

mamOS

madur gas monitoring system



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

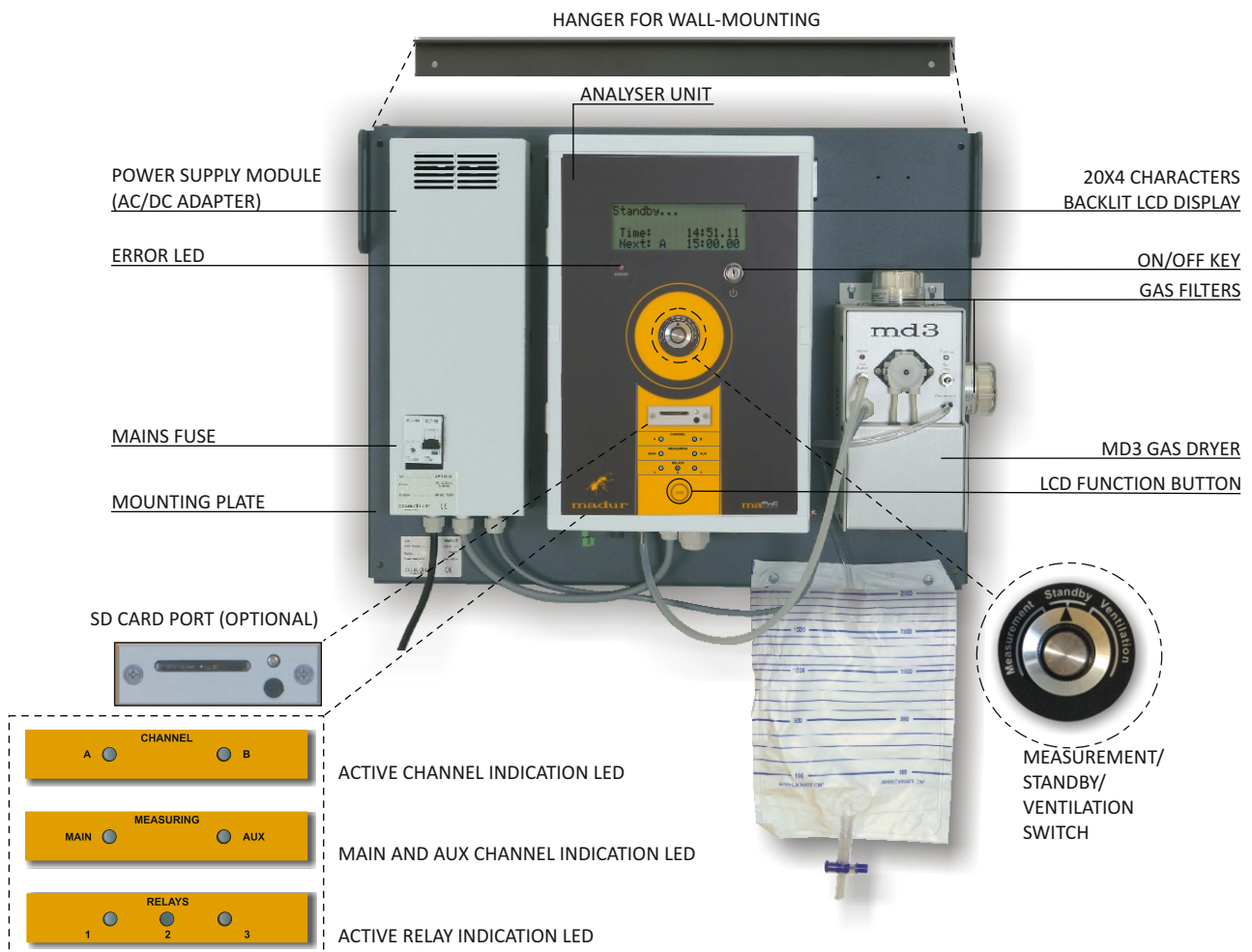
Small in size, yet very skillful analyser – it has the best capabilities/price ratio. maMoS is our alternative for large, intricate CEMS systems, as it does not fall behind them concerning functionality and abilities, and is far ahead in terms of expenses.

