



SYNGAS ONLINE ANALYSER

CO, CO₂, O₂, N₂, CH₄, C_xH_y and H₂

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.

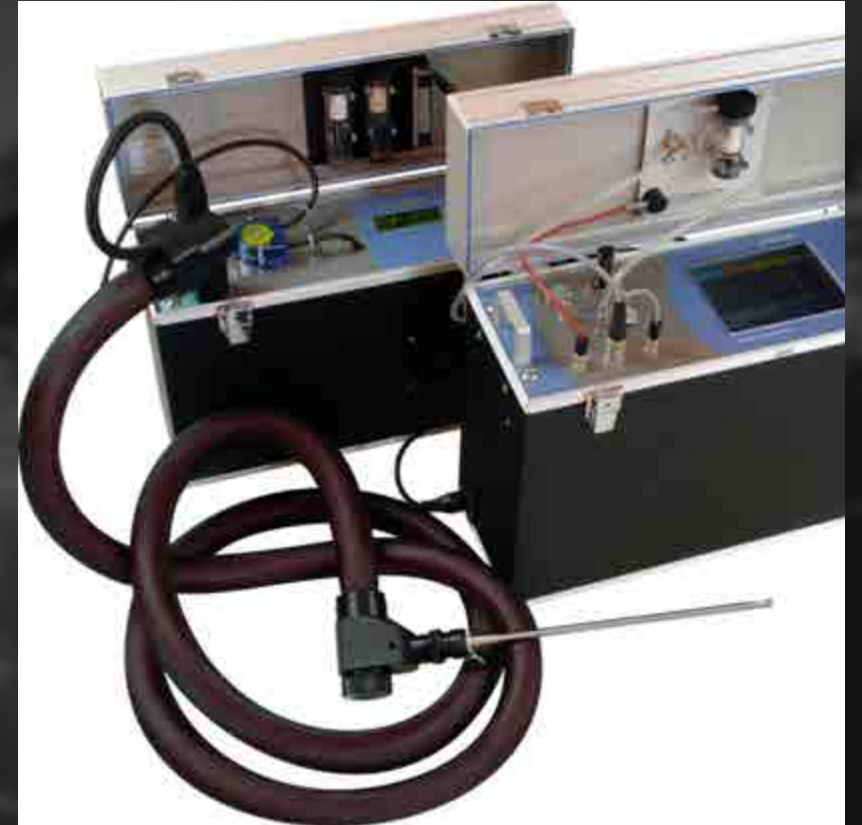
The logo for MADUR, consisting of the word "madur" in a lowercase, yellow, sans-serif font.



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.

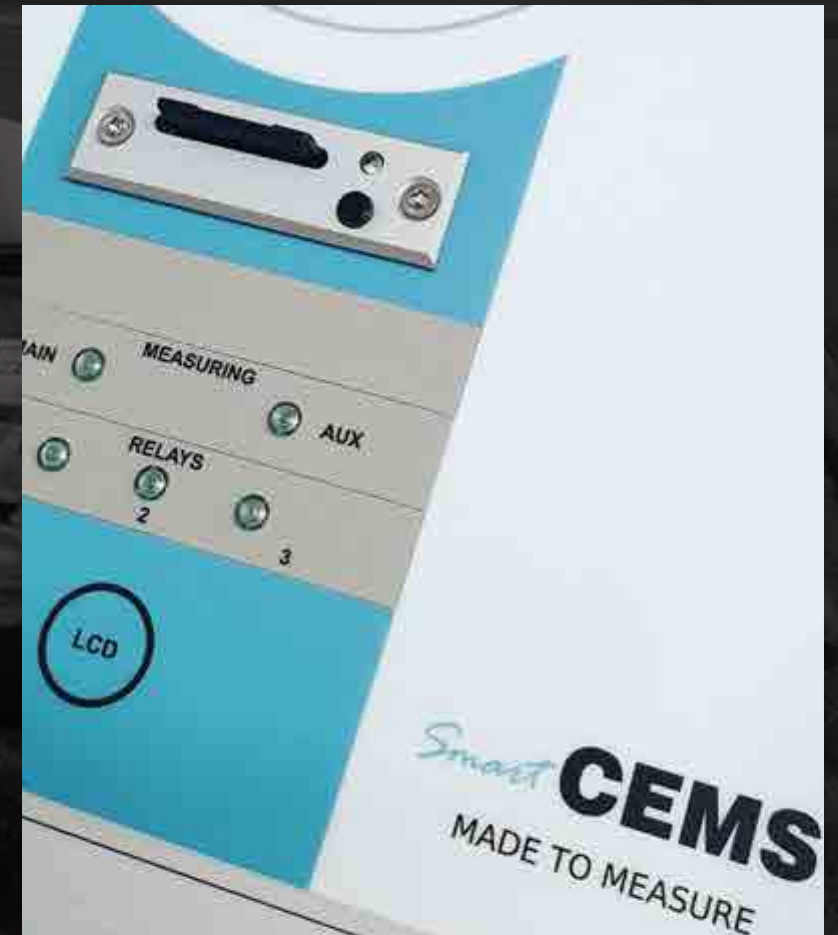


SmartCEMS Syngas



Main Features

- Online Monitoring of Syngas Primary constituents in Syngas 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)
- CO, CO₂, O₂, N₂, CH₄, C_xH_y and H₂, 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.

