

maMoS

madur gas monitoring system



CHARACTERISTIC | FEATURES | TECHNICAL DATA | SENSORS | EQUIPMENT | APPEARANCE

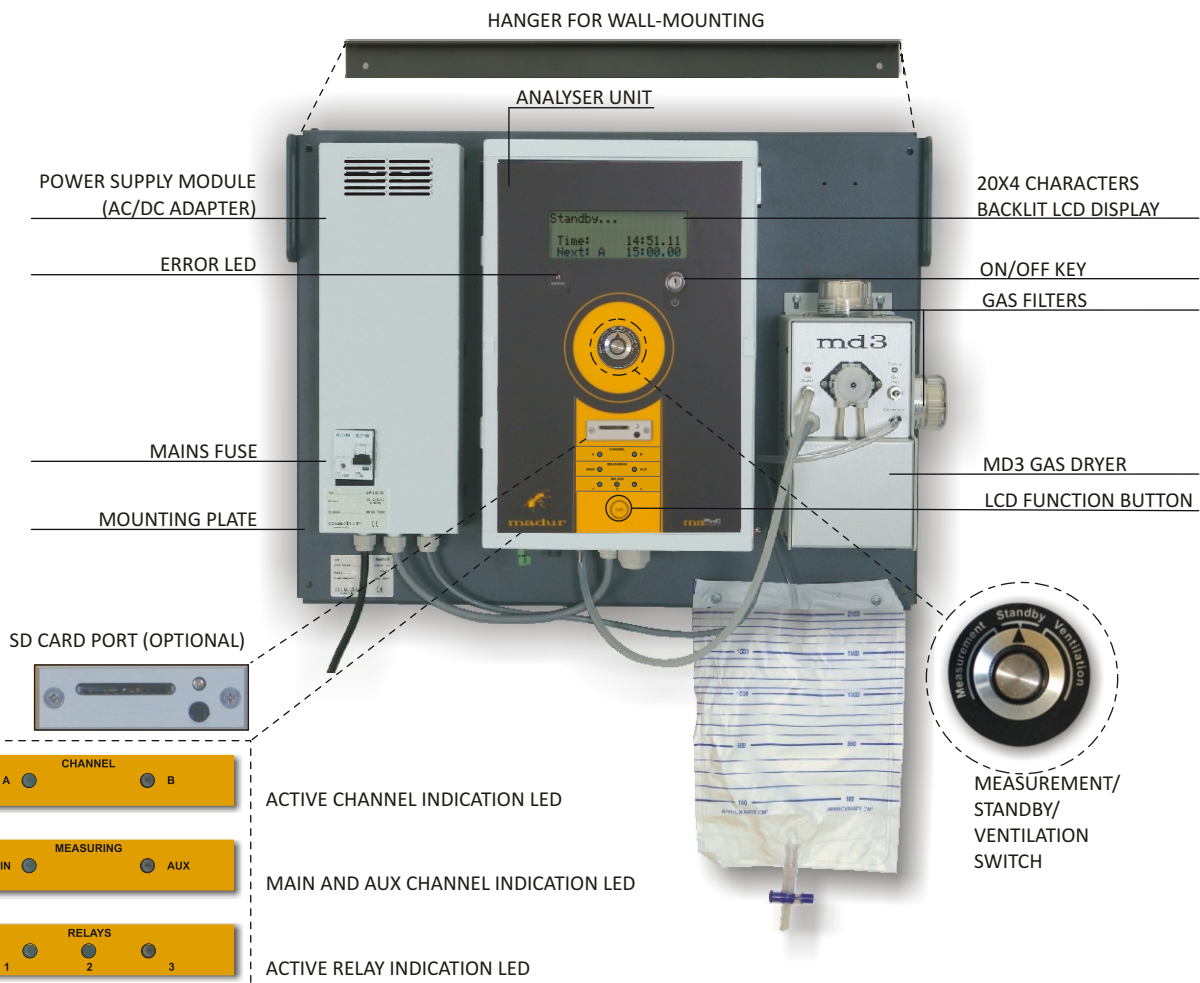
Small in size, yet very skilful analyser – it has the best capabilities/price ratio. maMoS is our alternative for large, intricate CEMS systems, as it does not fall behind them concerning functionality and abilities, and is far ahead in terms of expenses.

