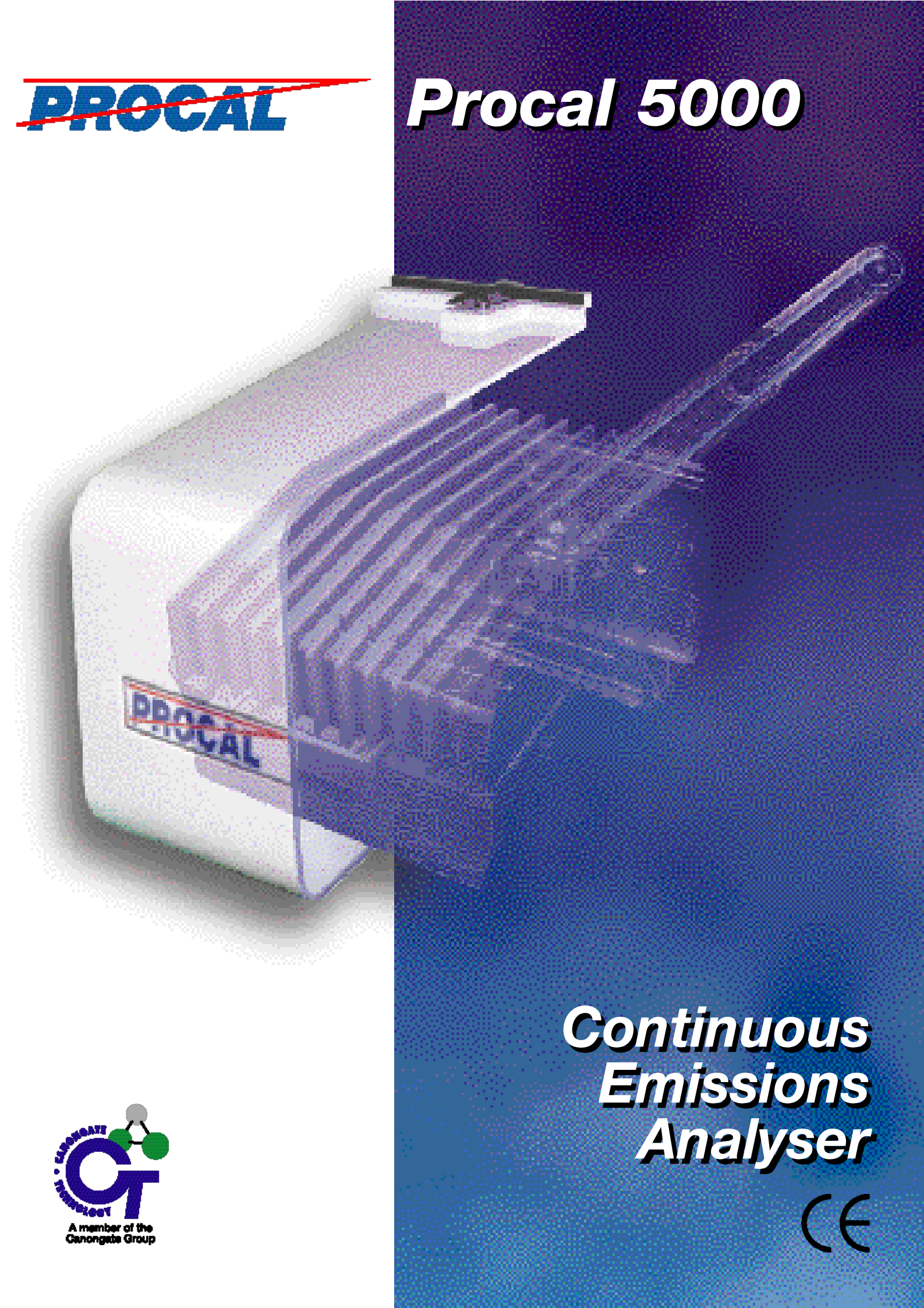
PROCAL

Procal 5000



Continuous Emissions Analyser

CE

A member of the Canongate Group

PROCAL 5000 - System Description

The Procal 5000 continuous emission monitoring analyser is designed for in stack analysis of gas phase stack emission components.

Utilising absorption spectroscopy the instrument stores and analyses a full UV spectrum and using advanced mathematical techniques calculates the emission concentrations.

