SEMS-PV

SOLAR ENERGY MEASUREMENT SYSTEM FOR PHOTOVOLTAIC SOLAR POWER PLANTS

For solar energy resource assessment purposes and solar power plant monitoring, generally it is required to measure the Solar Irradiance. This is made by the Remote Solar-Meteo Stations of the **SEMS-PV** System, consisting of one **METEODATA** Data Logger, one or two Pyranometers and a set of meteorological sensors to measure the rest of relevant ambient parameters as wind speed and direction, ambient temperature or air pressure.

GEONICA introduces the **SEMS-PV** Solar Energy Measurement System, a turnkey integral solution for measuring the sun power, that is, the solar energy resource, as well as for the remote monitoring and efficiency analysis of solar power plants, thermal or photovoltaic, in real-time, via Internet.
Our **SEMS-PV** Solar Energy Measurement System is the most advanced technical and cost efficient solution for solar energy resource assessment available in the world market today. **SEMS-PV** is also the necessary tool for the measurement of Solar Irradiance to be used as a precise incoming energy reference during the operation of Photovoltaic Solar Power Plants (PV).
Solar resource assessment is the first objective to be covered, in order to determine, during a certain time, the site conditions regarding the available solar energy. So the **SEMS-PV** System has been designed for allowing the measurement solar radiation by means of highly sensitive Pyranometers. The **SEMS-PV** System has been designed around the Remote Data Acquisition and Transmission Unit, Series **METEODATA**, working as a data logger.
Besides the measurement of the solar radiation, the **METEODATA** unit allows the connection of other additional meteorological sensors.

METEODATA
Datalogger / Transmitter Unit
(3G/GPRS, Radio or Satellite)

Once the solar plant is in operation, other three fundamental issues are covered by the **SEMS-PV** System:

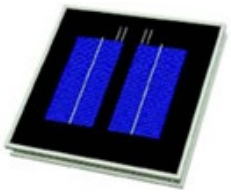
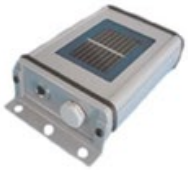
- Real-time monitoring of all the main or critical plant parameters. This will provide the possibility of a quick identification of failed components or abnormal operation conditions of the plant.
- An efficient remote alarm management procedure by means of urgent transmission of SMS alert messages to cellular phones and e-mails to central computers, in order to minimize the troubleshooting efforts and to prevent damages in key plant components.
- On-line and Off-line analysis of the plant efficiency, in order to know the overall performance of the photovoltaic installation.

DATA COMMUNICATIONS OPTIONS OF SEMS-PV SYSTEM

In System **SEMS-PV the METEODATA** datalogger records and stores all the measurements, including Solar Irradiance, as well as all additional meteorological parameters required for each project.

Data is transmitted to a Central Receiving Station and a complete SQL database is generated for subsequent analysis and final data process. Communications with a local SCADA are also possible.

- Option MODBUS Protocols, "Modbus Slave" communications module integrated in the own remote Station program, allowing a Master device (i.e. PC, PLC, RTU, etc.) connected to the Station to access variables map in order to:
  -Read instantaneous values of every channel in the Station
  -Read statistical values regarding the last calculation period of every channel in the Station
  -Master and Station date and time synchronization
  Depending on the physical link type and the Master Station protocol, the following alternatives can be chosen (to be defined with the order):
  -MODBUS-RTU Option, Serial port RS232/RS485 link, or
  -MODBUS-RTU over TCP/IP Option, or
  -MODBUS-TCP Option.
- Option ETHERNET for Direct connection to Ethernet networks, SCADAs, INMARSAT Terminal, etc. Includes RJ45 connector.
- Option GPRS / 3G cellular modem.
- Option "VipService-4K" **GEONICA**'s Virtual IP Service that enables communication between Data Receiving Center and Remote Station regardless the operator´s SIM/RUIM features (public, private, static or dynamic IP adrress, etc.), allowing full featured communications with all mobile operators supplying Internet access SIM/RUIM cards over the world. Note that the VipService-4K requires the option GPRS-IP already included in the basic pack.
- Option INMARSAT BGAN M2M Satellite Terminal, including antenna and connecting cables. Bidirectional communications. Broadband Global Area Network.

