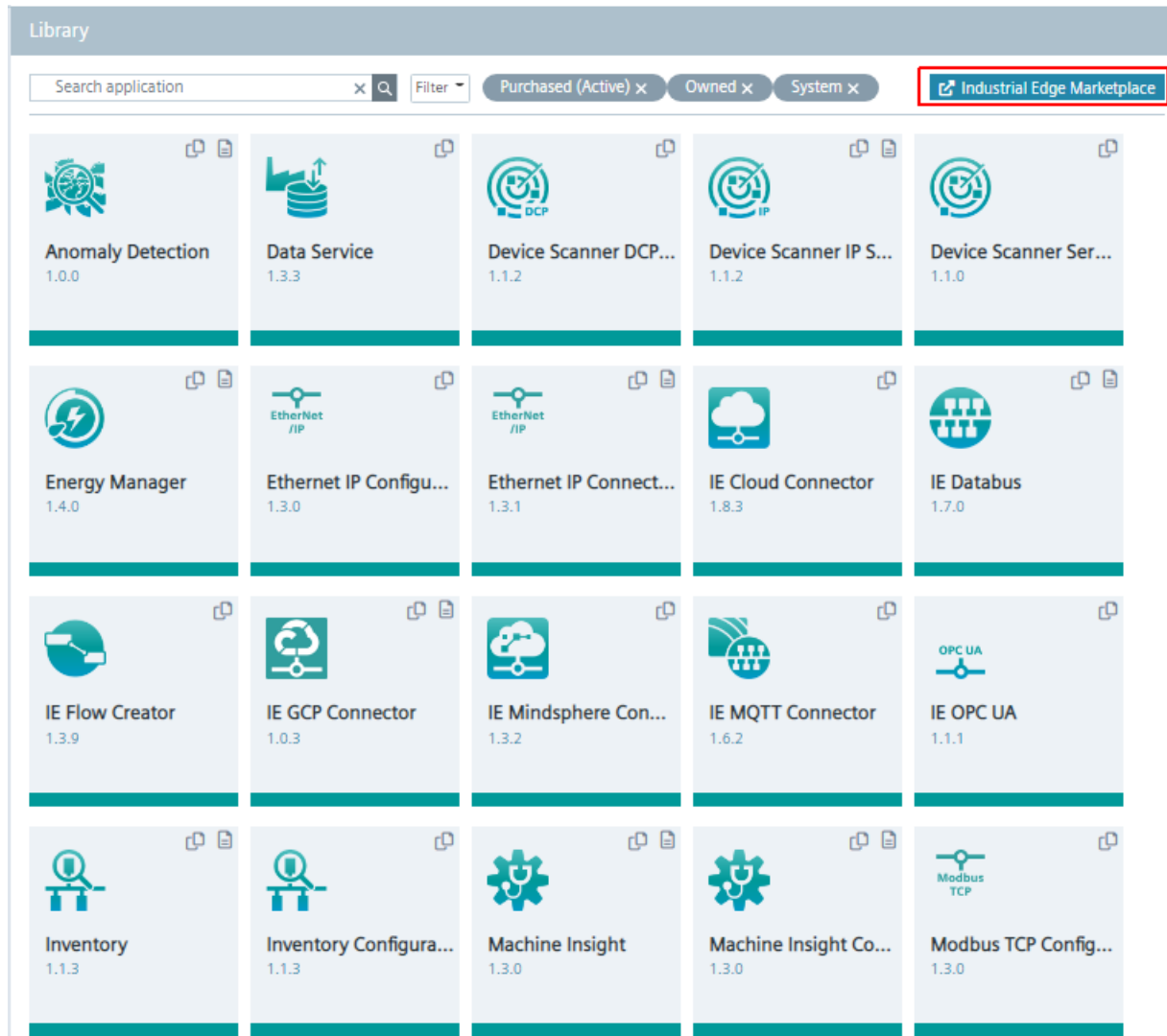
You can use the IE Marketplace to purchase an app or app license. To purchase an app, you need an access code. You will receive this access code from your regional Siemens contact.

Requirement

You have received the access code from your regional Siemens contact.

Procedure

1. In the "Library" screen of IE Hub, click "Industrial Edge Marketplace".



2. Click "Manufacturing & Process Industries".
The Industrial Edge Marketplace opens.
3. Click the tile of the app you want to buy.
The app description and details are displayed.
On the left side you can see all the prerequisites and requirements to run this app in the IEM.
You can purchase all the products you require in one transaction.
4. Enter the number of licenses required in the "Quantity" input field.
5. Enter the received access code in the "Access code" input field.

6. Click "Add to Cart".
The shopping cart is displayed.

The screenshot shows a shopping cart interface. At the top left is a shopping cart icon and the word "Cart". Below this is a single item card for a subscription. The card includes a circular icon with a checkmark, a price tag, and the following text: "Billing Term: Yearly", "Subscription Term: Yearly", and "Additional Info". To the right of this text is a quantity selector set to "10" with a "Minimum: 1" label below it. Further right is the "Price" field. On the far right of the card are "Supported Purchase Methods" listed as "Credit Card" and "Payment On Account", and a "Delete" button. Below the item card are three buttons: "Promo Code" (input field), "Apply Code", and "Apply Quantity Changes". At the bottom right, there is a "Total:" field and a note: "Prices and offers in the cart are subject to change until the order is submitted." At the bottom left is a "Continue Shopping" button, and at the bottom right is a "Payment Type" dropdown menu followed by a "Checkout" button.

7. Add other products that are required to use the app to the shopping cart.
To do this, click on the corresponding links under "Prerequisites" and add all the desired products to the shopping cart in the same way.

The screenshot shows the same shopping cart interface, but now it contains three items. The first item is the same subscription as in the previous screenshot. The second item is "Industrial Edge Hub Access", with a quantity of "1" and a "Valid Input: 1" label. The third item is "Data Service", with a quantity of "10" and a "Minimum: 1" label. Each item card follows the same layout as the first item, including a circular icon, billing/subscription terms, quantity selector, price, supported purchase methods, and a delete button. The "Apply Code" and "Apply Quantity Changes" buttons are still present. The "Total:" field and the note "Prices and offers in the cart are subject to change until the order is submitted." are also visible. The "Continue Shopping" and "Checkout" buttons remain at the bottom.

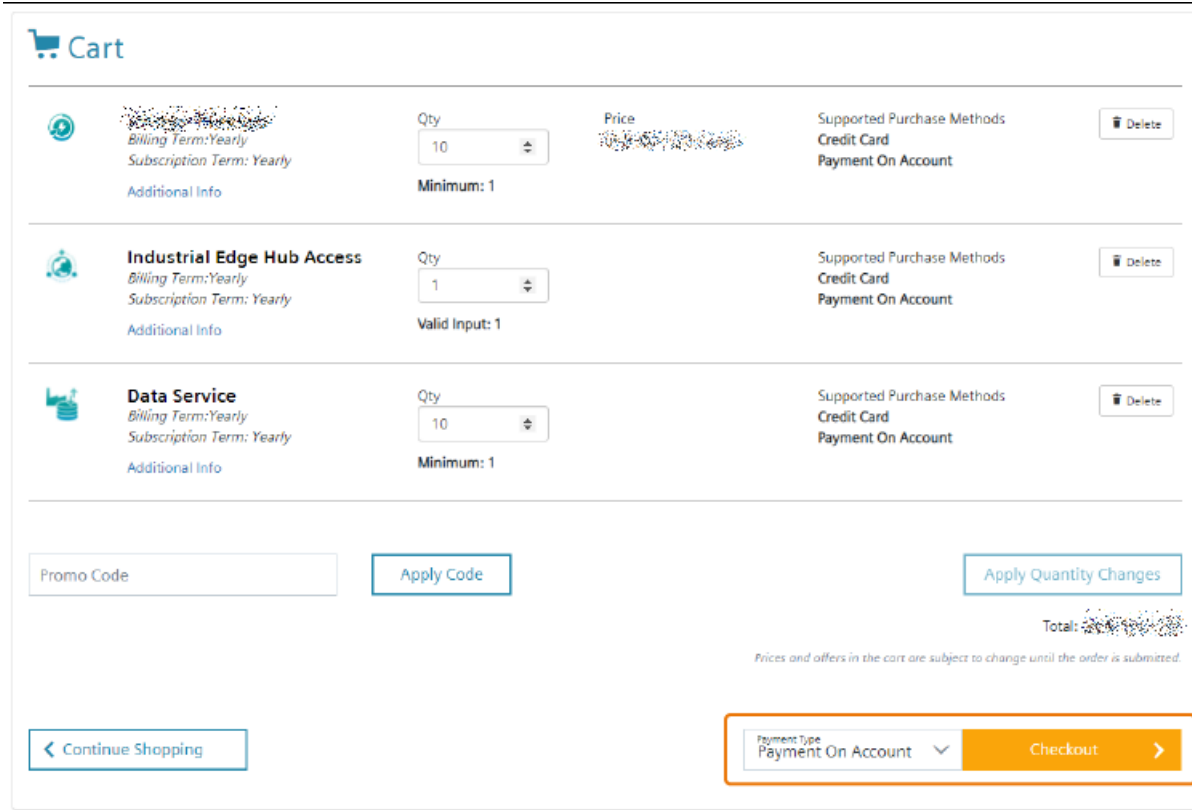
3.2 Buying an app

- 8. Select your preferred payment type from the "Payment type" drop-down list. Only "Credit Card" payment method is available for third-party apps.
- 9. Check again the information provided.

Note

You can edit the number of licenses again. Then click "Apply Quantity Changes".

- 10. Click "Checkout" and follow the instructions on the screen.

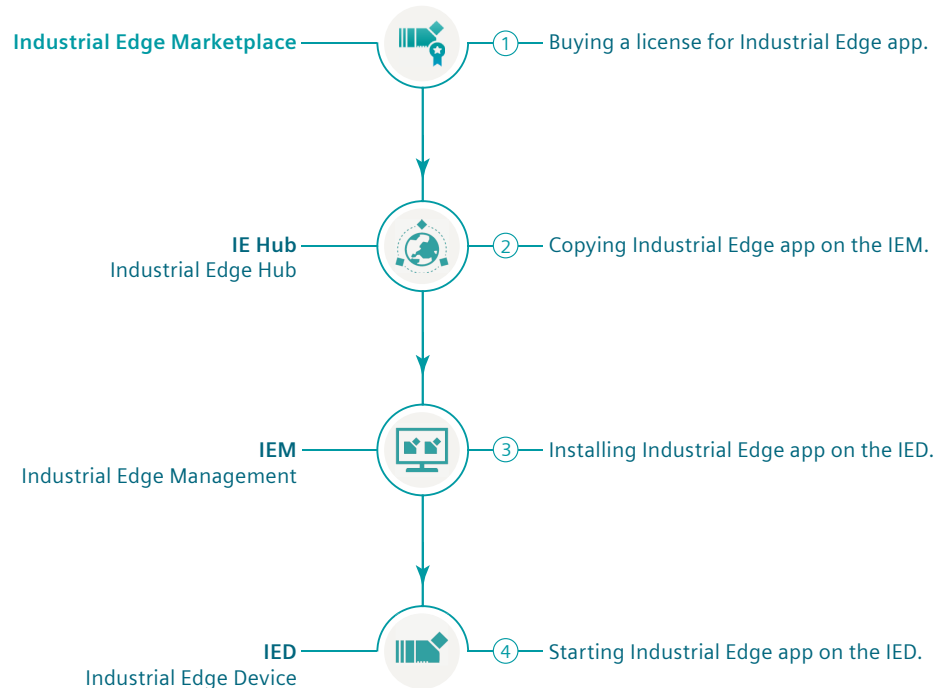


After you purchase the app, it appears in the "Library" section of IE Hub. From here, you can copy the app to your IEM instances. The number of licenses, the license itself and other details are displayed under "Licenses". If necessary, you can purchase additional licenses of the app in question from this location.