The Procal 5000 system is a fully integrated stack gas analyser with built in auto zero/calibration facilities. The instrument will report concentrations of stack gas pollutants either through the Procal Analytics Analyser control Unit (ACU) or Personal Computer (PC) running Procal Analytics Analyser Control Windows (ACW) software. An-in stack heater (ISH) is optionally supplied when process conditions are liable to result in water vapour condensing in the analyser sample cell.

The on stack analyser consists of two main parts:

The main instrument housing, which is manufactured from cast aluminium and rated to IP65 \ NEMA 4X. This custom designed housing has many benefits including two separate compartments, ribbed cooling fins to allow good heat dissipation and hinged covers for easy maintenance.

The main upper compartment houses the optical components consisting of an ultra violet source and Procal designed and manufactured robust diode array spectrometer.

In a second compartment with separate access a mains power supply, microprocessor and auto zero \ calibration module are located.

Procal Analytics unique in-situ sample cell with its auto/zero calibration capability is attached to the aluminium housing. The use of the advanced in-situ sample cell thereby avoids the need to extract a sample from the stack. Thus, the use of costly high maintenance sample handling systems is eliminated.

Sintered stainless steel filter panels fitted to the sides of the in-stack measuring cell allows the permeation of stack gas whilst preventing the ingress of dust and particulates. The envelope thus formed allows the introduction of zero and span gas enabling the system to be fully verified on stack. Complies with US EPA 40 CFR part 60 and 75.

The Analyser Control Unit (ACU), or a PC running Procal analyser control software for Windows displays gas concentrations of each of the monitored components along with information on sample condition diagnostic data and trends. The information can be retransmitted in the form of 4 - 20mA current outputs (one per measured component), parallel printer output and optional RS232C serial output.

The ACU or PC can support up to four optical head units of any Procal analyser type.

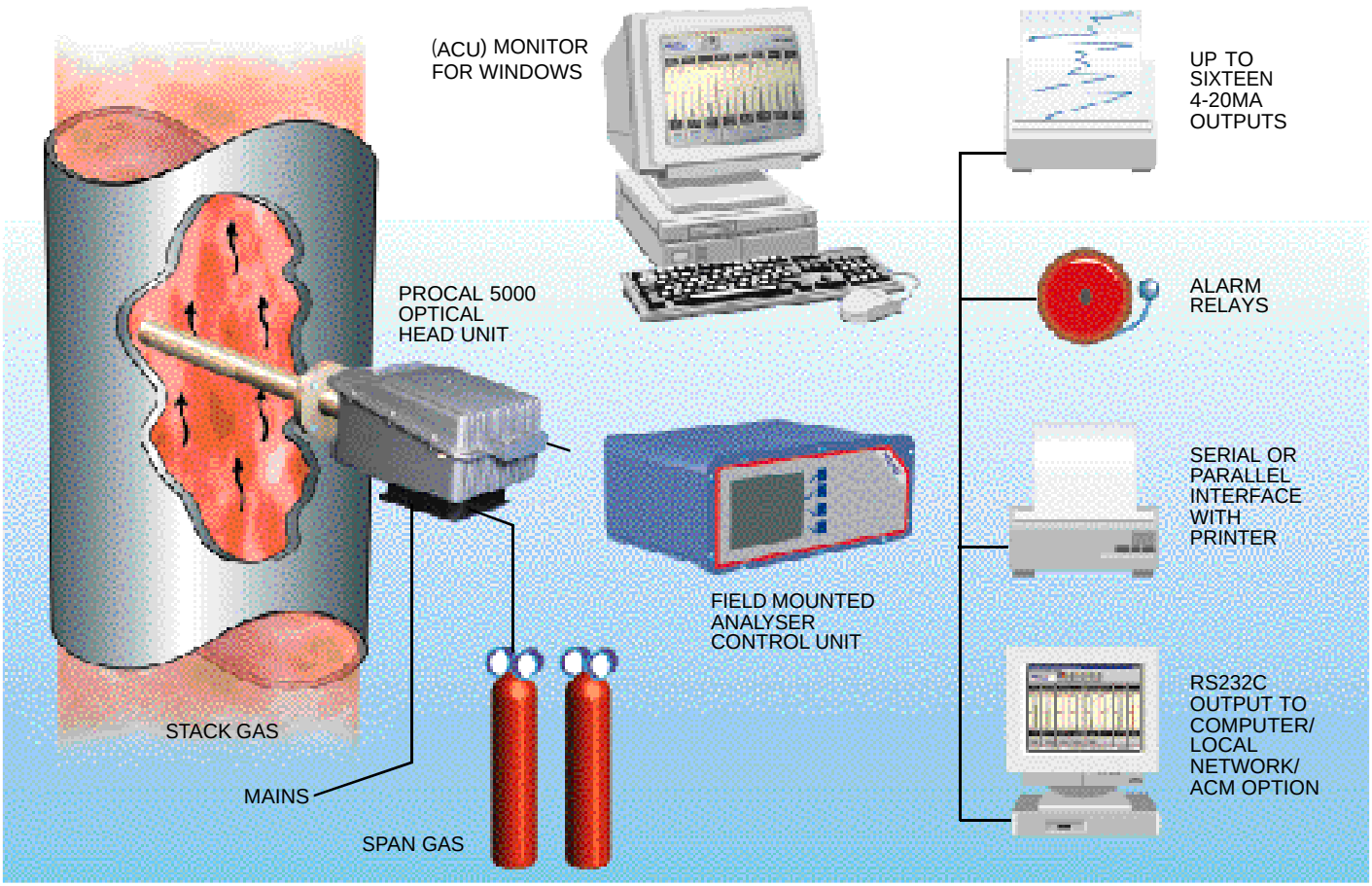
Analyser control unit (ACU) data sheet 7-3008