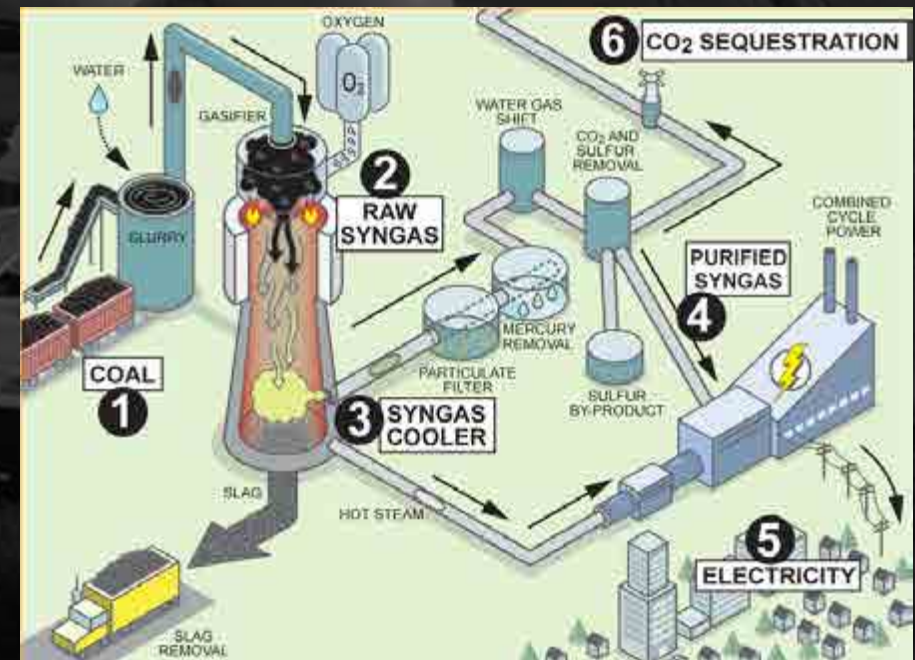


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Applications

- Emissions monitoring at the stack or sinter plant: CO, SO₂, NO_x, O₂
- Raw material storage hall: CO monitoring
- Raw material silo: C₂H₂ and O₂ monitoring
- Downstream of blast furnace uptake duct: CO, CO₂, CH₄ H₂
- After dust bags - Early detection of explosion risk for the dust bags from CO contents of the blast furnace gas CO CO₂, CH₄ H₂
- Determination of the calorific value of the blast furnace gas for billing purposes CO, CO₂, CH₄ Calorific value H₂, N₂, O₂, CO
- Optimizing the converter process from the composition of the converter off gas CO, CO₂, O₂ CO, CO₂, H₂
- Scrubber efficiency and OCS: H₂S and VOC
- Syngas composition and BTU real-time monitoring: : C_xH_y, CH₄, CO₂, O₂, H₂S and VOC
- Reporting as per NGER National Greenhouse and Energy Reporting CO, CO₂, CH₄ Calorific value H₂, N₂, O₂, CO
- Monitoring compliance of dust emission with existing regulations CO Dust
- Monitoring compliance of pollutant emission with existing regulations CO, NO, SO₂, O₂ Dust

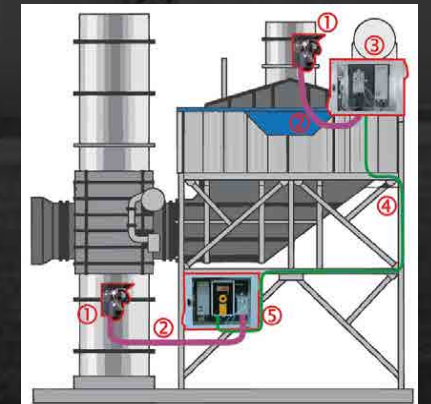
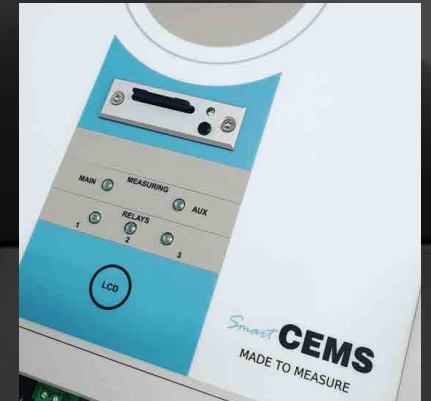


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Additional features

- 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 compare to typical intricates Syngas monitoring systems (spectrometer, multigas NDIR, Gas Chromatograph)



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References

- SUEZ Perth WA
- YARA Pilbara WA
- VISY Smithfield NSW
- Gippsland Water VIC
- NYRSTAR Port Pirie SA
- ENVIROPACIFIC Barangaroo remediation site Sydney NSW
- PYROCAL Power Station Loganholme QLD
- Gold Coast City Council QLD
- Brisbane Utilities Brisbane QLD
- And more.