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 of up to 6 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 program to adjust the analyser's settings and to view the results
- Rich offer of add-ons and accessories
- **NEW** Possibility to work with heated hoses. Standard lengths: 3m 5m, 8m for 115VAC and 230VAC supply.
- **NEW** Possibility to work with programmable logic controllers (i.e. Siemens S7-1200) via modbus RTU.



maMoS IP55 **NEW**



DUAL FILTER WITH ABSORBENT



ACCESSIBLE AC POWER SOCKET

SUPPORT FOR HEATED HOSES

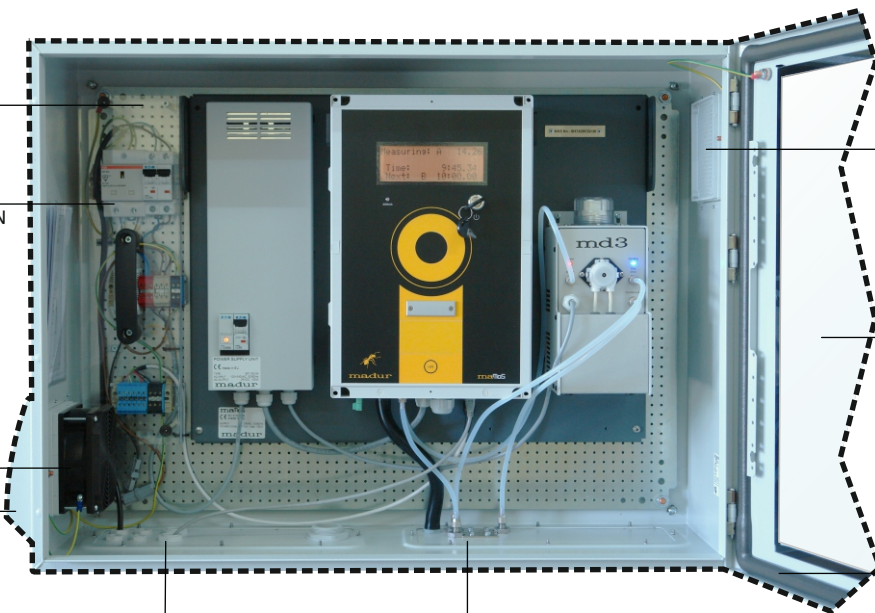
- IP55 cabinet for maMoS and MD3 provides better protection in harsh environment.
- Available with the same sensor and equipment configuration as regular maMoS.
- Build-in ventilation system (option).
- Cabinet available also with climate control module or without ventilation (both IP65 rated).
- Single or dual filtration system for protection from toxic gasses. Filter can be used with various absorbent (e.g. from Purafil).
- Cabinet features high quality steel construction with glazed door.

INTERNAL MOUNTING PLATE

ELECTRIC CONNECTIONS UNDER PLEXIGLASS PROTECTION

FAN

AIR INLET VENT



AIR OUTLET VENT

GLAZED DOOR

RUBBER GASKET

GAS AND ELECTRIC CABLE PASSES

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

TWIN SPLIT CONFIGURATION

ANALYSER AND TWO GAS DRYERS, EACH WITH A POWER SUPPLY.

TWIN-SPLIT CONFIGURATION WITH ONE DRYER ON A SEPARATE MOUNTING PLATE.

ANALYSER WITH GAS CONDITIONING UNIT #1



GAS CONDITIONING UNIT #2



GAS CONNECTION

TWIN SPLIT CONFIGURATION, WITH BOTH GAS DRYERS ON SEPARATE MOUNTING PLATES

GAS CONDITIONING UNIT #1



ANALYSER UNIT



GAS CONDITIONING UNIT #2



GAS CONNECTIONS

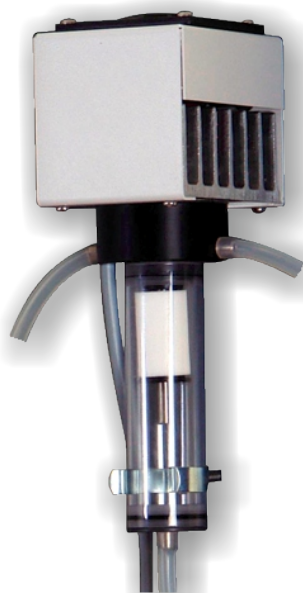
MAMOS GAS ANALYSER

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

maMoS IP55 **NEW**



Dimensions (W * H * D)	800 mm * 600 mm * 300 mm
Weight	25,5kg cabinet + weight of the device
Door type	Glazed Security glass
Color	Grey RAL 7035
Installation type	Wall-mounted
Lock type	3 points lock, 3mm double-bar
IP rating	IP55 for cabinet with ventilation (NEMA 3) IP65 for cabinet without ventilation (NEMA 4x) IP65 for cabinet with climate control module (NEMA 4x)
Accessibility	Front
Operating conditions for analyser in IP55 cabinet with ventilation	max. ambient temp. 35°C, out of direct sunlight
Storing temperature	0°C ÷ 55°C
Ventilation fan	120mm * 120mm * 120mm 55m ³ /h 40dBA IP55

