AQUA GAS

BIOGAS AND HYDROCARBON STREAM MONITORING SOLUTIONS

CH4, CxHy, CO2, H2S, VOC and O2

About Us

AquaGas Monitoring Systems

Integrated Systems and Customised Services

- Founded in 2013, based on the Gold Coast
- Systems integrator of AMS (Automated Monitoring Systems)
- Turnkey solutions for environmental compliance and process control
- Focused on customer satisfaction
- Air, Water, Emissions and Process gas
- Short to long term rental (CEMS & process analysers)
- High performance and cost-effective technologies
- Strong support of suppliers' network
- Customised service agreement with dedicated technicians
- Industry leading manufacturers: DURAG, HORIBA, Madur…

SmartCEMS

- Automated Monitoring System integrated in Australia by AquaGas.
- Monitoring equipment is designed and manufactured by MADUR in Europe within the frame of an OEM agreement. Madur monitoring system are CE and ISO certified
- Data Acquisition and Handling System is designed and manufactured in UK by a1cbiss. CDAS Software Suite is Mcerts certified for CEM application.

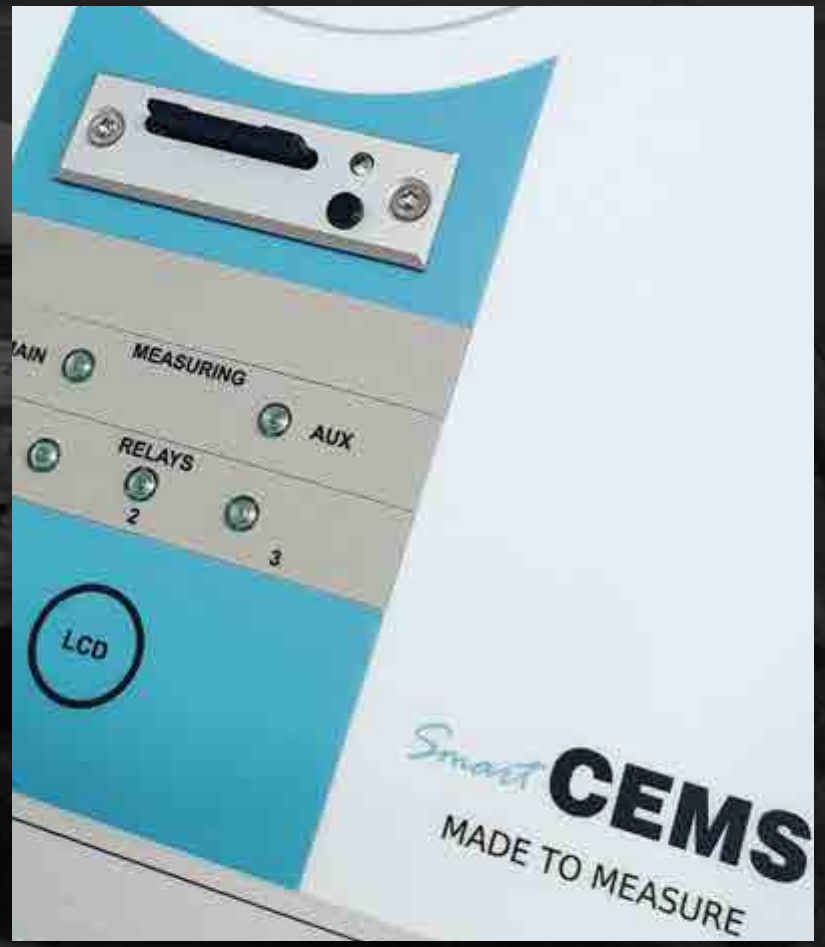
MADUR

- Madur electronics was founded in 1984 in Vienna
- In 1994, Madur headquarters moved to Poland
- Handheld, portable and stationary gas analysers
- Large selection of sensors for complex gas matrix
- Broad selection of gas conditioning and sampling methods
- Field replaceable components (pre-calibrated sensor)
- AquaGas distributorship since 2013.

SmartCEMS Biogas

Main Features

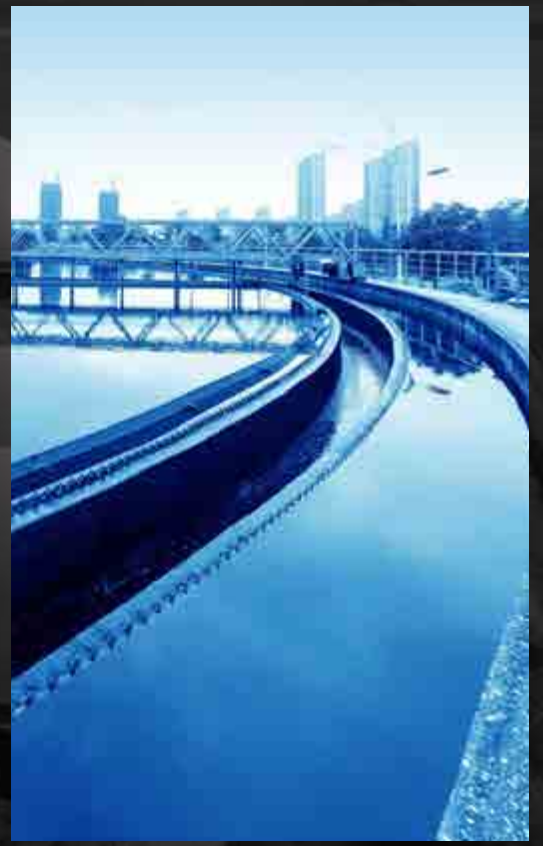
- Online Monitoring of Biogas Primary constituents in biogas and HC streams
- Powerful sensor combinations for complex gas matrices
- Fully supported by AquaGas in Australia, New Zealand and the Pacific Islands (sales and services)
- CH4, CxHy, CO2, H2S, VOC, O2, gas temperature, velocity and flow
- Modular and flexible design offering a pertinent selection of measuring and sampling methods
- Complies with international standards (EN14181, WA CEMS code, EPAs, NGER)
- Semi-automatic or automatic redundancy for greater data availability
- Empower NGER National Greenhouse and Energy Reporting
- Mcerts DAHS computer and CDAS software suite
- No requirements for career, purge or zero gas.



