

# Electrification X

## Network Fault Management

Feature: Substation Fault Management

For fast and efficient fault handling

**SIEMENS**

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# Overview

Substation Fault Management is a feature under Electrification X Network Fault Management that empowers power grid operators to efficiently check the operational status of their protection device and power quality (PQ) device. By retrieving fault records and logs, the application enables quick analysis of the protection faults and the optimization of maintenance activities, ensuring improved reliability and performance of the power grid. This application provides real-time insights and analytics, helping operators to promptly address issues, reduce downtime, and enhance overall grid stability.

Customer Benefits:

- Ensuring transparency in the operation of protection relays and power quality devices to maintain system integrity
- Implementing a comprehensive monitoring system that operates round-the-clock, providing immediate notifications to customers regarding any alarms or trips due to protection events
- Facilitating access to fault records and visualizations, enhancing the ease of fault management and analyzing processes
- Streamlining operations through efficient management of various logs, including event, trip, operational, and user-defined logs
- Fetching protection settings help user to quickly visualize protection parameters
- Providing improved access to continuous recording and trend analysis, making it more user-friendly and accessible
- Leveraging digitalization and effective data management to inform strategic decisions for grid upgrades and enhancements where necessary
- Offering valuable insights into power consumption and distribution patterns over time, aiding operators in optimizing system performance

As your trustworthy partner we provide ...

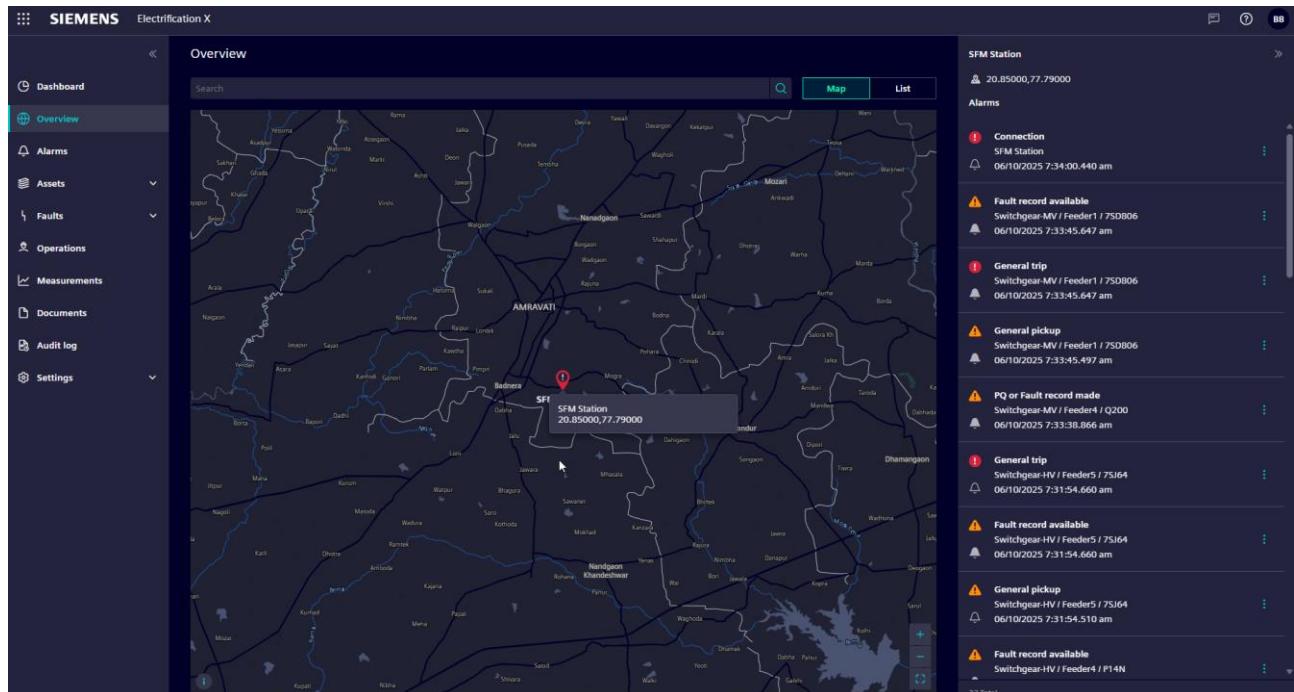
- Reliable IoT connectivity hardware forms the backbone of any IoT ecosystem, enabling seamless communication between devices and systems
- open and reliable IoT ecosystem Electrification X
- Electrification X Substation Fault Management provides a comprehensive solution for monitoring and managing the electrical faults in transmission and distribution electrical networks, enhancing transparency and reliability with the help of fault record transfer