3.3 Installing Data Service on an IED via IE Hub

3.3.1 Overview of the installation process

Installation process of an Industrial Edge app on an IED:



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

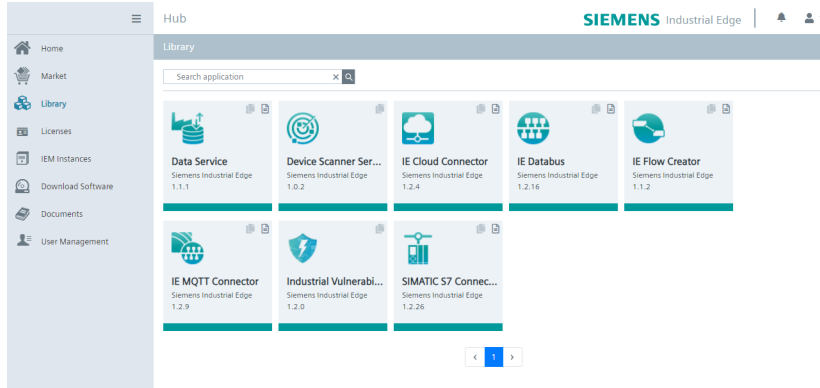
Description


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.

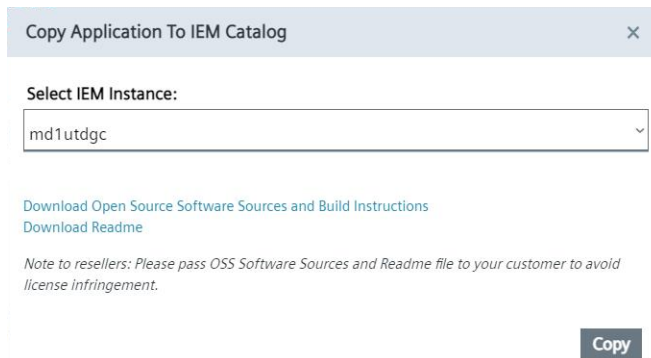
Procedure

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.

3.3.3 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

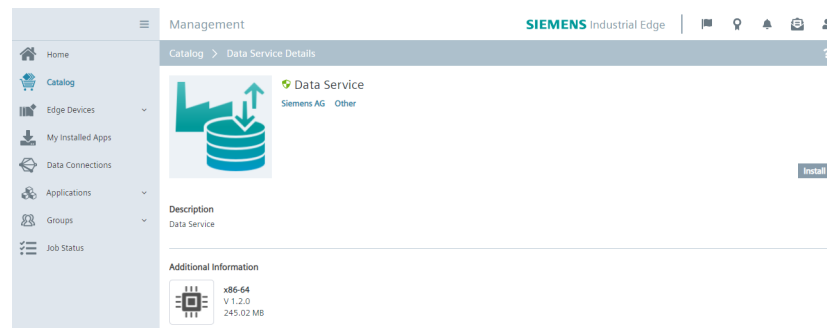
- You must be logged into the Industrial Edge Management (IEM).
- The Data Service app was copied to the catalog. You can find additional information here: Copying the Data Service app from the IE Hub to the IEM catalog (Page 15)

Procedure

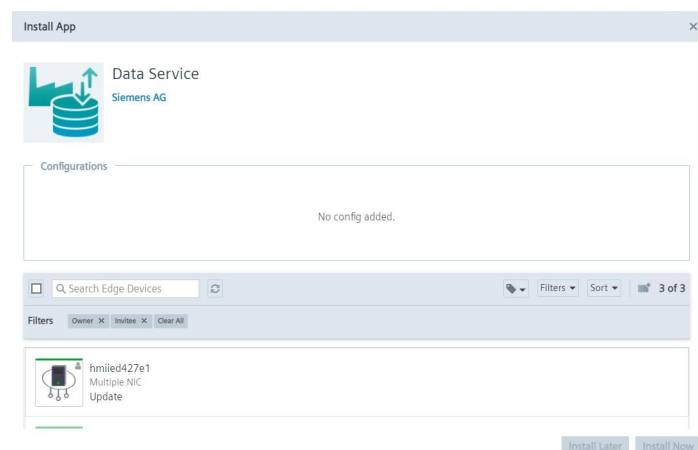
To install the Data Service app, follow these steps:

1. Open the "Catalog" tab.
2. Click on the "Data Service" tile.

The following dialog box opens:

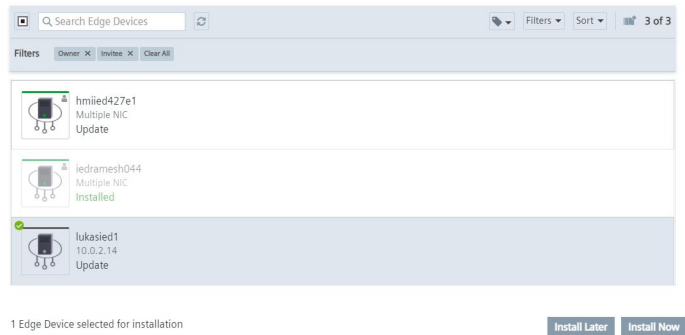


3. Click "Install".
The "Install App" dialog window is displayed.



3.3 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.

3.3.4 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.

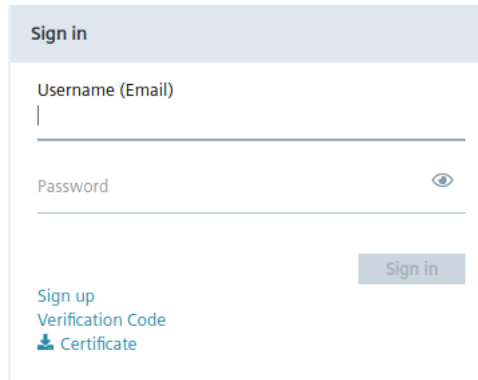
Requirement

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":



The image shows a 'Sign in' form with the following fields and options:

- Sign in** (header)
- Username (Email)** (text input field)
- Password** (password input field with an eye icon for visibility toggle)
- Sign in** (button)
- Sign up** (link)
- Verification Code** (link)
- Certificate** (link with a certificate icon)

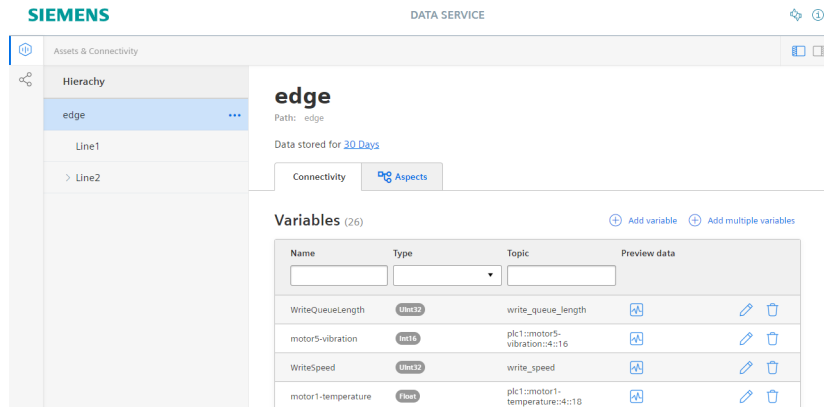
3. Open the "Apps" tab:



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

Result

The Data Service app opens in the browser:



3.4 Installing the Data Service app on a panel

3.4.1 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

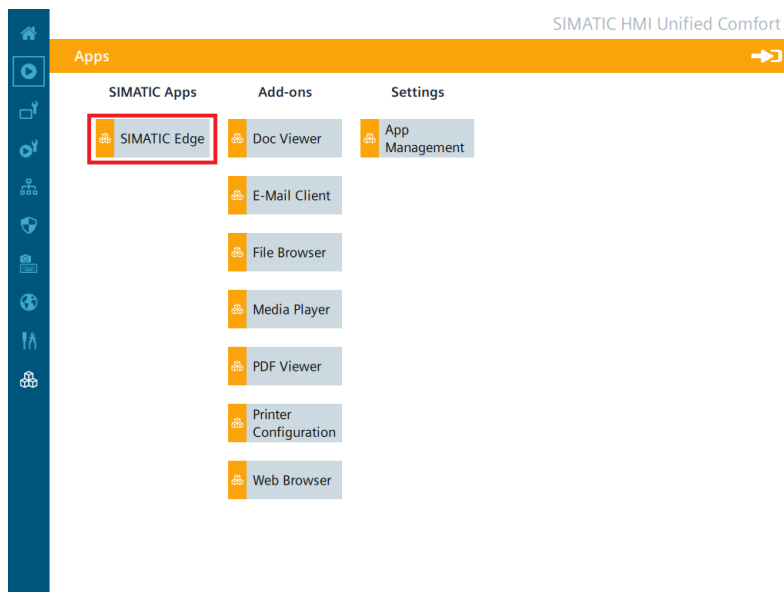
To install the Data Service app on your panel, follow these steps:

- Download the app files from the Siemens Industry Online Support (SIOS).
- Unzip the downloaded ZIP package.
- Transfer the "DataServicex.x.app" file to your panel, for example, by using a USB flash drive.

