PRESENTATION AND SUMMARY OF GEONICA PRODUCTS

GEONICA S.A. Spanish Company founded in 1974, designs, manufactures, installs and maintains Automatic Stations, Systems and Measuring Networks with Data Transmission, Images and Alarms in Real or Delayed time, for Meteorology, Hydrology and Oceanography, as well as for Environmental Monitoring in general.

Based on our own line of Automatic Data Acquisition and Transmission Stations, METEODATA/HYDRODATA Series, and an advanced and flexible management software, we have integrated all types of sensors to provide complete solutions, systems and measuring networks, intended for different applications on several sectors such as: Meteorology, Hydrology, Water Management and Water Quality, Agriculture, Renewable Energy (Solar and Wind), Coastal Oceanography, Tides and Waves, Road Safety, Airports and Heliports, Civil Protection, Industry and Mining, environmental Noise, Military applications, etc.

During our nearly 40 years of business, we have executed hundreds of projects around the World, always in the professional, scientific, industrial and military fields where the highest quality and the strictest technical specifications are required.

Below you will find a presentation of our line of products, classified by sectors, underlining the most important aspects of each of our SYSTEMS.

**RENEWABLE ENERGY**

**SOLAR ENERGY MEASUREMENT SYSTEM (SEMS)**

Designed for evaluating the location of major thermal and photovoltaic solar plants that, due to the investments worth millions they require, need high quality professional measurement equipment providing reliable data. These are essential requirements for the promoters/investors that need to guarantee the return on investments.

Likewise, mid- to small-sized solar plants require information on solar radiation and other weather parameters such as wind, pluviometry, atmospheric pressure, humidity and ambient temperature, or even the surface temperature of the solar panels themselves, since their performance is affected by all weather conditions.

This is one of the flagship lines of our company, with a solidly consolidated position in the national and international markets offering comprehensive systems for assessing the energy resources of the sun, as well as for monitoring photovoltaic (PV) solar Energy, Concentrating Solar Power (CSP), and Concentrated photovoltaics (CPV) plants, since during the operation of a Solar Plant, it is essential to be aware at all times of its performance based on the available energy source; in this case, global, direct and diffuse solar radiation, depending on the type of technology used.

The measurement of the terrestrial irradiance with our equipment installed at the field can be complemented by the analysis of the satellite image in the visible spectrum performed by our partner company IRSOLAV (www.irsolav.com).

The following preliminary documentation is attached with information regarding our SunPower System:

- Brochure No. 9722.0081 Remote Station Model METEODATA-3000
- Brochure No. 9742.0007 SEMS System Description
- Diagram No. 9785.0057 SEMS System Diagram
- Reference list No. 9993.0015
- Diagram No. 9785.0072 illustrating the Indian Solar Network, Phase II
WINDPOWER SYSTEM

This system is oriented to assessing the sites for installation of wind turbines as well as for measuring wind speed and weather conditions in wind farms during their operation.

For such purpose GEÓNICA offers the provision of meteorological towers over 100 meters height, including the necessary wind and meteorological sensors mounted at different measuring levels, as well as the suitable Data Logger which also allows data transmission via GSM/GPRS with bidirectional communications for remote programming and diagnosis.

The following documentation is included for this system:

- Brochure No. 9722.0050 Remote Station Model METEODATA-2000C
- Brochure No. 9749.0009 WindPower System
- Manual for Towers Series 450
- Reference list No. 9993.0001 Wind energy sector
HYDROMET SYSTEM

Designed for measuring all sorts of meteorological and hydrological parameters, be it as stand-alone stations or networks with data transmission via GSM/GPRS, direct radio link or satellite, such as the INMARSAT network, with its global coverage and advanced performance (with two-way communications and IP addressing) that harness the whole power and universality of the Internet.

For managing all our stations, systems and communications networks in general, we offer our advanced GEÓNICA SUITE Software Package, briefly described in the attached document.

Additionally, and as a presentation of our measurement networks, you can also check a diagram of a typical Hydro-Meteorological Network:

- Brochure No. 9722.0043 METEODATA/HYDRODATA-3000C Station
- Brochure No. 9780.0040 GEONICA SUITE Software Package
- Diagram No. 9785.0073 and 0074 Hydro-Met Network
RAINALERT SYSTEM

The RainAlert System has been designed for providing early warnings to the population and Civil Protection authorities in case of heavy rains and risks of flooding.

