MAESTRO SENSING TECHNOLOGIES & SERVICES - SCADA

An Introduction

Since few years Maestro Sensing is serving the Industry with its diversified product portfolio of IIoT Gateways, Dataloggers, Sensors, SCADA solutions, EV Charging Stations etc. **Maestro Sensing AIM to be one of the Leader working with the Leaders for the Leaders.**

Maestro Sensing is one of the Authorised Partner of Global Leaders in Machine Communications – Webdyn, Reseller Partner for Kipp n Zonen, Hukse Flux & EKO sensors, Pristine for SCADA, Preferred Partner of FIBOX for IP67 Polycarbonate Enclosures & many segment leaders.Maestro Sensing caters to the customer base in PAN INDIA, South East Asia & Middle East.

MS_SCADA - It is a Supervisory Control & Data Acquisition (SCADA) Software. It is a multi package or applications running under common sphere. It is multi-station configuration software. Hence, as number of stations increases, they can be easily configured in an existing setup, without adding any extra cost.

It can be used for any Data Acquisition and Control Application as it can be configured for specialised applications.

However, there are predefined modules for specific applications where the configuration becomes negligible or eliminated. Some of the examples are Solar Power Generation, Wind Power Generation; Gas based generation, Pollution Control application, weather monitoring application, Plant Automation, Process Control / Automation, Fermentor applications and many more.

SCADA has **web connectivity** and web based modules. The data generated at the plant level can be uploaded on the web server or at cloud computing. so that it can be viewed from anywhere. It also has Short Messaging Service (SMS) channel. This enables alarms and other crucial information to be passed on to important decision makers on the fly.

SCADA package also consist of **mobile application**. It works on Android™ or iOS™ devices.

It has **plant control** module. The entire plant active power, reactive power, night shutdown, phase angle can be controlled automatically or manually.

This feature can be used to control the **reverse power** feeding in grid as well as working of Diesel Generator on optimum diesel consumption.

It has module for Battery Managment System **(BMS)** as well as Energy Managment System **(EMS)**. This enables hybrid systems to be controlled.

It is a **multilingual** software. The menus, messages & reports can be configured in any language supported by operating system.

It has built in **OPC** (**O**bject Linking and Embedding for **P**rocess **C**ontrol) server. The server can pick up data from virtually any machine including **analogue signals** like 4 to 20 mA. This makes it extremely versatile OPC server and enhances capabilities of It.

It can interact with the field with PLC (Programmable Logic Controllers) or with just field I/O (Input/Output) controls. This gives the same flexibility at a cheaper cost for various slow resource loading applications.

It has various analysis modules to undertake the analysis of various parameters as well as an alarm module.

Features

It has been tuned for Solar and Storage Industry. Following features of It makes it one of the best software packages.

Multi-thread OPC server to acquire data - It has a built in OPC server that can interact with any available inverter, string box, energy meter. Most of these devices work with MODBUS™ protocol or IEC 1106 protocol. As it is own developed OPC, any proprietary communication protocol can also be integrated. Apart from standard OPC feature, there is analogue channel in OPC as well. This makes it possible to collect the data from weather sensors like pyranometer, Temperature RTD, Hydrometer etc. The field inputs from substation can be integrated with Digital I/O channels. OPC server has multi thread channels hence data, that is required to be acquired at faster speeds separated on a different thread. Each thread has a different read out cycle.

Relational Database Management System (RDBMS) - It has robust, strong RDBMS, Microsoft™ MS SQL. The data security, redundancy, roll backs are all managed with professional speed and ease.

Real Time Display of Data. The acquired data by OPC can be displayed in graphical or statistical format.

Historical and Statistical Analysis. The data that is collected in data base is a strong collection of information to analyse, losses, events and performance.

Predictions. It has a strong prediction module that computes the expected mathematical energy generation based on weather satellite and real time data. This is specially useful to compute the losses based on external factors like loss of grid or to give forecasting report to Grid.

Alarm, History, Statistics & Notification - It has a strong configurable alarm module. A user can set up audio video alarm at local level or trigger a process at local level or can send an alarm condition via SMS or email to selected operators.

Reports, Auto Reports, Customised Reports. It has a reporting tool. The reports can be fully customised. They can be manually triggered or can be sent automatically at predefined time or even based on local sun rise, sun set time.

FTP, Cloud, Web and Mobile App for Remote Control. It is mainly plant control and monitoring software. However, it has a strong communication channel for external monitoring. Any local parameter can be sent on cloud on real time basis or on FTP server on fix interval or It Web Portal. It also has a mobile Application for Android and iOS.

Smart Grid. Auto / Manual. Most of the recent plants has a requirement from Electricity Grid to Automatically Adjust plant Active, Reactive power and phase based on grid command. It has this feature. It has been successfully working in Germany and in Republic of Senegal.