It has modular construction, and many add-ons, that makes it easily adjustable to a very specific, individual application.

Powerful PC software allows to adopt many aspects of the analyser’s work very individually (work schedule, analogue outputs’ behaviour, data presentations, and more...).

Manufactured according to the principles of ISO 10396.

- Standard configuration consists up to 4 sensors (NDIR and electrochemical)
- Up to 8 sensors in an extreme, unique configuration
- **NEW** Large display with backlight, 4 lines x 20 characters
- Different types of gas dryers to fit the customers needs
- Compact, Split and Twin split configurations
- Data-logger with SD card for results collection
- Analogue outputs (both current and voltage) to control external devices
- Digital and analogue inputs to pass signals from external devices, to trigger maMoS actions
- Communication with PC via different interfaces (**USB, LAN, RS485 and MODBUS**).
- Different work modes to select from (continuous measurements, work with scheduler, measurements triggered with digital input, “work in-turns” - allows to measure from two different sources, and more...)
- Powerful PC programme to adjust the analyser's settings and to view the results
- Rich offer of add-ons and accessories. Analyser prepared to work in harsh environment
- **NEW** Possibility to work with heated hoses
Standard lengths: 3m 5m, 8m for 115VAC and 230VAC supply.



COMPACT CONFIGURATION

ALL MOUNTED AT MEASUREMENT SITE

WITH MD2 GAS DRYER



WITH MD3 GAS DRYER



SPLIT CONFIGURATION

ANALYSER AND GAS DRYER ARE INSTALLED SEPARATELY, EACH WITH ITS OWN POWER SUPPLY
GAS DRYER INSTALLED ON THE MEASUREMENT PLACE, ANALYSER CAN BE IN A DISTANCE

ANALYSER UNIT



GAS CONDITIONING UNIT



GAS CONNECTION

ANALYSER AND TWO GAS DRYERS, EACH WITH A POWER SUPPLY. EACH DRYER IS AT THE MEASUREMENT SITE. MAMOS MEASURES IN TURNS - ONE CYCLE PER LOCATION.

SPLIT CONFIGURATION

ANALYSER UNIT



GAS CONDITIONING UNIT



**TWIN SPLIT CONFIGURATION A
ANALYSER UNIT WITH A DRYER**



**SECOND
GAS CONDITIONING UNIT**



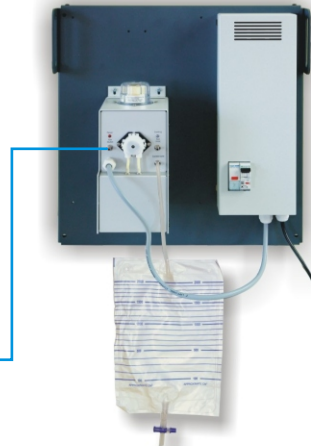
**TWIN SPLIT CONFIGURATION B
ANALYSER UNIT**



GAS CONDITIONING UNIT



**SECOND
GAS CONDITIONING UNIT**



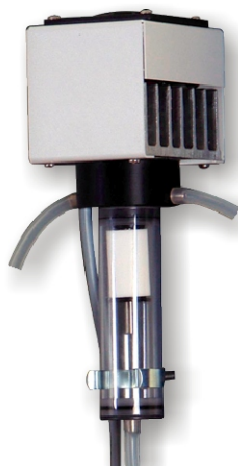
MAMOS GAS ANALYSER

| | |
|--|--|
| Dimensions (W * H * D) | 240 mm * 360 mm * 160 mm |
| Weight (depends on equipment) | 4kg ÷ 5kg |
| Casing material | ABS |
| Mounting plate: dimensions (H*W) material weight | 596 mm * 450 mm aluminium 1,9 kg |
| Operating conditions | T: 10°C ÷ 50°C; RH: 5%÷90% (non condensing) |
| Storing temperature | 0°C ÷ 55°C |
| Power consumption (analyser only) | 30W max |
| Data-logger: type size number of results | SD flash card max 4GB practically unlimited |
| Display: type maximum number of results per screen | 20 characters x 4 rows 4 measurement results |
| Gas pump: type max gas flow standard gas flow | Diaphragm max 2l/min 1.5l/min (90l/h) - with automatic flow control |
| Current analogue outputs | 4 outputs 0 mA ÷ 20 mA or 4 mA ÷ 20 mA |
| Voltage analogue outputs | 4 outputs 0 V ÷ 5 V or 0 V ÷ 10 V |
| Digital inputs | 2 inputs, TTL levels, floating - high level |
| Digital outputs | 1 open collector output + 2 SPDT relays (optional) |
| Communication interface with PC computer | B type USB |

