



EMP6 - 3100/4100
Particulate Emission Monitor
Installation & Operation Manual



INNOVATIVE ENVIRONMENTAL SOLUTIONS

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Installation and Operations Manual

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Warning

Use of controls or adjustments or procedures other than those specified in this manual may result in product failure, or poor product performance. You are cautioned that any changes or modifications to the product not expressly approved in this manual could void your product warranty.

Health and Safety Information

Equipment Operation

Use of this instrument in a manner not specified by Goyen may be hazardous.

Electrical Power Supply

Before working on the electrical connections all of the electrical power lines to the equipment must be isolated. All the electrical cables and signal cables must be connected exactly as indicated in these operating instructions. If in doubt contact Tyco Environmental Systems.

Face and Eye Protection

Suitable face and eye protection must be worn when working on hot vessels and ducts!

Special safety measures must be taken when working on a high-pressure duct.

Protective Clothing

Protective clothing must always be worn when working in the vicinity of hot vessels or ducts.

Signs and Symbols Used on Equipment and Documentation



Caution, risk of electric shock.



Caution, attention to possibility of risk of damage to the product, process or surroundings. Refer to instruction manual.



Protective Conductor Terminal. Must be connected to mains earth (ground).

Storage

The instrument should be stored in its packaging, in a dry sheltered area.

Unpacking

Check all packages for external signs of damage. Check the contents against the packing note.

Return of Damaged Goods

IMPORTANT

If any item has been damaged in transit, this should be reported to the carrier and to the supplier immediately. Damage caused in transit is the responsibility of the carrier not the supplier.

DO NOT RETURN a damaged instrument to the sender as the carrier will not then consider a claim. Save the packing with the damaged article for inspection by the carrier.

Return of Goods for Repair

If you need to return goods for repair please contact our Customer Service Department. They will be able to advise you on the correct returns procedure.

Any item returned to Tyco Environmental Systems should be adequately packaged to prevent damage during transit.

You must include a written report of the problem together with your own name and contact information, address, telephone number, email address etc.

Lifting Instructions

Where items are too heavy to be lifted manually, use suitably rated lifting equipment.

Refer to the Technical Specification for weights. All lifting should be done as stated in local regulations.

Design and Manufacturing Standards

Certifications



If applied, these symbols indicate compliance with the EMC directive and the Low Voltage directive (LVD), and with Australian / New Zealand C-tick standards for EMC emissions and safety,

The Control Unit is MACT and MCERTS compliant and ROHS certified.

Dimensions

All measurements are given in millimetres and inches, unless otherwise stated.

Introduction

This manual contains information relevant to the installation, commissioning and operation of the EMP6 Triboelectric Emission Monitors. EMP6 and all associated products and this manual are subject to continuous development, and it is acknowledged that the manual may contain errors and/or omissions. For the most up-to-date information, including applications information, the user should always refer to Tyco Environmental Systems.

Product Description

All suspended dust particles in motion accumulate an electric charge by virtue of the triboelectric effect. The EMP6 is designed to detect the motion of such charges, and therefore to detect, indicate and alarm the relative flow rate of dust in the duct, in the very low concentrations now demanded by newer legislation.

By performing a calibration process, the output signal may be adjusted so that it indicates in any required units, eg mg/s or mg/m³.

These triboelectric emission monitors consist of:

- a rectangular **control unit**,
- a separate cylindrical **active head**,
- a **probe** (a sensing rod, wire or other element screwed to the active head) and
- a **serial cable** to connect to the control unit from a PC (required to set the logging rate).

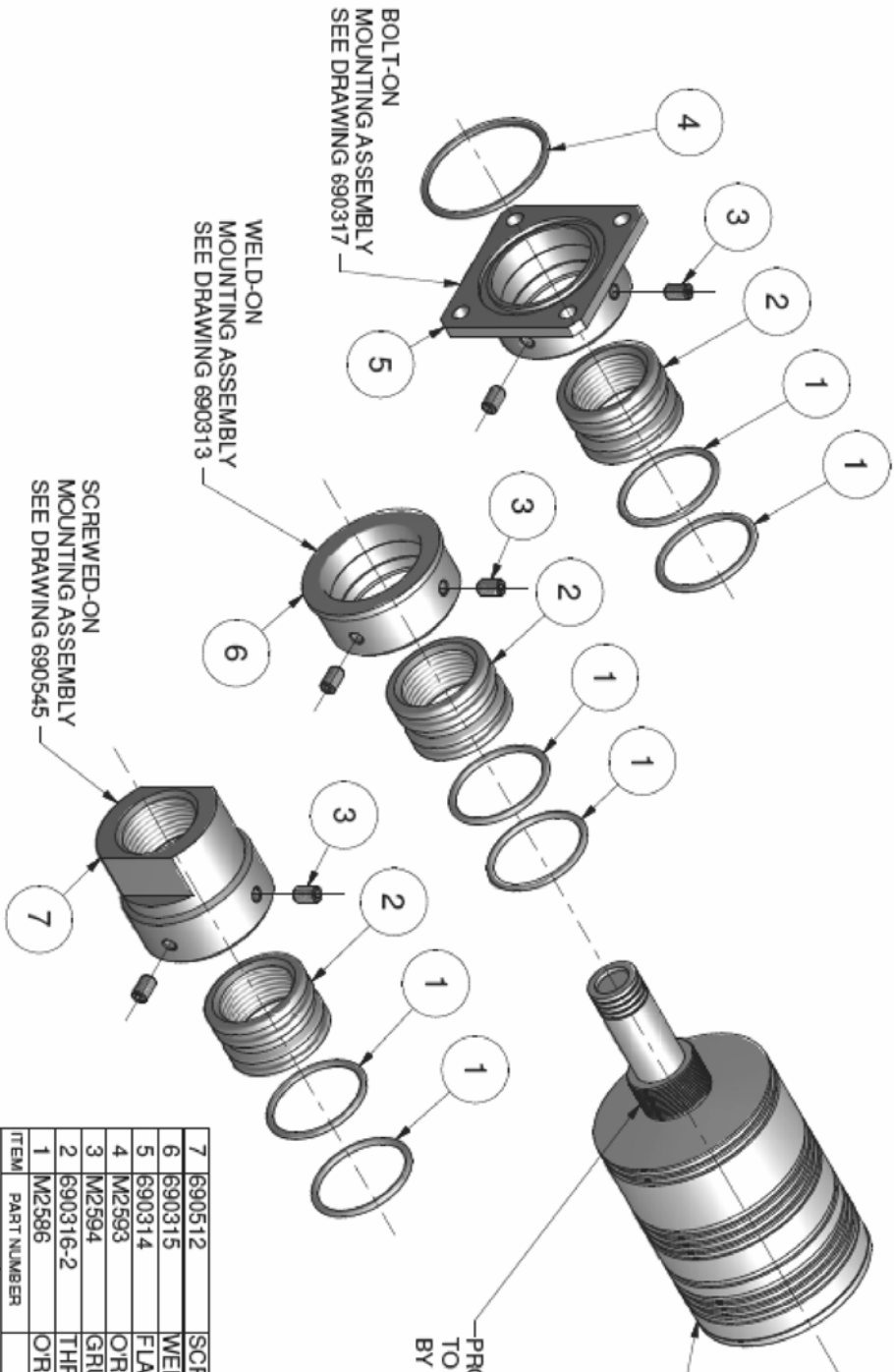
The active head is typically mounted through the wall of a duct carrying the moving particles so that the probe is exposed to the particles. The gas stream often exhausts to atmosphere (such as in a stack), but these emission monitors are equally suited to detecting particles in motion in a gas stream under other conditions, for example pneumatically-conveyed or gravity-fed particles.

