

## ELECTRICAL SAFETY POWER QUALITY ENERGY MANAGEMENT



## Eetarp Graphene

- Smart Monitoring Platform (IoT Solution)
- Highly Customizable and Scalable
- Customizable Reporting System
- Web-Client to Access your Data wherever you want
- Easy database integration (e.g. SQL)

# Eetarp Graphene



## Product Description

Graphene is a modular and scalable management system for various applications. It not only assists the user in detecting potential failure but also enables to diagnose and analyze the potential issue in order to increase the overall system reliability and efficiency. At the same time, it presents meaningful information with a highly customizable report function.

This enables Graphene to work as a centralized solution to combine and transfer data from multiple locations through intra-, or inter-net, from systems like Building Management Systems, Lighting Management Systems, Solar Systems, and Chiller Monitoring Systems.

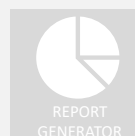
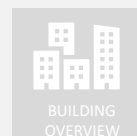
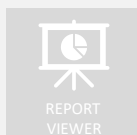
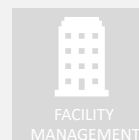
The open communication interfaces allow the integration of IoT sensors and electrical, mechanical, environmental, facilities equipment. Also, systems like medical isolated power system (IPS), residual current monitoring system (RCMS), HVAC, or IFLS can be integrated into one comprehensive platform. This gives the user an in-depth insight into the system's entire data at any time, with real-time monitoring, alarming, and analysis. Whenever and wherever needed.

## Feature Overview

- Modular and scalable system
- Highly customizable Reporting
- Dashboards
- Graphical online view
- Alarm notification via SMS or E-mail
- Trending of historical and live data
- Power quality analysis
- Facility monitoring
- Benchmark analytics
- Correlation analytics
- IoT device interfacing
- Integration via open communication protocols



- **Benchmark Analysis** - Compare the present performance against historical records to identify necessary settings and parameters in order to achieve the best system performance.
- **Correlation Analysis** - Analyze the relationship and correlation between variables and values. The result will display the strength and synergies of the relationship.
- Determine where energy **costs can be reduced** without adversely affecting your business operation.
- **Improve Reliability** - Prevent failures from occurring by identifying problems before they result in failures and subsequently downtime.
- Improved **data reporting efficiency** with automated reporting features in order to minimize human errors.
- **Smart Monitoring** - Collect and display field data, perform calculations, and share information with other management systems via open database SQL server or web-server GUI.
- **Load Profile Monitoring** - Understand the load flow of your facility and its electrical system operation by tracking and metering the load profile.
- Improve your **billing and cost allocation** processes by automatic collection of meter readings and energy consumptions.



# Applications



**Building Monitoring System (BMS)** - The centralized monitoring of the health- and alarm-statuses of the building equipment and the possibility of remote control and maintenance increases the efficiency and flexibility of the maintenance team dramatically.



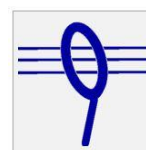
**Energy Monitoring System (EMS)** - Determine where energy costs can be reduced without adversely affecting your business operations. This prevents failures from occurring by identifying problems before they result in alarms, shutdowns, and subsequently, downtimes. Automatically generate the report according to the pre-configured report template to maximize efficiency.



**Power Quality Monitoring System (PQMS / PMS)** - Analyse and verify the power quality compliance with international standards or Singapore standards (e.g., Singapore Transmission Code, EN50160, IEC61000, IEEE519, etc.). Identify the source of power quality-related process interruptions, and initiate corrections with mitigation equipment.



**Isolated Power Monitoring System** – Centralized monitoring system for Isolated Power System installed at Hospital and Medical Centers (Group 2, according to IEC60364-7-710) to ensure the insulation fault can notify the maintenance team immediately for rectification without risking the patient life.



**Residual Current Monitoring System** - Centralized monitoring system for Residual Current Monitoring Devices, which assists in detecting the deterioration of the insulation level during an early stage, which maximizes the uptime of the systems. The message control sends a message to the user even before reaching the tripping threshold of the RCD in order to perform predictive maintenance.



**Data Center Infrastructure Monitoring (DCIM)** - With an automated monitoring system and full-stack visibility across the entire data center, Graphene collects the data automatically and helps detect, monitor, and protect the entire IT infrastructure. The 24/7 monitoring maximizes reliability and efficiency.

