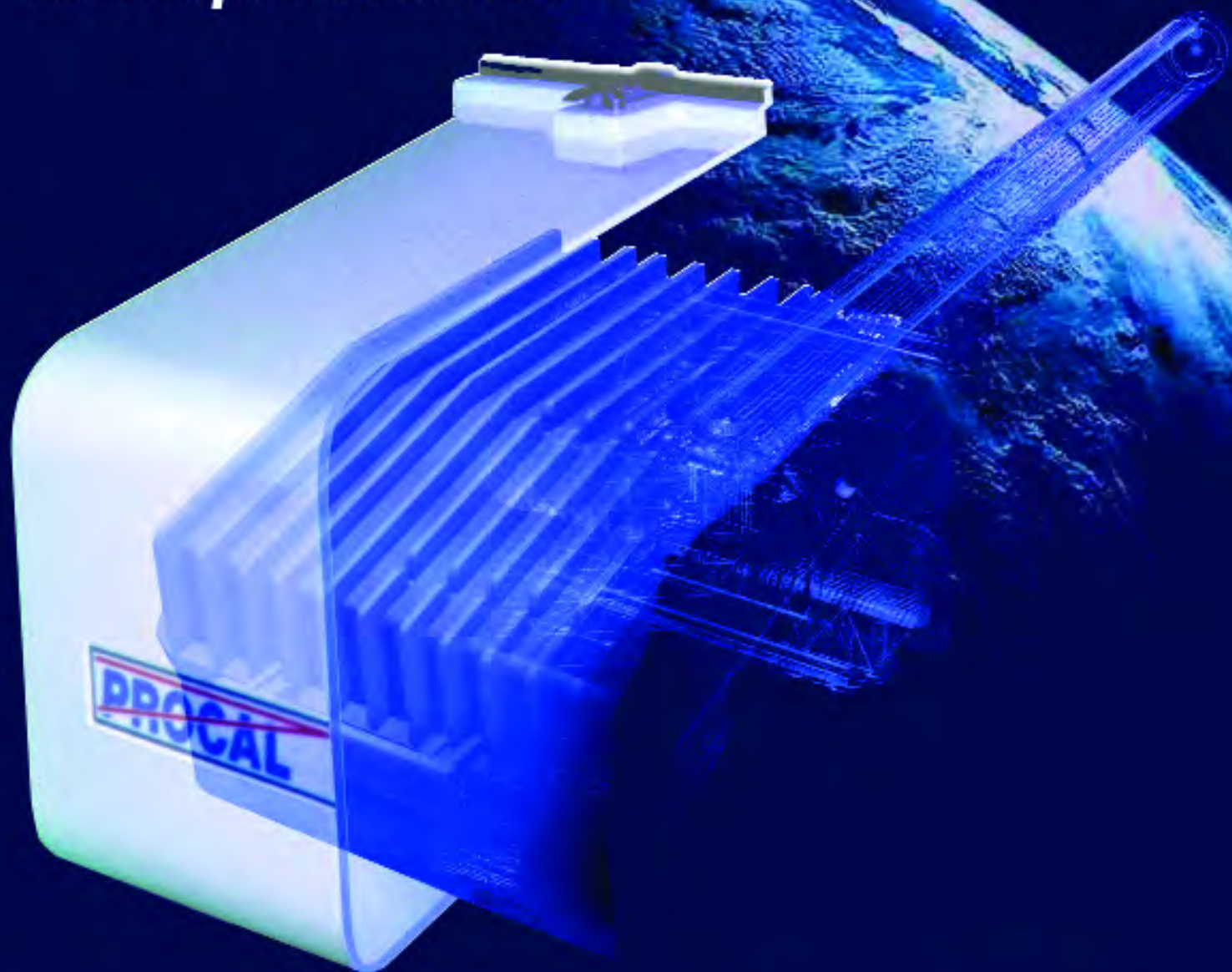


~~PROCAL~~

PROCAL 5000 CEMS SYSTEM

www.procal.com



US EPA
40 CFR
Part 60&75
Compliant



sira
Certified Network
ISO 9001:2008



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 gas 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 for Windows (ACWn) software. An in situ 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, 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 upper compartment houses the optical components consisting of an ultra violet source and a 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 and this 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 (ACWn) 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 serial modbus output.