The EMP6 included a big, clear LED bar graph to indicate the current emission level, two adjustable time-delayed alarm relays, data logging on a SD card in ASCII comma delimited format, 0-10VDC and 4-20mA analog output, relay switch indicating when alarm 1, 2 and test are active, alarms can be normally open and normally closed, and optional DC or universal AC mains power supply.

The common active head features a robust machined alloy housing with purge air facility for hostile environments, easy mounting, easily replaceable probe, low noise electronics and a wide-range sensitivity switch.

These products are part of a complete family of products for the clean air industry from monitors to control computer systems and turnkey projects, all designed for a long, trouble-free service life.

No 691138 SHEET 1



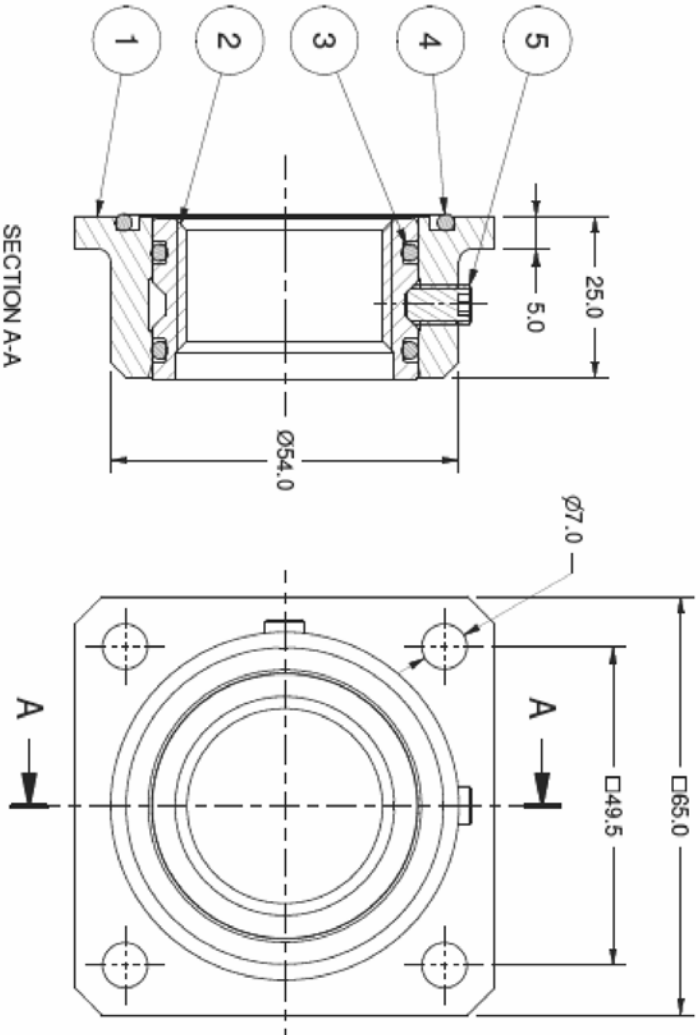
ITEM	PART NUMBER	DESCRIPTION	P	QTY
7	690512	SCREWED-ON MOUNTING		1
6	690315	WELD-ON MOUNTING		1
5	690314	FLANGE MOUNTING		1
4	M2593	O/RING BS 134 VITON		1
3	M2594	GRUB SCREW/STEEL 1/4"x3/8"		2
2	690316-2	THREADED INSERT S/STEEL		1
1	M2586	O/RING BS127 VITON		2

1	RELEASE	EC90 8256	30.1.08	EC90	DATE	AUTHORISED	
MATERIAL SPEC.		TOLERANCE UNLESS OTHERWISE STATED LINEAR ±0.2 ANGULAR ±0.5°					
TEST SPEC.		REMOVE ALL BURRS, FLASH & SHARP EDGES: MAX. 0.2x45° or 0.2 RAD.					
PROCESS SPEC.		DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN DO NOT SCALE DRAWING					
D.O.CHECK		DATE 30/01/2008					
DRAWN		Kdunn					
SCALE		NTS					
SHEET		OF 1					
FIRST USED ON		NO 691138					
TITLE		GENERAL ARRANGEMENT PROBE MOUNTING OPTIONS					

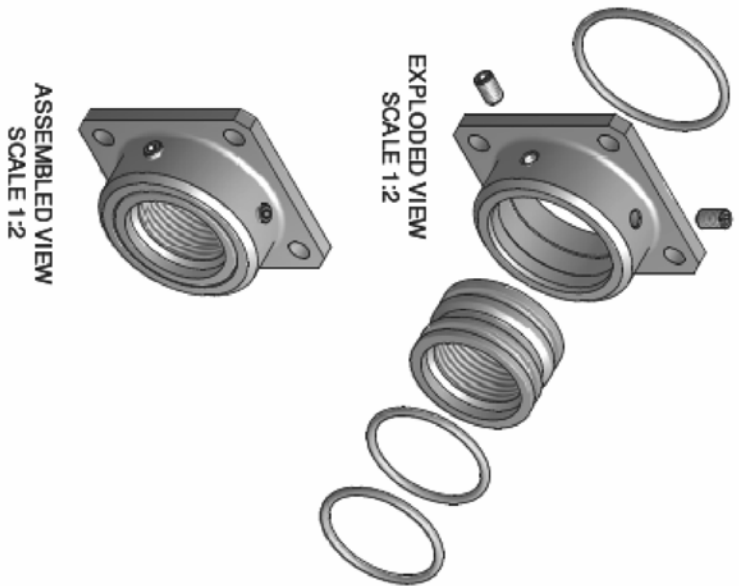
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A4

No 690317 SHEET 1



MODEL: P2-60203-SS



2	REDRAWN IN INVENTOR	EGRO 8256	D.O.CHECK	
1	PRODUCTION RELEASE	18.1.08	DATE	18/01/2008
1	ISS	EGRO 4289	DRAWN	KOLUIN
	DETAILS OF CHANGE	15.6.94	AUTHORISED	
MATERIAL SPEC.			TOLERANCE UNLESS OTHERWISE STATED LINEAR ±0.2 ANGULAR ±0.5	
TEST SPEC.			REMOVE ALL BURRS, FLASH & SHARP EDGES: MAX. 0.2x45° or 0.2 RAD.	
PROCESS SPEC.			DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN DO NOT SCALE DRAWING	

5	M2594	1/4"x3/8" GRUB SCREW S/STEEL	2
4	M2593	O/RING BS134 VITON	1
3	M2596	O/RING BS127 VITON	2
2	690316-2	THREADED INSERT	1
1	690314	FLANGE MOUNTING	1

