

Giano BC₁





PMx Sequential Samplers

Description

Giano BC₁ is a PMx sequential sampler with built-in Black Carbon analyzer allowing the determination in real-time and directly on the filter under sampling.

The instrument can sequentially sample the PMx fractions autonomously for 21 days and is equipped with the most up-to-date logging solutions, such as the possibility to record the data on the filter cassette, through RFID technology, download the data on USB stick or remotely with LAN network, which also allows the remote control of the unit.



Developed in partnership with company PM₁₀, a University of Genova - Department of Physics spin-off, **Giano BC₁** can evaluate the Black Carbon component collected on the filter thanks to optical module measuring the laser beam reflectance.

Giano BC₁ is the first solution available on the market using reflectance instead of transmittance for the BC evaluation.

Characteristics

Black Carbon concentration is evaluated using the Optical Absorbance Coefficient (ABS), which is directly correlated to the capability of the atmospheric particulate matter to absorb the light radiation.

Patented technology

Differently from other Black Carbon analyzers available on the market, **Giano BC₁** measuring technology is based on reflectance of the laser beam instead on transmittance. This innovative approach, now patented, allows a linear correlation to the absorbing coefficient (ABS), used in the calculation of the concentration.

This also allowed to integrate the BC sensor into the sequential sampler, offering the big advantage of real-time readings to sampling operation, directly on the field.

In compliance with the requirements of the method EN12341:2014, **Giano BC₁** is equipped with a conditioning system based on liquid cooled Peltier cell which allows to keep the exposed filters temperature below 20°C when the ambient temperature exceeds the 23° C.

As for all the Dado lab solutions, also the hardware of the **Giano BC₁** is based on advanced electronics with rugged and reliable industrial grade components.

The blank/exposed filters tanks can store up to 21 "smart cartridges" granting a high autonomy for unattended operations.

One of the major advantages of technology developed by PM_{Ten} and integrated in the **Giano BC₁** is the possibility to make further analysis on the filters. Not only for further speciation of the sample but, for instance, also evaluation of the BC using laboratory equipment and consequently evaluate the MAC value, which can then be programmed in the **Giano BC₁**. Any 47mm filter made of glass or quartz fibers can be used in the **Giano BC₁**, which makes it more flexible and practical than other solutions.

Giano BC₁ features the most up-to-date communication interfaces starting from the physical supports, such as the USB and RFID chips installed on the filter cassettes, to the network connection through the Dado lab web application.

Display

Giano and Gemini are equipped with a high resolution color LCD display reporting the status, the ongoing operation and supplying the information "at the glance", including weather sensors information.

Most important information are concentrated on the main display, everything is logged.



Program

Set up of the sampling schedule is much easier and faster thanks to the graphical interface and simplified software. Just set the number of channels (Gemini), starting time, daily cycle and it's done.

In case of power loss, data are safely secured and instrument will automatically resume on return of mains voltage



Storage conditioning

After the sampling operation, exposed filters are stocked in a storage tank.

To fulfill the EN12341 request and avoid semi-volatile compounds loss, a high performances air conditioning system is available and automatically keeps the temperature of the storage tank below 23°C.

The air conditioning system is placed on the support stand, just below the instrument, and the cooling effect is enhanced by two fans pushing the air up in the filter storage area.

Pneumatic circuit

The sample is taken from the inlet to the filter through a straight, insulated aluminum tube designed to minimize any kinetic, thermal, chemical or electrostatic effect which may lead to any PM loss.

The sampling flowrate is digitally controlled through an orifice meter with an accuracy better than 1%. This solution has proven to be highly reliable and allow the use of any type of pump.

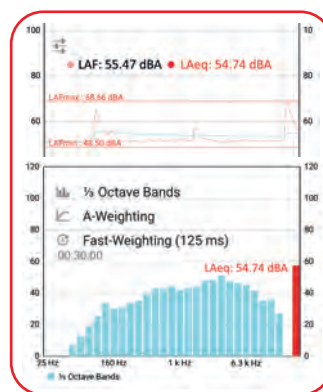
The pump is the last element of the system. Along with a rationalized pneumatic system, this solution greatly increases the tightness of the sampling line while system management, maintenance costs and power consumption are reduced.

The sampling pump is a 4.5 m³/h and was chosen because of its characteristics :

- Performance: nominal flowrate up to 70 lt/min;
- Reliability: maintenance free for more than 12000 hours of operation;
- Ruggedness: the sampling pumps are treated with nitrocarburizing process which increase their resistance to oxydation and chemical aggression. Those pumps were tested on isokinetic sampling systems where proved to be highly reliable. operating under highly stressing conditions;

Silent sampling pump

Quietness is a very important aspect for instruments usually located in urban areas, sometimes even on balconies, private gardens or schools.



The pump chosen for the Giano/Gemini samplers are very quiet. Even if placed very close to housing areas or human activities, no disturb will be caused.