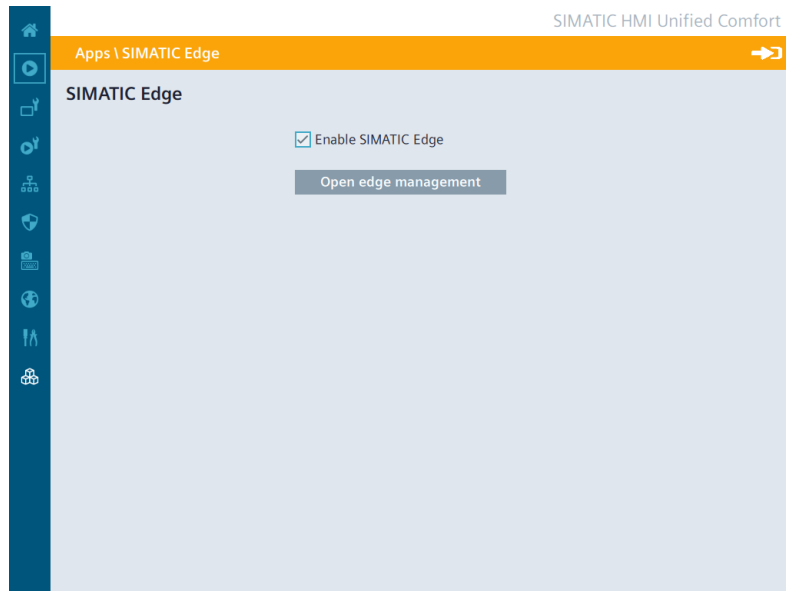
4. Click the "Apps" tab or tile on your panel:



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



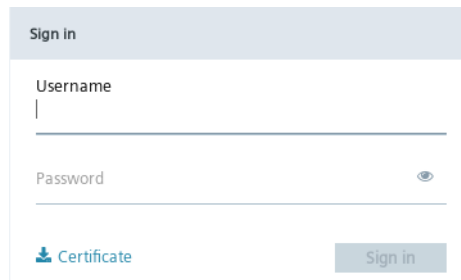
6. Select the "Enable SIMATIC Edge" option and click on "Open edge management":



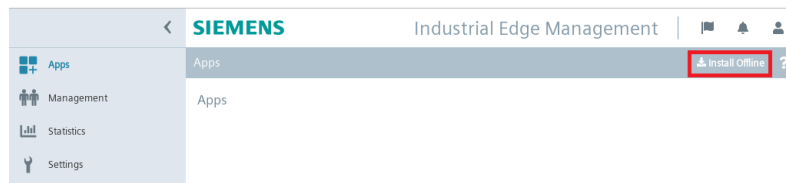
7. Log into the Industrial Edge Management by clicking "Sign in":



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



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, each with a text input field and a 'Browse' button. The first section is 'App File', the second is 'Signature (Optional)' with a 'Signature File' input, and the third is 'Public Key (Optional)' with a 'Public Key File' input. A red rectangle highlights the 'App File' input field and its 'Browse' button. At the bottom right, there 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:

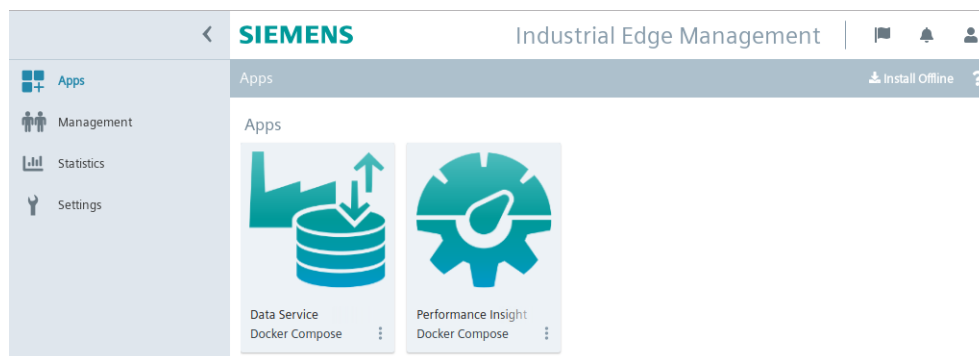
The screenshot shows the 'Install Offline' dialog box. At the top, there are two radio buttons: 'Storage Media' and 'Browse' (which is selected). Below this, there are three sections, each with a text input field and a 'Browse' button. The first section is 'App File', the second is 'Signature (Optional)'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



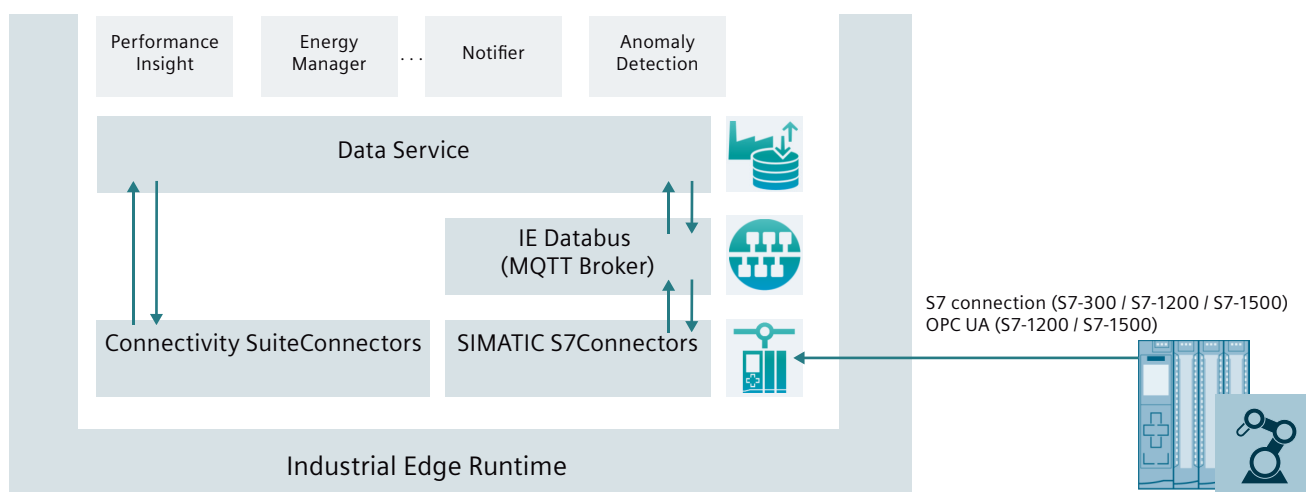
Introduction to the Data Service

4.1 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 connectors, such as a SIMATIC 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 January 1, 2023. If you want to continue using the app, please order the appropriate license.

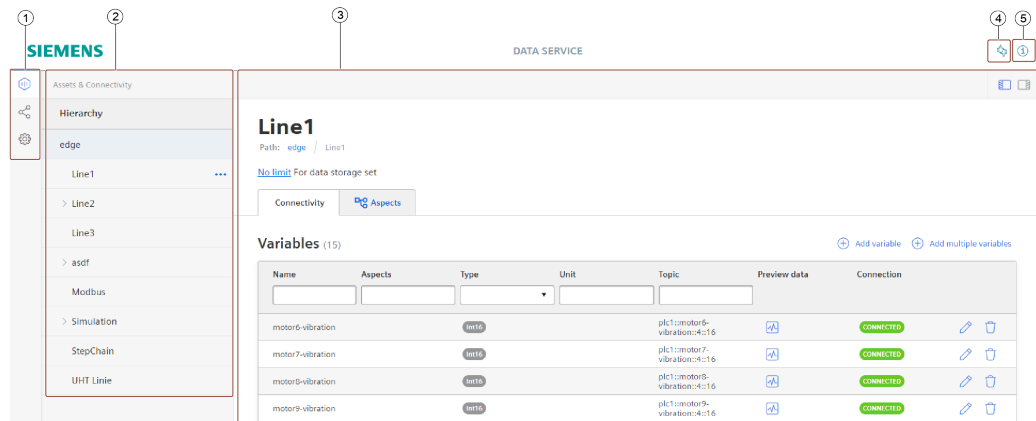
4.2 Structure of the app

Dashboard

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

- (1) Navigation area:
 - Assets & Connection
 - Adapter
 - Settings => Backup and restore settings
- (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

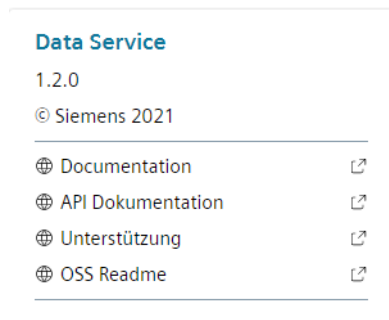
Difference from the view on a panel

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 the documentation and to the Industry Online Support:



4.3 Changing the user interface language

Description

- You can change the user interface language in the settings of the browser, e.g. Google Chrome. The following languages are available:
 - German
 - English
 - Spanish
 - Chinese

Procedure

Proceed as follows to change the user interface language:

1. Open the settings in the browser.
2. Click "Languages".
3. In the Google Chrome browser, click the three dots next to the desired language and enable the "Display Google Chrome in this language" option.
4. Click "Restart".

Result

The Data Service user interface is displayed in the desired language.

4.4 Getting Started

Description

You can find a Getting Started for using the Edge App Data Service here: Getting Started - Data Service (<https://github.com/industrial-edge/data-service-getting-started>)

You can find a Getting Started for using the Custom Adapter in the Data Service here: Getting Started - Custom Adapter (<https://github.com/industrial-edge/how-to-central-data-collection-with-data-service>)

4.5 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.

4.6 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 Marketplace (https://www.dex.siemens.com/?selected=edge)	Platform to purchase app licenses
Industrial Edge Hub (https://iehub.eu1.edge.siemens.cloud)	This page describes the functions of the Siemens Industrial Edge platform and the functionalities of the Edge management system. All the documentation for the IE platform can be found under "Documents".
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.
Industrial Edge in 10 minutes (https://cache.industry.siemens.com/dl/dl-media/991/109772991/att_1010695/v1/109772991_V16_Highlights_V2_web/start.htm#!en/12329)	Web Based Training: Integrate IT in the production with Siemens Industrial Edge
Unified Comfort Panel (https://support.industry.siemens.com/cs/ww/en/view/109795870)	You can find the Unified Comfort Panel manual and a description of the user administration on a UCP here.
Industrial Information Hub (IIH) (https://support.industry.siemens.com/cs/ww/en/view/109803582)	You can find the IIH manual here.

Connecting connectors

5.1 Overview

Description

Using the connectors, 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 connector 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 connectors are available by default:

Connector	Documentation in Siemens Industry Online Support
Ethernet IP Connector	Ethernet IP Connector (https://support.industry.siemens.com/cs/ww/en/view/109811396)
HMI Runtime adapter (Unified Comfort Panel)	
Modbus TCP Connector	Modbus TCP Connector (https://support.industry.siemens.com/cs/ww/en/view/109811395)
OPC UA Connector	
PROFINET IO Connector	PROFINET IO Connector (https://support.industry.siemens.com/cs/ww/en/view/109793251)
SIMATIC S7 Connector	SIMATIC S7 Connector (https://support.industry.siemens.com/cs/document/109795606/simatic-s7-connector-configurator?dti=0&pnid=28189&lc=en-WW)
SIMATIC S7+ Connector	SIMATIC S7+ Connector (https://support.industry.siemens.com/cs/ww/en/view/109808327)
Simulation Connector	
SLMP Connector	SLMP Connector (https://support.industry.siemens.com/cs/ww/en/view/109804360)

Connector	Documentation in Siemens Industry Online Support
System Info	The System Info connector can be used to save metrics (such as CPU load, RAM load, etc.) in the Data Service to monitor it and to have more data available for troubleshooting in the event of an error. You can view the metrics visualization in the system information dashboard: Display system information (Page 83)
UnifiedonEdge	











Variables of the System Info connector




The System Info connector offers the following variables:

Name	Description
CPU statistics	
CPUUsage	The current CPU usage in %. The value range is from 0 to 100.
Heap statistics (RAM usage)	
TotalHeapSize	The RAM (in MB) that is currently reserved by the app.
UsedHeapSize	The RAM (in MB) currently used by the app.
FreeHeapSize	The RAM that is currently available (not reserved by any app).
App status - Database	
DatabaseSize	The currently reserved size (in MB) for the database.