# Feature: Substation Fault Management – Basic Asset Transparency of Protection Relay & Power Quality Devices, Protection Settings, Fault Localization including File Transfer

The Substation Fault Management feature allows you to check the operational status of your protection device and PQ device fleet. The fault analysis and notification processes are easy and convenient. The following views are provided as part of this application and are described in more detail below:

## Fault Localization

Geographic view of fault localization and a color code showing the Transparency Index, alarms, and local time. Additionally, the latest unacknowledged alarms are shown in a list.



Electrification X – Network Fault Management: Map view on a Tablet

## Basic Asset Transparency of Protection Relays and PQ Devices

The **PROT15 App**, installed within the SICAM 8 Application, retrieves device-related information such as manufacturer details, device type, firmware versions, serial numbers, and product codes.

SIPROTEC 5 devices with any IEC 61850 on the integrated Ethernet port J or on an equipped Ethernet communication module, either in the base module (port E or port F) or for modular devices with communication extension module CB202 (port N or port P) can be used. PQ meters are connected to RJ45 port to retrieve above information.

Reyrolle 5 protection relay, through its integrated Ethernet interface, utilizes IEC 61850 protocol architecture retrieving Basic Asset Information.

PQ device, through its integrated Ethernet interface, utilizing IEC 61850 protocol architecture retrieving the Basic Asset Information.

SIPROTEC 4 protection device, enhanced with EN100 communication module<sup>\*1</sup>, utilizes the IEC 61850 protocol to retrieve Basic Asset Information. The EN100 communication module supports the following versions: V04.26.01, V04.29.01, V04.33.01, and V04.40.01.

SIPROTEC 4 protection device, with DIGSI 4 interface (serial or Ethernet), utilizing **SIP4Client** installed in SICAM 8 application retrieves Basic Asset Information.

3<sup>rd</sup> Party Devices, PROT15 App utilizing IEC61850 protocol retrieve Basic Asset Information from MiCOM (P14x, P44x), GE Multilin Series.

SEL protection device, with Telnet protocol (serial or Ethernet), utilizing **3PCONNECT01 installed** in SICAM 8 application retrieves Basic Asset Information.

<sup>\*1</sup> Any other versions of EN100 communication module shall be discussed with the Product Team

SIEMENS Electrification X

Devices view

Search: SIP5\_7KE85

Device information

Main component

Name	SIP5_7KE85_118_116
Manufacturer	SIEMENS
Product family	SIPROTEC
Product	7KE85
Order number	7KE85-DAAA-AAD-AAAAAO-AA8111-531138-AAA000-000AC1-CB18A1-CB1CB1-CB1CB1
Serial number	BM0123456789
Installed firmware version	V09.80

Settings

Name	Device Parameter Set
Settings version	09.80.01

Network Interfaces

Name	Ethernet Interface
Description	Ethernet Interface
IP address	192.168.118.116

## Electrification X – Network Fault Mgmt (Substation Fault Management): Devices Transparency

## Fault Records (COMTRADE Files), Visualization and Download

Electrification X shows a filterable list of all records in COMTRADE format from the grid. These records can be visualized and downloaded. These records come from protection relays and PQ devices which communicate over IEC 61850 protocol to the IoT Gateway. The **PROT15** App installed in the SICAM 8 application, retrieves these records.

SIPROTEC 5 devices with any IEC 61850 on the integrated Ethernet port J or on an equipped Ethernet communication module, either in the base module (port E or port F) or for modular devices with communication extension module CB202 (port N or port P) can be used for retrieving the Fault records

Reyrolle 5 protection relay, through its integrated Ethernet interface, utilizes IEC 61850 protocol architecture retrieving the Fault records.