Pyranometers	Calibrated Solar Cells	PV Module Temperature	Air Temperature & Relative Humidity	Wind Speed & Direction
				
GEO-SR20	**CCAL**	**285-PT100**	**PTHR-4000**	**03002**
				
GEO-SR11	**SI-V1.5 / I420**	**PT100-4.20 CONV**	**STH-S331**	**GEO-WS**

GEO-MDFS2

Soiling Measurement
Automatic Monitoring System
that determines the soiling
index for solar PV plants
See Doc. 9734 0042

SUN TRACKER 2000

High accuracy and reliability
for solar direct and diffuse
irradiance in solar plants
See Doc. 9754 0006

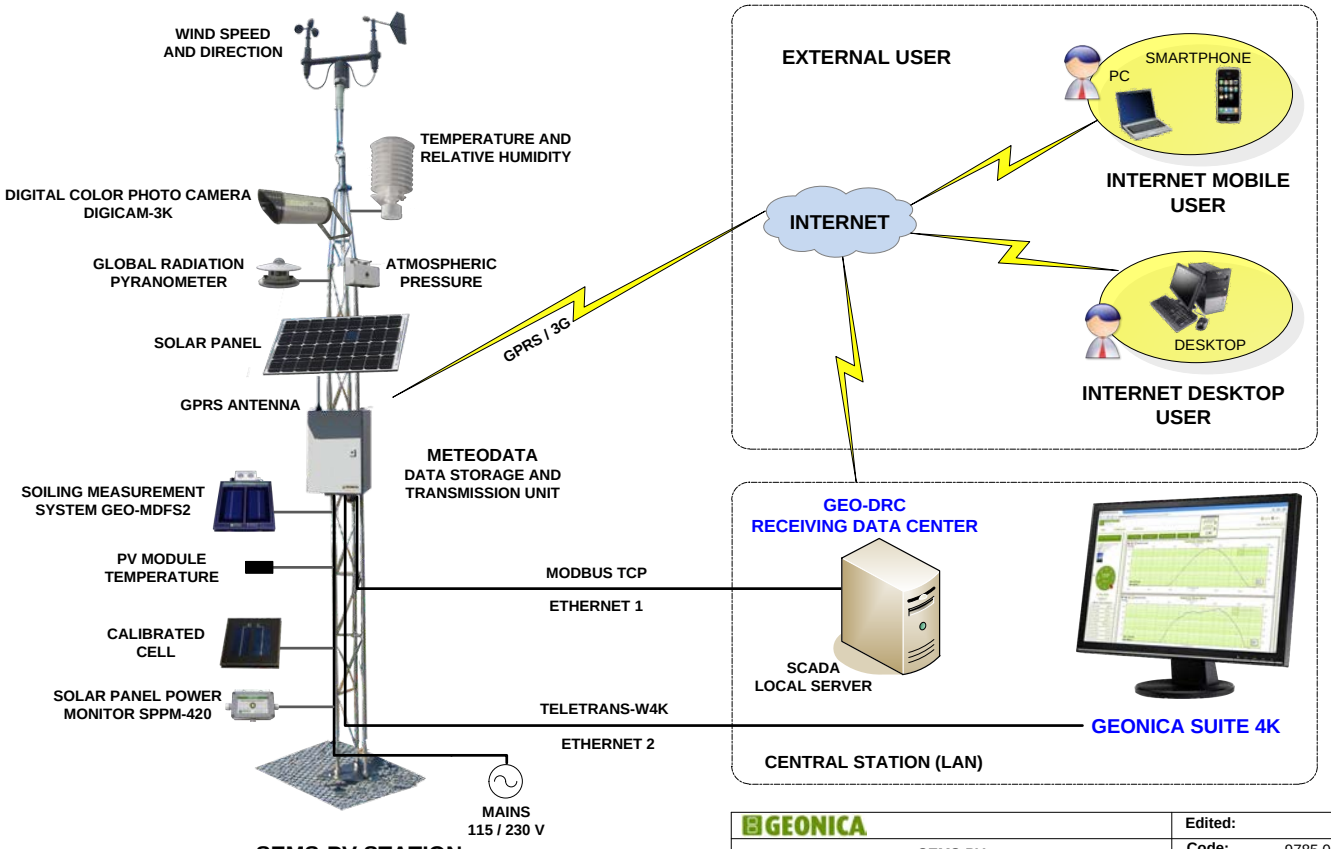
SPPM-420

ISC, VOC Measurement
Solar Panel Power Monitor
with 4-20mA Output of
Reference Solar PV Panels
See Doc. 9734 0046

DIGICAM-3K

Digital Camera
to capture color images &
low-power consumption
See Doc. 9769 0007

SEMS-PV SOLAR ENERGY MEASUREMENT SYSTEM FOR PHOTOVOLTAIC PLANTS



GEONICA		
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GEONICA SUITE Management Software Package

TELETRANS-W4K

- Remote communication with stations
- Wide variety of communication systems supported: GSM, GPRS, 3G UMTS/WCDMA, Wi-Fi, WiMAX, Fiber Optic, Ethernet, ISM Radio, RS232, RS485, USB, Satellite (INMARSAT, Thuraya, Insat, Meteosat, GOES, ...), etc.
- Data storage remote request
- Instantaneous data display on tables /charts
- Request of images captured by the stations
- Station settings: time, channels, etc.
- Basic and advanced test of station features
- Calibration of stations and sensors
- Automatic execution of tasks
- Station firmware / configuration update
- Compatible with high availability cluster
- "Keep Alive" function included
- Fully automated and unattended operation

