

PCME offer industry leading expertise to customers and partners through a comprehensive range of technical support services, training packages and a 'knowledge transfer' approach. Our aim is to provide expert advice and support to aid you in meeting your specific particulate monitoring challenges, from initial consultation and product selection through to life-cycle support services and tailored maintenance programs. The demands of meeting Environmental regulatory compliance, process control and optimisation, plus corporate social responsibility needs, each present unique demands on particulate monitoring. Our Technical Support Services Team bring experience from a wide range of industry sectors and process applications, thus ensuring that systems are set-up, operated and maintained to maximise performance and functionality for their intended purpose. PCME's range of Technical Services also enable Environment Agency regulated processes that are subject to the Operator Monitoring Assessment (OMA) scheme to maintain or improve their scoring through having formal and service maintenance contracts to ensure that calibration and maintenance is carried out at the correct time. Our service packages also help ensure Part A2 and Part B processes met their permit requirements with regard to maintaining their monitoring systems.



Worldwide on-site support

PCME's service capability extends throughout the world and has proven to provide robust, responsive services to our global customer base. We know the importance to our customers of having instruments serviced at their sites to reduce downtime and increase instrument availability. World-wide service partners have teams of service engineers who are trained by PCME to provide on-site support. In the UK, a network of field service engineers provides on-site national coverage.

Service Contracts

Preventative maintenance, extended warranty, rapid breakdown response and calibration services are all covered by a range of service contracts to meet regulatory and process specific support requirements. In the UK, a range of contracts help operators achieve a high OMA (Operator Monitoring Assessment) score for their monitoring systems and worldwide PCME supports its distribution partners to provide similar high level field and factory services.

Breakdown Service

Many of PCME's instruments include automatic self-checks to provide warning of the need for any instrument repair or service. In the case of instrument breakdown our network of field service engineers are fully trained to carry out instrument fault analysis and repair on site. Factory repair services are available from the UK headquarters in St Ives, Cambs.

Calibration Services

PCME understands that a calibration is not simply an Iso-kinetic test. Documented and traceable calibration procedures capture instrument performance and configuration. Calibrations are provided using a range of National and International sampling standards (eg. EN 13284-1 and BS ISO9096) via a subcontracted network of approved sampling personnel. In the UK, sampling personnel are MCERTS approved.



Training

PCME provides regular on-site and factory service training for plant personnel to support their monitoring systems. In addition, PCME organises Training Courses to improve knowledge and understanding of instrument service requirements, legislative issues, the features and performance of monitoring systems and the optimised use of emissions analysis and reporting software.

PCME have **global service centres** to cover repairs in North and South America, Europe, Australasia, Asia and Africa. Please see our website for further details.

ABOUT PCME LTD

As a progressive environmental Company, PCME Ltd (an Environnement S.A Group company) specialises in particulate and flow 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 for consultation regarding the selection and usage of the most suitable equipment for any particulate monitoring application.



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Particulate and Emission Monitoring Solutions

for Regulatory Compliance and Process Control



About us

PCME is a leading specialist in the development, manufacture and supply of continuous particulate emission monitors for industrial processes. With instruments monitoring over 30,000 emission sources worldwide across a broad range of industries, PCME's particulate monitoring solutions meet stringent regulatory requirements which improve environmental performance and control, increase plant effectiveness and assist in reducing costs.

Headquartered in Cambridgeshire, UK, with distribution representing over 40 countries worldwide, PCME operate a continual development programme to maintain their position at the forefront of advanced particulate emission monitoring solutions.

Many PCME particulate monitoring systems are certified by TUV and MCERTS to EN 15267-3 with QAL1 as defined by EN 14181. Other systems are certified to the latest performance standard specific to filter leak /filter particulate monitoring (mg/m^3) as defined by EN 15859 providing peace of mind that the latest regulatory requirements are met.