EMS (Energy Management System) It is needed in battery and storage systems to manage critical and non critical load, dynamically based on battery condition and grid availability statistics. It has a feature to do the same.

BMS (Battery Management System) In case of battery system, continuous monitoring of battery health is an essential task. The charging and discharging currents, depth of discharge, counting charging cycles are essential task for Battery Management System. It Undertakes the same.

Multilingual - It is a multilingual software. Reports and the Screens are interfaces with local needs.

Flexibility - Software is essentially a service. A good service needs flexibility as every use & every location is different. It software is completely flexible and modifications and customisations are possible. It understands that every customer has different method of calculation of Plant Performance Ratio (PR), Calculations of some specific parameters, colour scheme and dash board requirements, specific non standard instruments. Many a site reliable internet connection is not available. It takes care of all these situations.

Fix Pricing and Licensing Policy - It is not charged on yearly subscription basis. It is one time fixed cost. Once paid the license is life time. There is an optional annual maintenance contract but it is basically to get free updates.

Plant Monitoring 24 X 7 - Our plant monitoring centre in India, can monitor the plant, (if permitted by customer), 24 X 7 from our plant monitoring centre. This is a separately chargeable service.

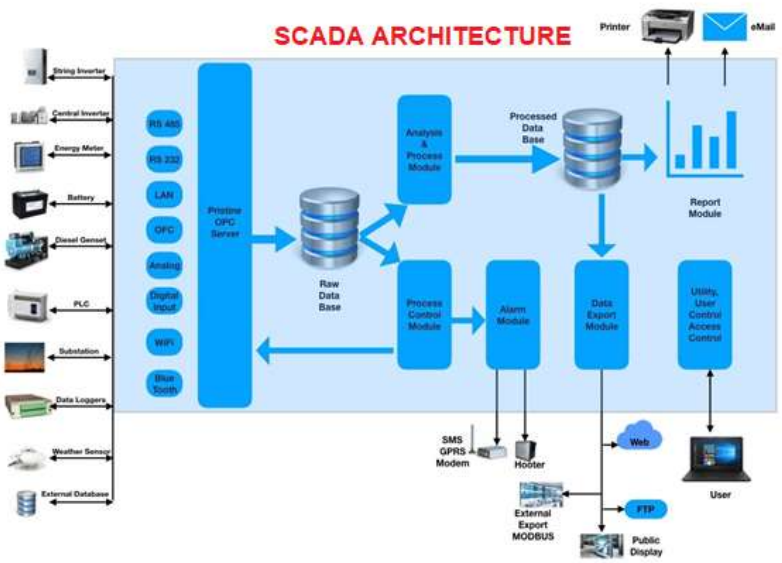
Internet Connectivity It has web connectivity and web based modules. The data generated at the plant level can be uploaded on the web server so that it can be viewed from anywhere. It also has Short Messaging Service (SMS) channel. This enables alarms and other crucial information to be passed on to important decision makers on the fly.

Loss Analysis Most important for any investor or owner of the plant is the loss analysis. It gives real time measured value from every part component against the mathematical predicted output. This is done on real time basis. In case, if the loss is more than prescribed limit, an alarm can be generated to the local operator to undertake the corrective measure.

Reverse Power Control / Grid Export. At many locations, grid does not allow the reverse power generated from solar plant to feed back to grid. In case of more solar power generation than the consumption, the excess power is fed back to grid. It can control this phenomena and prevent reverse power feeding back to grid.

Diesel Optimiser. If the Diesel Generator is used in the system, the diesel consumption is optimised, if the diesel generator is used at 30% of its peak power. It can adjust the inverter power so that the system diesel generator works at diesel optimiser zone.

System Architecture



It is PC based data collection and analysis software. It has an OPC server module. This module can interface with the external devices using any of the hardware layer. It can be serial interface (RS 232 or RS 485), an Ethernet interface (LAN or OFC), Wireless interface (WiFi or Blue Tooth) or an analogue interface (Voltage or 4 to 20 mA or Digital input) The data collected from the OPC server is stored in a RDBMS (Relational Data Base Management System). The data is then processed and sent to control module to take the control action as well as to analysis and process module. This module analyses and processes the data. The process data is stored in separate data base. This data is used for data export as well as for reports. Reports can be either printed or sent on email. The data exporting can be on Web portal site or to any other FTP (File Transfer Protocol) site or it can be sent to some external devices using MODBUS or can simply sent to public display. The system also has an alarm module that can be hooked for SMS using GSM/GPRS modem or a local hooter. A strong user interface is provided for customization and monitoring.

