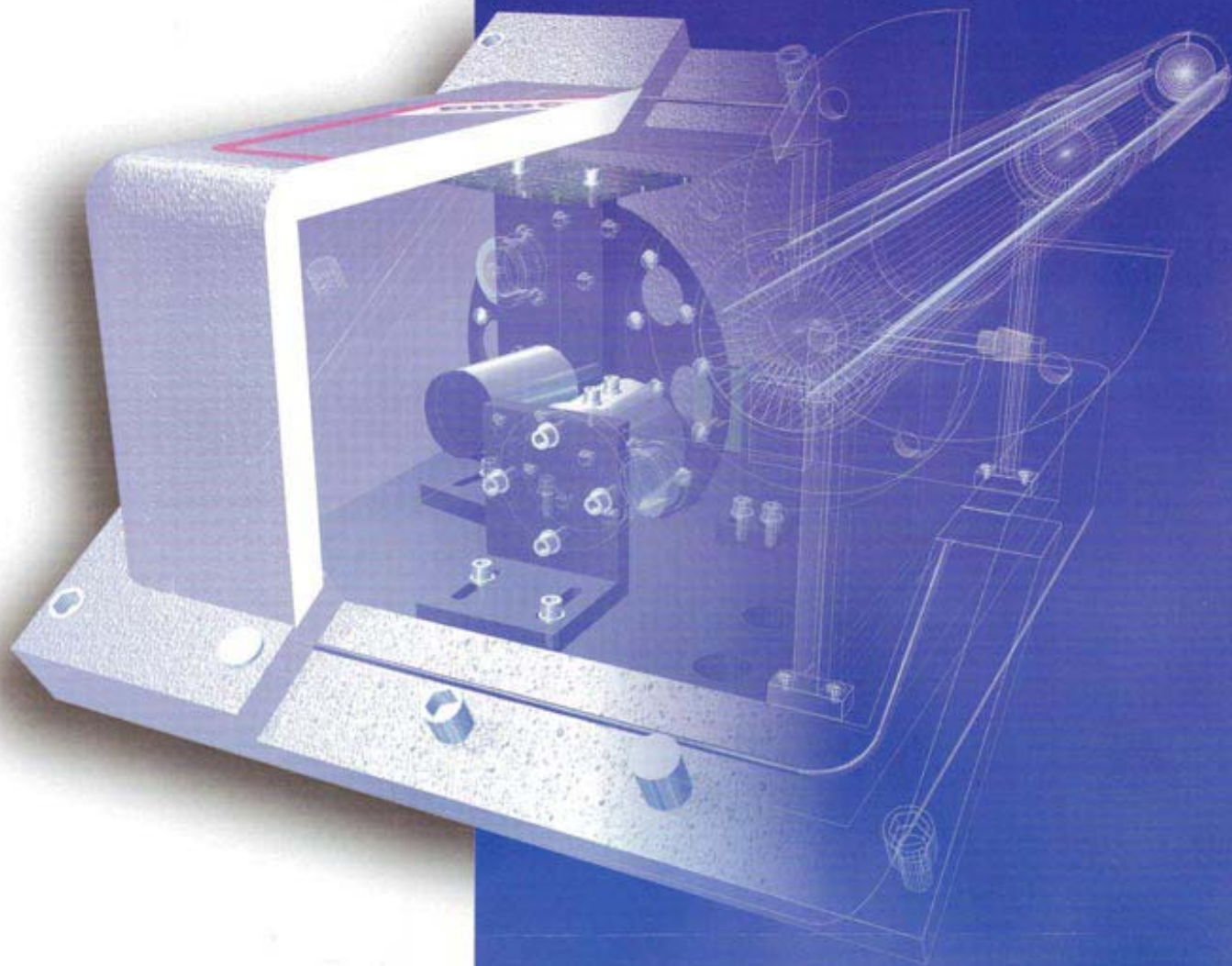


PROCAL

Pulsi 200LR CEM SYSTEM



In Situ Stack Gas Analyser System



**A RANGE OF CENELEC
APPROVED ON-LINE
ANALYSERS**



PULSI 200LR Series - System Description

The PULSI 200LR series of instruments are designed for in-stack analysis of up to six gas phase stack emission components.

