

# *Marine Emissions*

## *Meeting the Environmental Challenge*



### Overview

The need to demonstrate environmental responsibility is key for today's marine and offshore industries. Charterers and the public demand high standards of performance and reliability. Fuels and exhaust gas emissions are also the subject of international, regional and national controls. The most significant is IMO MARPOL Annex VI – Regulations for the Prevention of Air Pollution from Ships, which also applies to mobile offshore drilling units and other oil industry platforms.

The most important gases in terms of emissions are currently sulphur oxides – SO<sub>x</sub>, and nitrogen oxides – NO<sub>x</sub>. Annex VI has a schedule for significant reductions in both over the next 10 years.

The creation of Emission Control Areas and stringent limits on fuel sulphur content in port are challenging particularly for the shipping industry and its suppliers. Ship operators have near imminent decisions to make based on a complex set of circumstances and a fluid regulatory background.

The penalties for non-compliance are potentially huge. Whilst the pace of change has created uncertainty and appears to have pushed the boundaries for some technologies, the Protea 2000 emissions monitoring system has been proven in long-term service onboard ship as a robust and reliable method of confirming compliance with emissions regulations.

## The Emissions Monitoring Solution

The Protea 2000 emissions monitoring system is approved for the analysis of exhaust gases from the engines and boilers of ships and offshore rigs. Robust and with proven reliability, up to six gases can be measured including SO<sub>2</sub>, CO<sub>2</sub> and NO<sub>x</sub>.

The Protea 2000 emissions monitoring system comprises up to 6 exhaust mounted analysers, each with automatic verification facilities. Emissions data from the entire system is securely managed and displayed at a dedicated Classification Society approved panel PC, with outputs to networks, control systems, and reporting facilities.

The advanced Protea 2000 analyser utilises an in-situ (inside the exhaust) sample cell so avoiding the need to extract gas. Importantly this avoids the use of costly, high maintenance sample handling systems, and enables analysis of an unmodified, truly representative gas sample.

Exhaust gases from the combustion of residual and distillate fuels can be analysed, so that compliance can be confirmed in port, in Emissions Control Areas and in international waters. The Protea 2000 includes highly effective sintered filters that prevent the ingress of particulate matter into the sample gas cell and a heater to prevent condensation and deposits where the exhaust is below its dew point. Construction materials are ideally suited to the marine environment.

The measurement range of Protea 2000 analysers is such that compliance can be confirmed even when regulated emissions are at a very low level. Emissions after an exhaust gas scrubber, that are the equivalent of 0.1% sulphur fuel, are readily measured.

Protea 2000 analyser solutions can be fitted to all sizes of exhaust and ATEX/IEC approved options are available for use in the hazardous areas typically found offshore.

## Protea P2000 Maritime CEMS

Gas Species & Ranges Monitored		Un-Scrubbed	Scrubbed
Sulphur Dioxide	SO <sub>2</sub>	0 – 1,500ppm	0 – 30ppm
Carbon Dioxide	CO <sub>2</sub>	0 – 15%	
Oxides of Nitrogen	NOx	0 – 300ppm	
SO <sub>2</sub> ; CO <sub>2</sub> Ratio as required by IMO		0 – 30	
In addition there may be benefits from monitoring:-			
Water Vapour	H <sub>2</sub> O(g)	20%	
Un-burnt Hydrocarbon	HC	100ppm	

*The analyser will automatically range change (capable of multiple ranges) in the event of a non-operational Exhaust Gas Cleaning Systems. This also allows monitoring of higher levels of SO<sub>2</sub> when the vessel is outside an ECA area but still subject to the higher global emission level.*

## Features

- \* Proven in service
- \* Reliable and robust
- \* Low maintenance and no consumables

### Direct in situ measurement

- \* One analyser measures multiple gases
- \* No requirement for extractive sample handling systems
- \* Auto-verification facilities
- \* Measurement of exhaust from residual and distillate fuel combustion
- \* High sensitivity at low levels
- \* User friendly display and secure recording of data from up to 6 analysers
- \* Multiple data outputs