What is Industry specific Need

The specific needs for the solar power plants are:

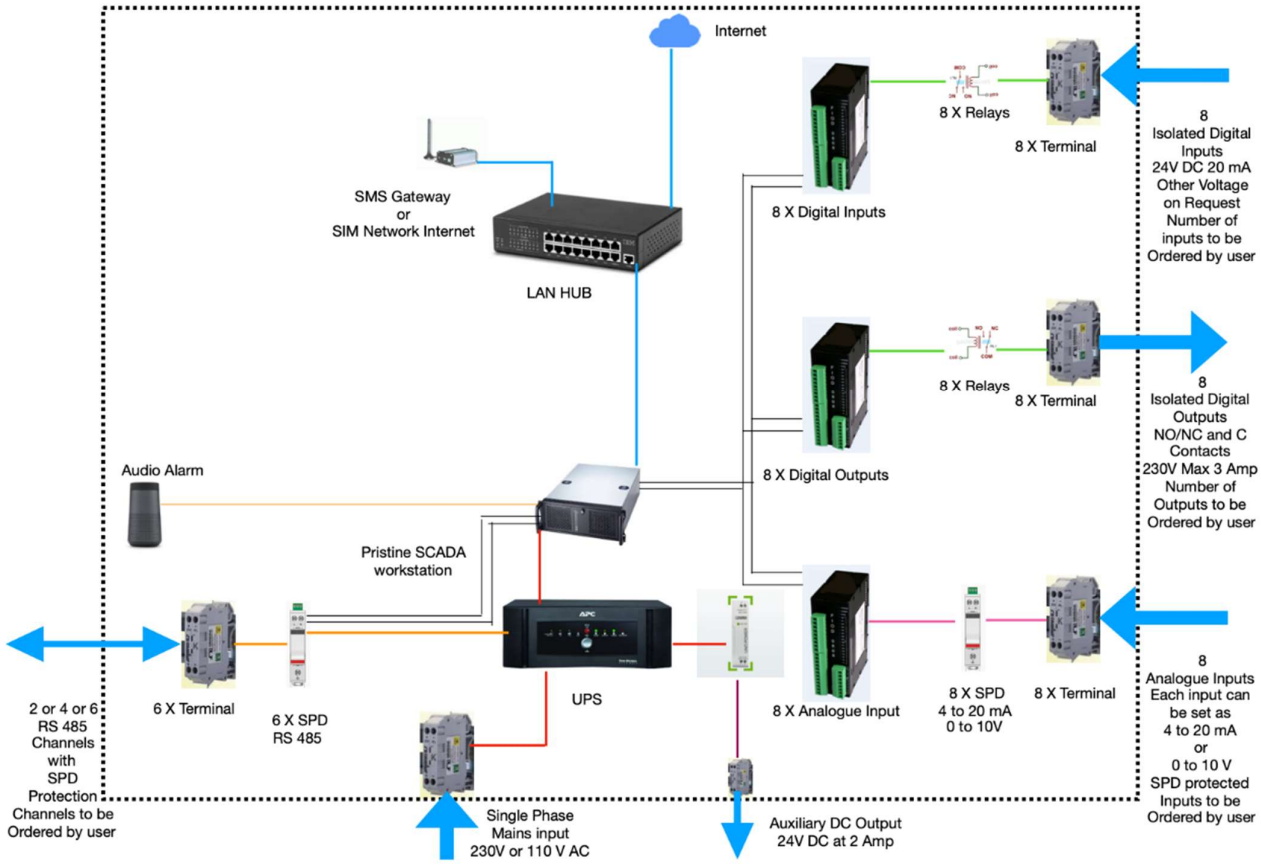
1. Interface with weather data on real time basis. This includes solar radiation, solar duration, wind speed, wind direction, ambient temperature etc. Based on this data, real plant efficiency (PE), Performance Ratio (PR), Plant Load Factor (PLF) or Capacity Utilisation Factor (CUF) can be calculated.
2. Interface with mathematical solar expected radiations. Based on the plant latitude and longitude, expected solar radiations can be computed. This gives the trend of power generation in advance. This is very important to determine the cash flow. Needless to say, this is only an expected trend and weather variations can affect the same but at same time, it gives certain indication. If plant has proper Internet connectivity, this trend will automatically get adjusted with the use of Internet based weather satellite data.
3. Solar PV plant has many modular units while photovoltaic plant has multiple modules. Normally, they need not to be individually monitored. But they need to be periodically scanned for efficiency. If the problem is detected then it should indicate which module has failed or needs cleaning. In It, alarm on System or SMS with X & Y coordinated of the module, indicates the plant maintenance team to locate and attend only the specific module.
4. Solar Power Plants are initially working on some kind of Government help either in form of subsidy or special feed in tariff. Government need certain mandatory, periodic reports. Most of the times reports are in specific format and in specific regional languages. Also their format and computation method changes. It can achieve this.
5. Efficiency of solar modules is three functions analysis. Efficiency depends on temperature, radiation and load. For effective analysis, the software needs three dimensional graphs as well as polar graphs. It can support both these graphs.

