TGS - Energy Monitor

## MONITORING SYSTEM
FOR PV PLANTS

SiEL
ENERGY&SAFETY

Platform architecture

It's an advanced platform to monitor and manage photovoltaic plants, dedicated to the O&M companies and investment funds specialized in distributed energy generation.

The system is designed to accommodate plants of every size: from 3 kW to several MW power plants.

It's composed by an industrial datalogger to be installed on the field and by a web platform "in the cloud" that receives and analyse the data in real time.
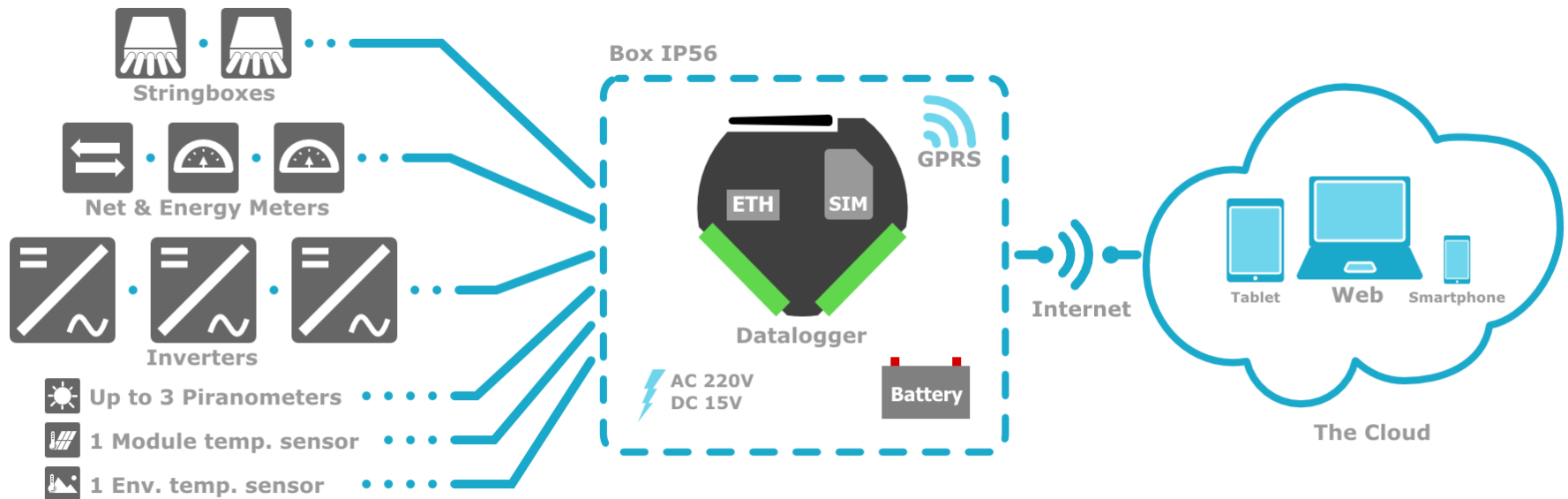
Energy Kit

- Box IP56, containing:

  - EnergyLog datalogger

  - 5mt GSM Antenna cord extension for external uses

  - Industrial power supply AC 220V – DC 15V

  - Battery UPS 7Ah (24h estimated battery duration)

- Piranometer Class 2 calibrated and certified

- External temperature sensor PT100 in platinum, calibrated and certified

- Module temperature sensor PT100 in platinum, calibrated and certified
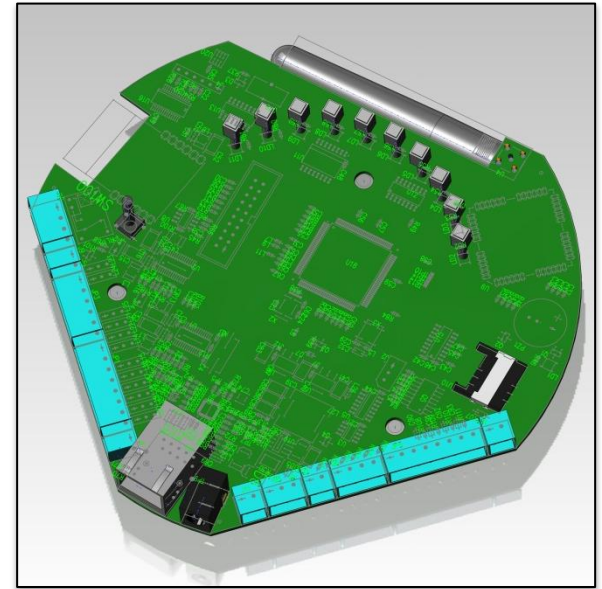
EnergyLog - Datalogger

- **Versatile:** is capable to communicate with several brands of device: inverters, stringboxes, energy and net meters.