Method	Range Resolution	Accuracy	Time (T90)	Conformity
O₂ - OXYGEN				
Electrochemical, partial pressure	20,95% 0,01%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical, partial pressure	25,00% 0,01%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical, partial pressure	100,00% 0,1%	± 0,2% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Paramagnetic	25% 0,01%	± 0,2% abs. or 5% rel.	45 sec	EN 14789, OTM-13
Paramagnetic	100% 0,1%	± 0,2% abs. or 5% rel.	45 sec	EN 14789, OTM-13
CO - CARBON MONOXIDE				
Electrochemical	4 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochem., with H2 compensation	4 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical	20 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochem., with H2 compensation	20 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	ISO 12039; CTM-030
Electrochemical	10% 0,001%	±0,005% abs. or 5% rel.	45 sec	ISO 12039; CTM-030
NDIR	10% 0,01%	± 0,05% abs. or 5% rel.	45 sec	EN 15058; Method 10
NDIR	25% 0,01%	± 0,05% abs. or 5% rel.	45 sec	EN 15058; Method 10
NDIR	50% 0,01%	± 0,05% abs. or 5% rel.	45 sec	EN 15058; Method 10
NDIR	100% 0,1%	± 0,5% abs. or 5% rel.	45 sec	EN 15058; Method 10
CO₂ - CARBON DIOXIDE				
NDIR	5% 0,01%	± 0,05% abs. or 5% rel.	45 sec	ISO 12039; OTM-13
NDIR	10% 0,01%	± 0,05% abs. or 5% rel.	45 sec	ISO 12039; OTM-13
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
CH₄ - METHANE				
NDIR	1% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR	5% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR	10% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR	25% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR	50% 0,01%	± 0,05% abs. or 5% rel.	45 sec	
NDIR	100% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
NO - NITRIC OXIDE				
Electrochemical	1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	CTM-022
Electrochemical	5 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	CTM-022
NO₂ - NITROGEN DIOXIDE				
Electrochemical	1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	60 sec	CTM-022
Electrochemical	4 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	60 sec	CTM-022
SO₂ - SULPHUR DIOXIDE				
Electrochemical	2 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	
Electrochemical	5 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	

Method	Range Resolution	Accuracy	Time (T90)	Conformity
H₂S- HYDROGEN SULFIDE				
Electrochemical	1 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	70 sec	
Electrochemical	10 000 ppm 1 ppm	± 5 ppm abs. or 5% rel.	45 sec	
H₂ - HYDROGEN				
Electrochemical	2 000 ppm 1 ppm	± 10 ppm abs. or 5% rel.	50 sec	
Electrochemical	20 000 ppm 1 ppm	± 10 ppm abs. or 5% rel.	70 sec	
Thermal Conductivity Detector	10% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
Thermal Conductivity Detector	25% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
Thermal Conductivity Detector	50% 0,1%	± 0,5% abs. or 5% rel.	45 sec	
Thermal Conductivity Detector	100% 0,1%	± 0,5% 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
NDIR	5 000 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	250 ppm 1 ppm	± 5 ppm abs. or 5% rel.	60 sec	
VOC - VOLATILE ORGANIC COMPOUNDS				
PID - Photoionization Detector	100 ppm 1 ppm	± 5 ppm abs. or 5% rel.	120 sec	METHOD 21
PID - Photoionization Detector	1 000 ppm 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	-10 hPa ÷ +40 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 program 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