PCME Provide Industry-Leading Solutions

Regulatory Compliance:

Industrial processes installing and operating continuous monitoring instrumentation to meet and/or exceed national and international requirements including US EPA, UK MCERTS and German TÜV standards

- Measurement in mg/m^3
- Monitoring the performance of filter plant systems
- Quantitative/indicative monitoring

Corporate Responsibility:

Industrial processes monitoring emissions to provide data for their own internally driven environmental programs and quality control procedures

- Improved environmental performance through corporate governance or environmental programs (e.g. ISO 14000)
- Instruments meet the demand for high quality measurement similar to any process instrument where data is of value to the organisation

Process Improvement:

Industrial processes installing monitoring instruments to improve their process with a financial return

- Instrument output is directly used to control the process
- Typical uses include improved powder production, reduction of product loss from process particle collection devices and reduced running costs of fabric filters (e.g. extending life of bags)

Innovation and Product Development

PCME offer an unparalleled range of sensor and system technologies, with a focus on added value features designed to address the differing particulate emission monitoring challenges faced by specific industries. These unique PCME features have been developed through years of practical application experience, with ongoing consultation between plant operators, regulators and PCME driving a continuous development program for the furthering of particulate monitoring technology.

The PCME QAL 181 WS (left) is designed to measure particulates where the flue gas is below dew point or where water droplets are present. This product marks a significant milestone in that it is the first complete system to be TUV certified to EN 15267-3 with QAL1 as defined by EN 14181 with a certification range of 0 - 15 mg/m^3 . It utilises a direct extractive continuous monitoring approach with heating which overcomes the problem of interference from condensation and water droplets when using an in-situ particulate monitor after wet collectors.

The PCME STACK 160 (right) is suitable for measuring dust concentrations and monitoring filter failure in medium to large diameter stacks (2 to 15m) on industrial and combustion processes. It provides a more sensitive and reliable alternative to traditional opacity instruments. The instrument is based on ProScatter™ laser-based technology which measures the light scattered back from the particulate, without the need for a retroreflector on the opposite side of the stack.



Particulate Matter Continuous Monitoring System for wet stack applications



Back Scatter ProScatter™ Particulate Monitoring System for large stacks

products

Particulate emission monitoring is a challenging technical field, not only because of the application-specific accuracy and performance of particulate emission monitors, but also due to the harsh environments in which they must continuously operate. To meet these challenges, PCME produce a comprehensive range of monitoring solutions to meet the broad needs of particulate emitting industries worldwide and the requirements of national and international regulations.



Particulate Measurement Systems

Particulate Measurement Systems provide continuous measurement of particulate emission concentrations which, for a defined range of application conditions, have the accuracy and consistency of response to be reliably calibrated against isokinetic gravimetric test samples (standard reference method). PCME's range of approved particulate measurement systems satisfy rigorous standards to meet national and international regulatory requirements. Instruments are also supplied for non-regulatory measurement with similar performance to approved instruments.

Filter Performance Monitors

Filter Performance Monitors continuously monitor and display particulate emissions and indicate relative changes over time to provide valuable feedback on filter plant performance (bagfilters, cyclone filters, dryers, scrubbers). In addition, the ability to locate faulty filter media by row or compartment minimises the need to replace filtration media, reduces labour requirements for fault location and reduces process downtime. This functionality can be combined with Particulate Measurement Systems and PCME's data logging control units, and where required systems are available with full performance approvals.



Filter Leak Monitors

Filter Leak Monitors, also known as Burst Bag Detectors (Europe) and Bag Leak Detectors (US), track changes in emissions from particulate arrestment plant and provide a tool to minimise emissions and monitor for arrestment plant malfunction (e.g. damaged filtration media). PCME's range includes approved Filter Leak Monitors where quality assurance features are required – performance standards are similar to ASTM standard D7392-07 for Bag Leak Detectors and therefore offer MACT compliant monitoring solutions in the USA. Instruments not verified under an approval scheme retain a variety of quality assurance and functionality options.

