

SITRAM FreeCAM

Your free of charge condition assessment management system



Table of contents

01

**SITRAM FreeCAM
Introduction**

Page 3

02

**SITRAM FreeCAM
Features**

Page 5

03

**Direct Current
Detector**

Page 13

04

SITRAM CAM

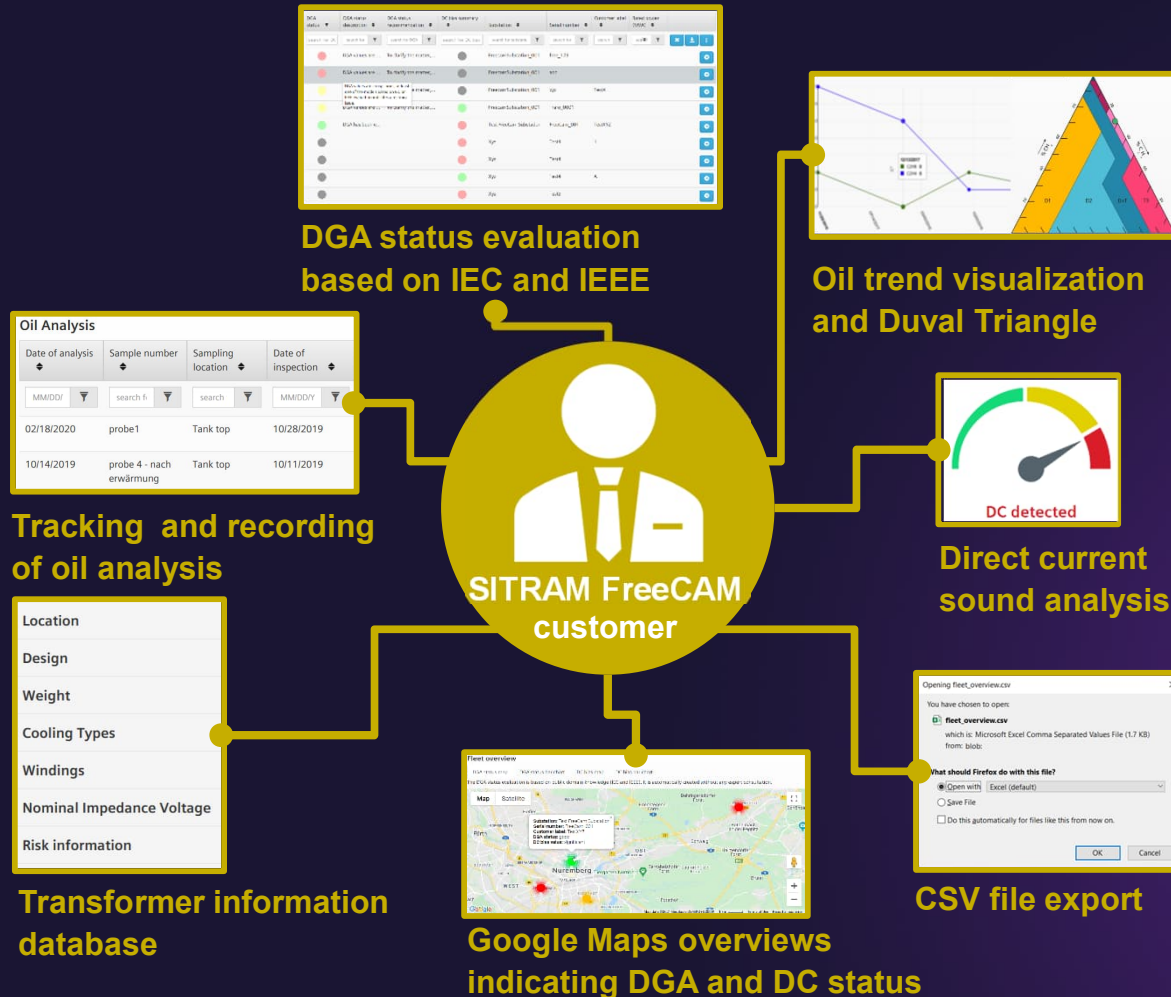
Page 15

Your DGA and DC analysis recorded, evaluated and visualized with a free of charge service