All these specific needs are addressed in solar module. The technical idea for the same is that on broad data acquisition and control software, we have piggybacked some special modules. These modules give entire necessary user interface and reduce time for customization and implementation.

Hardware Rack

Maestro Sensing can supply either only the SCADA software or the complete hardware devices for Client Server as well as Cloud Mode along with the SCADA software setup.

SCADA Rack - Hardware Options - MES - Roorkee



Specification for Full system

The specification depends on the plant specification but typical specifications are

Hardware Requirement

The hardware specifications depend on number of devices connected and the speed at which the controlling is needed. However a typical specification if the hardware needs to be purchased directly then

Basic

1. Intel® based PC. i7
2. Display is completely optional. If the local station does not need the display, it can work without that. Maximum number of displays are 4
3. Internal CACHE memory 1 Gb or more
4. Motherboard RAM 16 Gb or more
5. Motherboard with 32 bit or 64 bit architecture
6. Hard disk size depending on data storage. For 10 year plant data, the hard disk of 4 Tb is recommended.
7. Optional Keyboard, mouse, needed only if local station is needed

Optional Items

This will improve the system performance

1. UPS 1 kVA with 4 Hrs battery life
2. GSM modem for SMS alarm.
3. 4 serial port card to increase serial interface connections.
4. Antivirus software.

Operating System

The software is tested on following Operating systems

1. Microsoft® Windows Xp Professional Edition with Service Pack 3 or above
2. Microsoft® Windows Vista Ultimate Edition 32 bit or 64 bit matching with hardware Service pack 1 and above
3. Microsoft® Windows 7 Ultimate Edition 32 bit or 64 bit matching with hardware.
4. Microsoft® Windows 8.1 Professional Edition 32 bit or 64 bit matching with hardware.
5. Microsoft® Windows 10 Professional Edition 32 bit or 64 bit matching with hardware.

Web module

The software is tested on following web browsers

1. Microsoft® Internet Explorer
2. Safari Browser
3. Google Chrome

Mobile Application

The mobile App is available at

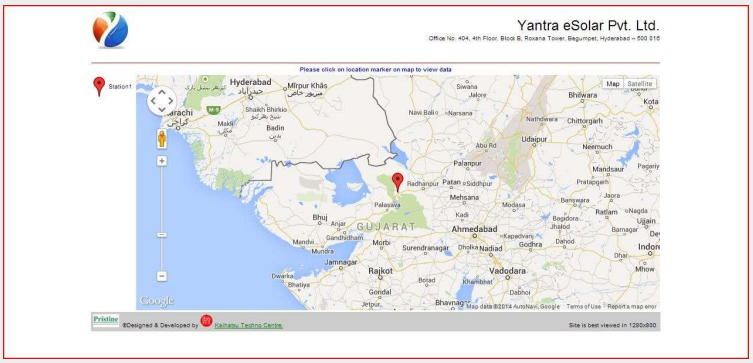
1. Android Operating system through Google Store
2. iOS Application through Apple store.

