Physical Dimensions and Order Codes

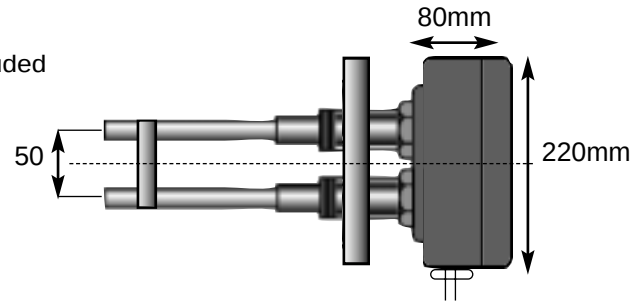
Control unit order code: SMIIC - X

- N = No longterm memory
- L = Longterm data logger included

Senor order code: SMIIS - X X

- Temperature range
- Stack diameter

StackMasster II Sensor



Specifications

Dust Measurement principle	Electrodynamic
Minimum concentration detection level	0.02 mg/m^3
Dust Range	Fully adjustable over 0-1,000 mg/m^3 range
Velocity Measurement principle:	Electrodynamic cross-correlation
Velocity error over (1 - 20m/s) range	<2% FS
Minimum dust required to measure velocity	4*mg/m^3

*Application specific. Could be lower

	Product Code	
Stack Connection		3” 150 lb ANSI, PN6 DN80 Code 101
Temp Range	250	0 - 250˚C
	400	0 - 400˚C
Sensor Material	S	316 Stainless Steel
Stack Diameter	I	Standard probes for up to 4m

Optional Components

Component	Purpose	Specification	Size (mm)
Cable	Power and communication to sensors from control unit	4-core screened (2 for 24V DC, 2 for RS-485 COMMS)	10m/sensor (included) Extendable to >1000m* Belden 9402 (or equivalent)
AIM	Input data from external devices (eg for Temp and O_2)	4 x 4-20 mA inputs 4 x Digital Inputs (contact closure)	176w x 80h x 60d
SPUR	Divides cable into 2 branches	3 cable connections	100w x 64h x 44d
PSU/Repeater	Voltage and signal boost for extended cabling runs with multiple sensors	90 - 260 VAC input (50/60 Hz) 24V DC output	222w x 125h x 81d

*Can be extended further by use of additional PSU

About PCME

PCME is a world leader in particulate measurement. The company produces equipment for emissions monitoring, process control and solids flow monitoring. 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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Issue 01/03