PQ device, through its integrated Ethernet interface, utilizing IEC 61850 protocol architecture retrieving the Waveform records, MCS records and Transient Records.

SIPROTEC 4 protection device, enhanced with EN100 communication module<sup>\*2</sup>, utilizing the IEC 61850 protocol to retrieve Fault Records. The EN100 communication module supports the following versions: V04.26.01, V04.29.01, V04.33.01, and V04.40.01.

SIPROTEC 4 protection device, with DIGSI 4 interface (serial or Ethernet), utilizing **SIP4Client** installed in SICAM 8 application, retrieve Fault Records. (COMTRADE - 1997).

3<sup>rd</sup> Party Devices, PROT15 App utilizing IEC61850 protocol retrieve Fault Records from MiCOM (P14x, P44x), GE Multilin Series.

SEL protection device, with Telnet protocol (serial or Ethernet), utilizing **3PCONNECT01 installed** in SICAM 8 application retrieves Fault Records.

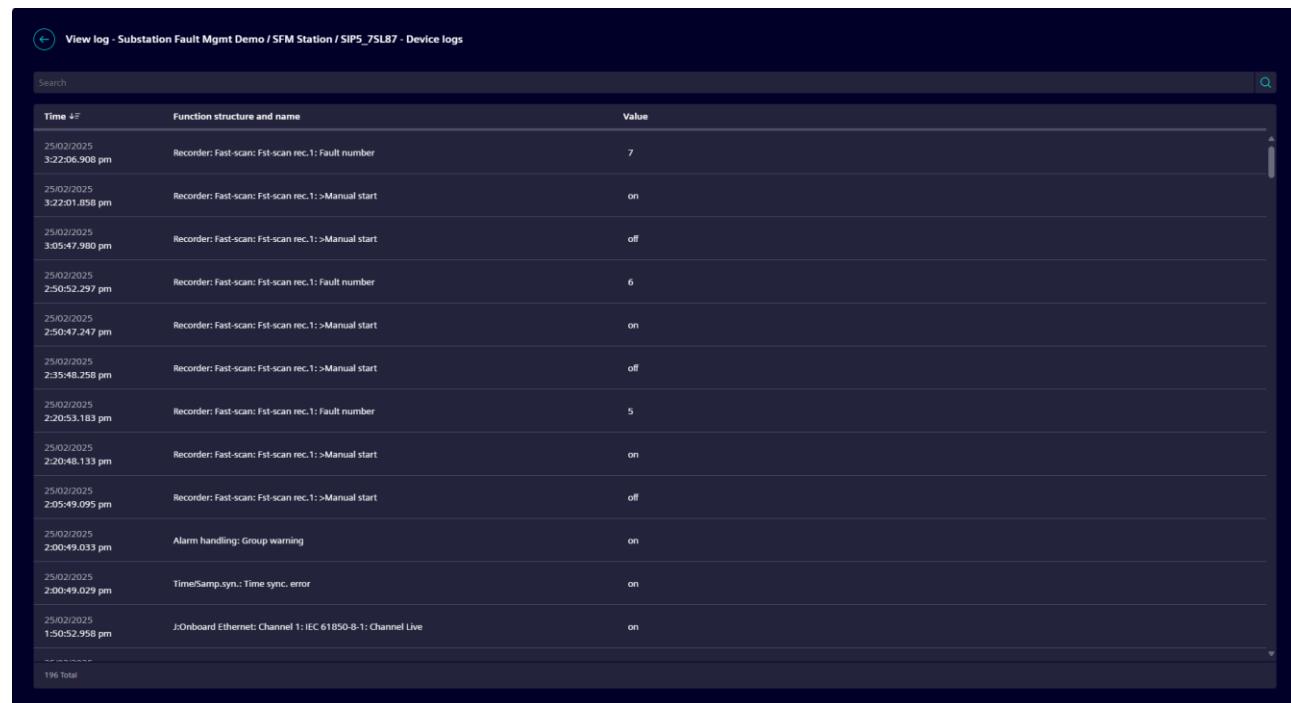
<sup>\*2</sup> Any other versions of EN100 communication module shall be discussed with the Product Team

The screenshot displays the Siemens Electrification X Network Fault Management interface. The left sidebar includes navigation links for Dashboard, Overview, Alarms, Assets, Faults, Records and logs, Operations, Measurements, Documents, Audit log, and Settings. The main area is titled 'Records and logs' and shows a list of fault records and logs for a 'Substation Fault Mgmt Demo' station. The list includes entries for various devices and types, such as 'Substation Fault Mgmt Demo / S...' and 'Fault record (COMTR...)'. A filter dropdown is set to 'Continuous record (PQDIF) 5+'. Below the list are four stacked waveforms labeled IA, IC, IN, and IA, each triggered at 08/05/2025 23:25:14.356. The waveforms show voltage or current signals over time.

