

CONFIRMATION

about Product Conformity (QAL1)

Number of Certificate: 0000028733

Approved AMS: SWAM 5a Dual Channel Monitor for PM₁₀ and PM_{2,5}

Manufacturer: FAI Instruments s.r.l.
Via Aurora, 25
00013 Fonte Nuova (Roma)
Italy

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

We confirm that the AMS has been tested and found to comply with:

**VDI 4202-1: 2002, VDI 4203-3: 2004, EN 12341: 1998, EN 14907: 2005,
Guide to Demonstration of Equivalence of Ambient Air Monitoring Methods: 2005,
EN 15267-1: 2009, EN 15267-2: 2009**

The approval of the measuring equipment subject to the above mentioned conditions
was authorized by the German relevant body (LAI).

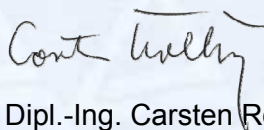
This confirmation is valid up to the official announcement in the Federal Gazette,
but no longer than 6 months from issuing
(see also the following pages).



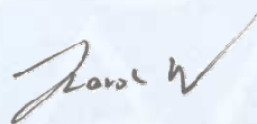
- Certified equivalent EN method
- Complying with 2008/50/EC
- TUV approved
- Annual inspection

The confirmation is valid until: 05 December 2011

TÜV Rheinland Energie und Umwelt GmbH
Köln, 06 June 2011



i. A. Dipl.-Ing. Carsten Röllig



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Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Confirmation:
0000028733 / 06 June 2011

Test report: 936/21217522/A of 23 March 2009
Validity of confirmation until: 05 December 2011

Tested application

The AMS is approved for permanent and parallel monitoring of suspended particulate matter PM₁₀ and PM_{2.5} in ambient air (stationary operation). The suitability of the product for this application was assessed on the basis of a laboratory test and a field test at four different test sites respectively time periods. The AMS is approved for the temperature range from +5°C to +40°C.

Any potential user should ensure, in consultation with the manufacturer that this AMS is suitable for the ambient air application on which it will be installed.

Basis of the confirmation

This confirmation is based on the test report 936/21217522/A of 23 March 2009 and on the decision of approval by the relevant body (German Umweltbundesamt)

AMS name:

SWAM 5a Dual Channel Monitor for PM₁₀ and PM_{2.5}

Manufacturer:

FAI Instruments s.r.l., Fonte Nuova (Roma), Italy

Approval:

For continuous parallel monitoring of suspended particulate matter PM₁₀ and PM_{2.5} in ambient air (stationary operation).

Measuring ranges during the suitability test:

PM₁₀: 0 – 200 µg/m³
PM_{2.5}: 0 – 200 µg/m³

Software version:

Version Rel 04-08.01.65-30.02.00

Remarks:

1. The requirements according to guide "Demonstration of Equivalence of Ambient Air Monitoring Methods" are fulfilled.
2. Filter cartridges with a β-equivalent spot area of 5.20 cm² have been used for the testwork.
3. The AMS is to be calibrated on site in regular intervals by application of the gravimetric PM₁₀ reference method according to DIN EN 12341.
4. The AMS is to be calibrated on site in regular intervals by application of the gravimetric PM_{2.5} reference method according to DIN EN 14907.

Test report:

TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Köln
Report-No.: 936/21217522/A of 23 March 2009

Tested product

This confirmation applies to automated measurement systems confirming to the following description:

SWAM 5a Dual Channel Monitor measuring system determines the mass of separated particles based on the principle of beta attenuation after passing a layer of thin material.

The SWAM 5a Dual Channel Monitor measuring system is an automatic and sequential measuring device for dust measurement on filter membranes. The system operates with two independent sampling lines. One of the sampling lines was operated with a PM₁₀ sampling inlet and the second line was operated with a PM_{2.5} sampling inlet during the suitability test. Different configurations are possible. Ambient air was aspirated via both sampling inlets with the help of two separate pumps. The dust-laden sampling air was then separated by the respective filter (1 x PM₁₀, 1 x PM_{2.5}), followed by determining the mass of the separated dust based on the radiometric principle of beta absorption. The mass of dust collected on the filters of both sampling lines was determined by a single radiometric mass determination module.

The AMS comprises two sampling inlets (PM₁₀ & PM_{2.5}), two inlet tubes, two vacuum pumps, a measuring device, a compressor for compressed air generation and two filter magazines (loading and unloading device) for virgin and sampled filters.

The AMS is equipped with two sampling inlets for PM₁₀ and PM_{2.5}. The sampling inlets are produced by the manufacturer of the AMS and are available for different flow rates (2.3 m³/h or 1 m³/h).

Sampling inlets for 2.3 m³/h were used during the suitability test. The design of these sampling inlets conforms to the specification of the Reference Standards EN 12341 (PM₁₀) and EN 14907 (PM_{2.5}).

After suction and passing the sampling inlet, the particle-loaded ambient air passes through the sampling line until it hits the filter.

Optionally the sampling line may be led through a coaxial chamber flowed by ambient air if a high proportion of volatile dust components is expected. Even active heating or cooling of the sampling line is possible.

The sampling line did neither pass through the coaxial chamber nor was it heated or cooled actively during suitability testing. It was simply wrapped in foam coating within the measuring cabinet as a means of isolation.

The two vacuum pump units take in ambient air through the sampling inlet, the sampling lines and the two filter membranes. They consist of a piston pump equipped with ballast to compensate on-line pressure fluctuations. An automatic flow rate regulation is carried out independently for each sampling line.

The sampler can be operated with other pumps (e.g. graphite vane pumps) if the required performance is guaranteed at any time.

The central unit of the AMS comprises all servo-mechanical parts as well as the pneumatic and radiometric measuring unit, and all electronic units and microprocessors for system operation, control, and monitoring. The operating panel and system display can be found on the front side of the AMS, whereas all pneumatic and electric ports as well as the communication interfaces can be found on the back. The filter magazines and inlet tubes are installed to the upper side of the AMS.

The AMS requires compressed air (200 to 300 kPa) to carry out several servo-mechanic movements such as loading and unloading of filters. For this reason the AMS is equipped with a service air compressor unit.

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The AMS is operated via membrane keyboard which is combined with a display at the front side of the system. All relevant data (such as sampling time) are set via the keyboard. Furthermore it is possible to view necessary information about the current system status (ongoing sampling) as well as collected data of earlier measurements or numerous parameters for quality control purposes.

In addition to the direct communication via keyboard and display, the AMS offers a means of connection suited for a standard terminal (e.g. HyperTerminal) or a PC / modem via serial port RS-232. The AMS can be controlled, operated and parameterised through the terminal or with the help of the operating software Dr. FAI Manager, either directly via PC or indirectly via GSM modem. This provides an easy and comfortable way for reading out collected data in text format and preparation for further processing.

Measured values and status messages can be displayed via an analogue output, if desired. Moreover, the AMS provides a means to keep the operator informed about the current system status and the latest measured values via SMS.