The PULSI 200LR system comprises four standard units: the PULSI 200LR OPTICAL HEAD UNIT (OHU), the ANALYSER CONTROL UNIT (ACU), and the AUTOZERO UNIT (AZU). An IN-SITU HEATER (ISH) is optionally supplied when process conditions are liable to result in water condensing in the analyser.

The instrument operates on the dual wavelength infra-red principle where pulses of two wavelengths, per gas, at specific wavelengths, are sent through the sample cell of the STACK MOUNTED OPTICAL HEAD UNIT (OHU). The 'measure' pulse is partially absorbed by the gaseous component(s) to be measured whilst the 'reference' PULSI is relatively unaffected. A total of 8 wavelengths are available and in some circumstances reference wavelengths are shared. This allows up to six (6) gas phase concentrations to be measured simultaneously.

The specific wavelengths used for analysis are application dependent and selected by the Procal Analytics Application Group before each instrument is calibrated.

The selected infra-red wavelengths (8) used for analysis are obtained by means of interference filters and gas filled cells (GFC) mounted on a rotating wheel located in the STACK MOUNTED OPTICAL HEAD UNIT.

The PULSI 200LR Series has resulted from the culmination of many years research and development into stack gas analysis. The advanced stack gas analyser utilises an in situ (inside the stack) sample cell thereby avoiding the need to extract a sample from the

stack. This avoids the use of costly, high maintenance sample handling systems, but more importantly analyses an UNMODIFIED, truly representative gas sample.

Sintered stainless steel filter panels fitted to the sides of the in-stack measuring cell allow the permeation of stack gas whilst preventing the ingress of dust and particulates. The envelope thus formed allows the introduction of zero and span gases.