Dust Gross Filter Failure Detectors

Dust Gross Filter Failure Detectors track significant increases in particulate loadings to indicate failure in the arrestment plant (e.g. gross bag filter failure or cyclone overflow). Gross Filter Failure Detector alarms typically require immediate reactive maintenance to be taken on the filter plant, as there is no pre-emptive warning or early indication of filter deterioration.



COMBUSTION & INCINERATION

- POWER PLANTS
- INCINERATORS
- REFINERIES
- PULP & PAPER



Monitoring Issues:

- Approved and certified systems for dust concentration, not simply colour
- Tolerance to flyash which contaminates monitoring systems
- Low maintenance needs due to limited man-power to maintain analysers and instruments
- Highly abated emissions after incineration processes and therefore minimum detection level constraints
- EN-14181, incineration and combustion specific standards, WID (Waste Incineration Directive) & LCPD (Large Combustion Plant Directive)
- Tolerance to vibration and high temperatures and suitability for large stacks
- Dust analysers are integral but specialist part of emission CEM system

Emission Sources:

- Coal Fired Boilers
- Recovery Boilers
- Oil and Gas fired boilers
- Biomass boilers
- Limestone dry scrubber
- Activated carbon dry scrubber
- Munciple waste incineration
- Chemical waste treatment

MINERAL

- LIME
- CEMENT
- ROADSTONE
- GYPSUM



Monitoring Issues:

- Humid emissions from mineral drying and calcining plant
- Extensive use of ESP, Cyclone and bagfilter dust arrestment plant, all which can fail causing visible emissions
- Environmentally sensitive emissions from main kiln stack as well as multiple emission sources from mills, coolers and silos (IPPC, WID, LCPD)
- Tolerance to abrasive and contaminating dust
- Fugitive dust emissions from storage and handling
- Potential to emit large amounts of emissions due to large size of filter systems
- Approvals and regulatory compliance issue, US, European regulations under US EPA and IPPC

Emission Sources:

- Kilns
- Calciners
- Raw mills
- Clinker coolers
- Cement mills
- Silos/Materials Handling
- Rotary ore dryers
- Kettles
- Board drying kilns
- Mixing conveyors
- Screening

TOBACCO

Monitoring Issues:

- Multiple emission sources from primary and secondary processes

Emission Sources:

- Cutters & Dryers
- Conveying Systems
- Blenders and Mixers
- Cigarette Making Machines

TIMBER

Monitoring Issues:

- Re-circulating air from arrestment plant in timber and wood working industries while meeting Health and Safety dust exposure levels

Emission Sources:

- Boiler Plant
- Extraction Systems on Saws, Planes, Machining & Sanding Processes

ASBESTOS

Monitoring Issues:

- Very low levels of particulate
- High environmental concerns

Emission Sources:

- High Efficiency filters (HEPA)

rial companies across a broad range of manufacturing
improve environmental performance and control.

METALS

- STEEL
- FOUNDRY
- BATTERY
- NON-FERROUS
- ALUMINUM

Monitoring Issues:

- Tolerance to contaminating particulate with high carbon, moisture and metal content
- Emission control is critical due to toxic nature of some particulates
- EX requirements from Blast Furnaces
- High levels of particulate and large arrestment plant from smelting, sinter and furnace applications
- Low level abated emissions (typically $<0.2 \text{ mg/m}^3$) in non-ferrous and battery industries
- Elevated temperatures and abrasive dusts create increased maintenance challenges
- Efficient control and operation of multi-compartment bagfilters and ESP

Emission Sources:

- Furnaces
- Shotblasting process
- Sand plant
- Smelting furnaces
- Converters
- Lead refineries
- Anode baking ovens
- Coke plant
- Calciners
- Electrolytic reduction
- Reverberatory furnaces
- Steel casting
- Blast furnaces
- Sinter plant