# Graphene License Module

In order to meet the requirements of a variety of applications, Graphene is designed to be as flexible as possible. The modularity design is optimized to provide the fastest turnaround time for the project implementation and allows the user to customize the system based on personal needs by selecting the required monitoring modules.

- Mobile Access (**New!**)
- Dashboard (**Improved!**)
- Electrical Overview (**Improved!**)
- Correlation Analytic (**New!**)
- Customizable Alarm Thresholds (**New!**)
- Standard Reporting
- Advanced Reporting
- SQL-Integration
- Failure Analysis (**New!**)
- Alarm Analysis & Management
- Message Control
- Archive Server and Historical Trend (**Improved!**)
- Power Quality Analysis
- Facility Monitoring
- Benchmark Analytic (**New!**)

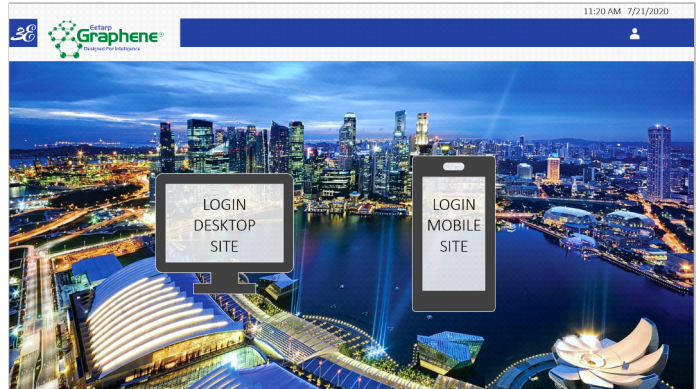
The screenshot displays the Eetarp Graphene 2.0 dashboard. At the top right, the time and date are shown as 12:00 PM 7/21/2020. The dashboard header includes the Eetarp Graphene logo and a navigation bar with various icons. Below the header, the main content area is titled 'HOME' and 'GRAPHENE 2.0'. A sidebar on the left contains a vertical list of icons for navigation. The main area is divided into three sections: 'DASHBOARD' with icons for 'ONLINE PORTAL', 'SSSG4', and 'GREENMARK'; 'MONITORING MODULE' with icons for 'BUILDING OVERVIEW', 'ELECTRICAL OVERVIEW', 'KW OVERVIEW', 'NETWORK TOPOLOGY', 'FACILITY MANAGEMENT', 'POWER QUALITY ANALYSIS', 'RESIDUAL CURRENT MONITORING', 'BRANCH CIRCUIT MONITORING', and 'ISOLATED POWER SYSTEM'; and 'ENGINEERING MODULE' with icons for 'ALARM LIST', 'TRENDING', 'BASIC REPORT GENERATOR', 'ADVANCED REPORT GENERATOR', 'BENCHMARKING ANALYTIC', and 'CO-RELATIONSHIP ANALYTIC'. A large, stylized molecular structure graphic is positioned on the right side of the dashboard.

