Passionate about Particulate

PCME

PCME QAL 181

PROSCATTER™ INSIDE

Particulate Measurement System

QAL1 Approved and PS-11 compliant PM CEM

mCERTS TÜV

- Minimum detection limit of < 0.05 mg/m^3 and certification range of 0-15 mg/m^3 and measurement range 0-200 mg/m^3
- Complies with Waste Incineration Directive and Large Combustion Plant Directive EN 13284-2/EN 14181 (Europe) and PS-11 (US)
- Reduced cross-sensitivity to changing particle type and size due to low angle forward scattering principle (ProScatter™ Forward Scatter technology)

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2007

nqa. ISO 9001 Registered UKAS QUALITY MANAGEMENT 015

Certificate No: 9389

technology/applications

System Description

The **PCME QAL 181** is an approved particulate CEM (Continuous Emission Monitor) complying with monitoring standards EN 14181, EN 13284-2 and US EPA standard PS-11. The instrument holds QAL1 approvals to the requirements of EN 15267-3 with both MCERTS version 3 Class 1 and TUV BImSchV 17, 13, 27: latest revision approvals. As such, the instrument provides a precise and robust monitoring solution for monitoring according to EN 14181 with special relevance to the European Waste Incineration Directive (WID) and Large Combustion Plant Directives (LCPD).

Suitable for measuring particle emissions after both bagfilter and electrostatic precipitator arrestment plant, the **PCME QAL 181** satisfies the need for high quality assurance on emissions data. The instrument is suitable for measuring both low (<1mg/m^3) and high particulate concentration levels (>200mg/m^3). It has reduced sensitivity to changing particle type and is unaffected by changes in velocity. From a regulatory perspective its high quality assurance features (MCERTS and TUV approved) makes it suitable as a compliance device. Typical application areas include Cement Kilns, Boiler Plant (including Coal Fired plant with FGD and high temperature Biomass boilers) and Waste Incineration Plant.

Specific requirements satisfied by the instrument are:

1. High quality dust measurement with minimal cross sensitivity to particle type.
2. Compliance to US EPA standards for PM CEMs (PS-11).
3. Approved as meeting EN 13284-2 for Incinerators, Power Plant and Cement Kilns.

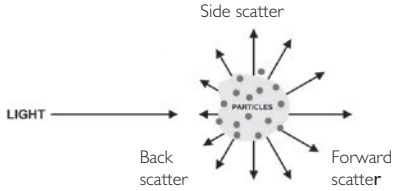
Process and Application Conditions

- Certification range: 0 -15mg/m^3 (QAL1 approval).
- Extended certification range: 0-100mg/m^3 (QAL1 approval).
- Measurement capability: 0-200 mg/m^3.
- Long term zero drift: <0.1mg/m^3.
- Inspection frequency: 3 months.
- Air purge requirements: 30 to 40 litres/ minute.
- For measurement in non condensing flue gases.
- Not suitable for applications with water droplets.

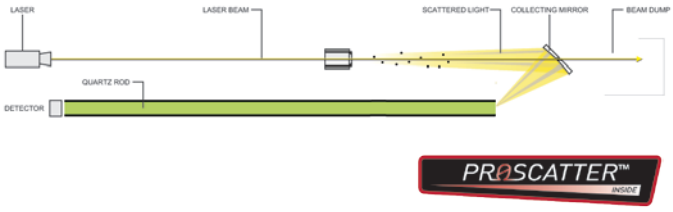
Principles of Operation

The **PCME QAL 181** measures the scattered forward light from a laser source. The measurement volume in the sensor probe is positioned in a representative location within the stack. The scattered light response is directly proportional to dust concentration. The instrument optimises its resolution and zero drift characteristics, meaning accurate measurement below 0.1 mg/m^3 as well as rugged operation in stacks where emissions exceed 100 mg/m^3. The ProScatter^{TM} Forward Scatter technique used in the **PCME QAL 181** collects the total cone of scattered light from particles in the measurement volume. This patented measurement method increases the instruments signal to noise ratio giving high stabilty at even low dust concentrations (< 0.1 mg/m^3). The instrument provides a precise measurement of particulate concentration. Unlike the probe-based light scattering technique, the **PCME QAL 181**'s measurement and detection volumes are larger, offering more resolution and better minimum dust level detection capabilities. In addition, ProScatter^{TM} Forward Scatter technology greatly reduces the effect of changing particle size to calibration and measurement errors found in other Scattering, Opacity and Triboelectric based monitors.