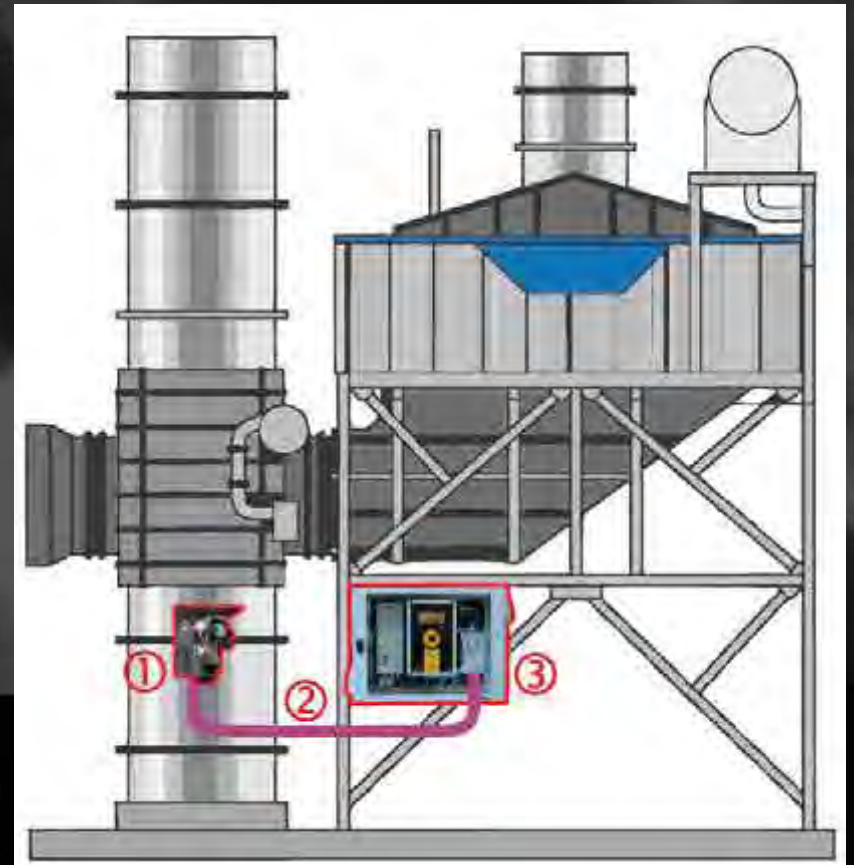


SmartCEMS Configuration

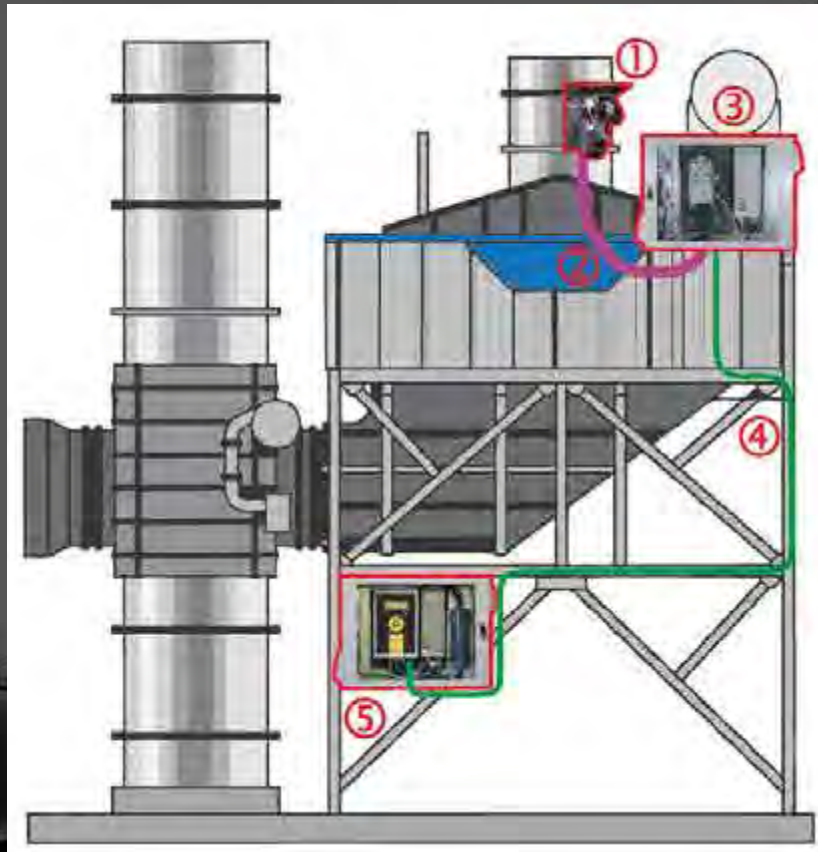


Compact
Direct Extractive

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



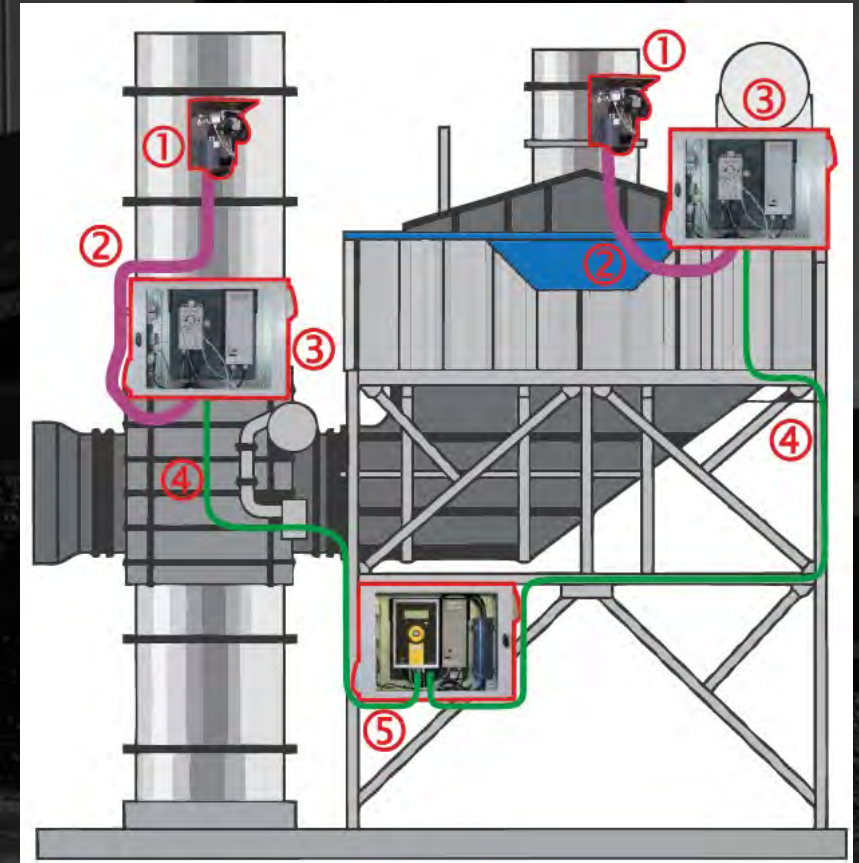
Split

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
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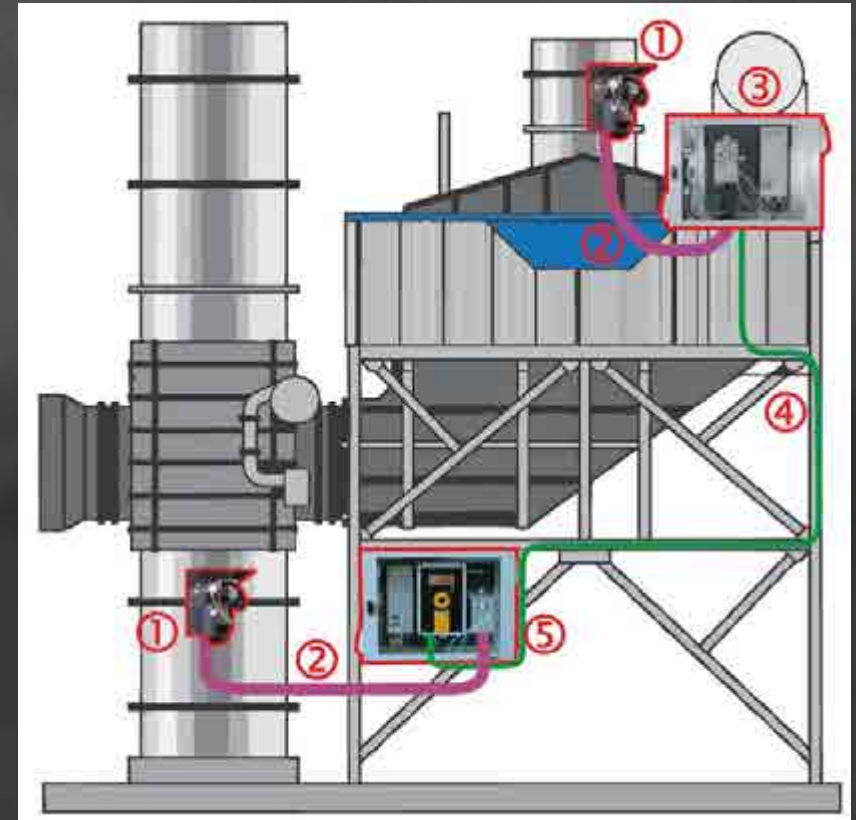


SmartCEMS Configuration



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.
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SmartCEMS Syngas

