

# Particulate Measurement Monitors

PROCESS & EMISSIONS MONITORING SYSTEMS



**ELECTRODYNAMIC™**  
INSIDE

## SPECIFIC FEATURES:

- Category 1 certified for Ex (ATEX and IECEx) Gas Zones 0, 1 & 2 and Dust Zones 20, 21 & 22
- Intrinsically safe dust sensor with separate advanced control unit and isolating spur (fail-safe system)
- Unique *ElectroDynamic*® dust measurement principle provides robust operation
- High-temperature and high-pressure sensor versions available (PCME VIEW Ex 820)



# TECHNOLOGY

## SYSTEM DESCRIPTION AND PRODUCT RANGE

The PCME VIEW Ex Series instruments are used for particulate emission monitoring where Category 1, 2 or 3 hazardous area certification is required. The instruments are typically used after arrestment plant, such as Bagfilters and Cyclones to monitor emissions, quantify particulate loadings in  $\text{mg}/\text{m}^3$  and/or detect process upsets. The PCME VIEW Ex 800 is suitable for temperatures and pressures found in most stack conditions, while the PCME VIEW Ex 820 can tolerate the elevated pressure and temperatures found in coal gasification and certain combustion applications.

## Ex APPROVALS AND SAFETY CONTROL

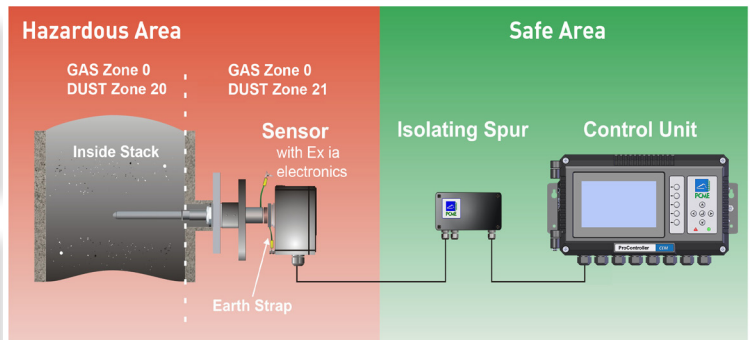
The PCME VIEW Ex Series are intrinsically safe certified particulate emission monitors suitable for Ex Gas and Dust Zones. The instruments are certified as Category 1 devices by the Notified Body, SIRA, UK according to both the ATEX Directive (94/9/EC) and IECEx requirements. As such they are suitable for use in both hazardous Gas Zones 0, 1, 2 and hazardous Dust Zones 20, 21, 22. The sensor electronics are certified intrinsically safe (ie fail-safe under two fault conditions) and are, therefore, suitable for installation directly in the hazardous Gas Zone. The control unit and isolating spur unit are located in the safe area. The sensor is connected to the controller via an isolating (IS) Spur. The system uses galvanic isolation meaning that no independent, intrinsically safe earth is required. An 'Earth strap' connection is required between the sensor body and the stack as part of the system safety (see manual for further details).

### Certification for Enclosure – Outside Stack

- Ambient temperature range of  $-20^{\circ}\text{C}$  to  $50^{\circ}\text{C}$
- Intrinsic safety for Gas Zone 0 (ia) to maximum surface temperature of  $135^{\circ}\text{C}$
- Protection by enclosure for Dust Zone 21 (tb) to maximum surface temperature of  $80^{\circ}\text{C}$

### Certification for Sensor Rod – Inside Stack

- Probe temperature range of  $-20^{\circ}\text{C}$  to  $250^{\circ}\text{C}$  (Ex 800 sensor) or  $-20^{\circ}\text{C}$  to  $400/450^{\circ}\text{C}$  (Ex 820 sensor)
- Intrinsic safety for Gas Zone 0 (ia) and for Dust Zone 20 (iaD)



## PROCESS AND APPLICATION CONDITIONS

- Long-term zero drift:  $<0.1 \text{ mg}/\text{m}^3$
- Measurement capability:  $0\text{--}500 \text{ mg}/\text{m}^3$
- For measurement in non-condensing flue gases.
- For stack measurement but not suitable for use with Electrostatic Precipitators (ESPs) or applications with water droplets.
- For use in processes with flow rates of  $8 \text{ m}/\text{s}$  to  $20 \text{ m}/\text{s}$  with no restrictions. Constant velocity is required outside this range.
- For stack diameters of between  $\text{Ø}100 \text{ mm}$  and  $6 \text{ m}$  (flow-profile dependent on larger stacks).