Principle of Scattered Light



Method of Implimentation

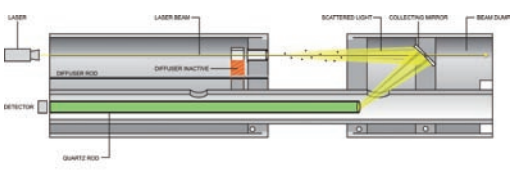


Self-checks for Compliance Measurement

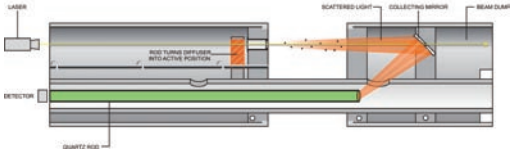
The **PCME QAL 181** includes automatic self-checks designed to ensure appropriate quality assurance and to meet the QAL3 regulatory requirements for particulate compliance monitors installed on Incinerators, Cement Kilns and Power Plant in Europe (EN 13284-2). Appropriate zero and upscale (span) tests are included as standard.

These checks 'challenge' the instrument's performance, checking the operation of the transmitter and receiver optical and electronic components are within specification as well as the instrument's accuracy in measuring scattered light. This permits any instrument failure or mis-measurement to be rapidly diagnosed and corrected. The diffuser introduced during the automatic span check simulates a scattered signal, meaning the check is a true check of the instrument's ability to measure scattered light, rather than just attenuated light.