POWER SUPPLY UNIT

| | |
|------------------------|--|
| Dimensions (W * H * D) | 360 mm * 130 mm * 56 mm |
| Weight | 1,4kg |
| Casing material | Aluminium |
| Mounting plate | Power supply is mounted on common plate with analyser unit |
| Operating conditions | T: 10°C ÷ 50°C; RH: 5% ÷ 90% (non condensing) |
| Storing temperature | -20°C ÷ 55°C |
| Input voltage | 100 ÷ 240 V AC 50 / 60 Hz |
| Output voltage | 24V DC / 6,3 A 150W |
| Output current | 6,3A max |
| Mains fuse | 6A |
| Cable pass | 2 pcs PG-9 |

MD2 GAS DRYER



| | |
|---|--|
| Dimensions (W * H * D) | 211 mm * 74 mm * 82 mm |
| Weight | 450g |
| Drying method | Water condensation by rapid cooling down |
| Cooler type | Based on Peltier cooling element with fan (7VDC supply) |
| Cooling temperature | Down to +4°C electronically stabilised Dew point of outlet gas 8°C below the temperature of inlet gas |
| Ready to operate after | 10 minutes |
| Operating conditions | T: 0°C ÷ 35°C, RH: 5% ÷ 90% (non-condensing) |
| Storing temperature | 0°C ÷ 55°C |
| Maximum gas flow for efficient drying (at inlet gas temp. 100°C and RH 100%) | 40 l/h |
| Gas filter | Integrated, with condensate reservoir and replaceable insert |
| Filter insert: length ID OD material pore size | 32mm 15mm 20mm PE 5µm |
| Condensate removal | With peristaltic pump installed in analyser's body |
| Peristaltic pump capacity | 38 ml/min |
| Power supply | Via maMoS (through 15-pin D-SUB connector) |
| Power consumption | 9 W |

MD3 GAS DRYER



Dimensions (W * H * D)

Without filters: 110 mm * 205 mm * 160 mm
With filters: 145 mm * 240 mm * 160 mm

Weight

1790 g (single filter version)

Drying method

Water condensation by rapid cooling down

Cooler type

Based on Peltier cooling element with fan (12VDC supply)

Cooling temperature

Constant, about +1°C, output gas dewpoint about +4°C

Ready to operate after

5 minutes

Operating conditions

T: 0°C ÷ 50°C, RH: 5% ÷ 90% (non-condensing)

Storing temperature

0°C ÷ 55°C

Maximum gas flow for efficient drying
(at inlet gas temp. 100°C and RH 100%)