SmartCEMS Biogas

Applications

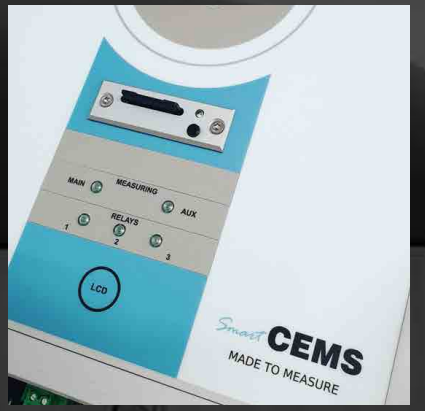
- Raw biogas in digesters small to large scale anaerobic processes: CH4, CO2, O2, H2S and VOC
- Scrubber efficiency: H2S and VOC
- Odour control system: H2S and VOC
- Biogas composition and BTU real-time monitoring: : CxHy, CH4, CO2, O2, H2S and VOC
- Reporting as per NGER National Greenhouse and Energy Reporting
- Biogas process control: CxHy, CH4, CO2, O2, H2S and VOC
- Residual H2S content in feed gas: H2S
- CO, CO2, NO, NO2, NOx engine emissions reporting

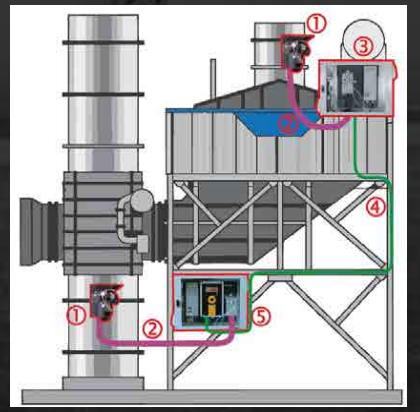


SmartCEMS Biogas

Additional features

- Versatile selection of sample gas conditioning method incl. Peltier, Nafion, Compressor
- Extended monitoring capabilities with the inclusion of key components such as HF, HCl, NH3
- Modular sampling train enabling optimal sampler transfer (up to 90m sampling line)
- Compact design
- Cost effective compared to typical intricates Biogas monitoring systems (spectrometer, multigas NDIR, Gas Chromatograph)



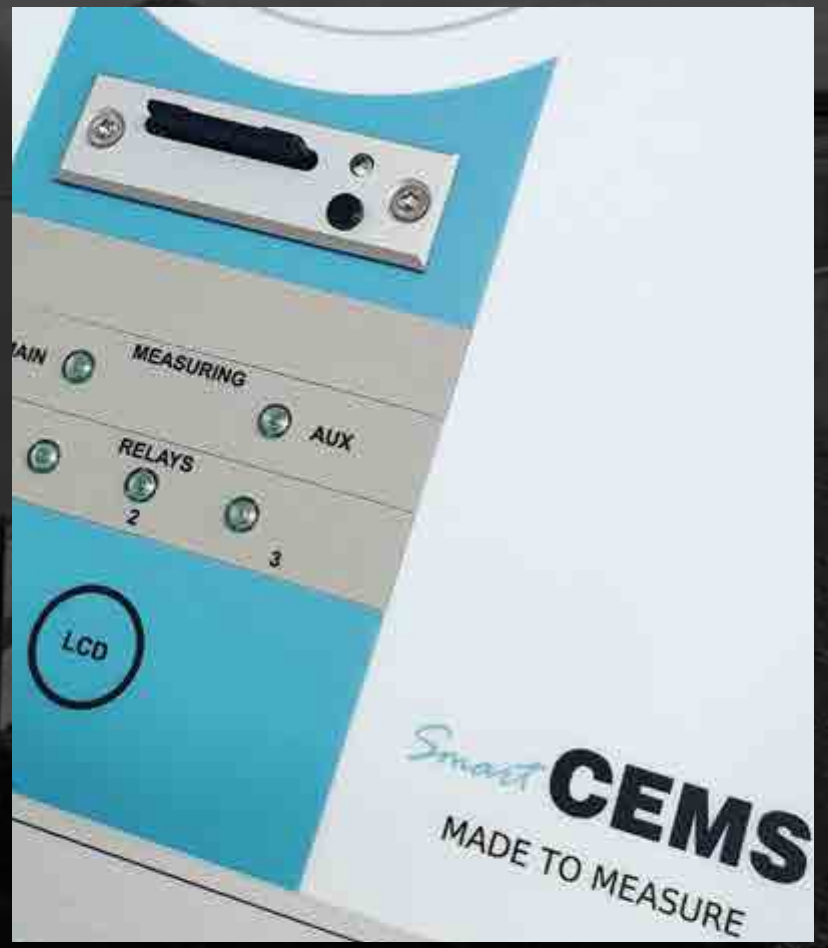


SmartCEMS Biogas

AQUA GAS

References

- YARA Pilbara WA
- VISY Smithfield NSW
- Gippsland Water VIC
- SUEZ Perth WA
- NYRSTAR Port Pirie SA
- ENVIROPACIFIC Barangaroo Sydney NSW
- PYROCAL Loganholme QLD
- Gold Coast City Council QLD
- Queensland Urban Utilities Brisbane QLD
- BECA Nelson New Zealand
- ENERCAL Power Station New Caledonia
- And more.