Measurement Mode



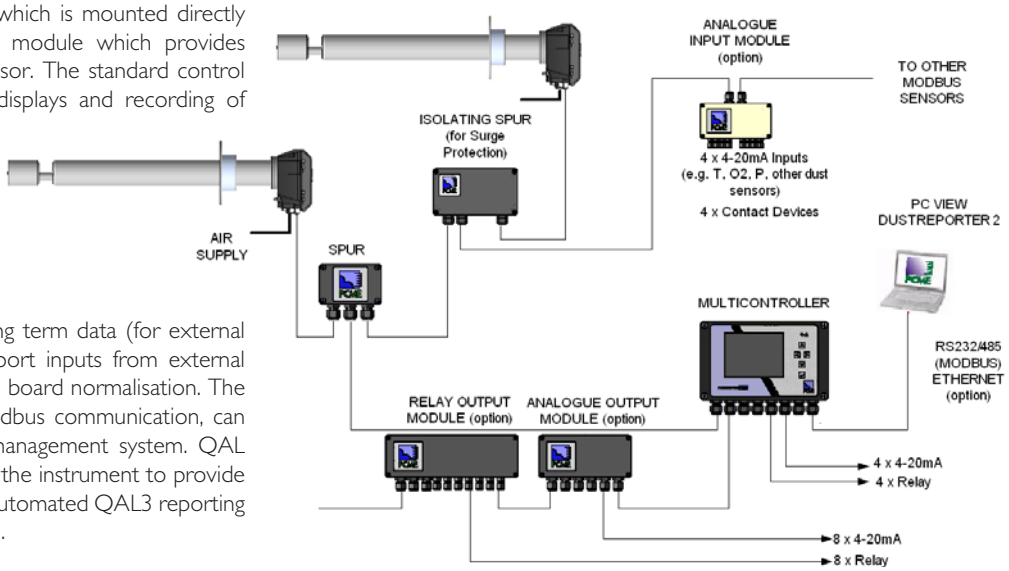
Span check with diffuser performs QAL3



product features

Connection Schematic

The **PCME QAL 181** comprises the sensor which is mounted directly in the stack and a powerful user interface module which provides power and digital communication for the sensor. The standard control unit provides set-up functionality, graphical displays and recording of emissions and QAL3 data for a single sensor system. The ***PLUS*** version of the instrument (with MultiController) extends this up to 16 sensors and to include ethernet capability (option). The control unit can also provide simultaneous recording of the pulse data (for arrestment plant cleaning diagnosis), short term data (for process control) and long term data (for external emissions reporting). Both control units support inputs from external oxygen and temperature meaurements for on board normalisation. The sensor, which supports industry standard modbus communication, can be connected directly to a PLC or CEMs management system. QAL Reporter PC software is fully compatible with the instrument to provide secure and powerful emissions reporting and automated QAL3 reporting in full compliance with EN 13284-2/EN 14181.

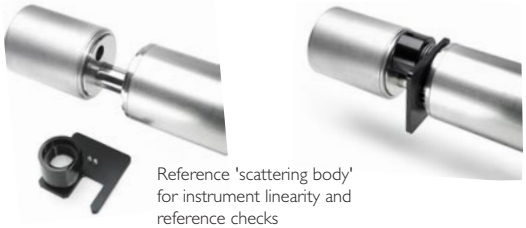


Reliability and Contamination Resistance

The instrument will work reliably in high dust applications due to the use of extended air curtains which protect all optical surfaces from the flue gas. The instrument must be connected to a reliable source of dry compressed air or supplied with its own air blower unit. The **PCME QAL 181** also operates reliably at elevated temperatures (optional to 500°C), having the advantage of no active electronic components exposed to stack temperature or moving measurement components. The instrument's patented design is inherently reliable by avoiding the use of fibre optics (which age with temperature) and the need for the movement of detectors for the self-checks (which are position critical).

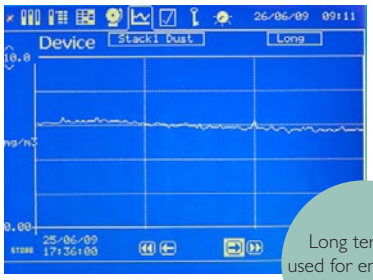
Quality Assurance/Audit

The instrument is supported by an optional *ProScatter*™ Audit unit which is an approved reference material for conducting linearity tests as part of AST or QAL2 procedures. To audit the instrument, the sensor is temporarily removed from the stack and reference 'scattering bodies' are inserted into the measurement chamber. The resulting response is measured to ensure linearity and also to provide a reference check that there is no contamination affecting instrument performance.



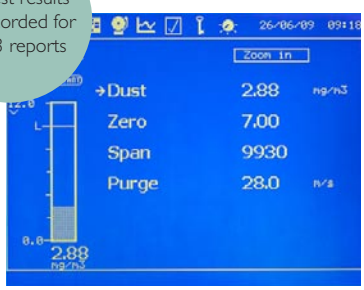
Reference 'scattering body' for instrument linearity and reference checks

Control Unit Options



Long term log used for emmisions reporting

Self-test results are recorded for QAL3 reports



ETHERNET CAPABILITY

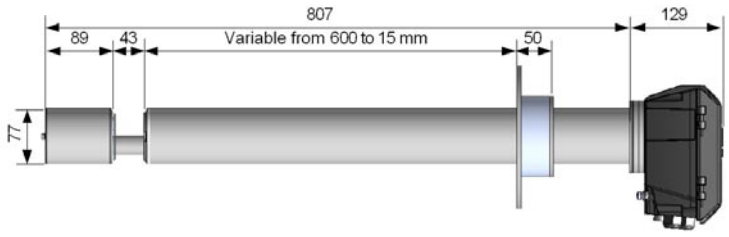
	Standard System	*PLUS* System
Controller Type	Interface module	MultiController
No of Sensor Channels	1	1-16
ICON Driven Multilingual Menus	Emission and Alarm levels Quality Assurance results Calibration screens Review data logs Show graph and bar chart Set up and password Advanced calculations (Mass, normalisation)	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, normalisation)
Filter Optimisation Diagnostics	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	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	Ethernet (Modbus TCP) (optional)
Outputs	1 x RS-485 (Modbus RTU) 1 x 4-20mA (500 ohm) 2 x Relay (2A@250V, user selectable)	1 x RS-485 (Modbus RTU) 4 x 4-20mA (500 ohm) 4 x Relay (2A@250V, user selectable)
Inputs	1 input for plant off indication, bag cleaning reference and multiple calibrations	4 inputs for plant off indication, bag cleaning reference and multiple calibrations
Enclosure Size (mm)	220 W x 123 H x 80 D	263 W x 160 H x 91 D
Power Supply	90 to 260 VAC (50/60Hz), 1A	90 to 260 VAC (50/60Hz), 1A