Electrification X – Network Fault Mgmt (Substation Fault Management): Fault Records Visualization and Lists

## Fault Logs & Trip Logs (COMFEDE Files), Visualization and Download

The Log files show a filterable list of all available log files of the SIPROTEC 5 device with minimum firmware version V7. 90<sup>\*3</sup> which is supported by IEC 61850 in the Ethernet module and port J of SIPROTEC 5. The available log file types like fault, ground-fault, operational, setting-history, user defined log are depending on the SIPROTEC 5 configuration and availability of the log file as COMFEDE format via IEC 61850. The PROTIS App installed in the SICAM 8 application retrieves these files.



Time	Function structure and name	Value
25/02/2025 3:22:06.908 pm	Recorder: Fast-scan: Fst-scan rec.1: Fault number	7
25/02/2025 3:22:01.858 pm	Recorder: Fast-scan: Fst-scan rec.1: >Manual start	on
25/02/2025 3:05:47.980 pm	Recorder: Fast-scan: Fst-scan rec.1: >Manual start	off
25/02/2025 2:50:52.297 pm	Recorder: Fast-scan: Fst-scan rec.1: Fault number	6
25/02/2025 2:50:47.247 pm	Recorder: Fast-scan: Fst-scan rec.1: >Manual start	on
25/02/2025 2:35:48.258 pm	Recorder: Fast-scan: Fst-scan rec.1: >Manual start	off
25/02/2025 2:20:53.183 pm	Recorder: Fast-scan: Fst-scan rec.1: Fault number	5
25/02/2025 2:20:48.133 pm	Recorder: Fast-scan: Fst-scan rec.1: >Manual start	on
25/02/2025 2:05:49.095 pm	Recorder: Fast-scan: Fst-scan rec.1: >Manual start	off
25/02/2025 2:00:49.033 pm	Alarm handling: Group warning	on
25/02/2025 2:00:49.029 pm	TimeSync.syn.: Time sync. error	on
25/02/2025 1:50:52.958 pm	J:Onboard Ethernet: Channel 1: IEC 61850-8-1: Channel Live	on

Electrification X – Network Fault Mgmt (Substation Fault Management): View of Fault Logs & Trip Logs

<sup>\*3</sup> COMFEDE in SIPROTEC 5 is available from V07.90 for IEC61850.

## Continuous Records (PQDIF File), Download

Fault Recorder 7KE85 and PQ device supports continuous recording of files. These files generate Trend records and Measurement records in PQDIF format. The PROTIS App installed in the SICAM 8 application, retrieves these records. These devices should be connected to the ethernet interface and IEC 61850.

## Records with Large File Size

Supporting the large files of up to 25MB with continuous records in terms of COMTRADE File and PQDIF file from Fault Recorder 7KE85 and PQ devices.

## Aggregated Information of Fault

With the assistance of Related Information of Protection Trip events, users are directed to all fault information including fault records, logs, alarms of within +/- 10sec combined across AOR's level.

The screenshot displays a fault management interface with two main sections. The top section shows a table of events within a 10-second time span, with columns for Status, Time, Related device, Topology, Name, Value, and Quality. The bottom section shows three stacked waveforms for VA, VB, and VC, triggered at 10/12/2024 11:25:03.067. The waveforms show voltage fluctuations over time.