Data management

Giano and Gemini have the most advanced communication technology available such as:

- USB Port
- Text Messaging for status/activation
- Data logging on smart cartridges
- Web based app for data transfer and remote control

Those options allow local/remote data transfer and also instrument control.

USB Port

Allows to export data to an USB stick locally. Quick and easy way to transfer the data



Text Messaging

The Giano and Gemini PMx samplers can be equipped with a GSM modem. This allows a basic remote control of the instrument which will respond to commands sent through text messages for sampling operation start and stop, alarm and status condition communication.

Smart Cartridge

This is a unique feature of the Giano and Gemini appositely developed by Dado lab to increase the traceability of the data.

The instrument is supplied with special cartridges which can be programmed by the user before the sampling and by the unit during the operation.

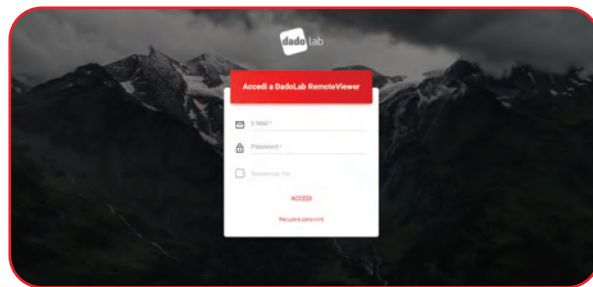
Inside the filter cartridge there is a special memory chip which can be programmed with the most important information. Before the sampling, the user can enter information such as the filter initial weight and technician ID. During the sampling all the information about temperature and pressure conditions, volume, rH%, sampling time etc are stored permanently on the cartridge.



Sampling data are now linked with the filter and will always travel with it.

Once back to laboratory, the smart cartridges can easily and quickly transfer the data to the dedicated software using the our fast reading solution.

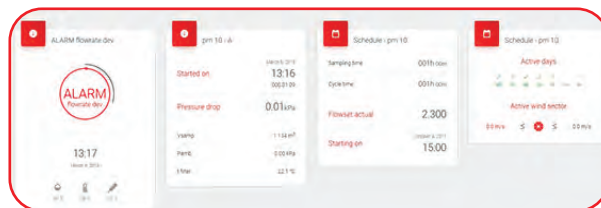
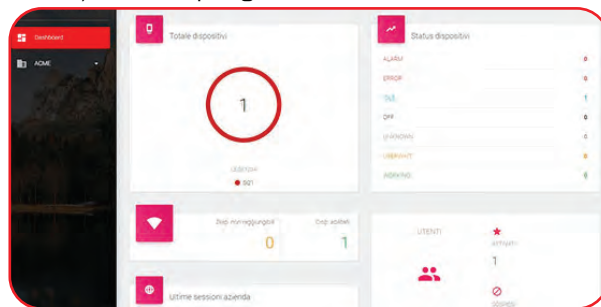
Web based app (Cloud)



Dado lab PMx samplers are supplied with a network port granting the access and interface from the network.

This solution represent the cut edge technology available for data transfer or remote viewer and control.

Through the local network or LTE/UMTS modem, Giano and Gemini connects to a dedicated web platform where is possible to upload the data from all the Dado lab instruments, check their status and alarms history, program or modify the sampling schedule and conditions.



The access to personal web platform can be authorized through enabled users.

Dado lab considers data safety and traceability as a priority, all those solutions combined will grant to our customers the safest way to always access to the sampling data.

* For the web app remote connection, a SIM Data, with "Public IP" option (denat) enabled is required. The modem will have to be reprogrammed in our service dept.

Technical Characteristics :

General

Operative conditions	-20 ÷ 45°C
Stock conditions	-10 ÷ 50°C 95% UR
Sampled/Exposed tank capability	21
Display	LCD graphic 3.5" LCD (QVGA)
Data port	USB 2.0
Internal memory	16GB
Power supply	230 Vac ±10% 50/60Hz
Construction	Combined steel/aluminum structure
keyboard	Polycarbonate with tactile effect
Weight	43 kg
Consumption	0.65 A - about 0.150 kW

Sensors and measure characteristics

Black Carbon

Type of measure	optical in reflectance
Measure frequency	every 15 minutes
Sensibility	0,1 ug/m ³ at 2.3 m ³ /h 0,05 ug/m ³ at 1 m ³ /h
Lower detection limit	0,05 ug/m ³
Saturation	200 ug/m ³ with 2.3 m ³ /h head (1 hr sampling) 500 ug/m ³ with 1 m ³ /h head (1 hr sampling)
Range	0,05 - 10 ug/m ³ with 2.3 m ³ /h head (24h average concentration) 0,05 - 22 ug/m ³ with 1 m ³ /h head (24h average concentration)

Flowrate

Sensor	orifice meter
Range	10 ÷ 60 l/min
Resolution	0.01 l/min
Accuracy	± 1%

Ambient/In line pressure

Range	10 ÷ 105 kPa (1050 mBar)
Hysteresis and Linearity	0.25 % F.S
Resolution	0.01 kPa (0.1 mBar)
Accuracy	Better than 1% (± 0.25kPa)

