Passionate about Particulate

PCME

PCME STACK 181

PROSCATTER™ INSIDE

Particulate Measurement System

For Dry applications
As a PM CPMS or PM CEMs needing to comply with PS-11

US EPA MACT Compliant

- Continuous Particulate Monitoring based *ProScatter*™ Forward Scatter technology with minimum detection limit of < 0.05 mg/m³ and measurement range of 0-300 mg/m³
- For use as PM CPMS or PM CEMS that need to comply with PS-11
- *ProScatter*™ technology provides improved measurement due to reduced cross–sensitivity in particle type and size
- Forward Scatter measurement technique with automatic zero and upscale checks that fully challenge the system's ability to measure forward scattered light and satisfy daily drift checks
- Robust and rugged for challenging high temperature 932°F stack conditions and Ex hazardous zones

THE QUEEN'S AWARDS FOR ENTERPRISE INTERNATIONAL TRADE 2013

System Overview

The **PCME STACK 181** is suitable for measuring particle emissions after both bag-filter and electrostatic precipitator arrestment plant.

The **PCME STACK 181** utilizes the patented *ProScatter*™ forward-scatter measurement technique for measuring particulate concentration levels, typically between 0.05 mg/m^3 to 300 mg/m^3.

The *ProScatter*™ forward scatter measurement technique offers improved levels of performance when compared to other forward-scatter systems which make the **PCME STACK 181** very suitable for use as a PM CPMS or PM CEMS that needs to comply with US EPA PS-11 for site operators looking to satisfy the recent MACT and MATS rules.

Due to the inherent rugged design the **PCME STACK 181** *ProScatter*™ particulate monitoring system is suitable for use in a wide range of applications within the Power Incineration, Cement, Chemical, Metal, Mineral and Petrochemical industries.

© Luhr Filter. Incinerator image reproduced with kind permision.

Principles of Operation

The **PCME STACK 181** utilizes an improved Forward Scatter technique *ProScatter*™ featuring patented options for enhanced reliability.

As particles travel through a beam of light, the particle scatters light in all directions with the strongest intensity of light being scattered in a forward direction (Figure 1).

PCME's patented *ProScatter*™ forward scatter uses a beam of light transmitted by a laser along the probe to and through the area of measurement. The beam of laser light then continues through a concave mirror to the beam dump (Figure 2).

The forward scattered light collected by the concave mirror is then focussed onto a quartz rod where the light is transmitted towards the light detector positioned within the electronic enclosure located outside the stack. The amount of light detected is proportional to the particulate concentration.

The **PCME STACK 181** *ProScatter*™ technique benefits from improved levels of performance when compared to other forward-scatter systems due to its increased area of detection (more than 10x larger) and smaller angle of incidence, reducing variability in sensitivity and measurement due to particle type and size.

Figure 1: Principle of Scattered Light

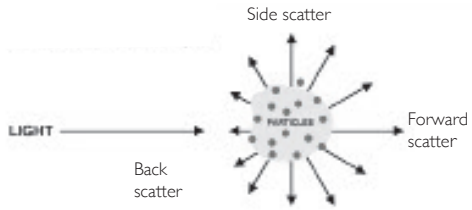
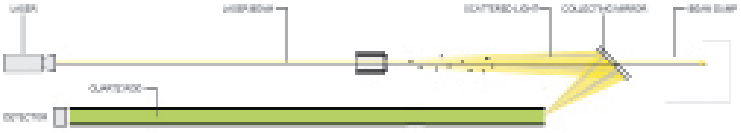


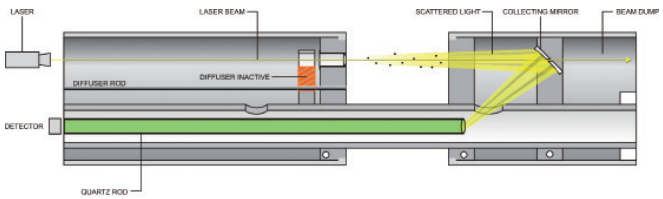
Figure 2: PCME *ProScatter*™



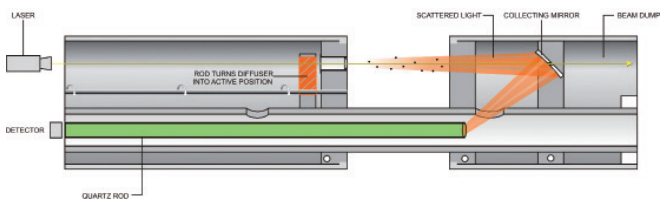
Class 3R Laser Product. AVOID DIRECT EYE EXPOSURE!

