



Particulate Monitoring Systems

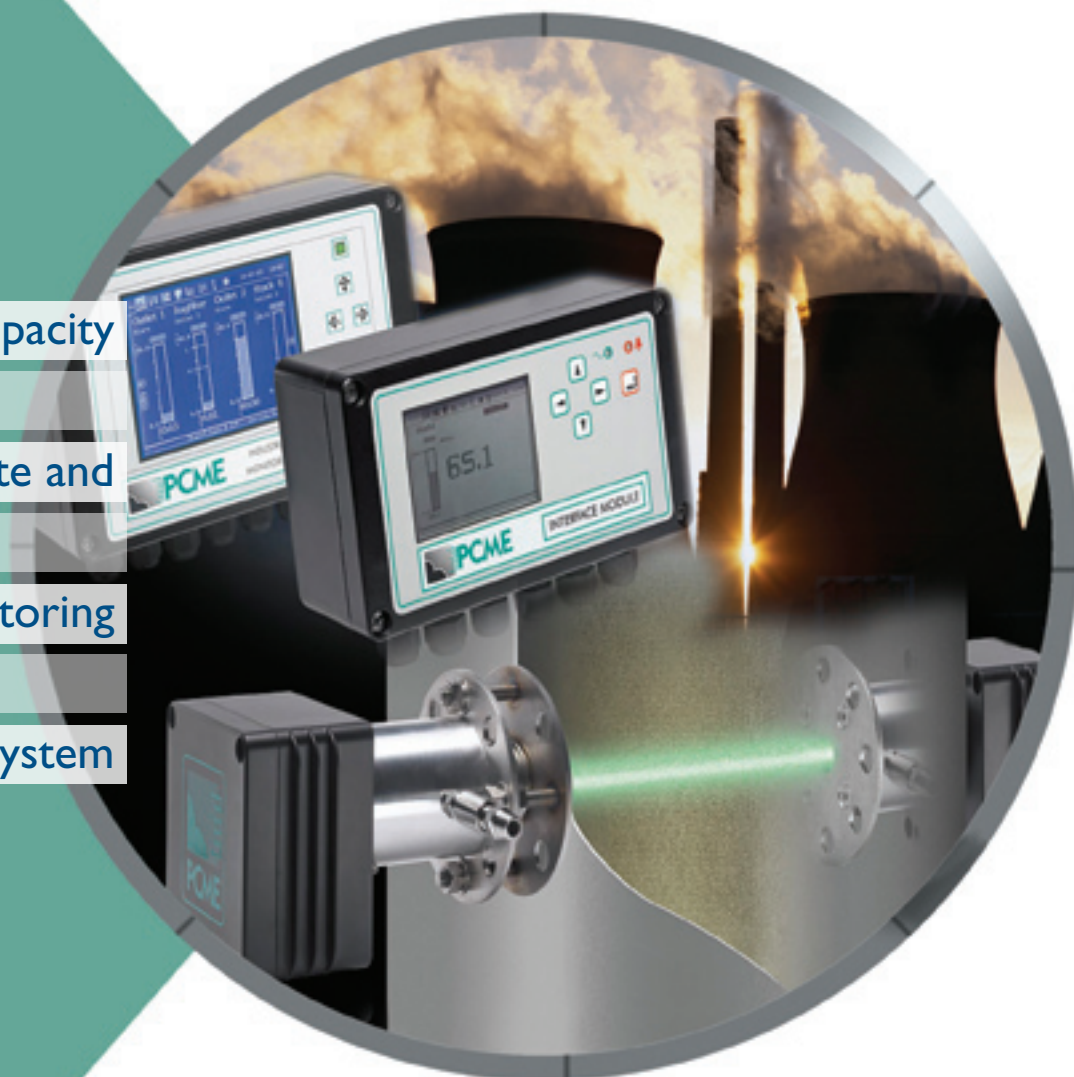
Advanced Dynamic Opacity
Monitor for Particulate Monitoring