Status and connection of the connectors

You can see from the icons whether a connector is connected or not:

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

Symbol	Meaning
	The connector is connected to the IE Databus or the topic. This means metadata has been received via the metadata topic.
	The connector has no connection.
	The connector is connected (status = active), but no metadata is received via the metadata topic.

Adding self-developed connectors

You can use the icon  to add connectors 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 connector.

MQTT connector

The Ethernet IP connector, Modbus TCP connector, Profinet IO connector, SIMATIC S7 connector and System Info connectors use the "Message Queue Telemetry Transport" (MQTT) protocol. The connection to the MQTT broker must be configured in the Industrial Edge data bus: IE data bus (<https://support.industry.siemens.com/cs/document/109795600/industrial-edge-databus-configurator?dti=0&lc=en-DE>)

More general information about the MQTT protocol can be found here: MQTT.org (mqtt.org)

HMTIRuntime connector (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>)


5.2 Adding connectors (self-developed)

Description

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

Procedure

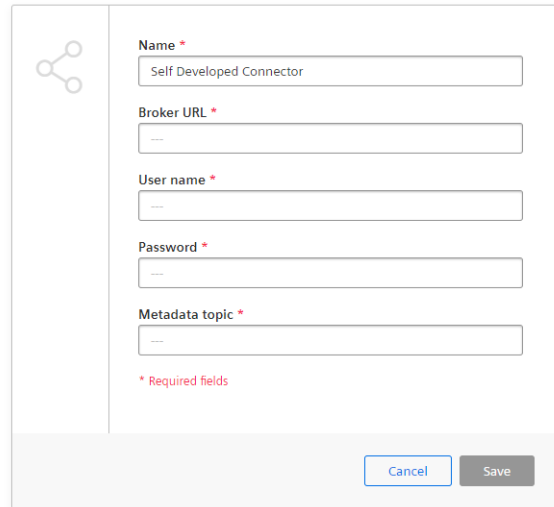
To add a connector, follow these steps:

1. Click on the "Connectors" tab.
2. Click on the  icon.

The following view opens:

Add adapter

Settings for the adapter



The screenshot shows a web form titled "Add adapter" with the subtitle "Settings for the adapter". On the left is a sidebar with a connector icon. The main form area contains five required fields, each with a red asterisk: "Name", "Broker URL", "User name", "Password", and "Metadata topic". The "Name" field is filled with "Self Developed Connector". The other fields are empty. At the bottom right are "Cancel" and "Save" buttons. A red asterisk legend indicates "* Required fields".


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

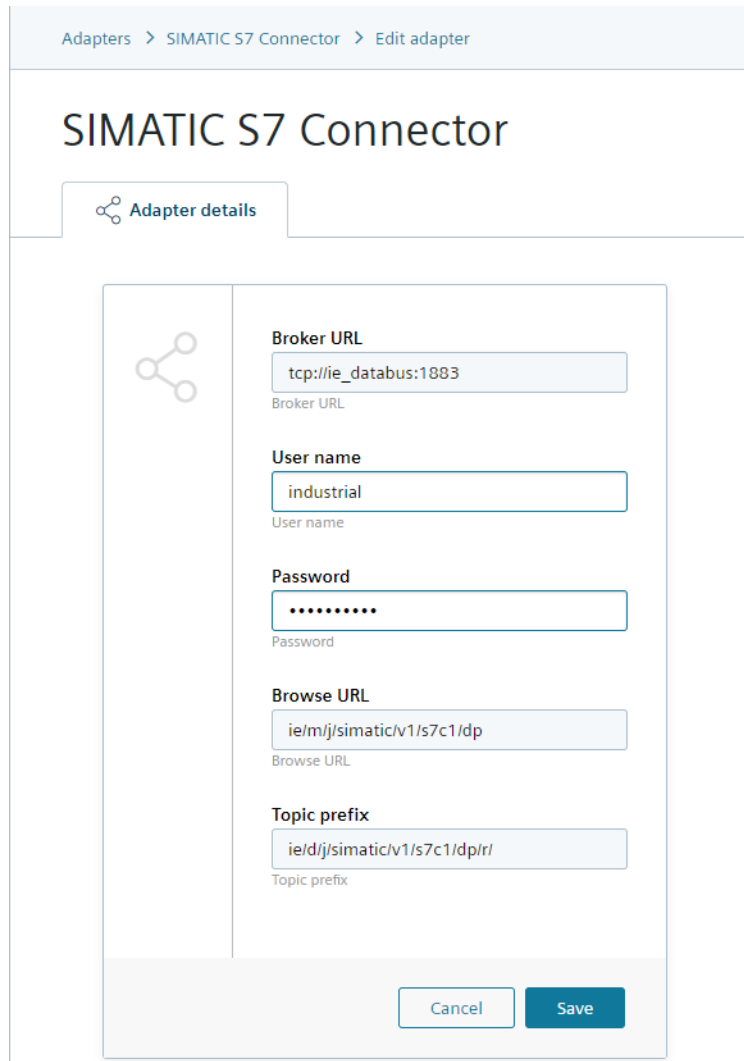
Note

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 connector 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 connector.
The information in the "Browse URL" field must match the topic that was configured in the connector.
7. Click "Save".

8. Click the  icon in the detail view.
The following view opens:



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

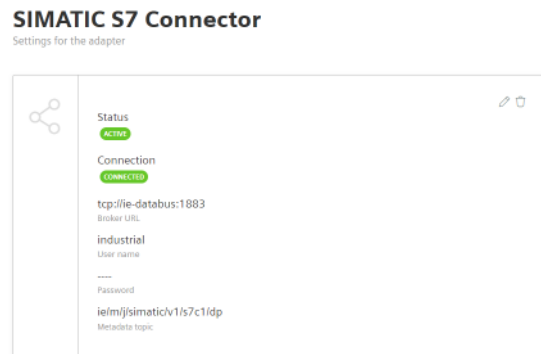
Topic prefix
ie/d/j/simatic/v1/s7c1/dp/r/
Topic prefix

Cancel Save

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

Result

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



5.3 Activating or deactivating connectors (default)

Description

In the "Connectors" tab, you can activate or deactivate existing connectors.

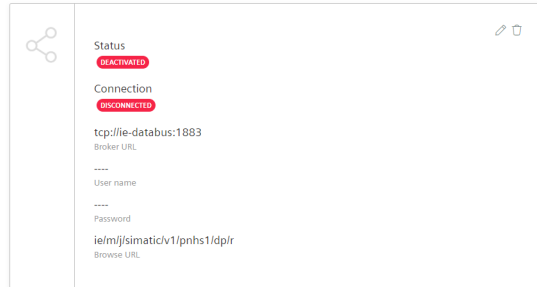
Procedure

To activate a connector, follow these steps:


1. In the "Connectors" tab, click the connector you want to activate, for example, Profinet IO Connector.

Profinet IO Connector

Settings for the adapter

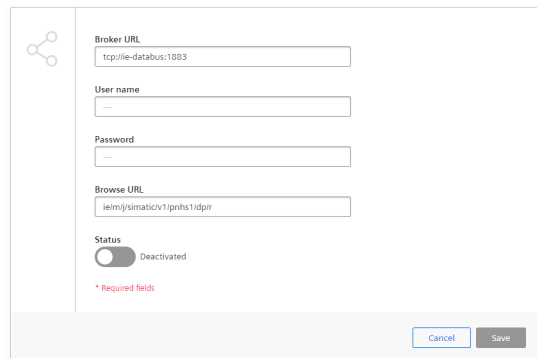


In the detail view, the connector is displayed with the status "DEACTIVATED" and the connection "DISCONNECTED".

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

Profinet IO Connector

Settings for the adapter



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

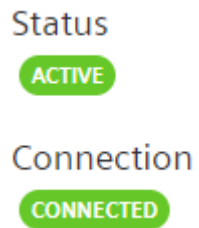
The user name and password must be configured in the MQTT broker, or in the IE Databus, and then entered in the corresponding adapter and in the Data Service, respectively.

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 connector.
The information in the "Browse URL" field must match the topic that was configured in the connector.

6. For the "Status", move the slider to the right to activate the connector.
7. Click "Save".

Result

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



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

5.4 Deleting custom connectors

Description

In the "Connectors" tab, you can delete existing custom connectors.


Note

Custom connectors

Only custom connectors can be deleted.

Procedure

To delete a connector, follow these steps:

1. In the "Connectors" tab, click the desired connector.
2. Click the  icon in the upper right-hand corner.
3. Click "Delete".

5.5 Assigning the HMIRuntime connector (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.

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

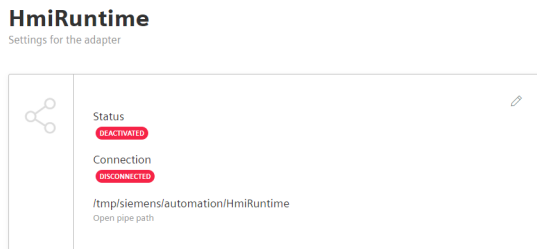
The Data Service connects to the pipe by name:


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

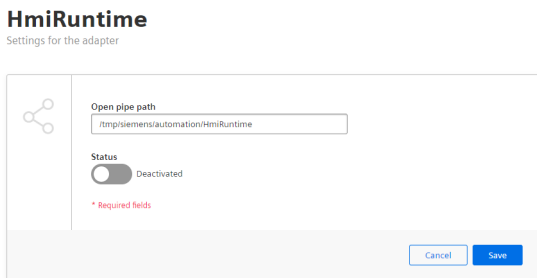
Procedure

To assign an HMIRuntime connector, follow these steps:

1. In the "Connectors" tab, click the HMIRuntime connector:



2. Click on the  icon:



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

Result

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

Creating a system structure (assets)

6.1 Creating assets

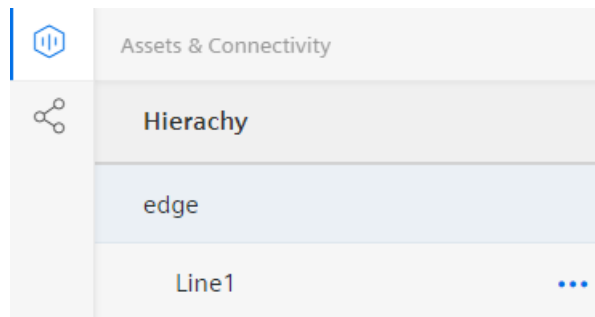
Description

In the "Hierarchy" tab, you can create assets and their child assets. You can use the assets to recreate your system structure and add the corresponding variables.