# Modules

## NEW! - Mobile Access

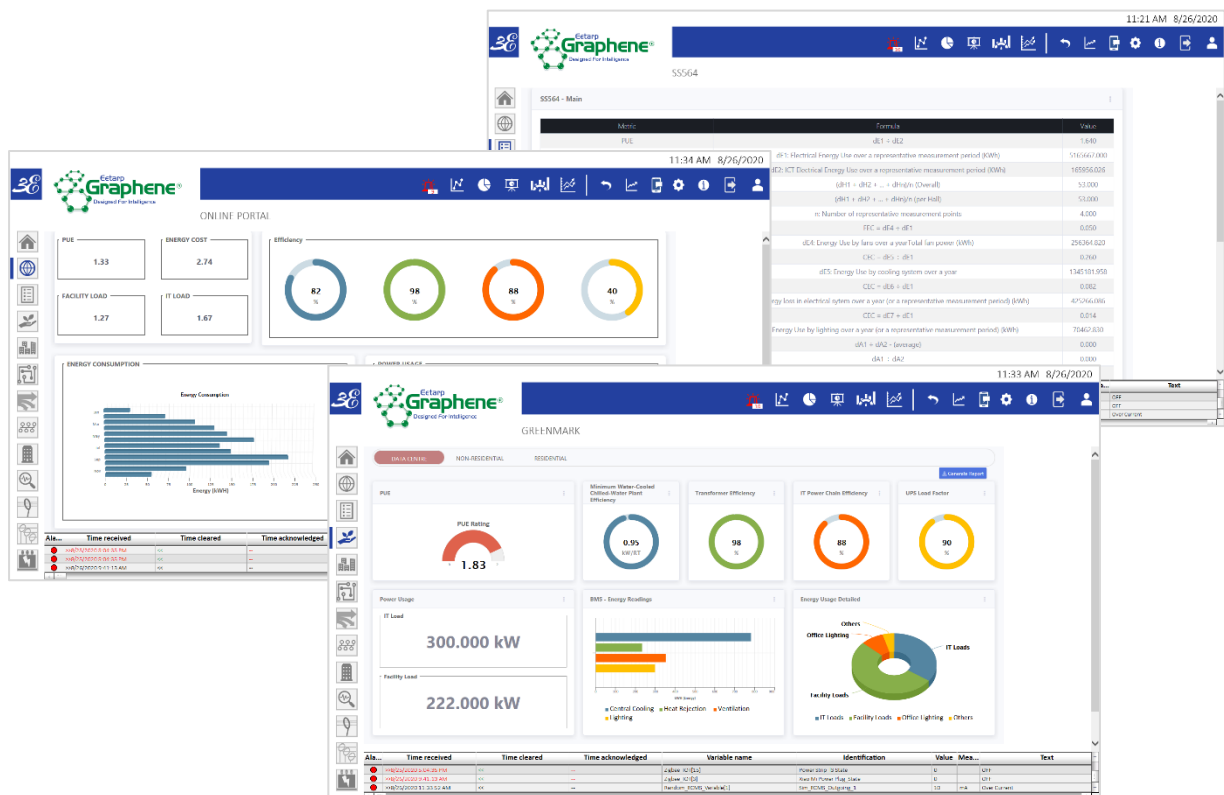
The mobile access allows remote access to real-time information on the user's mobile devices, e.g., phone or tablet, for remote monitoring.

This gives a comprehensive view of the monitored systems and helps the user to identify critical issues quickly from everywhere.



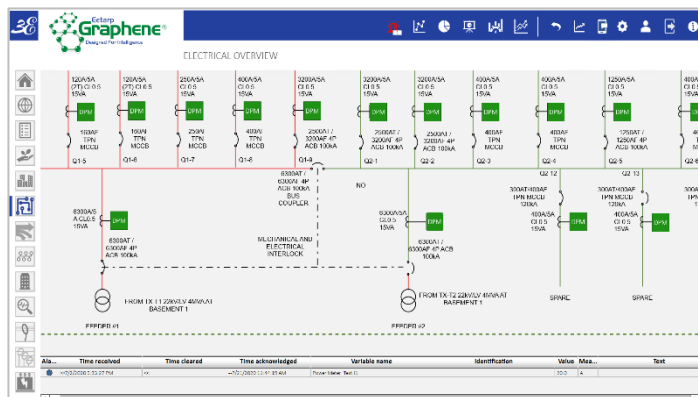
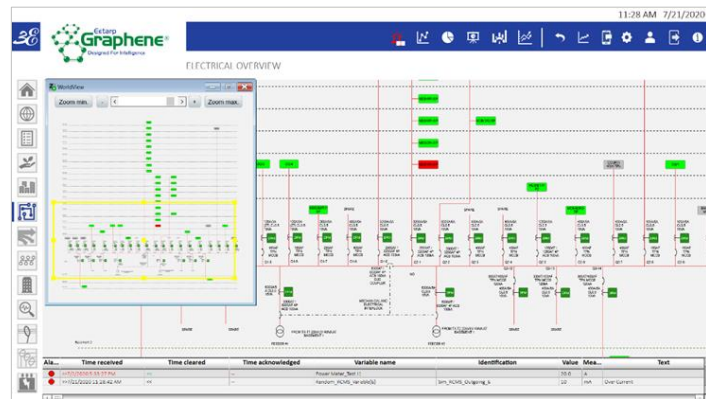
## Improved Dashboard

The Improved Dashboard is designed to showcase a complete view of the system in the most efficient way. With bar charts, pie charts, and live graphical trending, the user have quick access to useful information at-a-glance. As a default, our dashboard module comes with a few templates designed to suit BCA Green Mark requirements and the SS564 standard.



