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Integrated Outdoor Monitoring System Multiparameter system for air quality measurements

The state of air quality with respect to pollution processes involving particulate and gaseous material in suspension is a point of considerable criticality in the environmental reality.

The Italian and European legislation identifies only a few indices through which to express a synthetic assessment of the degree of pollution by particulate matter in suspension.

However, the exclusive control of these indices is not sufficient to characterize the entire system "atmospheric particulate matter", given the wide variety of processes and potential sources of contamination that may contribute to the degree of pollution.

In order to meet this need, it is therefore essential to have adequate measures able to provide qualitatively and quantitatively correct data.

It is therefore proposed an integrated instrumentation capable of transmitting the data collected to a single data centre.

In order to finalize an effective evaluation of the state of air quality with respect to pollution, it is proposed the use of an integrated multiparameter system - Integrated Outdoor Monitoring System - able to provide real-time detailed information of the following parameters:

I. Analysis of the size spectrum of the particulate material (30 particle size thresholds) and the subsequent estimation in real time of the mass (use of "Adaptive" PMX algorithms)

II. Air sampling on filter media for chemical component analysis

III. Data transmission system to remote location through 4G modem.

Indoor Outdoor Monitoring System:

Brief Description.

The IOMS integrated system consists of two modular units of limited size and weight that will allow the housing of the measurement/control devices and of all the electronic and pneumatic components necessary for the functioning, the data transmission and the functional control of the system in an automatic and autonomous way.

All the values of the measurements made will be stored in memories and sent in real time and with established frequencies to a remote data collection station (cloud system or Data logger).

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Integrated system description

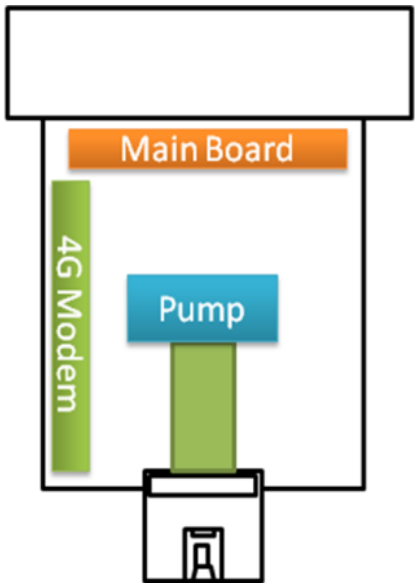
IOMS is an innovative and low cost monitoring system that can be used for source apportionment studies, studies of spatial variability of PM chemical components, model studies and applications related to environmental monitoring.

IOMS integrates two completely independent and/or integrated systems:

1) **H**igh **S**patial **R**esolution **S**ampler:

Low volume sampler that allows chemical analysis of PMx on user-selected filter media.

The availability of samples for chemical analysis and good quality real-time data for the main environmental and air quality parameters make IOMS a complete system for pollutant characterization and epidemiological studies with health impact.



Features of the HSRS sampling system:

- Low flow rate (2 l/min) for long-term sampling (1 week -1 month)
- Sample available for chemical analysis
- User filter media selection (PTFE, Quartz, etc...)
- Sampling data recorded directly on the filter cartridge (RFID technology) to minimize operational errors
- Real-time environmental conditions recorded
- Remote access to the instrument to verify sampling conditions

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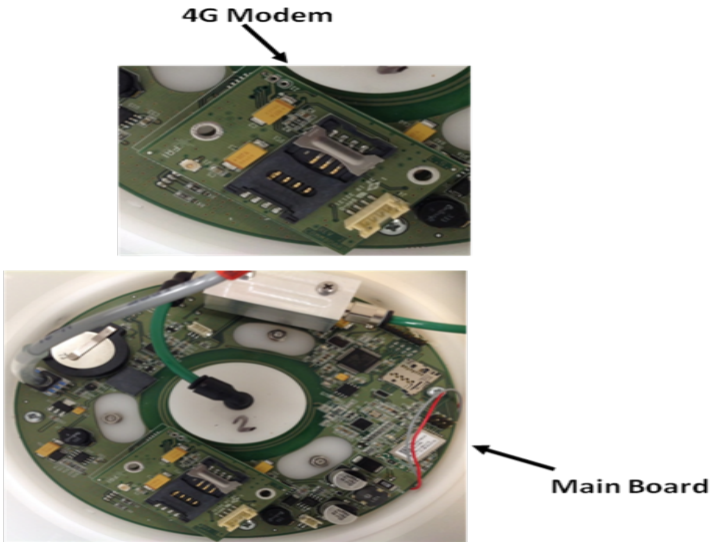
Main Board features:



- The Main Board measures flow and controls the pump to maintain a constant flow rate.

- Main board can measure the main parameters of environmental conditions (T, P, RH) through dedicated accurate sensors.

- Main board stores the last two data of the sampling campaign (maximum 2 months) 1h record.

- 4G modem connection system with cloud

Power supply:

HSRS is available with 110/220V power supply adapter.

The HSRS is available with the 40W Solar Panel power supply system which allows for installation at remote sites or anywhere that the standard power supply cannot be used.

