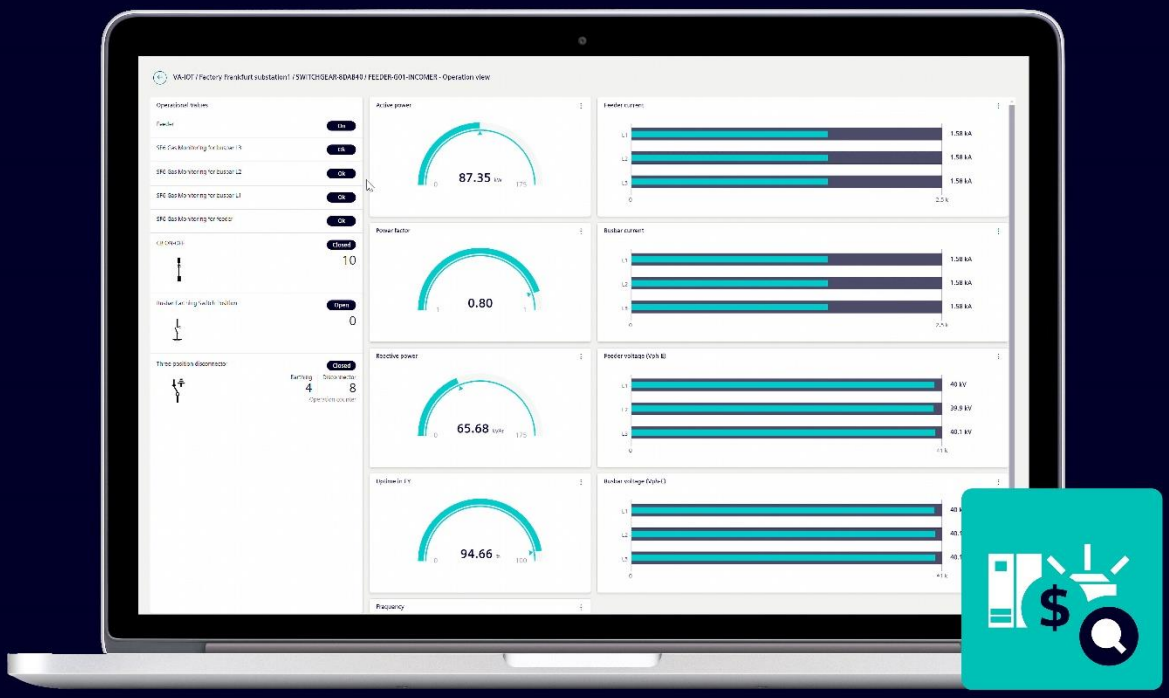


Electrification X

Asset Management

Digital caretaker for your energy distribution, automation systems and networks at the medium- and low-voltage levels

SIEMENS

Contents

Overview

The first step is to connect industry assets like electrical distribution equipment at the field level to a common remote IoT platform through a reliable IoT connectivity device popularly known as “IoT gateway.” The second step is to access, visualize, and analyze the data using an IoT application hosted in a secure and reliable cloud environment. The goal of the journey is to help industry acquire real value by obtaining the necessary assets and business transparency and establishing continuous improvement and optimization processes.

The challenges are getting more and more complex. Networks will be loaded and challenged in different ways by integration of renewables, higher loads in distribution networks and the general call for action regarding sustainability. The resiliency must be increased. The analysis of data enables targeted service actions and will increase safety and availability.

We help you …

- to gain transparency across your electrical distribution assets
- to identify optimization strategies to reduce your operation costs
- to better manage risks by identifying potential asset breakdowns and failures before they happen

As your trustworthy partner we provide …

- reliable IoT-ready electrical distribution assets, including medium- and low-voltage switchgears
- reliable IoT connectivity hardware like gateways and edge devices
- open and reliable IoT ecosystem Electrification X
- ONE tool for electrical distribution – Electrification X Asset Management

Your benefits

- Prevent unplanned shutdowns
- Increase uptime, availability and resilience of the substation
- Reduce time for manual data collection and analysis, and optimize maintenance cycles
- Optimize OPEX by reducing operating and maintenance costs
- Extend asset life through preventive maintenance
- Identify potential optimizations to improve asset utilization & reduce CAPEX

Functions

The Feature Set Electrification X Asset Management can be purchased on a modular subscription-based model composed by a minimum subscription package:

- Electrification X Base Package (once per Electrification X tenant)
  +
- Asset Transparency single busbar (AIS, GIS) – 1 MV-Feeder
  or
- Asset Transparency double busbar (GIS) – 1 MV-Feeder

Additional extension modules which can be acquired on demand for following use cases:

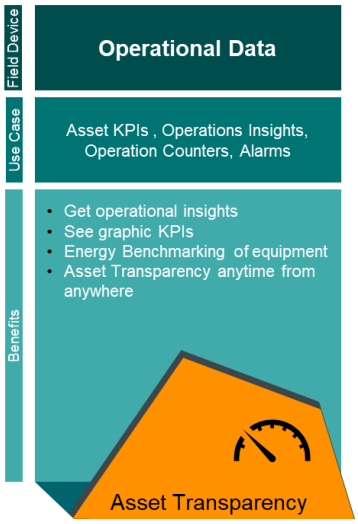
- Temperature/Mechanical Operation Counter Monitoring (Standard/Extended)
- Circuit Breaker Monitoring (Advanced/Basic)
- Partial Discharge Monitoring
- Motor Monitoring via partner API
- Transformer Monitoring Basic
- Transformer Monitoring Advanced via partner API

Electrification X Asset Management is designed to fit to customers' requirements and monitoring strategies.

Asset Transparency

The **Asset Transparency** package includes:

- Geographic view of asset localization and a color code indicating the Asset Transparency Index, alarms, and local time.
- Local temperature conditions, weather forecast and a list of existing assets with corresponding status and Asset Transparency Index.
- Aggregated asset specific view with information on energy budget usage, operational uptime, Asset Transparency Index and CO2 emissions.
- Historical power consumption and asset utilization (based on rated capacity) for every asset.
- List of feeders of the assets with individual alarm visualization, status and Asset Transparency Index.
- Deep dive into individual feeder displaying real-time operational data (Operations and Measurements) and the status of the different components (e.g. ON, OFF) as well as operational counter KPIs of the components.



For **Asset Transparency** there is a dedicated package for a single-busbar switchgear for air-insulated and gas-insulated switchgears. For double busbar switchgears there is a separate package for gas-insulated switchgears.

1 **Asset Transparency** package must be activated per 1 medium-voltage Feeder.

Condition Monitoring

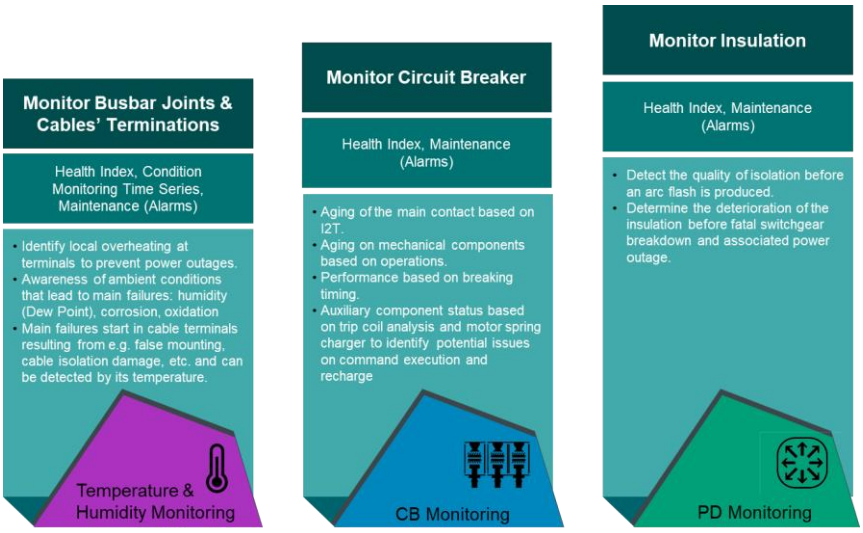
The **Condition Monitoring** allows you continuous monitoring and online health index of your electrical assets remotely. It is based on Temperature/Mechanical Operation Counter Monitoring including Humidity Monitoring and can be complemented by Circuit Breaker Monitoring (Basic/Advanced) and Partial Discharge Monitoring. **Condition Monitoring** packages also send an e-mail notification to your designated maintenance engineer with details of the alarm as soon as an abnormality occurs.
Condition Monitoring helps scheduling the maintenance activities as well as taking decisions regarding replacement of parts or components or the asset itself based on accurate diagnosis of electrical assets behaviors.