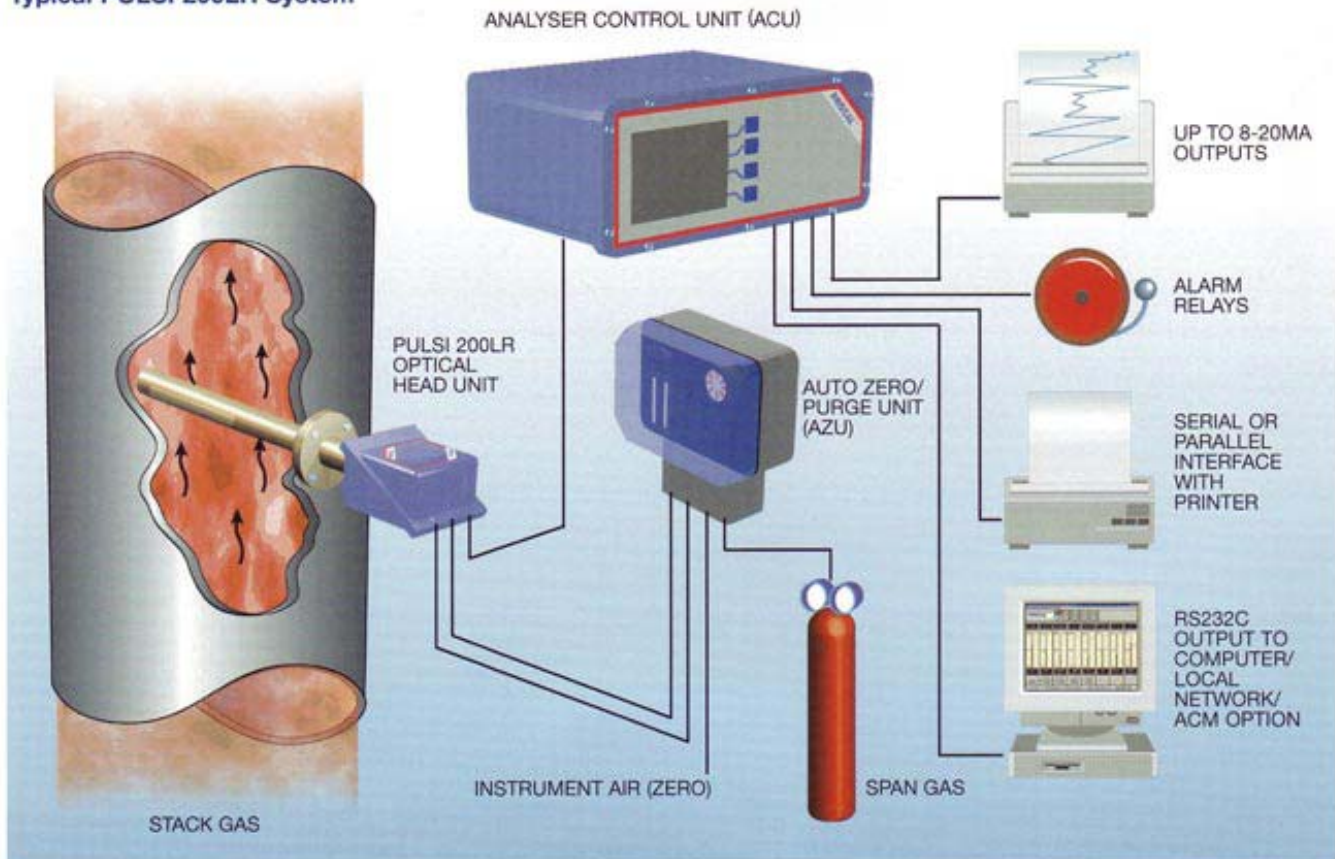
The OPTICAL HEAD UNIT requires no independent power supply; all necessary power is supplied via the ACU interconnection cable. The ANALYSER CONTROL UNIT (ACU) displays gas concentrations on the integral liquid crystal display along with information on sample conditions, diagnostic data and trends. The information can be retransmitted in the form of 4-20mA current outputs (one per measured component), parallel printer interface and optional RS232C serial output.

The OHU controls the AUTOZERO UNIT. On command from the ANALYSER CONTROL UNIT, the AZU will initiate a zero check on the system by filling the sample probe with zero gas typically clean, dry instrument air.

In addition to the auto zero function, the AZU has a safety feature which, in the event of power loss to the analyser, or too low a sample temperature will purge the sample cell with instrument air. This is done to prevent highly corrosive condensates forming in the sample cell.

The OHU also controls the temperature of the optional IN-SITU HEATER which is used if the analyser is required to operate in stacks or ducts where the sample gas temperature is below its dew point. In this application the ISH requires a mains supply.

The ANALYSER CONTROL UNIT can support up to 4 OPTICAL HEAD UNITS of any PULSI analyser type.
(See brochure part number 7-3008).
Typical PULSI 200LR System



