Close to 100 years
Since 1925

SIAP+MICROS
Environmental Monitoring Solutions

DATA ACQUISITION AND TELEMETRY SYSTEM

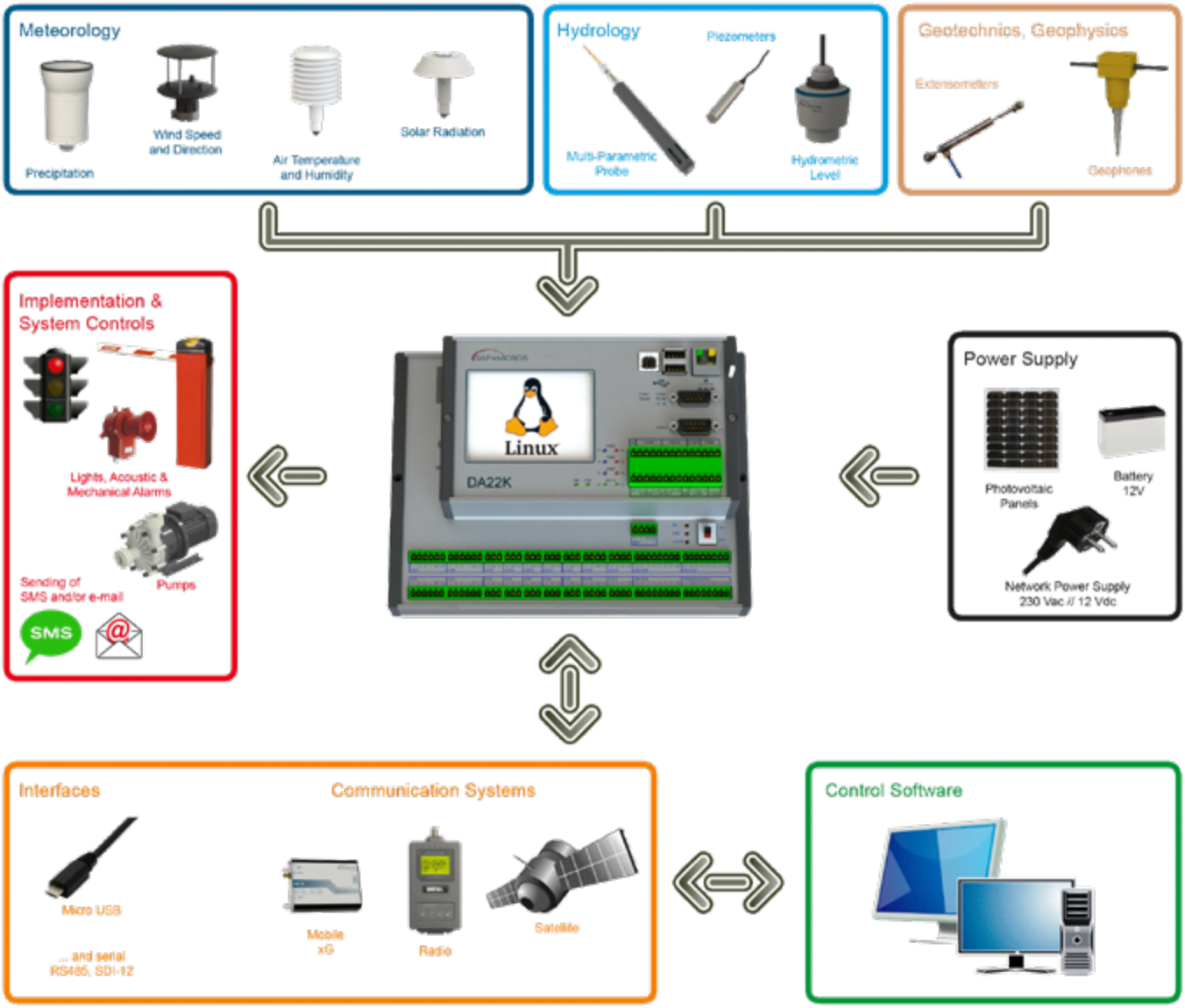
DA22KE Datalogger-ET

- Embedded Linux® Operating System
- Designed on the DA18K legacy reliable hardware
- Easy integration with third-party products
- Low power consumption with high calculation capacity
- Long-term stability in harsh environmental conditions
- Automatic stand-by system for energy saving
- Wide range of analog / digital communication interfaces
- Analog inputs with 24 bit ADC
- Standard Modbus RTU master / slave protocol

Description

DA22KE has been carefully designed for environmental and meteo-hydrological monitoring systems, in order to have a very versatile, reliable and powerful data logger with high standards of accuracy and precision. Sensors, analyzers, chemical-physical probes, and many other devices can be easily connected to DA22KE by means of a wide variety of analog and digital communication interfaces. Futhermore, the datalogger is equipped with serial and LAN ports that allow to interconnect communication systems such as radio-modems in free or licensed band (UHF, VHF, HF, SRD, ...), GPRS modem, UMTS, LTE, router, satellite equipment (Iridium, Inmarsat, Meteosat, Goes, ..), and wired lines for remote connection.
DA22KE is a forefront datalogger with very low power consumption, produced in Italy, and equipped with Modbus RTU communication protocol and Embedded Linux® operating system. It is an extremely robust and highly durable device, and it is suitable to be installed at any latitude, longitude and weather condition, from -40 °C to +80 °C, in every environment from the dry African deserts for example, to the wet and rainy Amazon forest. The device is supplied with the DAK configuration wizard software, but it has been possible also to program customized applications using available open libraries, functions and / or specific procedures for the interoperability with third-party systems.
The large number of input ports makes DA22KE a very flexible datalogger, suitable for the inter-connection of any sort of monitoring sensors, communication systems, or high-level interfaces (for example: PLC, PC).

