

Extractive Particulate Measurement System

PROCESS & EMISSIONS MONITORING SYSTEMS



PROSCATTER™
INSIDE

SPECIFIC FEATURES:

- Continuous Particulate Monitoring for wet stack applications typically found after wet scrubbers, WESPs, and FGD (without reheat)
- For use as a PM-CPMS or PM-CEMS that need to comply with PS-11
- Direct extractive heated sampling system configured for Iso-kinetic or fixed velocity sampling methods
- Forward Scatter measurement technique with automatic zero and upscale checks that fully challenge the system to satisfy daily drift check requirements
- Easy to use intuitive multi-lingual text driven menu and display for improved user interface complete with on board data logging for increased level of security of data



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TECHNOLOGY / APPLICATION

SYSTEM OVERVIEW

The PCME STACK 181 WS is suitable for measuring particulate emissions from wet scrubbers and other processes where the flue gas falls below the dew point or has water droplet presence. The extractive instrument takes a representative continuous sample from the stack, heats this well above dew point and evaporates any water droplets to enable measurement of the particulate concentration under dry conditions.

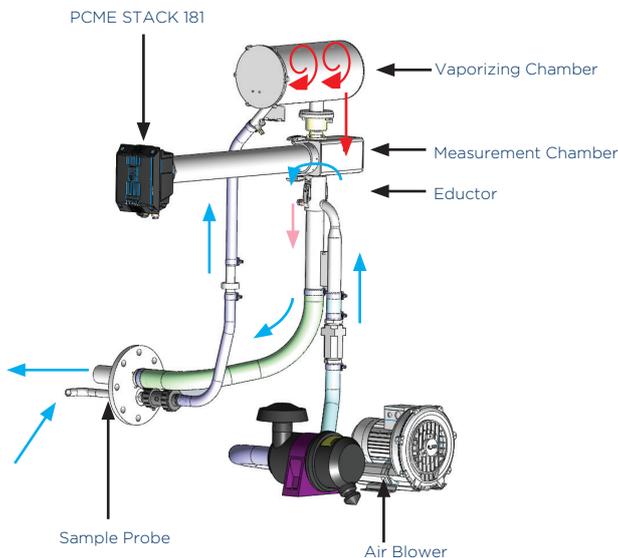
The PCME STACK 181 WS may be used as a PM-CPMS or PM-CEMS that need to comply with PS-11 to satisfy MACT and MATS continuous monitoring requirements.

This extractive approach with heating overcomes the problem of interference from condensation and water droplets when using an in situ particulate monitor after wet collectors.

The PCME STACK 181 WS utilizes direct extractive heated sampling which can be configured to either extract an Iso-kinetic sample or extract a sample based on a pre-set user defined velocity. The extracted sample passes directly into a heated vaporizing chamber. The sample entrained with water droplets is thrown against the wall of the vaporizing chamber to maximize contact area and thermal conductivity to evaporate the water droplets and water vapor above the dew point. This means the system is compact and much more efficient than systems which heat a linear sample line.



PCME STACK 181 WS - System Overview



PCME STACK 181 WS - Principles of Operation

The vaporized sample then passes through the measurement chamber. The key measurement part of the instrument is a *ProScatter™* forward light scatter sensor (PCME STACK 181), which benefits from using a narrow forward angle of scatter (minimizing effects of changing particle type and refractive index). The instrument has reduced sensitivity to variation of particle sizes. This is due to the selection of a specific angle of incidence of the laser beam in the measurement volume, when compared to other forward light scattering sensors.

The extracted sample velocity is measured and the speed of the air blower supplying the eductor is varied to reach the desired Iso-kinetic or pre-set sampling velocity. The extracted sample is then returned to the stack by the same sampling port as the sample is taken.

The system setup, control and display of both the measured particulate and internal diagnostic values is provided by an intuitive easy to use multilingual menu driven display complete with built in data loggers for added security and an enhanced user experience.

INBUILT QUALITY ASSURANCE

The PCME STACK 181 WS has an automatic zero and upscale checks to ensure good quality measurements and continuous diagnostics on the sample and handling system to permit early diagnosis of any deterioration in system performance.

The automatic self-checks involve reference scattering bodies which are automatically rotated into the measurement path periodically providing a full check of the instrument's capability to measure forward scattered light.

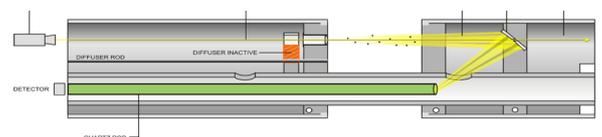
The instrument has been designed for easy and safe operator access to the measurement volume for external auditing with reference materials and absolute correlation audit for PS-11 capability.

Flow rates and heater temperatures are continually monitored to ensure any sample line blockage or problems through insufficient heating are automatically detected and avoided. The system automatically indicates when valid measurements are occurring, hence avoiding any measurement errors during any system warm up. In addition, trace heaters may be added to the intake air tubing to minimize condensation.