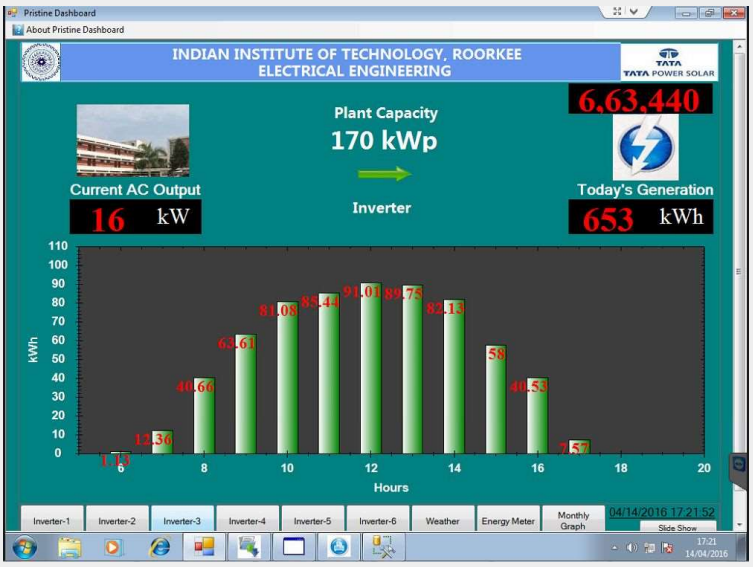
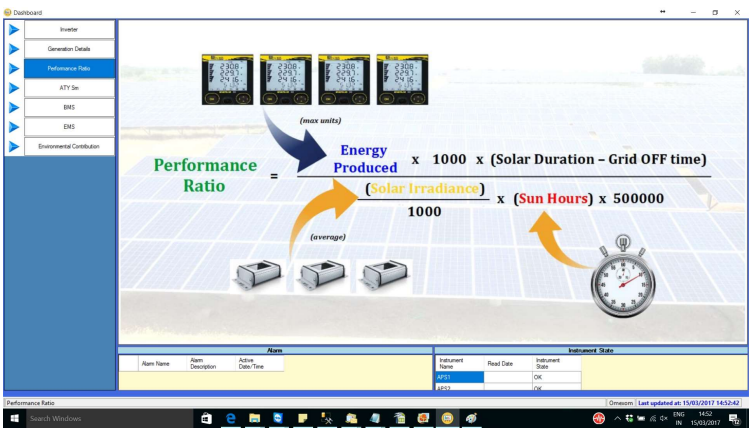
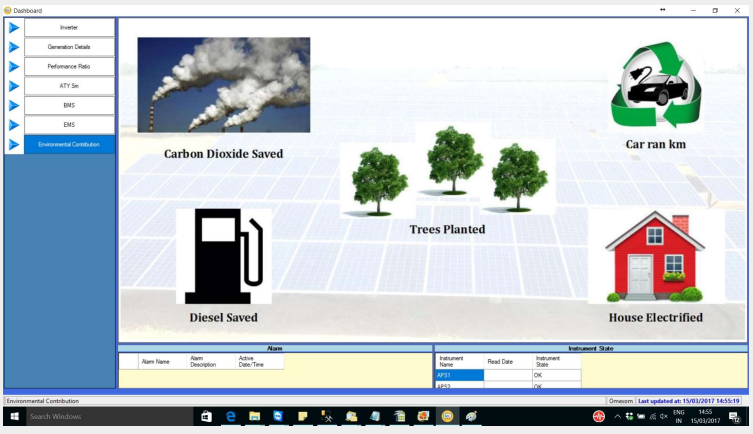
Wiring & Cabling Hardware

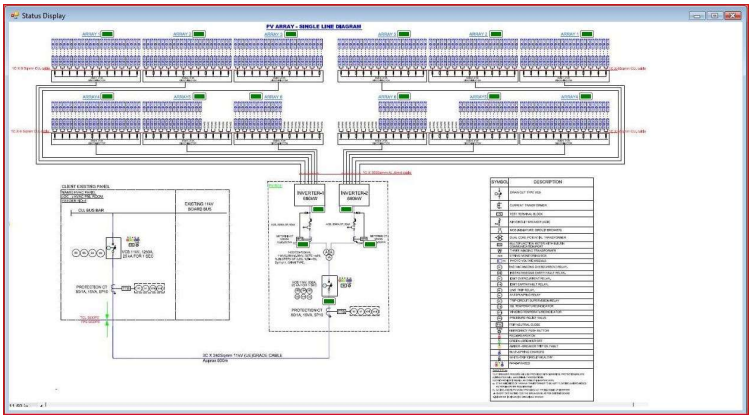
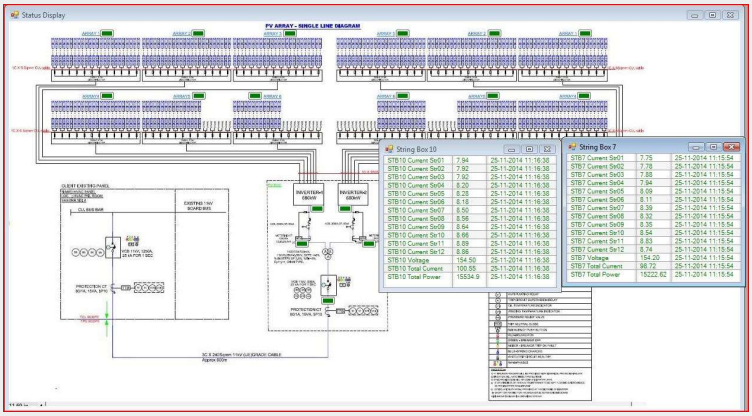
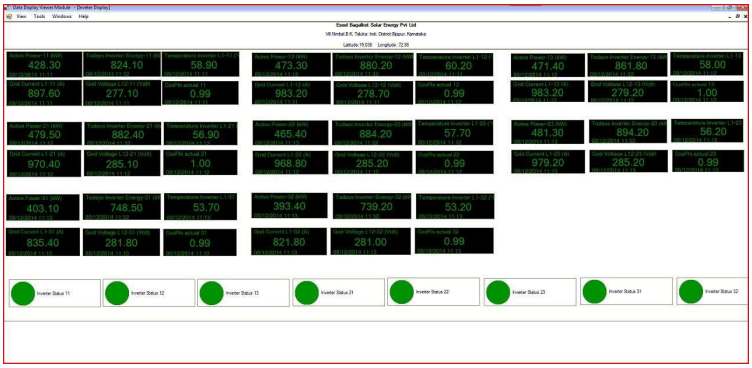
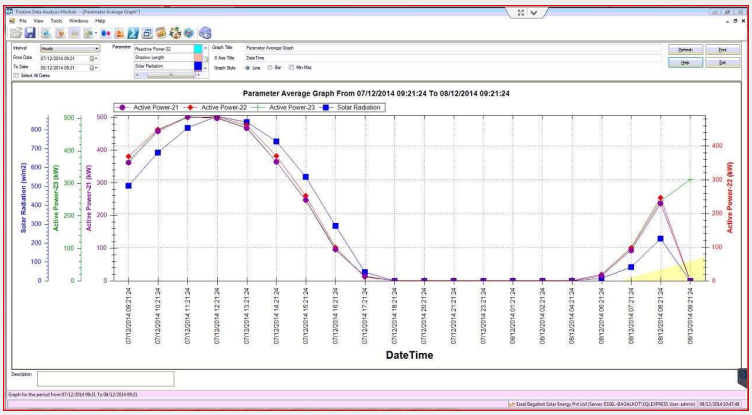
Based on the plant size the RS485 cable or fibre optics or any required communication cable has to be established.