Inbuilt Quality Assurance

Measurement Mode



Span check with diffuser performs upscale cheks



The **PCME STACK 181** has automatic zero and upscale checks that fully challenge the forward-scatter measurement technique. Additionally, internal diagnostic checks running in the background ensure a high level of confidence in the quality of the measurement and permit early diagnosis of any deterioration in system performance.

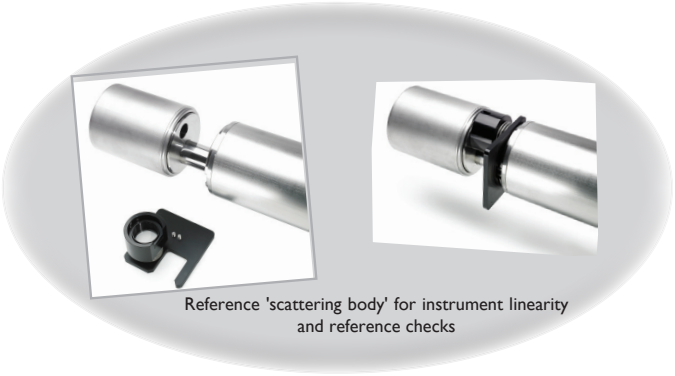
The automatic upscale check employs a reference scattering body, which is periodically positioned into the measurement path providing a full check of the instrument's capability to measure forward-scattered light, unlike other systems which use ratios of laser intensity as the upscale check or do not challenge the optical path of the measurement mode.

Quality Assurance/Audit

The **PCME STACK 181** *ProScatter*™ forward-scatter instrument is supported by filter audit units, which is an approved reference material for conducting quarterly linearity checks as Absolute Correlation Audit (ACA).

To audit the instrument, the sensor is temporarily removed from the stack and Filter Audit reference 'scattering bodies' are inserted onto the **PCME STACK 181** measurement zone.

The resulting response is measured to ensure linearity and also to provide a reference check that ensures contamination is not affecting the performance of the instrument.



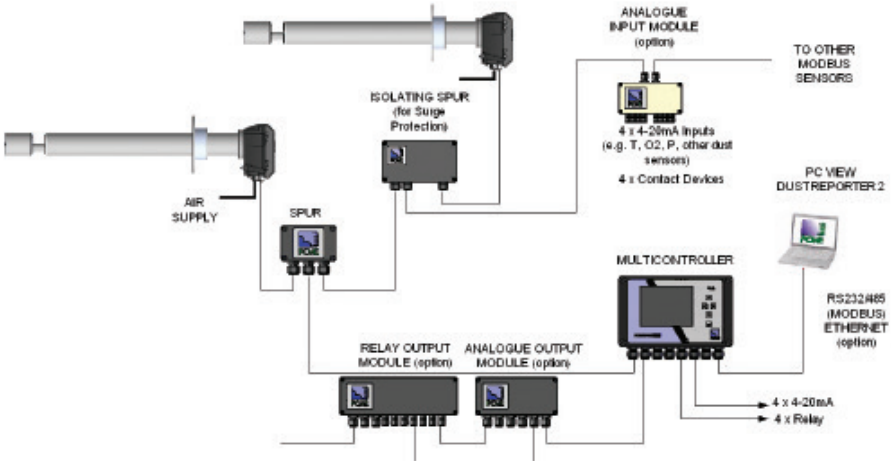
Reference 'scattering body' for instrument linearity and reference checks

Connection Schematic

The **PCME STACK 181** *ProScatter*™ forward scatter system is comprised of the sensor probe which is mounted directly in the stack and a powerful user controller which provides power and digital communication for the sensor. The **Standard** control unit provides setup functionality, graphical displays, and recording of emissions for a single-sensor system.