## PRINCIPLE OF OPERATION

The PCME VIEW Ex Series instruments use ENVEA's unique and patented *ElectroDynamics*<sup>®</sup> 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 filter out the DC current caused by particle collisions. This signal may be correlated to dust concentration by comparison to the results of an isokinetic sample for those types of industrial stack applications for which the instrument is designed (see application conditions).

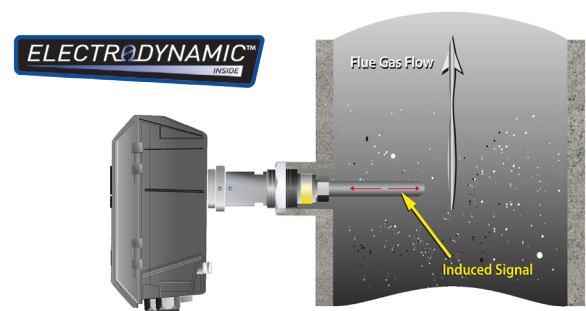
Core features of the *ElectroDynamic*<sup>®</sup> Probe Electrification technology are that the signal generated is:

- 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 (see separate TUV approvals for PCME Ltd technology).
- Reliable and stable in the target applications for the instrument (see Process Conditions above). Identical PCME technology to this is used in the PCME QAL 991 instrument, which was the first ever probe electrification instrument to become TUV and MCERTS approved against the exacting standard of EN15267-3 for QAL1.

### Technology Comparisons and Benefits

Compared to other types of AC systems, *ElectroDynamic*<sup>®</sup> systems have 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).
- Protected probes or insulated rods are not permitted in hazardous zone applications.



Compared to DC triboelectric systems and 'induction sensing and protected probe systems' *ElectroDynamic*<sup>®</sup> systems have the following added benefits:

- Tolerance to contamination on the rod.
- 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.

# PRODUCT FEATURES

## ADDED VALUE FEATURES

The PCME VIEW Ex Series instruments include an advanced level of autothematic functionality checks to provide high quality assurance:

- A probe rod short circuit check - enables the operator to know when the sensing rod may be electrically shorted to the stack and avoid associated errors.
- Automatic electronic zero and drift checks - improves measurement reliability and ensures that the instrument is working correctly. These checks are done in the sensor to ensure the major part of the instrument is challenged during these tests.

The system includes advanced signal processing and diagnostics to permit a plant operator to locate the position of leaking bags as well as improve the quality of emission measurement:

- 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 for "on-line" and "off-line" bag-cleaning cycles for predictive filter failure and faulty bag location detection.
- Rolling digital average calculations for accurate emission measurement.

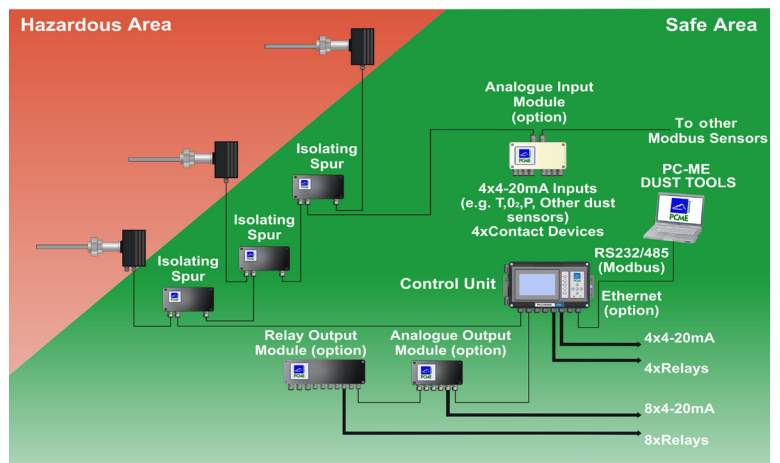
## SYSTEM CONFIGURATIONS AND LAYOUT

Two versions of the PCME VIEW Ex system are available: the Standard version is based on the Interface Module and allows a single sensor to be set up remotely and the PRO version for multi-sensor networked systems that is powered by PCME's ProController.