CHEMICAL AND FOOD

- CARBON BLACK
- PLASTICS
- TiO_2
- PIGMENTS
- SUGAR
- STARCH
- MILK POWDER

Monitoring Issues:

- Discriminating between steam and particulate in spray dryer stacks in food, detergent and chemical industry
- Tolerance to contamination due to inherent physical properties of carbon black and other chemical powders
- Explosive gas zones in refineries, paint operations and chemical processing
- ATEX dust zones due to potentially explosive areas in starch, sugar and flour processes (problematic for optical systems)
- Extensive use of bagfilters and cyclones with measurement, process optimisation and failure detection requirements
- Digital and analogue interface to existing instrumentation, plant control systems and LAN connections

Emission Sources:

- Spray dryers
- Agglomerators
- Silos
- Mills
- Classifiers
- Pelletizers
- Fluid bed and rotary dryers
- Dryers
- Coolers
- Materials handling
- Blenders
- Process Reactors

PHARMACEUTICAL

Monitoring Issues:

- Humid emissions from drying plant
- Product loss

Emission Sources:

- High Efficiency Filters (HEPA)
- Spray Dryers
- Materials Handling & Blending
- Vacuum Transfer systems & Silos

AUTOMOTIVE

Monitoring Issues:

- Oil aerosols after engine compartment machining operation
- Preventative Maintenance on filters

Emission Sources:

- Coalescent filters
- Paint Spray Extraction
- Casting and Shotblasting

GALVANISING

Monitoring Issues:

- Typically short-term batch processes

Emission Sources:

- Galvanising Bath

added value designs

Tolerance to Contamination

ElectroDynamic™ instruments are tolerant to rod contamination since the charge induction is not restricted to direct contact between particulate and the measurement surface. DynamicOpacity™ instruments operate with no reduced accuracy even with the transmitter and receiver optics 90% contaminated. The design of ProScatter™ instruments ensures that critical optical components remain unaffected by any build-up of contamination.



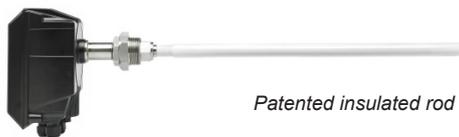
ElectroDynamic™ rod contaminated with carbon black



Measurement volume of ProScatter™ - Forward Scatter instrument

Humid Monitoring Conditions

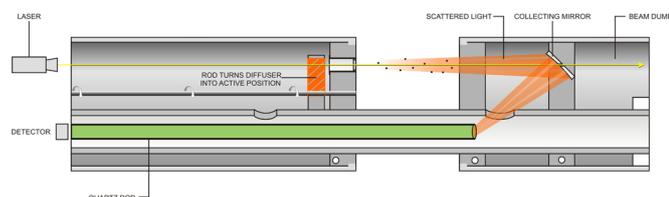
Patented Insulated sensor technology (option) permits instruments to operate reliably in high humidity stacks after spray driers and fluid driers. ElectroDynamic™ measurement technology discriminates effectively between particulate and water vapour.



Patented insulated rod

Automatic Self-Checks

Robust automatic self-checks are provided on all compliance instruments, specifically on PCME's Light Scatter instruments. These checks provide an audit of the instrument's operation while not changing the measurement principle to satisfy QAL 3 of EN-14181. The diagram below shows how the measurement path remains constant while self-checks are performed in a Light Scatter instrument.



Approved, Accurate and Repeatable Measurements

PCME's particulate emission monitoring systems carry full regulatory approvals including European CEM certification (QAL1 for EN 14181, EN 15267-3), German TA-LUFT, BImSchV 17, 13 and 27, UK MCERTS certification and meet the performance requirements for US-EPA PS-1 and PS-11.

