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## Procal 2000

Continuous Emission Monitoring (CEMS/AMS)  
Process Analyser



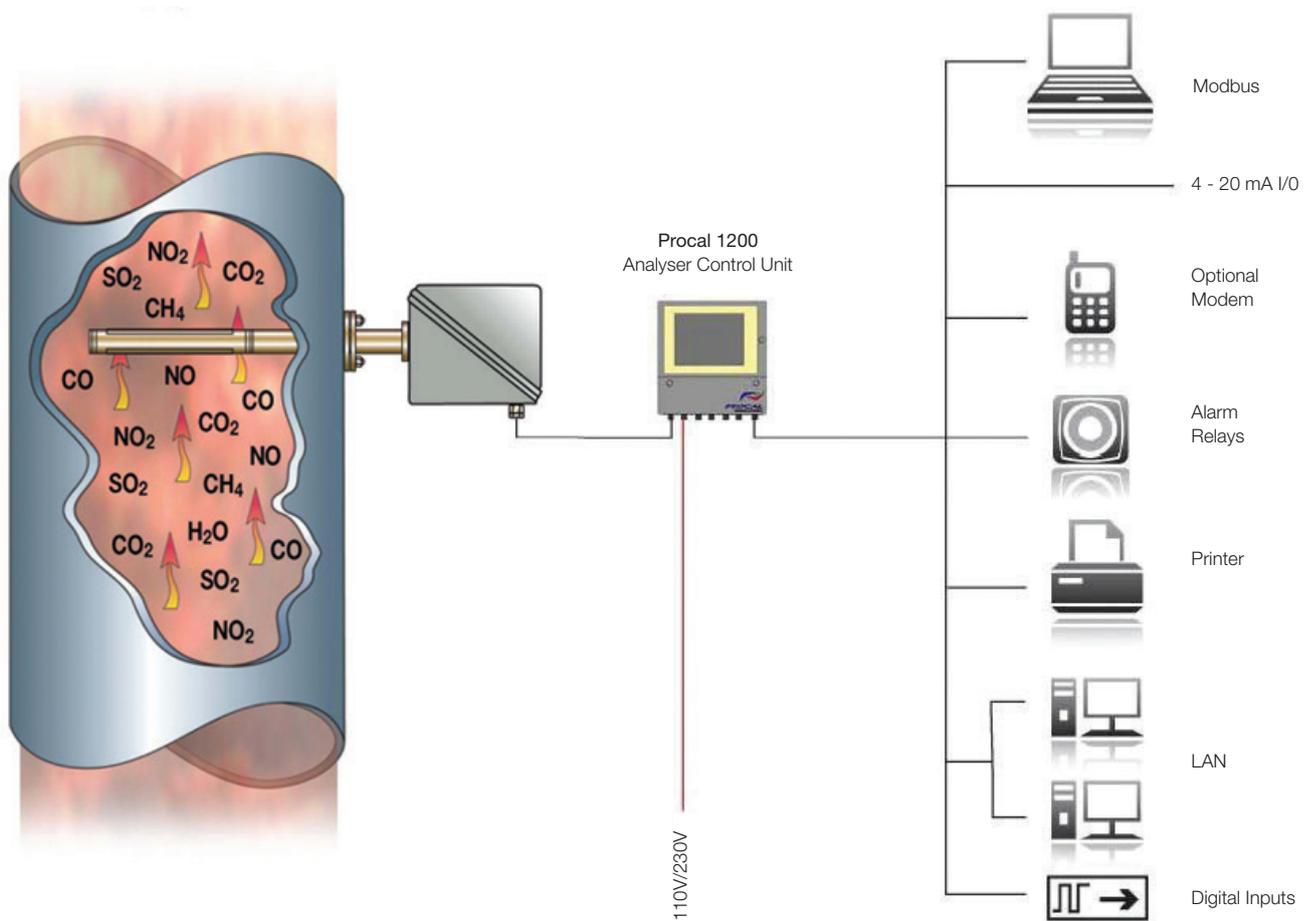
# Instrument Overview

Procal 2000 is an infra-red (IR), duct or stack-mounted Analyser, designed to provide In-Situ analysis of up to six gas-phase emission components.