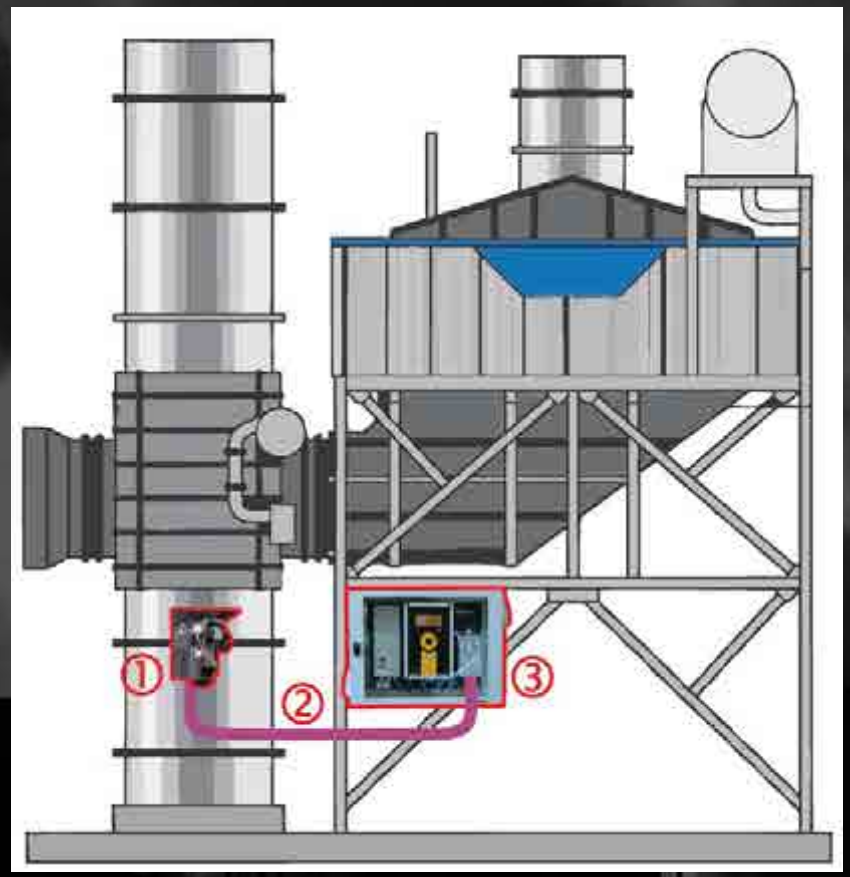


SmartCEMS Configuration

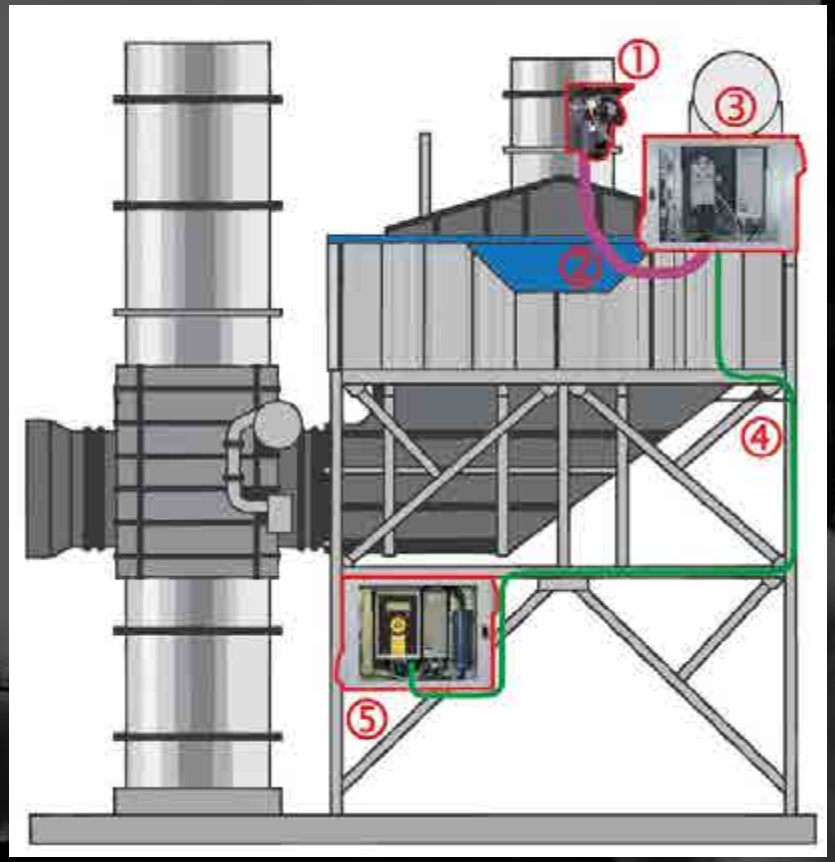
AQUA GAS

Compact
Direct Extractive

1. Stationary gas sampling probe with optional heated filter, insitu filter and backflush
2. Heated sample line (1 to 5m)
3. Mamos Multigas CEM Analyzer with MD3 gas conditioning system with Peltier cooler, peristaltic pump and particulate filter with optional IP55 housing.



SmartCEMS Configuration



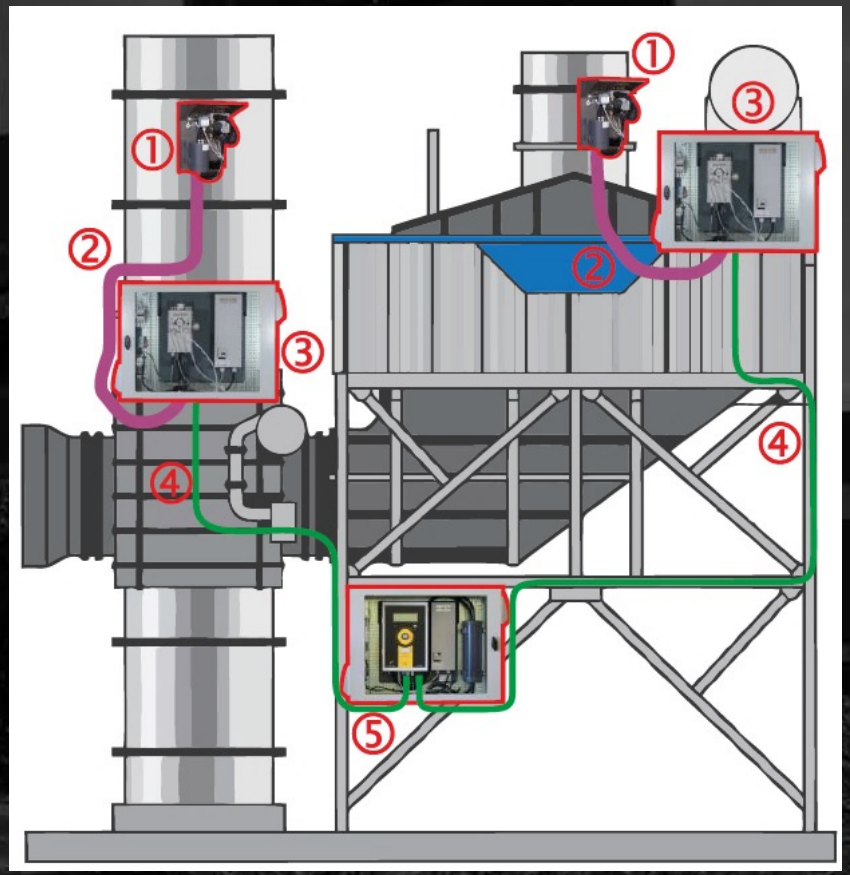
Split

1. Stationary gas sampling probe with optional heated filter, Insitu filter and backflush
2. Heated Sample line short (1 to 3m)
3. MD3 gas conditioning system with Peltier cooler, peristaltic pump and particulate filter installed near the sampling probe assembly and integrated into the AC housing.
4. Non-heated sampling line with gas and electric cables – up to 100M
5. Mamos Multigas CEM Analyzer with optional IP55 housing

SmartCEMS Configuration

Two stream Multiplexer

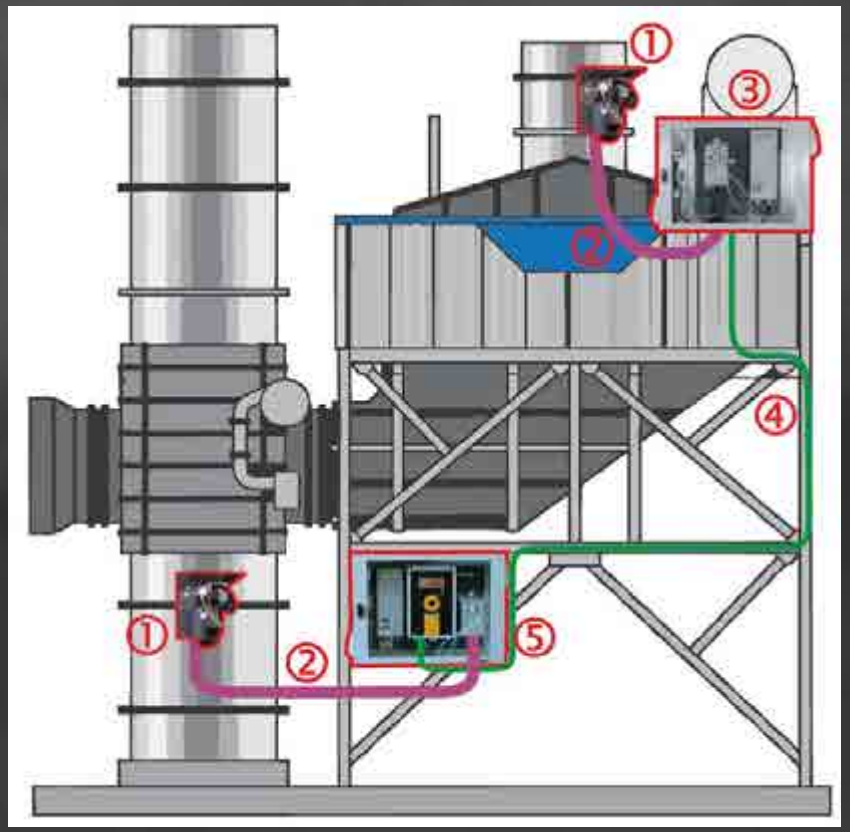
1. Stationary gas sampling probe with optional heated filter, Insitu filter and backflush
2. Heated Sample line short (1 to 3m)
3. MD3 gas conditioning system with Peltier cooler, peristaltic pump and particulate filter installed near the sampling probe assembly and integrated into the AC housing.
4. Non-heated sampling line with gas and electric cables – up to 100M
5. Mamos Multigas CEM Analyzer with optional IP55 housing