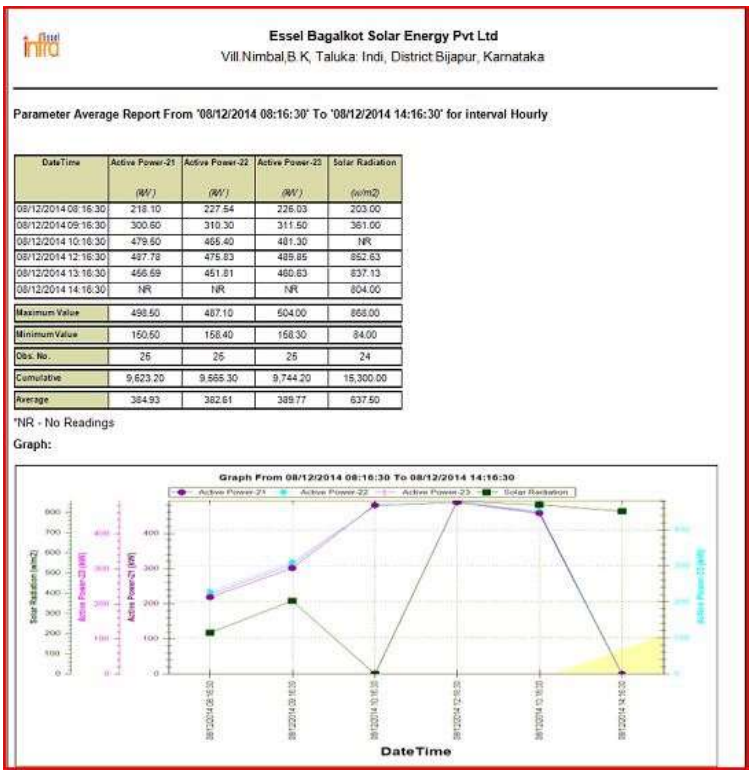
Screen Shots

Various Screen shots and pictures are listed bellow.

	Multi monitor Desk top can be arranged to have a total control of the plant
	Multiple plants can be linked with Google™ maps. On the click of a map location the individual plant can be viewed.
	Main Dashboard. All the important parameters are available on Dash Board. The Parameters are user configurable

	Multiple Dashboard supported for easy plant monitoring
	Dashboard for Live Performance Ratio (PR) Calculation
	Dashboard to show the Environmental impact

	Total Plant details are available on Plant SLD. Click on any item of SLD to get the details
	Click on any String box to get the currents of individual strings.
	Real time display of user selectable parameters of inverter or energy meter is available with working / non working status. (Green is working, Red is not working)
	Historical and Real time Graphical representation of multiple parameters on single screen is available



Essel Bagalkot Solar Energy Pvt Ltd
Vill.Nimbal,B.K, Taluka: Indi, District Bijapur, Karnataka