- **Kind:** it integrates every communication ports: RS-422, RS-485, RS-232, CAN bus, USB, Ethernet e I/O.

- **Accurate:** it acquires readings, statuses and registers directly from the devices (energy production registers, alarm codes, statistics, etc).

- **Independent:** it communicates via a GPRS connection integrated in every datalogger.

- **Multi-Purpose:** it integrates a professional meteo station to enable the direct connection of environmental sensors (up to 3 piranometers and 2 temperature sensors PT100).

- **Comfortable:** it can be remotely configured: through the web application or mobile. No inconvenient display or custom configuration to remember.

- **Always Updated:** it updates remotely its firmware with a click.

- **Scalable:** it supports more than one datalogger on the same plant: easier installation and resilience.

- **Reliable:** hardware & software are designed, engineered and made in Italy.

Web application cloud based

The web platform is at the heart of the system: it receives continuously the data gathered from the dataloggers installed on the plants.

It centralises, archives and elaborates this data in a powerful cloud based infrastructure, always available through a web browser or a smartphone and tablet device.

The web application not only aims to stand out among the monitoring of photovoltaic plants of any size but also constantly evolves with new features and becomes more and more useful to the operating management of the plants themselves.

For example, the new O&M management module provides an effective tool to organize and track the activities on the plants.

An Indipendent and Multi-Brand Platform
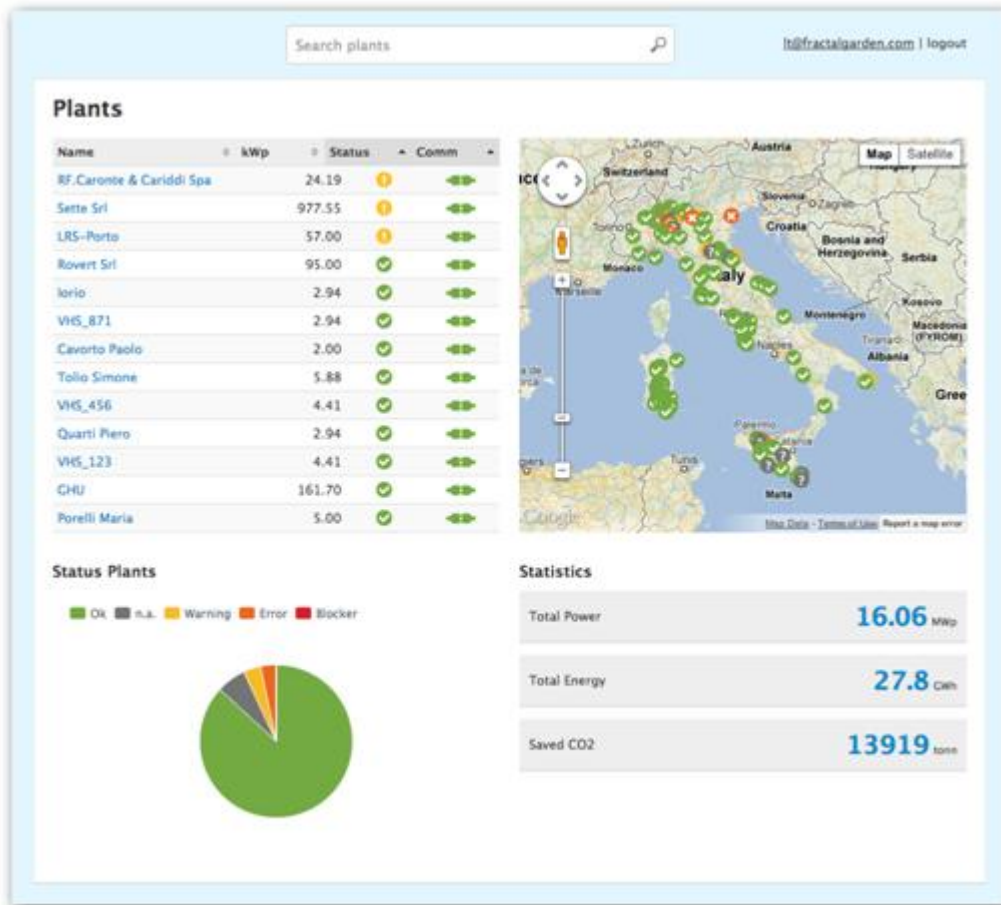
The platform has been designed to monitor and display hundreds of plants in a clear and easy user interface.