Dynamic Opacity

Particulate and

Opacity Monitoring

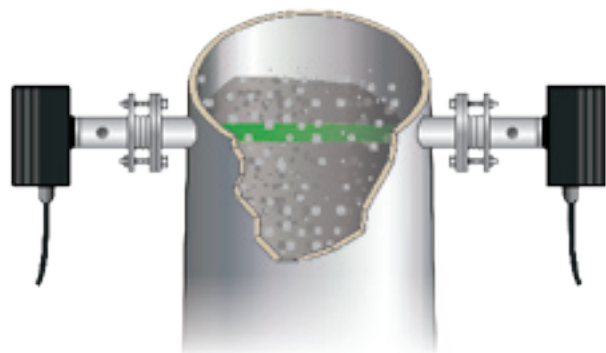
System



Certificate No: 9389

- Dynamic Opacity technology with both dust concentration (mg/m^3) and Opacity (%) outputs
- For compliance mg/m^3 measurement in the Power, Steel and Cement Industries
- Automatic Zero and Span features and optional audit unit to manually validate system
- Operational range of 0 to $150 \text{ mg}/\text{m}^3$ in large stacks (up to 15m) and after Electrostatic Precipitators
- Rugged operation with dust concentration measurement, unaffected by lens contamination

Instrument Overview



The SC602 is a modbus based cross-stack optical measuring system which uses a dynamic sensing technique to measure the rate of change of light (Dynamic Opacity) as particulates pass through a modulated light beam. This proven optical technique, coupled with advanced design features, offers significant reliability and resolution advantages over traditional Opacity monitors and virtually overcomes lens fouling associated with standard Opacity monitors.

The SC602 provides similar dust measurement capability to the PCME SC600 which is already approved (by TUV and MCERTS) for dust measurement in the range 0-150mg/m³ in coal power plant applications.

Principle of Operation

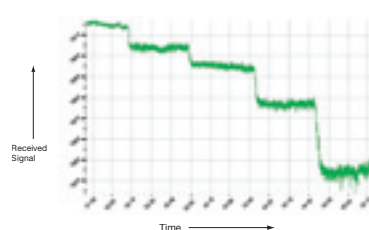
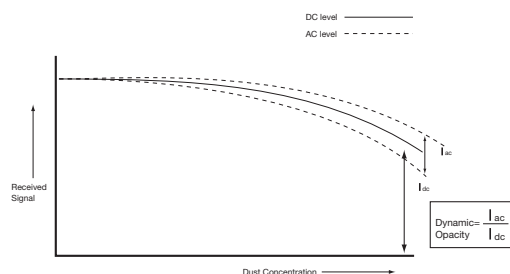
The SC602 measures the effect of particles on a light beam transmitted across the stack. The instrument measures the ratio of the temporal variation in intensity to the intensity, unlike traditional Opacity instruments in which the beam intensity is simply measured. This intensity variation derives from the statistical variations in the distribution of particles in the air-stream. The higher the concentration of particles, the greater the range of variation. Empirical results confirm a repeatable relationship between Dynamic Opacity and dust concentration. A linear relationship has been demonstrated in 3rd party independent approvals such as MCERTS and TUV and permits the instrument to be calibrated in mg/m³ by comparison to the Standard Reference Method of Iso-kinetic Sampling (ISO 9096).

The SC602 is primarily designed for applications with typical emissions in excess of 25 mg/m³ where interferences from water vapour and heat effects are small compared with dust signals. The instrument will also operate at much higher dust concentrations (up to 500 mg/m³)* and is capable of measuring as low as 5 mg/m³* in applications with ambient temperature and low humidities.

The SC602 can also measure Opacity (and extinction) directly and this output is available for processes which are still regulated and controlled in terms of Opacity (Colour impact) rather than dust concentration in mg/m³.