## Electrical Overview

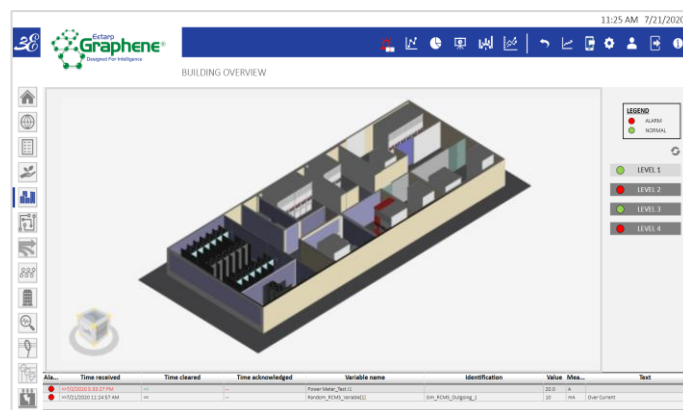
This feature allows to see and monitor each location at-a-glance. Graphene provides real-time resource data utilization of the monitored systems to help the user understand and evaluate the electrical, mechanical, and environmental equipment conditions. **New!** - "World View" enables the overall view on the complete electrical- and mechanical system as well as floor plans with a convenient zoom-in function.



**New!** - "Automatic Line Colouring" automatically define system line colours based on the live status of power cables, energy flow direction, cable's voltage, or breaker status in order to improve the readability of the systems.

## NEW! - 3D Graphical View

Instead of a commonly used 2D view, Graphene allows to have a 3D display of the systems. Supported files are 3D step files, 3DS files, and DWFX 3D files. All elements can be linked with variables and additional functions for animation and efficient data display. Pre-defined camera positions based on personal preferences helps to orientate quickly.



# Modules

## Customizable Alarm Threshold

The customized alarm threshold module allows the user to configure and personalize the threshold settings according to the system requirements with any back-end configuration or programming.

RESIDUAL CURRENT MONITORING - ALARM THRESHOLD SETTING			
OUTGOING NO.	TAG NAME	CURRENT	THRESHOLD
1	Circuit 1	6 mA	12 mA
2	Circuit 2	6 mA	10 mA
3	Circuit 3	9 mA	10 mA
4	Circuit 4	8 mA	10 mA
5	Circuit 5	8 mA	10 mA
6	Circuit 6	7 mA	10 mA

Setpoint input

RMS\_Alarm Threshold Setting[1]

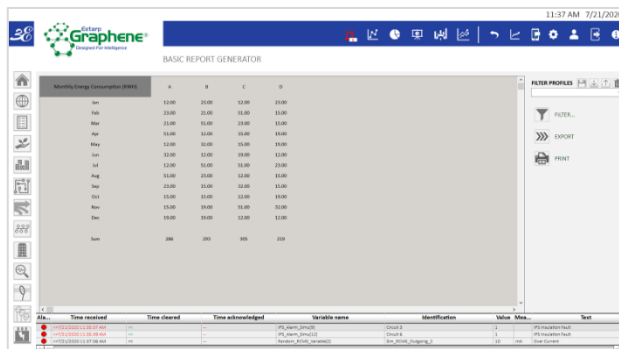
Command

Modify spontaneous value

Value:  Measuring range: Min.: 0 Max.: 15

OK Cancel

## Standard Reporting

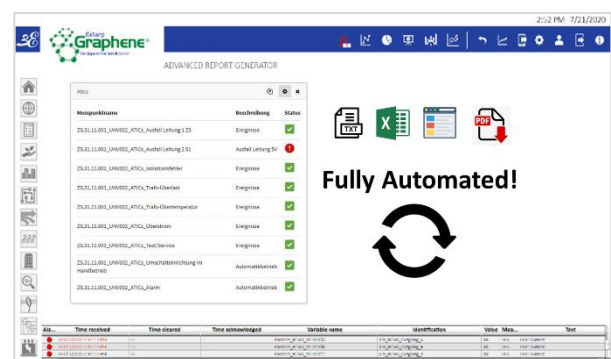


The standard report module evaluates, calculates, filters, and presents the processed data saved in the archive database. The result will be shown in the report viewer window. The reports can be customized into graphical presentations such as pie charts, bar charts, texts (Microsoft Word), and Excel (Microsoft Excel). As a default, Graphene provides a standard reporting to generate a report based on pre-defined .txt or excel format.