The ACU can support up to four analysers and the PC up to eight of any Procal analyser type.

Analyser control unit (ACU) data sheet 7-3008

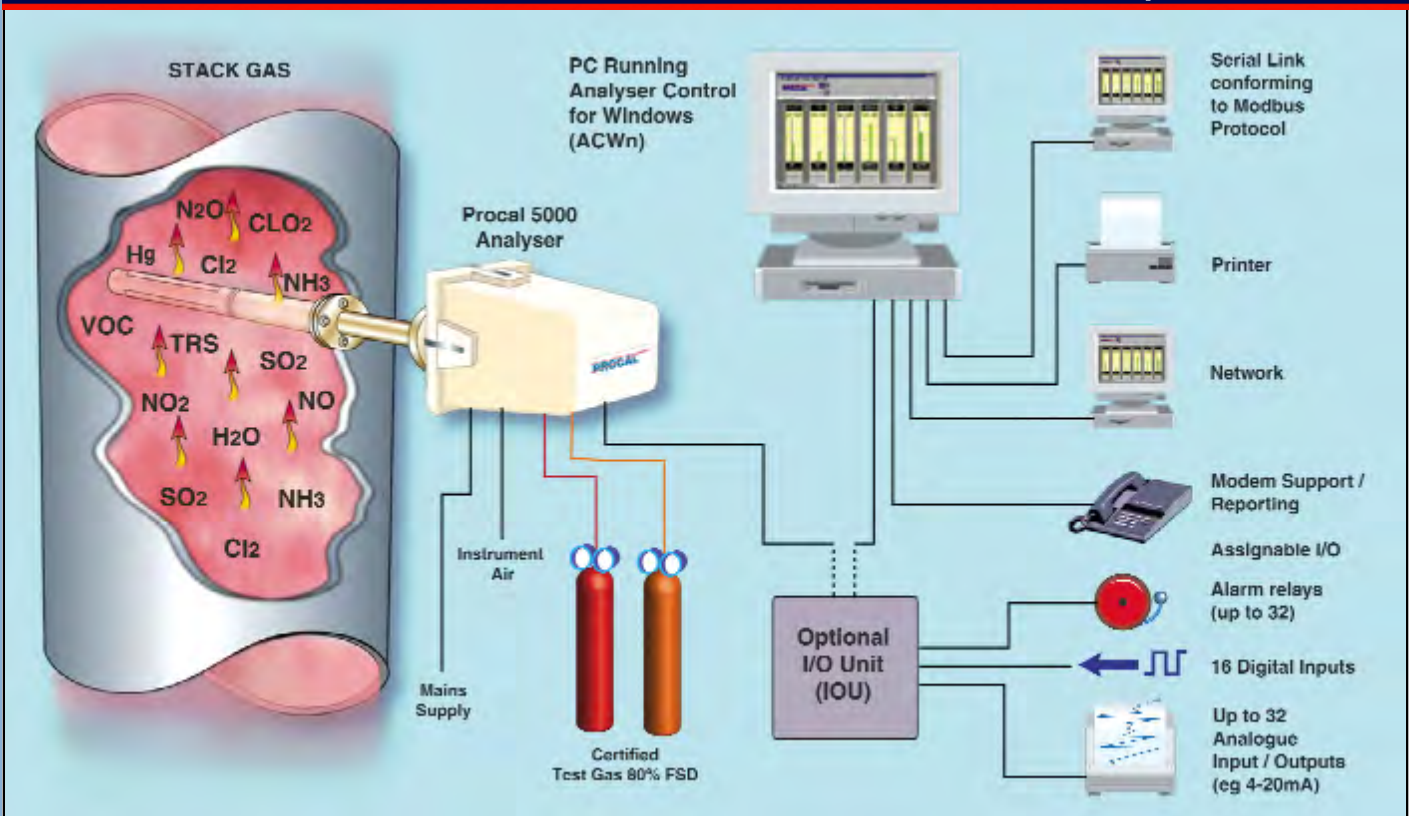
Analyser control software for PC (ACWn) data sheet 7-3037

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, with option to 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.