SIEMENS
ENERGY

Summary and feature overview



- SITRAM FreeCAM is a free of charge service offering its users an unique bundle of features tailored for transformer asset operators and owners
- The service is extracted out of a larger framework, SITRAM CAM (see chapter 4)
- SITRAM FreeCAM provides a solution for
 - Recording, managing and visualizing DGA results
 - automatized interpretations of DGA results based on IEEE and IEC standards
 - Direct Current (DC) bias detection
 - ...,and much more

Table of contents



01

**SITRAM FreeCAM
Introduction**

Page 3

02

**SITRAM FreeCAM
Features**

Page 5

03

**Direct Current
Detector**

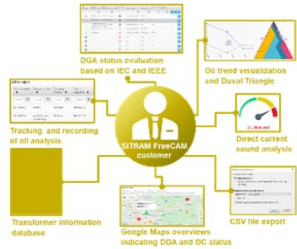
Page 13

04

SITRAM CAM

Page 15

Have your transformer and substation details at hand



Transformer information database

- Enter multiple substations and transformers with various details, like..
 - Label
 - Year of manufacturing
 - Application
 - Design
 - Rated power
 - Rated voltage (MV, LV)
 - Manufacturer, etc.
- See all substations and transformers listed with key details

Transformers

Substation*

Serialnumber*

Customer label

Year of manufacture

Application Design

Rated Power (MVA)

Rated Voltage HV (kV) Rated Voltage LV (kV)

Project number

Manufacturer

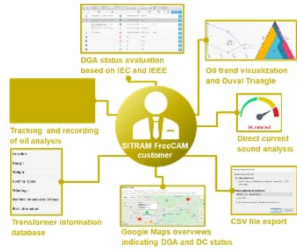
Type

Original oiltype

Transformers

Substation	Serialnumber	Customer label	Year of manufacture
<input type="text" value="search for substation"/>	<input type="text" value="search for serialnumber"/>	<input type="text" value="search for customer equipment label"/>	<input type="text" value="search for year of manufacture"/>
Demo 1	1234	Trafo 1	1961
Demo 1	33435	33435	1988
Demo 1	33435	Trafo 2	1961
Demo 1	aaa111		
Demo 1	OAT 130		
Demo 1	OAT 30	small transformer	1987

Record your oil analysis values



Tracking and recording of oil analysis

- Enter multiple oil analysis for each transformers with a vast variety of specifics grouped under different chapters, like..
 - Oil sample information
 - Process information
 - DGA
 - Furane/ DP
 - Oil parameter
- Select for each DGA value the IEC standard and the test method out of the FreeCAM database
- See all oil analysis listed with key details

Oil Analysis
Profile: none

Date of analysis* Report language

Sample number* Without existing inspection

Oil sample information ⓘ

Process information

DGA

Furane/DP

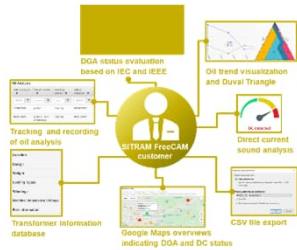
Oil parameter

Colour [Std.: ✕ Testmethod: ✕]	Purity [Std.: ✕ Testmethod: ✕]
Breakdown voltage (kV) [Std.: ✕ Testmethod: ✕]	Moisture content (mg H2O/kg oil) [Std.: ✕ Testmethod: ✕]
Neutralization number (mg KOH/g oil) [Std.: ✕ Testmethod: ✕]	Interfacial tension (mN/m) [Std.: ✕ Testmethod: ✕]
Power factor [Std.: ✕ Testmethod: ✕]	Dissipation factor [Std.: ✕ Testmethod: ✕]

