

Passionate about Particulate



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## PCME QAL 991

ELECTRODYNAMIC™  
INSIDE

Particulate

Measurement

System

QAL1 approved  
PM CEM



- Complies with standards EN 13284-2, EN 14181 and EN 15267-3
- Suitable for bagfilter applications with Emission Limit Value (ELV) of 10 mg/m<sup>3</sup> (Incineration) and 30 mg/m<sup>3</sup> (Co-incineration)
- Automatic recording of span and zero checks to satisfy QAL3 requirements



Certificate No: 9389

# technology/applications

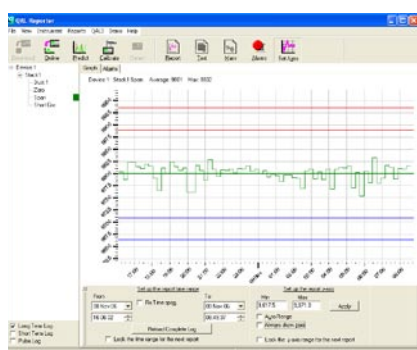
## System Description

The **PCME QAL 991** is an approved particulate CEM (Continuous Emission Monitor) complying with monitoring standards EN 14181 and EN 13284-2. The instrument holds a QALI approval to the latest performance requirements, as specified in EN 15267-3. This approval has been made both under MCERTS (version 3 Class 1 performance standards for CEMS) and TUV (BlmSchV 17, 13, 27 latest revision).

The **PCME QAL 991** benefits from using *ElectroDynamic™* Probe Electrification measurement technology and is particularly suited for monitoring emissions from Waste Incineration Plant where emissions are controlled with dry scrubbing and bagfilter technology. The instrument may also be applied to other industrial processes controlled with high efficiency bag filtration. The sensor is provided with an active/passive design to eliminate any concerns or effects of condensation in the stack connection stub.



## Application and Certification Conditions



Stewart Chart of span for QAL3

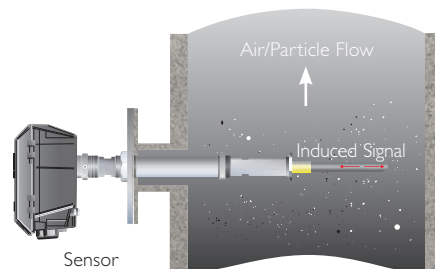
- Certification range: 0-15mg/m<sup>3</sup> (as stated in QALI approval).
- Measurement capability: 0-100mg/m<sup>3</sup>.
- Long term zero drift: <0.1mg/m<sup>3</sup>.
- Maintenance Interval: 3 months.
- Inspection frequency: 6 months.
- For measurement in non-condensing flue gases.
- For constant process applications controlled by bagfilters. Not suitable for Electrostatic precipitators or applications with water droplets.
- No velocity restrictions in processes between 8m/s-20m/s. Constant velocity required outside this range.
- For Stack Diameters: 500mm to 3m (multi-sensor configuration required for stack > 3m).

## Principles of Operation

The instrument uses PCME's unique and patented *ElectroDynamic™* Probe Electrification technology. The sensor electronics measures the current signature created by particles interacting with the grounded sensing rod which protrudes into the stack. The electronics extract a specific frequency band of this signal and electronically filters out the dc current caused by particle collisions. This signal may be correlated to dust concentration by comparison to the results of an iso-kinetic sample (the Standard Reference Method for particulate) for those types of industrial stack applications for which the instrument is designed (see process limits).

Core features of the *ElectroDynamic™* Probe Electrification technology are that the signal generated is:

- Unaffected by contamination on the sensor rod (which may cause signal drift issues for other systems).
- Not affected by velocity variations within typical bagfilter velocity ranges (8-20m/s).



**ELECTRODYNAMIC™**

### Technology Comparisons and Benefits

Compared to other types of AC systems, *ElectroDynamic™* Systems has the following added benefit:

- An optimised frequency spectrum to extend the velocity range over which the system has no cross sensitivity to changing velocity (see TUV approvals).

Compared to DC triboelectric systems and 'induction sensing and protected probe systems', *ElectroDynamic™* systems have the following added benefits:

- Tolerance to contamination on the rod (no air purge for rod required and insulator airpurge only recommended with conductive dusts).
- Stable results and calibrations (protected probes are not necessary in dry applications and therefore drift caused by electrostatic charging effects is avoided).
- Reduced sensitivity to the effects of changing velocity.

### Added Value Features

The **PCME QAL 991** includes an advanced level of automatic functionality checks to provide high quality assurance as well as be fully QALI compliant:

- A probe rod short circuit check - to enable the instrument to detect (and hence avoid) the sensing rod becoming electrically shorted to the stack which would cause errors.
- Automatic zero and span checks - as required for QAL3 reporting according to EN 14181.