The PRO version of the instrument provides central communications for compliance reporting, for analysing emissions data and trends, as well as data recording for multiple sensors (up to 32 sensor channels) for multi-stack and plant-wide systems, and links the sensors into data acquisition systems (DAHS/DCS).

A number of interfaces (including fast Ethernet, RS-232/RS-485 over Modbus and USB 2.0) are available for simultaneous communications to data reporting systems and for temporary service connections. The PC-ME DUST TOOLS software suite provides further functionality.

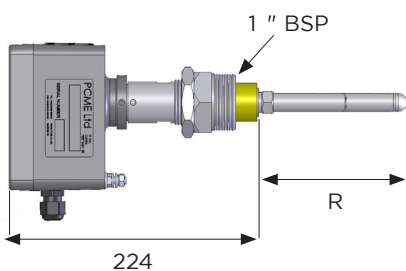
The instruments are rated both for ATEX and IECEx Gas zones 0/1/2 and Dust zones 20/21/22. The Ex 820 offers two high-pressure rating options for up to 50 bar.



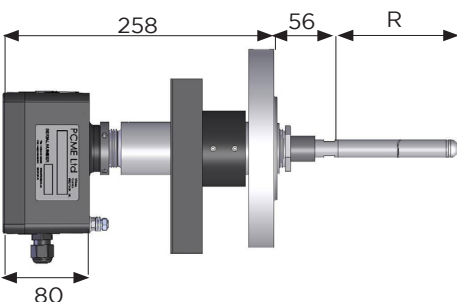
Typical multi-sensor system

## SENSOR DIMENSIONS AND OPTIONS

Ex 800 Sensor (0-250°C)



Ex 820 Sensor (0-400°C, 50 bar)



Note: All dimensions are given in mm; R = length as required.

### Ex 800 / Ex 820 Sensor Specifications and Options

|                               |   |  |
|-------------------------------|---|--|
| Stack Pressure Rating         | Ex 800  | Standard: < 2 bar (0-250°C)                                  |
|                               | Ex 820  | Option 1: < 50 bar (0-400°C)<br>Option 2: < 38 bar (0-450°C) |
| Enclosure Dimensions          | W 144 x H 124 (145) x D 80 mm (incl. cable gland)   |  |
| Ambient Temperature Range     | -20°C to 55°C   |  |
| Protection Rating             | IP65  |  |
| Enclosure Material            | Die-cast aluminium (epoxy coated)   |  |
| Cable Entries                 | 1x PG11 cable gland   |  |
| Weight                        | 1.8 kg  |  |
| Sensor Body Material          | Ex 800  | 316 Stainless steel  |
|                               | Ex 820  | High-grade ceramic   |
| Stack Connection              | Ex 800  | 1 1/2 in. BSP (option)                                       |
|                               | Ex 820  | DN40 PN64  |
| Power Supply Voltage          | 24V DC (via the IS Spur)  |  |
| Consumption                   | approx. 200 mA (incl. IS Spur)  |  |
| Air Purge Requirements        | Required on some applications as advised. Air purge fitting and external supply of 5-10 litres/minute of dry, clean instrument air. |  |
| Hazardous Zone Classification | ATEX / IECEx Gas zone 0/1/2<br>ATEX / IECEx Dust zone 20/21/22  |  |

