

Portable PM Measuring System



Particulate matter (PM) is an air pollution term for a mixture of solid particles and liquid droplets found in the air. The pollutant comes in a variety of sizes and can be composed of many types of materials and chemicals. Particles that are small enough to be inhaled have the potential to cause health effects. Of particular concern is a class of particles known as fine particulate matter or PM_{2.5} that gets deep into the lung.

LCT-14 is the **Qbit** portable PM Measuring system directly derived from the experience of LCT-12 the Laser scattering based PM Measuring Station for Environmental Monitoring.

LCT-12 has proven its capabilities in outdoor H24 measures for over two years, without maintenance needs. This made it possible to have minute by minute a PM_{2.5} measurement available to everyone through the web (see data at the URL: www.PM2.5firenze.it).

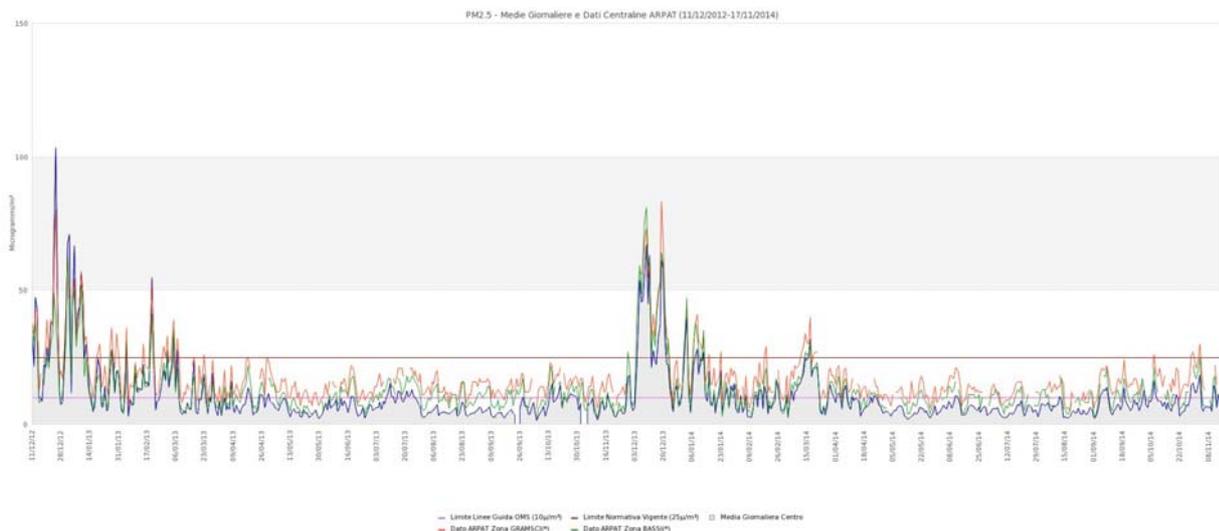


Fig.1 Two years of daily averaged values of PM_{2.5} in the center of Florence, compared with the data available from the Regional Environmental protection Agency in two other sites in town.



Fig.2 Indoor (left) and Outdoor (right) versions of the LCT-12 measuring station. PM measuring stations can be integrated with NDIR or electrochemical trace gas sensors, to monitor other possible pollutant.

LCT-14 shares with LCT-12 the Laser Light scattering sensor produced by QBit, but has the advantage of being **battery operated** and enclosed in a **rugged watertight plastic case**. Thus it can be easily carried and operated in many different field applications: among others indoor and outdoor working places to monitor dust and pollution conditions, both for the protection of workers health and for the success of various processes.