Oil Analysis

Date of analysis	Sample number	Sampling location	Date of inspection	Customer order number	DGA	Furane/DP	Oil parameter
<input type="text" value="MM/DD/YYYY"/>	<input type="text" value="search for sample number"/>	<input type="text" value="search for sampling local"/>	<input type="text" value="MM/DD/YYYY"/>	<input type="text" value="search for customer order"/>	<input type="text" value="all"/>	<input type="text" value="all"/>	<input type="text" value="all"/>
07/07/2020	12234445	Circulating pipe	07/13/2020		⊙		
04/29/2020	bottom_202004	Tank bottom	04/28/2020		⊙		⊙
03/26/2020	1372/2017	Tank top	12/13/2017	c5			⊙
11/28/2019	1372/2017	Tank top	12/13/2017	c5			
11/28/2019	1372/2017	Tank top	12/13/2017	c5			
01/04/2018	1372/2017	Tank top	12/13/2017	c5	⊙	⊙	⊙

Evaluate your DGA status and see it indicated for each transformer

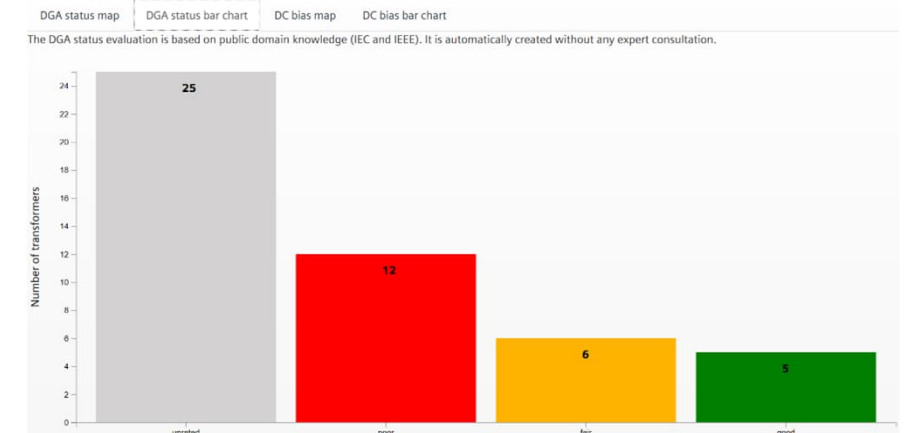


DGA status evaluation based on IEC and IEEE

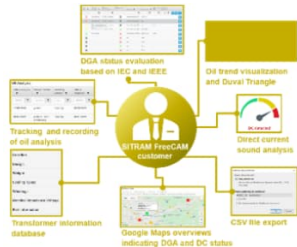
- Based on the oil analysis values SITRAM FreeCAM evaluates the DGA status based on public domain knowledge
- The DGA status is indicated via a simple and transparent color signal in the transformer overview list
- When the signal is yellow or red further recommendations are given

DGA status	DGA status description	DGA status recommendation	DC bias summary	Substation	Serial number	Customer label	Rated power (MVA)
Red	DGA values are ... To clarify the matter,...		Grey	FreecamSubstation_001	free_123		
Red	DGA values are ... To clarify the matter,...		Grey	FreecamSubstation_001	abc		
Yellow	DGA values are conspicuous, at least one of the models based on IEC or IEEE evaluation indicates a technical issue. DGA values are ... To clarify the matter,...		Grey	FreecamSubstation_001	xyz	TestX	
Yellow	DGA values are ... To clarify the matter,...		Green	FreecamSubstation_001	Trafo_0001		
Green	DGA has been e...		Red	Test FreeCam Substation	FreeCam_001	TestXYZ	
Grey			Red	Xyz	Test4	1	
Grey			Red	Xyz	Test4		
Grey			Green	Xyz	Test4	A	
Grey			Red	Xyz	Test3		