*Application dependant

Dynamic Opacity Curves



Increasing dust concentration influences Opacity and Dynamic Opacity

Extended Maintenance Interval

Dynamic Opacity instruments are often used to replace Opacity instruments which require extensive maintenance and servicing time. In 'dust mode' the SC602 uses a ratiometric measurement method with the significant advantage that this ratio is unaffected by lens contamination. This allows the instrument to operate while the lens contamination has exceeded 90%. Air purges should be connected to the transmitter and receiver heads to provide a positive displacement of air away from the lens surfaces, however, since air usage is in the order of 1m³/hour it is economical to use plant instrument air rather than install specific air blower systems.

The transmitter and receiver heads are designed so that the lens can be accessed and cleaned without the need for disconnecting flanges from the stack ensuring correct alignment even after maintenance intervals.

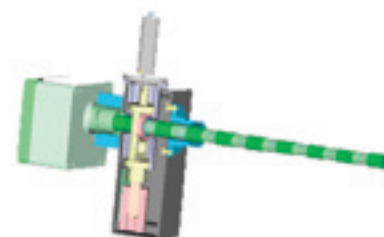
Lens condition	Light intensity	Variation	Scintillation
100% transmission	I	x	x/I
90% transmission	0.9I	0.9x	0.9x/0.9I = x/I
50% transmission	0.5I	0.5x	0.5x/0.5I = x/I

Automatic Zero and Span Checks

The instrument has automatic zero and span checks which monitor for instrument integrity. These checks simulate the operation of the instrument and permit any internal instrument problems to be self-detected. Span checks for the Dynamic Opacity mode involve varying the light signal by means of an oscillating filter in the transmitter head. The zero check involves measuring the variation with no transmitter light present. These checks are carried out automatically over a period of 3 hours.

Optional Audit Unit

Should manual checks of the instrument be required, then an optional audit unit is available which permits audit filters to be inserted in the instrument measurement path under the control of the user. An audit of both Opacity and Dynamic Opacity operation can be performed with this unit.



Audit Unit for manual instrument checks

product features

Monitoring Range

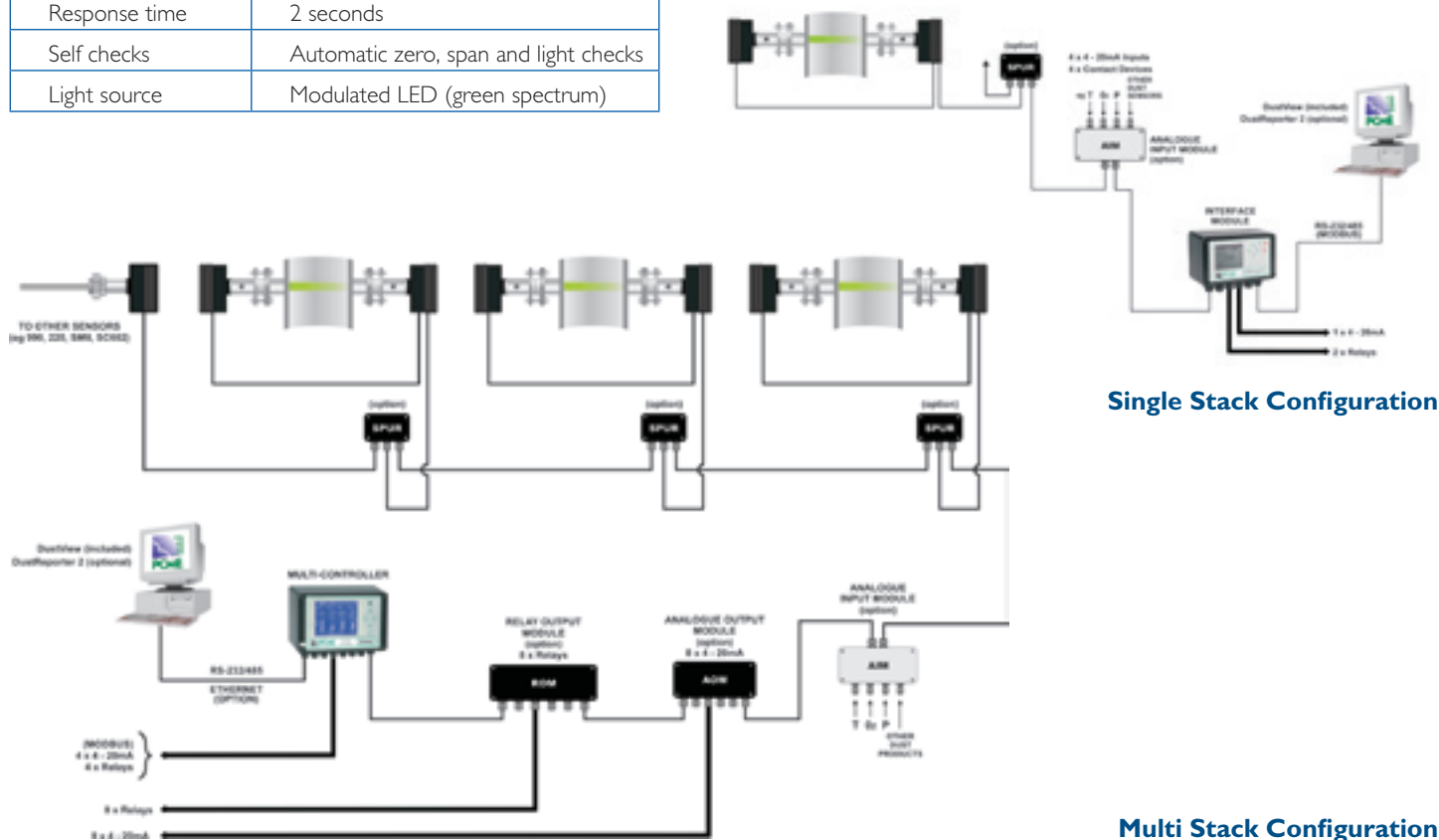
Operational Range	<5.0 to 1000 mg/m ³ *
Stack temperature (option)	up to 400°C, up to 800°C