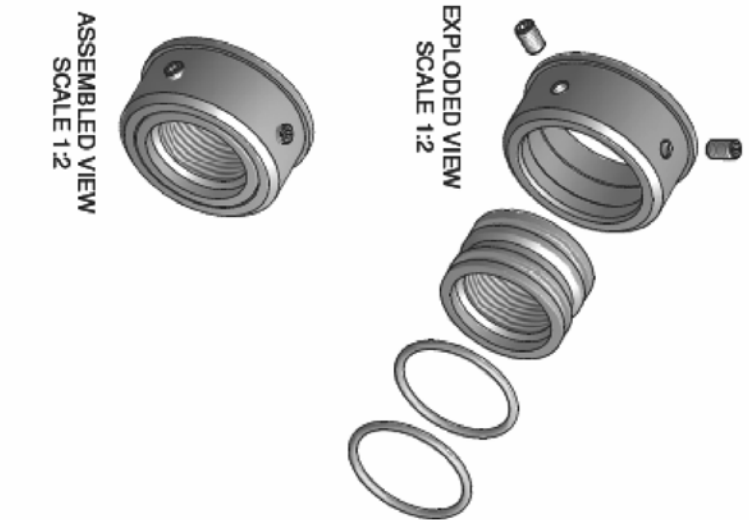
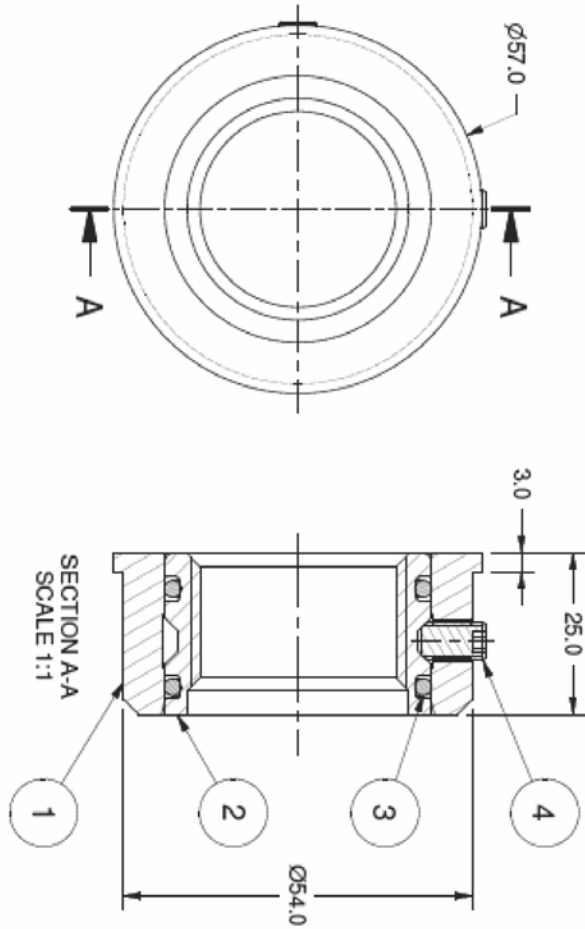
ITEM	PART NUMBER	DESCRIPTION	P	QTY
5	M2594	1/4"x3/8" GRUB SCREW S/STEEL		2
4	M2593	O/RING BS134 VITON		1
3	M2596	O/RING BS127 VITON		2
2	690316-2	THREADED INSERT		1
1	690314	FLANGE MOUNTING		1

SCALE 1:1		TITLE
SHEET 1	OF 1	BOLT-ON PROBE MOUNTING ASSEMBLY
FIRST USED ON		NO 690317

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A4

No 690313 SHEET 1



MODEL: P2-60202-SS

2	REDRAWN IN INVENTOR	EGRO 8256	
	690316-2 WAS 690316	16.1.08	
1	PRODUCTION RELEASE	EGRO 4289	RRB
		16.6.94	
ISS	DETAILS OF CHANGE	EGRO DATE	AUTHORISED

	0.0 CHECK
	DATE 17/01/2008
	DRAWN Kdunn

4	M2594	1/4"X3/8" GRUB SCREW S/STEEL	2
3	M2586	O-RING BS127 VITON	2
2	690316-2	THREADED INSERT	1
1	690315	WELD-ON PROBE MOUNTING	1

GOYEN is the first choice for Control Technology Solutions that enhance the reliability, quality & productivity of our Customers' Control Systems.

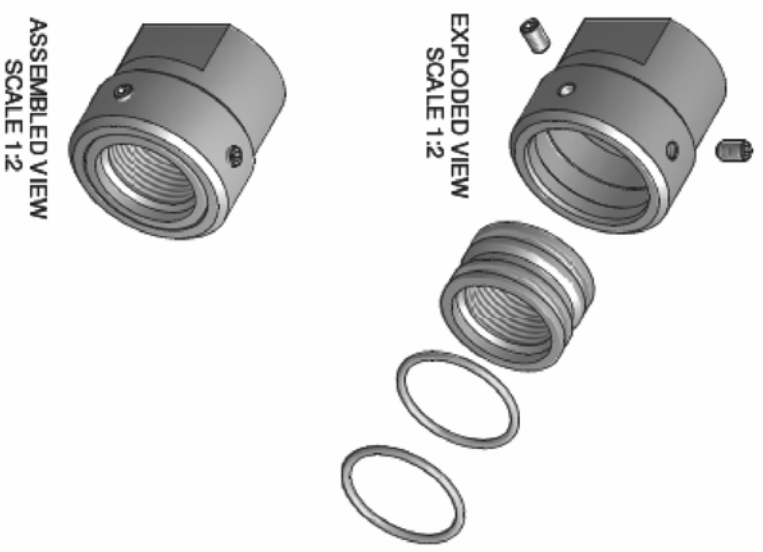
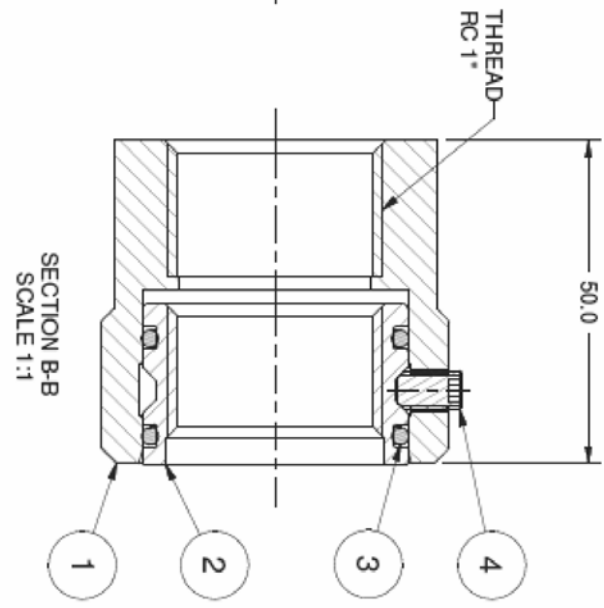
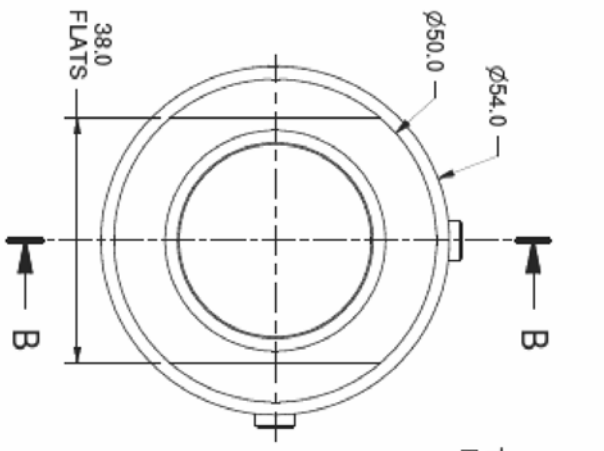
WELD-ON PROBE MOUNTING ASSEMBLY

MATERIAL SPEC. TOLERANCE UNLESS OTHERWISE STATED LINEAR ±0.2 ANGULAR ±0.5
 TEST SPEC. REMOVE ALL BURRS, FLASH & SHARP EDGES: MAX. 0.2x45° or 0.2 RAD.
 PROCESS SPEC. DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN DO NOT SCALE DRAWING

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No 690545 SHEET 1



MODEL: P2-60204-SS

2	REDRAWN IN INVENTOR	EGRO 8256	16.1.08		D.O.CHECK
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ISS	DETAILS OF CHANGE	EGRO DATE		AUTHORISED	DRAWN Kdunn
MATERIAL SPEC.		TOLERANCE UNLESS OTHERWISE STATED LINEAR ±0.2 ANGULAR ±0.5			
TEST SPEC.		REMOVE ALL BURRS, FLASH & SHARP EDGES: MAX. 0.2x45° or 0.2 RAD.			
PROCESS SPEC.		DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE SHOWN DO NOT SCALE DRAWING			