It allows to uniform the monitoring of plants, even if they are really heterogeneous between them.

TGS - Energy Monitor also offers the ability to monitor the UPS SIEL.

The application's user interface is completely localized in English and Italian. It can be easily translated in other languages.

Easy and Usable

The user interface has been designed to display information and data clearly and effectively.

The access can be enabled to different kinds of users, limiting the scope and the number of information displayed to the user.
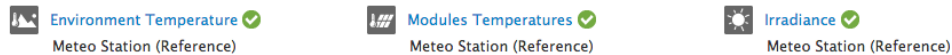
Some users has to interact with the system, others only to see the data in a read-only interface.
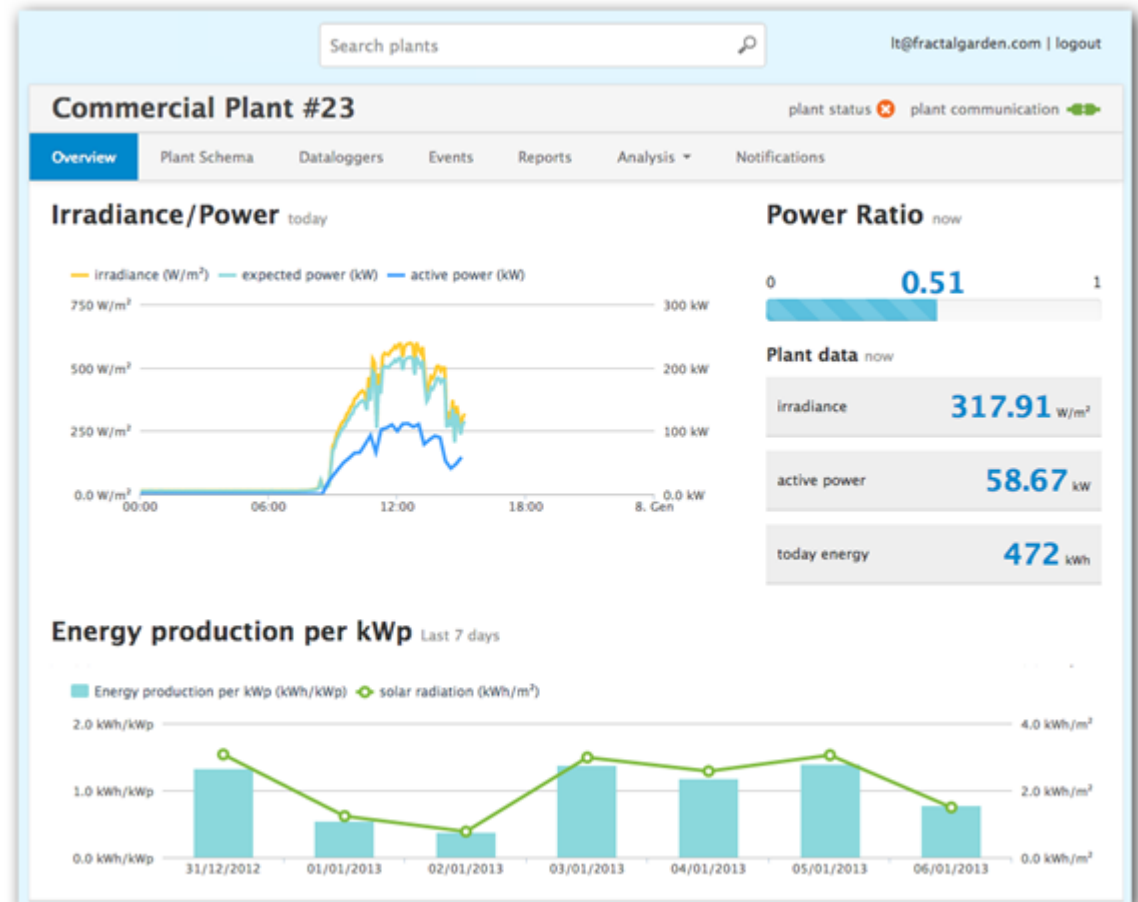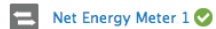
Plant Schema

The performances of every plant's device is displayed in real time.