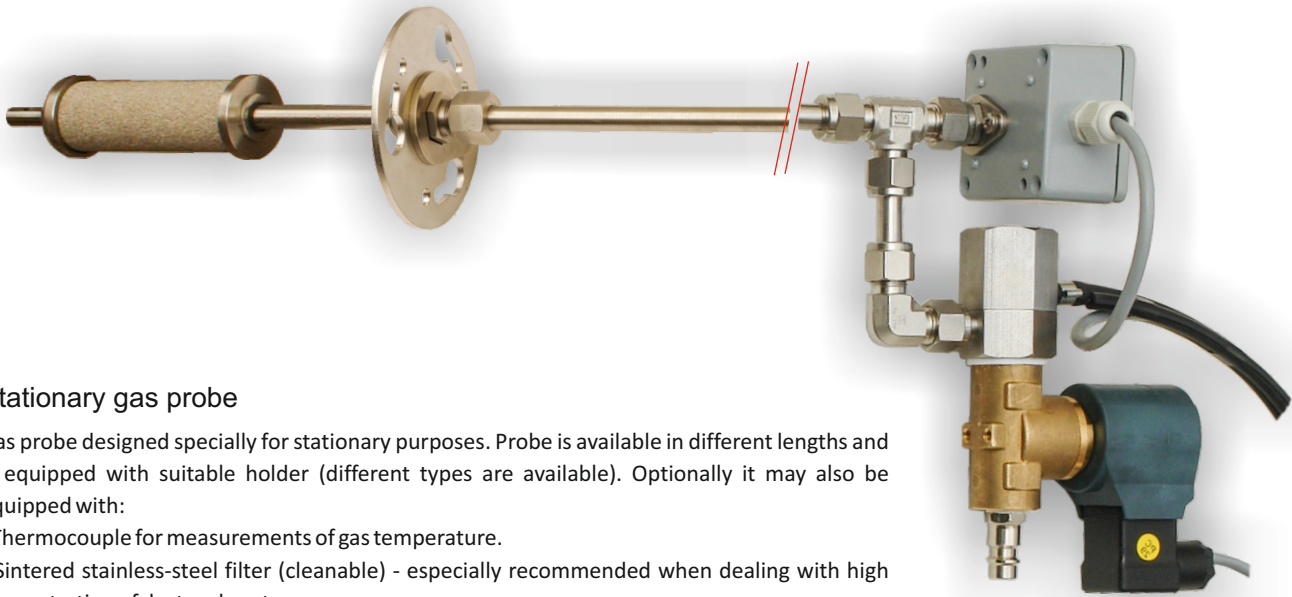
- MD3 gas dryer with power supply unit

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:

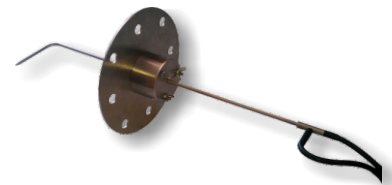
- Thermocouple for measurements of gas temperature.
- Sintered stainless-steel filter (cleanable) - especially recommended when dealing with high concentration of dust and soot.
- "Blow-back" cleaning option - valve that allows to switch between measured gas and the compressed air inlet that is used for cleaning the sintered filter.

- **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**

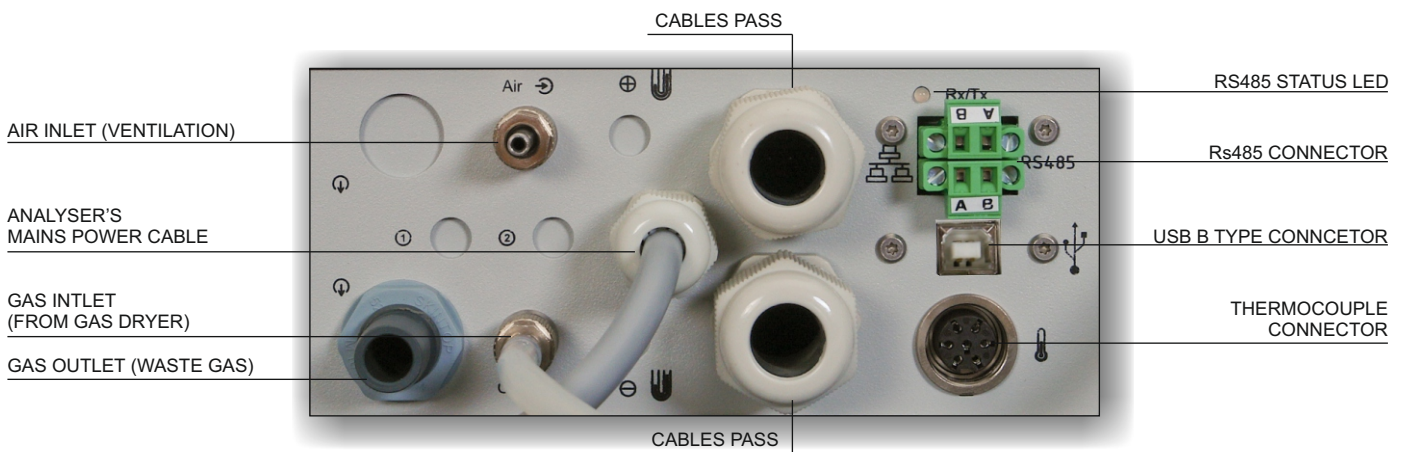
Optional interface allows to communicate with maMoS analyser within LAN network either via cable or wirelessly with help of special WiFi adapter.