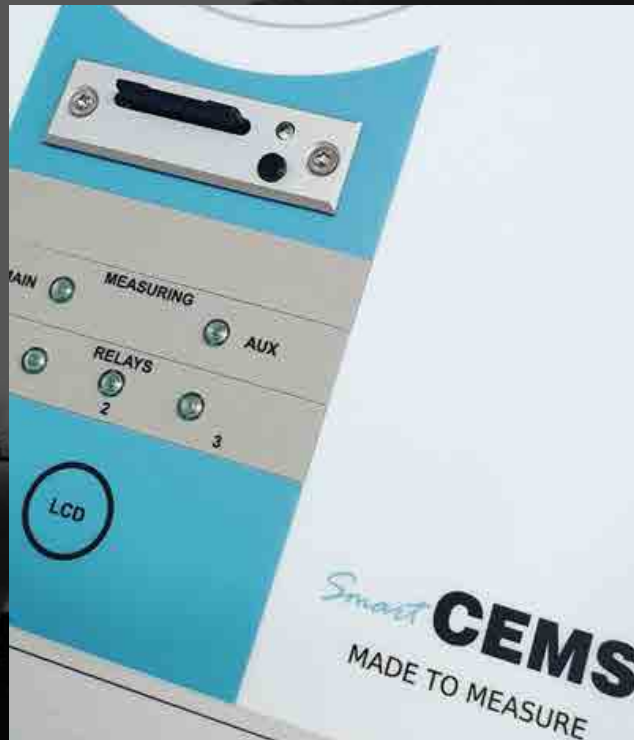


SYSTEM OVERVIEW

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Analytical Performances
Lower Detection Limits



Gas	LoD	Unit
CO	0.01	%vol.
CO2	0.01	%vol.
CH4	0.01	%vol.
O2	0.01	%vol.
H2	0.01	%vol.
CxHy	0.01	%vol.

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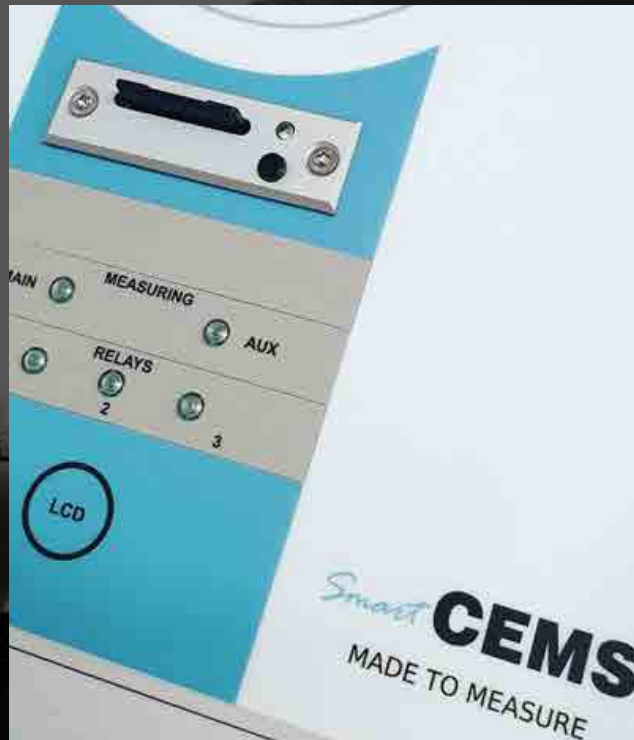
Analytical Performances Measuring Ranges

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	%
H2	0-100	%
Syngas Temp	-50 to 100	°C
Diff Pressure	-10 to +40	hPa
Gas velocity	1 to 50	m/s

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Analytical Performances Accuracy and Response Time



Gas	Range	Time T (90)
CH4	± 0.05 % abs.	45s
CxHy	± 0.05 % abs.	45s
CO2	± 0.1 % abs.	45s
O2	± 0.1 % abs.	45s
H2	± 0.1 to 1% abs.	45s
Syngas Temp	0.1 °C	5s
Diff Pressure	1Pa	5s
Gas velocity	0.1m/s	5s

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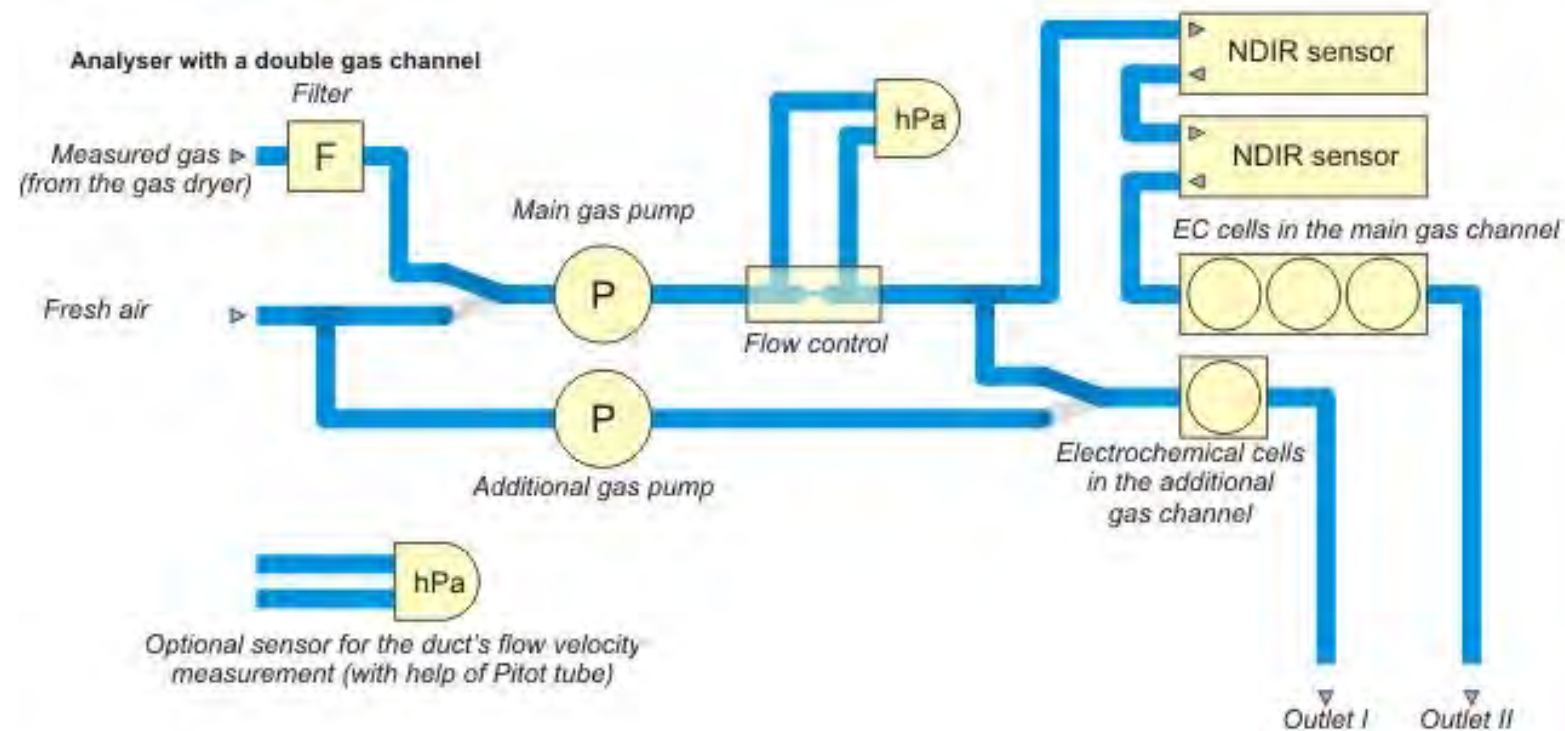
Analytical Performances Approved Methods