*Application dependant

Stack sizes	1 to 15 metres
Output range	User defined over full range

Instrument Specifications

Response time	2 seconds
Self checks	Automatic zero, span and light checks
Light source	Modulated LED (green spectrum)



Single Stack Configuration

Multi Stack Configuration

Extended Features

The SC602 transmitter and receiver heads communicate directly with a user interface control unit. A single instrument controller (Interface Module) is supplied as standard, however, a multichannel control unit (Multicontroller) is available for centralised control of up to 32 sensor heads and can be combined with other PCME dust analysers and components.

Both types of control unit provide features for:

- Calibration in mg/m³
- Opacity in %
- On line normalisation for Temperature and Oxygen
- Emissions recording and reporting (via DustReporter 2 software)
- Emissions trending and graphing

Control Units

The following user interface is provided by the control units. The MultiController allows for future expansion. Specifications are below:



Dust emissions are displayed with **alarm level**

Graphics screen assists avoidance of emissions



	INTERFACE MODULE	MULTICONTROLLER
Number of Channels	1 (single)	1-32 (multi)
Order Code	SC602S--CON	SC602M--CON
Size (mm)	220w x 123h x 80d	260w x 160h x 90d
Power Supply	90 - 260 VAC (50/60 Hz)	90 - 260 VAC (50/60 Hz)
Enclosure Rating	IP65	IP65
User Screens	- Set-up - Trends - Memory - Alarm Log - Bargraph	- Set-up - Trends - Memory - Alarm Log - Multiple Bargraph - System Overview
Memory	Pulse, Short and Long	Pulse, Short and Long
Output	1 x 4-20 mA 2 x Relay RS232/485 (MODBUS)	4 x 4-20 mA 4 x Relay RS232/485 (MODBUS)
Optional Output		Ethernet
Inputs		4 x digital