Status	Time	Related device	Topology	Name	Value	Quality
⚠️	06/10/2025 7:33:45.647 am	SIP4_7SD806_DIGSI4	Substation Fault Mgmt Demo / SFM Station / Switchgear-MV / Feeder1 / 7SD806	Fault record available	Raised	Good
⚠️	06/10/2025 7:33:45.647 am	SIP4_7SD806_DIGSI4	Substation Fault Mgmt Demo / SFM Station / Switchgear-MV / Feeder1 / 7SD806	General trip	Raised	Good
⚠️	06/10/2025 7:33:45.497 am	SIP4_7SD806_DIGSI4	Substation Fault Mgmt Demo / SFM Station / Switchgear-MV / Feeder1 / 7SD806	General pickup	Raised	Good

Events within the time span ± 10s

Fault record - Substation Fault Mgmt Demo / SFM Station - SIP5\_7SL87 - 06/10/2025 7:29:45.000 am

Fault record - Substation Fault Mgmt Demo / SFM Station - SIP5\_7KE85 - 06/10/2025 7:30:24.000 am

Fault record - Substation Fault Mgmt Demo / SFM Station - SCHNEIDER\_P442 - 06/10/2025 7:31:09.000 am

Trigger: 10/12/2024 11:25:03.067

Trigger: 10/12/2024 11:25:03.067

Trigger: 10/12/2024 11:25:03.067

Primary Secondary Reset zoom

VA

VB

VC

VN

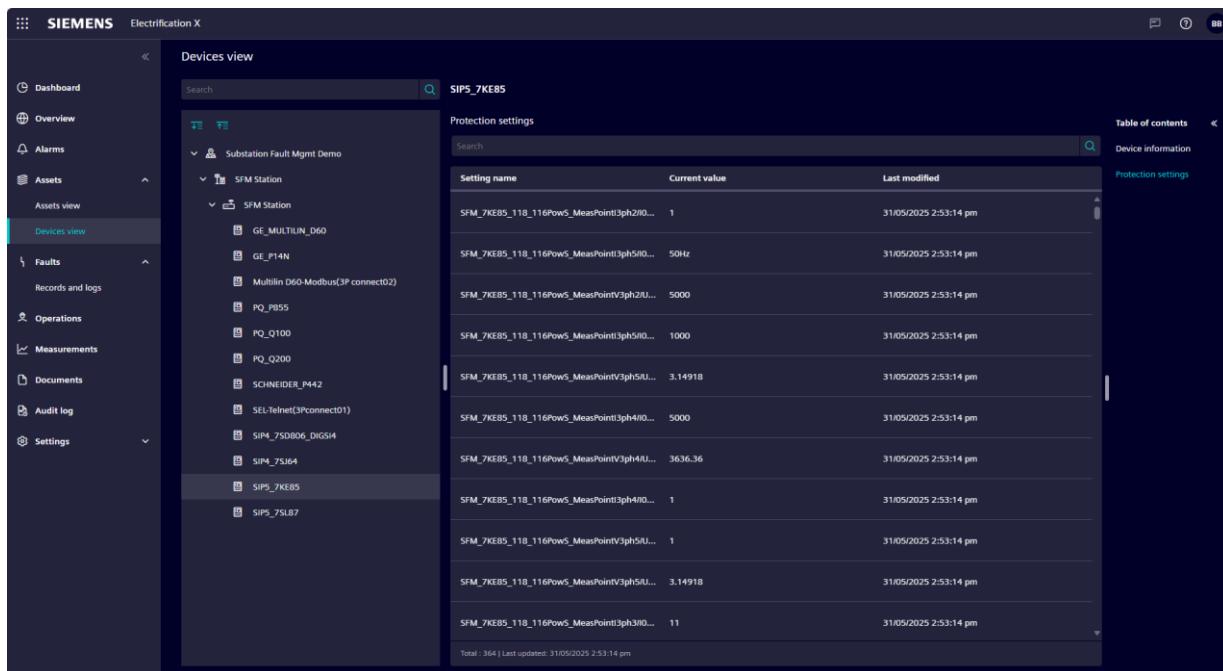
Timebase: 0.9, 0.6, 0.3, 0.0, 0.3, 0.6, 0.9, 1.2, 1.5, 1.8, 2.1

Electrification X – Network Fault Mgmt (Substation Fault Management): Aggregated information during fault

## Protection Settings and Changes

**PROT15 App;** fetch the current protection settings from the SIPROTEC 5 relays and display in tabular format of Device View. If user changes any settings, notification will appear as an event.