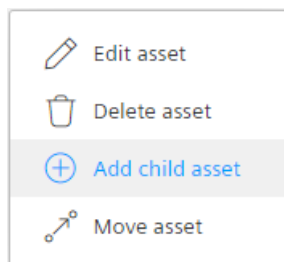
Procedure

To create an asset, follow these steps:

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



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



3. A dialog box is displayed:

 A screenshot of a dialog box titled "Add asset". It contains a "Name" field with a red asterisk indicating it is required. Below the name field is a smaller, optional description field. At the bottom of the dialog, there are two buttons: "Cancel" and "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
-

6.2 Moving assets

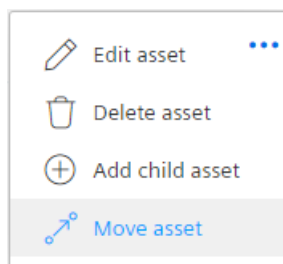
Description


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

Procedure

To move an asset, follow these steps:

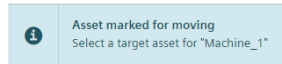
1. Select the asset you want to move. In the example below, "Machine_1".
2. Click on the three dots (ellipsis) in the corresponding row of the selection list.
3. Select "Move asset" in the selection window that opens:



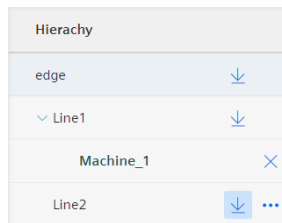
4. All assets to which you can move the selected asset are marked with this blue arrow :



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:



Result

The moved asset is displayed in the desired position:



6.3 Renaming assets

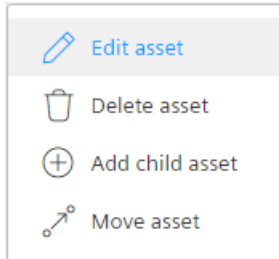
Description

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".

6.4 Deleting assets

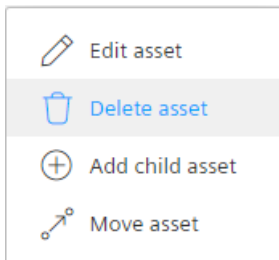
Description

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

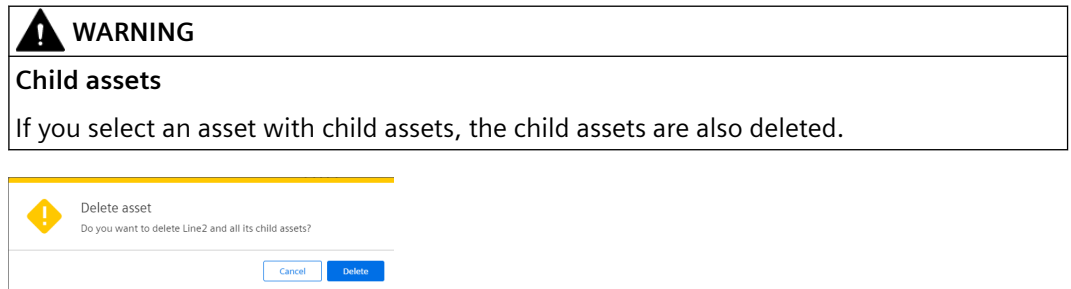
Procedure

To delete an asset, follow these steps:

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



3. A warning is displayed.



4. Click "Delete".

Setting the data retention

7.1 Overview

Description

You can set data retention for the following variables:

- Variables of MQTT connectors
- Variables of Connectivity connectors
- REST API variables
- OPC UA variables (supported as of V1.5)

7.2 Setting data retention for an asset

Description

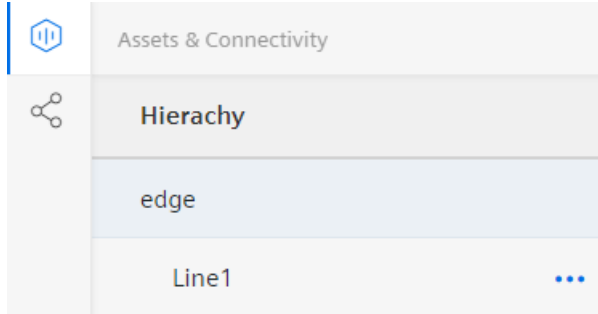
You can set the data retention period for an asset and all variables it contains. The data is deleted from storage after this time.

Data retention is inherited by the child assets, unless you set your own data retention on the child assets.

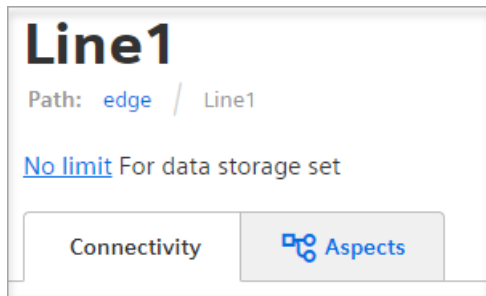
Procedure

To set the time period for the data retention of an asset, follow these steps:

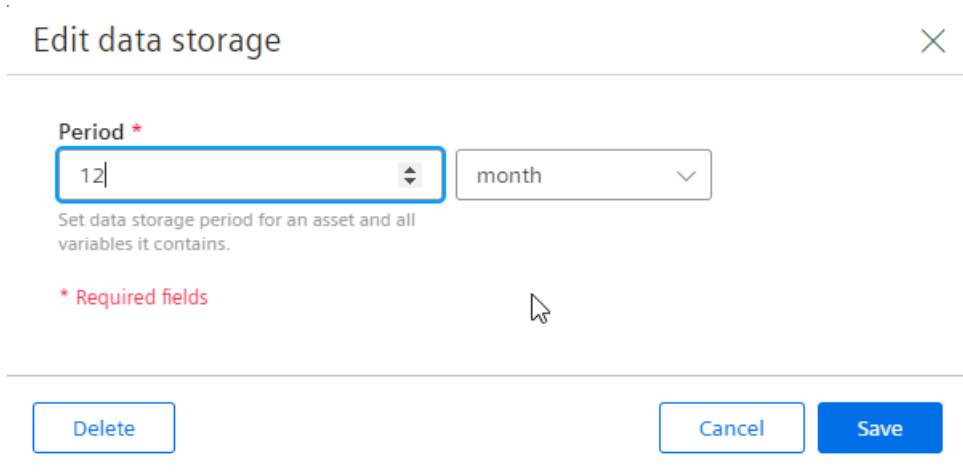
1. Select the corresponding row in the selection list.



2. In the detail view, click on the limit specification in the second row. As long as no data retention has been set the specification is "No limit".



The "Edit data storage" dialog box is displayed:



3. Select a time period. The following options are available: Second, minute, hour, day, week, month, quarter and year.
4. Write the desired number in the "Period" input field.
5. Click "Save".

Result

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

Edgeio
Path: [edge](#) / Edgeio
Data stored for [30_Days](#) (ASSET_MODULE.ASSET_DETAILS.INHERITED_FROM edge)

Connectivity **Aspects**

Variables (8) + Add variable + Add multiple variables

Name	Aspects	Type	Unit	Topic	Preview data	Connection
Manufact unit	Pixeom	Int16				
Model	Pixeom	Int16				
MotionDeviceCateg...	Pixeom	Bool		S7Plus::Clock_0_5Hz:...		CONNECTED
ProductCode	Pixeom	Int16		S7P2::tag1::4::4		CONNECTED

7.3 Setting data retention for an individual variable

Description

If you do not want to use the data retention period that you have set on the asset for individual variables, you can set a separate time period for each individual variable.

Procedure

To set the data retention for an individual variable, follow these steps:

1. In the detail view, click on the icon in the row of the corresponding variable. The "Edit variable" dialog box opens.
2. Activate the function "Use an individual data retention for this variable" under "Data retention of the variable".
3. Set the desired period for the data retention of the variable.
4. Click "Edit variable".

Creating variables

8.1 Adding a variable

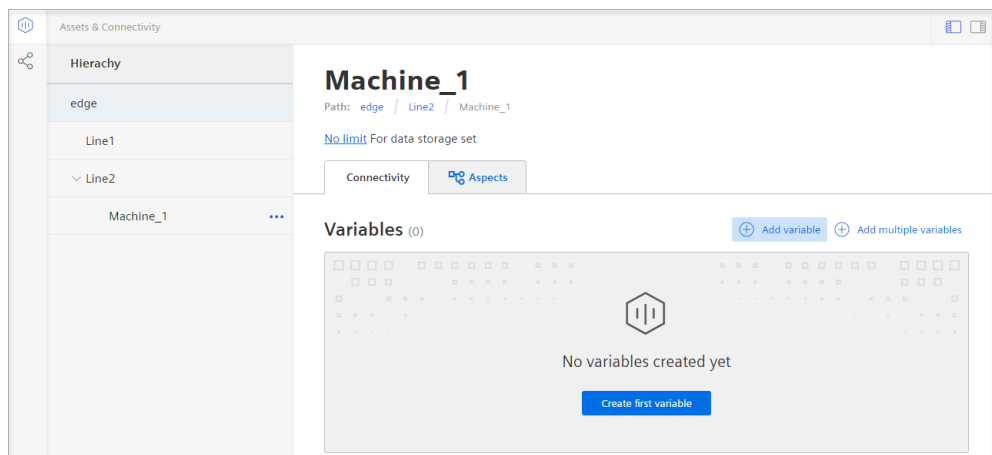
Description

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

Procedure

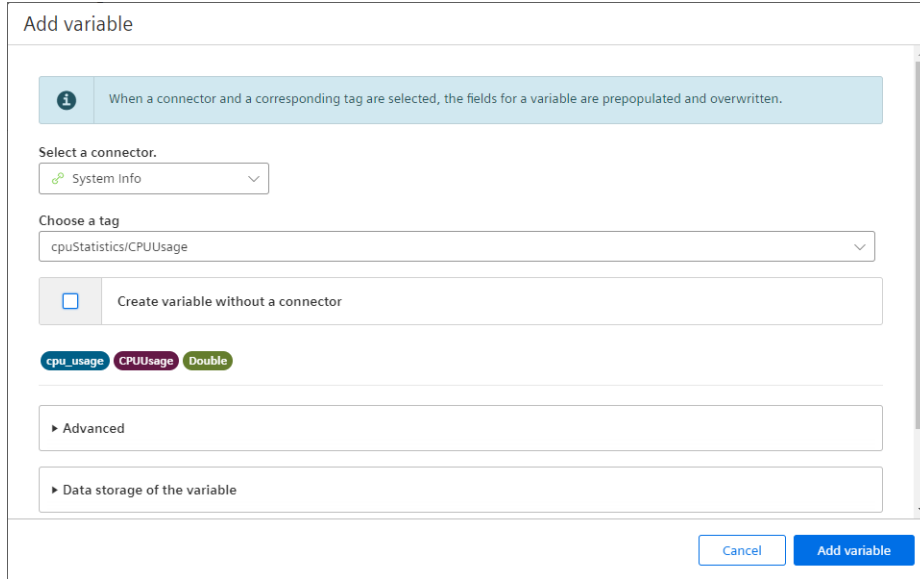
To add a variable, follow these steps:

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



8.1 Adding a variable

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



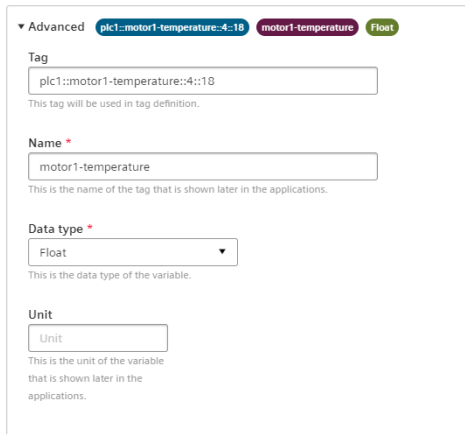
- 4. Select a connector.