# SPECIFICATIONS PCME VIEW Ex 800/Ex 820

## TECHNICAL SPECIFICATIONS - CONTROL UNITS AND NET MODULES

| Network Controllers*   |  | Standard Controller                  | ProController   |
|------------------------|--|--------------------------------------|---|
| Overview               | Number of sensors/channels   | 1                                    | 1-32  |
|                        | Display  | Two-tone grey, backlit graphical LCD | High-contrast, anti-glare 7" (viewable) TFT LCD   |
|                        | Multiple Data Viewing  | PC or RS-485                         | PC/RS-485/Ethernet simultaneously   |
|                        | Dimensions   | W220 x H124 x D80 mm                 | W390 x H221 x D118 mm   |
|                        | Power supply voltage   | 100-240V AC (50/60 Hz)               | 85-265V AC (50/60 Hz)   |
|                        | Protection Rating  | IP65                                 | IP66  |
|                        | Ambient Temperature Range  | -20°C to 50°C                        | -20°C to 50°C   |
| Features and Functions | Navigation keys  | Up/Down/Left/Right/Enter             | Up/Down/Left/Right/Enter plus 5 function keys: 3x short-cut keys and 2 user-programmable keys |
|                        | Icon-driven, multilingual menus  | n/a                                  | ✓   |
|                        | Secure password protection   | ✓                                    | ✓   |
|                        | Sensor system setup and configuration options  | ✓                                    | ✓   |
|                        | Configurable emission alarm levels   | ✓                                    | ✓   |
|                        | Sensor calibration screens   | ✓                                    | ✓   |
| Data Logging*          | Seamless integration with existing PCME control units and sensors  | n/a                                  | ✓   |
|                        | Long-term Log  | 12 months @ 15 minutes               | 48 months @ 15 minutes  |
|                        | Short-term Log   | 7 days @1 minute                     | 28 days @ 1 minute  |
|                        | Pulse Log  | 8 hours @ 1 seconds                  | 32 hours @ 1 second   |
| System Outputs         | Alarm Log  | 500 entries                          | 500 entries   |
|                        | Ethernet (RJ45)  | n/a                                  | ✓<br>Connection type: 100Base-T/Tx 100 Mb/s   |
|                        | USB 2.0  | n/a                                  | ✓<br>Suitable for connecting to a local PC or laptop  |
|                        | Relays   | 2 off (programmable)                 | 4 off (programmable)  |
|                        | 4-20mA   | 1 off (programmable)                 | 4 off (programmable)  |
| System Inputs          | RS-485   | 1                                    | 1   |
|                        | Digital<br>User selectable for: PLANT OFF indication, Bag-filter cleaning sequences, multiple calibrations | 1                                    | 4   |
|                        | 4-20mA   | 0                                    | 2   |

\*Must be placed in the designated Safe Area. \*\*Data logging capacity for one sensor. Data stored varies per sensor type. Please consult ENVEA for specific data.

| Network Accessories*   |   | Standard Controller | Pro Controller |
|--|---|---------------------|----------------|
| Network Modules<br>(can be connected to Controller Network systems to provide additional Inputs and Outputs) | <b>Analogue Output Module (AOM)</b><br>provides 8 additional 4-20 mA outputs definable to sensors/channels                | 1                   | 1-8            |
|  | <b>Auxiliary Input Module (AIM)</b><br>provides 4 additional digital inputs, plus 4 additional relay outputs              | 1                   | 1-8            |
|  | <b>Relay Output Module (ROM)</b><br>provides 8 additional relay outputs   | 1                   | 1-8            |
|  | <b>Intrinsically Safe Spur (IS SPUR)</b><br>provides sensor network connection and local isolation during maintenance     | 1                   | 1-32           |
|  | <b>Power Supply Repeater (PSR)</b><br>provides voltage and signal boost for extended cable runs and large sensor networks | 1                   | 1-8            |

# SPECIFICATIONS

|                            | IECEX  | ATEX   |
|----------------------------|--|--|
| <b>EX 800/820</b>          | <b>Gas Zone 0</b>  |  |
| <b>Certificate number:</b> | IECEX SIR 07.0087X   | Sira 04ATEX2082X   |
| <b>Certification code:</b> | <b>Outside stack (enclosure)</b>   |  |
|                            | Ex ia IIC T4 Ga<br>T <sub>a</sub> = -20°C to +60°C   | Ex ia IIC T4 Ga<br>T <sub>a</sub> = -20°C to +60°C<br><b>II 1G</b>   |
| <b>Certification code:</b> | <b>Inside stack (probe<sup>A</sup>)</b>  |  |
|                            | Ex ia IIC Ga<br>Ex iaD A20 Da<br>T <sub>a</sub> <sup>B</sup> = -20°C to +250°C [0.5barg]<br>= -20°C to +400°C [50barg]<br>= -20°C to +450°C [38barg] | Ex ia IIC Ga<br>Ex iaD A20 Da<br>T <sub>a</sub> <sup>C</sup> = -20°C to +250°C[0.5barg]<br>= -20°C to +400°C [50barg]<br>= -20°C to +450°C [38barg]<br><b>II 1GD</b> |