Fleet overview

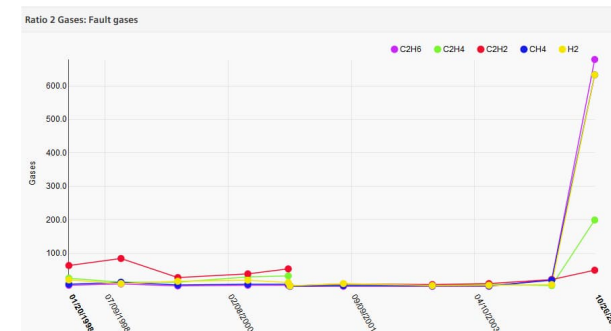
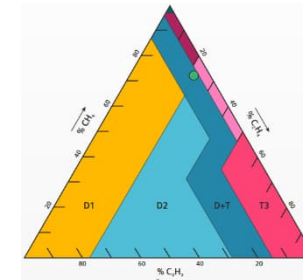


Create your own trend charts



Oil trend visualization and Duval Triangle

- See the oil analysis values displayed via a Duval Triangle or in trend charts
- Create own trend charts with parameters of your choice or select from one of the pre-defined profiles



My chart

Chart name*
My chart

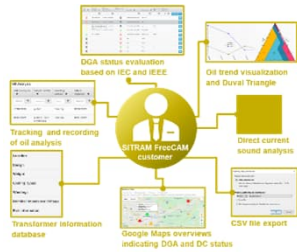
Axis title*
time

Scale*
Linear

Dataserries
+ Add dataserries

Dataserries	Color	Style	Symbol	
CH4 (ppm)	Blue	---●---	▼	🗑️
C2H6 (ppm)	Red	—●—	●	🗑️

Analyze your transformer fleet on direct current bias



Direct current sound analysis

- Record multiple sound spectrum analysis for each transformer using the [Direct Current Detector \(DCD\)](#) app (see DCD chapter)
- SITRAM FreeCAM analyses each recording and indicates via a simple and transparent color signal and diagnosis text if your transformer is affected by DC
- See all sound spectrum analysis listed with key details

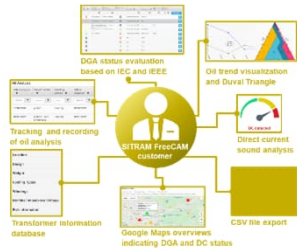
Sound Spectrum Analysis



Sound Spectrum Analysis

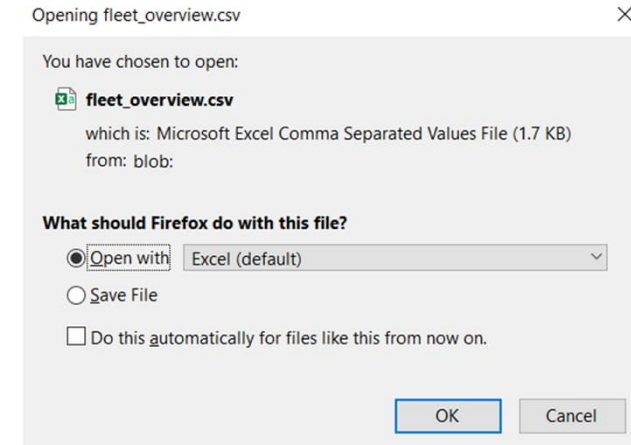
Date of analysis	Date of inspection	Signal-to-Noise Ratio	Resonance Factor Even	Resonance Factor Odd	DC Estimator	Load Noise Dominance
05/29/2020	05/29/2020	18.59	6.67	8.57	-18.38	4.71
06/10/2020	06/10/2020	22.97	6.67	8.57	-18.38	4.71
06/16/2020	06/16/2020	10.09	1.43	0.33	-1.29	-24.85
06/16/2020	06/16/2020	9.06	12.38	1.51	-16.51	-12.81
06/18/2020	06/18/2020	9.58	4.98	1.21	-2.47	-11.14
06/18/2020	06/18/2020	8.81	0.42	2.35	-1.03	-15.18
06/18/2020	06/18/2020	8.98	0.76	2.44	-1.06	-12.47