100 l/h

Gas filters: quantity | material

1 (optionally 2) | PA - body, PC - cover, viton - sealing

Filter insert: length | ID | OD | material | pore size

42mm | 26mm | 32mm | glass fibre | 2µm

Condensate removal

With built-in peristaltic pump

Peristaltic pump capacity

38 ml/min

Power consumption

30 W

| Method | Range Resolution | Accuracy | Time (T90) | Conformity |
|--|--------------------|--------------------------|------------|---------------------|
| O₂ - OXYGEN | | | | |
| Electrochemical, partial pressure | 20,95% 0,01% | ± 0,1% abs. or 5% rel. | 45 sec | ISO 12039; CTM-030 |
| Electrochemical, partial pressure | 25,00% 0,01% | ± 0,1% abs. or 5% rel. | 45 sec | ISO 12039; CTM-030 |
| Electrochemical, partial pressure | 100,00% 0,01% | ± 0,1% abs. or 5% rel. | 45 sec | ISO 12039; CTM-030 |
| CO - CARBON MONOXIDE | | | | |
| Electrochemical sensor | 20 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | ISO 12039; CTM-030 |
| Electrochemical with H ₂ compensation | 4 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | ISO 12039; CTM-030 |
| Electrochemical sensor | 10% 10 ppm | ± 50 ppm abs. or 5% rel. | 45 sec | ISO 12039; CTM-030 |
| NDIR | 10% 0,01 ppm | ± 0,05% abs. or 5% rel. | 45 sec | EN 15058; Method 10 |
| NDIR | 50% 0,01 ppm | ± 0,05% abs. or 5% rel. | 45 sec | EN 15058; Method 10 |
| NDIR | 100% 0,1 ppm | ± 0,5% abs. or 5% rel. | 45 sec | EN 15058; Method 10 |
| CO₂ - CARBON DIOXIDE | | | | |
| NDIR | 25% 0,01% | ± 0,05% abs. or 5% rel. | 45 sec | ISO 12039; OTM-13 |
| NDIR | 50% 0,01% | ± 0,05% abs. or 5% rel. | 45 sec | ISO 12039; OTM-13 |
| NDIR | 100% 0,1% | ± 0,5% abs. or 5% rel. | 45 sec | ISO 12039; OTM-13 |
| C_xH_y - TOTAL HYDROCARBONS | | | | |
| NDIR | 5% 0,1% | ± 0,05% abs. or 5% rel. | 45 sec | |
| NDIR | 25% 0,1% | ± 0,05% abs. or 5% rel. | 45 sec | |
| NDIR | 100% 0,1% | ± 0,5% abs. or 5% rel. | 45 sec | |
| NO - NITRIC OXIDE | | | | |
| Electrochemical sensor | 5 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | CTM-022 |
| NO₂ - NITROGEN DIOXIDE | | | | |
| Electrochemical sensor | 1 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | CTM-022 |
| SO₂ - SULPHUR DIOXIDE | | | | |
| Electrochemical sensor | 5 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | |
| H₂S- HYDROGEN SULPHIDE | | | | |
| Electrochemical sensor | 1 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | |

| Method | Range Resolution | Accuracy | Time (T ₉₀) | Conformity |
|---|---|------------------------------------|-------------------------|-------------------------|
| H₂ - HYDROGEN | | | | |
| Electrochemical sensor | 20 000 ppm 1 ppm | ± 10 ppm abs. or 5% rel. | 45 sec | |
| Thermal Conductivity Detector | 10% 0,1 ppm | ± 0,5 ppm abs. or 5% rel. | 45 sec | |
| Thermal Conductivity Detector | 25% 0,1 ppm | ± 0,5 ppm abs. or 5% rel. | 45 sec | |
| Thermal Conductivity Detector | 50% 0,1 ppm | ± 0,5 ppm abs. or 5% rel. | 45 sec | |
| Thermal Conductivity Detector | 100% 0,1 ppm | ± 0,5 ppm abs. or 5% rel. | 45 sec | |
| N₂O - NITROUS OXIDE | | | | |
| NDIR | 2 000 ppm 1 ppm | ± 10 ppm abs. or 5% rel. | 45 sec | ISO 21258 |
| CHF₃ - FLUOROFORM (REFRIGERANT R23) | | | | |
| NDIR | 2,5% 0,01% | ± 0,05% abs. or 5% rel. | 45 sec | |
| Cl₂ - CHLORINE | | | | |
| Electrochemical sensor | 250 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 45 sec | |
| HCl - HYDROGEN CHLORIDE | | | | |
| Electrochemical sensor | 100 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 120 sec | |
| VOC - VOLATILE ORGANIC COMPOUNDS | | | | |
| PID - Photo Ionization Detector | 100 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 120 sec | METHOD 21 |
| PID - Photo Ionization Detector | 1 000 ppm 1 ppm | ± 5 ppm abs. or 5% rel. | 120 sec | METHOD 21 |
| PID - Photo Ionization Detector | 5% 1 ppm | ± 5 ppm abs. or 5% rel. | 120 sec | METHOD 21 |
| PID - Photo Ionization Detector | 10% 1 ppm | ± 5 ppm abs. or 5% rel. | 120 sec | METHOD 21 |
| MEASUREMENTS | | | | |
| Variable | Method | Range Resolution | Accuracy | Time (T ₉₀) |
| T _{gas} - gas temperature | K-type thermocouple | -10 ÷ 1000°C 0,1°C | ± 2°C | 10 sec |
| T _{gas} - gas temperature | S-type thermocouple | -10 ÷ 1500°C 0,1°C | ± 2°C | 10 sec |
| T _{amb} - boiler intake air temperature | PT500 resistive sensor | -10 ÷ 100°C 0,1°C | ± 2°C | 10 sec |
| Differential pressure | Silicon piezoresistive pressure sensor | -25 hPa ÷ +25 hPa 1 Pa (0,01hPa) | ± 2Pa abs. or 5% rel. | 10 sec |
| Gas flow velocity | Indirect, with Pitot tube & pressure sensor | 1 ÷ 50 m/s 0,1 m/s | 0,3 m/s abs. or 5% rel. | 10 sec |
| Lambda λ - excess air number | Calculated | 1 ÷ 10 0,01 | ± 5°C | 10 sec |
| qA - stack loss | Calculated | 0 ÷ 100% 0,1% | ± 5°C | 10 sec |
| Eta - η combustion efficiency | Calculated | 0 ÷ 120% 0,1% | ± 5°C | 10 sec |