Advanced Probe Contamination check



Powerful User Interface

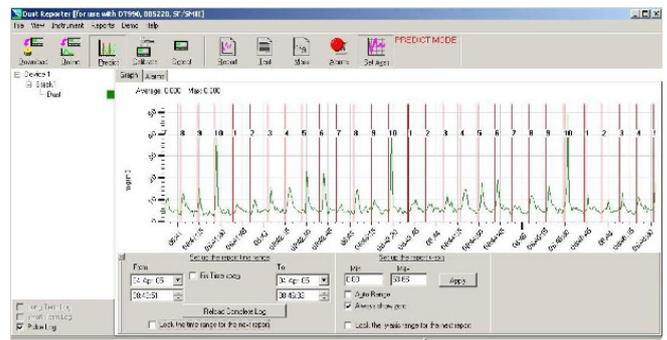
The instrument interface is optimised for parallel use by maintenance, process and environmental personnel. Powerful single and multi-sensor control units permit secure system configuration and access to data. Graphic trend and review screens provide Bagfilter pulse and average emissions concurrently and local or PC configuration and reporting is fully supported by open data architecture.



Environmental and Process Reporting

PCME provide a full suite of PC software for emissions reporting, instrument configuration and process optimisation. Software for the downloading, displaying, analysis and report generation of emissions data from a PCME emission control unit provides instantaneous and historical access to emissions data for both process and legislative reporting purposes.

- Real-time mode and short-term log for process control.
- Long-term log for emission reporting
- Powerful trend views with zoom and pan facilities
- Reporting to satisfy EN-14181 (QAL 3 reporter)
- Instrument overview, alarms, maintenance and failure condition reports
- Environmental reporting with data backup and system redundancy
- 'Predict' software option to locate faulty filter media and reduce maintenance on multi-compartment filter houses



Dynamics of dust levels during bag cleaning. Cleaning Sequence marker pulses are fed to the system and displayed as red lines to aid in location of faulty filter rows

Rugged Sensor Options

PCME have developed a range of rugged sensor options for its probe electrification instruments.

These enable PCME's ElectroDynamic™ particulate measurement range of instruments to be used in some challenging industrial applications and combine the benefits of an ElectroDynamic™ measurement of dust (application dependent) with long term robust operation.

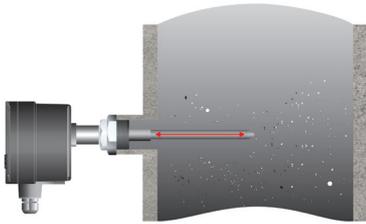
The following sensor options and modules are available to provide solutions to:

- Elevated pressure and temperature applications
- Acid attack protection (combustion of fuels with high sulphur content)
- Elevated temperature acid attack protection (as above with higher temperature rating)
- High humidity applications (process and spray driers)
- Air purged sensor (conductive dust and high dust applications)
- Explosive dust and gas zones (ATEX and IEX)



technologies

PCME have a comprehensive range of particulate monitoring technologies to ensure that only the right technique is used in a particular application. Interference and cross-sensitivities are minimised by selection of the most appropriate technology.



ElectroDynamic™



Principle of Operation

Proprietary technique based on a charge induction principle derived from particle interaction is not restricted to direct contact with the probe inserted into a stack or duct. The instrument output is an analysis of this frequency response and in appropriate applications is a function of the concentration of particulate

Applicability

- Bagfilters, Cyclones, Humid air streams*
- * using patented insulated sensor

Dust Concentration

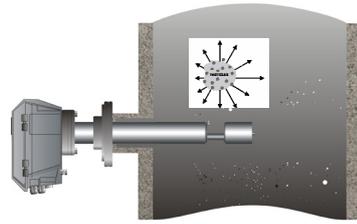
- 0.01 mg/m³ to 10,000mg/m³ (product specific)

Certification Range

- 0 – 15mg/m³ (MCERTS/TUV)