## NEW! - Advanced Reporting

The advanced reporting module allows the user to fully utilize all possibilities to create the reporting according to the requirements of the application and preferences without limits.

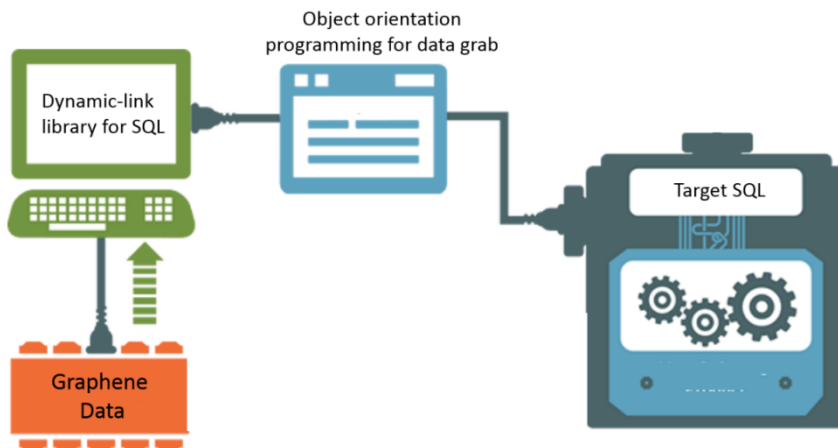
It's a complete reporting system that automatically processes the data into a pre-configured report template and processes it into text, excel, webpages or PDF-format. The results can automatically be sent to local or remote disk drives, send by email, or even to the FTP server. This feature significantly improves productivity, reduces human errors, and improves the time-consuming process when generating the reports.





## SQL Integration

The SQL integration module provides the capability to evacuate archives to an SQL database, which allows the standardized storage of data for use in other applications. All common database structures are supported, for example, Microsoft SQL Server, Oracle, CRATE.IO, and other database systems with an ODBC interface.



## Failure Analysis

The failure analysis module assists the user in understanding the consequences in case of any possible failure scenarios that occurred in the system at one glance. The decision making, which generally consumes significant resources and time, is now simplified with an automated failure analysis tool.

**FAILURE ANALYSIS - Power Consumption Table**

Unit	Quantity in N	Unit Capacity (kW)	N System Capacity (kW)
% CPU	1	3000	3000
% GPU	1	4000	4000

**FAILURE ANALYSIS - Power Consumption Table**

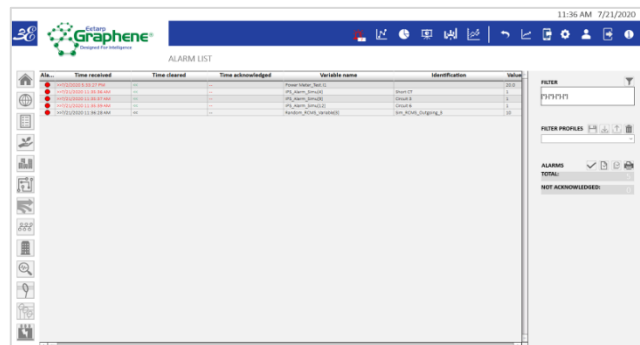
Unit	Quantity in N	Unit Capacity (kW)	N System Capacity (kW)
% CPU	1	3000	3000
% GPU	1	4000	4000

# Modules

## Alarm Analysis & Management

Alarming is used throughout the overall system to draw attention to critical events and to support the user in localizing and eliminating the alarms events. The ring buffer includes all active alarms which manages the followings:

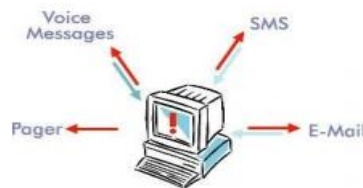
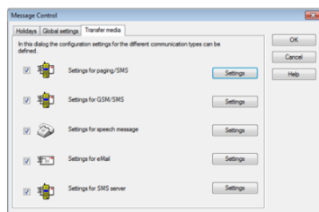
- Time received in milliseconds as a unique signature
- Additional information such as cause, value, etc.
- Time cleared
- Time acknowledged