Analyser control software for PC (ACW) data sheet 7-3023

The analyser controls an integral auto zero unit. On command the unit will check and if necessary adjust zero by introducing instrument air into the probe thereby forcing out sample gas and establishing a true zero.

If required the unit can then introduce a known concentration of test gas into the sample cell thereby establishing the calibration point, if required the unit will then auto calibrate. In the event of power loss to the analyser or too low sample temperature the integral auto zero unit will purge the sample cell with air. This is done to prevent highly corrosive condensates forming in the sample cell.

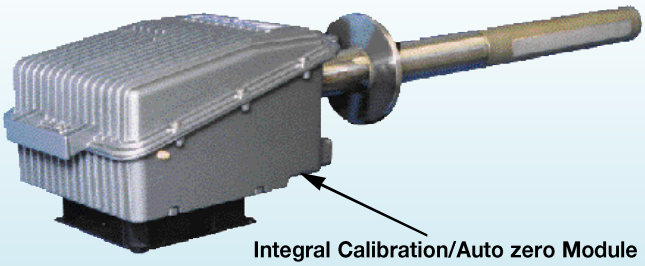
If the analyser is to operate in a stack or duct near or below dew point an optional in-stack heater is fitted: The temperature of this unit is controlled by an output from the analyser. However a separate mains supply is required.