Enveloped Folded Beam Principal

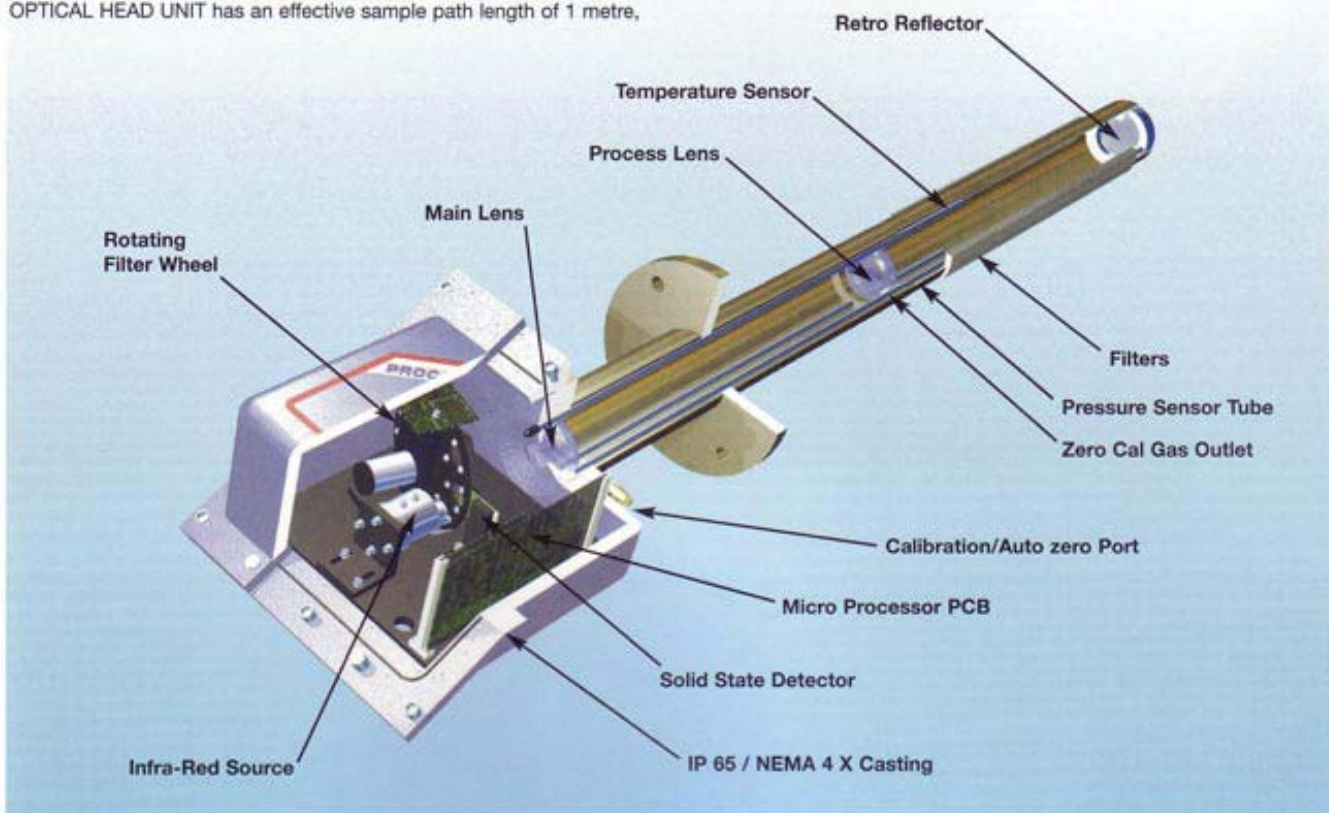
The sample cell of the PULSI 200LR OPTICAL HEAD UNIT consisted of a process lens mounted in a robust stainless steel tube with a retro reflector mounted at the far end, protected from particulates by a sintered stainless steel filter.

The collimated infra-red beam passes down the length of the sample cell and is returned by the retro reflector to the detector via the process and main lenses.

This enveloped folded beam technique means that the PULSI 200LR OPTICAL HEAD UNIT has an effective sample path length of 1 metre,

giving high sensitivity and hence low minimum detectable levels of gases to be measured.

The Insitu Cell also incorporates Sample Temperature & Pressure Measurements enabling compensation for fluctuations of these parameters. The Calibration / Auto zero Port gives the PULSI 200LR the capability to check both zero and calibration of each measured concentration.



CENELEC Approval

The equipment is CENELEC approved with an explosion proof housing. It is approved to specifications EN50014 and EN50018 and is type certified as EExd IIB T6.

Minimal Cross Sensitivity

Cross Sensitivity is overcome in the PULSI 200LR, using two techniques.

Gas Filter Correlation (GFC) is a technique which yields greater prime sensitivity and reduces cross sensitivity.

An additional measuring wavelength is used that is specific to the component causing cross sensitivity. This signal is used in equations which calculate the concentration of the gas being measured, thereby removing the cross-sensitivity effect.