Time received	Time cleared	Time acknowledged	Variable name	Identification	Value
11:35:00.000			Power_alarm_1	Power 1	200
11:35:00.000			Power_alarm_2	Power 2	150
11:35:00.000			Power_alarm_3	Power 3	100
11:35:00.000			Power_alarm_4	Power 4	50
11:35:00.000			Power_alarm_5	Power 5	25

## Message Control

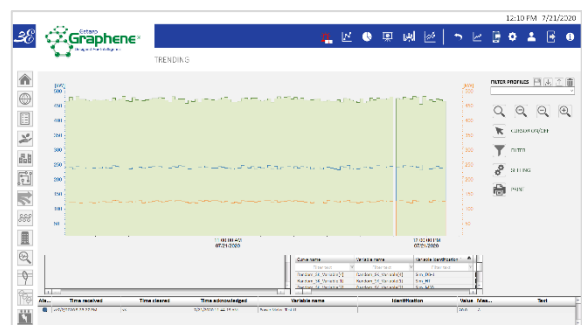
Message control allows Graphene to send the SMS and email notification to user whenever an event occurred. It aims to reduce potential costly losses resulting from infrastructure downtime. It can send messages to any desired recipient or group of recipients automatically.



## Archive Server & Historical Trend

The archive server module logs and stores raw data from field devices as well as processes variables derived from any server into the database. Optional the SQL-Integration-Module is required in case data need to be stored in the SQL database.

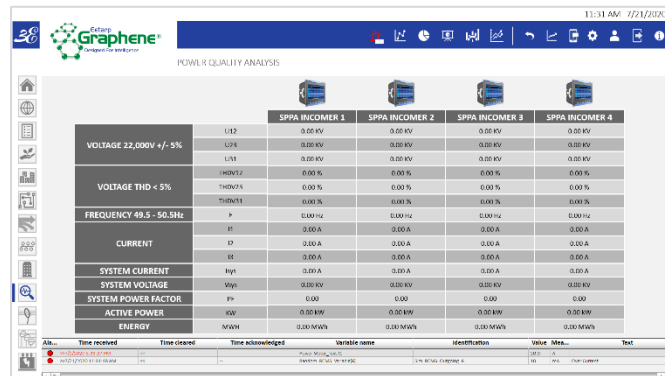
**New!** - The latest version of the historical trend module allows the user to select the variables with drag & drop for graph plotting, which is an easy and user-friendly way to monitor state changes in real-time or historical playback data from the database.



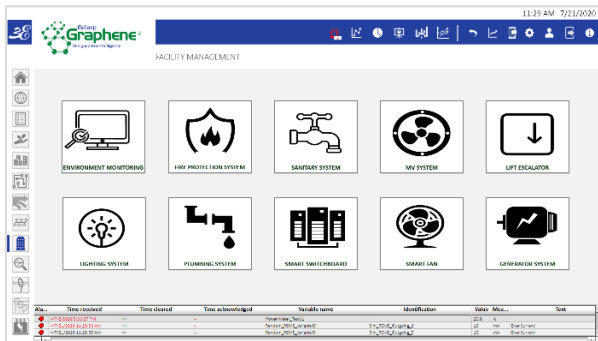
## Power Quality Analysis

The Power Quality Analysis Module presents waveforms of voltage, current, harmonic spectrum as well as phasor diagrams, trends of measured values, and energy consumption profiles.

This module enables the user to understand the cause of the disturbances and resolve problems with proactive methods in order to prevent breakdowns.



## Facility Management



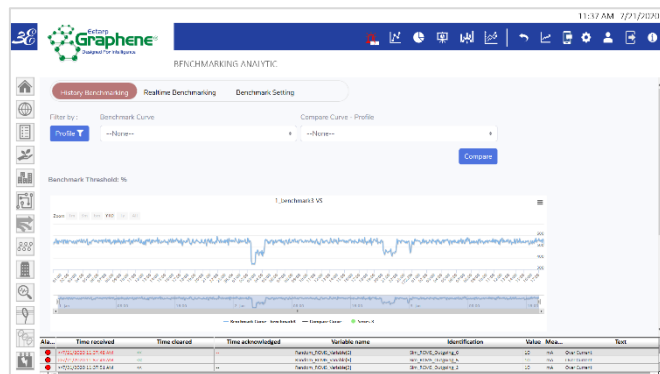
Graphene can monitor all electrical, mechanical equipment, environment sensors, and IoT devices essential for the building services, including:

- Uninterruptible power supply (UPS)
- Environment sensors
- ACMV devices
- DC chargers
- Transformers
- Power quality meters and power meters

Graphene provides a useful overview for detailed analysis to enhance users' decision-making process and improve the overall efficiency of the facilities management.