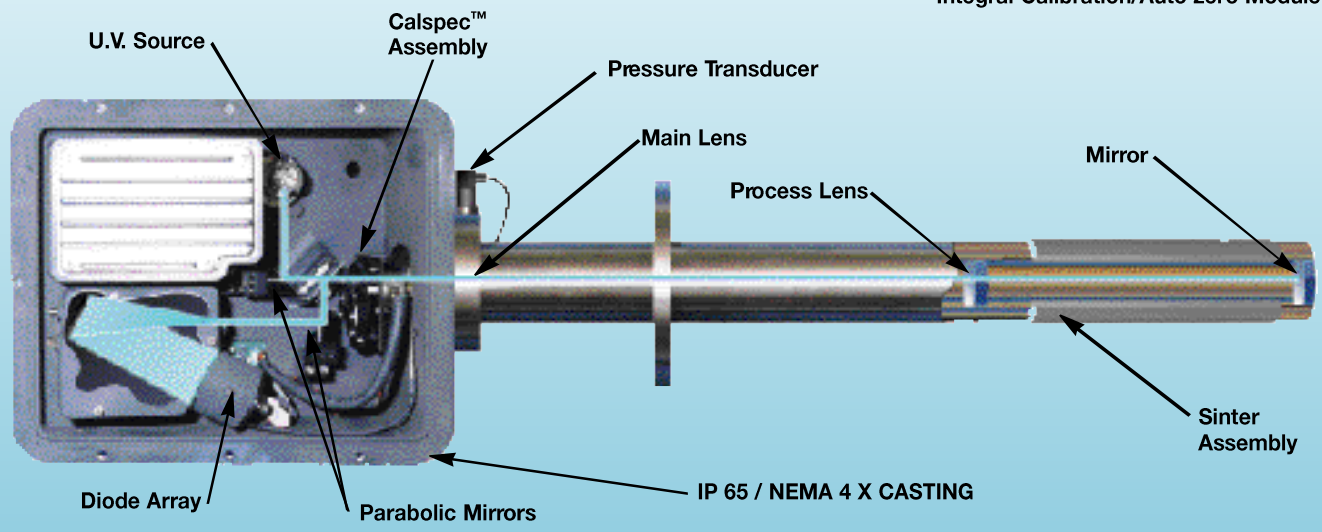


Enveloped Folded Beam™ Principal

The sample cell of the Procal 5000 consists of a process lens mounted in a robust stainless steel tube with a reflector mounted at the far end, protected from particulates by a sintered stainless steel filter.

The collimated Ultraviolet beam passes down the length of the sample cell and is returned by the reflector to the spectrometer unit via the process and main lenses. This enveloped folded beam technique means that the Procal 5000 OPTICAL HEAD UNIT has an effective sample cell length of 1 metre, thereby greatly increasing the sensitivity of the unit, hence decreasing the minimum detectable levels of gases to be measured.





Integrated Auto calibration Unit (Option)

The AUTO ZERO \ CALIBRATION UNIT meets the requirements of USA EPA CFR part 60 and 75.
On command from the ACU or PC this unit will initiate a zero check, and a span verification and if necessary adjustment. Any adjustments are automatically logged in the non volatile memory of the ACU or PC.

Continuous Emissions Monitoring (CEM)

The Procal 5000 is a truly verifiable CEM system designed to meet the requirements of both customers and environmental authorities worldwide. The system enables upgrades to meet changing worldwide regulations with regard to measuring range, presentation and reporting format.

Minimal Cross Sensitivity

By utilising a full spectrum analyser compared with a conventional optical filter based analyser it is possible to improve prime sensitivity of the instrument and reduce cross sensitivity.

Total Stack Monitoring Solution

The Procal 5000 system is capable of receiving data in the form of up to three 4-20mA signals, from other instruments. These typically measure parameters such as Oxygen, Opacity/Dust, Velocity and Pressure. In addition to displaying, data logging and retransmitting this information the Procal 5000 can use this data to correct the readings to a normalised level such as 11% Oxygen.

Features Benefits

Multi Component	Each analyser can be calibrated to measure a series of gas concentrations
Direct in-situ measurement	No requirements for high cost, high maintenance sample handling system
	No modification to the sample
Autozero	No operator adjustment, eliminates drift
Stack calibration	Proof of calibration to environmental authorities
Integral data logger	At-a-glance record of plant performance and emissions monitoring
Reporting facility	Daily hard copy to conform to the authority's requirements
Single flange mounted analyser	Reduced cost of installation
Low maintenance	Reduced cost of ownership
No consumables	Reduced cost of ownership

Specification

PROCAL 5000 RANGE ANALYSER SPECIFICATION

Principle of operation: Ultra-violet absorption full spectrum method.

Gases measured: Series of gas concentrations as determined by the application.

Ranges (minimum):

NO	0-30ppm / 40mg/Nm^3
NO_2	0-30ppm /60mg/Nm^3
SO_2	0-20ppm / 60mg/Nm^3
NH_3	0-25ppm / 20mg/Nm^3
Cl_2	0-25ppm / 80mg/Nm^3
O_3	0-1ppm / 2mg/Nm^3
H_2S	0-20ppm / 30mg/Nm^3

Other gases on application.

Spectral range: 180nm to 400nm.

Ultra-violet source: Extended life deuterium lamp. (typically 7000 hrs).

Ultra-violet detector: Miniature photo diode array.

Sample path length: 1 metre.(Other lengths on application.)

Cross-sensitivity: Minimal due to full spectrum principle and advanced algorithms in the processor software.

Pressure compensation: To allow for atmosphere/stack pressure variation.

Accuracy: Typically ±2% of full scale concentration but dependent on application.

Response time: Application dependent but typically 120 Secs to T90.

Calibration Requirements: Supplied pre-calibrated. Short term drift of less than the quoted accuracy is removed by zero calibration, carried out automatically, typically every 24 hours depending on application.