A typical system comprises of a stack mounted Analyser, an integral Calibration Module and a Control Unit with options which include a powerful In-Situ Heater and a stand-alone Analysis Software package.

Procal 2000 uses the reflective beam principal to directly measure process gas as it enters the in situ sample cell. Unlike higher maintenance extractive systems, Procal's patented, sintered metal technology removes the need for gas filtering or sample conditioning.

The Procal 2000 analyser requires very little maintenance and achieves a class-beating availability of over 98% in demanding applications.



The Control Unit can support multiple analysers from the Procal range

## Examples of Principles of Operation

**Analyser:** The Procal 2000 analyser operates on the proven, single beam, dual-wavelength IR principle. Mid IR Pulses, at two specific wavelengths per monitored component, are transmitted through the sample cell. The 'measure' pulse is partially absorbed by the gases being measured while the 'reference' pulse remains unaffected. Up to eight wavelengths are available, sometimes sharing reference wavelengths, allowing up to six gas-phase component concentrations to be monitored simultaneously. Uniquely, the operation, zero and calibration are "fully challenged" in that all operating modes use the same optical path and system components.

**Auto Verification:** The integral Auto Verification Unit provides a zero-check on the system by filling the sample probe with clean, dry instrument air. Similarly, it performs a span-check by filling the sample probe with certified span gas.

**Applications:** The Procal 2000 analyser has been in service for over 25 years with continual product improvement to match ever-tightening legislative requirements. Over 2,400 Procal 2000 units are in operation worldwide - refer to our industry data sheets or visit [www.procal.com](http://www.procal.com) for typical applications and associated measurement ranges.

# Features

Multi-component gas analysis  
Direct in-situ measurements

Wet or dry readings  
Automatic signal verification and recalibration  
Oxygen or CO<sub>2</sub> measurement normalisation (option)

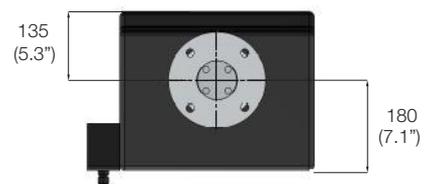
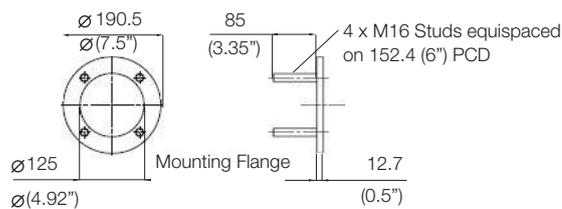
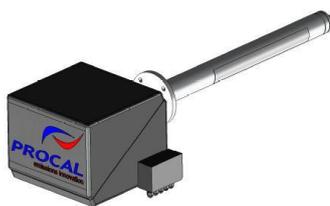
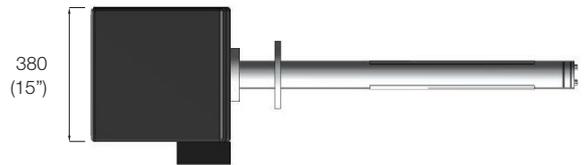
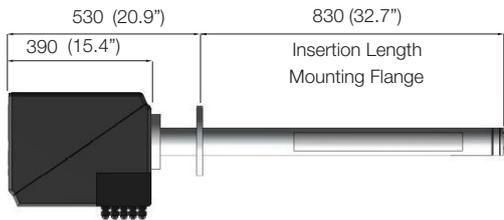
Single Flange mounted analyser  
Low maintenance  
ATEX / IEC option  
ABS approved  
Marine approvals  
MCERTS approval