SmartCEMS Configuration

Two stream Multiplexer
Twin Split compact with remote dryer

1. Stationary gas sampling probe with optional heated filter, Insitu filter and backflush
2. Heated Sample line short (1 to 3m)
3. MD3 gas conditioning system with Peltier cooler, peristaltic pump and particulate filter installed near the sampling probe assembly and integrated into the AC housing.
4. Non-heated sampling line with gas and electric cables – up to 100M
5. Mamos Multigas CEM Analyzer with optional IP55 housing

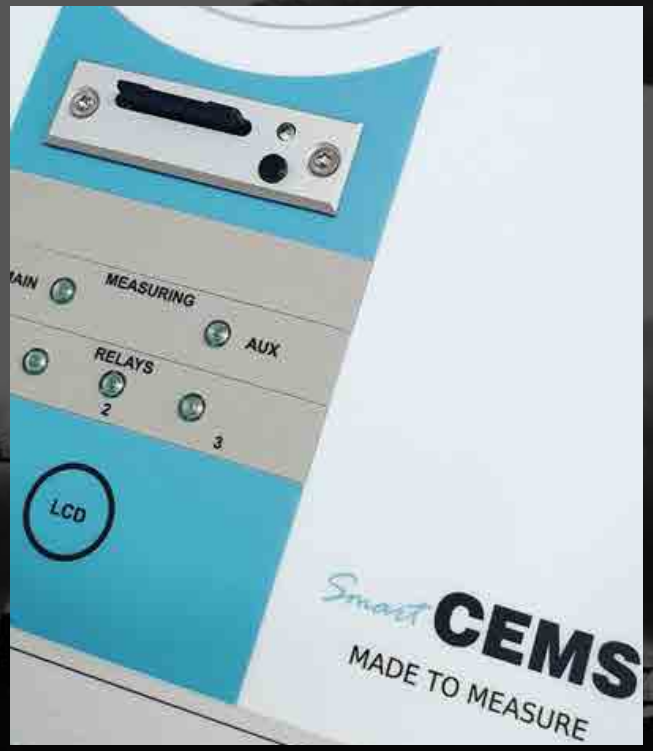


SmartCEMS Biogas

SYSTEM OVERVIEW

SmartCEMS

Analytical Performances
Lower Detection Limits



Gas	LoD	Unit
H2S	1	ppvm
CO2	0.01	%vol.
CH4	0.01	%vol.
O2	0.01	%vol.
H2S	0.1	ppvm
VOC (NMHC)	0.5	ppvm
CxHy	0.01	%vol.

SmartCEMS Biogas

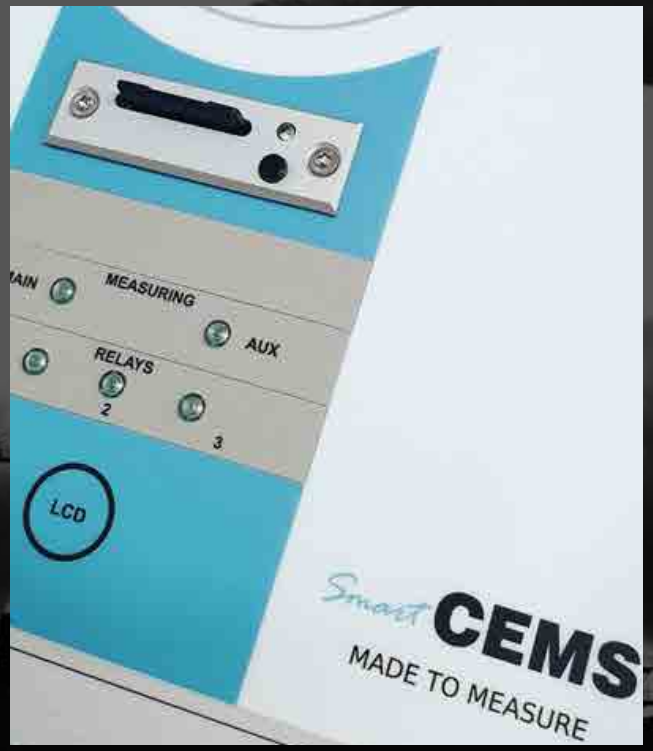
Analytical Performances
Measuring Ranges

Gas	Range	Unit
CH4	0-10 / 0-25 / 0-50 / 0-100	%vol
CxHy	0-10 / 0-25 / 0-50 / 0-100	%vol
CO2	0-10 / 0-25 / 0-50 / 0-100	%vol
O2	0-25	%
VOC (NMHC)	0-100	ppvm
Biogas Temp	-50 to 100	°C
Diff Pressure	-10 to +40	hPa
Gas velocity	1 to 50	m/s

SmartCEMS

AQUA GAS

Analytical Performances
Accuracy and Response Tim



Gas	Range	Unit
CH4	± 0.05 % abs.	45s
CxHy	± 0.05 % abs.	45s
CO2	± 0.1 % abs.	45s
O2	± 0.1 % abs.	45s
VOC (NMHC)	± 1 ppvm abs.	45s
H2S	± 0.1 to 1 ppvm abs.	45s
Biogas Temp	0.1 °C	5s
Diff Pressure	1Pa	5s
Gas velocity	0.1m/s	5s