The following documentation is included:

• Brochure No. 9722.0083 RainMet-3000C
• Brochure 9735.0012 DataRain-4000
• Brochure No. 9746.0016 River level and flow sensor Model GEO-RQ30
• Diagram No. 9785.0024 Rain Alert System for heavy rain and flooding warnings.

The typical configuration of a Rain and Flooding Alert Network is made up by a series of remote pluviometric stations located at different parts of the river basin being monitored, completed with other river level measurement stations.

Both types of remote stations provide the appropriate data and alarm transmission systems via GSM/GPRS, Radio Link, or satellite (preferably INMARSAT, given the enormous technological advantages it provides), towards a Central Receiving Station.

This central station will be managed by the Civil Protection Authorities, who will be in charge of alerting the population depending on the risk of flooding for each rural or urban area.

This system operates in real-time, since in case of heavy and prolonged rains, the pluviometric stations located at different points of the catchment basin, as well as the river level measurement stations, will immediately send the appropriate warnings to the Central Receiving Station.

RainAlert System’s Management Software can be complemented with mathematical models that use time as a variable for calculating water volumes collected by the river basin, along with the topographic data of the area received via satellite using SAR (Synthetic Aperture Radar) Interferometry, in order to estimate the height of a possible flood.

These mathematical models can be time-adjusted for each risk area, using the river level data collected by the stations of the hydrological network itself.

LIGHTNING ALERT SYSTEM

This system has been designed for measuring the risk of a specific location being hit by lightning or atmospheric discharge under specific or certain weather conditions.

The system is made up by a precise meter that measures the Electric Field in the air, that is, the positive or negative gradient present in a range of ± 20,000 volts/meter. It’s value will determine the risk of lightning falling in a range of around 6-8 Km from the point of measurement.

The electric field meter is connected to one of the METEODATA-2000C/3000C type stations, which records the measurements and transmits the data and warnings to a local (SCADA) or remote computer using whatever means possible, be it GSM/GPRS cellular telephony or direct cable connection.

The warning thresholds are programmable at the METEODATA station, depending on the electric field value, which is what determines the risk conditions. Note that this system is not designed for detecting actual lightning strikes, as is the case of lightning detector systems. That is, it is designed to alert about the risk of lightning in order to prevent its consequences.

The Lightning Alert system should be used, for example, at Airport facilities, basically for risk assessment during fuel loading operations in planes, as well as in fuel storage areas, gas and petrol transfer areas, etc., golf courses, recreational areas, swimming pools and open-air events, operations with big cranes in sea ports, blasting works, electric substations, wind farms, etc.
An electric field exceeding 2000V/m means that the risk of lightning formation is starting to become considerable, and according to certain regulations, it is advisable to take the necessary precautions by interrupting operations momentarily until the risk disappears.

AGROMETEOROLOGY

AGROMET SYSTEM

The typical agrometeorological stations are basically made up by one Data Logger Model METEODATA-2000C/3000C, connected to a series of classic meteorological sensors, complemented with other specific types of sensors for measuring, for example, parameters such as evaporation, soil temperature and humidity at one or several depths, leave wetness, or even the conditions of dryness and temperature of the mass of trees, considered as forest fuel, in order to determine the risk of forest fires.
QUALITY OF WATER

AQUALERT SYSTEM

The continuous measurement and monitoring of the quality of both surface and underground water represents an unavoidable requirement for knowing its condition and helping to take the necessary measures to preserve both the environment and a resource as valuable and increasingly scarce as water.

For this purpose, GEÓNICA has developed the AQUALERT system for the continuous measurement of the physicochemical parameters of water (Conductivity, Temperature, pH, Dissolved Oxygen, REDOX Potential and Turbidity) as well as other parameters such as the concentration of Ammonium, Nitrates and Chloride, Chlorophyll-a or Rhodamine.

The system also allows continuous measurement of the Total Organic Carbon (TOC), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) and even Nitrates and Nitrates using submersible probes based on UV-VIS spectrometric technology.