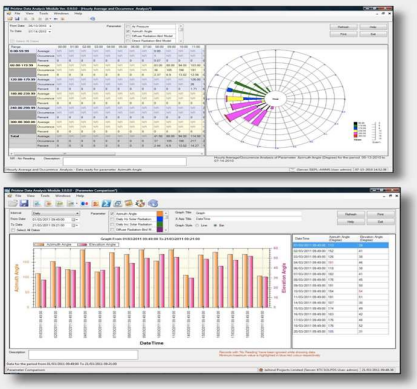
Parameter Average Report From '08/12/2014 08:16:30' To '08/12/2014 14:16:30' for interval Hourly

DateTime	Active Power-21 (W)	Active Power-22 (W)	Active Power-23 (W)	Solar Radiation (w/m2)
08/12/2014 08:16:30	218.10	227.54	226.03	203.00
08/12/2014 09:16:30	300.60	310.30	311.50	361.00
08/12/2014 10:16:30	479.60	465.40	481.30	NR
08/12/2014 12:16:30	487.78	475.83	489.85	862.63
08/12/2014 13:16:30	466.69	451.81	460.63	837.13
08/12/2014 14:16:30	NR	NR	NR	804.00
Maximum Value	498.50	487.10	504.00	868.00
Minimum Value	150.50	158.40	168.30	84.00
Obs. No.	25	25	25	24
Cumulative	9,623.20	9,565.30	9,744.20	15,300.00
Average	384.93	382.61	389.77	637.50

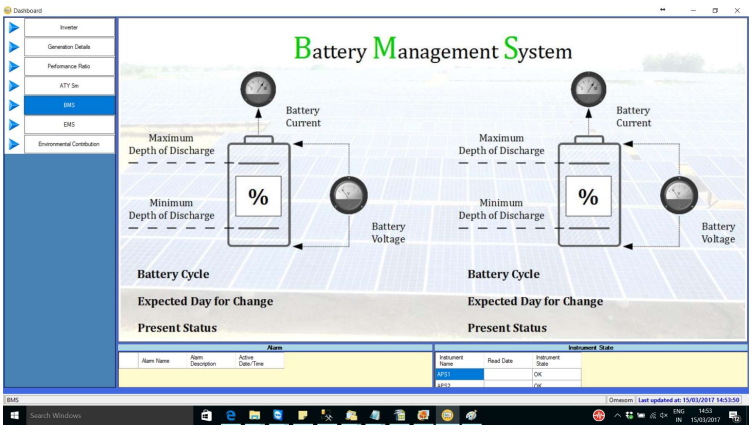
*NR - No Readings

Graph:

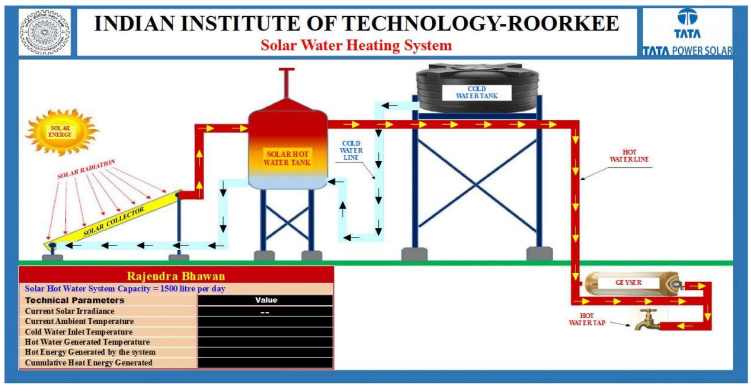
Colour print reports with selected date, time and selected range are available. The reports are available as Print, pdf or Excel format