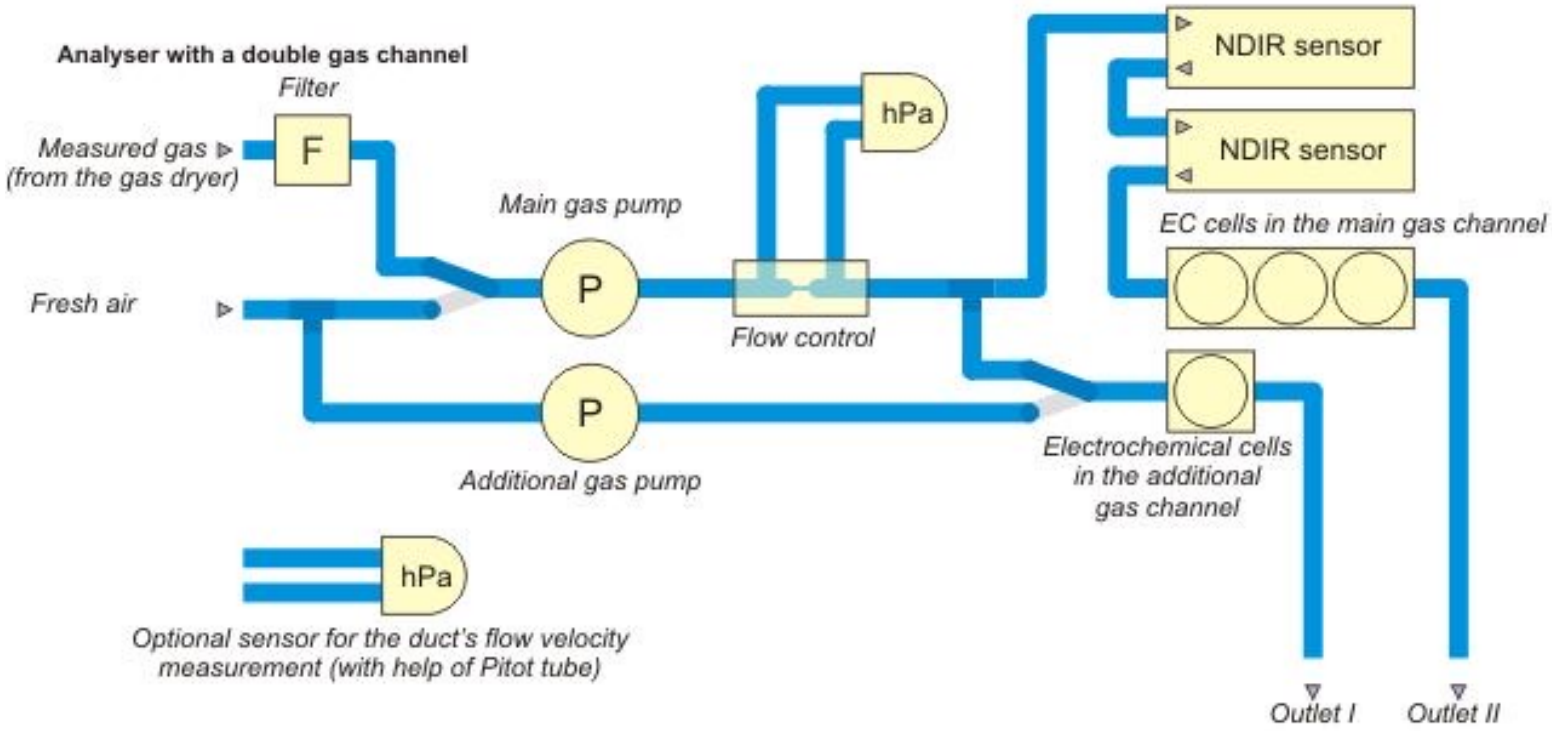
SmartCEMS

Analytical Performances
Approved Methods

- O2, CO: ISO 12039, CTM-030
- CO2: ISO 12039, OTM-13
- CH4: ISO 12039, OTM-13
- CxHy: ISO 12039, OTM-13
- NO, NO2: EPA Method CTM022 (Emissions reporting)
- VOC : USEPA Method 21 Photo Ionization Detection (PID)
- Flow, velocity and temperature: USEPA method 2C