The device's status is easily identified through an icon that points out its alarm level: normal, alert, error, blocker and under maintenance.

The device's details are available by clicking on the device's name.

Device's data and details

Every device on the field - inverters, stringboxes, meteo stations, energy and net meters - has a dedicated section to display the information about the device itself and every readings for a given day or up to that moment in real time.

The chart displays the daily trend while the underlying table shows the raw numerical data.

The data can also be exported in an Excel spreadsheet and a different date in the past can be chosen.
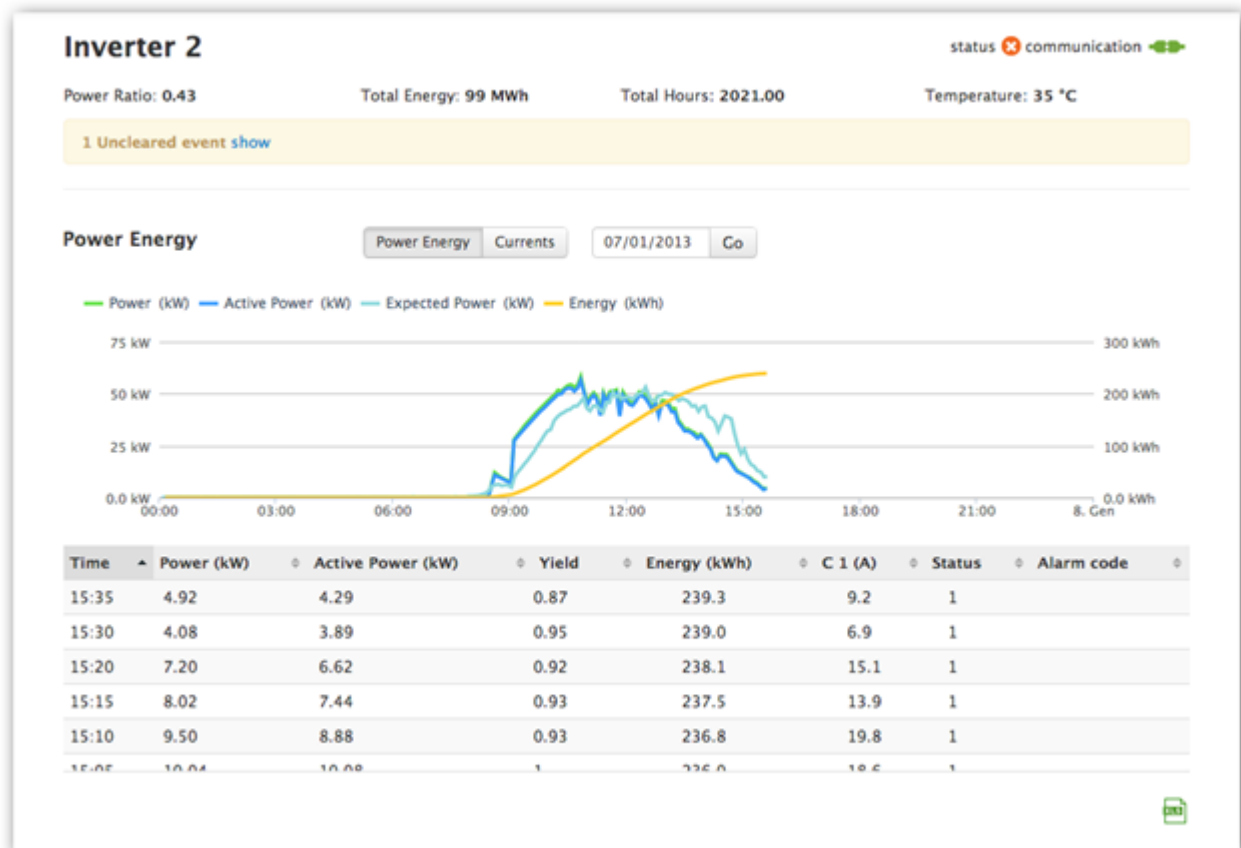
Connection schema and communication