See your whole transformer fleet on Google Map

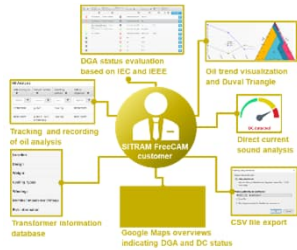


Export your fleet data

- Create tailored fleet overviews and export them via CSV files
- Use these CSV files in any way you like, e.g. for company presentations, MS-Excel overviews or to upload to other data management systems



See your whole transformer fleet on Google Map



Google Maps overviews

- See all transformers on Google Maps overviews indicating DGA status* and DC bias
- Navigate to your transformer of choice and receive all details at the transformer overview list

Fleet overview

DGA status map | DGA status bar chart | DC bias map | DC bias bar chart

The DGA status evaluation is based on public domain knowledge (IEC and IEEE). It is automatically created without any expert consultation.

Map | Satellite

Substation: TestFreeCam Substation
Serial number: FreeCam_001
Customer label: TestXYZ
DGA status: good
DC bias value: significant

Map data ©2021 GeoBasis-DE/BKG (©2009) 1 km Terms of Use Report a map error

Fleet overview

DGA status map | DGA status bar chart | DC bias map | DC bias bar chart

To record sound spectrums and detect DC bias, please use the **DC-Detector app** and synchronize your records with SITRAM CAM.

Map | Satellite

Map data ©2021 GeoBasis DE/BKG (©2009) 10 km Terms of Use

Table of contents

01

**SITRAM FreeCAM
Introduction**

Page 3

02

**SITRAM FreeCAM
Features**

Page 5

03

**Direct Current
Detector**

Page 13

04

SITRAM CAM

Page 15

Indicate DC bias at your transformer with any smartphone with the DCD app

Direct Current Detector (DCD)

- The easy-to-use app transforms any smartphone into a DC detection device
- The Direct Current Detector records the noise level around the transformer, processes the audio file, and indicates the DC bias grade on the smartphone.
- A more detailed report with diagnosis and recommendations can be received when synchronizing the measurements with SITRAM FreeCAM
- It can be applied by any person at site, either with or without internet connection
- Open the link with a mobile device (preferably with Google Chrome or Safari) and add the DC Detector to your home screen