The **Condition monitoring** strategy is defined by the engineering team that considers the technology of switchgear, the environmental conditions, and other aspects of the project. Each of the following modules can be ordered separately and can be implemented in different points of time.

Temperature/Mechanical Operation Counter Monitoring including Humidity Monitoring can identify many problems because of unusual temperature changes.

The second step is the Circuit Breaker Monitoring, which analyses the main component of the switchgear. As the Circuit Breaker ages or has executed many switching operations, its remaining lifetime is reduced. Many factors can influence it and knowing the right time to repair or even replace the Circuit Breaker can reduce investment and increase reliability. Circuit Breaker Monitoring enables full transparency on Circuit Breaker current performance and expected lifetime.

The third step is Partial Discharge Monitoring to detect faulty components/installations (e.g., medium-voltage cables, insulators, bushings, voltage transformers).



Some of the extensions related to **Condition Monitoring** require additional IoT hardware.

Customer gets detailed information along with indications about the health status of the asset based on different **Condition Monitoring** options such as temperature, operation counter, humidity, circuit breaker and partial discharge monitoring based on the availability of the respective sensors. The information provided on the health status of the assets is merely indicative and not binding to you. However, this can be used as guidance in assessing the risk associated with assets. This information might help you in scheduling the maintenance as well as taking decisions regarding replacing the parts/components/assets itself.

Temperature/Mechanical Operation Counter Monitoring

The **Temperature/Mechanical Operation Counter Monitoring** including Humidity Monitoring of certain parts of the switchgear helps to identify early symptoms of potential failures. Faulty or loose connections in busbar and cable terminations or insufficient contacting surface in withdrawable vacuum circuit breakers can cause increase of contact resistance, which in turn leads to an increase in heat. That continuous increase in heat may cause thermal failure of the connections or isolations, leading to heavy damages, long outages and even accidents involving personal.

For medium-voltage air-insulated switchgears, the temperature and humidity monitoring will be conducted through specific sensors in the busbar and cable compartment. For gas-insulated medium-voltage switchgears, those sensors will be placed in the cable compartment and in the environment.

Specific rules and analytics implemented in Electrification X Asset Management application then provide a health status index per feeder. Those indexes are subsequently aggregated to a switchgear level. This allows you to manage your risks better, to improve performance of switchgear operation and to optimize your maintenance schedules.

For medium-voltage air-insulated switchgears, there is a standard package with no additional temperature sensors on bushing side and an extended package with additional temperature sensors on bushing side available.
For medium-voltage gas-insulated switchgears, there is a standard package with one temperature sensor per phase and an extended package with more than one sensor per phase per cable available.

Overall Electrification X Asset Management contributes to reduce your OPEX significantly.

1 **Temperature/Mechanical Operation Counter Monitoring** package must be activated per 1 medium-voltage Feeder.

Circuit Breaker Monitoring

Circuit Breaker Monitoring combines data from protection relays and measured values/ operational data collected by specific hardware and sensors directly from the switchgear. After every switching operation the analysis is updated. The **Circuit Breaker Monitoring** includes:

- From relays: I2t, 2P, mechanical open & close time, make time, break time and pole scatter close & open time values are used to calculate the expected health status of Circuit Breakers, the Operation Counter can be used to calculate the remaining number of operations and the number of days since last operation, which can lead to a maintenance alarm based on the usage of circuit breaker & switchgear inactive days allowance defined by user.
- From additional sensors: supervision of closing coil and opening coil excitation profile, spring charging motor profile including detailed view of last switching operation performance.

All the data and respective analysis and results are stored linked to the serial number of the circuit breaker, so data will not get lost when withdrawable circuit breaker will be moved from one feeder to the other.

For **Circuit Breaker Monitoring** there is basic and an advanced package available for air-insulated and gas-insulated switchgears.
Circuit Breaker Monitoring Basic is based on data coming from the protection relay (no additional hardware needed). **Circuit Breaker Monitoring Advanced** is based on data coming from the protection relay and data coming from additional sensors (additional hardware needed).

1 **Circuit Breaker Monitoring (Basic/Advanced)** package must be activated per 1 medium-voltage Feeder.

Partial Discharge Monitoring

Partial Discharge Monitoring can be provided to allow early detection of faulty components and installations including medium-voltage cable plugs, insulators, bushings and voltage transformers. **Partial Discharge Monitoring** addresses gradual insulation deterioration due to moisture, dust, faulty components etc. Data for monitoring Partial Discharge are obtained from additional sensors installed in the switchgear.