Note

Adding a variable without connector


By selecting the "Create variable without connector" option, you can also add a variable without selecting a connector.

- 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:



You can find additional information about the data types here: Supported data types (Page 56)

- 6. Fill in the "Unit" field.

7. Set the data retention for each variable.
 - If you enable the function "Use an individual data retention for this variable", you can define a time period for data retention for each variable.
 - If you do not activate the function, the specified data retention period of the asset will be used.
8. Optional: Select one or more aggregations with the respective desired calculation cycles for the variable by clicking .

Note**Improving performance**

Pre-calculated aggregations are taken into account when querying the data. This decisively shortens the duration of the query. For example, the aggregations API queries the last month with aggregation "Sum".

For this, the aggregation is calculated from the raw data as needed (at 1 ms cycle = 2 628 000 000 data points). However, if pre-calculated aggregations have been configured on the variable, the aggregation can be calculated from them (e.g. 1h aggregation configured = 730 data points).

The following aggregations are available:

- Sum
 - Count
 - Average
 - Min
 - Max
 - First
 - Last
 - Counter
 - Timer
 - TimeWeightedAverage
 - StandardDeviation
 - Variance
9. Activate the "Variable" option if you want to save the calculated values in a separate variable. With this setting, you can tell by the name supplement that the values of this variable are pre-calculated, for example, in Performance Insight or in Energy Manager.
Example: EnergyConsumption_Sum_1_Day
The raw data values of this variable are summed once daily.
 10. Click "Add variable".

Result

The new variable is displayed in the detail view:



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

8.2 Supported data types

Description

The Data Service offers a set of supported data types. These are identified by keys, e.g. "Int32" "String", etc.

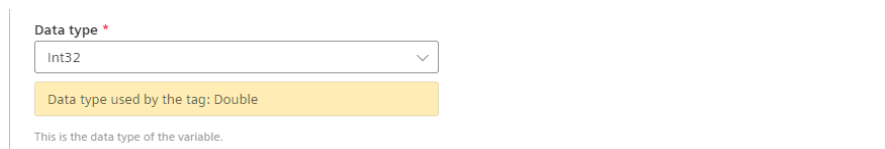
The types of data that are transmitted via the MQTT broker, e.g. from an S7 CPU, are assigned in the Data Service as follows:

Data type assignment		
MQTT data type		Data Service data type
Bool	= >	Bool
SInt	= >	Int8
Int	= >	Int16
DInt	= >	Int32
LInt	= >	Int64
USInt	= >	UInt8
Byte	= >	UInt8

Data type assignment		
MQTT data type		Data Service data type
UInt	= >	UInt16
Word	= >	UInt16
UDInt	= >	UInt32
DWord	= >	UInt32
ULInt	= >	UInt64
LWord	= >	UInt64
Real	= >	Float
LReal	= >	Double
String	= >	String
Char	= >	String
TimeSpan	= >	Time

However, if a connector calls the same data types differently, such as Number instead of Int32 or Text instead of String, these data types are initially unknown to the Data Service. The data types are actually retainable in the DataService, but this is not recognized because the data type is unknown.

For this case, you can select a data type known in the Data Service when adding the variable itself:



Data type *

Int32

Data type used by the tag: Double

This is the data type of the variable.

The hint tells you the data type of the tag. Select the matching data type in the Data Service.

8.3 Adding a variable (Unified Comfort Panel)

If the type is incompatible with the data received, an error is displayed.

Note

Changing the data type in the Data Service

By default, the data type for a variable is transmitted or assigned 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), TimeSpan (time period)

8.3 Adding a variable (Unified Comfort Panel)

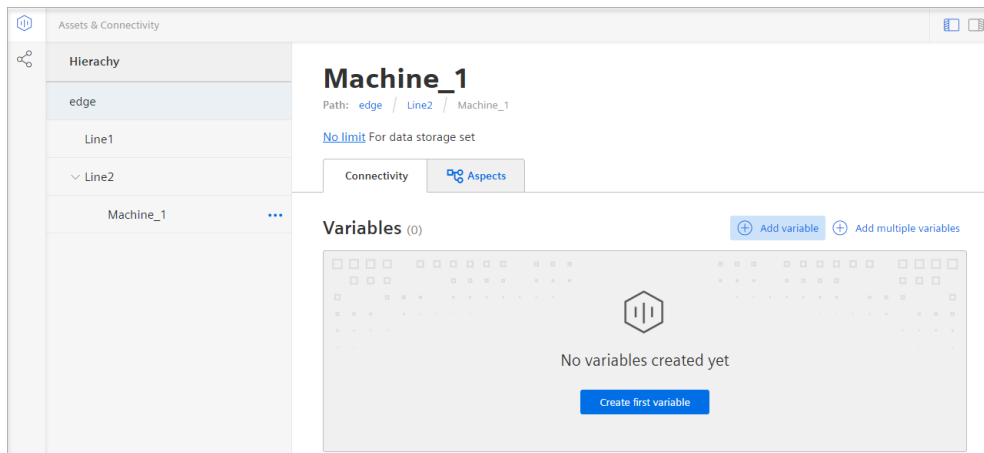
Description

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.



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

- Select the "HMIRuntime" connector.

- Fill in the appropriate information for the variable: Tag, name, data type and unit.
- Click "Add variable".

8.4 Adding multiple variables at the same time

Description

You can also add multiple variables at the same time.

Note

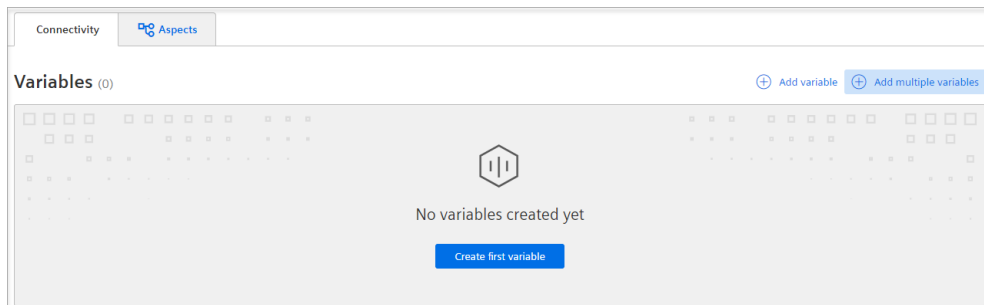
Availability of option

The "Add multiple variables" option is only available when at least one connector has been activated.

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 the desired connector.
All tags or topics provided by the connector are displayed:

Add multiple variables

Choose an adapter
SIMATIC S7 Connector

Select tags to create variables
25 Available tags

temperature

<input checked="" type="checkbox"/>	plc1/motor1-temperature
<input checked="" type="checkbox"/>	plc1/motor10-temperature
<input checked="" type="checkbox"/>	plc1/motor11-temperature
<input checked="" type="checkbox"/>	plc1/motor12-temperature
<input checked="" type="checkbox"/>	plc1/motor13-temperature
<input type="checkbox"/>	plc1/motor14-temperature
<input type="checkbox"/>	plc1/motor15-temperature
<input type="checkbox"/>	plc1/motor16-temperature
<input type="checkbox"/>	plc1/motor17-temperature
<input type="checkbox"/>	plc1/motor18-temperature
<input type="checkbox"/>	plc1/motor19-temperature

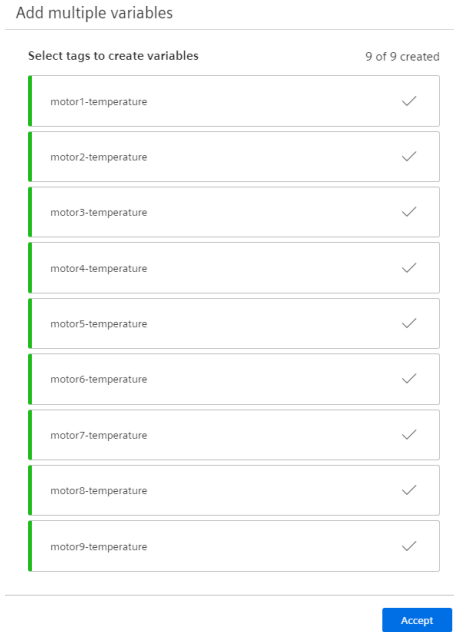
Cancel Save

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

5. Select all the tags you want.

8.4 Adding multiple variables at the same time

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



- 7. Click "Accept".

Result

The added variables are displayed in the detail view:

Connectivity Aspects

Variables (5) + Add variable + Add multiple variables

Name	Aspects	Type	Unit	Topic	Preview data	Connection
motor11-temperature		Float		plc1::motor11-temperature:4:19		CONNECTED
motor13-temperature		Float		plc1::motor13-temperature:4:19		CONNECTED
motor1-temperature		Float		plc1::motor1-temperature:4:18		CONNECTED
motor12-temperature		Float		plc1::motor12-temperature:4:19		CONNECTED
motor10-temperature		Float		plc1::motor10-temperature:4:19		CONNECTED

8.5 Connection status of the variables

Description

Based on the connection status, you can see at a glance if metadata from the IE data bus (MQTT broker) is being transmitted for the variable:

Connection status	Explanation
CONNECTED	The metadata is transferred from the IE data bus (MQTT broker).
DISCONNECTED	No metadata are transferred.

8.6 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.

The screenshot shows the 'Machine_1' connectivity interface. It includes a path 'edge / Line2 / Machine_1', a 'Data stored for 2 Days' indicator, and tabs for 'Connectivity' and 'Aspects'. Below these is a 'Variables (8)' section with a table. The table has columns for Name, Aspects, Type, Unit, Topic, Preview data, and Connection. One variable, 'motor1-temperature', is shown with a 'Float' type, 'Degree' unit, and a 'CONNECTED' status. A line graph icon is visible next to the variable name.

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

Result

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



You can set the period of the preview and whether you want to see the values aggregated.


8.7 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 connector, the name of the variable, or other settings.
5. Click "Edit variable".

Result

The settings of the variable have been changed accordingly.

8.8 Filtering variables

Description

You can filter the variables of an asset according to various criteria:

- Name
- Aspects
- Data type
- Unit
- Topic

Procedure

To filter the variables, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click on the "Connectivity" tab.
All created variables are displayed.
3. Specify one or more filter criteria.