For each case, and depending on the requirements, the system includes the appropriate multiparameter probe, which is connected to the Measurement unit Model HYDRODATA-2000C/3000C, in charge of storing all the information and transmitting the data to a Central Receiving Station via GSM/GPRS, Radio Link or satellite.

The following documentation is included for this system:

- Diagram No. 9785.0071 illustrating the general configuration of the AQUALERT system.
- Brochure No. 9736.0023 of the multiparameter probe
- Brochure No. 9736.0024 Spectrometric Multiparameter Probe

TRAFFIC AND ROAD SAFETY

SAFEROAD SYSTEM

GEÓNICA offers the Safe Road System as a response to the pressing need for improving safety on roads and motorways, since traffic can be affected by the most diverse and extreme weather conditions, such as lack of visibility, ice on the road, the presence of snow or heavy rains, etc.

This sector is of great importance, especially in countries where roads cross cold or mountainous areas with frequent fog banks that reduce visibility, as well as shady areas where ice is likely to form on the surface, or simply those that are prone to suffer adverse weather conditions, such as wind, rain, etc., representing an important risk to the safety of vehicular traffic.
All the information is stored in the Remote Measurement Station, which is also in charge of transmitting the data to the Central Receiving Station, via optical fiber or GSM/GPRS cellular network.

The following documentation is included for our SafeRoad System:

- Brochure No. 9722.0061 METEODATA-3000 Meteorological Station for Roads
- Brochure No. 9723.0022 General description of the SafeRoad System
- Brochure No. 9737.0119 Model GEO-2020E Remote road surface condition sensor
- Brochure No. 9755.0008 Model GEO-SWS Visibility and Present Weather sensor
- Diagram No. 9785.0081 Example of sensors installation on a met tower
- Brochure No. 9786.0012 Example of Road Weather Information System (RWIS)

---

**DATACAR SYSTEM**

The DataCar System has been designed by GEÓNICA to assist traffic management by providing information to the appropriate authorities on the number of vehicles travelling through different sections of roads and motorways, while classifying them according to their size or length.

Depending on the type of sensors used, it is also possible to detect queues and traffic jams. These data complete the information required for preparing vehicular traffic studies.

The vehicle sensors or detectors are connected to one of our Remote Data Collection Units, which logs all the traffic measurements, transmitting the information in real time to a Central Receiving Station or SCADA, usually via optical fibre optic cable or using GSM/GPRS cellular network, if the road does not provide its own communications network.

We provide two versions of this system:

The first one, **DATACAR-3000**, uses one vehicle detector per lane. That is, if a road or motorway has three lanes, we must use three detectors, which are connected to the same electronic unit. The appropriate brochures are listed below:

- Brochure No. 9723.0019 DATACAR-3000 System
- Brochure No. 9723.0018 Detector model 292

The second version is the **DATACAR-4006L** System, which uses a RADAR detector capable of measuring up to 4 traffic lanes simultaneously. This new version is still under development and we hope to make it available around end-2013.

---
COASTAL OCEANOGRAPHY

DATAMAR SYSTEM (RADAR TIDE GAUGE)

Within the Coastal Oceanography sector, we offer the DATAMAR-2000 System, a **Tide gauge with a high precision and stability RADAR type sensor** that can optionally use also sensors based on other technologies.

As a reference, we can state the 10-station network of tide gauges provided to the Peruvian Navy. The data from these stations is uploaded on the Internet using our own Web server in Madrid, which uses our **WEBTRANS Ubiquitas** Internet Platform. A demonstration with real data is available at our URL: [http://demowebtrans.geonica.com](http://demowebtrans.geonica.com)

This is just one example of the many customers that use our Web Server for presenting the data from their stations on the Internet. In other words, our **WEBTRANS Ubiquitas** application is common to all our systems, be they meteorological, hydrologic or of any other type, and can be installed on a Computer or Server provided by the client. This application is described in Brochure No. 9780.0031.

- Brochure No. 9743.0036 DATAMAR-2000 Tide Gauge
- Brochure No. 9854.0010 Information on our System DATAMAR-2000
- Brochure No. 9757.00024 AIS AtoN Transponder
SAFEPORT SYSTEM

For the coastal oceanography sector, we offer our Safe-Port System, which measures all weather (meteorology) and hydrodynamic (tides, currents and waves) parameters of sea and river ports in real time, and transmits the information to the Port Authorities. Optionally, it can also upload the data to the Internet, making them available to any boat with Internet access, be it using 3G mobiles or similar technologies.