The system also includes advanced signal processing and diagnostics to permit a plant operator to locate the position of leaking bags in large bagfilter applications:

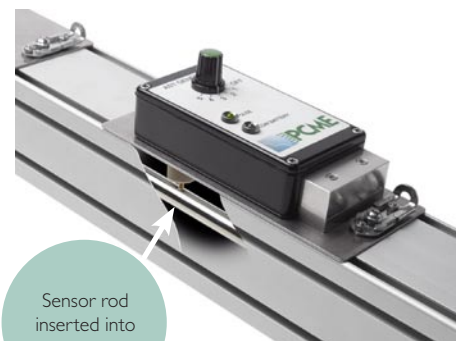
- Rapid dynamic ranging of 10,000:1 permitting bag cleaning pulses to be accurately monitored while maintaining high accuracy in background emission measurement. Sufficient dynamic range is provided to follow "on-line" and "off-line" bag cleaning cycles for predictive filter failure and faulty bag location detection.

# product features

## QAL1, QAL3 and AST Features

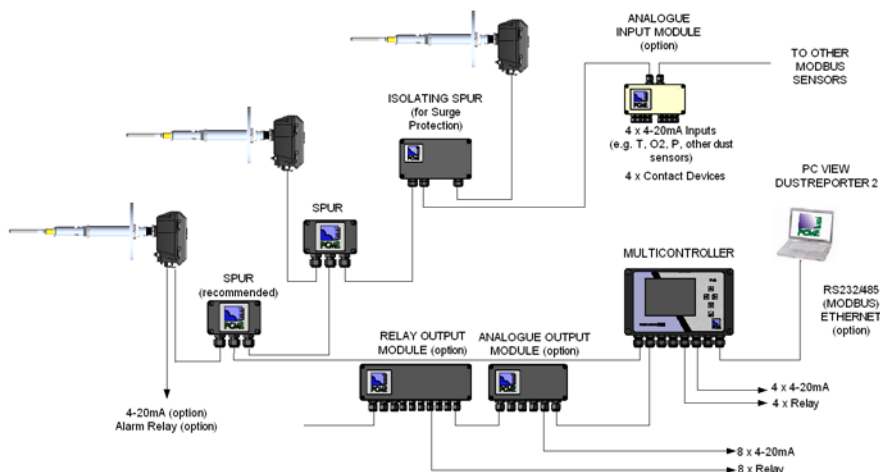
The **PCME QAL 991** provides a complete solution for measurements according to EN 14181 in its specified application range. The instrument holds a QAL1 certification range of 0-15mg/m<sup>3</sup> meaning that it is suitable for compliance reporting from processes with Daily Emission Limit Values as low as 10mg/m<sup>3</sup> (ie: Incineration Plant). The measurement and calibration features facilitate a 15 point/5 point calibration (QAL2) and permit the specification of a valid calibration range. The internal Quality Assurance Features of the instrument have been designed and approved to meet the QAL3 and AST requirements of EN 14181.

- Automatic zero, span and contamination self-checks are used to assess internal uncertainty. The results of these tests are recorded for later statistical analysis. This provides the infrastructure for QAL3 tests according to EN 14181.
- Optional PC Software 'QAL Reporter' provides secure emissions and QAL3 reporting. It provides the statistical treatment of the zero and span results for the user to demonstrate that the instrument is operating according to defined specifications (uncertainty).
- The instrument is supported by an optional *ElectroDynamic™* Audit unit which is an approved reference material for conducting linearity tests as part of AST or QAL2 procedures. When using this option, the sensor is temporarily removed from the stack and inserted in the audit chamber. Surrogate signal levels are applied to the sensor as references and these are measured to ensure linearity and performance against specifications.

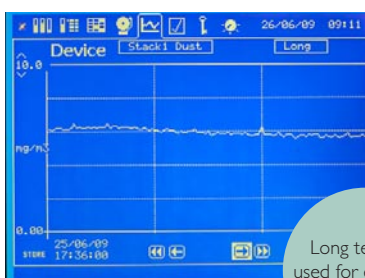


## System Layout

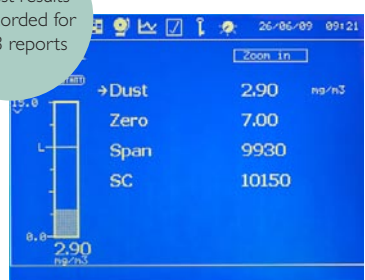
The **PLUS** version of the instrument permits up to 16 sensors to be connected to a single central control unit. The control unit provides power for the sensors (additional Power Supply Units (PSU) required on larger systems) and industry standard outputs (4-20mA, RS232/RS485 Modbus) are provided for easy connection to plant control systems. The control unit also comprises a powerful data logging capability to permit process and regulatory reporting. In addition, other PCME Modbus sensors can be connected to the control unit.