- O₂, CO: ISO 12039, CTM-030
- CO₂: ISO 12039, OTM-13
- CH₄: ISO 12039, OTM-13
- C_xH_y: 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



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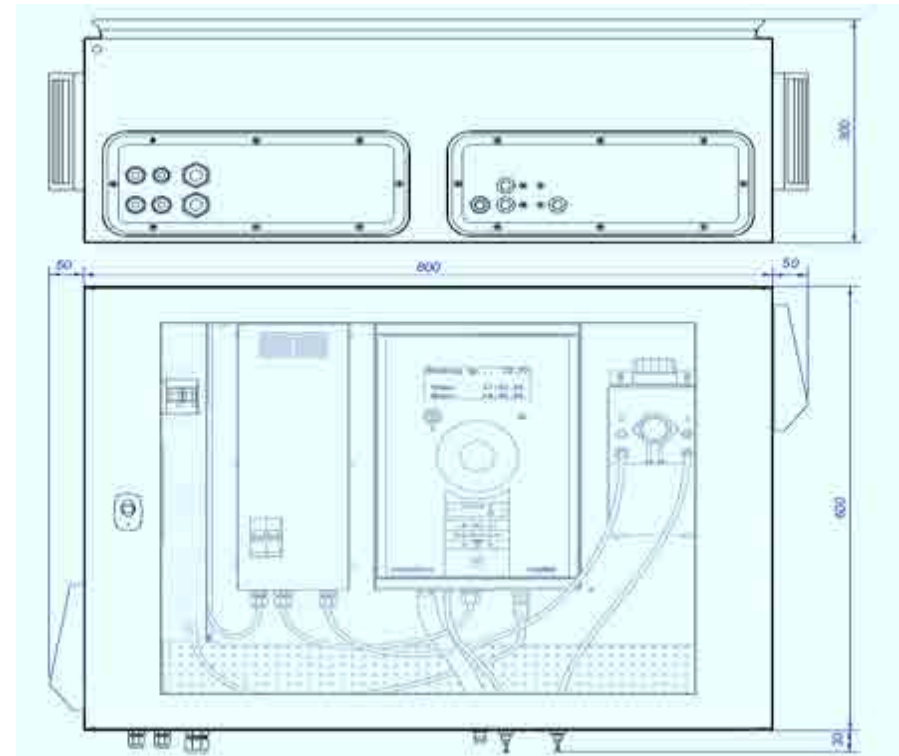
Flow Diagram



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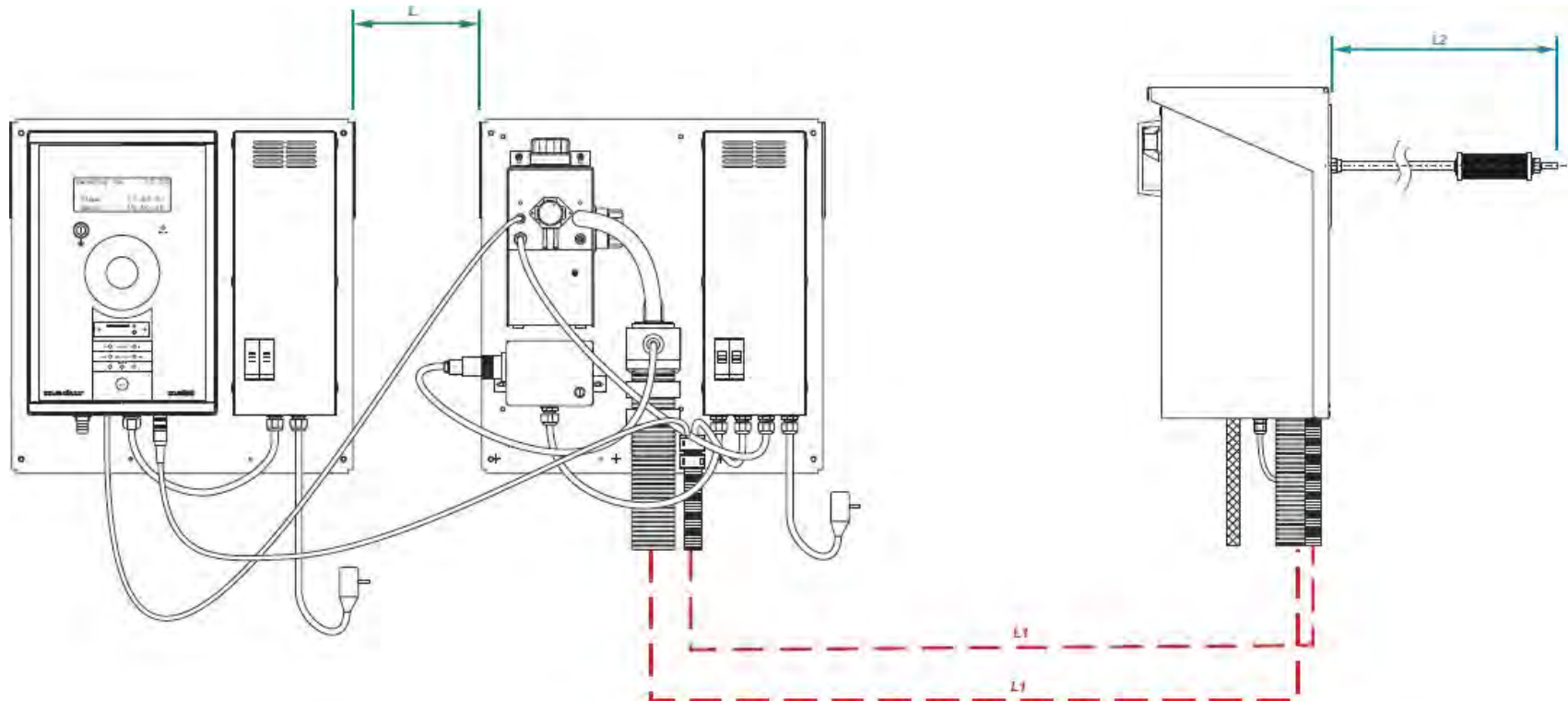
Enclosure