SmartCEMS Biogas

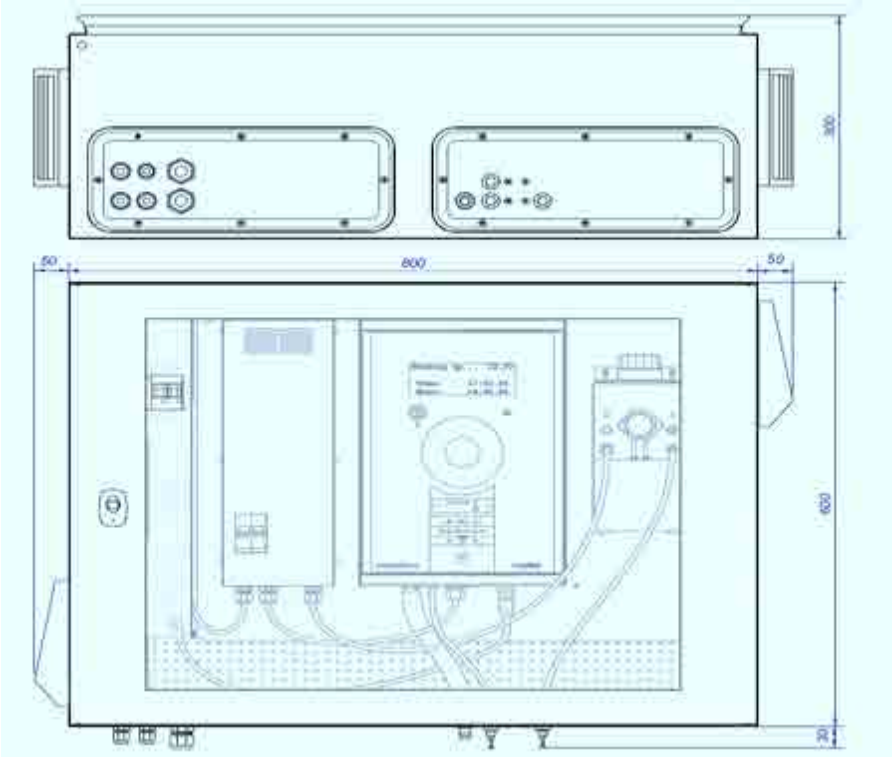
Flow Diagram



SmartCEMS Biogas

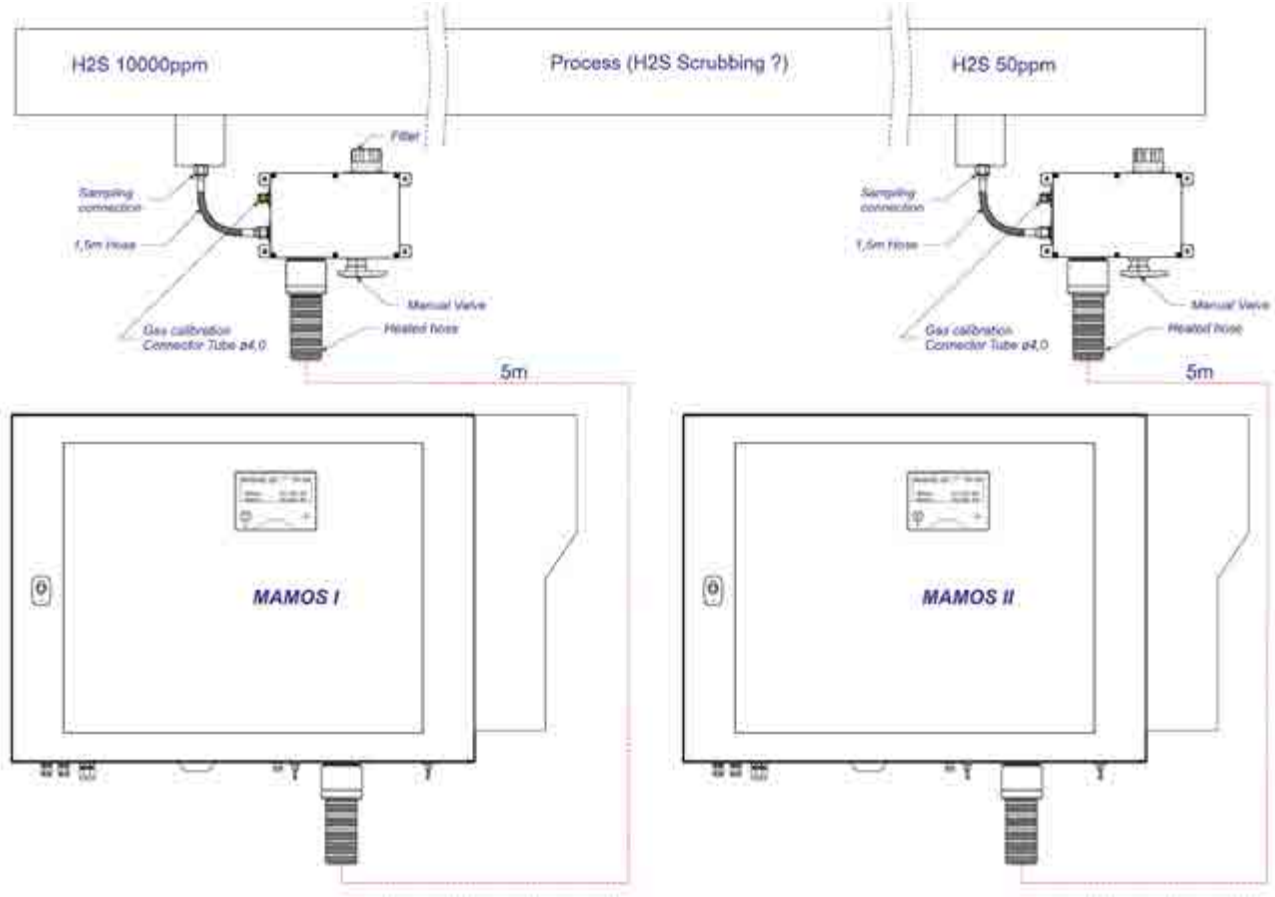
AQUA GAS

Enclosure



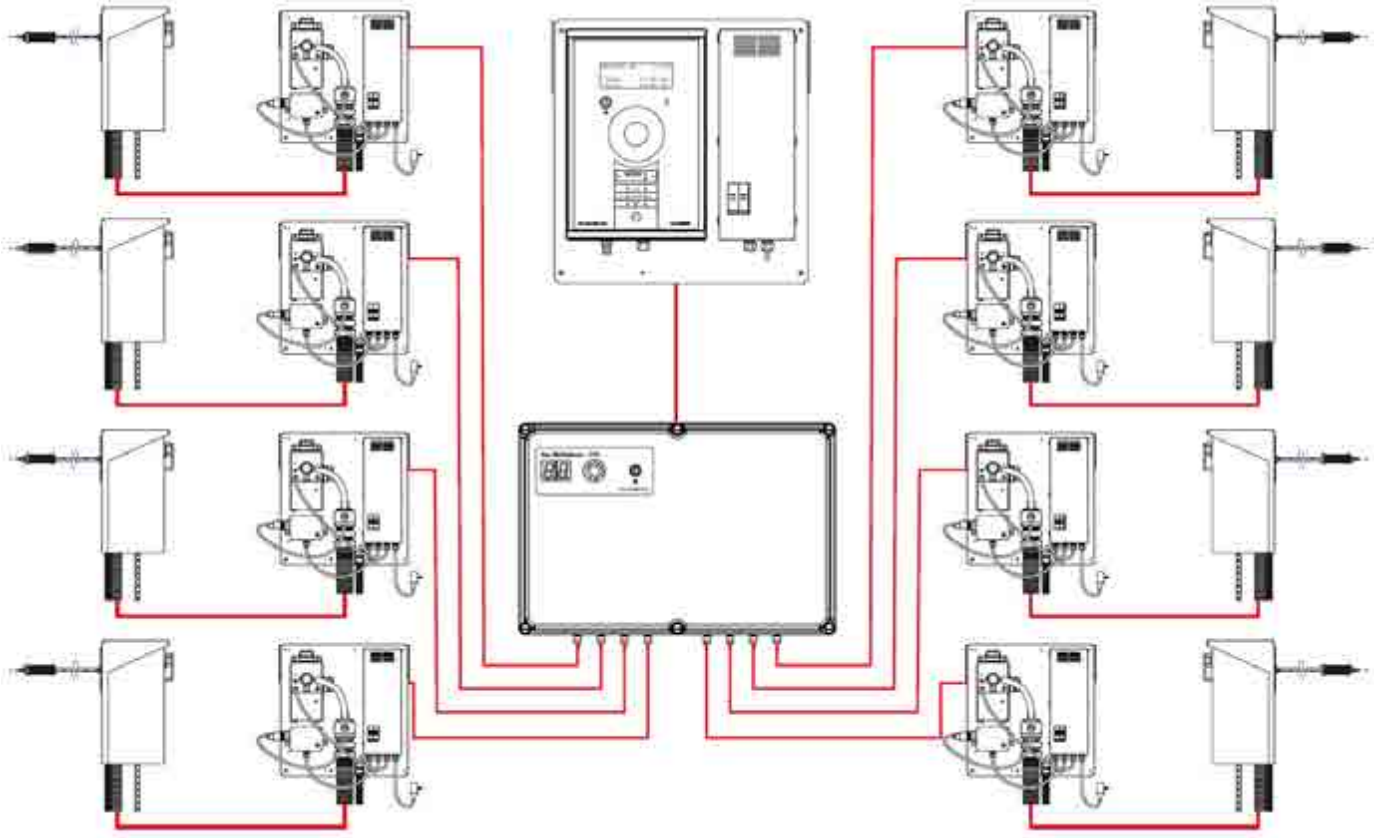
SmartCEMS Biogas

Typical integration for scrubber monitoring



SmartCEMS Biogas

8 Streams Multiplexer



SmartCEMS Biogas

Main Components

- Sampling Probe (Madur)
- Pitot Tube (Madur)
- Heated Sample Line (Madur)
- CEMS switch panel (Madur)
- Duty and standby analysers (Madur)
- IVIS calibration terminal and switchover panel (a1cbiss)
- DAHS computer and CDAS software suite (a1cbiss)

SmartCEMS Biogas

Sampling System
Sampling Probe

- Insitu Filter (20 microns)
- Light weight sampling probe
- Variable length of sampling tube (up to 3.5 m)
- Calibration solenoid valve for injection as per EN14181
- SS316L wetted components
- Backflush solenoid valve
- Flange mounted (adaptor available)
- Reduced maintenance

SmartCEMS Biogas

Sampling System
Heated Sample Line

- Temperature controlled (150 deg C)
- Up to 50m length
- Prevent loss of targeted compounds (water soluble gases)
- Eliminate the risk of contamination
- Optimal and fast sample transfer
- IECEx solution available

SmartCEMS Biogas

Sampling System
Gas Conditioning System

MD3 PELTIER COOLER

- Temp set point: output gas dewpoint about +4°C
- Two inline filters
- Peltier cooler Stability +/- 1°C
- Cooling period: 5min
- Max gas flow 110 lph at inlet gas temp. 100°C and RH 100%

