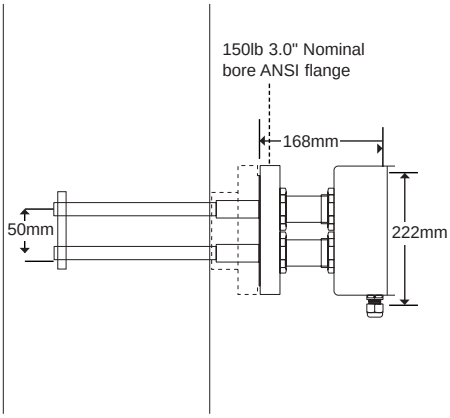
Sensor Installation and Physical Dimensions

The Stackflow II sensor must be located where the flow is representative. This is not quite as restrictive as the conditions for fully developed flow (ie isokinetic sampling location).

Notes:
1 Locating the Stackflow II sensor in a duct into which rain is likely to fall when plant is shut off should be avoided.
2 An ideal position for the Stackflow II sensor is in a straight section of duct, ideally four duct diameters down-stream from a flow disruption (corner, fan etc) and at least one duct diameter upstream from the duct exit or a flow disruption. The four duct diameter requirement may be shortened if necessary.

NB Probe length to suit stack diameter and process requirements (typical lengths – 250 mm, 500 mm, 750 mm, 1000mm).



Sensor Order Codes

SFIIS - X X

- First X: Temperature Range
- Second X: Stack Diameter

Specification

Measurement	
Capability	4-40 m/s
Velocity Error (4-40 m/s range)	2% of reading + 0.2 m/s
Response Time (>90%)	<5 secs
Minimum dust required for measurement	4mg/m³*

*Application specific. Could be lower.

Power Supply Unit / Control Unit	
Voltage	115/230 V AC, 50/60 Hz
Enclosure Ratings	IP-65

Optional Control Unit * *	
Number of sensors	1 to 32
Capability	Alarms Display of Readings Graphical Trending Recording Local 4-20mA output Modbus 485/232 output

* * For further information refer to DT990 datasheet

Sensors		
	Order Code	
Temperature Range	250 400	0-250°C 0-400°C
Sensor Material	S	316 Stainless Steel
Sensor outputs		Isolated 4-20mA* x 2 RS-232/485 (Modbus)
Sensor Unit Voltage		24V DC (provided by PSU or control unit)
Stack Diameter	D	up to 4m
Stack Connection (flange bolts aligned in direction and across flow)		3” 150lb ANSI or PN6 DN80 Code 101

*4-20mA range/filter set via PC software (standard) or optional control unit.

Cable	
Cable length from PSU/control unit to sensor	10m (standard) (extendable to 1000m)†

†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

DUST FLOW PCME

POLLUTION MONITORING SYSTEMS

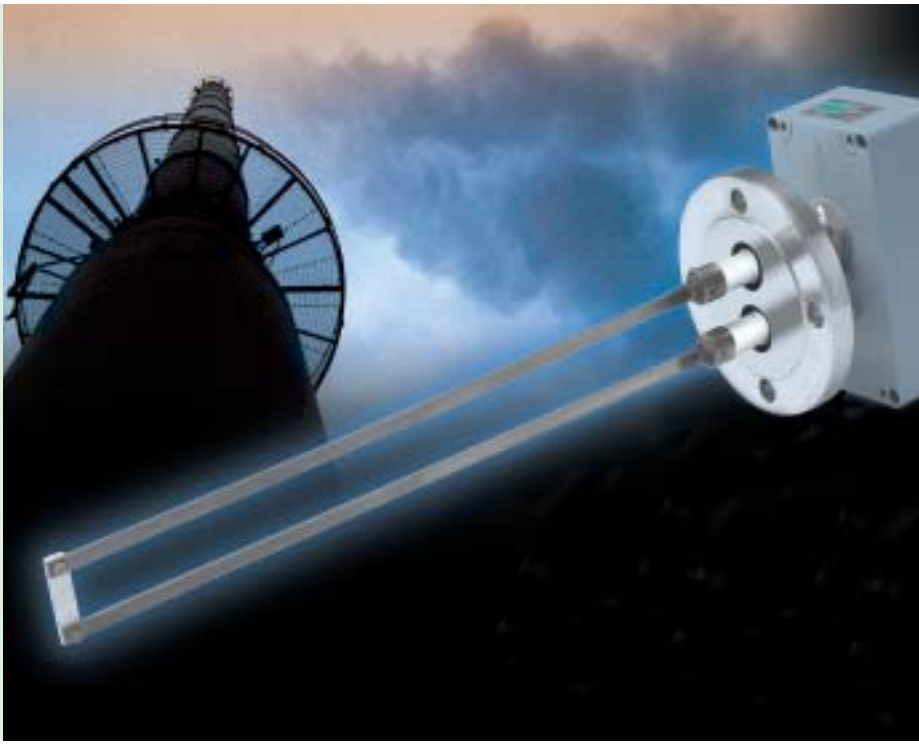
Continuous Velocity and Volume Flow Rate Monitor for Stacks