ITEM	PART NUMBER	DESCRIPTION	QTY
4	M2594	1/4"x3/8" GRUB SCREW SYSTEM	2
3	M2586	O-RING BS127 VITON	2
2	690316-2	THREADED INSERT	1
1	690512	SCREWED-ON COUPLING	1

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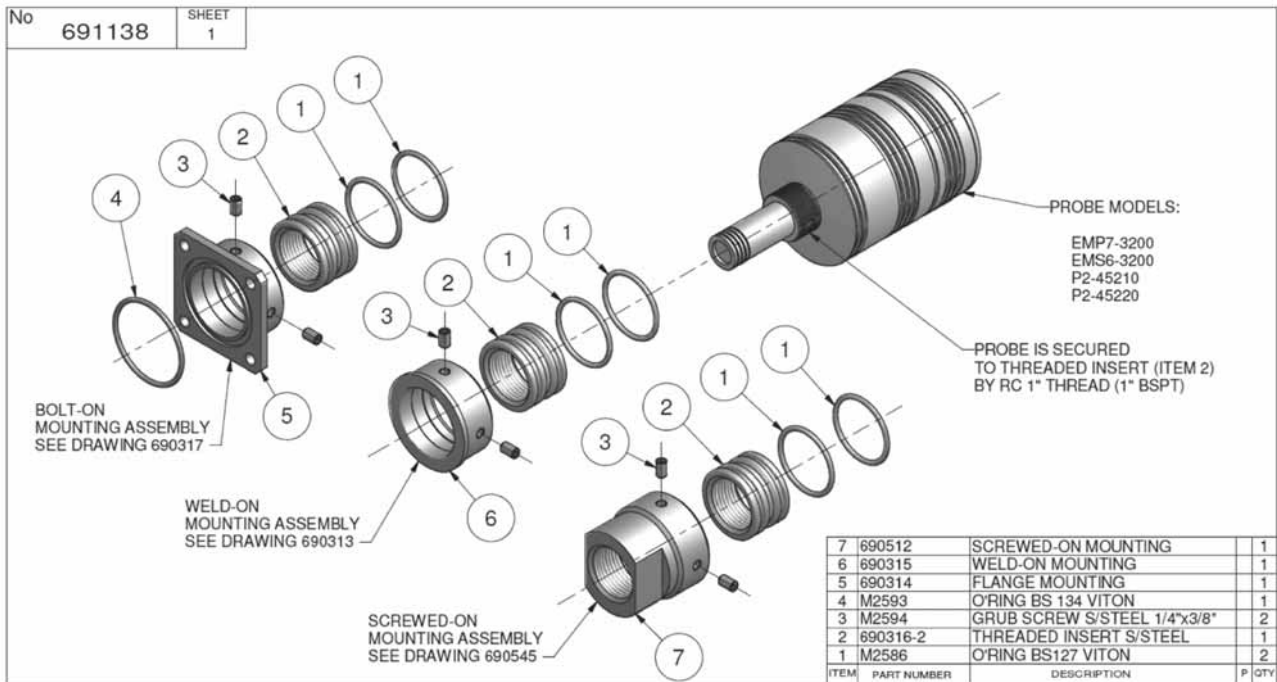
TITLE: SCREWED-ON PROBE MOUNTING ASSEMBLY

NO: 690545

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Quick Start

Product Installation Drawing



Installation

Cut a 30mm hole in the duct, and either:

- Weld on a plain 1 inch BSPT female bush (firmly hand-tighten the monitor in the bush),
- Weld on the Weld-on Mount Kit P2-60202-SS; or
- Weld on a flange to suit Bolt-on Mount Kit P2-60203-SS.



If a mount kit is to be used it will include a metal barrel with a 1 inch BSP thread inside to suit the monitor, and two Viton O-rings outside to seal into the adapter. Screw the monitor firmly into the barrel with the chamfer outwards (see above).

Either bolt the bolt-on adapter P2-60203-SS to the duct (using the supplied Viton O-ring to seal), or weld the weld-on adapter P2-60202-SS to the duct. Then press the Monitor / barrel assembly into the adapter, apply thread sealant to the grub screws and tighten them (see above).

Wiring

AC Control Unit: 100-240VAC +/-10% 50/60Hz.

DC control unit: 12-30DC regulated +/-10%

Power to the active head is supplied from the Control Unit via a 4 core plus screen data cable (50m recommended, 200m max for Belden 9534 cable).

Specifications

Standard Conditions

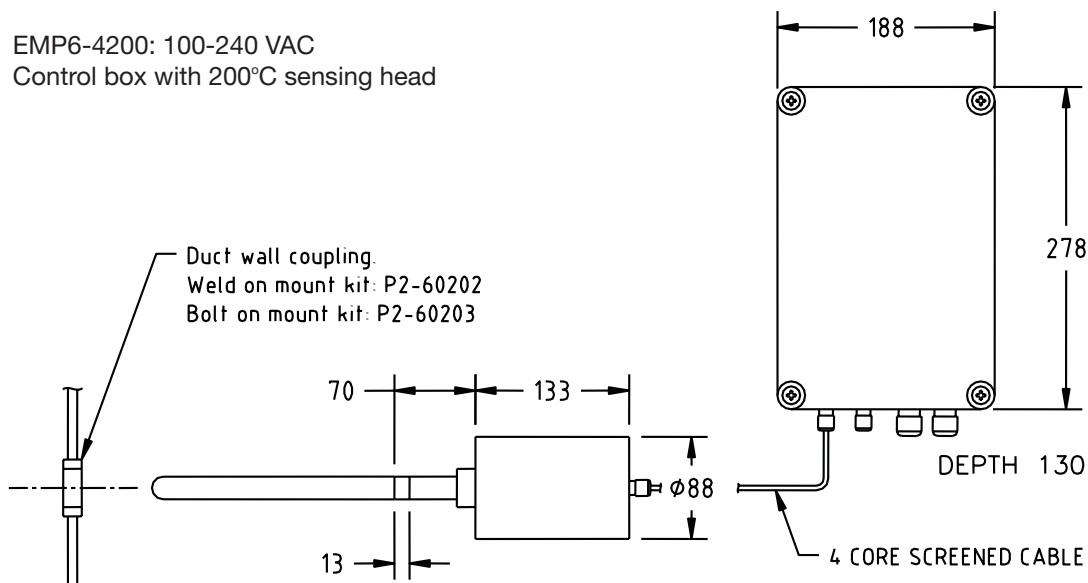
Ambient Temperature:	-20°C to 60°C (-4°F to 140°F [for electronics])
Vibration:	1G (10m/s ²) RMS max continuous, any direction or frequency (with short or separately supported wire rope probe)
Environment:	Active head: IP66/NEMA4, non-corrosive (Aluminium alloy body, stainless steel inserted parts) Control Unit: Plastic Composite ATEX II 3D&G enclosure
Duct Gas Pressure:	100kPa (15 PSI) max
Duct Gas Temperature:	-20°C to 200°C max (-4°F to 390°F [standard models, higher temp to order])
Purge Air Pressure:	400kPa (60 PSI) max
Duct Gas Velocity:	5m/s to 30m/s (16 ft/s to 98 ft/s (virtually unlimited with appropriate probe installation))
Particle Size:	0.1µm to 1000µm (wider with some changed characteristics)
Duct Size:	50mm to 10m diameter (2in to 33ft [using the appropriate probe options])
Humidity:	0 to 80% non-condensing
Magnetic Field:	60A/m max at 50Hz (= 50Ampere-Turns in a 1m X 1m square coil)

