










-  Open source FreeRTOS Operating System
-  Bluetooth and Wi-fi modules on-board
-  Integrated 2G/3G/4G/5G modem (optional)
-  More than 10 different diagnostic parameters
-  Cost effective
-  Low power consumption
-  Designed for long-term use in harsh environmental conditions

Description

The MegaSUM has been designed to be a perfect solution to be used as a monitoring station datalogger which do not require extremely high computational capacity but able to acquire data from numerous sensors of many different supported types at the same time. In fact, the unit can be considered as more powerful and extended version of the MicroSUM logger, with a wider range of serial communication interfaces as well as a built-in Ethernet port. The FreeRTOS Operating System ensures power efficiency of the unit even during intense operation. The datalogger can manage multiple data transmission devices for data sending such as radio-modems in free or licensed band (UHF, VHF, HF, SRD, ...),GPRS/UMTS/LTE modem/router, satellite equipment (Iridium, Inmarsat, Meteosat, Goes, ..).

Furthermore, the datalogger has been thoroughly designed to ensure maximum performance even in the harshest climate conditions, ranging from the typical coldest temperatures of the high altitudes, to the warmest of the tropical and desert areas. The device is supplied with the DAK configuration wizard software.

Main Features

DISPLAYING

User friendly alphanumeric display for both instant data and elaborated data (average, minimum, maximum, etc), data memory status, connection status, general status, operating system diagnostics, date and time.

DATA PRE-PROCESSING

(instantaneous measurements)

- Data validation (check of the measure);
- Data processing (corrective formulas and calculation algorithms).

STATISTICAL PROCESSING (recorded measures)

MegaSUM acquires the instantaneous values and stores them in a temporary archive. At the end of a settable time base, stored values are processed to compute and elaborate the desired statistical data.

For each measurement it is possible to define the acquisition frequency and the recording frequency.

Main statistical elaborations are: instant measurements, arithmetic mean, accumulation, vector mean, trigonometric average, minimum and maximum.

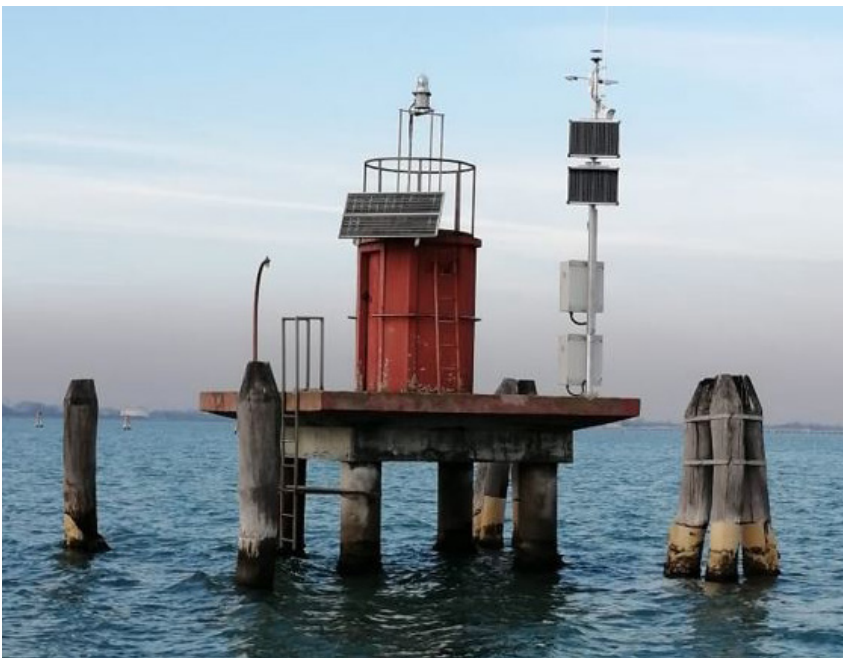
STORAGE

- Initially the acquired data are saved in a temporary area (typically hourly set). Then data are permanently stored in an internal FAT memory area. Data can also be copied into an external SD memory card.
- Management of memory in linear mode (progressive filling until the intended memory is saturated; thereafter, the memory, will update gradually replacing the oldest values);
- Record track is done with a compact binary structure, to minimize the costs and time required to transfer data to a remote station.

CONFIGURATION

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

- Through wireless connection to the unit with a portable device (smartphone, tablet);
- Locally by means of either the display, an USB terminal (notebook, tablet) or DAK
- Remotely via the communication system or in client mode with web server via WI-FI.
- Ability to program in Python



COMMUNICATION / TRANSMISSION

- Wi-fi and bluetooth connection for: datalogger configuration, data download/upload, remote navigation;
- Data transmission by: radio-modems in free or licensed band, built-in or pluggable GPRS/UMTS/LTE/5G modem/router, satellite devices, RS232 or RS485 serial connection or by any combination of the afore mentioned;
- Message dissemination through SMS; FTP, MQTT, SDI-12 communication protocols, MODBUS-RTU, MODBUS-TCP/IP, TCP/UDP over LAN.

SELF DIAGNOSTICS

MegaSUM keeps under control more than 10 different internal parameters:

- Voltage, current and power of: solar panel, battery charger, load;
- Internal Temperature;
- Status of acquisition channel;
- Storage area;
- Communication performance;
- Charge controller operating point (MPPT) HW only.

CONFIGURABLE PARAMETERS

- Parameter name and engineering units;
- Minimum and maximum value detectable by the sensor (start of scale and full scale);
- Number of decimals after the decimal point to set the measurement;
- Corrective formula: conversion formula to obtain the value in engineering units from the incoming signal;
- Intervals for acquisition / recording and processing of data that can be generated;
- All information for sending data.