ELECTRODYNAMIC

STACK

VELOCITY

MONITOR



CE

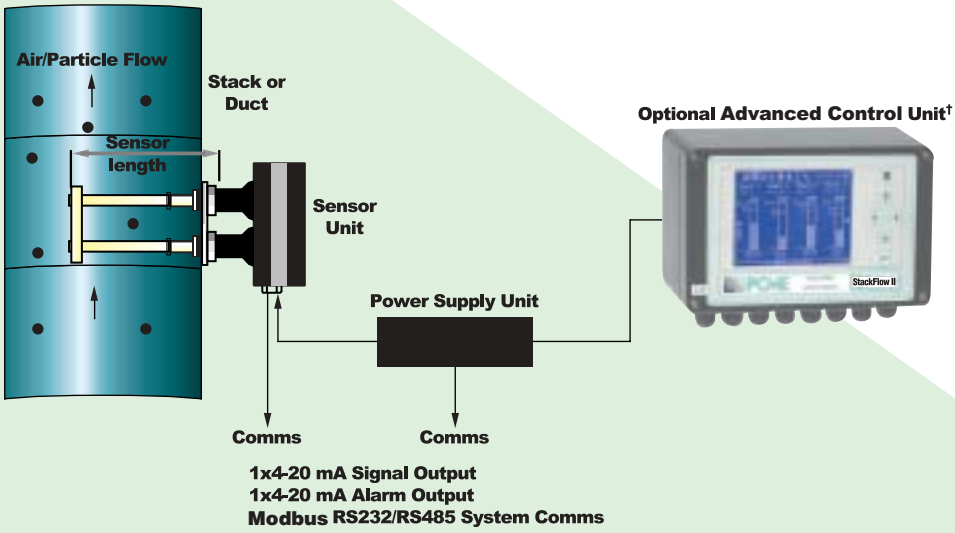
NQA ISO9001 REGISTERED COMPANY UKAS QUALITY MANAGEMENT 015

Certificate No: 9389

- Rugged measurement technique without pitots or moving parts
- Unique twin Electrodynamic probe design, including self checks to allow direct measurement of stack velocity and volume flow rate unaffected by gas density or temperature
- Accurate mass emissions monitoring (kg/yr) for SO_X, NO_X, CO_2 or particulate when combined with appropriate monitor
- Upgradeable to StackMasster system for simultaneous monitoring of mass, dust concentration and velocity of dust

Principles of Technology

The StackFlow II utilises an advanced Electrodynamic cross correlation technique to accurately determine particle and hence stack velocity. The instrument accurately measures the electrical signal induced by particles passing a sensor rod. This signal is cross correlated with the signal derived from a second downstream rod to determine the transit time of the particles. The velocity is simultaneously calculated since the geometric spacing of the sensor rods is known.



Unlike most other velocity techniques the response of the instrument is not impaired by the presence of particles. This means the StackFlow II can provide robust operation in particle laden and aggressive applications.

The instruments pre-set calibration is sufficient for most stacks less than 4m in diameter*. Site calibration (for example against a pitot traverse) is only required in stacks with non-uniform velocity profiles.

*Assumes relatively homogenous flow.

†Can be used in place of or in addition to the Power Supply Unit

Self Checks

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

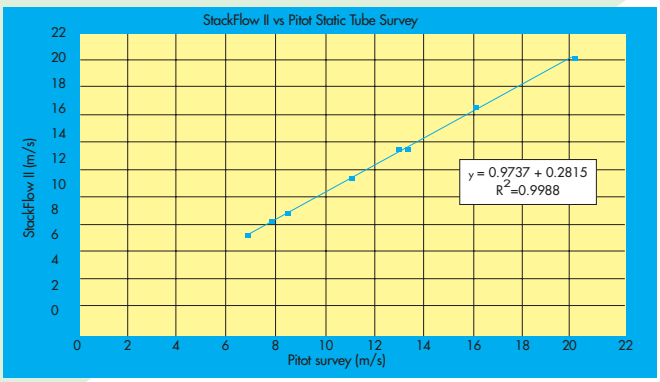
- No Signal
- Main peak, peak ratio small
- Zero test for velocity, dust and correlation
- Span test for velocity, dust and correlation
- Contamination (probe short circiut)
- Comms

Applications

The StackFlow II's reliable, accurate measurement and ease of use combined with minimum maintenance has proven to be a significant advantage against existing methods of velocity measurement, for 'end users', System Integrators, OEMs and sites requiring upgrades to existing CEM systems.