Mechanical

Purge Air:	RC 1/8 inch or NPT 1/8 purge air connection point is provided. Periodically pulsed purge air may reduce particulate build-up
Probe:	Removable, M8 thread fitting. 300 x 5mm stainless steel stranded wire rope is standard. Probe length and type in accordance with installation requirements
Probe Options:	Solid rod, tubular, extendable, PTFE coated, tubular ceramic, wear resistant alloys, multiple supports, any length
Probe Mounting:	1 inch male BSPT requires 1 inch female pipe fitting on duct (optional quick disconnect)

Control Unit Mounting Dimensions

EMP6-4200: 100-240 VAC
Control box with 200°C sensing head



Electrical

Power supply:	AC Control Unit: 100-240VAC +/- 10% 50/60Hz.
DC Control Unit:	18-30VAC +/- 10% 50/60Hz
Active Head:	Powered from control unit via 4 core screened data cable (50m recommended, 200mA slow-blow fuse for wiring protection)
Alarm outputs:	Alarm 1 and Alarm 2: 8A Resistive/3.5A Inductive

Emission Signal

Resolution Typically:	0.2mg/m ³ on the bar graph display, 0.001mg/m ³ on the 4-20mA and (at max gain) 0-10VDC outputs
Zero Drift:	Better than 0.3% of range per year Better than 0.3% of range over specified temperature range
Gail Drift:	Better than 1% of range per year Better than 1% of range over specified temperature range
Circuit Linearity:	Better than 1% of range
Circuit Stability:	Only high stability components are used (no trim pots)
Noise Immunity:	All 50Hz or 60Hz and harmonics are effectively removed from the signal before Noise Immunity detection. However, proper grounding and shielding techniques must be used to avoid mains frequency interference overloading the first amplifier
Gain Switch:	Three positions: Low (0-20 mg/m ³) Medium (0-150 mg/m ³) High (0-1000 mg/m ³) Nominal only: depends on material velocity, geometry

All components are high stability, rated for -20°C to +60°C industrial temperature range (no trim pots).

Installation Preparation

Temperature Considerations



Caution

If the insertion temperature is over 200°C (390°F), check with Tyco Environmental Systems to ensure that the equipment, accessories and mounting arrangements are suitable.

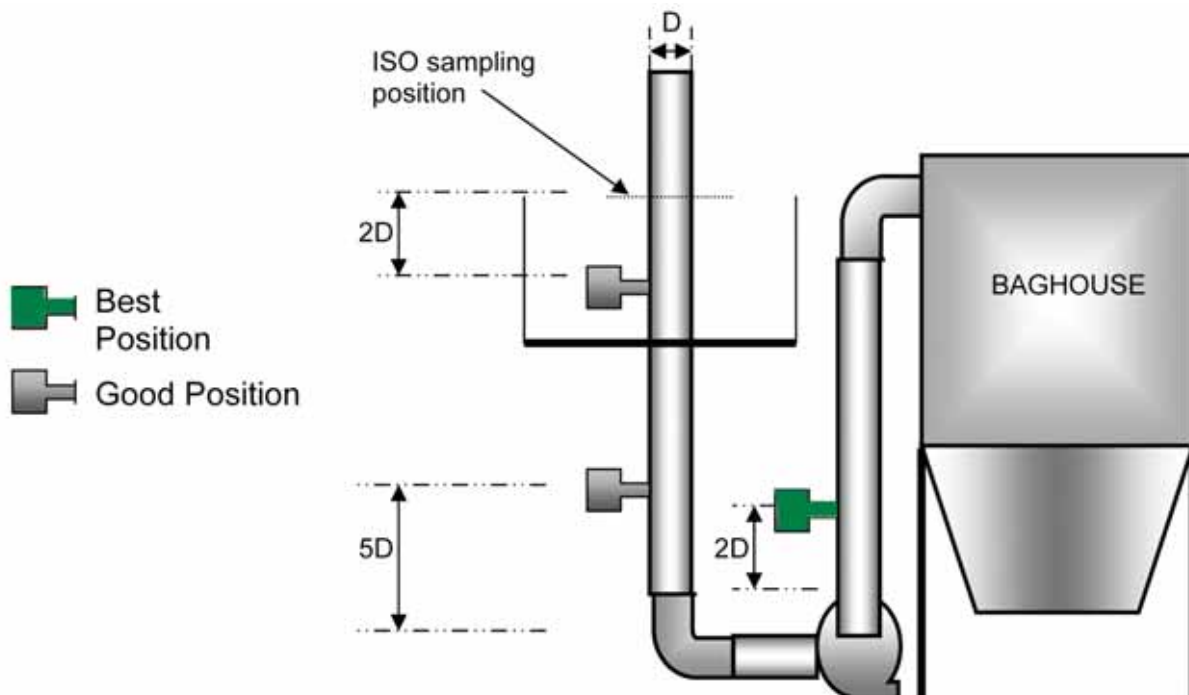
Although the probe model is available rated for insertion temperature 200°C (390°F) max, the ambient temperature rating in all cases is 60°C (140°F) max.

When a monitor is mounted in a duct wall, the body of the monitor will tend to rise towards the temperature of the duct wall, and may exceed the 60°C (140°F) ambient temperature rating.

Mounting Positions

Choose a mounting position which satisfies these criteria:

In a straight section of metal duct, at least 5 diameters after or 2 diameters before any bend or screen, about 2 diameters before any isokinetic sampling point, at right angles, even further from dampers, fans, away from high vibration, ambient temperature or direct radiation, with probe axis perpendicular to the gas flow.



Grounding Of the Duct Material

If possible, replace any insulating material (particularly plastic) which comes into contact with the gas flow, with grounded metal.

Ensure that every part of the duct and all metal exposed to the gas flow (eg inspection covers, fan and damper blades, isokinetic probes) are grounded.

Should there be any ungrounded metal or insulating material in contact with the gas stream, ensure that it is electrically screened from the probe (eg, by an intermediate grounded welded mesh screen). For any unusual conditions, consult Tyco Environmental Systems.