**SIP4Client App;** fetch the current protection settings from SIPROTEC 4 relays from DIGSI 4 port and display in tabular format of Device View. If user changes any settings, notification will appear as an event.

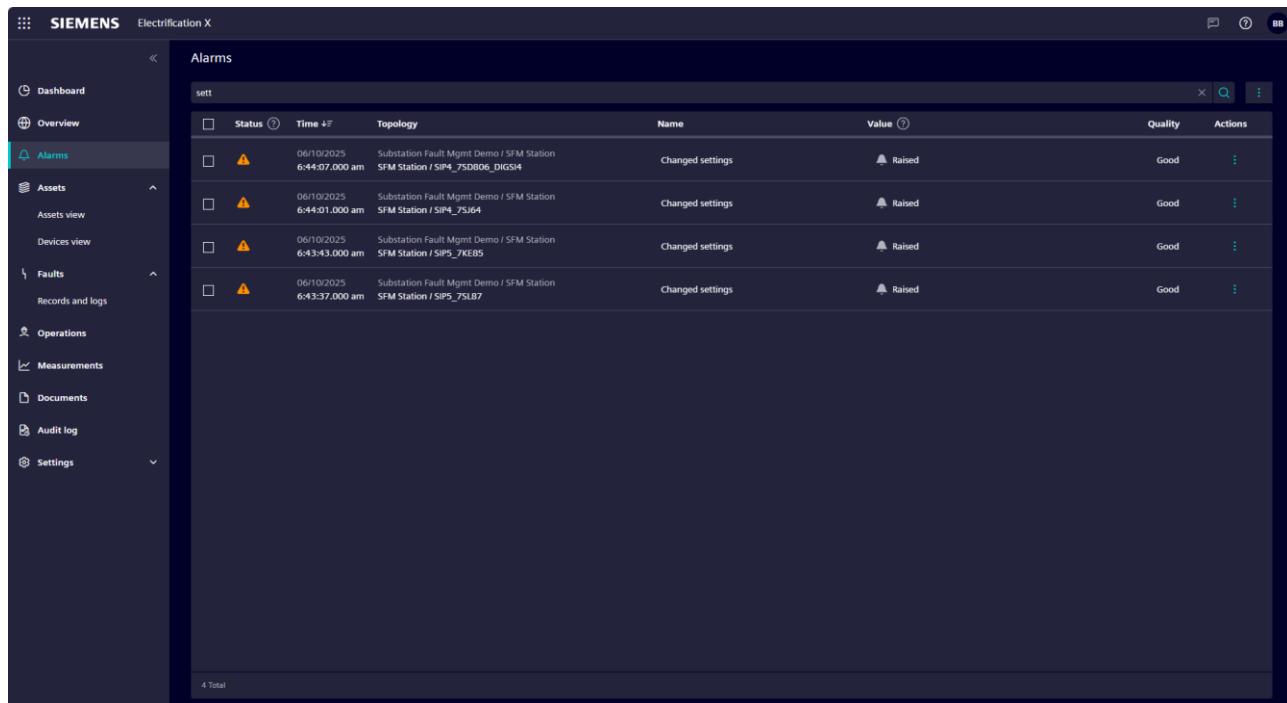


The screenshot shows the Siemens Electrification X software interface. The left sidebar includes 'Dashboard', 'Overview', 'Alarms', 'Assets', 'Assets view', 'Devices view' (which is selected), 'Faults', 'Records and logs', 'Operations', 'Measurements', 'Documents', 'Audit log', and 'Settings'. The main 'Devices view' window shows a tree structure under 'Substation Fault Mgmt Demo' with nodes like 'SFM Station', 'GE\_Multilin\_D60', 'GE\_P14N', 'Multilin D60-Modbus(3P connect02)', 'PQ\_PB55', 'PQ\_Q100', 'PQ\_Q200', 'PQ\_Q200', 'SCHNEIDER\_P442', 'SEL-Telnet(3Pconnect01)', 'SIP4\_7SD806\_DIGSI4', 'SIP5\_7SJ64', 'SIP5\_7KE85' (which is selected), and 'SIP5\_7SL87'. The right panel is titled 'Protection settings' and displays a table with the following data:

Setting name	Current value	Last modified
SFM_7KE85_11B_116PwS_MeasPoint13ph2I0...	1	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint13ph5I0...	50Hz	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint3ph2U...	5000	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint13ph5I0...	1000	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint3ph5U...	3.14918	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint13ph4U...	5000	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint3ph4U...	3636.36	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint13ph4I0...	1	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint3ph5U...	1	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint3ph5U...	3.14918	31/05/2025 2:53:14 pm
SFM_7KE85_11B_116PwS_MeasPoint13ph3I0...	11	31/05/2025 2:53:14 pm

Total : 364 | Last updated: 31/05/2025 2:53:14 pm

Electrification X – Network Fault Mgmt (Substation Fault Management): Protection Settings



The screenshot shows the Siemens Electrification X software interface. The left sidebar contains a navigation menu with the following items: dashboard, overview, Alarms (selected), Assets (Assets view, Devices view), Faults (Records and logs), Operations (Measurements, Documents, Audit log, settings). The main content area is titled 'Alarms' and shows a table of four alarms. The table columns are: Status (with a warning icon), Time (06/10/2025 6:44:07.000 am), Topology (Substation Fault Mgmt Demo / SFM Station SFM Station / SIP4\_7SDB06\_DIGS4), Name (Changed settings), Value (Raised), Quality (Good), and Actions (three dots). The table has a search bar at the top with the text 'sett'.

Status	Time	Topology	Name	Value	Quality	Actions
⚠️	06/10/2025 6:44:07.000 am	Substation Fault Mgmt Demo / SFM Station SFM Station / SIP4_7SDB06_DIGS4	Changed settings	Raised	Good	⋮
⚠️	06/10/2025 6:44:01.000 am	Substation Fault Mgmt Demo / SFM Station SFM Station / SIP4_7SJ64	Changed settings	Raised	Good	⋮
⚠️	06/10/2025 6:43:43.000 am	Substation Fault Mgmt Demo / SFM Station SFM Station / SIP5_7KE85	Changed settings	Raised	Good	⋮
⚠️	06/10/2025 6:43:37.000 am	Substation Fault Mgmt Demo / SFM Station SFM Station / SIP5_7SL87	Changed settings	Raised	Good	⋮

Electrification X – Network Fault Mgmt (Substation Fault Management): Detection of any change in Protection Settings

## Add Analysis to Files

Users can now add analysis/comments to fault records and PQDIF files, making it easy to trace analysis data for each file whenever needed. Analysis comments are editable, allowing users to update the analysis further. Adding and editing comments against records are tracked in the Audit log for transparency.

Electrification X – Network Fault Mgmt (Substation Fault Management): Add analysis to fault records

## Additional Functions

- Historical feeder power consumption and asset utilization (based on rated capacity)
- List of feeders of the assets with individual alarm visualization and status
- Customizable SVG uploads for detailed substation Single Line Diagrams, enhancing operational visibility
- Advanced monitoring of individual feeders, presenting real-time operational data and component status for informed decision-making

# Subscription

Standard Subscription Plan	Electrification X Network Fault Management
<b>Functions</b>	All
<b>Subscription metric</b>	Feature Substation Fault Management – Basic Asset Transparency of Protection Relay & Power Quality device, Protection Settings, Fault Localization including File Transfer per relay per month
<b>Subscription term</b>	Annually, auto-renewal
<b>Billing term</b>	Annually, payment in advance
<b>Upscale</b>	Effective immediately, pro-rated billing
<b>Downscale/Cancellation</b>	Effective with end of subscription term
<b>Connected Devices</b>	To be purchased separately
<b>Permitted Users</b>	Unlimited, Extended Use

The Substation Fault Management feature under Electrification X - Network Fault 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 charging station and per charger or feeder. The subscription plan assumes a charging station refers to one unique postal address or geo coordinates.