ordering code:
ZMA3-ADAP-WIFI



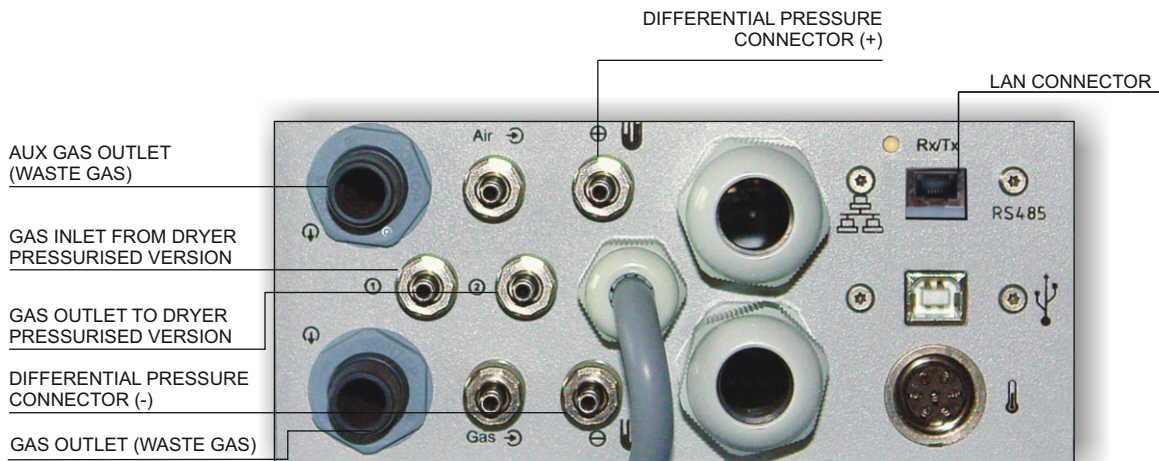
GAS AND ELECTRIC CONNECTORS (ANALYSER BOTTOM VIEW)

CONNECTION PANEL FOR THE STANDARD CONFIGURATION WITH A SINGLE GAS CHANNEL

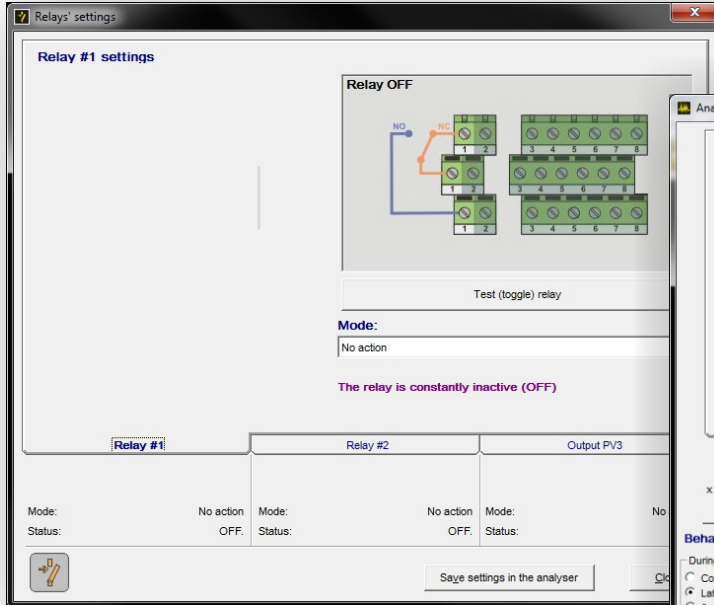


GAS AND ELECTRIC CONNECTORS (ANALYSER BOTTOM VIEW)