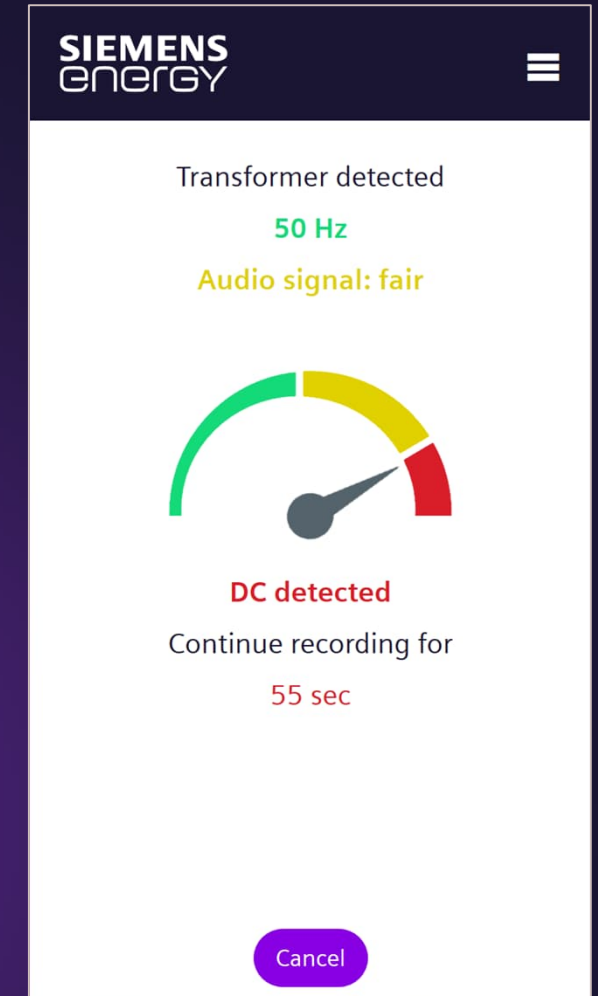


Table of contents

01

**SITRAM FreeCAM
Introduction**

Page 3

02

**SITRAM FreeCAM
Features**

Page 5

03

**Direct Current
Detector**

Page 13

04

SITRAM CAM

Page 15

FreeCAM is one application of the SITRAM CAM platform, which supports key stakeholders for transmission asset diagnostics

WHY

To enhance and facilitate field service and diagnostics by...

- A **vast database** of over 1.800 transformers and their lifecycle activities
- **Knowledge modules** calculating health indices and making recommendations

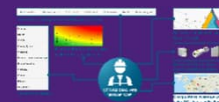
To support transformer asset operators and owners in their decision making by...

- Creating **full transparency** on the transformer fleet condition and lifecycle activities
- Free-of-charge **DGA status evaluation** and **DC-sound analytics**

To digitally interconnect service teams, asset operators and oil labs by...

- Creating **one data lake** for all tailored to their needs

WHAT



SITRAM CAM DIAG customer access

- **SITRAM DIAG customer platform** for all diagnosis and lifecycle activities records
- **Fleet overview** with healthy index, relevance and criticality



SITRAM FreeCAM

- Free of charge **transformer database** with **DGA status evaluation** and **visualization**
- **DC sound analytics, records and mapping** with the Direct Current Detector app

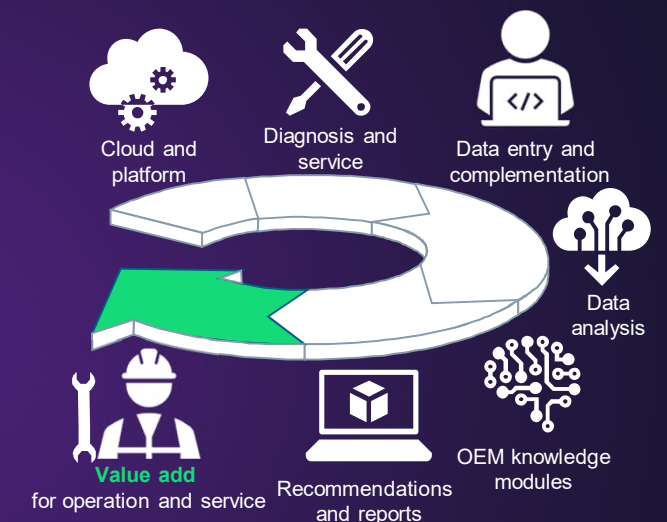


Internal Siemens tool

- Global Siemens platform for field service teams, oil labs, sales and product management

HOW

- A cloud-based **software platform** with low technical dept
- Multiple **service teams, oil labs** and **customers** contributing information and data
- A vast existing **database** of transformers and lifecycle activities, transformer **OEM knowledge** and **knowledge modules**





Siemens Energy Global GmbH & Co. KG

Transmission Service

Humboldtstr. 64
90459 Nuremberg
Germany

Transmission Service related:

Tel.: +49 911 6505 6505

Email: support@siemens-energy.com

SITRAM FreeCAM or Direct Current Detector related:

Email: camsupport.energy@siemens-energy.com

Disclaimer



“Subject to changes and errors. The information given in this document only contains general descriptions and/or performance features which may not always specifically reflect those described, or which may undergo modification in the course of further development of the products. The requested performance features are binding only when they are expressly agreed upon in the concluded contract.”

“All product designations may be trademarks or product names of Siemens Energy Global GmbH & Co. KG or other companies whose use by third parties for their own purposes could violate the rights of the owners.”