The ***PLUS*** version of the instrument (which includes a MultiController) extends this up to 16 sensors and can include Ethernet capability (option). The control unit can also provide four data loggers:

1. Pulse data logger for instantaneous data which hold the last two hours of data from a single-sensor system.
2. Short-term data for storing a rolling 24 hours of 1 minute averaged data from a single sensor for process control.
3. Long-term data for storing up to 1 year of a rolling 15 minute averaged data from a single sensor for emission monitoring.
4. Alarm data logger for a rolling 500 alarm events from a single sensor.



Power and various system signals are connected to Standard and MultiController via the internal terminal blocks.

Onboard normalization can be accomplished by using additional 4-20 mA input and output and relay modules inputs from external devices such as oxygen and temperature transmitters. Flow sensors for calculating Mass emissions can be accomodated along with additional I/O to the controllers.

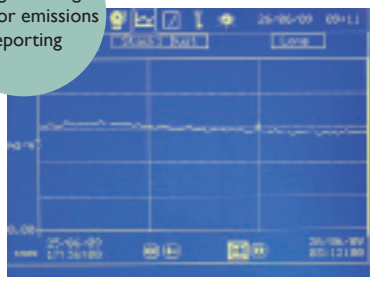
Added Value Features and Benefits

The **PCME STACK 181** *ProScatter*™ forward scatter system's rugged design provides durable long-term measurement. In addition to the reduced cross- sensitivity to changing particulate type and size, increased instrument lifetime and improved measurement reliability are indicated due to:

- ✔ No moving parts in the instrument path for increased lifetime and reliable measurement.
- ✔ Can be used on stacks with flue gas temperatures up to 932°F by using a high quality Quartz rod for transmission of forward scattered light to the detector. The Quartz rod is fixed in position and will not age prematurely and become brittle when used at elevated temperatures in contrast to other forward-scatter systems that use fiber optic cables.
- ✔ Inbuilt data logging and recording of measured particulate and internal diagnostic value for added confidence and security of data.
- ✔ TCP/IP Ethernet, RS485, RS232, 4x 4/20 mA output, 1x 4/20 mA input, 4x Relay outputs, 1x Relay input, for increased choice of integration into your DCS or DAHS.
- ✔ Powerful multilingual, text-driven menu for initial setup without the use of external equipment and display for an improved user experience.
- ✔ Proven rugged and robust mechanical designed for harsh environments.