For **Partial Discharge Monitoring** there are two separate packages for air-insulated and gas-insulated switchgears available.

Electrification X Asset Management offers PRPD patterns to download for in-depth examination in gas insulated switchgears.

1 **Partial Discharge Monitoring** package must be activated per 1 medium-voltage Feeder.

Motor Monitoring via partner API

Motor Monitoring via partner API provides you with Motor Monitoring via selected partner via API provided that you contract with the respective partner separately.

1 **Motor Monitoring via partner API** package must be activated per 1 Motor.

Transformer Monitoring Basic

Transformer Monitoring Basic provides you with Transformer Basic for 1 Transformer

1 **Transformer Monitoring Basic** package must be activated per 1 Transformer.

Transformer Monitoring Advanced via partner API

Transformer Monitoring Advanced via partner API provides you with Transformer Monitoring via selected partner via API provided that you contract with the respective partner separately.

1 **Transformer Monitoring Advanced via partner API** package must be activated per 1 Transformer.

Subscription

Standard Subscription Plan	Electrification X Asset Management
Functions	All
Subscription metric	• Asset Transparency single busbar system (AIS, GIS) per Feeder per month • Asset Transparency double busbar system (GIS) per Feeder per month • Standard Temperature/Mechanical Operation Counter Monitoring with standard number of sensors (AIS, no additional temperature sensors on bushing side) per Feeder per month • Standard Temperature/Mechanical Operation Counter Monitoring with standard number of sensors (GIS, one temperature sensor per phase per cable) per Feeder per month • Extended Temperature/Mechanical Operation Counter Monitoring with additional sensors (AIS, GIS, additional temperature sensors on bushing side or more than one temperature sensor per phase per cable) per Feeder per month • Partial Discharge Monitoring (AIS) per Feeder per month • Partial Discharge Monitoring Basic (GIS) per Feeder per month • Circuit Breaker Monitoring Basic (AIS, GIS) per Feeder per month • Circuit Breaker Monitoring Advanced (AIS, GIS) per Feeder per month • Motor Monitoring via partner API per Motor per month • Transformer Monitoring Basic per Transformer per month • Transformer Monitoring Advanced via partner API per Transformer per month
Subscription term	Annually, auto-renewal
Billing term	Annually, payment in advance
Upscale	Effective immediately, pro-rated billing
Downscale/Cancellation	Effective with end of subscription term
Connected Devices	To be purchased separately
Permitted Users	Unlimited, Extended Use

The Electrification X – Asset Management Feature set subscription plan is the regular, scalable Offering for this Cloud Service. The subscription term is twelve (12) months with automatic renewal; the Cloud Service fee is paid in advance. The subscription plan can be upscaled at any time and Cloud Service fees for upscales are calculated on a pro-rated basis. The Customer can also scale down the Cloud Service effective with the end of the current subscription term. The subscription fee will be adjusted for the upcoming billing term. The Cloud Service can be cancelled any time, effective with the end of the current subscription term.

The subscription plan can be purchased in packages per Feeder and for non-switchgear assets per Motor or Transformer.

Extended Use entitles the Customer to authorize its Affiliates and third parties to access and use the Cloud Services in accordance with the rights set out in the Terms and Conditions.

Prerequisites

Electrification X Tenant	The Electrification feature set is operated on an Electrification X Tenant. Therefore, a tenant with an Electrification X Base Package is required. The Electrification X Base Package has a subscription term of 12 month and must be purchased together with the first Asset Transparency package, if not otherwise already available and in operation.
Supported Connected Devices	The Cloud Service is currently compatible with commercially available Connected Devices from Siemens. A description of the available Connected Devices is provided below. A Connected Device must be purchased and installed on premise at a site specified by the Customer as agreed between the Customer and Siemens to use the Cloud Service. Customer is responsible for installing the Connected Device at the site and any associated costs to perform said Cloud Service in accordance with related Documentation for the Connected Device. List of supported Connected Devices: SICAM GridEdge on SICAM 8 (CP8031/CP8050, IPC SWS) For order information, Customer may contact its local sales representative.
Web browser and viewing devices	Chrome is recommended to use the Cloud Service, but other standard browsers might also serve this function. Screen resolution of 1920x1080 pixels or higher is recommended for best user experience
Internet Connection	The bandwidth of Customer's internet connection determines the performance of the Cloud Service.

