AUTOMATIC WEATHER AND HYDROLOGICAL STATIONS

METEODATA/HYDRODATA-2000C SERIES

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GENERAL DESCRIPTION

The **METEODATA/HYDRODATA-2000C** type Automatic Meteorological and Hydrological Stations are **measurement, storage and data and image transmission** equipment, specially designed for outdoors installation, in remote unattended areas, with the possibility of building systems or networks of stations comprising an undetermined number of field stations and one or more Central Stations for receiving, presenting, storing and optional end processing of all the information received.

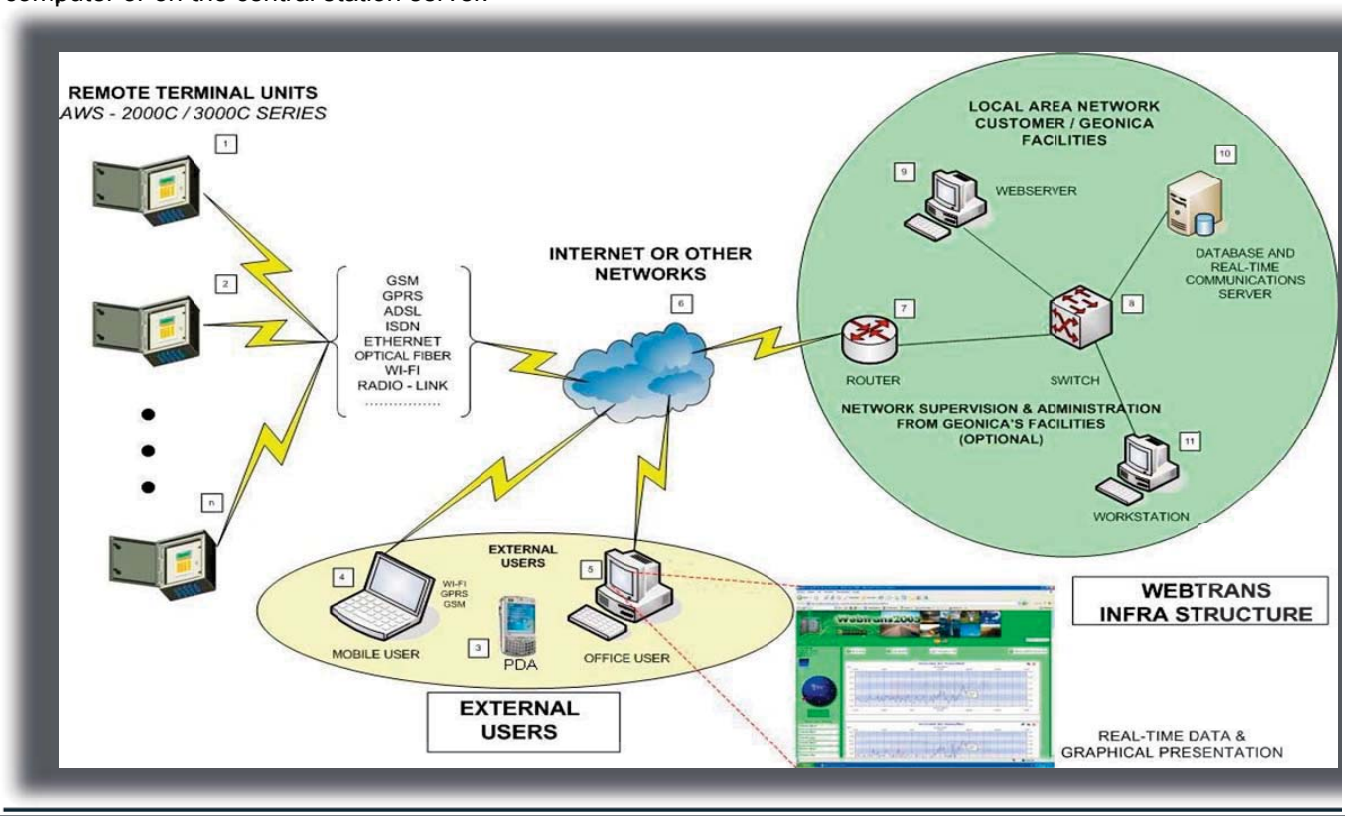
If operating a network using any of the communication options available (cellular telephone GSM/GPRS, point-to-point radio link, Ethernet connection, etc.), from the Central Station it is possible to manually or automatically get information from each and every one of the measurement stations, remotely program all their functionalities, manage alarms received and even display the images captured by one or more of the **webcams**, connected to the field stations, on the central server monitor.