## NEW! - Benchmark Analytic

Benchmark analytics module allow the user to measure the performance of their system by recording the historical best data as a benchmark reference. The recorded benchmark can be used as the reference point to further evaluate the system condition to improve the system efficiency and to identify potential issue caused by abnormality of the devices, tools or machines.

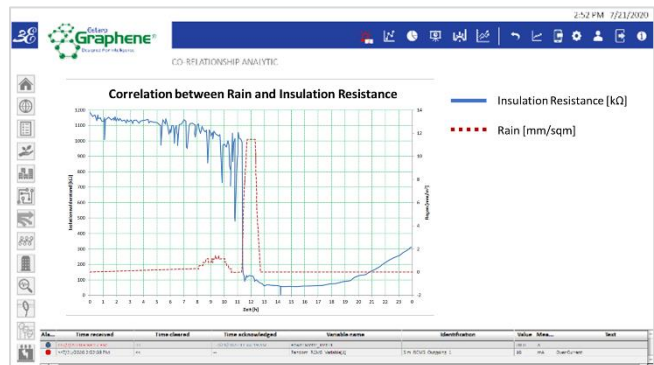


# Modules

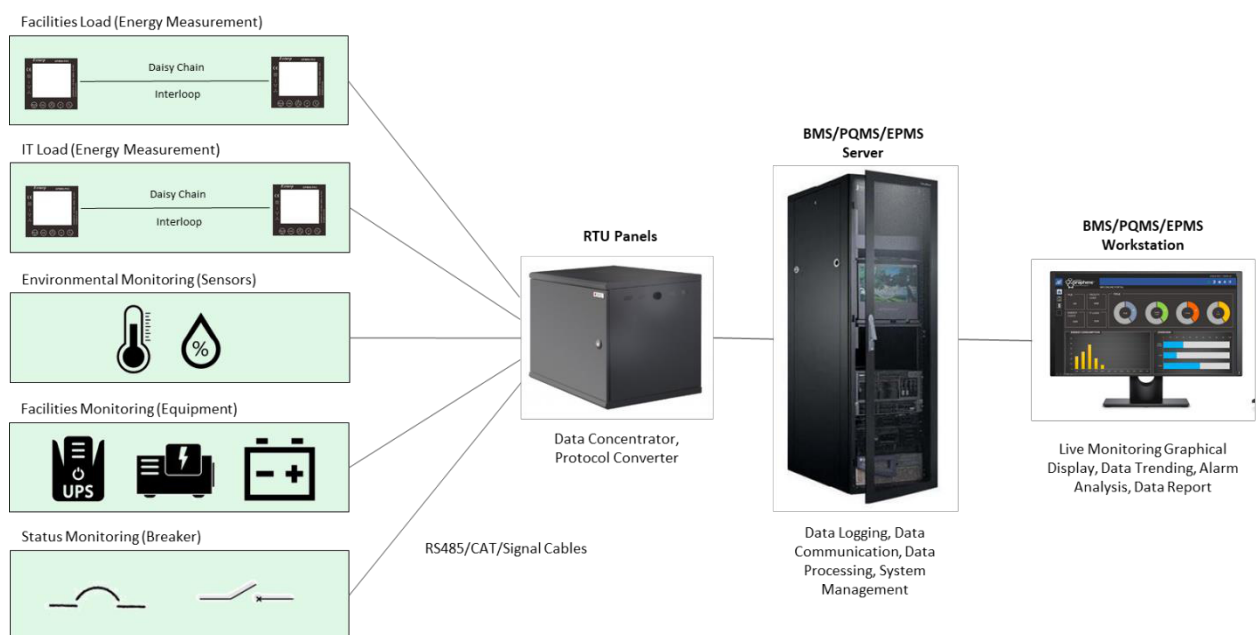
## NEW! - Correlation Analytic

The Correlation analytic module enables user to use statistical methods to discover the relationship between two variables/ data-sets and to identify whether there is any significant connections, patterns, or trends between the two.

A customized threshold setting can be used as alert in order to get informed by any abnormality earliest possible.



## System Architecture



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