## Control Unit Options



Self-test results are recorded for QAL3 reports



### Standard System

### PLUS System

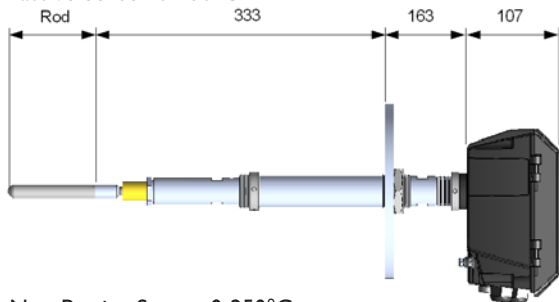
	Standard System	PLUS System
Controller Type	Interface module	MultiController
No of Channels	1	1-16
ICON Driven Multilingual Menus	Emission and Alarm levels Quality Assurance results Calibration screens Review data logs Show graph and bar chart Set up and password Advanced calculations (Mass, normalisation)	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)
Bagfilter Optimisation Diagnostics	Pulse log review for diagnosing location of leaking bags	Pulse log review for diagnosing location of leaking bags
Emission Data Logs	<b>Capacity stated for 1 sensor - with QAL3 Channels</b> 3 months @ 15 minutes 7 days @ 1 minute 2 hours @ 1 second 500 entries	<b>Capacity stated for 4 sensors - with QAL3 Channels</b> 3 months @ 15 minutes 7 days @ 1 minute 2 hours @ 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: Local 4-20mA and Relay output also available from each sensor (option) and from optional accessory components (option).

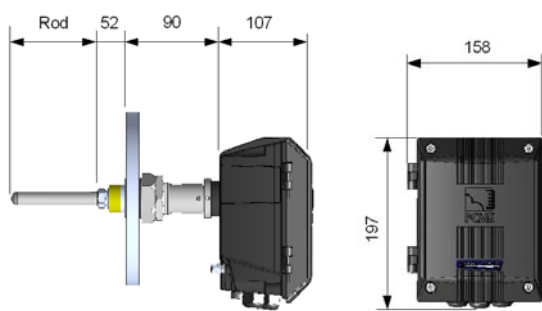
# specifications

## Dimensions

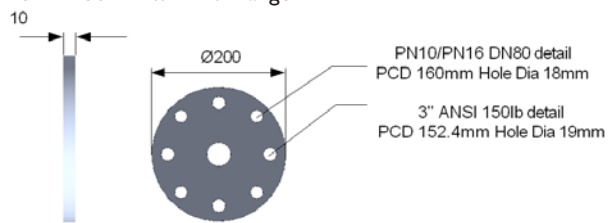
### Passive Sensor 0-250°C



### Non-Passive Sensor 0-250°C



### 3" ANSI/PN10/PN16 Flange



Enclosure Temperature Rating	-25°C to +55°C
Enclosure Rating	IP65
Enclosure Material	Die-cast aluminum (polyester powder coated)
Sensor Material	316 stainless steel
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 and external supply of 5-10 litres/min of dry clean, oil free instrument air

## Order Codes

**PCME QAL 991** [single channel]  
**PCME QAL 991 PLUS** [multi channel]

### Control Unit Options

CON 991 – 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 991  M  ET

### Sensor Options

SEN 991 – 1 2 3 4 5 6

1	Sensor Type	Passive/active sensor 0-250°C Non-Pasive sensor 0-250°C	250P 250S
2	Rod Length	100-0800mm (passive/active) 0100-1000mm (non-passive)	RODxxxx
3	Air Purge Fitting	None Air purge fitting	0 AP
4	Air Filter/Regulator	None Filter + regulator assembly	0 X22
5	Stack Connection	Flange (standard) 1.5" BSP	FL BSP
6	Local Outputs	None Local 4-20mA and Alarm Relays	0 420L

Example: SEN 991  250P  ROD0500  AP  REG  0  0

### System Options

4-core Cable	Specify length required (10m per sensor included as standard)	CAB4
ElectroDynamic™ Audit Unit	Perform 5-point linearity check of sensors	AUD-ED
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

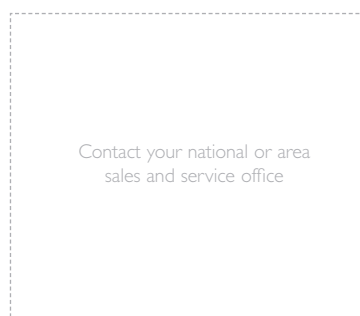
### PC Software Options

PC View	View of real time data	PV
Dust Reporter 2	Emission reporting and analysis	DR
QAL Reporter	Emission reporting including QAL3 analysis	QAL
Configuration Wizard	Remote setup	CW
Dust Reporter Options	Online Predict Auto Download	O P A-D

## 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.

[www.pcme.co.uk](http://www.pcme.co.uk)



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