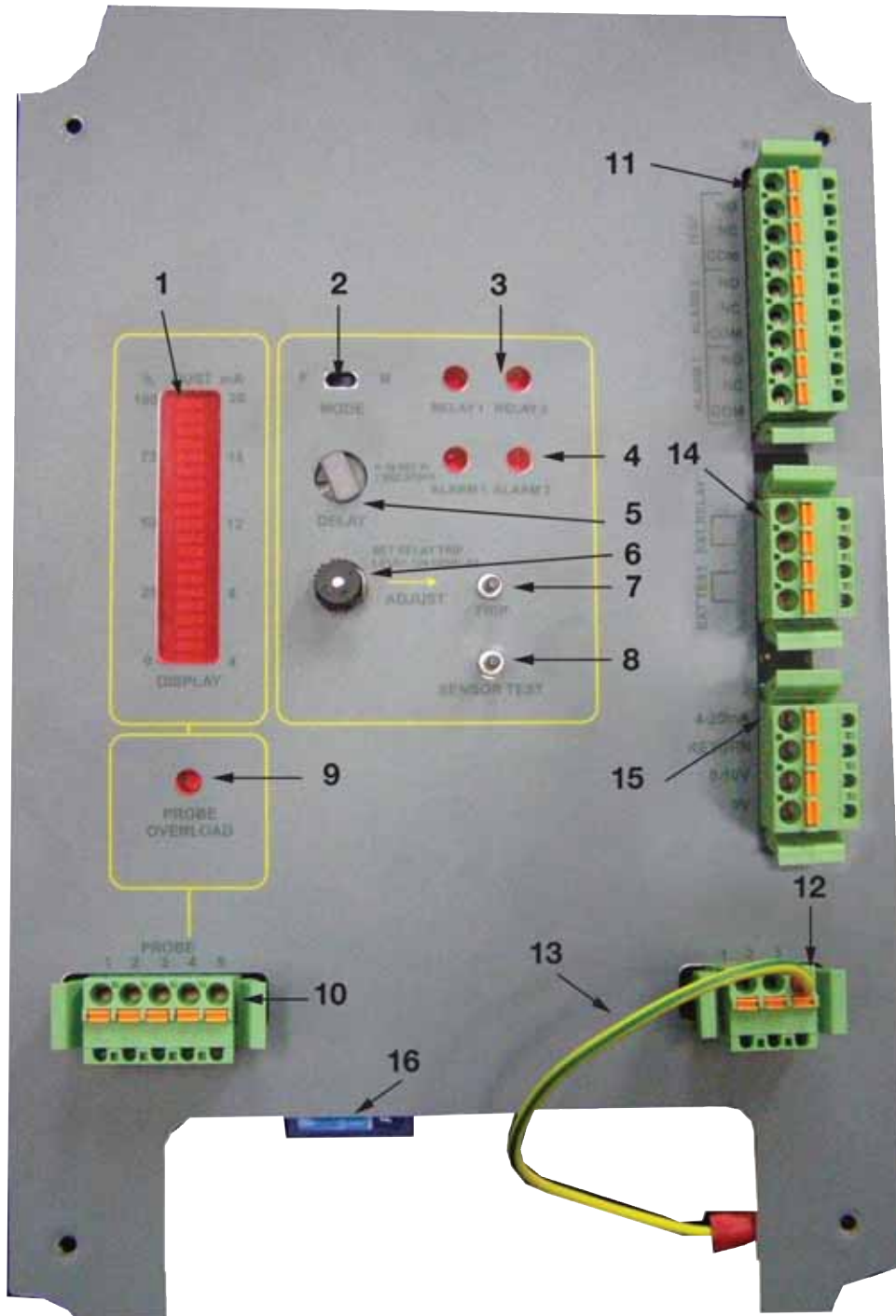
Particle Moisture

Moisture content (of the particulate) can affect both the material chemistry and material physics, and hence the sensitivity. The effect is decreasing sensitivity per unit mass as moisture increases, however this is partly offset by the increasing mass of the particulate, so for typical low-to-medium particle moisture, triboelectric emission monitors suffer only a minor observable effect, which is typically a small decrease in sensitivity as moisture increases.

Water droplets are generally not a problem in the output from combustion processes once the process is at running temperature, the droplets may outweigh the dust as much as 100 times, so the Emission Monitor should be mounted as far from the moisture source as possible, so that water droplets have evaporated, and the dust surface has dried.

Moisture in the gas (humidity) has not been shown to significantly affect the sensitivity of a Triboelectric Emission Monitor, as long as the conditions are stable. If the humidity is above 80% or unstable, water droplets may appear momentarily, and be detected, increasing errors.

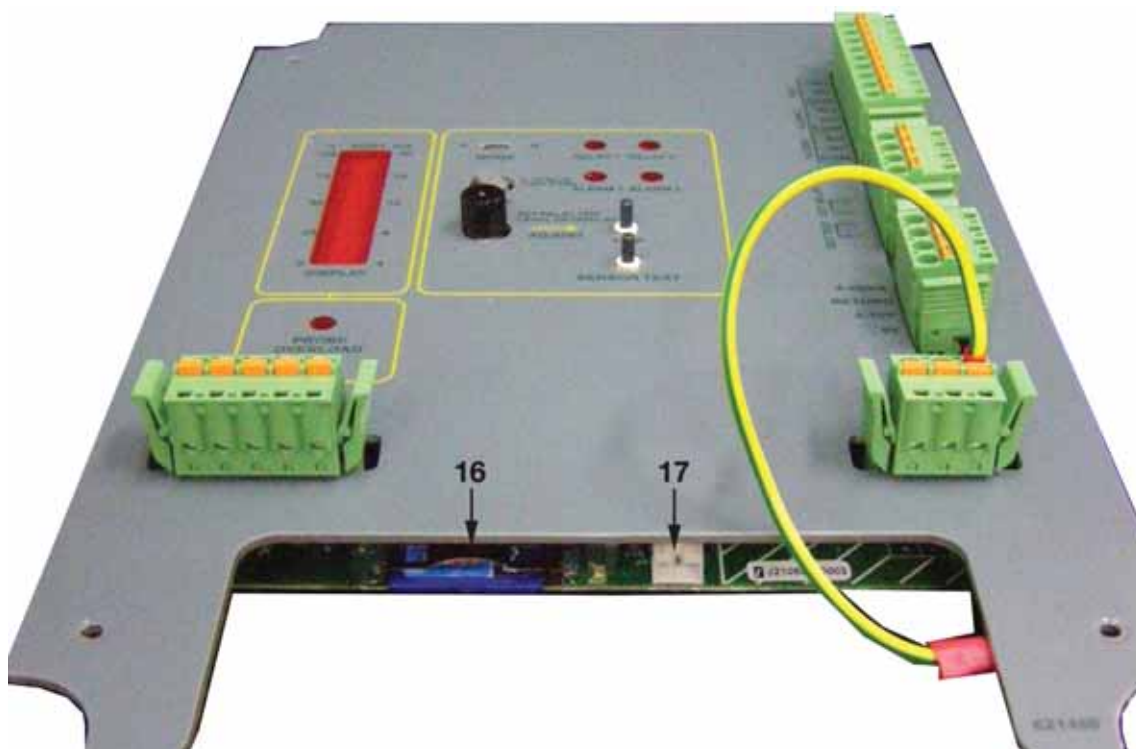
EMP6 Control Unit



Key

1. Bargraph Display – Visual display of the dust level registered by the Active Head
2. Failsafe Switch – ‘N’ normal operation, ‘F’ failsafe operation. Under failsafe the Relay LEDs are on when the dust levels are below the alarm set point, and off when the dust level is above the alarm set point
3. Relay 1 and Relay 2 LEDs – LEDs turn off after the specified delay time once the corresponding alarms LED turns on.
4. Alarm 1 and Alarm 2 LEDs – LEDs turn on after a the dust levels reach a specified set point.
5. Time Delay Switch – Set the delay to trip the relays, increments of 1 second from 0-9 seconds
6. Adjust Switch – Sets the set point for alarm 1 and alarm 2

7. Trip – Press and hold flashes alarm 1 adjust the Control Switch to set the set point for the alarm , release and press again sets alarm 2
8. Sensor Test – Puts the unit into test mode
9. Probe Overload LED – Turns on when signal is dropped
10. Probe Connector – Connect to the probe via a 4 core screened cable
11. Relay Connector – Outputs the state of the relays to an external device such as a PLC.
12. Power Supply Connector – Power supply in
13. Earth Cable – Grounds the cover to the PCB. At no time when power is supplied to the control unit can this be disconnected
14. External Relay/External Test – Inputs by an external source such as a PLC. Can set the unit into test mode or turn the relays both on (if failsafe switch is set to normal) remotely.
15. 4-20mA/0-10V – Outputs a 4-20mA or 0-10V signal of the dust level to an external device such as a PLC



16. SD Card – Logged data is kept
17. Programming port – Using the serial cable supplied connect to this port to program the controller.

Installation

See Quick Start (page 2)

Wiring

Wiring may only be undertaken by a qualified and licensed practitioner, and must be performed in full accordance with all local regulations. The front panel must remain fitted at all times while the unit is connected to a power source. After all connections are made, ensure that all electrical glands are tight to maintain IP ratings. Please refer to the diagram below to locate all controls and connectors referred to in the text.

Power Supply

After checking that the local power supply conforms to the unit's label specifications, connect the supply to connector (12) through the recommended fuse. If the control unit is to be hard-wired to a mains supply, a disconnect device must be fitted near the control unit, easily accessible by the operator.



This symbol indicates that hazardous voltages are present. Access only after disconnecting the power, and only by qualified Electrical personnel.



This symbol indicates a connection point which must be connected to mains earth (ground).