Dataloggers   Add new Datalogger

Log 1 edit

ID:	Firmware:	Last comm.:	Connectivity:
00d06944dff6	3.5 edit	07/01/2013 15:59	TIM
Model:	Configuration:	IP Address:	Power Supply:
ErmesLog Pro	00000000000001 edit	109.53.64.156	

ETH 6 5 4 3 2 1 0	Device	Status	Comm	Last comm.	Address	Seq	
ETH 6 5 4 3 2 **1** 0	inverter 1 (250K)	✓	⇄	07/01/2013 15:59	10	2	edit
ETH 6 5 4 3 2 **1** 0	inverter 2 (250K)	✓	⇄	07/01/2013 15:59	20	3	edit
ETH 6 5 4 3 **2** 1 0	inverter 3 (80K)	✓	⇄	07/01/2013 15:59	30	4	edit
ETH 6 5 4 3 2 1 **0**	Q7 – string-box 1 inverter 3 (String Box)	✓	⇄	07/01/2013 15:57	31	11	edit
ETH 6 5 4 3 2 1 **0**	Q8 – string-box 2 inverter 3 (String Box)	✓	⇄	07/01/2013 15:59	32	12	edit
ETH 6 5 **4** 3 2 1 0	stazione meteo (LSI – M-LOG)	✓	⇄	07/01/2013 15:59	1	1	edit

Log 2 edit

ID:	Firmware:	Last comm.:	Connectivity:
00d06944df6d	3.5 edit	07/01/2013 16:00	TIM
Model:	Configuration:	IP Address:	Power Supply:
ErmesLog Pro	00000000000002 edit	109.53.47.2	

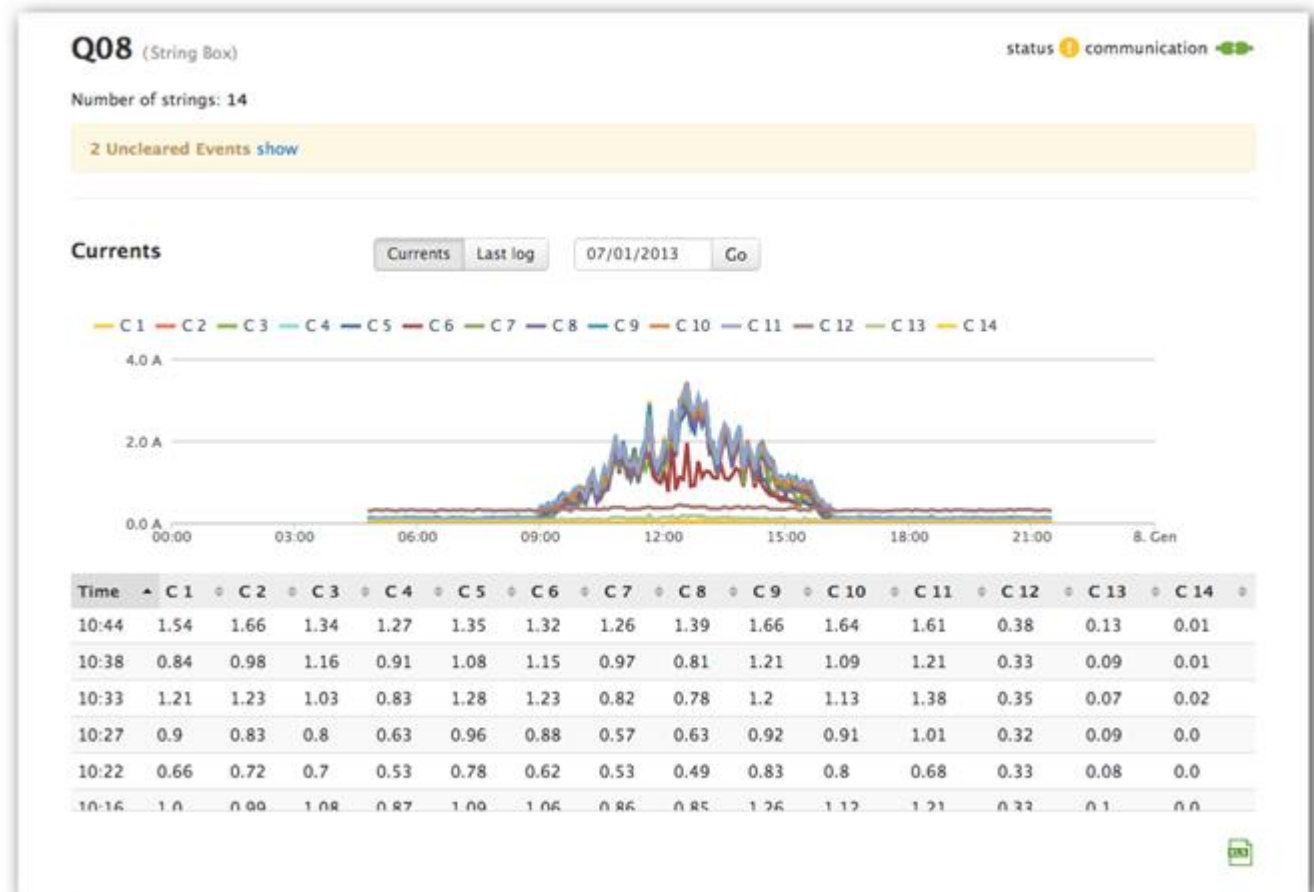| ETH 6 5 4 3 2 1 0	Device	Status	Comm	Last comm.	Address	Seq	
ETH 6 5 4 3 2 **1** 0	Q1 – string-box 1 inverter 1	✓	⇄	07/01/2013 16:00	11	5	edit
ETH 6 5 4 3 2 **1** 0	Q2 – string-box 2 inverter 1	✓	⇄	07/01/2013 16:00	12	6	edit
ETH 6 5 4 3 2 **1** 0	Q3 – string-box 3 inverter 1	✓	⇄	07/01/2013 15:58	13	7	edit