SmartCEMS Syngas



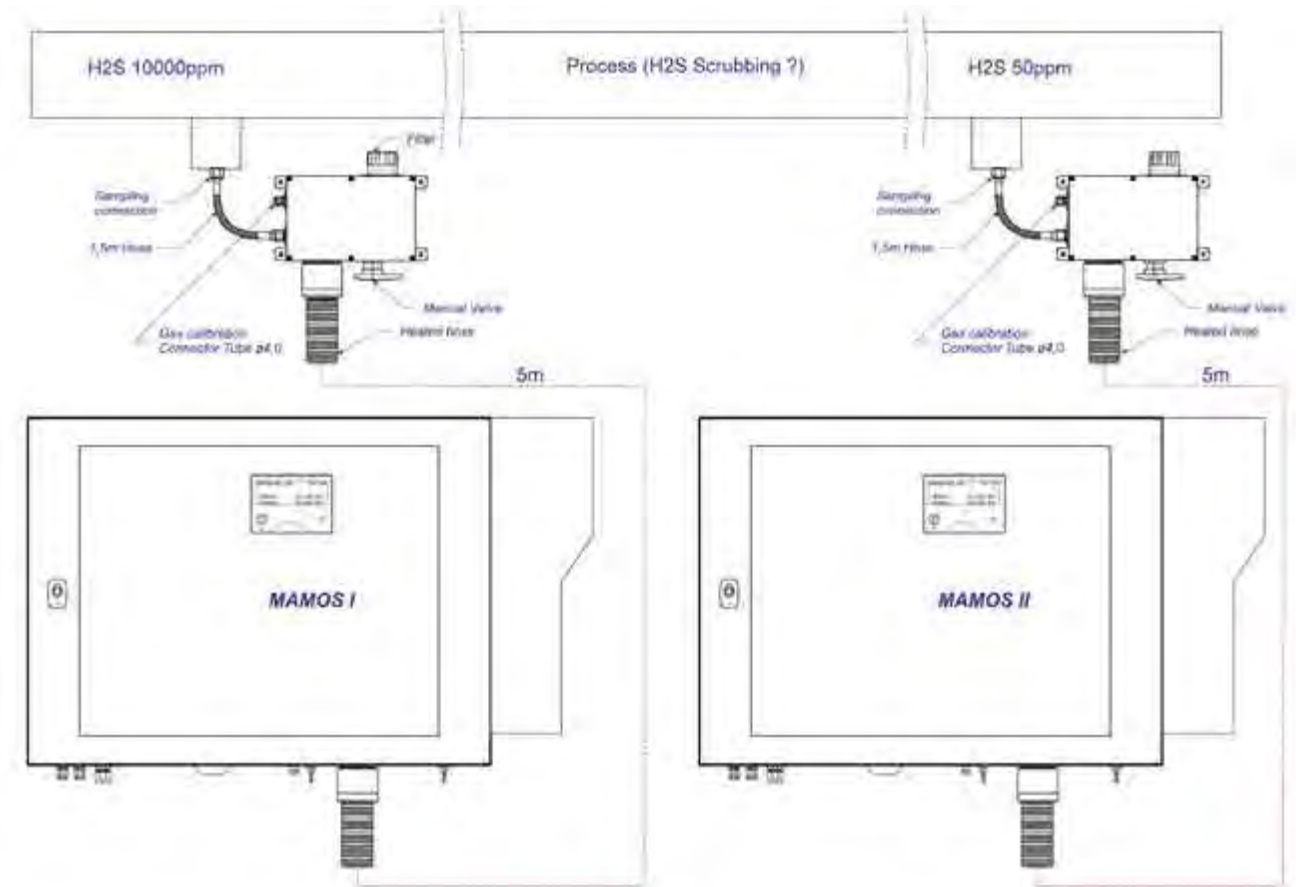
General Arrangement



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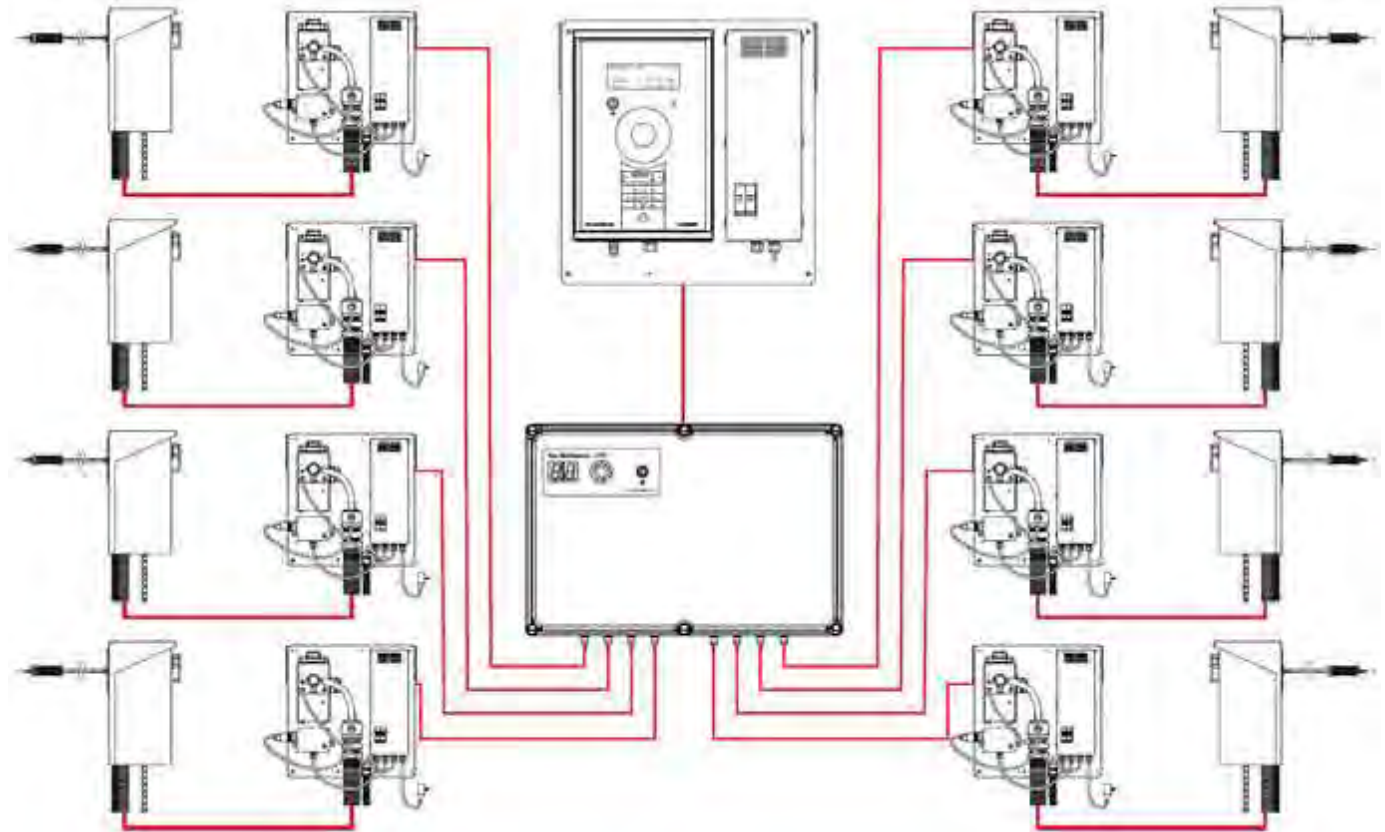
Typical integration for scrubber monitoring



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8 Streams Multiplexer



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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)



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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



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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



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Sampling System Pre-conditioning System

Gas purification unit designed for soot, tar, acid condensates continuous removal. Equipped with sampling Pump and Peristaltic pump, particulates filters and several inline scrubbers.