To program the 2000C series remote stations as well as to download data and manage all the field stations on a network, the **GEONICA SUITE** software package, developed specifically for such purposes, must be installed on a laptop computer or on the central station server.

The data and images from the remote stations can also be transmitted to the **WEBTRANS Platform**, which GEONICA offers on the Internet via a powerful **WEB Server** so that each subscriber to the **WEBTRANS** service is able to view the parameter graphs and the images captured in each one of the remote locations of their own stations. Additionally, they can download stored data without having to communicate directly with the stations, i.e. by simply accessing the platform with the corresponding password via their own INTERNET connection.

If the subscriber has **GPRS** or **CDMA** communication coverage, the WEBTRANS service permits obtaining data in quasi real time, updating information very five or ten minutes if necessary. A demonstration of said platform, in which real data for different types of applications in operation is shown, can be viewed at **http://demowebtrans.geonica.com**.

A typical **Data & Image Communications Network** with optional **INTERNET ACCESIBILITY** is showed in the following general diagram :



MODELS AVAILABLE

The 2000C electronic unit comes in two versions:

The **2008CP Model**, with a total of 16 Inputs/Out- puts and 4 Serial Ports. Mounted in a highly resistant waterproof Polypropylene box, with handle, IP-67 protection.

The **2008CM Model** with a total of 16 Inputs/Outputs and 4 Serial Ports. Metallic cabinet mount with IP-66 Protection.

MAIN FEATURES

In both cases this is a totally **compact «C»** assembly, storing all the following basic components inside the box or cabinet:

- **Microprocessor**
- **Protection Circuits**
- **Communications Modem**
- **Power Source including: Battery and Charge Regulator for solar panel or mains AC power supply**.
- **Display and keyboard (optional)**
- **Terminal Strip for external connections**, with access to the cables by way of a outdoors bushings.

Connections with the sensors and other external components such as the communication antennas, the solar panel, a radio-modem or satellite transmitter equipment, etc., can optionally be made using specific accessible connectors on the outside of the box or cabinet, which facilitate operation, permitting a quick connection that is useful when working with mobile or transportable stations.

The 2000C remote units were designed using the highest technology electronic components with a high level of miniaturization and integration, combining the following in a single 6 layers circuit board, SMD technology and other conventional components, which are necessary for the specific required functions

Among the most noteworthy technical characteristics of the 2000C are its:

- **Ultra low consumption** (**10 mA** in complete work cycle and **1 mA** at idle power-saving mode);
- **High resolution** (via a **20 bit A/D converter**);
- VeryHigh **data storage capacity** (via **64 MBytes** of internal memory or optionally 128 MB);
- Total versatility for communications (by cellular telephone GSM, GPRS, point-to-point radio, Ethernet links, satellite transmitter, etc.);
- **Local and remote programming capacity**
- **Possibility to connect all types of sensors with analog and digital outputs, smart sensors with special protocol**, etc.

The highly advanced technical characteristics of the 2000C Series remote stations, previously described and enumerated in detail below, are the result of more than 30 years of GEONICA experience in designing and manufacturing this type of electronic instrumentation, having also achieved total integration of the new Information and Communication Technologies. For all the aforementioned reasons, it can be affirmed that our stations offer the highest professional quality required with the important advantage of a truly competitive price.

TECHNICAL SPECIFICATIONS 1/3

Inputs / Outputs

(total of 16 without counting the 4 serial ports)

- 8 Analog input channels (totally differential)
- 2 Micro-relay digital inputs with 4000 V galvanic insulation
- 2 Micro-relay digital outputs with 4000 V galvanic insulation
- 4 Digital counters ,16 bits (for pluviometers, anemometers and other similar sensors with impulse output)

Input-Connectivity Signals

The 2008C Unit permits connection with any type of sensors, analog or digital, accepting:

- Voltage signals from ± 2.5 microV up to ± 2,500 mV, extendable up to ± 5,000 mV and other higher ranges.
- Current Signals in 0-20 / 4-20 mA, etc…
- PTC, NTC and Pt-100 type resistors for temperature measurement, thermistors, thermocouples, piezoelectric sensors, etc.
- Frequency signals
- Periodic signals
- Pulse counters
- Relay contact (reed type, voltage free, solid state, etc.)
- Smart sensors with their own communication protocol
- Webcams for taking and transmitting still images

Communication Ports (total of 4)

- **Com 1**: General purpose RS232 serial port
- **Com 2**: Ethernet port for generic use, INMARSAT, etc.
- **Com 3**: General purpose, programmable RS232/422/485 serial port
- **Com 4:** Serial port for connection to GSM/GPRS/GPS, etc. Modems

The communication speed can be programmed by the user for between 1,200 and 115,200 bauds. Likewise, the parameters for each serial port can be programmed, locally or remotely, using the TELETRANS-W4K software, included in the GEONICA SUITE software package.

Available Communication Protocols

- **TCP/IP** (Telnet, SMPT, FTP, etc.)
- Short **SMS** messages to mobile telephones for notices or alerts
- **GEONICA** protocol (TELETRANS-W4K Software)
- **SDI-12**
- **Modbus**
- **GPS** (NMEA, GLL, CGA, etc.), in case a GPS receiver is integrated in the station
- Specific protocol for **Smart Sensors**, etc. All of the

above as a function of the port used.

Communication Adaptors (options available)

- Physical cable for PC connection (RS232/USB)
- GSM Modem (internal)
- GPRS Modem (internal)
- Fiber optics (internal or external)
- Radio-Modem (internal or external)
- Ethernet (internal)
- SDI-12 (internal)
- Wi-Fi (internal or external)
- Blue -Tooth (internal or external)
- Satellite (internal or external): INMARSAT, INSAT, GOES, IRIDIUM, VSAT, THURAYA, etc

Internal Clock and Synchronization by GPS Receiver

The new 2000C series stations have a clock circuit and an Independent **watchdog**. Optionally, the clock circuit can be automatically synchronized by including a **GPS receiver**, internally integrated with the unit's own electric circuit and connected to an external antenna that receives time and position signals from a constellation of satellites.

This option permits clock precision on the order of nanoseconds, which is very useful r precisely synchronizing the pace of the clocks from all of a series of networked remote stations. Likewise, it permits knowing e position of each one of them with GPS precision.

TECHNICAL SPECIFICATIONS 2/3

- Remote Unit for Data and Image Collection, Processing and Transmission, with **MBytes of Flash Nand internal memory** (128 MB, optionally) and **20 bit resolution Analog/Digital converter**.

  All electronics are mounted on a **6 layer**, **monoplate circuit board** with a high level of integration, **totally weather proofed for tropical environments** for protection against humidity and condensation.

- The station and all the channels can be **totally programmed** independently, using a locally connected PC or remotely using communication links such as GSM, GPRS, Radio, Ethernet, etc.

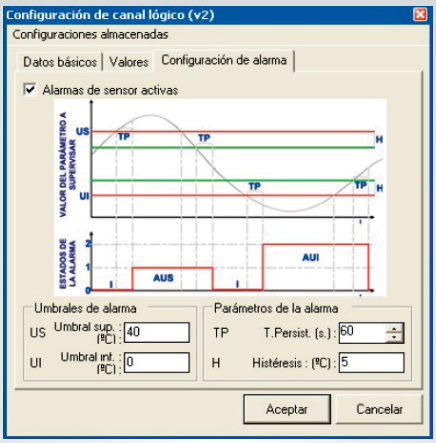
  For example, the sampling frequency can be independently programmed for each channel, for up to 25 samples per second, as a function of the desired resolution; select the calculation periods for the average, maximum, minimum and accumulated values; determine the data transfer rate, etc.

  The 2000C series units can also carry out very **diverse types of calculations** including **standard deviation** of the measurements obtained for a specific parameter; **Dew Point calculations** as a function of temperature and humidity; **adjusting a non-linear response sensor signal**, using a polynomial equation; calculating the potential **evapotranspiration** of a crop and even **calculating the hours of sunlight** with certain precision and without the need to connect a specific sensor for said purpose.