DC Model Power Supply Connector (12): Red to (+), Black to (-) (system common and earth). Use 1mm² wire.

AC Mode Power Supply Connector (12): Brown=Line/Active, Blue=Neutral, Green/Yellow=Earth (ground). Use 1mm² wire.

Active Head

For installation of the Active Head wire the ground terminal on the Active Head to ductwork/supports/local earth. Wire the active head via a 4 core screened data cable to connector (10) of the control unit, ensuring that only like pin numbers are joined. For Belden 9534 cable, wire as shown.

Pin	1	2	3	4	5
Connection	RS485 +	RS485 -	Screen	0V	+12V
Colour	White	Green	Clear	Black	Red

Relay Outputs

If an external alarm system or PLC is to be driven from Alarm 1, Alarm 2 or Test, connect to relay connector (11). The failsafe switch (2) can be set to normal or failsafe as required.

In normal mode the, the alarm relay is de-energised when the unit is fully powered up and is energised when the alarm is tripped. In Failsafe Mode, the alarm relay is energised when the unit is fully powered up and is de-energised when the alarm is tripped, thus also generating an alarm condition when the unit loses power.

Normally Open Contacts	Use the COM-NO contact to switch a normal alarm lamp, bell, siren or PLC.
Normally Closed Contacts	Similar effect to Failsafe mode, except that the COM-NC contact does NOT generate an alarm when power is lost.

Analog Outputs

EMP6 includes both 0-10V and 4-20mA analog outputs which can be used to drive a chart recorder, data logger, Distributed Control System (DCS), Programmable Logic Controller (PLC), Supervisory Control And Data Acquisition (SCADA) system, or a CONNECT Emission Control System. Both these signals have the same range as the bargraph display (1). The 0-10V signal is preferred for short distances (up to 10m), while the 4-20mA signal is preferred for longer distances (up to 4000m using Belden 9534 data cable). If either signal is required, make the connections via screened cable to 4-20mA/0-10V output connector (15).

4-20mA	4-20mA terminal to Load (+), RETURN to Load (-), cable screen to DRAIN. The 4-20mA load should be isolated 50-470 Ohms. If the load is located with a DC power supply, a 4 core screened cable may be used for both this function and the DC power supply function.
0-10V	0-10V terminal to load (+), RETURN to Load (-), cable screen to DRAIN; the load should be isolated, high impedance.

Relay Inputs

The EMP6 can be remotely controlled by an external PLC or other device to enter it into test mode or to automatically turn the relays on via the External Relay/External Test connector (14).

Probe Overload

If the Probe Overload LED (9) illuminates during operation, check the wiring or sensitivity of signal, and repeat the setup procedure.

Data Logging

Connection to the EMP6

SPController is the software required to set the data logging on the control unit. It can be downloaded from our website at www.cleanairsystems.com/tes_downloads#emission

An RS232 serial port is required on the PC to be able to connect to the EMP6. Before connecting to the EMP6, ensure that an RS232 port is available and functional. If an USB to RS232 port adapter is being employed, ensure that all appropriate device drivers have been installed and that the port number is known. Using the EMP6 serial cable, connect from the PC RS232 to the Control Unit programming port (17).

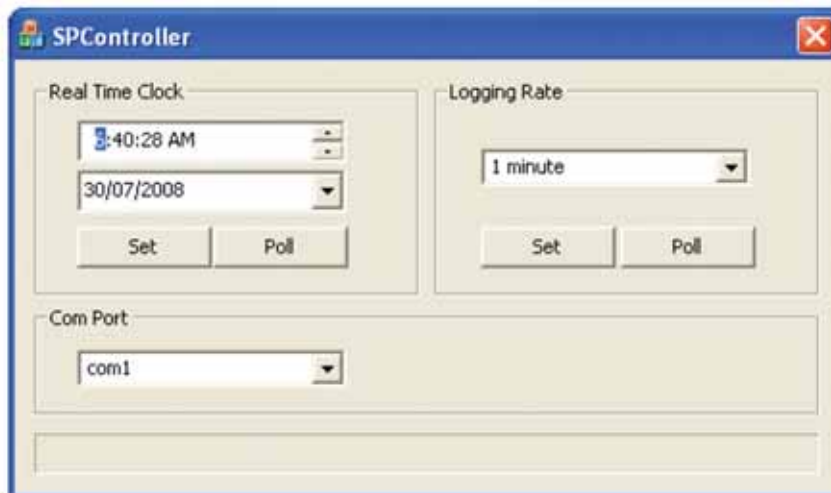
Initializing the data logger

From the PC Start menu, locate the EMP6 folder, and launch the SPController application. A screen similar to the one shown below should appear. Ensure that the Com Port number matches the RS232 port on the PC.

Here you can set the internal clock and intervals of logging onto the SD card (14).

- Logging rate interval can be selected within the user interface in the SPController screen
- Real time clock can be edited within the user interface in the SPController screen

- 'Poll' polls the Control Unit's internal clock/logging rate
- 'Set' sets the Control Unit's date and time/logging rate
- 'Com Port' selects the communications port on the PC.



Reading the logged data

The file generated on the SD card is a CSV file which can be opened in excel. Each line in this file represents one logging interval. It will log the date (DD/MM/YYYY), time (HH:MM:SS) in 24 hour period), averaged reading over the logging rate (XXXX), if alarm 1 turn on at any time during the logging rate (sample period) (1 or 0) and if alarm 2 turned on at any time during the logging rate (1 or 0).

An example of a reading:

```
20/01/2009      9:22:28      5000      1      0
```

This shows on the 20th of January, 2009 at 9:22 the control box recorded an average reading of 5000 from the probe over the logging rate. Alarm 1 was active and alarm 2 was not during the logging rate.

The reading of 5000 is a unit less figure which indicates the dust levels the probe senses. A value of zero indicates no particulates in the air and a value of 15561 indicates a maximum reading from the probe. *Note: The sensitivity switch on the active head can be altered to monitor relevant emission levels.*

If an external relay or probe fail is read by the control unit at any time during the logging rate the output would log the error, as the example below:

```
20/01/2009      10:09:10      'External Relay'
```

When the sensor test is activated, either by relay contacts (15) or by the sensor test button (7) the average reading over the logging rate and the test will be recorded, as in the following example:

```
20/01/2009      9:35:42      12000      'Sensor Test'
```

A new file is created every time the unit is turned off and on again.

The following table gives a rough guide of the time it takes for the memory capacity of the SD card to be reached.

Logging interval	512 MB SD card will last
1 minute	11 Days
15 minutes	5½ Months
1 hour	22 Months
1 day	44 Years

The more memory capacity in the SD card the longer it will last, eg, 1 Gigabyte will last twice as long and 4 Gigabytes will last eight times as long.

When the memory is exceeded on the SD card, new logging entries will overwrite the oldest records on the card.



Caution

All electronic devices may be damaged by the application of excessive voltage. Emission monitors include protection against damage by electrostatic discharge (ESD) however in certain situations the over-voltage energy can exceed the capacity of the protective devices, so precautions are recommended.

The incorrect application of any AC or DC power source to an instrument's terminals, however briefly, will often lead to destruction of the instrument. Only make connections when it is certain they are correct.

In some industrial plants where the earthing is poor or large electrical currents or large magnetic fields are present, or near arc welding, different earth locations may exhibit different potentials, causing instrumentation cabling to carry large currents, burn out and cause a fire.

In addition, non-isolated instrumentation can suffer internal damage from earth potential differences greater than 3.5VRMS or 5V peak. Avoid any possibility of these circumstances, and ensure that arc welding is performed ONLY where the instrument is NOT connected to the to the work piece.