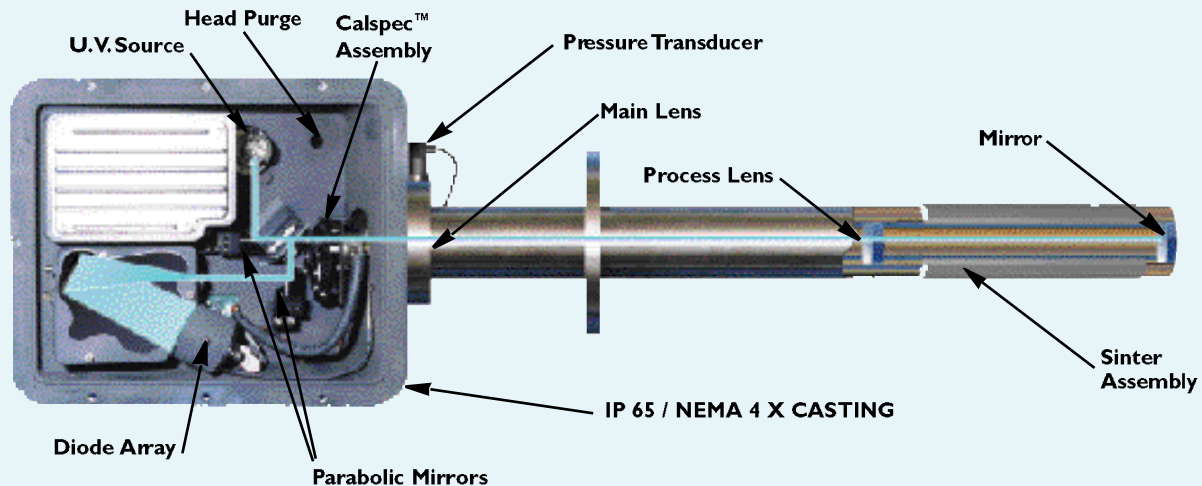
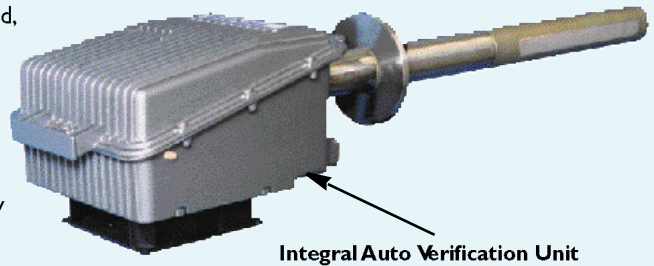
The Control Software can support multiple analysers from the Procal range



Enveloped Folded Beam™ Principle

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 analyser 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 Verification Unit

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.

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.

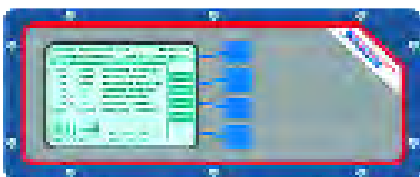
Continuous Emissions Monitoring (CEM/AMS)

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.

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 and Velocity. 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.

Control Unit - Options



Analysers Control Unit (ACU)

In addition to powering four analysers the (IP65 NEMA 4X) industrial PC displays gas concentrations on the integral liquid crystal display along with information on sample conditions, diagnostic data and trends. The information can be retransmitted in the form of 4-20mA current outputs (one per measured component), parallel printer interface and optional RS485 serial output. See data sheet 7-3008-00



Analysers Control for Windows™ Network (ACWn)