PARTICULATE MONITORING SYSTEMS

Combined Mass and Concentration Particulate Emissions Monitor

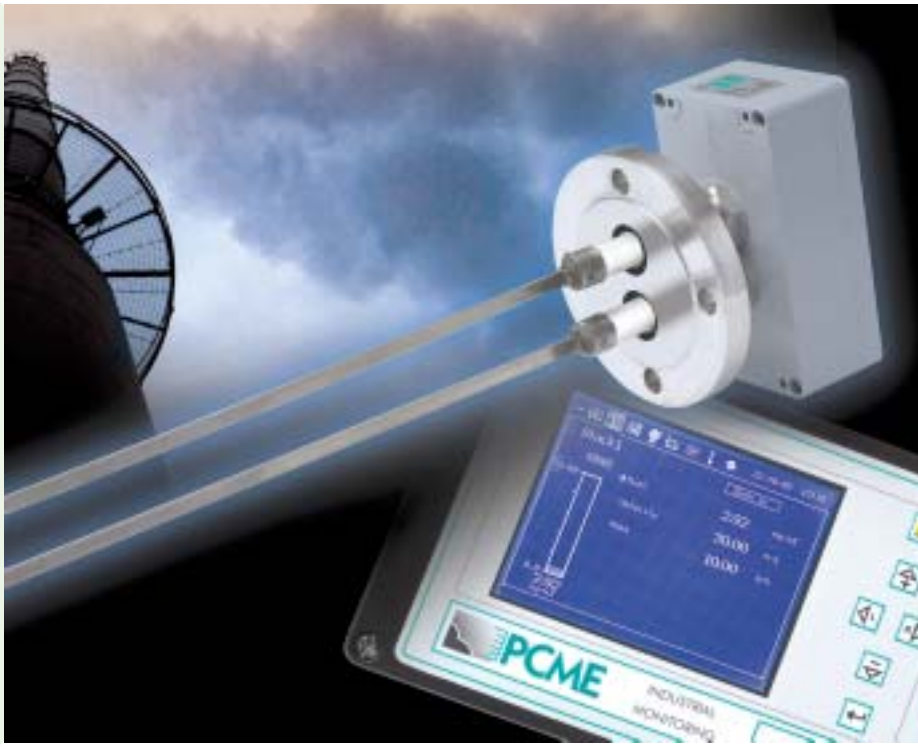
ELECTRODYNAMIC

MASS AND

CONCENTRATION

EMISSIONS MONITOR

FOR PARTICULATE



CE

NQA ISO9001 REGISTERED COMPANY UKAS QUALITY MANAGEMENT 015

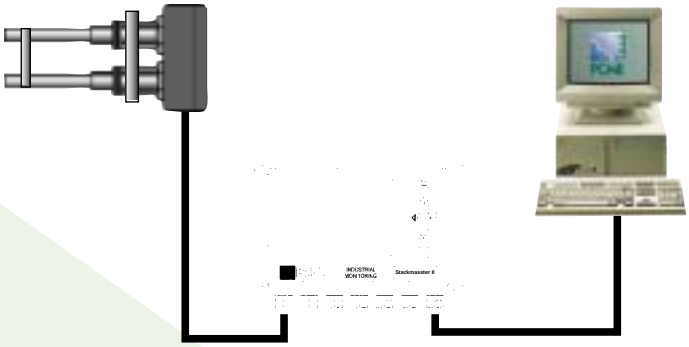
Certificate No: 9389

- Enhanced measurement through unique Electrodynamic technology
- Single sensor permits simultaneous measurement of stack particle velocity (m/s), particle concentration (mg/m^3) and mass (kg/year)
- Double-rod Electrodynamic sensor for high accuracy and reliability in high dust and humid applications
- Satisfies IPPC and IPC mass emissions reporting requirements
- Automatic self checks for increased measurement confidence

System Description

The StackMasster II permits both the mass emissions and concentration of particulate to be simultaneously monitored, recorded and reported. This satisfies both process and new regulatory requirements which focus on the total discharge of particulate from a plant (mass/time), as well as concentration limits (mg/m³). The StackMasster II provides a reliable, cost effective solution for the aggressive environment of a particle laden discharge in both constant and variable velocity applications.

The StackMasster II, with its precise time of flight velocity measurement principle, provides an accurate and robust solution for all but the cleanest emission applications. Its double rod sensor is virtually unaffected by particle contamination and will operate reliably in dusty and humid environments.



The system can be expanded to incorporate up to 32 sensors which may include additional StackMasster II sensors, Auxiliary Input Modules (for taking 4-20 mA from other instruments) and DT990 type dust concentration sensors.

Self Checks

In order to maintain the reliability and confidence in the measurement from the sensor, a complete set of self checks are incorporated.

- No Signal
- Main peak, peak ratio small
- Zero test for velocity, dust and correlation
- Span test for velocity, dust and correlation
- Contamination (probe short circiut)
- Comms

Control Unit Screens

Particle concentration, velocity and mass emission rates are all monitored and displayed in the control unit. This permits the operator to optimise performance of dust control equipment and to minimise excursions above emission levels. The control unit provides a full range of displays to review and analyse data including:

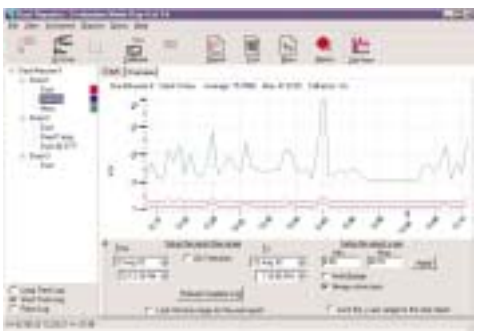
- Multichannel bargraph to permit comparison of both concentration and mass data against alarm levels
- Status screen for concise overview of alarms
- On-instrument graphing of stored data
- Customisable ‘channel grouping’ for displaying related data
- Alarm log for instrument and emission alarms
- Full on instrument review of three simultaneous memories (Long Term*, Short Term and Pulse).
- Windows based software to download to PC for reporting (option)
- Large back-lit graphical display (320 x 240 pixels) for easy interpretation of graphical data
- Full overview of current condition of system. i.e. zero, span, probe contamination, comms.
- Multiple calibration factors
- Password protection

PC Based DustReporter 2 Software (optional)

Analysis and Historical Reporting:

- Automatic* or user controlled transfer of data from control unit’s internal dataloggers to PC for further analysis and reporting
- Pre-configured and user configurable environmental report formats to satisfy legislation*
- Easy access to historical data and alarm logs
- "Zoom" function permits data to be viewed rapidly and concisely for analysis
- Windows 95, 98, 2000, XP and NT compatible
- Mass emission reports*
- On-Line alarm overview and graphs from various sensors displayed on PC screen*
- Bagfailure location*
- Real-time alarm overview

*optional features



Typical Emission Graph

Principles of Operation

Mass Measurement

The mass emission rate (mg/sec) is calculated directly from the concentration (mg/m³) and volume flow rate (m³/sec); data which is separately determined by the combined sensor unit. The total mass emissions is totalised and reported over a user selectable time once data has been transferred to the PC.