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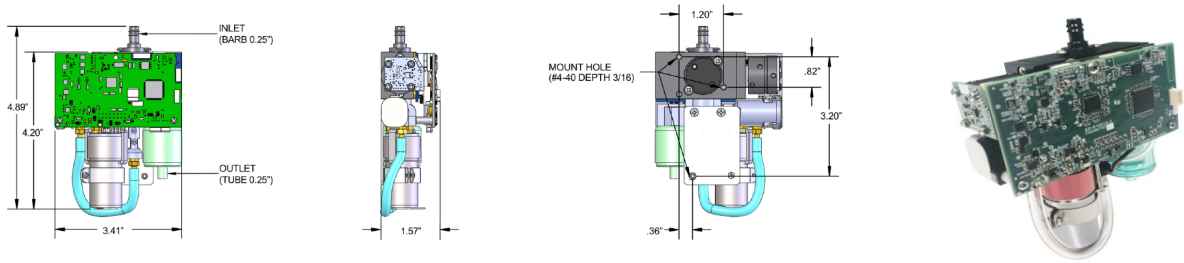
2) Optical Airborne Particulate Counter (Fai-9301P)

System Features

The optical counter measures up to 30 channels of particle count data from 0.3 to 25.0 µm, with a suction flow rate of 0.1 CFM (2.83 LPM).

The measurement system is mounted on a plate for easy integration with the external support structure. The unit includes a particle sensor, particle counting board, integrated suction pump, real-time acquisition system with battery backup, data logging and storage for up to 45,000 sample records, communication via UART system and 7 to 15 Vdc power supply.

The device meets the requirements of ISO 21501-4 and JIS B9921.



Optical counter specifications:

Model	**9301P-OEM**
Size Range	0.3 to 25 µm
Size Channels	Factory calibrated at 0.3, 0.5, 1.0, 2.5, 5.0, 10.0 µm
Flow Rate / Accuracy	0.1 CFM (2.83 LPM) / +/- 3%
Aerosol Concentration Range	0.01 to 20,000 µg/m³
Light Source	Long life laser diode
Resolution	.00000003 mg/m³
Zero Stability	No appreciable drift
Calibration	NIST traceable
Internal Vacuum Pump	Internal pump with automatic flow control
Number of Channels	30
Custom Size Channels	Calibration for custom size channels available
Airflow	Internally monitored
Audible Alarm	Adjustable built-in alarm
Communication Modes	Universal asynchronous receiver-transmitter (UART)
Standards	ISO 21501-4 and JIS B9921
Instrument Calibration	Recommended minimum once per year
Dimensions (L x W x H)	3.41" x 4.89" x 1.57" (8.7 cm x 12.4 cm x 4.0 cm) includes inlet height
Weight	13 oz.
Data Storage	65,000 sample records (rotating buffer) including particle count data and environmental data
Sample Time	1 second to 99 hours
Power	7 - 15 VDC
Operating Conditions	41º to 104ºF (5º to 40ºC) / 20% to 95% non-condensing
Storage Conditions	32º to 122ºF (0º to 50ºC) / Up to 98% non-condensing
Warranty	1 year limited warranty. Extended warranties available.

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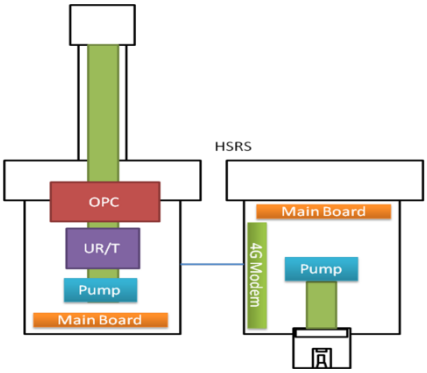
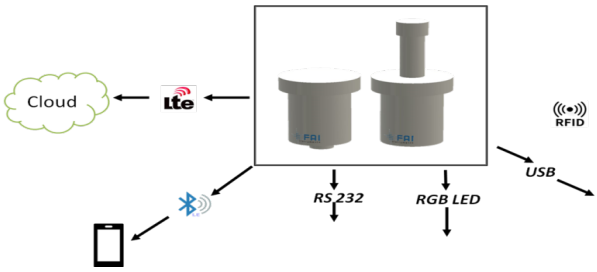
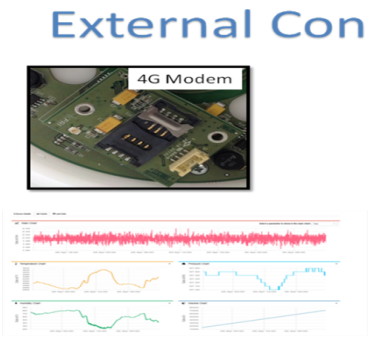
Integrated system specifications **IOMS:**



- Low volume sampler
- Real-time PMx data
- Real-time atmospheric particulate matter distribution
- Real-time T, P and RH
- Interfacing with Cloud/Datalogger data acquisition system
- Remote control system

IOMS system data transmission:





Cloud and remote control of individual devices and/or integrated available using 4G modem