When a cable is not connected to anything, it can carry high induced voltages which, while not necessarily dangerous to humans, are nonetheless dangerous to electronic devices. When such a cable is plugged or wired into the first device, the accumulated energy is discharged into the device. To avoid damage, it is good practice to momentarily discharge any accumulated charge on the cable screen to ground, eg by shorting the two with a multimeter lead.

The human body can accumulate high electrostatic charge while walking or standing next to high voltage electrical equipment. Therefore avoid any electrical contact with the pins on the network header either directly or indirectly via a screwdriver blade. If there is a possibility that electrostatic discharge might occur to the terminals, all care should be taken to ensure no discharge occurs.

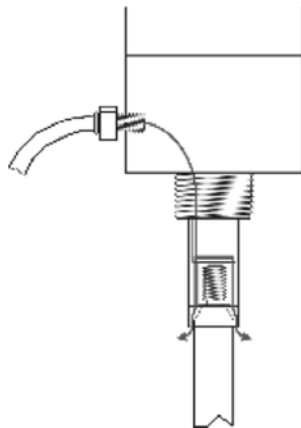
Purging

Particulate Build-up

Particulate build-up on the probe itself can be minimised by the use of PTFE coated probes (consult Tyco Environmental Systems), however build-up on the probe will not cause errors in any case. Build-up across the insulation barrier from the probe to the earthed metalware will, however, progressively attenuate the emission signal, so it should be avoided where possible. A low level alarm can be configured to detect this condition.

Connecting the Purge Air

If build-up across the insulators is considered to be a potential problem, then the purge port must be connected to a source of periodically pulsed clean dry instrument air to dislodge recently deposited particles. The pulsed air will flow as indicated below. NEVER exceed the rated pressure of the purge port (400kPa/60 PSI), or over tightening the air fitting. If the purge facility is not used, the original sealing plug and O-ring must be fitted at all times.



Corrosive Gases

If the gas is corrosive, it should not be allowed to enter the body of the Monitor; in these circumstances the purge air path can be sealed off completely by a plug inserted before the probe is screwed in (please see the supplier).

Maintenance

It is desirable to periodically remove, inspect and clean the inserted parts of the Monitor on the Active Head. The period of this maintenance may vary from weekly to annually, depending on the material characteristics.

After initial installation the Active Head should be removed and inspected weekly then monthly to gain a working knowledge of the interval that would be required for maintenance,

Your local Tyco Environmental Systems office can aid in this process.

Inspection

This is a visual inspection to ensure that the system is in good working order.

As these devices are typically mounted outdoors inspection of cabling, moisture ingress and general condition of the monitor is vital.

Things to look for are:

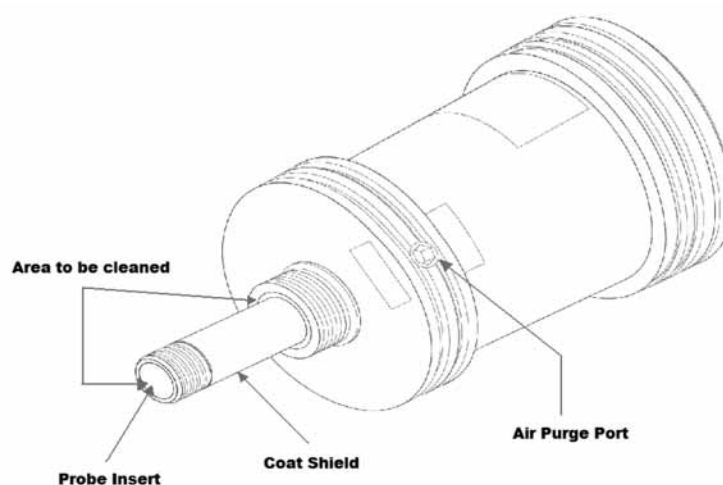
- Moisture ingress into the body of the monitor.
- Warn of frayed cabling.
- Any burn marks on termination.
- Tightening of all screws (terminals, lid, probe shaft etc.)
- Particulate build-up on the sensor front end and probe shaft.

Cleaning

Cleaning of the probe is a vital part of the maintenance process to ensure that no bridging occurs between the probe shaft and any grounded material.

Particles can build-up across the probe shaft to the “coat shield” and even to the duct wall, resulting in a LOW reading from the monitor.

To clean the monitor it needs to be removed from the stack and all inserted parts cleaned with compressed air. See image below for components to be cleaned:



Air purging can help to minimise the frequency of cleaning.

Options

Probe Options

The Emission Monitor Active Head is widely adjustable; however probe length also has a significant effect on sensitivity, so choose the probe length according to these recommendations:

- Below $1\text{mg}/\text{m}^3$: 0.8 duct diameters
- Above $100\text{mg}/\text{m}^3$: 0.1 duct diameters
- Otherwise: 0.5 duct diameters

Probes are traditionally formed from solid stainless steel rod. However stainless steel wire rope is standard for new models, and is available on request for all other models. Wire rope has a number of advantages over solid rod:

- The surface texture and small diameter minimise downstream gas flow disturbances to flow transmitters, isokinetic sampling probes, etc,
- The high internal damping eliminates resonance effects which can damage probes and Emission Monitors,
- The inherent sagging minimises the probability of a probe unscrewing itself in operation.
- The wire strands slide slightly against each other with normal movement of the probe in the gas stream, which tends to dislodge accumulated matter.

Standard wire rope probes are commonly fitted in one of these forms:

- Cantilevered probe 0-800mm: use a simple wire rope probe alone.
- Probe 800-2000mm total: supported on opposite side by P2-60230 support head.
- Probe above 2000: string the probe across the duct with egg insulators in line at both ends, and strong supports. Add another short section of stainless steel wire to connect the Emission Monitor to the probe.

Alternatively, consult Tyco Environmental Systems to discuss other probe options including: rigid rod, PTFE coated rod, rod or rope in wear-resistant material.

Temperature Options

The monitor may be mounted via an extension tube such as the high temp kits P2-60205 (300mm) or P2-60210 (450mm). A reflective metal heat shield (eg 400mm dia ss) may be clamped along the extension tube using two nuts on the threaded exterior of the tube.

Provided the gas path is at negative pressure and non-toxic (the usual case for a stack) and the emission monitor body is protected from rain or other contaminants, the monitor may be cooled by drilling several holes around the outermost end of the extension tube, thus allowing ambient air to coat the emission monitor's nose and part of the probe. By these means it is possible to use monitors rated for 200°C (390°F) max insertion temperature at gas temperatures of up to 500°C (P2-60205) or 600°C (P2-60210).

Hazardous Area Options

Please contact your local Tyco Environmental Systems office for information.

Mounting Options

If a quick-release tapping point is required, the Bolt-on Mount Kit P2-60203-SS or the Weld-on Mount Kit P2-60202-SS. (see Quick Start page 2).

Basic Fault-Finding

Problem	Possible Cause/s	Remedy
No Signal	No power to the device Incorrect input being read in data input device Probe shaft not connected Bridging of the probe shaft to ground	Apply power Ensure that input connections have been made to the correct location Connect probe shaft. Probe need to be cleaned (see maintenance).
Erratic Signal	No earth wire connected Earth potential is above recommendation Loose connection to probe shaft Ambient temperature has exceeded the rating for the monitor/control unit (60°C, 140°F)	Connect external earthing lug to ground Earthing point needs to be improved to eliminate high potential Ensure that the probe shaft is tight Steps need to be taken to ensure the temperature does not exceed the rating, contact Tyco Environmental Systems for further assistance
Probe overload LED remains on	Active Head and Control Unit not connected Damaged cables or bad connection	Connect two devices together Replace cables
Device showing lower than usual signal	Emissions from the stack have decreased Bridging of the probe shaft to ground No probe shaft connected	Actual emissions have decreased no action needs to be taken Probe need to be cleaned (see maintenance) Ensure probe shaft is connected and tight



Notes



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