Result

You will only be shown the variables that match the filter criteria you entered. The number in brackets after "Variables" shows you how many variables are actually available on this asset without a filter:

Data stored for 30 Days

Connectivity **Aspects**

Variables (25) [Add variable](#) [Add multiple variables](#)

Name	Aspects	Type	Unit	Topic	Preview data	Connection
motor		Int16				
motor1-vibration		Int16		plc1::motor1-vibration:4::16		CONNECTED
motor2-vibration		Int16		plc1::motor2-vibration:4::16		CONNECTED
motor4-vibration		Int16		plc1::motor4-vibration:4::16		CONNECTED
motor3-vibration	Vitus Test Topic	Int16		plc1::motor3-vibration:4::16		CONNECTED


8.9 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.

Creating aspects and grouping variables

9.1 Add aspect

Description

You can use aspects to group variables.

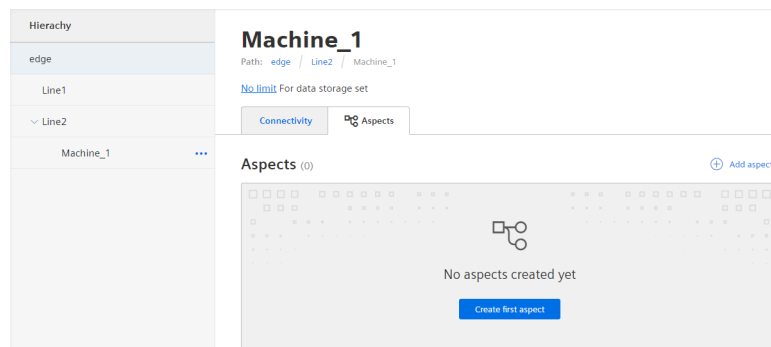
Requirement

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

Procedure

To add an aspect, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click the "Aspects" tab in the detail view.



9.1 Add aspect

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

Add aspect

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

Select aspect type
Available aspect types
You can optionally specify an aspect type to create automatically generated, predefined variables .

Cancel Add aspect

4. Enter a name.

Note

Selecting aspect types

You only need the aspect types if you want to use the sequencer analysis in the Performance Insight app.

To do this, select one of the predefined aspect types from the drop-down list.

5. Click "Add aspect".

- To assign variables to the created aspect, click "Edit aspect". The "Edit aspect" dialog box is displayed:

Edit aspect

Name *

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

Choose variables

motor13-temperature ×
motor11-temperature ×
motor1-temperature ×
▼

motor12-temperature ×
motor10-temperature ×

Choose one or more variables for this aspect.

Cancel
Edit 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 "Edit 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/dj/simatic/v1/s7c1/dpr/plc1/defa...
motor7-temperature	Float	ie/dj/simatic/v1/s7c1/dpr/plc1/defa...
motor8-temperature	Float	ie/dj/simatic/v1/s7c1/dpr/plc1/defa...
motor9-temperature	Float	ie/dj/simatic/v1/s7c1/dpr/plc1/defa...
motor10-temperature	Float	ie/dj/simatic/v1/s7c1/dpr/plc1/defa...

9.2 Adding aspect types for the step time analysis (PI)

Description

If you want to use the step time analysis in the Performance Insight app, you need aspects with predefined aspect types and with permanently assigned variables.

Procedure

To add aspect types for sequencer analysis, follow these steps:

1. In the "Hierarchy" tab, click the corresponding asset.
2. Click the "Aspects" tab in the detail view.
3. Click "Add aspect" or "Create first aspect".
4. The dialog box dialog is displayed:

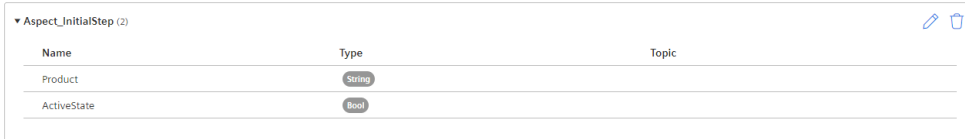
The screenshot shows a dialog box titled "Add aspect". It has a "Name" input field with a red asterisk and a placeholder "Name". Below it is a note: "This is the name of the aspect, that is shown later in the applications." There is a "Select aspect type" dropdown menu with a placeholder "Available aspect types" and a downward arrow. Below the dropdown is a note: "You can optionally specify an aspect type to create automatically generated, predefined variables." At the bottom right, there are two buttons: "Cancel" and "Add aspect".

5. Enter a name.
6. Select one of the two predefined aspect types:

The screenshot shows a dropdown menu titled "Select aspect type". The dropdown is open, showing two options: "StepChainAnalysis_InitialStep" and "StepChainAnalysis_Step". The "StepChainAnalysis_Step" option is selected and highlighted with a blue background.


Result

An aspect with the aspect type "StepChainAnalysis_InitialStep" contains two predefined variables:



Name	Type	Topic
Product	String	
ActiveState	Bool	

An aspect with the aspect type "StepChainAnalysis_Step" contains one predefined variable:



Name	Type	Topic
ActiveState	Bool	

Note

Product creation

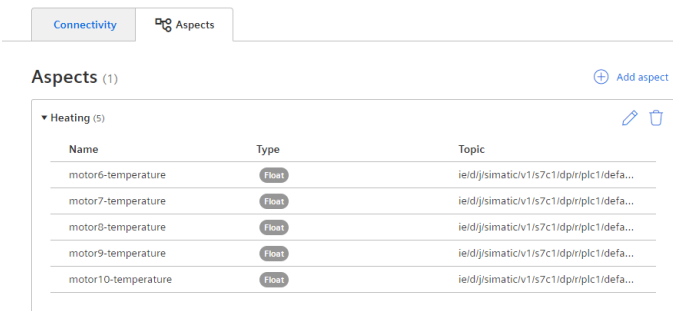
When using the aspect type "StepChainAnalysis_InitialStep", a product is created in the automatic dashboard of the step time analysis in Performance Insight. The product name is transmitted via the variable "Product" and can be specified in even more detail in the app using the display name.

9.3 Editing an aspect

Description

You can change the assignment of the variables to an aspect.

In the example, the variable "motor6-10-temperature" is assigned to the aspect "Heating":



Name	Type	Topic
motor6-temperature	Float	ie/dj/simaticv1/s7c1/dpr/plc1/defa...
motor7-temperature	Float	ie/dj/simaticv1/s7c1/dpr/plc1/defa...
motor8-temperature	Float	ie/dj/simaticv1/s7c1/dpr/plc1/defa...
motor9-temperature	Float	ie/dj/simaticv1/s7c1/dpr/plc1/defa...
motor10-temperature	Float	ie/dj/simaticv1/s7c1/dpr/plc1/defa...

Note


Difference from the view on a panel

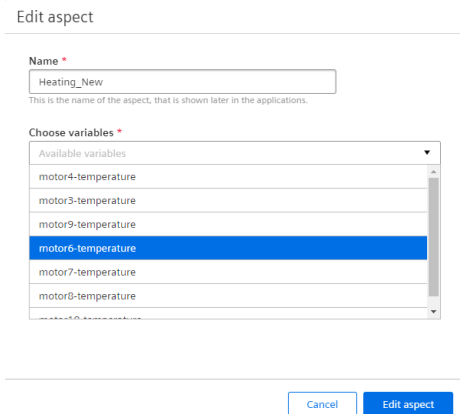
On a panel, the topic of the variable is, for example, named as follows:

- motor6-temperature => EITemperature

Procedure

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

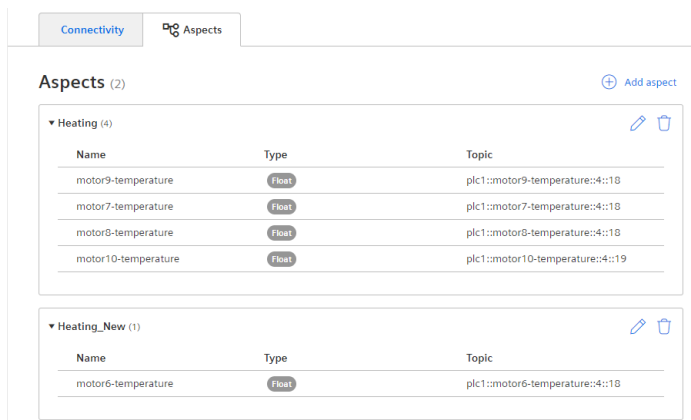
1. In the "Aspects" tab, click the  icon next to the desired new aspect in the detail view. The "Edit aspect" dialog box is displayed:



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:



Note**Assignment of variables**

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


9.4 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.

Backing up and restoring data

10.1 Data backup

Description

You can save the configuration and time series data in the Data Service (connector connections, asset structure, variables, aspects, etc.) and restore it to another IED, for example, or save a backup of your configuration.

Note

Restore backup

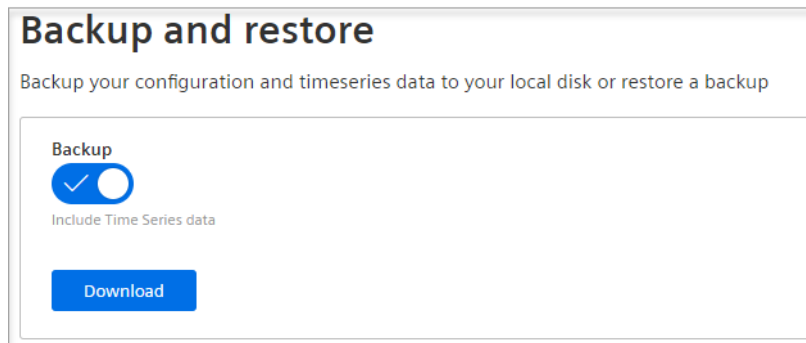
When you restore a backup of your data, only the data that was included at the time of the last backup is restored. Recent changes made in the Data Service after the time of the last backup are lost when the backup is restored.

For this reason, we recommend making regular backups of the data.

Procedure

Proceed as follows to back up the data:

1. In the navigation bar, click on "Settings > Backup and restore".
2. If you only want to back up the configuration files, click directly on "Download".
3. If you also want to save the time series data, enable the function "Include time series data":



4. Click "Download".

10.2 Restoring data

- The data is downloaded locally (in the Downloads folder):
 - For the configuration data: dataservice-backup-config.json
 - For the time series data: dataservice-backup-data.txt

Note

Creating the time series file

It may take a bit longer to create the file.

- To track the creation process of the files, you can enable the developer tools in the browser (F12 or Ctrl + Shift + I) and open the "Network" tab.

Result

The following data, for example, are backed up in the configuration file:

```
1  {
2  "adapters": [...],
119 "aspects": [...],
217 "assets": [...],
310 "dataRetentions": [...],
384 "variables": [...],
1178 "aspectTypes": [],
1179 "aspectTypeVariables": []
```

10.2 Restoring data

Description

You can restore a backup of your configuration or the time series data, or you can fill several other IEDs with the configuration of your Data Service, for example, and therefore do not have to set up any new configurations.

Note

Restore backup

When you restore a backup of your data, only the data that was included at the time of the last backup is restored. Recent changes made in the Data Service after the time of the last backup are lost when the backup is restored.

For this reason, we recommend making regular backups of the data.