STANDARD EQUIPMENT

SUPPLIED ALONG WITH THE DEVICE

- maMoS gas analyser on a mounting plate
- Power supply unit that converts mains supply 115VAC or 230VAC to 24VDC for maMoS
- USB communication cable
- 8 analogue outputs (4x current, 4x voltage)
- 2 digital inputs for triggering maMoS behavior
- 7-pin connector for Tgas probe (thermocouple connection)
- Software CD with programmes and manuals
- 4 wall plugs to attach mounting plate

ADDITIONAL EQUIPMENT

NECESSARY FOR THE ANALYSER TO WORK

- MD2 gas dryer

MD2 gas dryer – economy class Peltier cooler unit - basic equipment of the maMoS monitor

ordering code:
ZMAM-DRYER-MD2



- MD3 gas dryer

High efficiency gas dryer based on the Peltier cooling element. Equipped with 1 or 2 microfibre filters. Replaces the basic MD2 dryer.

ordering codes:
MD3 dryer with 1 filter - ZMA3-DRYER-MD3S
MD3 dryer with 2 filters - ZMA3-DRYER-MD3S2

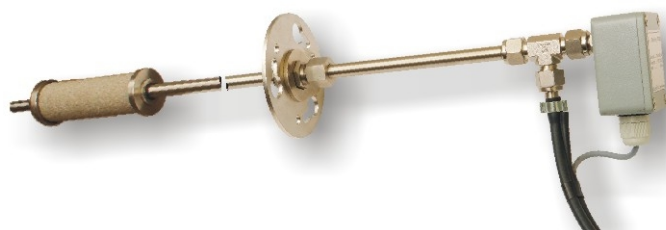


- MD3 gas dryer with power supply unit

MD3 gas dryer with its own power supply module. Can work as a part of maMoS analyser (in split or twin-split configurations), or as a standalone device.

ordering code:
M10-00001



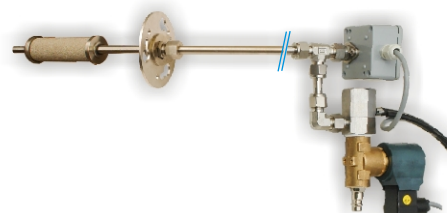


OPTIONAL EQUIPMENT & SPARE PARTS

• Stationary gas probe

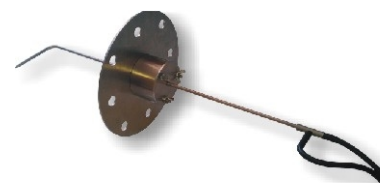
Gas probe designed specially for stationary purposes. Probe is available in different lengths and is equipped with suitable holder (different types are available). Optionally it may also be equipped with:

- Thermocouple for measurements of gas temperature.
- Sintered stainless-steel filter (cleanable) - especially recommended when dealing with high concentration of dust and soot.



• Pitot tube

Pitot tube is used for indirect measurement of gas flow velocity (measurement with the analyser's differential pressure sensor). A few lengths of tubes are available. Pitot tube has 2m gas tubings to connect it with the analyser. It may be provided with a suitable holder for stationary purposes



ordering codes:

pitot tube 800mm - Z00-PITOT-8002
pitot tube 500mm - Z00-PITOT-5002

• Heated filter

Heated filter is installed right after the gas probe. It is best when it is paired with heated hose to prevent vapour from condensing.