Continuous Emissions Monitoring (CEM)

The PULSI 200LR is a truly verifiable CEM system designed to meet the requirements of both customers and environmental authorities world-wide. 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.

Integrated Stack Monitoring System

The PULSI 200LR CEM system is capable of receiving data, in the form of 4-20mA signals, from other instruments. These typically measure parameters such as: Oxygen, Opacity/Dust, Velocity. In addition to displaying, data logging and retransmitting this the PULSI 200LR system can use this data to correct the readings to a normalised level such as 11% Oxygen. The PULSI 200LR measures the water content of the stack gas and can therefore display the measured component on either a wet or dry basis.

Data Logger

The integral data logger enables the display of the recent history of each of the measured values, temperature and additional external inputs. The standard format provides a 48 hours trend display with the facility to zoom in on any 3 hour section. These trends can also be printed either on demand or automatically once a day.

There is an option to extend the time base.

Features

Benefits

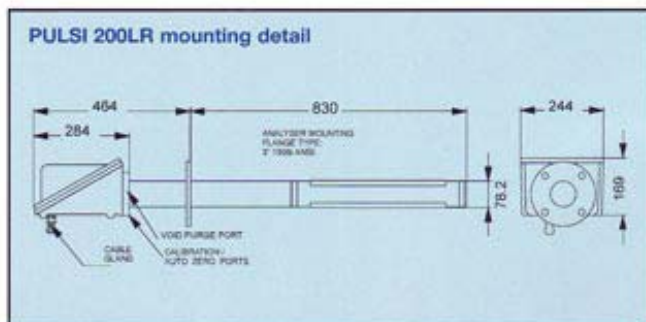
Multi Point	Four measurement points (Analysers) connected to one ACU
Multi Component	One Pulsi 200LR can measure up to six (6) components
Direct in situ measurement	No requirement for high cost, high maintenance sample handling system No modification to the sample
Automatic Autozero	No operator adjustment, eliminates drift
Dynamic verification (option)	Proof of operation to environmental authorities
Integral data logger	At-a-glance record of plant performance and emissions
Printout	Daily hardcopy to conform to the authority's requirements
Flange mounted analyser	Reduced cost of installation
Low maintenance	Reduced cost of ownership
No consumables	Reduced cost of ownership
CENELEC Approved	Can be used in hazardous areas

Specification

P200LR OPTICAL HEAD SPECIFICATION

Principle of operation:	Infra-red absorption with multiple wavelength selection utilising gas Filter Correlation (GFG) method where advantageous: interference filters and gas cells mounted on a rotating filter wheel. Sample cell uses the enveloped folded beam principle.
Gases measured:	Up to 6 hetero-atomic molecular gases as determined by the application.
Spectral range:	Specific application dependent wave lengths (up to 8) are selected between 2 and 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 Secs to T90.

Enclosure:	Aluminium alloy casting with high protection finish, protected to IP65 (NEMA 4X).
Operating environment	Operating temperature range -10°C to +45°C. Optional Head Cooler/Heater for greater temperature range.
Materials in contact with sample:	Calcium fluoride, Glass, 316 Stainless Steel, graphite.
Services required:	<ul style="list-style-type: none">● Power for electronics provided by associated PROCAL ANALYSER CONTROL UNIT (ACU).● 115/230V required for head cooler fan and In-Situ Heater (application dependent).● Instrument air Instrument air for the analyser void purge, autozero and sample cell protection, controlled by the Autozero unit Pressure 2-6 barG; flow rate 0.5 litre/min constant and 6 litre/min intermittent during A/Z (typically 8 minutes every 12 hours)..
Interconnection cable:	3 Twisted- pair cores with overall screen typically, allows up to 100m separation between Optical head Unit and Analyser Control Unit (ACU).
Weight:	21kg (46.3lb).
Dimensions:	Optical Head Unit 1294 (51") x 244 (9.6") x 164mm (6.5").



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