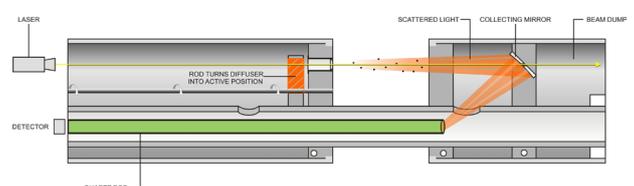
The system has been designed to facilitate maintenance and cleaning of all major components including the vaporising chamber being easily accessed and cleaned by opening the hinged heater cover. The inbuilt control system records measurements and internal parameters to facilitate easy diagnosis if any fault arises.



Measurement Mode



Upscale Check with Diffuser



Class 3R Laser Product. AVOID DIRECT EYE EXPOSURE

PRODUCT FEATURES

PROCESS AND APPLICATION CONDITIONS

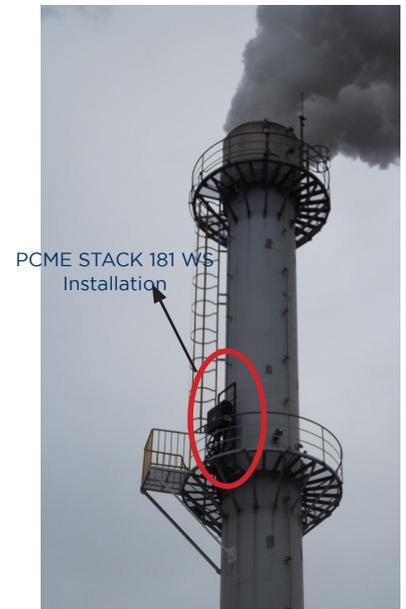
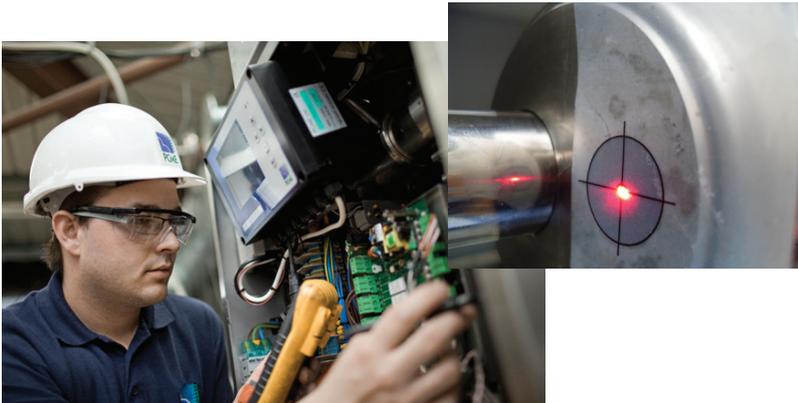
- Coal fired power plant with wet FGD (with or without SCR)
- Power and Waste Incineration plant with wet scrubbing abatement plant and WESPs
- Pulp and Paper recovery boilers
- Metallurgical, Cement and Chemical processes fitted with wet scrubbers
- For applications with corrosive flue gas (e.g. Wet FGD plant) PVDf or Hastelloy versions (corrosion resistant) are used



SERVICEABILITY

The system will provide reliable measurement of particle emissions in the aggressive environment of a wet stack, provided the system is correctly installed and commissioned and is appropriately maintained and cleaned.

As is good practice for any extractive system the frequency of scheduled maintenance and cleaning is defined according to the stack application. Plant personnel should be trained for first line support by ENVEA's network of service teams who can also provide more in depth adhoc and contracted on-site support with tailored service contracts.



ADDED VALUE FEATURES AND BENEFITS

- Continuous direct sampling and measurement avoiding issues created by dilution and cyclic measurement systems
- Heated sampling to avoid cold spots which cause condensation and sample blockages
- Iso-kinetic or fixed velocity sampling methods
- Increased sampling velocities 1-25 m/s
- Reduced low limit of detection $<0.3 \text{ mg/m}^3$
- Smaller Forward Scatter angle of incidence for reduced sensitivity to varying particle sizes
- Improved larger Forward Scatter measurement volume compared to other forward scatter systems creating better sensitivity and lower detection levels
- Gain a higher level of confidence with the automatic zero, and upscale checks that fully challenge the Forward Scatter measurement technique unlike other suppliers that use laser intensity or do not check the optical path of the measurement mode
- TCPIP Ethernet, RS485, RS232, 4x4/20mA outputs, 1 x 4-20mA input, Relay outputs, 1 x Relay input, for increased choice of integration to your DCS or DAHS
- Powerful multilingual menu driven display and inbuilt data logging for recording measured values and internal diagnostics parameters for enhanced user interface and improved security of data
- No moving parts in the measurement path for a rugged and reliable measurement