Unique Features

- Unaffected by contamination of probe
- Unique solution for dryers & humid gas streams
- Optimised to tolerate change in velocity of 8-18 m/s (unlike Triboelectric systems)
- Zero and Span Checks
- Patented Insulated Sensor for humid applications
- Patented Probe Contamination check
- **Velocity Insensitivity:** ElectroDynamic™ instruments maintain calibration under changing velocity conditions of 8 – 18 m/s. (Independently verified by German TÜV)



ProScatter™



Principle of Operation

- Forward Scatter - Cone of scattered light from particles within the measurement volume of the sensor probe is collected and measured
- Back Scatter - measures the amount of light scattered back from particles in the stack illuminated by a modulated laser

Applicability

- Incinerators with dry scrubbers, cement kilns, power plant (oil, gas and coal fired)

Dust Concentration

- 0.1 to 1000mg/m³ - Forward Scatter
- 1 to 500mg/m³ - Back Scatter

Certification Range

- 0-15mg/m³ (QAL 1)- Forward Scatter

Unique Features

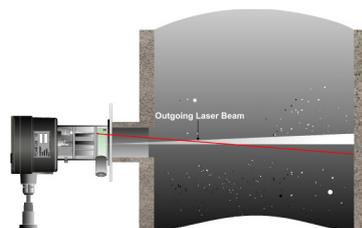
- Extended temperature range (no fibre optics)
- Detector position unchanged in self-check mode
- Self-checks to meet PS-11 and QAL 3 (EN-14181)
- Extractive system available for **wet stacks** below dew point or with water droplets present

Forward Scatter:

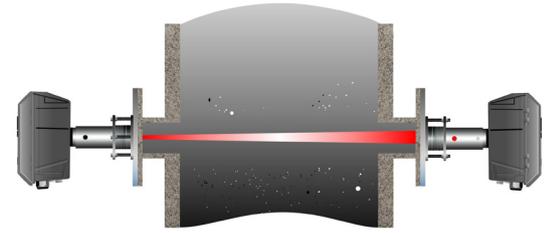
- Cone measurement increases particle interaction volume

Back Scatter:

- Conveniently mounted on one side of the stack and requires no light absorber or beam dump on the opposite side of the stack
- Ideal for measuring low dust levels in large stacks



Back Scatter technology schematic



Transmissometry



Principle of Operation

- *Opacity™* - measurement based on change in measured light intensity
- *DynamicOpacity™* - ratiometric measurement based on light intensity variation

Applicability

- Bagfilters, Electrostatic Precipitators, Cyclones, Boiler Stacks

Dust Concentration

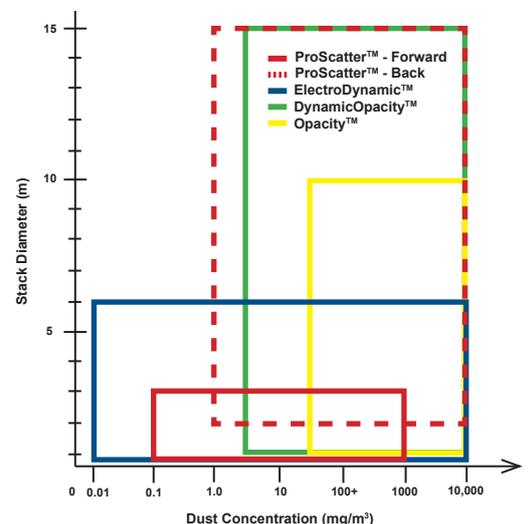
- 10mg/m³ to 20,000mg/m³ (minimum detection limit is application specific)

Certification Range

- 0 – 150mg/m³ (MCERTS/TUV)

Unique Features

- Ratiometric measurement permits accurate measurement when lens contaminated up to 90%
- Zero and span checks on compliance instruments
- Selectable dust concentration and/or **opacity outputs**
- Light intensity, upscale checks
- Optional audit unit (model specific)
- Blower systems not required since air purge is sufficient



This graph is intended to be representative of each technology. The actual capability is application dependent.