DATAGRAPH-W4K

Query

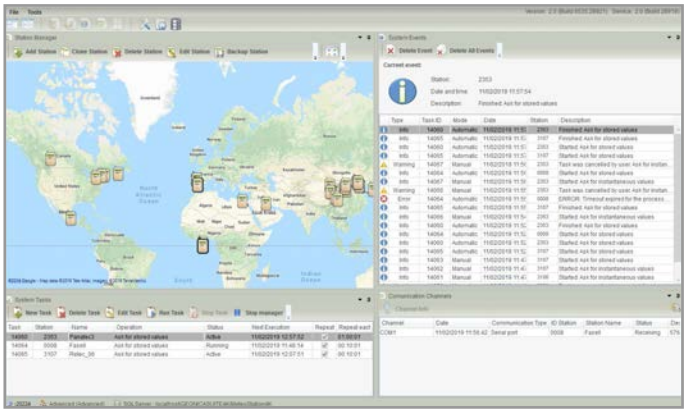
- View real time data, statistical and historical charts and graphs
- Reporting
- New virtual parameters from existing ones
- Alarms display
- Easy display of parameters with bit-coded data

Maps and Information

- Display of station's status data on map
- Latest data on map
- Display of weather forecasts and camera/radar/satellite images

Monitoring

- Data in real time displayed by means of "gauges"
- Full customization of monitoring environment



WEBTRANS *Ubiquitas* Internet Platform

The information available in the database of the Central Server can be transferred to a WEB Server by means of our ***WEBTRANS Ubiquitas*** Internet Platform as described in a separate Doc. No 9780 0030. This Application offers graphical and numerical information via Internet to authorized users.

So it is possible to access from your office to the WEB Server via Internet and to visualize in near real-time the curves of all parameters as well as to download data. Therefore our **WEBTRANS *Ubiquitas*** Internet Platform is also a very efficient tool for remote status surveillance, diagnostic and maintenance of **SEMS-PV** System.

- Data collected by Remote Stations accessible from Internet
- Restricted Webpage access using credentials
- Accessible from a wide variety of devices: PCs, Smartphones, tablets, etc.
- Customizable Website visual interface
- Easy installation and customization
- Graphical display of historic data
- Latest received data in the side panel values and compass rose
- Data downloading
- Display of images taken by **DIGICAM-3K** camera