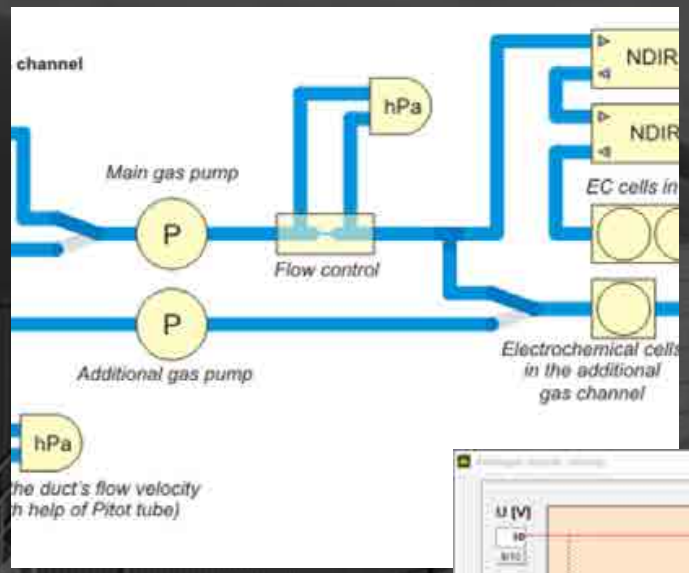
PERISTALTIC PUMP

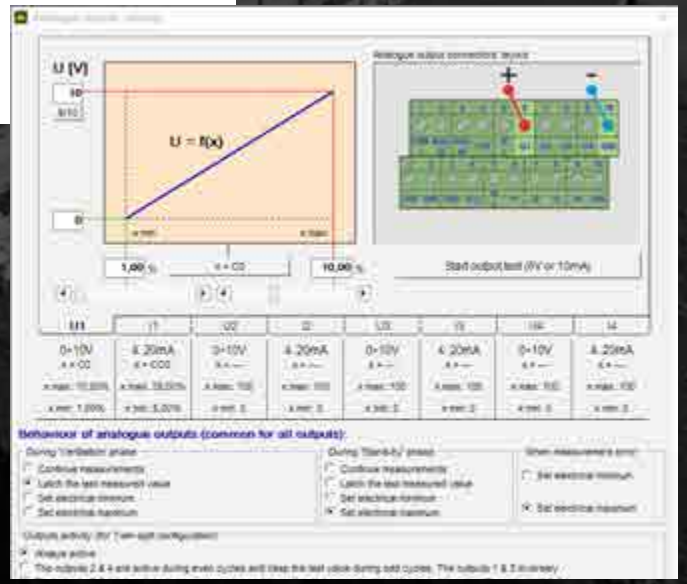
- Capacity 38ml/min

SmartCEMS Biogas

Multigas Analyser

- Proprietary gas paths and cells
- Safety filter
- PTFE coated Diaphragm 1.5 l/min with automatic flow control
- T: 10°C to 50°C; RH: 5% to 90% (non-condensing)
- Light (10kg) and compact design
- Madur's patented electronics and signal processing
- Mosys configuration, acquisition and trending software
- Field replaceable measuring cells
- Built-in data logger with SD card
- Large range of IOs incl. digitals (0-10 vdc; 4-20mA), analogues