ALARMS MANAGEMENT

- Possibility to set minimum and maximum alarm thresholds (hysteresis option included to reset prior condition);
- Possibility of sending alarm SMS and changing operating frequency for data transmission.



Technical Specifications*

(All Values are intended at 25°C)

Hardware features

Processor	32-bit Cortex®-M4
Operating System	FreeRTOS
Memoria	16 Mb flash memory
Memoria Aggiuntiva (opzionale)	Micro SD card
Display	4x20 character alphanumeric LCD with 5-position joystick

Communication interfaces	- COM1: RS232 (DB9)
	- COM2: RS232/RS485
	- COM3: RS232
	- COM4: RS485 (Can be used for optional display)
	- COM5: RS485/SDI-12
	- COM6: RS485/SDI-12
	- COM7: RS485
	- n.1 micro-USB connector
- n.1 Ethernet	

Full Scale Voltage ±2.5V

- Referral channels: CH1 ÷CH4, CH19÷CH22
- Alternative types of input: 8 differentials ±39mV, ±312mV, ±2.5V, 16 single ended 0 – 2.5V, 8 temperature Pt100
- Voltage resolution: 0.3µV
- Voltage accuracy: ± (10µV + 0.1% of the measurement)
- Uncertainty in tension: 10µV (3σ)
- Pt100 resolution: 0.0003°C
- Pt100 accuracy: 0.02°C
- Pt100 uncertainty: 0.005°C (3σ)
- Thermal drift voltage: ±10ppm/°C
- Pt100 thermal drift Thermal drift Pt100: ±10ppm/°C, ±25ppm/°C
- Input impedance: 1GΩ
- Voltage limit: 3.3V

Full Scale Voltage ±10V

- 24 bit Analog Inputs
- Referral channels: CH5÷CH13, CH16
 - Alternative types of entry: 8 single ended 0 – 10V, 4 differential ±10V
 - Resolution: 6µV
 - Accuracy: ± (20µV + 0.1% of the measurement)
 - Incertezza: 30µV (3σ)
 - Thermal drift: ±5 ppm/°C typical, ±12 ppm/°C maximum
 - Input impedance: 1MΩ
 - Voltage limit: 50V

Corrente 0 - 20mA

- Referral channels: CH8, CH9, CH14, CH15
- Input types: 4 current inputs 0 – 20mA
- Resolution: 6µA
- Accuracy: ± (15µA + 0.1% of the measurement)
- Uncertainty: 20µA (3σ)
- Thermal drift: ±5 ppm/°C typical, ±12 ppm/°C maximum
- Input impedance: ~ 100Ω
- Current limits: 0.5 – 24mA

Opto isolators

- Referral channels: CH17, CH18, CH23, DIG IN A: IF3÷IF5, DIG IN B: IF6, DIG IN C: IF10
- Alternative types of input: 8 frequency (0.5 – 5000 Hz); 8 counter (0 – (232-1)); 8 digital status (0, 1)
- Insulation: 5 kVrms tra IF+ e IF-
- Frequency uncertainty: 0.1% of the read value

Digital Inputs

Sinusoidal

- Referral channels: DIG IN B: IF7, IF8, DIG IN C: IF11, IF12
- Input types: 4 frequency (0.5 – 5000 Hz), 4 counter (0 – (232-1)), 4 digital status (0, 1)
- Frequency uncertainty: 0.1% of the read value

Digital Inputs

Analog Outputs
12-bit
(In voltage 0-2.5V)

- Referral channels: CH10, CH16
- Nominal range: 2 uscite 0-2.5V
- Resolution: 0.61 mV
- Accuracy: 3mV

Digital outputs
(Open drain)

- Referral channels: DIG OUT: OD1÷OD6, EXP: OD7, OD8
- Types of outputs: 8
- Voltage limit: 24V
- Current limit: 0.5A
- Power limit: 2W

Power supply

- Supply voltage: 9-24 Vdc
- Backup battery power supply: 12 Vdc nominal with MPPT battery charger
- Power supply from photovoltaic panel: integrated charge controller, Pmax 100W
- Batterie 5-10.8 V

Feeds input

Power supplies output

- Referral channels: CH1÷CH23, DIG IN A, DIG IN C, DIG IN C
- Power supply type: 24 outputs 12V - 200mA
- Reference channels: POWER SUPPLY
- Power supply type: 1 output 12V - 2.5A
- Referral channels: DIG OUT
- Power type: 1 switchable output 12V – 2.5A
- Referral channels: CH10
- Power Type: Reference 2.5V - 5mA
- Referral channels: CH16
- Type of power supply: 5V – 200mA

Protection

- EMC protection filters on power supplies, inputs, outputs and communication interfaces

Communication protocols

- Modbus RTU
- SDI-12
- Generic ASCII
- TCP/IP

Ethernet

- Modbus TCP
- MQTT
- FTP

Modem

- TCP
- SMS
- UDP

Other features

- Reference connector: EXP: A – B
- Output types: MODBUS protocol on RS - 485
- Port characteristics: 57600 bps, 8 data bits, 1 stop bit, no parity check

Connectivity
Serial over RS- 485

- Battery status monitor Monitor stato batteria
- Watchdog on operating program (power failure 30 seconds in case of blockage)
- Charge current measurement
- Measurement of current consumption
- Temperature measurement board

Environmental conditions of operation

- 40 ÷ + 60 °C
- Maximum allowable humidity % of 99% without formation of condensation

Other characteristics

- Date clock with automatic leap year management
- Watchdog

Ordering Codes

- | | |
|--|------------------------------|
| MegaSUM Datalogger | PEM-e021a-MEGASUM |
| MegaSUM Datalogger with integrated LTE modem | PEM-e021b-MEGASUM-LTE |

*Changes on technical performances can be applied upon request of specific calibration