Our Internet platform, WEBTRANS Ubiquitas, which is included as an option with the system, provides universal broadcasting of the sea port weather conditions, as well as of the tides, currents and waves, over the Internet. This is particularly interesting for sea ports and Marinas Marinas, providing support to maritime traffic.

The system is described in greater detail in Brochure No. 9754.0008

MONITORING OF AMBIENT NOISE

NOISEMAPPER SYSTEM

European regulations, and those of other continents and countries, force Municipal Authorities of urban centres exceeding a certain number of inhabitants to establish preventative measures for controlling and limiting the levels of ambient noise. For this purpose, so-called noise maps need to be generated, which in turn require a series of precise measurements and the appropriate mathematical models.

Our Noise Mapper System provides an advanced solution for the continuous measurement of ambient noise in urban areas, roads, airports, etc. Data are transmitted in real time to a Central Receiving Station, usually through our GSM/GPRS modem, which is integrated in the Remote Terminal itself.

Our ambient noise monitoring system is made up of outdoor fixed or mobile Remote Stations (Remote Terminals) with stand-alone operation based on internal batteries charged by a solar panel, and provided with a weather-resistant microphone.
The following documentation on our Noise Mapper-RT Terminal and overall System is available:

- Brochure No. 9722.0074 Noise Mapper-RT Remote Terminal
- Brochure No. 9722.0072 Noise Mapper System
- Diagram No. 9785.0036 Noise Mapper-RT Remote Terminal
- Photographic illustration of one of the ambient noise measurement stations at the Indian city of New Delhi.

We also provide a remote terminal version for measuring ambient noise which we call “compact” (NM-427 type), where the weather-resistant microphone includes the noise processor. The processor can be connected to one of the 8 analogue inputs on our remote station thanks to its 4-20 mA output signal.

Therefore, several compact microphones can be connected to a single station or remote terminal, making this an inexpensive way of providing detailed monitoring of industrial areas or environments. This NM-427 type compact weather-resistant microphone is described in Brochure No. 9752.0003.

As a reference, we can state that we have provided Phase I of the Indian urban noise measurement and monitoring network, with 35 stations covering the 7 most important cities in the country (New Delhi, Calcutta, Mumbai, etc.). Shortly, Phase II will be launched with another 35 stations, and subsequent extensions are more than likely. The client is a body of the Indian Government in charge of the Environment, the CPCB (Central Pollution Control Board).

The real-time data from this Indian network are available at the following URL: [http://www.cpcbnoise.com](http://www.cpcbnoise.com), based on our WEBTRANS Ubiquitas Platform. Access to this platform is restricted. However, under specific request, we can provide a login for a temporary visit.
AIRPORT WEATHER SYSTEM (AWOS)

The Airport Weather System deals with measuring all the meteorological parameters of airports, aerodromes, heliports, etc., providing data already processed to the Meteorological Center for distributing them to the aircraft pilots and Authorities responsible for air traffic safety, using different communication ways.

Depending on the category of the airport, or if a heliport with smaller requirements is to be implemented, the parameters to be measured can vary considerably. Below we have listed all those that should be considered in any of the two cases:

- Wind speed and direction.
- Air temperature.
- Relative humidity of the air.
- Dewpoint.
- Precipitation.
- Atmospheric pressure (QFE-QNH).
- Solar Radiation.
- Visibility (MOR- Meteorological Optical Range).
- Present weather (Intensity and type of precipitation: rain, snow, hail, etc.)
- Cloud base height.
- Vertical visibility.
- Turbulence in altitude.
We have developed our GEÓNICA SUITE Software Package for this important function, as described in brochure No. 9780.0039.

For presenting the data and graphics on the Internet, we offer our WEBTRANS Ubiquitas Platform, as mentioned above and described in Brochure No. 9780.0031.

As a summary of the whole presentation above, we have included Document No. 9992.0033, as well as an up-to-date copy of our ISO 9001:2008 Quality Certification.