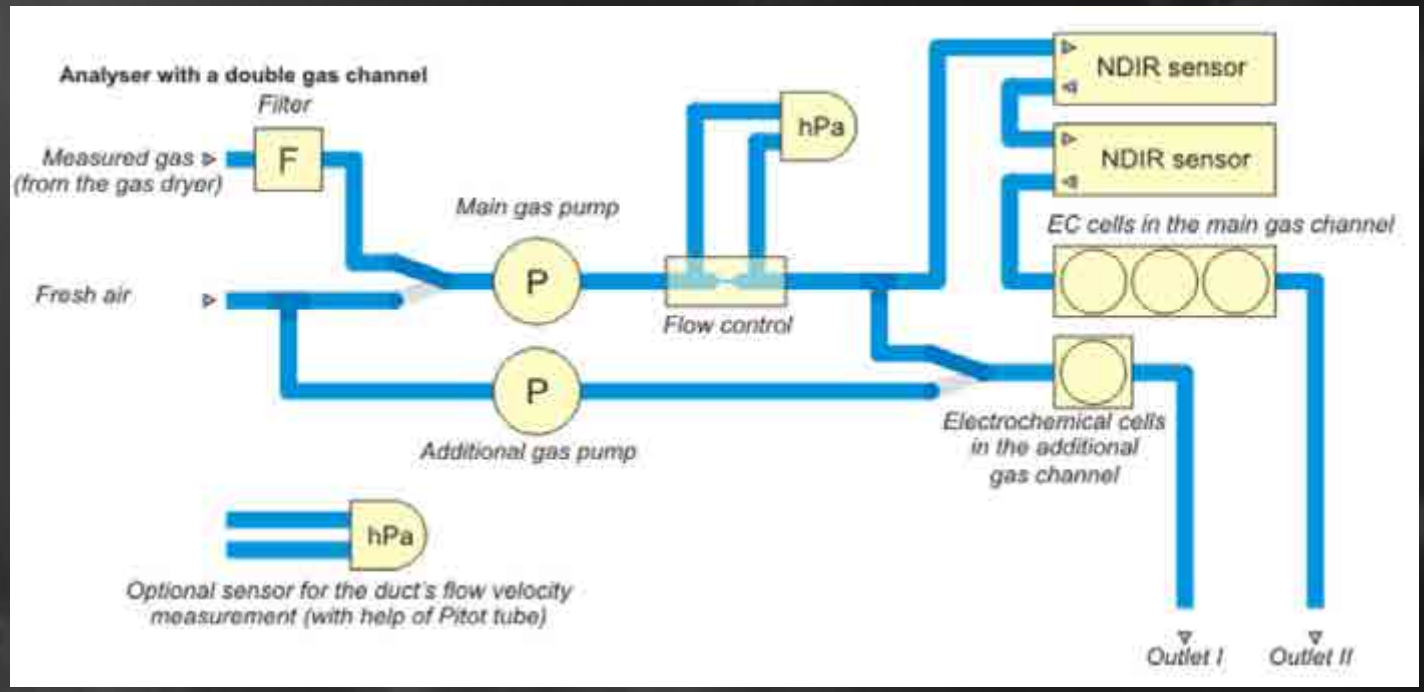




SmartCEMS Biogas

Analyser
Proprietary gas paths and cells

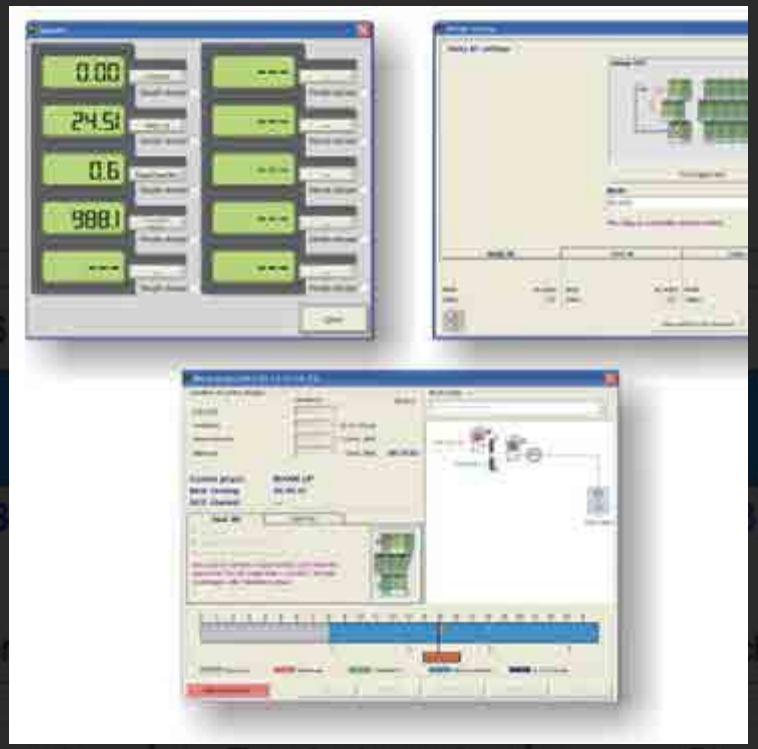
- Inline filters
- Auxiliary gas path
- Independent monitoring
- Flow control



SmartCEMS Biogas

Analyser
MoSys Software

- User configurable measuring sequences
- USB or TCPIP direct connection
- Remote control
- Sensor calibration
- Work mode
- IOs testing
- Diagnosis
- Instrument network capabilities



SmartCEMS Biogas

Analytical Performances
Measuring Principle

CO2, CXHY: NDIR NON-DISPERSIVE INFRA-RED
- Indutrial-type construction – single path beam
- Possibility to measure large concentrations up to 100% vol
- Sensors are delivered pre-calibrated – easy to swap at site
- Do not wear out in time, cannot be poisoned

VOC: PID PHOTO IONIZATION DETECTION

O2 PARTIAL PRESSURE
- Long-life oxygen sensor (up to 7 years in air)
- Range 0÷100% vol
- Suitable for stationary analysers
- Do not wear out in time, cannot be poisoned

H2S, NO, NO2, CO: EC ELECTROCHEMICAL
- Easy to use and to calibrate
- Low (ppm) and very low ranges possible
- Cheap (er) in comparison to other methods

PRESSURE: SILICON PIEZORESISTIVE

TEMPERATURE: K-TYPE THERMOCOUPLE

SmartCEMS Biogas

Systems Housing

SHELTER

- CEMS Shelter Zone C/D
- Form 15 wind rating C3 for
- Cyclonic Zone D Category 2
- AC, Gland plate, Instrument mounting
- System integration, Wiring and tubing
- Desk, cupboard and workbench
- Lighting and power plugs
- 115 and 240 VAC Junction boxes
- Ambient temperature sensor

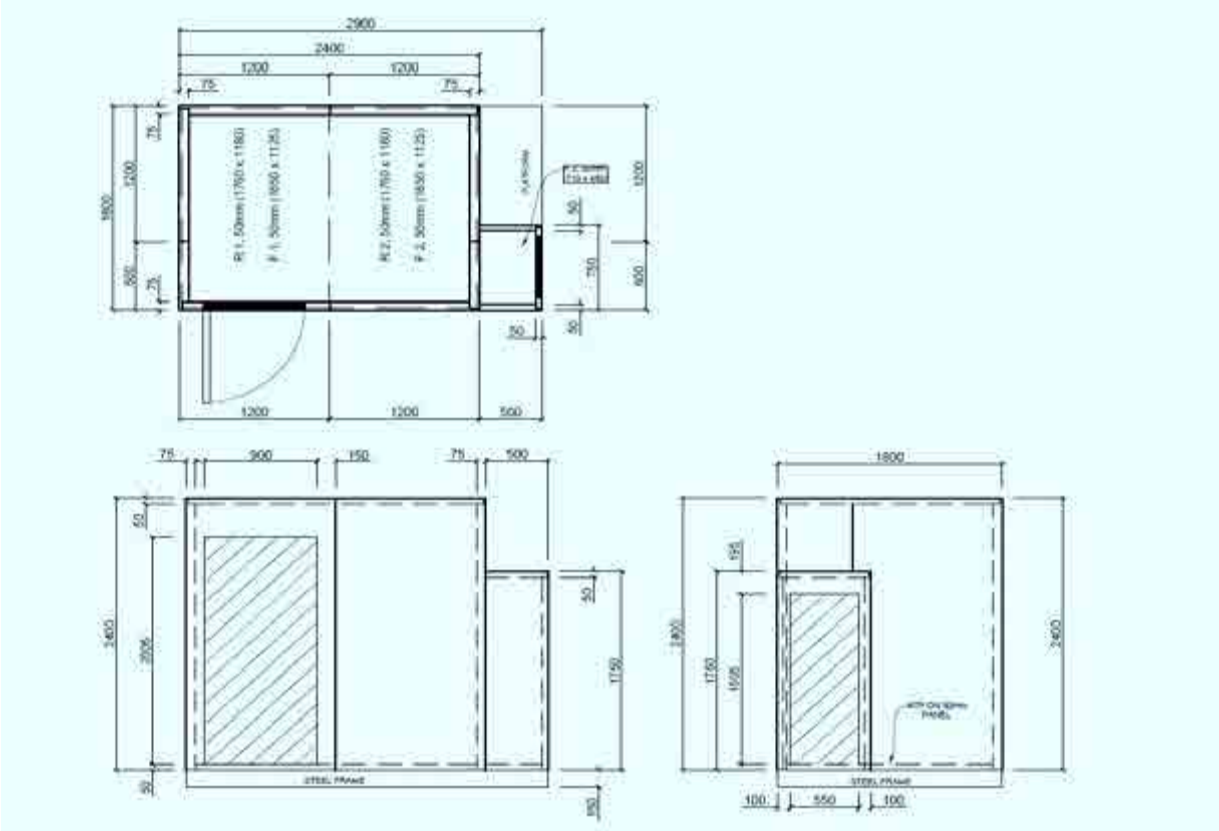
FIELD ENCLOSURE

- Fan (optional flow switch)
- IECEx certified solutions available
- Enclosed wiring and tubing
- Additional protection

SmartCEMS Biogas

AQUA GAS

Shelter



Technical Support

- Supply of consumables and critical spares
- Remote diagnosis
- Installation, commissioning, maintenance, training
- Dedicated Technician factory trained by MADUR and A1CBISS assigned for ongoing support
- 4 visits a year to perform preventive maintenance tasks
- Maintenance visits scheduled at a time mutually convenient to both parties
- Free email and Phone support 24h/7d

- Site attendance within 72 hrs
- 24 months consumables delivered with the system and kept at site
- Critical Spares (field replaceable components) delivered with the system and kept at site
- 1 set of spare MAMOS measuring cells available off the shelves at AquaGas (for all gases)
- 1 set of MAMOS electronic board available off the shelves at AquaGas

Services and Product Enquiries

Local: 1300 850 862

International: +61 (0)755 768 295

info@aquagas.com.au

AquaGs Pty Ltd

Head Office

35 Jarrahdale Drive | Elanora 4221 QLD | AUSTRALIA