## Benefits

- \* Highly effective method of demonstrating emissions compliance
- \* Minimal impact on staff with a high existing workload
- \* Simplicity for ships at sea and remote offshore installations
- \* Truly representative analysis
- \* Reduced cost of equipment
- \* Reduced cost of installation and operation
- \* No operator adjustment ideal for staff inexperienced with emissions analysis
- \* Enables compliance to be confirmed wherever required and fuel switching to be monitored
- \* Ideally suited for use with exhaust gas scrubbing equipment and where 0.1% sulphur fuel (or equivalent) is mandatory.
- \* Multiple engines and boilers monitored at a glance
- \* Support for further emissions control, alarm, and reporting systems

## Protea P2000 Maritime Emissions Monitoring Systems

Product	Application	Monitoring	Air Pollution Regulation
2100	Exhaust Gas Scrubber Monitoring	SO <sub>2</sub> , CO <sub>2</sub> (to <0.1% sulphur-in-fuel equivalence)	MARPOL Annex VI regulation 14 MARPOL Annex VI regulation 4
2200	NOx Technical Code Direct Measurement and Monitoring	NOx CO <sub>2</sub>	MARPOL Annex VI regulation 13
2300	Emission Control Area (ECA) Compliance	SO <sub>2</sub> , CO <sub>2</sub> (All ECAs) NOx (USÄ ECAs)	MARPOL Annex VI regulation 14 MARPOL Annex VI regulation 13
2400 (with ATEX/IEC and O <sub>2</sub> options)	Offshore Rigs	NOx, CO <sub>2</sub> , CO Total Hydrocarbons	MARPOL Annex VI regulation 13 EC Integrated Pollution Prevention Control (IPPC) Directive

## Approvals

### UK Maritime and Coastguard Agency

Under the analyser's former branding of Pulsi 200:  
 European Commission Directive 2008/67/EC of 30th  
 June 2008, amending Council Directive 96/98/EC  
 on marine equipment (4th Amendment) Annex 2, A2/2.1-  
 On board NOx monitoring and recording devices, MARPOL 73/78  
 Annex VI regulation 13 and the NOx Technical Code.

### ATEX

Certificate Number: Baseefa 18 ATEX 0060X

Markings: Ex II 2 G Ex db IIB T\* Gb  
 T6 Ta -20°C to +40°C  
 T4 Ta -20°C to +60°C

### IEC

Certificate Number : IECEx BAS 18.0040X

Markings: Ex db IIB T\* Gb  
 T6 Ta -20°C to +40°C  
 T4 Ta -20°C to +60°C

### International Association of Classification Societies

Concerning Electrical Installations - IACS E10 Test Specification  
 for Type Approval and relevant IEC 60945

### RINA Type Approval Certificate MAC111818XG

RINA Rules for the Classification of Ships - Part C "Machinery,  
 Systems and Fire Protection", Chapter 3, Section 6, Tab.1 and  
 IMO Res. MEPC.259(68) Chapter 6 "Emission Testing" as well as  
 the relevant requirements of Revised MARPOL Annex VI and NOx  
 Technical Code 2008.

### NIPPON KAIJI KYOKAI - Class NK Type Approval Certificate TA 19498M

NK Rules for the Type Approval of Materials and Equipment  
 for Marine use.

### Lloyd's Register - Type Approval Certificate 15/00083 (E1)

LR Rules & Regulations for the classification of ships  
 (July 2014) LR Test Spec No.1 (2015)  
 IMO Resolution MEPC 184(59) - 2009 Exhaust Gas Cleaning Systems  
 IMO NOx Technical Code (2008)

### MCERTS Certificate Number SIRA MC 050060

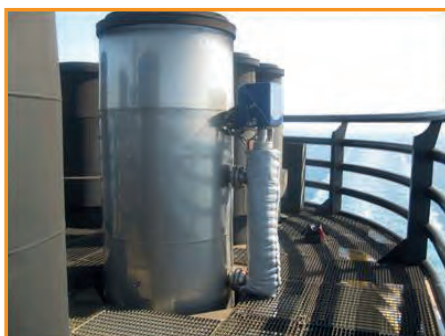
MCERTS Performance Standards for Continuous Emission Systems,  
 Version 4, dated July 2018  
 EN15267-3 : 2007 and QAL 1 as defined in  
 EN14181 : 2014



ISO 9001:2015  
 Management  
 System  
 www.tuv.com  
 ID 9108637504







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