- Measuring particulate velocity for use with Gas Analysers for calculation of gas mass emission Kg/Yr
- Measuring particulate velocity to enable calculation of particulate mass emission Kg/Yr
- For tuning efficiency of arrestment systems such as cyclones and EP's
- Measuring velocity of Pulverised Fuel
- For additional process feedback to increase process efficiency
- Easily integrated in CEM systems for both gas and dust mass emission calculations
- Suitable for monitoring both inlet and outlet velocity from cyclones, EP's and baghouses

Overview



A project to study the effects of velocity and other parameters on mass monitoring indicators was set up by the DTI (the UK's Department of Trade and Industry). One of the major challenges was to understand the effects of changing velocity from emission stacks.

A number of trials were carried out using PCME's Stackflow II including the Coal Research Establishment's pilot plant, a sinter plant and a sugar plant.
Results showed good correlation between instrument-determined velocity and average velocity from pitot traverses over a range of conditions. The system was found to satisfy ISO-14164 (the performance standard for flow instruments) and was, therefore, suitable for measuring flue gas velocity, even in very high dust applications.

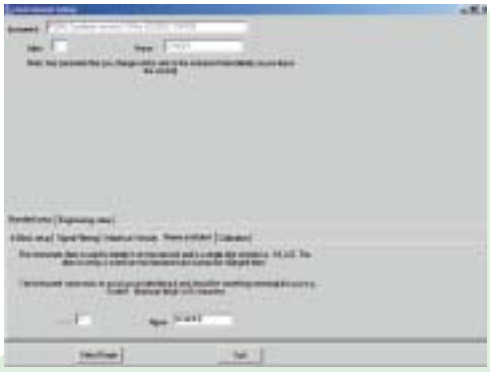
Features

- Requires only one flange mounting point on stack.
- Direct measurement of stack velocity and volume flow rate unaffected by gas density or temperature.
- Choice of bar graph or line graph for easy comparison/analysis of data.*

  *When used with optional control unit
- Upgradeable to StackMasster system for simultaneous monitoring of mass, dust concentration and velocity of dust.
- Virtually maintenance free in particle laden applications.
- Rugged measurement technique without pitots or moving parts.

Operation Overview

The StackFlow II is a self-contained module requiring only a remote power supply of 24V DC to operate. The StackFlow II sensor is configured by means of a dedicated PC based software package.



The Software is user-friendly requiring four simple steps in order to set-up the Stackflow II sensor:

Step 1
Set comms between PC and sensor.

Step 2
Engineering Set-up Menu - used primarily for setting up the sensor to suit dust type.

Step 3
Standard Set-up Menu - used for tuning the system to suit specific customer requirements and process conditions.

Step 4
After setting up the system, the sensor can be disconnected from the PC for stand-alone use. The velocity output is via a 4-20 mA signal to appropriate data logging or control instrumentation, eg PLC/DCS. Alternatively, it can be left connected to the PC where on-line graphs can be generated and stored for analysis and reporting.

The velocity signal can be confirmed/calibrated against a known accurate reference such as a pitot traverse. A calibration factor is available if adjustment is necessary.

Optional Extras – Advanced Control Unit

Particle velocity rates are monitored and displayed continuously in the control unit. This permits the operator to optimise performance of dust control equipment or other process systems and to minimise excursions above emission levels. The control unit provides a full range of displays and outputs to review and analyse data including:

- Multichannel bargraphs to permit comparisons of concentration, velocity and mass data against alarm levels†
- QA screen showing results of automatic self checks (zero, span and sufficient signal)
- Status screen for concise overview of alarms
- On-instrument graphing of stored and on-line data
- Customisable ‘channel grouping’ for displaying related stack data eg dust, velocity, gas, O_2, mass†
- Modbus 485/232 output
- 4-20 mA outputs x 4
- Alarms x 4
- Event log for review of all historic alarms

†Requires appropriate instruments to provide information via 4-20 mA eg dust monitor.