• Ethernet /WiFi communication interfaces

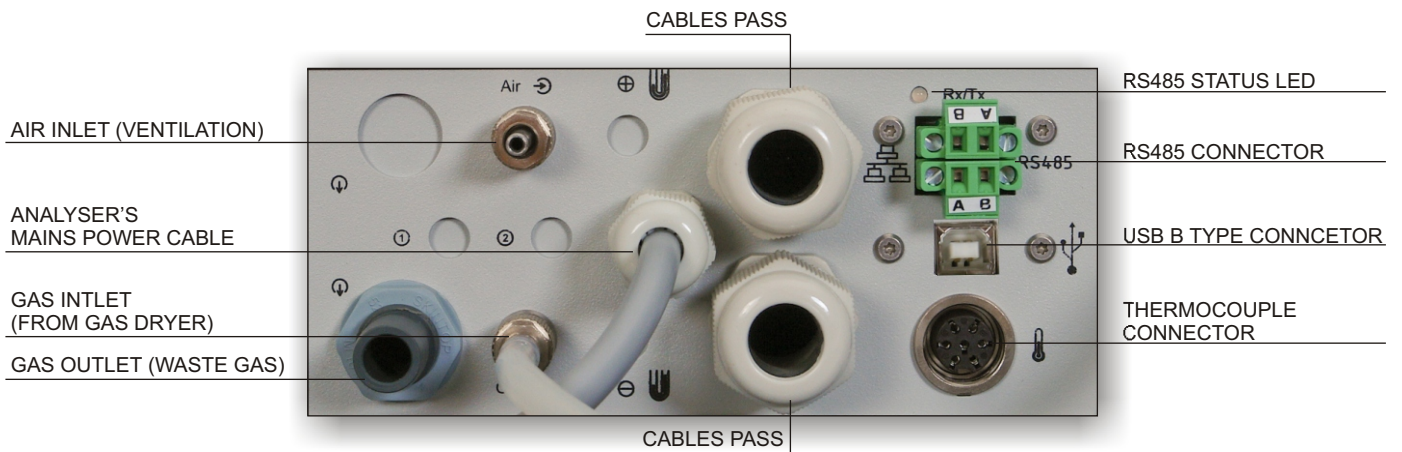
Optional interface allows to communicate with maMoS analyser within LAN network either via cable or wirelessly with help of special WiFi adapter.

ordering code:
ZMA3-ADAP-WIFI



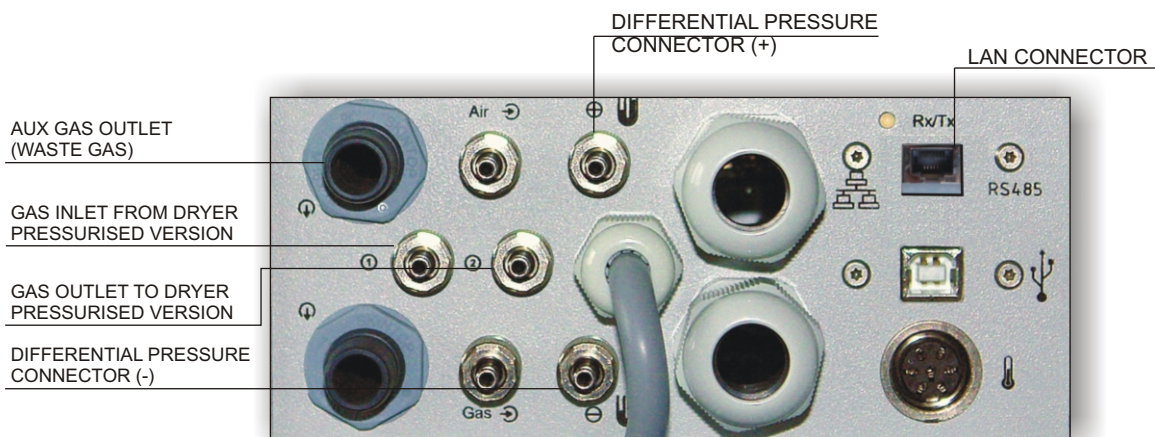
GAS AND ELECTRIC CONNECTORS (ANALYSER BOTTOM VIEW)

CONNECTION PANEL FOR THE STANDARD CONFIGURATION WITH A SINGLE GAS CHANNEL



GAS AND ELECTRIC CONNECTORS (ANALYSER BOTTOM VIEW)

CONNECTION PANEL WITH A DOUBLE GAS CHANNEL



EXAMPLE SCREENSHOTS FROM THE PC PROGRAMME