SPECIFICATIONS

Performance and Functionality

Typical Measurement Range	0 - 100 mg/m ³ or user defined
Detection Limit	< 0.3 mg/ m ³
Max. Stack Temperature	212°F
Flue Gas Velocity Range	1 - 25 m/s

Sampling Probe

Standard

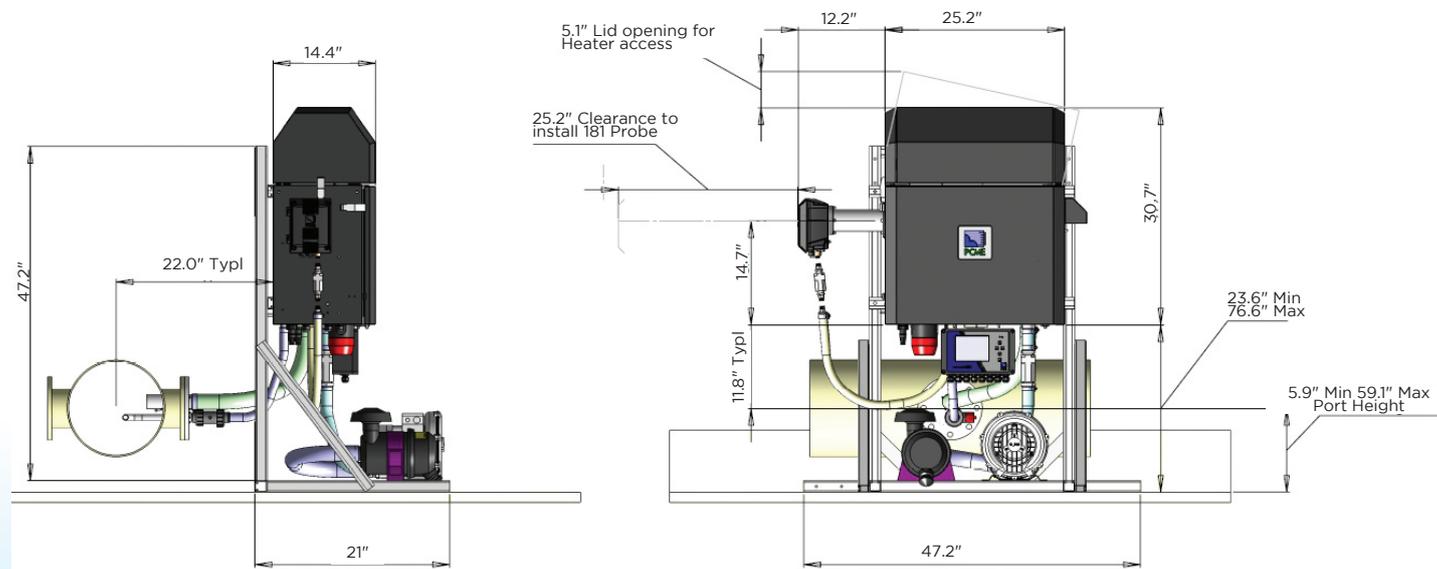
Sampling Probe flange	4" ANSI Flange (Class 150) DN100 PN10_16 JIS 100-5k,10k
Sampling probe insertion lengths	Typically 23.6" or 47.2" (other insertion lengths are available on request)
Sampling probe material (Acid resistant)	PVDF Hastelloy C276
(Flue gas composition dependant)	Other sampling probe material upon request

Systems supplied against a completed Application suitability Form and Site Installation Form

Analyzer

Power Supply	230VAC (standard), 3.2KW	115VAC 3KW
Interfaces	Modbus/ RS485/ RS232 4 x 4-20mA outputs 1 x 4-20mA input 4 x Relay outputs 1 x Relay input	Ethernet Additional Relay input/output module Additional 4-20mA input/output modules
Data recording	1 year of Emission averages (15 minutes average) Rolling 24 hours of short term data (1 minute average) Rolling 2 hour of instantaneous data Instrument self check results	PC-ME Dust Tools software for reporting on LAN or PC
User interface	Multi-lingual text driven menu and display	PC-ME Dust Tools PC software for data display and set up and recording of instrument configuration
External dimensions of main enclosure	30.7" x 25.2" x 14.4"	As standard
Weight fully assembled	264 lbs	As standard

DIMENSIONS & STACK MOUNTING



- Analyzer unit to be located above and closely coupled to sampling probe
- Sampling probe stack connection is 4" ANSI (class 150)/DN100 PN10_16/ JIS 100-5k,10k Flange
- Correct installation to Analyzer is required. Consult ENVEA for installation assistance

ABOUT ENVEA

As a progressive environmental Company, ENVEA specialises in particulate measurement for industrial processes. With a worldwide reputation for reliability, innovation and technological excellence, the Company produces under the trademark envea™ equipment for concentration and mass monitoring for regulatory, environmental and process control requirements. A dedicated team of qualified application and sales engineers is always on hand and should be consulted in the selection and usage of the most suitable equipment for any particulate application.



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