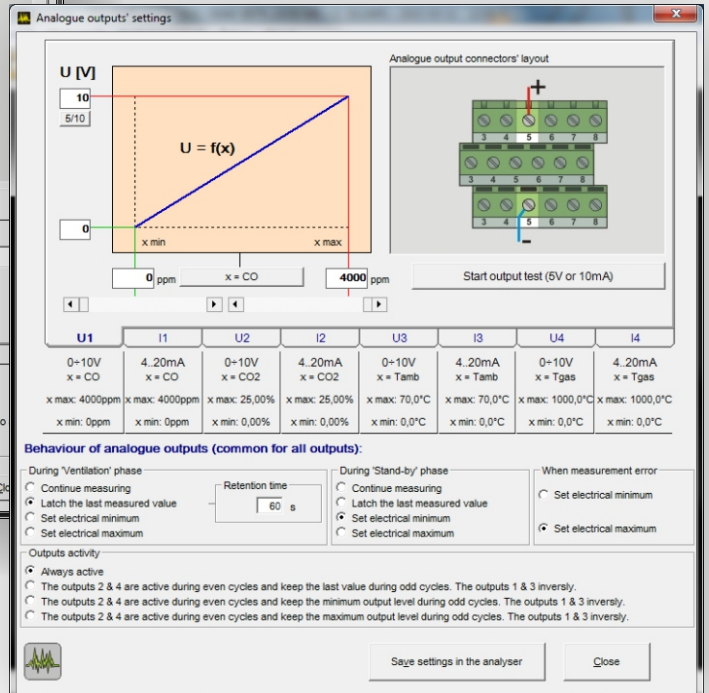
CONNECTION PANEL FOR THE OVERPRESSURE CONFIGURATION WITH A DOUBLE GAS CHANNEL



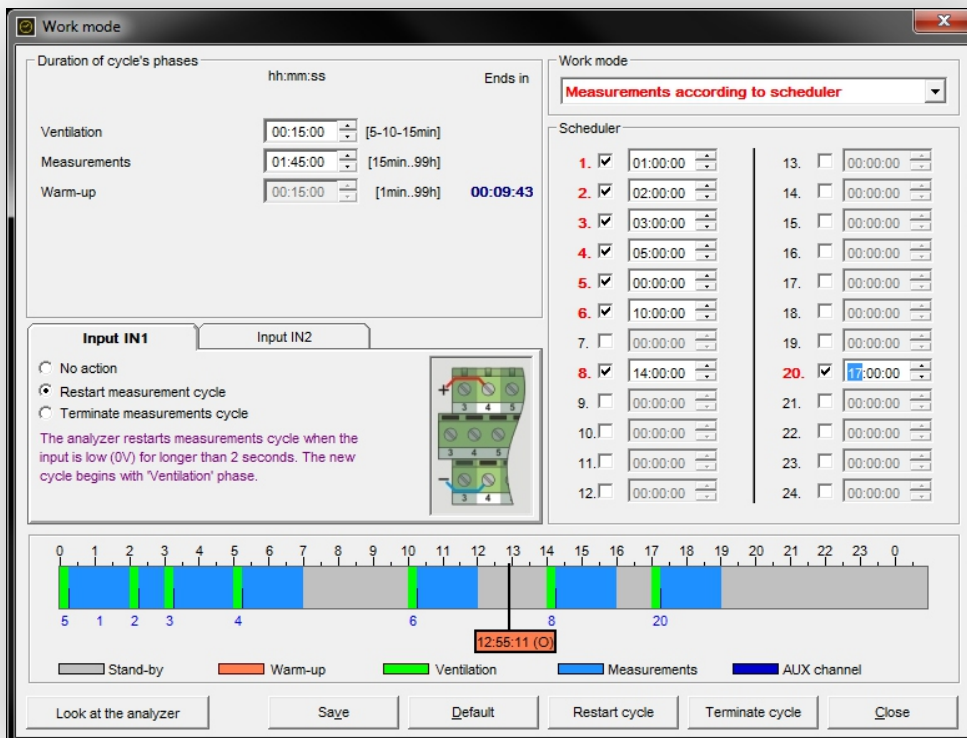
EXAMPLE PC PROGRAM SCREENSHOTS



ANALYSER'S WORKING MODES



ANALOGUE OUTPUTS' SETTINGS



DAILY WORKING HOURS AT SET TIMES