M = C x v x A

where

M = Mass Rate

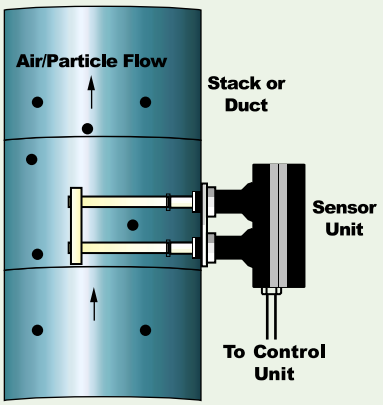
C = Particle Concentration

v = Stack Velocity

A = Area of Stack

Particle Concentration Measurement

The StackMasster II utilises PCME's unique Electrodynamic measurement principle. When the sensor of the StackMasster II is installed in the duct or stack, particles in the airstream interact with the upstream sensing rod and a charge induction affect is analysed in the probe. Distributions in the particle stream result in a frequency charge induction response which is directly proportional to the concentration of particles (application dependant). Unlike triboelectric systems the instrument's calibration (which is made by comparison to an Isokinetic sample) is not significantly affected by changes in velocity, making the system suitable for both variable velocity applications above 8 m/s and all fixed velocity applications.

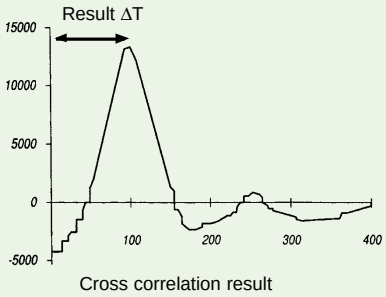


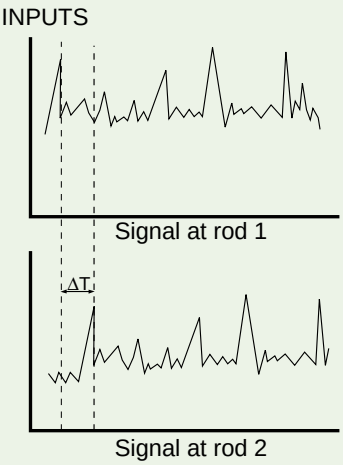
Volume Flow Rate

The volume flow rate is derived from the cross-sectional area of the duct and the measured stack velocity. In elevated temperature applications, velocity can be normalised to 273k and the StackMasster II includes features to make these calculations. Temperature sensor inputs are available via an optional AIM unit.

Principle of Velocity Measurement

A precision cross-correlation method for measuring velocity in which the Electrodynamic signal from the upstream rod is compared with the similar (but time delayed) signal from a second downstream rod. The transit time of the particles between the rods, which protrude partially across the stack, is determined by the time shift between the signals which coincides with the peak of the cross-correlation algorithm. The velocity is calculated from transit time and the geometric spacing between the sensors.
The sensor is calibrated by reference to a pitot traverse of the stack.





Control Unit

Multichannel support:	1 to 32 sensors
Enclosure rating:	IP65
Enclosure Size (mm):	260w x 160h x 90d
Power Supply:	90 - 260 VAC (50/60Hz)
Current Rating:	250mA
Display Type:	Backlit LCD providing graphical and text display

4 x Isolated 4-20mA Outputs	Configurable for mass concentration or velocity
RS-485 & RS-232 Outputs	Connection to PC or PLC
4 x Relay Outputs 4 x Digital Inputs	Configurable and assignable e.g Plant on/off bagfilter cleaning pulse, multiple calibrations

Note: 2 x Isolated 4-20mA outputs also provided from sensor

Simultaneous maintenance, control and reporting

Control Unit	Order Code	Purpose	Storage Rate / Capacity	Typical Log length (1 Sensor with conc, v, T & Mass)
Long Term	L	Calculating Emission Averages (for reporting)	1 min - 2 hours 150k entries	408 Days (@ 15 minutes)
Short Term	S	Visibility to Process Trends	1 sec - 4 mins, 20k entries	40 hours (@ 30 seconds)
Pulse	P	Locating Broken Bags	Optimised (13k entries)	50 minutes
Alarm Log	A	Log of all alarms	Instantaneous	1000 entries