A comprehensive section displays the communication status of every datalogger installed on the plant and its physical connection schema with the devices (port and connection parameters, addresses, etc).

Through this simple interface it can be possible to update remotely the datalogger's configuration and firmware.

Predictive Analysis

The platform constantly receives data from the plants: this information is analysed in order to identify potential anomalous situations, even before the device's own electronics can raise explicit alarms.

For example, in accordance of given irradiance values, the system constantly compares the actual and expected production of every inverter and possible gaps between the currents coming from the stringboxes.

O&M Management – integrated ticket system

The platform offers a powerful tool to track the activities to do on the plants.

The tickets can be assigned to every administrative users and they are specific to a given plant/device.

The tickets can be manually created by the account manager or by the maintenance staff itself.

The tickets can be sorted arbitrarily in order to create prioritized To Do lists for every maintenance staff member.

O&M Management – integrated ticket system

The most critical events are automatically associated to a new ticket created by the platform. The account managers then should be able to dispatch and assign these tickets to the accountable users.

Every maintenance staff member can keep an eye on her or his tickets to resolve and at the same time the management team can have a complete overview of every activity to do for every managed plant.

Ticket #23 edit   Resolve

Centrale: Q02 – String-box with no production

Status: **Open**   Priority: ⊗

The inverter's power ratio is under the threshold. Power ratio: 0.45 Power ratio threshold: 0.7
Active power: 0.79 kW Irradiance: 188.353 W/mq Irradiance threshold: 100.0 W/mq

Assignee: **Admin SolarCo**
Reporter: **n.a.**

Plant: **Centrale**
Device: **Q02**
Event: **String-box with no production**

Created: **Dec 14 2012 13:13**
Updated: **Dec 14 2012 16:12**
Resolved: **n.a.**
Closed: **n.a.**

Billable: **no**
Billed: **n.a.**

1 Comment

The ticket is really important.

Sent by **Luca Tironi** – Jan 07 2013 16:04

Add new comment

Save

Events and Notifications

Notifications

Enable/Disable email notifications
☑ This setting is global for EVERY user's associated plant.

Checking the boxes near the event's type, the system will send a notification to the user's email about the events of this plant.

☑	**Event Type**
☑	**Plant Communication Delay** No communication with the plant's data-logger for a certain amount of time. The plant's max delay can be configured.
☑	**Device Communication Delay** The communication with the device is delayed. The device's max delay can be configured.
☐	**Device Alarm** The device has sent an explicit alarm. The code field reports the alarm code for that device.
☑	**Bad Performing String(s)** The current coming from one or more strings of an inverter or string-box is under the average of the other strings.
☐	**Data-logger on battery** The data-logger is on battery power.
☑	**Device Low Power Ratio** The inverter's power ratio is under the threshold.
☑	**String-box with no production** The string-box prodution is too low or null.
☑	**Plant Low Production** The plant's power ratio is anomalous for the given radiation level.