Enclosure: Aluminium alloy casting with high protection finish, sealed to IP65 \NEMA 4X. Outer GRP weather protection.

Operating environment Operating temperature range: -20°C to +45°C (-4°F to 113°F). Ducted air provision for extreme temperatures. Sample temperatures up to 350°C (662°F) (higher temperature on application)

Materials in contact with sample: Calcium fluoride, glass, 316 stainless steel, graphite and fused silica.

For further details consult the operating manual.

Services required:

- 90-250V 80VA required for lamp PSU, head cooler fan (application dependent) and electronics.
- Instrument air for the analyser void purge, autozero and sample cell protection, controlled by the Procal 5000. Pressure 4-8 barG; flow rate 0.5 litre/min constant and 5 litre/min for 5 minutes every 24 hours.

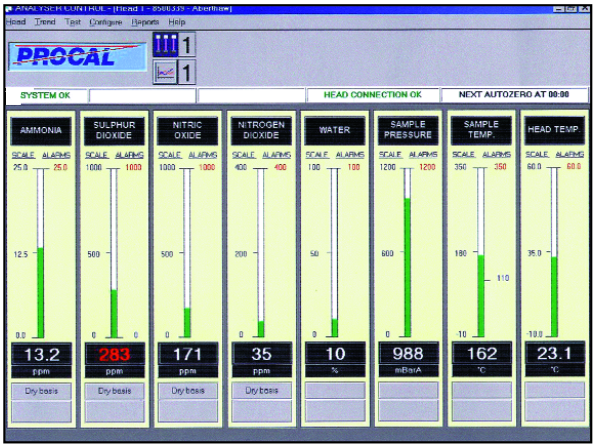
Interconnection cable: 2 Twisted pair cores with overall screen typically, allows up to 1,200m separation between Procal 5000 and ACU/PC.

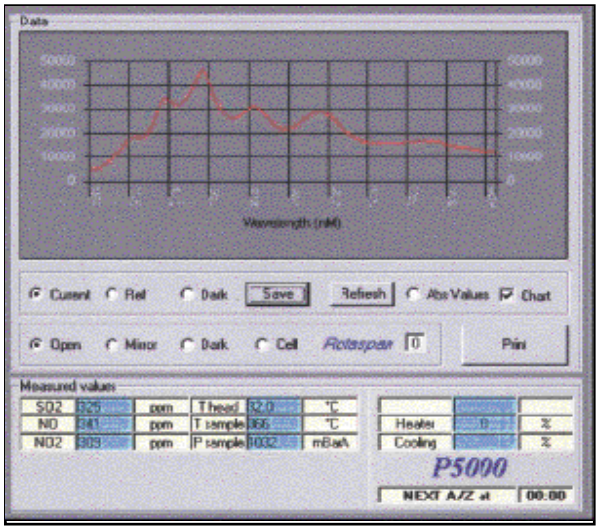
Mounting flange: 3" 1501b (note this is a special flange part number 4-1114)

Weight: 35kg (77.2lb)

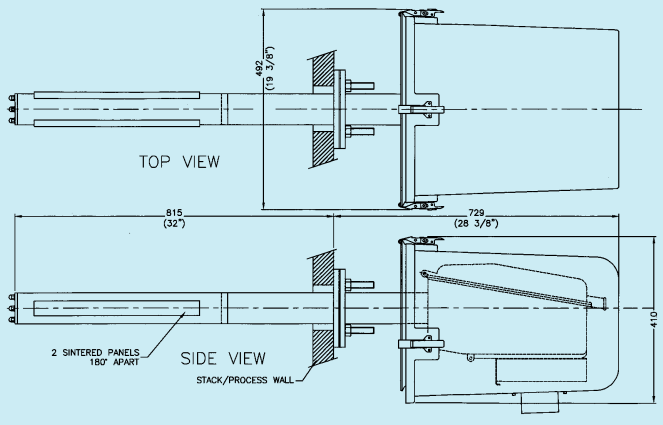
Dimensions: 1544 (60.78") x 492 (19.37") x 410 (16.14").

Typical (ACW) Displays (see data sheet 7-3023)





PROCAL 5000 OVERALL DIMENSIONS (mm)



OPTIONS

In-stack heater (110V 230V 1KW): Required when Stack Temperature is near or below dew point.

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