SCRUBBERS AND FILTERS

- 2 x wash-bottles
- 1 x adsorption cartridge
- 1 x Particles Filter TF3000 C

PUMP

- Capacity 38ml/min
- Sampling Pump PTFE coated 2 lpm



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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

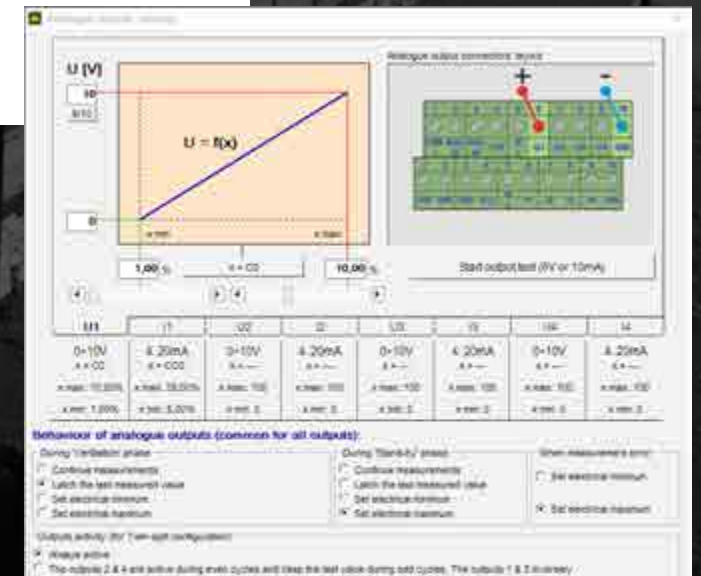
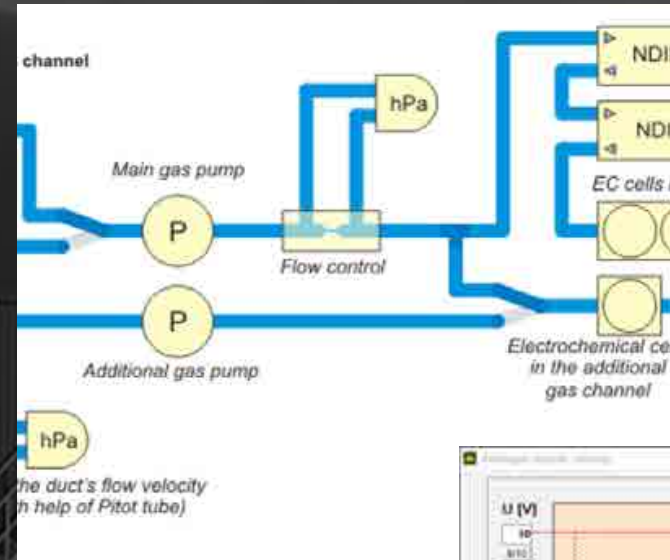
- Capacity 38ml/min

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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



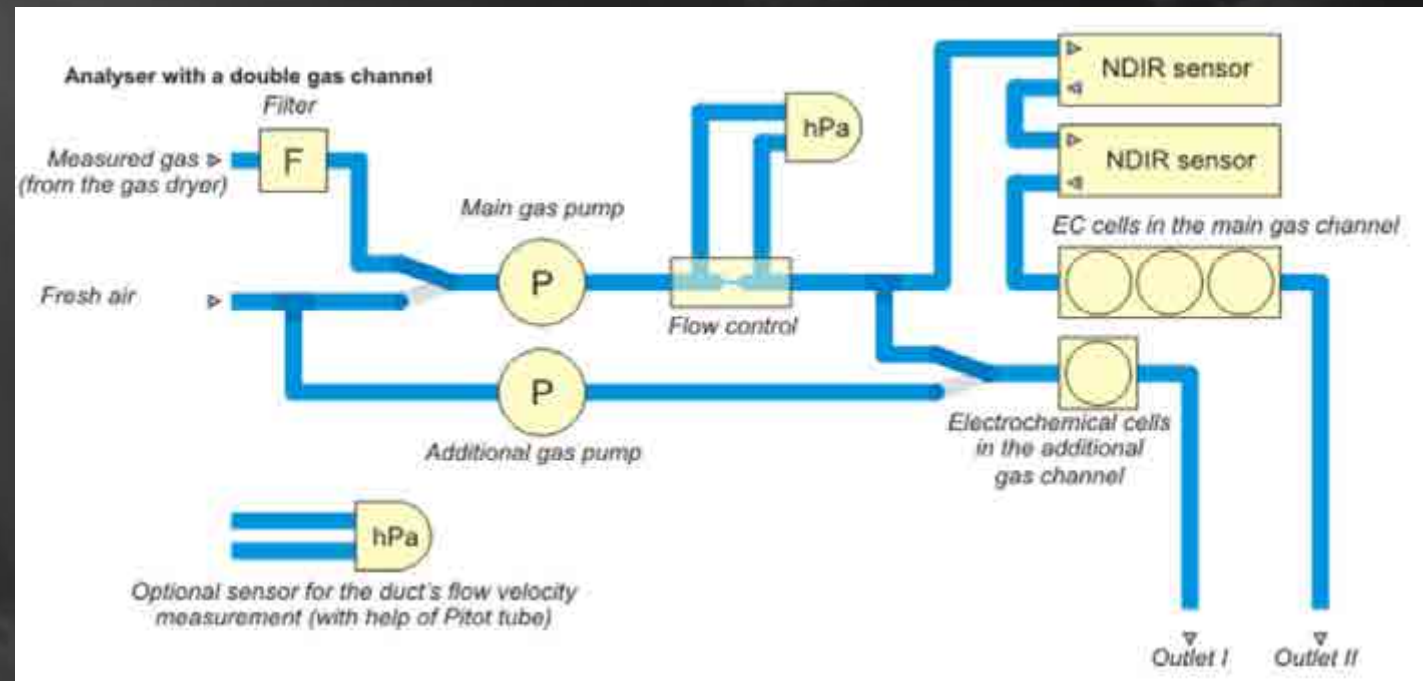
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Analyser

Proprietary gas paths and cells

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



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Input IN1

Input IN2

No action

Res

Ter

Analyser

MoSys Software

The input does not affect measurement cycle.