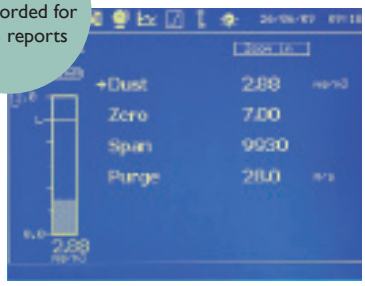
Control Unit Options

Long term log used for emissions reporting



ETHERNET CAPABILITY

Self-test results are recorded for QAL3 reports

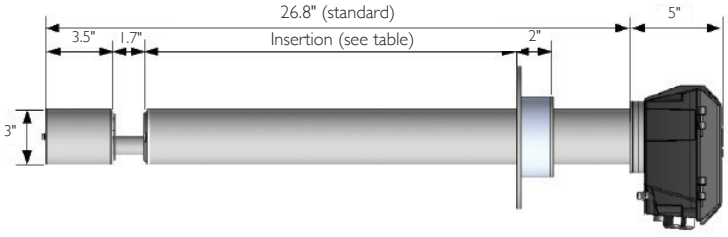


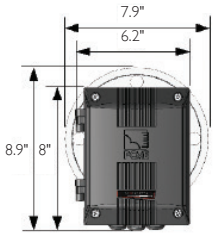
	Entry System	*Standard* System	*PLUS* System
Controller Type	Entry Controller	Interface Module	MultiController
No. of Sensor Channels	1	1	1-16
Icon-Driven Multilingual Menus	Not applicable (2 line LCD display)	Emission and Alarm levels Quality Assurance results Calibration screens Review data logs Show graph and bar chart Set up and password Advanced calculations (Mass, normalization)	Emission and Alarm levels Quality Assurance results Calibration screens Review data logs Show graphs and multi bar charts Set up and password Advanced calculations (Mass, normalization)
Filter Optimization Diagnostics	None	Pulse log review for diagnosing location of leaking bags or failing ESP plates	Pulse log review for diagnosing location of leaking bags or failing ESP plates
Emission Data Logs Long (averages for reporting) Short (process trends) Pulse data Alarms	None	Capacity stated for 1 sensor (plus QAL3 channels) 2 months @ 15 minutes 7 days @ 1 minute 2 hours @ 1 second 500 entries	Capacity stated for 4 sensors (plus QAL3 channels) 2 months @ 15 minutes 7 days @ 1 minute 2 hour @ 1 second 500 entries
Ethernet Enabled Option	None	None	Ethernet (Modbus TCP) (optional)
Outputs	1x RS-232 (Modbus RTU) 1x 4-20mA (500 Ω) 1x Relay (0.5A @110V)	1x RS-485 (Modbus RTU) 1x 4-20mA (500 Ω) 2x Relays (2A @250V, user selectable)	1x RS-485 (Modbus RTU) 4x 4-20mA (500 Ω) 4x Relays (2A @250V, user selectable)
Inputs	Input for plant off indication	1x input for plant off indication, bag cleaning reference and multiple calibrations	4x inputs for plant off indication, bag cleaning reference and multiple calibrations
Enclosure Size	W 8.7" x H 4.8" x D 3.2"	W 8.7" x H 4.8" x D 3.2"	W 10.4" x H 6.3" x D 3.6"
Power Supply	100 to 240 VAC (50/60Hz), 1A	100 to 240 VAC (50/60Hz), 1A	100 to 240 VAC (50/60Hz), 1A

Note: Additional 4-20 mA and Relay outputs are also available from optional accessory modules for Standard and *PLUS* systems.

Dimensions

Sensor

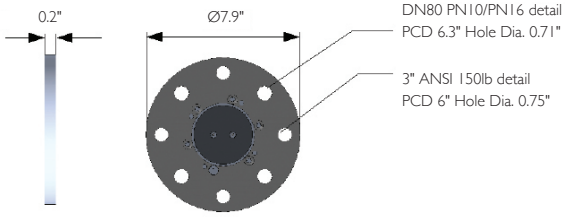




Insertion Distances for the Measurement Volume

	Nominal	Adjustable Insertion	Overall Length
181	21.7"	3–21.7"	26.8"
181 Long	51.2"	21.7–51.2"	56.3"

Flange



Enclosure Temperature Rating	-13°F to +122°F
Enclosure Rating	IP65 (Ex rated IP66)
Enclosure Material	Die-cast aluminum (polyester powder coated)
Connection required on Duct	Hole pattern to suit DN80 PN10/PN16 or 3" 150lb ANSI (hole ID at least Ø 88mm)
Power Requirements	24V provided by the control unit
Cable Entries	3 x M20 gland/conduit entries
Air Purge Requirements	Requires continuous air purge at 50 liters/minute

About PCME

As a progressive environmental Company, PCME specialises in particulate measurement for industrial processes. With a worldwide reputation for reliability, innovation and technological excellence, the Company produces 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.

PCME Ltd
Clearview Building
60 Edison Road
St Ives Cambs UK
PE27 3GH

Tel: +44 (0)1480 468200
Fax: +44 (0)1480 463400
Email: contact@pcme.com

www.pcme.com
Part of Environnement S.A

PCME Environment USA
Altech Environment U.S.A.
2623 Kaneville Court
GENEVA
Illinois 60134

Tel: +1 630 262 4400
Fax: +1 630 262 6220
Email: US.Service@pcme.com

ISO 9001 REGISTERED Quality Assurance — UKAS QUALITY MANAGEMENT

ISO 14001 REGISTERED Environmental Assurance — UKAS QUALITY MANAGEMENT

Publication No. 496004 v1.1 (07/2015)