The web platform automatically sends emails (and sms) to notify the situations of alarm happening on every plant.

In order to avoid an overload of notified events, the system automatically distinguishes between critical and not critical situations.

Doing so, it immediately notifies the most important alarms and postpones the less urgent notifications in a daily digest sent at night.

Every user can customise the kind of events she or he wants to be notified on a plant basis.

Event Register

Every event happening on the plant is archived, no matter its seriousness.

The register allows to display every event that has not been cleared on any plant and provides the historical data of past cleared events.

Analysis & Report

The Analysis and Report section allows the user to see several ways to analyse the data and export them as Excel spreadsheets or pdf monthly reports, containing production details and every events happened in a specific month.

The monthly pdf report also contains the resolved tickets associated to the O&M of the given plant.
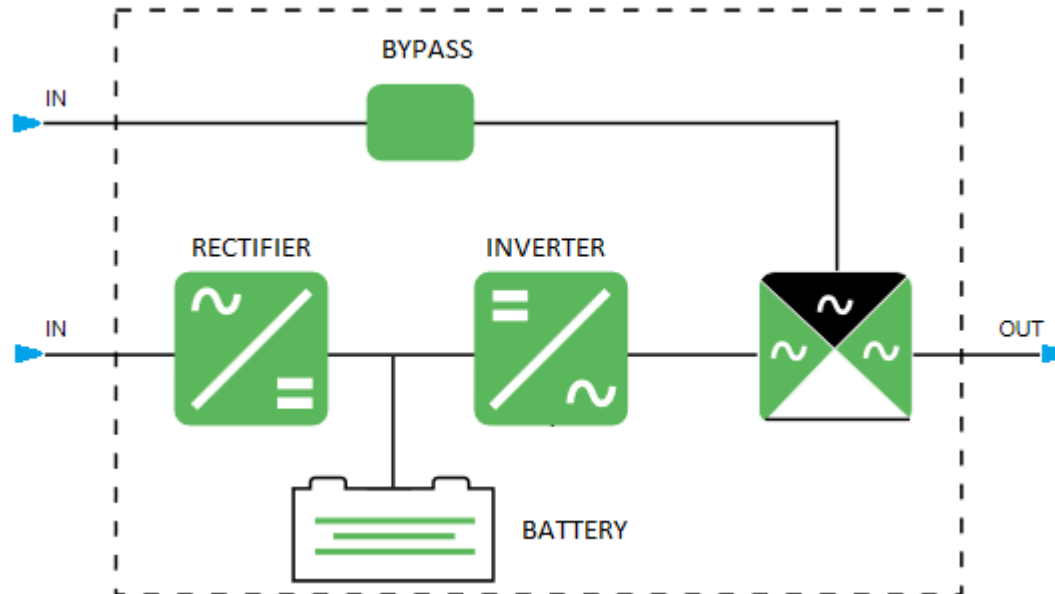
New features

UPS MONITORING

The same interface for all devices in the field!

The system displays all the information about the status of the UPS, ensuring alarms and reporting as for all other devices.

New features

SIEL UPSs are monitored via Modbus RTU.

Cloud

The IT infrastructure is cloud based: the whole platform has been developed with the latest web technologies and tools. There's no need to install PCs or servers on the plant's location or anywhere else. There's no need to backup the data on-site or do any kind of maintenance.

API

Sometimes it is not feasible to read directly the devices with our datalogger. In these cases, we provide a dedicated and documented API for the web platform, allowing the data to be submitted to the system anyway.
Doing so it's possible to take advantage of the web platform still maintaining the existing hardware already installed on the plant.

Database

Your plant's data are yours.
Every month we export all the received data for every device and we make them available to be downloaded.
In every moment the data can be downloaded as an Excel spreadsheet for a given day and a given device that is under the monitoring of the platform.

Web & Mobile

The whole web platform is developed using HTML5, without the usage of Flash or any other proprietary technologies. It's natively compatible to be accessed by every smartphone and tablet.