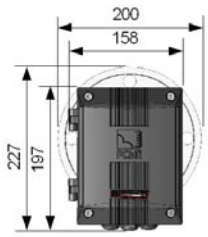
Note: Additional 4-20 mA and Relay output also available from optional accessory components.

specifications

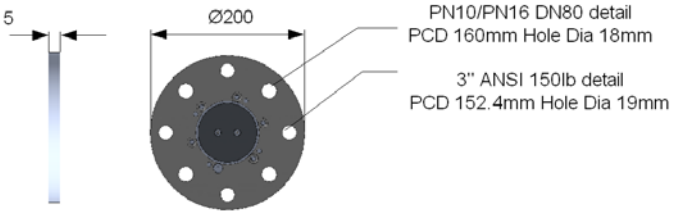
Dimensions

Standard Sensor 0-250°C





Flange



Enclosure Temperature Rating	-25°C to +55°C
Enclosure Rating	IP65
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 88mm)
Power Requirements	24V provided by the control unit
Cable Entries	3 x M20 gland/conduit entries
Air Purge Requirements	Requires optional air purge fitting at 30-40 litres/ minute

Order Codes

PCME QAL 181	[single channel]
PCME QAL 181 *PLUS*	[multi channel]

Control Unit Options

CON 181 – A B

A	Controller	*PLUS* version (MultiController) Standard version (Interface Module)	M I
B	Ethernet	None Ethernet fitted (*PLUS* version only)	0 ET

Example: CON 181 [A: M] [B: ET]

Sensor Options

SEN 181 – 1 2 3 4

1	Stack Temperature	Up to 250°C Up to 500°C	250C 500C
2	Air Purge	None Air Filtration Kit for use with instrument air line (strongly recommended)* Low Pressure Blower	0 AIR-L AIR-B
3	Orientation	Vertical Horizontal	VERT HOR
4	ProScatter™ single filter Audit Unit	Not included Included	0 AUD-1-LS
5	Sensor Material	316 Stainless (standard) Corrosion resistance for SO_2 (consult PCME)	
6	ATEX Category	Consult PCME	

*Requires continuous air supply of 30 to 40 litres/minute.

Example: SEN 181 [1: 250C] [2: AIR-L] [3: VERT] [4: AUD-1-LS]

System Options

4-core Cable	Specify length required (10m per sensor included as standard)	CAB4
ProScatter™ 5-point Filter Audit Unit	Perform 5-point linearity check of sensors	AUD-5-LS
Spur	Divides cable into 2 branches	SPR
Power Supply/Repeater	Voltage and signal boost for extended cabling runs with multiple sensors	PWR
Analogue Input Module (AIM)	4 x 4-20mA inputs 4 x Digital inputs	AIM
Analogue Output Module (AOM)	8 x 4-20mA (500 Ohm)	AOM
Alarm Output Module (ROM)	8 x Relay (1A @ 250V)	ROM
Isolating Spur	Provides Surge protection	SPR-X

PC Software Options (PC-ME Dust Tools)

Configuration Options	System Set
Real-time Data Options	On-line Predict
Historical Data Options	Data Downloader Data Viewer Data Reporter QAL Reporter Predict View

About PCME Ltd

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.

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