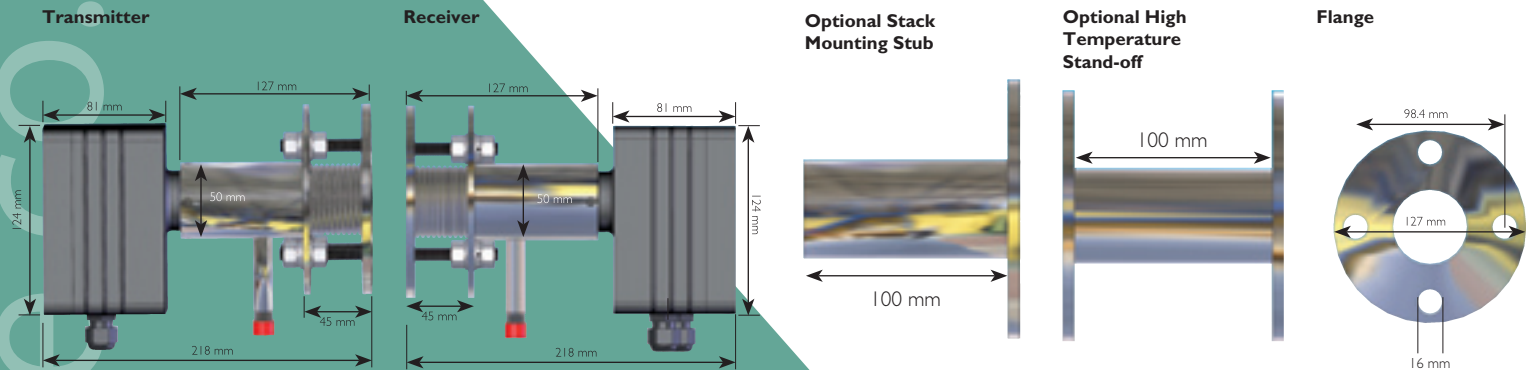
specifications

Sensors and Cables

Enclosing rating	IP65
Cable type	4 core screened
Cable length	10 metres standard: 1000 metres max
Sensor head material	Die-cast aluminium (epoxy coated) and 316 stainless steel
Coupling material	Stainless steel
Flange size	1 1/2" ANSI hole pattern

Air purge: Airline connection Air consumption	1/4" BSP up to 0.5 litres/second per head
Sensor types	-25° to 400°C - optional -25° to 800°C - optional
Transmitter & Receiver head weight	1.5kg each

Physical Dimensions



Optional Components

Component	Purpose	Specification	Size (mm)
Cables	Power (+24v DC) and communication (RS-485): Cable 1: from control unit to receiver (4-core) Cable 2: from receiver to transmitter (8-core)	4 conductor overall screened cable, diameter <0.8mm (Each conductor <0.5 mm ² <50 ohm/km, and suitable for RS-485) Eg. Batt cables 85364	2 x 10m (included). Extendable to > 1000m *
SPUR	Divides cable into 2 branches	3 cable connections	100 w x 66 h x 46 d
PSU/Repeater	Voltage and signal boost for extended cabling runs with multiple sensors	90-260 VAC input (50/60 Hz) 24V DC output	222 w x 125 h x 81 d
Analogue Input Module (AIM)	Input data from external devices (eg for temperature and O ₂)	4 x 4-20mA inputs 4 x digital inputs (contact closures)	160 w x 80 h x 65 d
Analogue Output Module (AOM)	Additional 4-20mA	8 x 4-20mA (500 ohms)	175 w x 80 h x 60 d
Relay Output Module (ROM)	Additional Relays	8 x Relay (1 Amp @ 250V)	250 w x 60 h x 80 d
220 Sensor	Broken bag detector (alarm only)	Temperature up to 125°C (250°C option)	1/2" (or 1 1/2" BSP) stack connection
990 Sensor	TUV approved dust monitor for bagfilter	Option to 800°C**	1 1/2" BSP stack connection
DustReporter2	PC Reporting software	Windows 95, 98, NT, XP	

** Higher on application

* Can be extended further by use of additional PSU

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, velocity 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 PE27 3GH UK

Tel: Int +44 (0)1480 468200
Fax: Int +44 (0)1480 463400
E-mail: sales@pcme.co.uk

Contact your national or area sales and service office