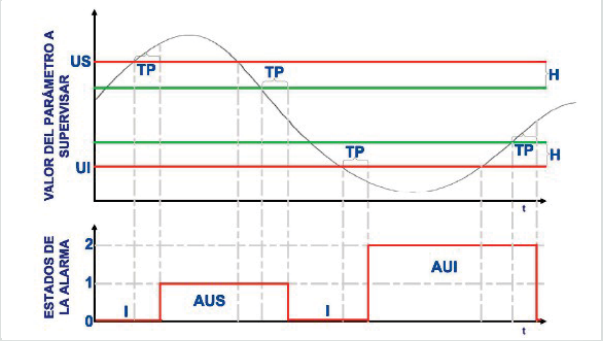
  It is also possible to use the software to adjust the **transfer constant deviations** for a sensor or **to calibrate the zero and the full scale** for a channel, produced as a consequence of prolonged temperature effects, aging of the transducer or for any other reason. This functionality is especially important since it omits the need to replace a specific sensor, maintaining the original precision of the measurements.

- Optional liquid crystal (LCD) 4x20 **alphanumeric display**, with integrated 18 key **membrane keypad**.

- Possibility to independently **program alarms** for each channel as well as to generate **SMS notice messages** sent to mobile telephones and to **send emails** to maintenance personnel if certain limits are exceeded for critical parameters or if certain alarm statuses are detected, which require pre-notice or specific surveillance.



Alarm Parameters Configuration



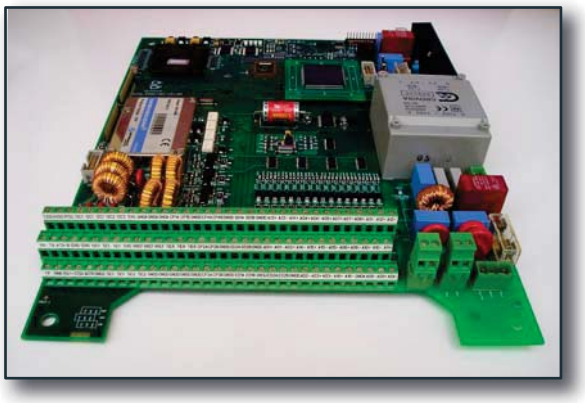
Graphic Illustration of the Alarm Criteria

- Possibility of connecting low consumption **webcam video cameras**, which are powered at 12 VDC from the same remote station, for capturing and sequentially transmitting images over the same transmission path as that used for the data.

- Possibility of **direct connection with Variable Message Signs** for presenting text messages or pictogram notices to the public on roadways or urban travel routes, maritime ports, etc. when there are low visibility conditions, fog or strong wind warnings, etc.

TECHNICAL SPECIFICATIONS 3/3

- **Internal quick connect terminal strips** for all the sensors, solar panel, supply network, radio transmitter, antennas, etc.



- **Integral protection for all Input/Output lines** for the equipment, using Transzorbs, gas Dischargers, Coils, Varistors, Resistors, Network filters and fuses.

- **Internal Power Source** including **12V-18Ah battery** and **Charger-Regulator** for connection to a Solar Panel or 110/220 VAC network . External battery is optional.

- **Average consumption** of the microprocessor: **10 mA at 12 VDC** on 100% work cycle. **Consumption at idle power-saving mode**: less than 1mA.

Operating Temperature

The 2000C remote stations are prepared to operate in a wide range of temperatures, between **-30ºC and +70ºC** (-40 ºC to +70 ºC optional), as long as the LCD display is still legible at the lower limit of -20ºC.

External Connections

All the remote unit connections with the sensors, solar panel, antennas and other external elements, are made using IP-67 protection bushings or alternatively by specific connectors in order to facilitate a quick connection and disconnection in case the stations are mobile or transportable.

Assembly

The **2008CP Model** is made of a completely compact unit, with all of its components (microprocessor, modems, battery, circuit, network charger and solar panel, keyboard, display, etc.) mounted on the inside of a highly resistant, weatherproof, Polypropylene box at a size of 32x24x13cm and with IP-67 protection.

It includes a transport handle and the accessories necessary to install it on a wall or on a post/mast.

Alternatively, it can be supplied, mounted in a 30x30x21 cm metal cabinet with IP-66 protection **(Model 2008CM)**