- User configurable measuring sequences
- USB or TCP/IP direct connection
- Remote control



0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

▪ Sensor calibration

▪ Work mode

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

▪ IOs testing

▪ Diagnosis

Stand-by

Warm-up

Ventilation

Measurement

▪ Instrument network capabilities

Preview

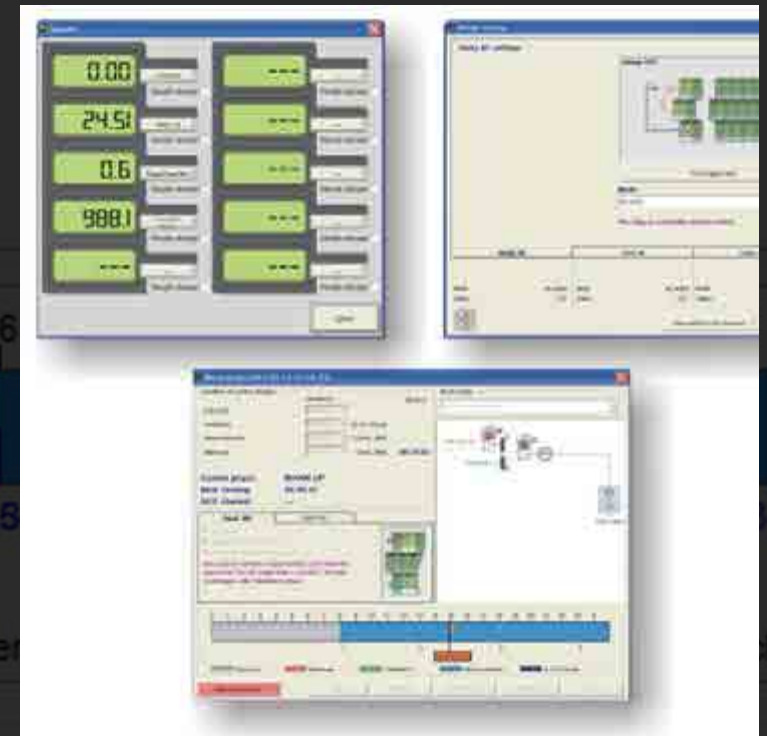
Save

Default

Restart cycle

Terminate cycle

Close



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Analytical Performances Measuring Principle

CO₂, C_xH_y: NDIR NON-DISPERSIVE INFRA-RED

- Industrial-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



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Month	Maximum Half Hourly Value	Time of maximum Half Hour	Exceedances in Month to Date	Valid Half Hours in Month	Exceedances in Year to Date	Valid Half Hours in Year to Date	Exceedances in Year to Date
January	N/A	N/A	0	0	0	0	0.00
February	N/A	N/A	0	0	0	0	0.00
March	N/A	N/A	0	0	0	0	0.00
April	N/A	N/A	0	0	0	0	0.00
May	N/A	N/A	0	0	0	0	0.00
June	N/A	N/A	0	0	0	0	0.00
July	N/A	N/A	0	0	0	0	0.00
August	N/A	N/A	0	0	0	0	0.00
September	N/A	N/A	0	0	0	0	0.00
October	N/A	N/A	0	0	0	0	0.00
November	245.32	05 November 2009 07:30	21	239	21	239	8.79
December	260.33	11 December 2009 00:00	66	354	87	593	14.67

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

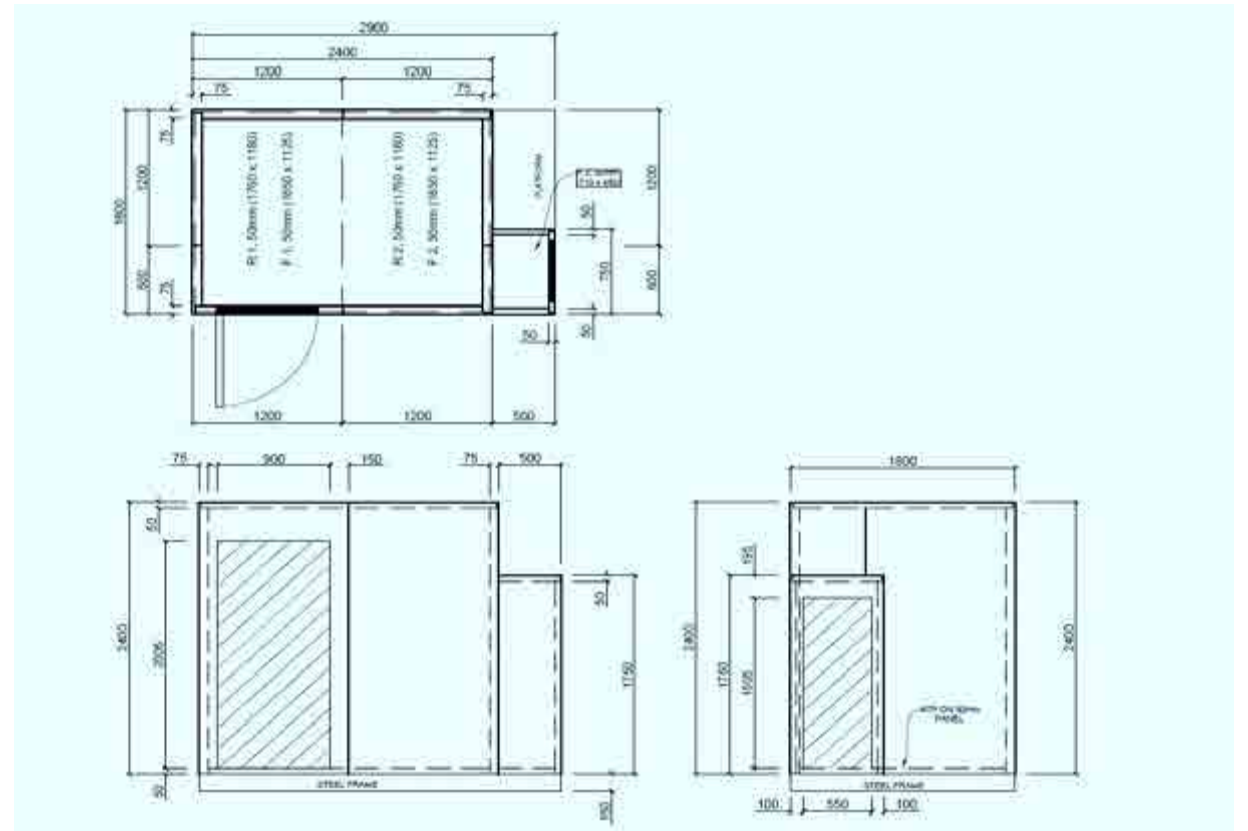
- Fan (optional flow switch)
- IECEx certified solutions available
- Enclosed wiring and tubing
- Additional protection



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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



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