# Benefits

Each Procal 2000 can measure up to six components  
No requirement for high cost, high maintenance sample handling system or sample conditioning  
Can inherently report on Wet or Dry gas basis  
No operator intervention during routine use  
Report measurement corrected to normalised O<sub>2</sub> or CO<sub>2</sub> reference conditions  
Reduced cost and simplicity of installation  
Reduced cost of ownership  
Can be used in hazardous areas  
Suitable for marine applications

## Examples of Monitoring Ranges

Principle of operation:	Single Beam Dual Wavelength Infra Red with GFC where advantageous		
Gases measured:	Up to 6 hetero-atomic molecular gases as determined by the application.		
CO	0 - 150ppm / 188mg/Nm <sup>3</sup>	CO <sub>2</sub>	0 - 15%
SO <sub>2</sub>	0 - 100ppm / 280mg/Nm <sup>3</sup>	H <sub>2</sub> O	0 - 12%
NO	0 - 240ppm / 322mg/Nm <sup>3</sup>		



All measurements are in Millimeters

## Control Unit Options

### Analyser Control Unit - Procal 1000

The Procal 1000 data logging and control system is Microsoft Windows based.

The system is capable of controlling up to six, widely dispersed, Procal analysers of any design. The Procal 1000 range is also designed to accept signal I/O from other instruments in the process to provide a single CEMS data hub. The Procal 1000 system displays gas concentrations and third party analyser I/O along with information on sample conditions, diagnostic data and trends. The information can also be made available to external devices in a variety of industry standard data protocols.



# Specifications & Installation

Spectral range:	Specific application dependent wavelengths (up to 8) are selected between 2-12 µm
Infra-red source:	Enclosed nichrome filament.
Infra-red detector:	Solid state pyroelectric element.
Sample path length:	1 metre
Sample temperature:	Up to 350°C (660°F) (higher temperatures on application)
Cross-sensitivity:	Minimal due to the wavelength selection and advanced algorithms in the processor software.
Accuracy:	Typically ±2% of full scale concentration but dependent on application.
Response time:	Application dependent but typically 120 seconds to T90.
Enclosure:	Aluminium alloy casting with high protection finish, protected to IP65 (NEMA 4X)
Operating Environment:	Operating temperature range -20°C to 55°C (-4°F to 130°F). Optional Analyser Cooler/Heater for greater temperature range.
Materials-contact with gas:	Calcium Fluoride, Glass, 316 Stainless Steel, Graphite.
Services required:	Power for analyser 115V/230V 175W Power for in situ heater (optional) 115V/230V 1kW Instrument air for the analyser void purge, auto zero and sample cell protection, controlled by the analyser, 2 barG; flow rate 0.5 litre/min constant and 6 litre/min intermittent during Auto-zero (typically 8 minutes every 12 hours).
Interconnection cable:	2 twisted-pair cores with individual screen typically allows up to 1000m separation between Analyser and Procal 1000 Analyser Control Unit.
Weight:	21 kg (46.3lb).
Physical Dimensions:	Analyser 1360mm (53.5") x 380mm (15") x 315mm (12.4")

## Optional Components

Optional accessories are available to extend the analyser's capability in cases of extreme process or ambient variations. Typical examples would be a probe heater to ensure the in situ gas cell operates above process gas dew point, a gas flow bypass for high sample applications analyser for operation in high ambient temperature conditions. Further details of these and many other accessories are available at [www.procal.com](http://www.procal.com) or on the accessories data sheet.

## Approvals

### Continuous Emissions Monitoring

CEM - US EPA 40 CFR part 60 & 75  
AMS - Europe QAL 1 of EN 14181

The Procal 2000 system is designed to meet the requirements of both customers and environmental authorities worldwide. The system enables rapid upgrades with regard to measuring range, presentation and reporting format, thus ensuring compliance with reporting criteria such as US EPA 40 CFR part 60 & 75 legislation. The system calculates errors due to drift in Zero and Span gas calibration suitable for use as input data to external EN14181 QAL 3 reports.

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