Requirement

Existing files:

- For the configuration data: dataservice-backup-config.json
- For the time series data: dataservice-backup-data.txt

Procedure

To upload or restore the configuration data, follow these steps:

1. In the navigation bar, click on "Settings > Backup and restore".
2. Under "Restore backup of the configuration", click on "Select file".
The selection window opens in the Explorer.
3. Select the file (.json) required for the configuration.
4. Click "Open".
The file name is displayed.
5. Click "Upload configuration" to upload a configuration file.

Note

Data is overwritten

When you confirm the dialog window, the old data is overwritten.

6. Click "Confirm".

Result

The configuration is restored.

Migrating Data Service and integrating it into the IIH (Industrial Information Hub).

11

11.1 Migrating Data Service

Note

Do not omit any version

We recommend that you avoid omitting any version of the Data Service during migration. This will ensure that all data is automatically migrated as well.

V1.1 > V1.2 > V1.3 > V1.4

Migration from V1.3 to V1.4 (recommended)

As soon as you update the version of the Data Service from V1.3 to V1.4, a migration of all data runs automatically in the background. No additional action is required.

Migration from V1.1, V1.2 or V1.3 to V1.5

 WARNING
Loss of data
If you are currently still using V1.1, V1.2 or V1.3 of the Data Service and upgrade to V1.5, all Data Service data will be lost. There is no automatic migration of the data.

Solution:

Back up the Data Service data and configuration manually in V1.1, V1.2, or V1.3 and restore it in V1.5.

Migration from V1.0, V1.1 or V1.2 to V1.4 or V1.5

With migration, data is not migrated automatically and no data backup can be performed. All Data Service data will be lost.

Note

Contact Support

Contact your support team for assistance in migrating the data.

11.2 Integrating Data Service into the IIH

Note


Integration of Data Service V1.5 into the IIH


We recommend that you wait for version 1.5 of the Data Service before integrating it into the IIH. Based on version 1.5, all data, assets and variables of the Data Service are automatically migrated to the IIH without data loss.

Description

You can integrate the standalone Data Service with its own user interface into the IIH (Industrial Information Hub).

You can perform the integration starting from the Data Service or from the IIH.

 WARNING
Data is lost with version 1.4
You can already integrate the Data Service into the IIH with V1.4. However, all data of the Data Service are then lost.

 CAUTION
Undo integration
The integration cannot be undone and after the integration no data/variables independent of the IIH can be saved in the Data Service.

Requirement

The following apps must also be installed on the IED:

- IIH Configurator
- IIH Core

The green check mark indicates that all necessary apps are installed on the IED:

 IIH available

Procedure starting from the Data Service

To integrate the Data Service into the IIH, follow these steps:

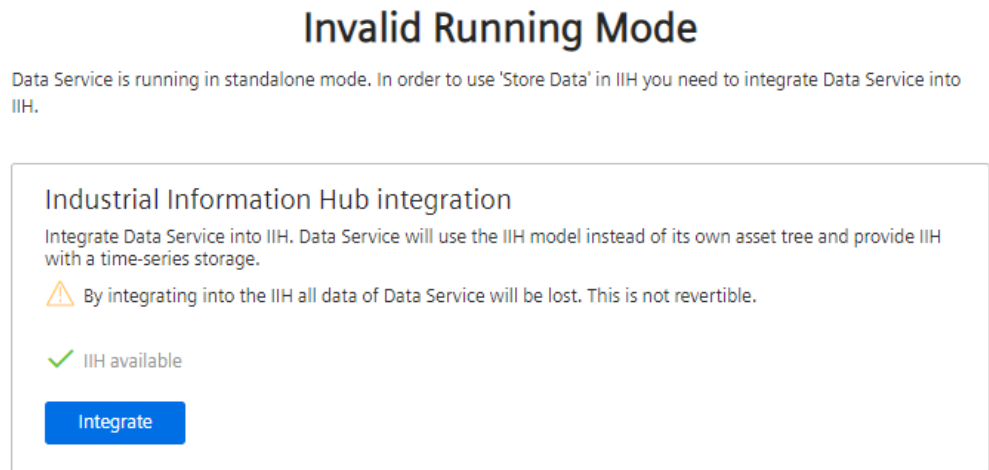
1. Open the "Settings".
2. Click "Integrate".

Procedure starting from IIH

To integrate the Data Service into the IIH, follow these steps:

1. Open the "Save data" tab.

If the Data Service is not yet integrated, you see the following window:



2. Click "Integrate".

Result

The Data Service is now integrated in the IIH. The integrated Data Service no longer has its own user interface. Switch to the IIH Common Configurator to create new connectors, assets and variables. You set the data retention in the IIH in the "Save data" tab.

The API remains unchanged by the integration into the IIH, thus apps based on it, such as Performance Insight or the Notifier, continue to function as usual.

Appendix

12.1 Display system information

Description

In the System Information dashboard, you can view various information provided by the System Info connector, such as CPU load, RAM usage, database size and write speed:



Procedure


To display the system information, follow these steps:

1. Open the "Settings". (In the standalone Data Service)
-or-
2. In the navigation, click on "Save data > Configuration". (In the integrated Data Service in the IHH)
3. Click "System information".

12.2 Data Service OpenAPI specification

Description

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

You can find the routes for the Data Service by clicking the  icon in the title bar under "API Documentation".

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.

Requirement

The OpenAPI of the Data Service is available in the Industrial Edge Device-wide Docker network "proxy-redirect".

To communicate with the OpenAPI from the Data Service, an app must define this "external" network with the "bridge" driver:

```
networks:  
  proxy-redirect:  
    external:  
      name: proxy-redirect  
      driver: bridge
```

Depending on the environment, the Data Service is available there under this URL:

Edge Box: <http://edgeappdataservice:4203>

Industrial Edge App Publisher

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

Procedure

To set up a connection to the OpenAPI of the Data Service, 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.

Note

Quality of values

If the quality is GOOD or UNCERTAIN, then the values are taken fully into account in the app.

What does it mean if the value has the quality BAD:

- This value is not taken into account when calculating KPIs, for example, in Performance Insight or Energy Manager.
 - The value is also saved when the raw data is saved in an app.
-

12.3 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 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 connector in packets, more data can be processed. For example, a connector 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

Database (dashboard configuration in Performance Insight)		
4 counter variables in 1 second resolution		
Widget 1: Chart (diagram)	3 counter variables	No aggregation
Widget 2: Chart (diagram)	3 counter variables	Aggregation: Average
Widget 3: Gauge (pointer diagram)	1st counter variable	Aggregation: Average
Widget 4: Value	2nd counter variable	Aggregation: Average
Widget 5: Heatmap	3rd counter variable	No aggregation

The test runs were performed on a Unified Comfort Panel (UCP) instead (with the minimum hardware equipment).

Load times of the database		
Loading 1 day	10:70 s	777,600 data points
Loading 1 week	58.00 s	5,443,200 data points

Impact of parameters on the test:

Time period		
1 day	10:70 s	777,600 data points
2 days	19:21 s	1,555,200 data points
3 days	28:99 s	2,332,800 data points
4 days	37:09 s	3,110,400 data points
5 days	50:57 s	3,888,000 data points
6 days	61:01 s	4,665,600 data points
7 days	68:00 s	5,443,200 data points
=> Linear influence		

Calculation time period (1 day)		
10 min	11:83 s	777,600 data points
20 min	10:41 s	
30 min	11.03 s	
40 min	11.46 s	
50 min	11.84 s	
60 min	11.68 s	
= has no effect		

Variable cycle (1 day)		
1 s	11.50 s	777,600 data points
2 s	8.50 s	388,800 data points
3 s	4.30 s	259,200 data points
4 s	4.09 s	194,400 data points
5 s	4.23 s	155,520 data points
6 s	3.12 s	129,600 data points
7 s	3.01 s	111,086 data points
8 s	2.52 s	97,200 data points
=> Linear influence		

Aggregation (1 day, all requests use only one specific aggregation)		
Average	3.28 s	777,600 data points
Min	2 s	
Max	2.5 s	
Sum	4 s	
Last	2 s	
Counter	70 s	
Timer	62 s	
=> no influence of the aggregations in the database => major influence of the aggregations in the program code		

12.4 Calculation example for data consumption

Description

You can calculate how many GB of memory are required for which data points.

Calculation formula

The calculation formula is made up as follows:

Number of variables * ValuePerVariable * Data type size

For data types with <= 32-bit values, the data type size is 66 bytes.

And for data types with 64-bit values, the data type size is 70 bytes.

Example

5 millisecond cycle -> 200 values per second

8 hours of storage time -> $200 * (60 * 60 * 8) = 5,760,000$ values per variable (5.76 million)

90 integer variables -> $90 * 5,760,000 * 66 = 34,214,400,000$ bytes = 32,629 MB = 31,865 GB

12.5 Quality codes

Description

The quality code measures the quality of a value when it is transferred from a CPU via the connector to the Data Service.

There are three different types of qualities:

- GOOD
- UNCERTAIN
- BAD

The Data Service saves all values, regardless of the type of quality, and forwards them to other apps. In the respective apps, the values are then taken into account or ignored according to their quality.

If the quality is GOOD or UNCERTAIN, then the values are taken fully into account in the app.

What does it mean if the value has the quality BAD:

- This value is not taken into account when calculating KPIs, e.g. in Performance Insight or Energy Manager.
- The value is also saved when the raw data is saved in an app.

WinCC UA Standard is used to mark the quality of the values.

From bits 6 and 7 you can read out the quality which a value has. From bits 2 to 5 you can get more information about the quality.

Flags				Extended Sub-status				Quality		Sub-status			Limits		
bit 15	bit 14	bit 13	bit 12	bit 11	bit 10	bit 9	bit 8	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0

Quality bits 6 and 7

Quality code	Quality	Description
0	BAD	The value is not reliable. You can read out the reasons for this from the bits of sub-status.
1	UNCERTAIN	The quality of the value is worse than usual. It might still be possible to use the value. You can read out the reasons for this from the bits of sub-status.
2	GOOD (non-cascade)	The quality of the value is good.
3	GOOD (cascade)	The quality of the value is good and can be used as a control.

BAD + Sub-status bits 2 to 5

Quality code	Quality	Description
0	Non-specific	There is no information available as to why the value is BAD quality.
1	Configuration error	The value is not useful due to some inconsistencies in the configuration.
2	Not connected	The value is not reliable because the connection to the provider, e.g. to the CPU, was terminated.
4	Sensor failure	The value is not meaningful because it cannot be converted.

Quality code	Quality	Description
5	No communication, with last usable value	The value is not meaningful because communication with the data source has failed. However, the last known value is available.
6	No communication, no usable value	The value is not meaningful because communication with the data source failed or was not set up.
7	Out of service	The value is not reliable because the provider is not active.

UNCERTAIN + Sub-status bits 2 to 5

Quality code	Quality	Description
0	Non-specific	There is no information available as to why the value is UNCERTAIN quality.
1	Last usable value	The connection to the data source still exists, but the data source no longer updates the value.
2	Substitute value	A predefined value is used because the value is invalid due to communication problems.
3	Initial value	A predefined value is used.
5	Range violation	The value is outside the specified limits (min/max values)
6	Sub-normal	A value derived from multiple values has less than the required number of good sources.