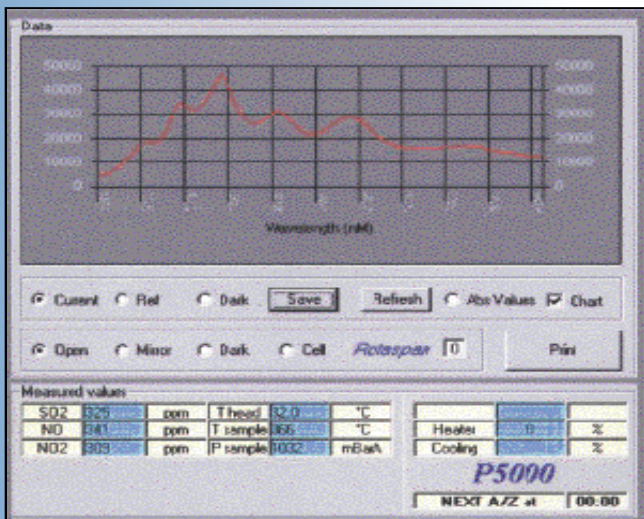
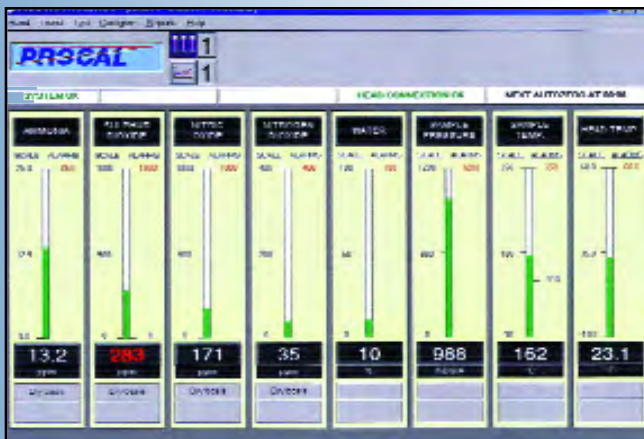
The ACWn is a stand-alone software package which provides all the display requirements of up to eight Procal analysers including the incorporation of third party data. In this way it can be the basis of a complete CEM / AMS System. In addition to long term data logging the information can be retransmitted using the RS485 serial output or utilizing the optional Input Output Unit (IOU) in the form of 4-20mA (one per measured component) See data sheet 7-3037-00

Specification

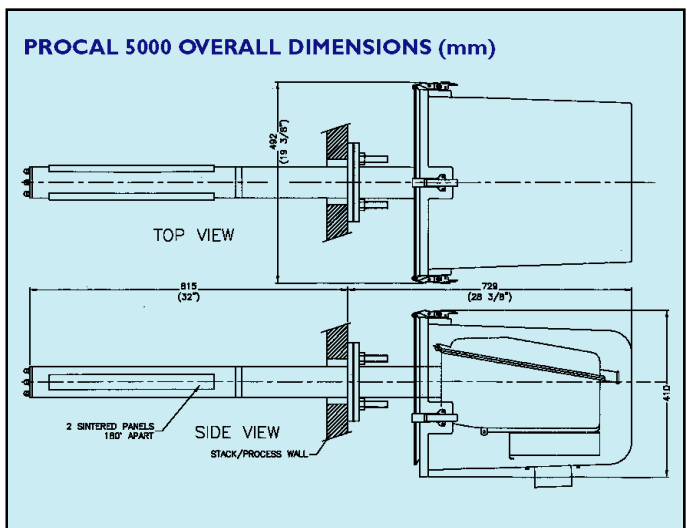
PROCAL 5000 RANGE ANALYSER SPECIFICATION

- Principle of operation:** Ultra-violet absorption full spectrum method.
- Gases measured:** Series of gas concentrations as determined by the application.
- Ranges (minimum):**
- | | |
|------------------|--------------------------------|
| NO | 0-20ppm / 26mg/Nm ³ |
| NO ₂ | 0-20ppm / 41mg/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 ₂ S | 0-20ppm / 30mg/Nm ³ |
| H ₂ | 0-2ppb / 20µg/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 atmospheric/stack pressure variation.
- Accuracy:** Typically ±2% of full scale concentration but dependent on application.
- Response time:** Application dependent but typically 120 Secs to T90.

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



- 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 400°C (750°F) (higher temperature on application)
- Materials in contact with sample:** Calcium fluoride, glass, 316 stainless steel, graphite and fused silica.
- 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 2.5-3 barG; flow rate 5.5 litre/min constant and 5 litre/min for 5 minutes every 24 hours, regulator takes up to 10 bar but set to 2 bar g to give correct flows as Autozero unit flow is pre-set for intake of 2 bar
- 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" 150lb (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").



OPTIONS

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

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Procal reserves the right to alter these specifications without prior notification.