|                            | <b>Dust Zone 20</b>  |   |
|----------------------------|--|---|
| <b>EX 800/820</b>          | <b>Dust Zone 20</b>  |   |
| <b>Certificate number:</b> | IECEX Sira 09.0126X  | Sira 09ATEX9306X  |
| <b>Certification code:</b> | <b>Outside stack (enclosure)</b>   |   |
|                            | Ex tb IIIC T80°C Db IP66<br>T <sub>a</sub> = -20°C to +55°C                                | Ex tb IIIC T80°C Db<br>T <sub>a</sub> = -20°C to +55°C  |
| <b>Certification code:</b> | <b>Inside stack (probe)<sup>C</sup></b>  |   |
|                            | Ex ta IIIC Da IP66<br>T <sub>a</sub> = -20°C to +250°C<br>T <sub>a</sub> = -20°C to +400°C | Ex ta IIIC Da<br>T <sub>a</sub> = -20°C to +250°C<br>T <sub>a</sub> = -20°C to +400°C<br><b>II 2/1D</b> |

| <b>ATEX Approval - IS Spur</b>  |   |
|---|---|
| <b>Certificate number:</b>  | <b>Sira 06ATEX2383</b>  |
| <b>Certification code:</b>  | For Gas zone 1: [Ex ia Ga] IIC<br>For Dust zone 1: [Ex ia Da] IIC   |
| <b>Input / Output Parameters for Connector K3 (Hazardous area connection)</b> | <b>Terminal 4 wrt Terminal 1 (Power)</b>  |
|   | U <sub>o</sub> = 8.61V, I <sub>o</sub> = 162mA, P <sub>o</sub> = 350mW,<br>C <sub>i</sub> = 0, L <sub>i</sub> = 0, C <sub>o</sub> = 6.0µF, L <sub>o</sub> = 1.0mH |
|   | <b>Terminal 3 wrt Terminal 2 (Data)</b>   |
|   | U <sub>o</sub> = 8.61V, I <sub>o</sub> = 67mA, P <sub>o</sub> = 144mW,<br>C <sub>i</sub> = 0, L <sub>i</sub> = 0, C <sub>o</sub> = 6.0µF, L <sub>o</sub> = 1.0mH  |

| <b>ATEX Approval - IS Spur</b> |   |
|--------------------------------|---|
| <b>Certificate number:</b>     | <b>Sira 06ATEX2383</b>  |
|                                | <b>Terminals 1, 2, 3 &amp; 4 (Power &amp; Data)</b>   |
|                                | U <sub>o</sub> = 8.61V, I <sub>o</sub> = 229mA, P <sub>o</sub> = 494mW,<br>C <sub>i</sub> = 0, L <sub>i</sub> = 0, C <sub>o</sub> = 6.0µF, L <sub>o</sub> = 0.5mH |
|                                | <b>Terminal 5: Screen</b>   |
|                                | <b>Terminals 6 and 7: No connection</b>   |

**A** The probe does not generate heat, therefore, the surface temperature is dependent upon the stack temperature, which is maximal 250 °C for the PCME VIEW Ex 800 and maximal 400 °C or 450 °C, respectively, for the PCME VIEW Ex 820.

**B** Note that the barg values given for T<sub>amb</sub> (ambient temperature) are maximum values (P<sub>max</sub>).

**C** The probe does not generate heat, therefore, the surface temperature is dependent upon the stack temperature, which is maximal 250 °C for the PCME VIEW Ex 800 and maximal 400 °C or 450 °C, respectively, for the PCME VIEW Ex 820.

## ABOUT ENVEA

As a progressive environmental Company, ENVEA specialises in particulate measurement for industrial processes. With a worldwide reputation for reliability, innovation and technological excellence, the Company produces under the trademark envea™ 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.



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