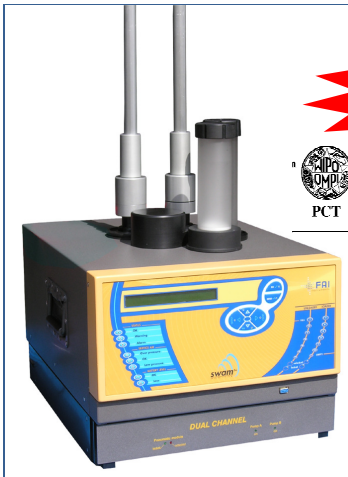
DUAL CHANNEL MONITOR - SAMPLER OF ATMOSPHERIC PMx PARTICLES

SWAM 5a Dual channel Monitor



PATENTED

PCT (10) International Publication Number WO 2008/023325 A2

NO K CORRECTION FACTORS NEEDED!

Innovative Dual Channel particulate matter sampling system on filters membranes with mass measurement performed using the implementation of a revolutionary and exclusive ß measurement method.

TÜV / MCERTS combined Certification

for both PM10 and PM2.5, in compliance with the European Standards EN 12341 and EN 14907

TÜV Certification

as Standard & Reference sampler, in compliance with the European Standards EN 12341 and EN 14907

High accuracy of PM2.5 measure also compared with the new limits introduced by ***Directive 2008/50/EC***.

SWAM 5a Dual Channel Monitor revolutionizes the implementation of the mass measurement technique, achieving precision levels such as to putting itself forward as an **ideal candidate for the automatic reference methods for PMx measurement**.

Two independent sampling lines for the simultaneous sampling on two filter membranes allow to:

- draw samples with different granulometric cut sizes (for example PM10 and PM2.5 or PM2.5 and PM1)
- remove the errors characteristics of the accumulation phase (granulometric cut size and sample chemical representativeness) thanks to a sophisticated thermostatation system of the sampling lines and to advanced automatic Quality Controls on the sampling phase (granulometric cut at constant volume/Stokes).

One single and integral "source + detector" system for the simultaneous mass measurement of the two samples, the use of "**spy filters**" of the same population as the operating filters and subjected to beta attenuation ancillary measures, the highly sophisticated Quality Controls on the measurement phase allow to:

- remove the systematic errors connected with the implementation of the mass measurement technique based on the ß rays attenuation (fluctuations of the air density in the measurement area, of the filtering medium mass, of the Detector efficiency)
- make the ß attenuation method metrologically traceable

NEW model

SWAM5a Dual Channel – Hourly Mode
[code: SWAM5a-DC-HM]

NEW FUNCTIONALITIES:

- **HOURLY MEASURE** of the PMx mass concentration, using a specific application of the Beta technology
- **MEASUREMENT OF THE β ACTIVITY** associated with the Radon decay products, for the evaluation of the PBL mixing ratio (**integrated PBL Monitor**)

MAXIMUM DATA RELIABILITY

SWAM 5a Dual Channel Monitor enters in the air quality control networks to provide an extremely accurate and reliable estimation of the average particulate matter mass concentration.

APPLICATIONS

- **MONITOR Mode** for the simultaneous sampling on two independent lines with associated mass measurement and possibility of drawing samples with different granulometric cut sizes (for example PM_{10} and $PM_{2.5}$ or $PM_{2.5}$ and PM_1)
- High quality standard **REFERENCE Mode** using one of the two sampling lines as auxiliary line to achieve particularly high metrological goals

CHARACTERISTICS

1. **High quality standard of representative suspended PMx sampling phase** (measurement of all physical parameters characterizing the sampling phase, operating flow rate control at sampling inlet level, automatic control of the flow rate measurement system calibration, automatic control of the presence and entity of pneumatic circuit losses, etc.)
2. **High quality standard of the PMx samples mass determination phase**, thanks to an innovative implementation of the ß technique, International Patent Pending, that uses a unique integral source+detector system and ancillary measures on "spy filters" (estimation and removal of the possible biases associated with the ß measurement)
3. **Long working autonomy** without the operator's intervention, thanks to the automatic management of a lot of filter membranes (up to 96)
4. **Complete instrumental management also by remote connection via Modem** (data acquisition, instrumental electronics and mechanics diagnostic and teleassistance). Possibility of automatic SMS (concentration data and main diagnostic information)
5. High quality standard of the **servomechanisms engineering for the automatic management of the sampling cycles** (real-time acquisition of the parameters characterizing every single mechanical movement and relative quality controls)

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DUAL CHANNEL MONITOR-SAMPLER
OF ATMOSPHERIC PMx PARTICLES
SWAM 5a Dual channel Monitor

TECHNICAL SPECIFICATIONS

Mass measurement operative interval	Mass thickness till 5 mg/cm²
Mass thickness measurement reproducibility	±2 µg/cm²
Mass measurement reproducibility	± 10 µg; ± 15 µg; ± 23 µg respectively with sampling ß spot area 5.20; 7.07; 11.95 cm²
β source	^{14}C with 3.7MBeq (100 µCi) nominal activity
Operating flow rate	Programmable in the range 0.8 – 2.5 m³/h
Flow rate measurement reproducibility	1% of the measured value
Flow rate measurement relative uncertainty	2% of the measured value
Flow rate control	Automatic, with regulation valve moved by a step motor. Stability in flow rate control better than the 1% of the required nominal value
Max allowed pressure drop	40 kPa at 2.3 m³/h
Filters Loader/Unloader capacity	No. 36 filter cartridges (72 on demand)
Filter cartridges	Standard supply: for ∅ 47 mm filter membranes
I/O devices	RS232 interface for PC connection (equipped with 2 male DB9 connectors to be used in mutual exclusion). RS232 interface for Modem GSM/PSTN connection (equipped with 1 female DB9 connector).
Service compressed air	Operating pressure 200÷300 kPa (supplied by an auxiliary air compressor supplied with the instrument)
Power supply	230 V (± 10%) 50 Hz single-phase
Absorbed electric power	1200 W (max)
Power supply continuity in direct current	2 12 V 3.5 Ah floating batteries - Autonomy to complete mass measurements and filters movements
Air compressor unit	12 l/min at 300 kPa
Operating conditions inside the installation cabinet	Relative Humidity lower then 85% (with no condensate)
Storage conditions	Temperature within - 10 and + 55 °C Relative Humidity lower then 85% (with no condensate)
Dimensions(W x D x H) Sampling unit Vacuum pump unit Air compressor unit	 430 x 540 x 370 mm 200 x 320 x 200 mm 180 x 320 x 200 mm
Weights Sampling unit Vacuum pump unit Air compressor unit	 36 kg 10 kg 18 kg
Sampling inlets manufactured by FAI Instruments (on customer demand)	– PM10 sampling inlet (LVS-PM10 model, in compliance with EN 1234-1 standard, working at 2.3 m3/h) – PM10 sampling inlet LVS-PM10 with 1 m3/h nominal flow rate (equivalent to the LVS-PM10 EN 1234-1 model) – PM2.5 sampling inlet (LVS-PM2.5 model, nominal flow rate 2.3 m3/h) – PM2.5 sampling inlet (LVS-PM2.5 model, nominal flow rate 1 m3/h) – PM1 sampling inlet (LVS-PM1 model, nominal flow rate 2.3 m3/h)

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