Ordering

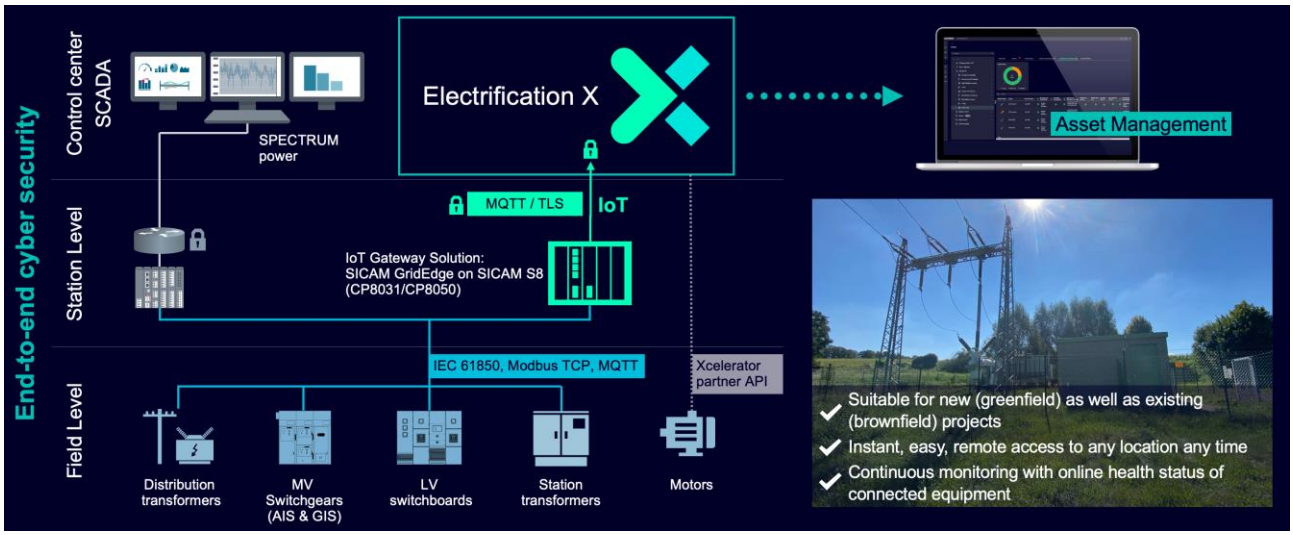
Ordering Process for the Subscription	To order the Cloud Service for the first time, Customer must request a quote from its Siemens sales representative. Depending on the offering either with Services, then customer will receive a link to his tenant, or without services, then the Customer will receive a link to the shopping cart. In this case Customer needs to (i) choose the payment options and (ii) accept the Terms and Conditions to start using the Cloud Service. The "Terms and Conditions" consist of the "Supplemental Terms Electrification & Automation", the Base Terms and the General Software and Cloud Supplemental Terms, the Acceptable Use Policy, the Siemens Data Processing Terms, this Product and Service Data Sheet and any other Supplemental Terms which may be referenced in either of the mentioned documents. Customer may upgrade, downgrade, and cancel the Cloud Services directly in the Subscription Manager store https://subscribe.siemens.com
Ordering Connected Devices	To order Connected Devices the Customer may request a quote from its Siemens sales representative
Connected Device	SICAM GridEdge on SICAM 8 (CP8031/CP8050)
Ordering	For order information, Customer may contact its local sales representative

Product Documentation

Technical Documents	Document ID	Document ID German	Document ID English
Building X – Accounts User Guide	A6V12050070		
Building X – Devices User Guide	A6V12050067		
Electrification X – General Package User Manual		E50417-H7500-C200-A1	E50417-H7540-C200-A1
Electrification X – Asset Management User Manual		E50417-H7500-C204-A1	E50417-H7540-C204-A1
Electrification X – Engineering Guide		E50417-H7500-C203-A1	E50417-H7540-C203-A1
Electrification X – Security Manual		E50417-H7500-C204-A1	E50417-H7540-C204-A1

Technical Documents can be downloaded here:
https://support.industry.siemens.com/

Topology



Data communication between the Connected Field Devices on premise and the Cloud Service requires internet connectivity (to be provided by the Customer).

Customer Support

Siemens may offer helpdesk support. Customer may contact its local Siemens representative for support requests.

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For more information, please contact Customer Support:
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