Graphs are available in various formats. All are user selectable

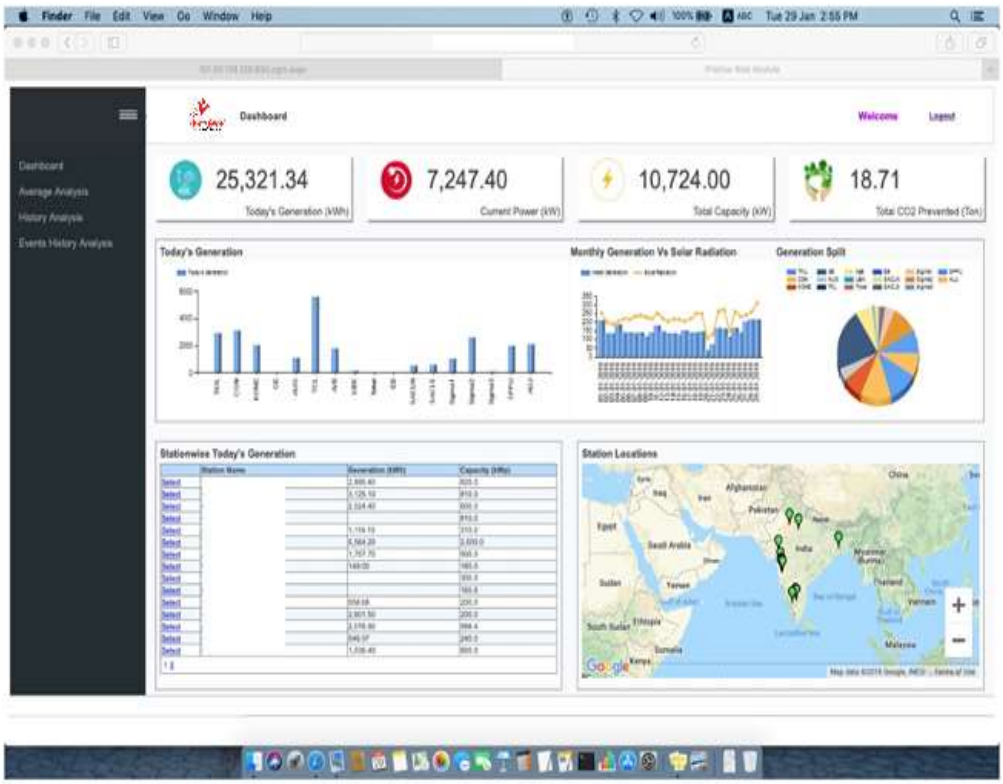


(Optional) Battery Management System Dashboard

	Special Screen for Solar Thermal screen
	Special Screen for Fuel Cell Project

Screens for Portal

It Comes with strong portal service. Almost all the screens are available on portal. The entire analysis is available on portal. If the internet connectivity is an issue then only relevant parameters are available on portal as Edge technology. The portal comes with own dashboard



Limitations of MS_Pristine SCADA Software

Before you order It, please understand limitations of this software.

1. It is not an un-attended automatic software. It is not in the category of “life supporting software”
2. An attendant with fairly good computer skill is needed on site. The person can be trained online free of cost by Webdyn.
3. It is a PC based or IIoT (Industrial Internet Of Thing) software. The same PC/Device should not be used for multi-tasking other applications like office work, playing games or watching multimedia etc. Performance of either application will get affected.
4. PCs do get “hanged” or “in-active mode” This happens with all softwares. This has nothing to do with It. The Operating System, Hardware, Over Temperature etc. can be a cause for this phenomena.
5. Quality and configuration of SCADA PC does affect performance of SCADA system.
6. It is “Data Collection and Analysis” software. It is not a “data correction” software. It just uses the data given by instrument or sensor. It does not “adjusts” the data.
7. It as software can give high performance, with high speed scanning, redundancy of all data. For this, hardware must be of that grade. One cannot expect to get all these features with ordinary office PC.
8. Communication failures do happen because of wiring, sensors or hardware. It does not contribute to communication failures. They need to be manually repaired.
9. Decreasing the polling interval increases data and reduces storage capacity. This also increases, searching time as well as report generation time. Hence, please select polling interval wisely and optimum to necessity.
10. Sensor hardware need to be properly selected. Analogue Sensors (4 to 20 mA) with long wiring loop in high voltage field does cause a communication problem. Long wiring length of RS 485 or LAN network, reduces communication baud rate and increases the data collection time.
11. Web module and email Alarm module does need internet connection. SMS alarm module does need GPRS modem with network connectivity. It cannot correct internet or network issues.

Deliverables

Hardware will be delivered as ordered.

Software.

Microsoft Windows© 10 based software with two licenses one for SCADA work-station.

Web module the plant monitoring will be displayed in web. This is an optional item and will be given only if ordered.

Guarantee

The software & hardware will have a free replacement for one year against any manufacturing defects. One year will be considered from the date when the licence key is issued.

Any loss of data or hardware cannot be guaranteed. However if the back up of the data is obtained properly then recovery of the data might be possible.

If there is any loss of software due to virus or loss of hardware due to improper power or use, this will be excluded in guarantee.

The license key is only issued once per site. However if due to hardware issue, if the software has to be reinstalled, the license key will be issued again.

No liability or indemnity will be undertaken for any compensation based on data or loss of data.

Upgrades

All upgrades are free for one year from the date the software is installed. They will remain free, after that, if Annual Maintenance Contract is signed.

Any upgrade in the operating system must be undertaken after confirmation from Webdyn. This is because, Webdyn upgrades the software for new operating system but it takes some time for testing.

Anual Maintenance Contract (AMC)

It Software is a one time license. Hence, it does not need AMC for working. The software will continue working without AMC

However, with AMC following services within the guarantee like

a. Free upgrades
b. Monitoring for 365 days
c. Screen and Report Changes
d. Back-up and Restore
e. Cloud & Edge Storage space