Temperature

Ambient	PT100
Range	-20 ÷ 100°C
Resolution	0.01°C
Uncertainty	≤ 1°C

Weather sensors

rH %

Range	0 ÷ 100 %
Uncertainty	± 5 % (range 0% to 60% RH)

Wind speed sensor

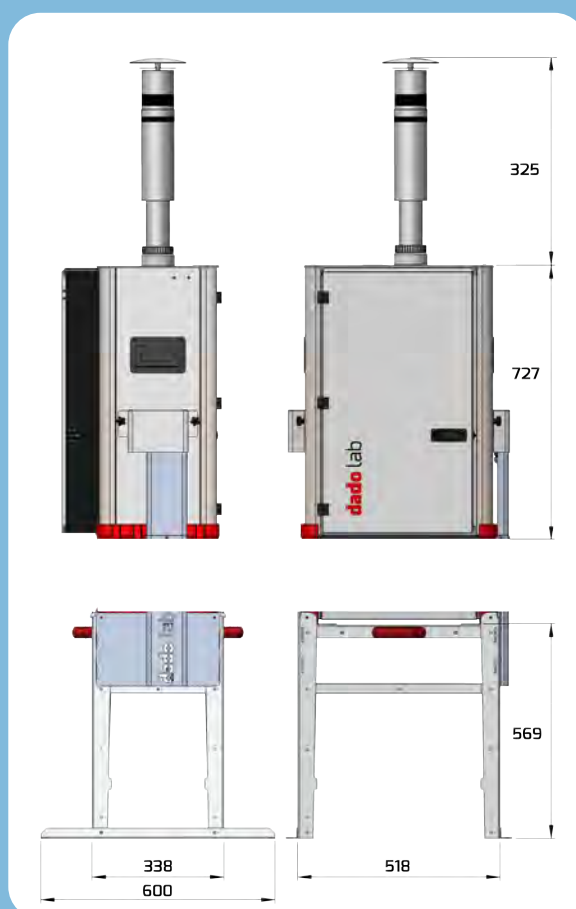
Range	0.5 ÷ 80 m/s
Resolution	0.1 m/s
Uncertainty	± 1 m/s

Wind direction sensor

Resolution	8 settori su rosa dei venti
Uncertainty	± 4°

Exposed/Blank filters	TC Type J
Range	-20 ÷ 100°C
Resolution	0.01°C
Uncertainty	≤ 1°C

Dimensions:



Models, accessories and spare parts



102 101 1021 **Giano BC1 PMx Sequential sampler w/ BC analyzer - Outdoor version**

102 101 1031 **Giano BC1 PMx Sequential sampler w/ BC analyzer - rack 19" version**

Standard supply:

- Test and Calibration report
- Administration USB key
- Power cable
- User Manual

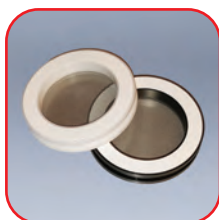


102 101 2001 **EN-LVS Sampling head**

EN-LVS PMx Sampling Head (PM10+PM2.5) operating at 2.3 m³/h including both PM10 and PM2.5 accelerating nozzles.

102 101 2010 **TSP-LVS Samplig head**

Sampling inlet for total suspended particles.



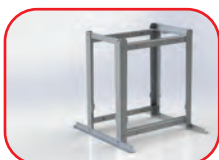
102 101 2050 **Box of 21 Smart Cartridges - White**

102 101 2051 **Box of 21 Smart Cartridges - Black**

POM cartridges for Ø 47mm filter membranes.

102 101 2080 **Giano Support Stand**

Realized in light aluminium, the stand is designed to support the single channel sequential sampler and the optional air-conditioning system for the twin channel.



102 101 2070 **Air-conditioning System**

A proper air conditioning realized for the Gemini, where both sampled filters tanks need to be kept at controlled conditions to avoid loss of semi-volatile compounds, as required by EN12341.

102 101 2075 **Peltier Conditioning System**

Light and efficient liquid cooled Peltier expressly realized for single channel Giano. It keeps the sampled filters tank at controlled conditions to avoid loss of semi-volatile compounds, as required by EN12341.



102 101 2100 **Wind Speed/Direction Sensor Interface**

Interface required for wind speed-direction / rain sensor

102 101 2101 **Wind Speed/Direction Sensor**

Weather station for wind speed-direction measurement



102 101 2093 **Modem UMTS per controllo remoto tramite portale Dado lab**

includes 1 year free access to our web portal (SIM not included)

300 104 1111 **CF1 - Digital flow calibrator with 0,4-45 NL/min range and rH probe**

Primary calibrator for flowrate, volume, temperature and relative humidity.

All parameters can be ISO17025 certified. Includes adapters for Giano/Gemini/IPMx