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

<b>Electrification X Tenant</b>	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 Substation Fault Management – Basic Asset Transparency of Protection Relay & Power Quality device, Protection Settings, Fault Localization including File Transfer per relay per month , if not otherwise already available and in operation
<b>Supported Connected Devices</b>	<p>The Cloud Service is currently compatible with commercially available Connected Devices from Siemens. A description of the available Connected Devices is provided below.</p> <p>A Connected Device must be purchased and installed on premises at a site specified by the Customer as agreed between the Customer and Siemens to use the Cloud Service. The 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.</p> <p>List of supported Connected Devices: <b>SICAM CP-8031/CP-8050</b>. For order information, Customer may contact its local sales representative.</p>
<b>Web browser and viewing devices</b>	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
<b>Internet Connection</b>	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

**SIEMENS: SICAM CP-8031/CP-8050**

## Ordering

For order information, Customer may contact its local sales representative

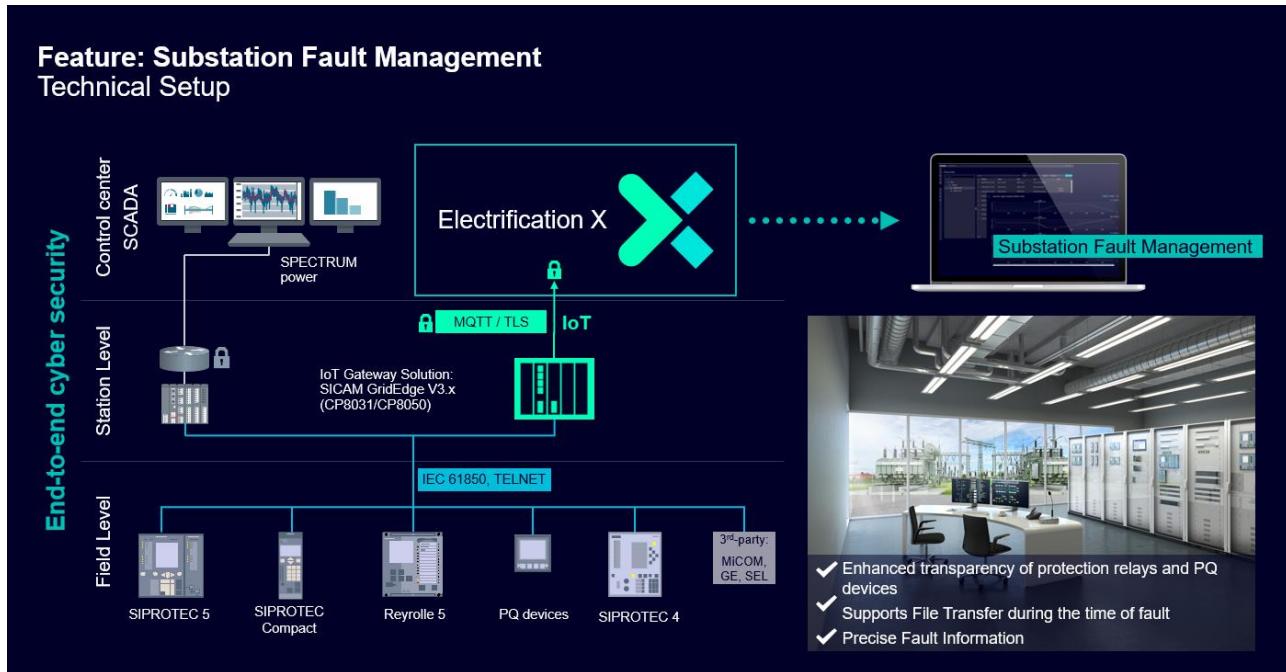
# Product Documentation

Technical Documents	Document ID	Document ID German	Document ID English
<b>Building X – Accounts User Guide</b>	A6V12050070		
<b>Building X – Devices User Guide</b>	A6V12050067		
<b>Electrification X – Base Package Operating Manual</b>		E50417-H7500-C200-A6	E50417-H7540-C200-A6
<b>Electrification X – Engineering Guide</b>		E50417-H7500-C203-A6	E50417-H7540-C203-A6
<b>Electrification X – Network Fault Management Operating Manual</b>		E50417-H7500-C202-A5	E50417-H7540-C202-A5
<b>Electrification X – Security Manual</b>		E50417-H7500-C204-A6	E50417-H7540-C204-A6

Technical Documents can be downloaded here:

<https://support.industry.siemens.com/>

# Topology



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

## Customer Support

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

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