Logical scheme



Main Features

DISPLAY (NO TOUCHSCREEN)

Instant data and data processed as average, minimum, maximum, data memory status, connection status, general status, operating system diagnostics, date and time.

DATA PRE-PROCESSING (instantaneous measurements)

- Data validation (plausibility check of the measure);
- Data processing (for example: corrective formulas, calculation algorithms, application of forecast models).

STATISTISTICAL ELABORATIONS (stored data)

DA22KE acquires the instantaneous values of measured samples and store it in a temporary file. At the end of a configured time period, and using the overall data, DA22KE computes the desired statistical parameters. For each measure it's possible to define the time period and the statistical parameters. The main statistical parameters are: instantaneous value, arithmetic average, trigonometric average, vector average, cumulate, integrate, period, integral.

DATA ACQUISITION AND STORAGE

- Data acquisition based on independent processes (on serial ports);
- Data storage on SQLite 3 quick access database;
- Different safety data storages in which instantaneous, sta- tistical and alarm values can be separately memorized; Data can also be stored on a removable memory;
- Memory management in linear mode (continuous storage up to full memory card capacity) or circular mode (data are overwritten once the memory card is full);
- Dynamic format structure for data transmission length op- timization. This feature reduces the data volume, reducing transmission time and communication costs.

CONFIGURATION

Very flexible configuration software that can operate in the following ways:

- Locally means of either a keyboard or an USB terminal (notebook, tablet);
- Remotely through the communication system or in web client mode.

SELF-DIAGNOSTICS

DA22KE has a set of procedures for the following checks:

- Verification of acquisition channel;
- Verification of memory capacity;
- Verification of communications performance;
- Verification of power supply blackouts.

CONFIGURABLE PARAMETERS

- Unit of measurement expressed in engineering units;
- Range: define minimum and maximum value registered by the sensor (lower and upper scale value);
- Decimals: number of decimals that define the measure;
- Conversion formula: mathematical formula to convert the input electrical signal in to engineering units;
- Offset: define a measure offset (e.g. water level respect referring level).

ALARMS MANAGEMENT

- It's possible to define two alarm thresholds, one for minimum value and one for maximum value;
- Once a threshold is exceeded, DA22KE can send alarm messages or sms and define actions to undertake, through a specific pre-configuration.

COMMUNICATION / TRANSMISSION

- Data transmission by: modem, cellular phone, radio, satellite, serial cable RS232 or RS485 or mixed connection;
- Integrated OpenVPN® client with data security SSL/TLS ;
- Data transmission through SMS (Short Messages System), e-mail, fax;
- Communication protocol TCP-IP, FTP, SMTP, MODBUS and MODBUS-TCP/IP, Store & Forward with control CRC MOD16.

Technical Specifications

Hardware features	
Processor	CPU ARM 9 (32 bit RISC) 240 Mhz
Embedded O.S.	Embedded Linux® Yocto Project LT Support
Memory	SDRAM 64MB FLASH 512MB (30MB required by O.S.)
Additional memory (optional)	512 MB, or higher, SD as mass storage (internal) 512 MB, or higher, SD as removable memory (external)
Display	3.5" 320x240px colOR
Communication interfaces	n. 1 USB Host n. 1 USB Slave n. 1 Ethernet 10/100 Base T n. 2 SDI – 12 n. 3 RS – 232 n. 1 RS – 485 (RS – 232 opt.) n. 3 RS – 485

Extended version	
24 bit Analog Inputs	**Up to 14 differential** **or 28 single ended** ▪ Differential -2.5 ÷ 2.5 V Resolution 0.3µV Accuracy ± (10µV + 0.1% of measure) Uncertainty (3σ) 3µV ▪ Single ended 0 ÷ 2.5 V Resolution 0.3µV Accuracy ± (20µV + 0.1% of measure) Uncertainty (3σ) 10µV ▪ N° 8 Pt100 Resolution 0.0003°C Accuracy 0.02°C Uncertainty (3σ) 0.005°C
Outputs	**8 digital open drain** (500mA maximum per output) **4 digital open collector** (100mA maximum per output) **2 analogue 0 ÷ 2 V, 12 bit** (25 mA maximum per output)

Power supply and consumption	
Battery power supply voltage	10.5 – 13.8 V (VBT)
Typical power consumption	▪ <10 mA (suspend / resume) ▪ <20 mA (full duty cycle)
Integrating charging regulator	▪ Photovoltaic Panel PMAX 100 W ▪ IMAX 5 A / 15.2 V MPP
Battery charger integrated circuit	Internal, three phases, battery charger with solar panel Maximum Power Point at 15.2 V
Battery charger integrated circuit	N° 18 VALM , VBT @ 0.2A max N° 1 VPWR , VBT @ 2.5A max N° 1 VSWT , VBT @ 2.5A max, (ON/OFF)

Communication protocols	
Serial	MODBUS SDI-12
Ethernet	MODBUS FTP HTTP

Other features	
Control functions	▪ Battery status monitor ▪ Process watchdog (30 seconds of power off) ▪ Charge current measurement ▪ Power supply current measurement ▪ PCB temperature measurement
Protections	EMC filter protection on power supplies, inputs, outputs and communication interfaces
Digital input protection	5kVRMS, optoisolated
Environmental operating conditions	-40 ÷ + 80 °C Maximum humidity 99% without condensation
Other characteristics	Internal clock with automatic leap years management Watchdog
Digital Inputs	**N° 12 optoisolated 5kVrms ; 4 are configurable with variable reluctance** ▪ frequency (0.25 ÷ 5000 Hz) ▪ counter or digital state **N° 4 optoisolated 3.75kVrms: logic state**

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