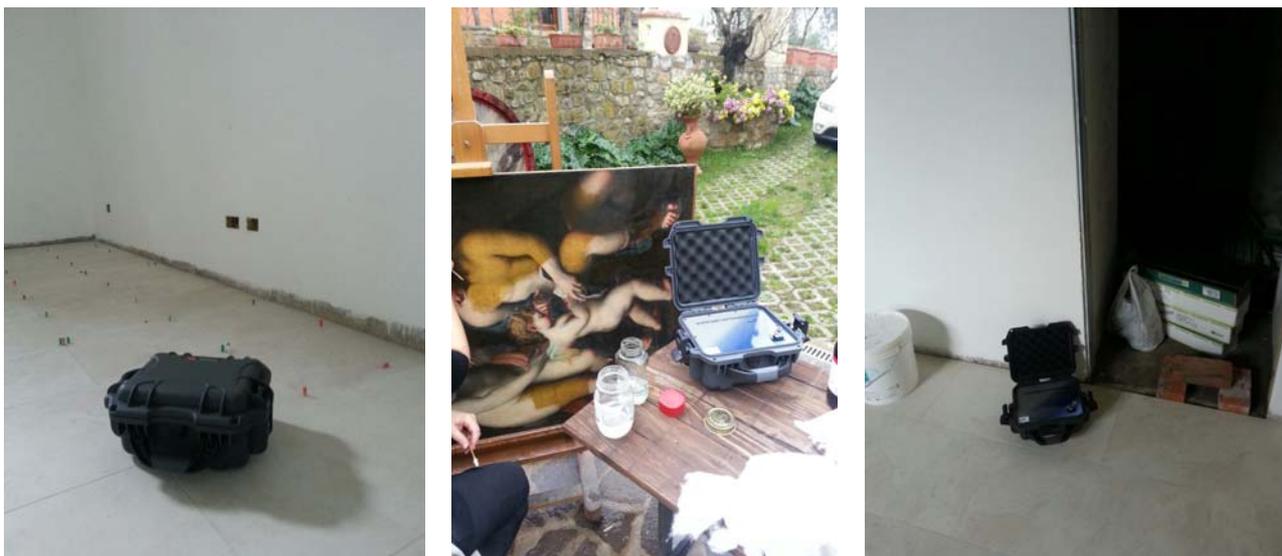


Fig.3 Monitoring process and working pollution conditions with an LCT-14 portable PM meter.

A further advantage of LCT-14 is that it has been designed to be operated using standard open-source resources. This makes it much easier to interface with the external world and take advantage of the "Internet

of things”. Our portable meter communicates simple ASCII data through a standard USB-port or a blue-tooth and thus it can be connected with a desktop, laptop, tablet or even a smart-phone using open source programs and apps. Specific apps can easily be developed for any platform on customer request. The adoption of a standard tablet or smart-phone as control unit enables the immediate availability of data and procedures such as GPS coordinates recording, or WiFi/GPRS networking.



Fig.4 LCT-14 data on Smartphone, tablet or PC.

LCT-14 reads the density of Particulate matter that enters the optical cell. The particulate size can be selected using an inertial filter (of the impactor or cyclone type) at the gas inlet. To adopt a large variety of filters the gas flow can be adjusted and calibrated by the user between 0.8 and 4.0 NI/min. Particulate matter (PM) measures are completed with the measure of other relevant environmental parameters such as Temperature (T) , Pressure (P) and relative Humidity (rH).

Technical Specifications.

Dimensions:	(L) 318mm × (W) 257mm × (H) 152mm
Weight:	3 kg (with a standard battery pack)
Power Consumption:	4.5 W (9W peak)
Battery Operation time:	8 Hours (with a standard 8000 mAh battery pack) (Charging time ~4 h).
Measuring time:	set by the user between 1 and 120 sec
Calibration:	automatic calibration, time lapse between calibrations set by the user
Resolution:	1 µg/m ³ for 30 sec measurements
Internal memory:	Flash 2 MByte (from 2 to 20 Weeks of continuous recording of data)
Sampling flow:	between 0.8 and 3.0 NI/min, set by the user.
I/O Interface:	USB & Blue-tooth (virtual-com standard protocol)
Optional:	Backup battery packs Temperature, Humidity and Pressure recording. Membrane Filter cartridge for PM analysis. RS-232 or 4-20 mA Analog Interfacing.