

# GA-12

madur

www.madur.com



<b>CHARACTERISTIC</b>	FEATURES	TECHNICAL DATA	SENSORS	EQUIPMENT	APPEARANCE
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GA-12 is madur's smallest gas analyser - hand-held, equipped with up to 3 EC cells. Small dimensions and light weight makes it very convenient for technicians that use analyser on a daily basis. Rich offer of equipment and add-ons makes it interesting for more demanding users. Manufactured according to the principles of EN50379.

# GA-12

CHARACTERISTIC

FEATURES

TECHNICAL DATA

SENSORS

EQUIPMENT

APPEARANCE

- Equipped with 2 or 3 electrochemical cells (typical configuration: O<sub>2</sub>, CO, NO/NO<sub>x</sub>)
- Works with an external portable printer via wireless communication (IR LED)
- Up to 60 hours of work (version with replaceable alkaline batteries)
- Fixed probe of two different lengths with inline filter and condensate trap
- Differential pressure sensor - for measurements of chimney draft and flow velocity (with help of Pitot tube)
- Additional gas filter with condensate trap (installed in the lid)
- Differential pressure sensor - for measurements of chimney draft and flow velocity (with help of Pitot tube)
- Cooperation with digital RH and temperature sensors
- Measurements of gas and ambient temperatures
- Results presented on LCD display (128\*64) with backlight
- Calculations of many additional parameters
- Firmware for gas calibration
- Two versions of power supply are possible:
  - version with four replaceable AA batteries (alkaline, Ni-Cd or Ni-MH)
  - version with built-in Li-ion rechargeable battery and additional mains adapter for battery charging

SUPPLY / CHARGER  
(DELIVERED ONLY WITH B VERSION  
- WITH LI-ION BATTERY)



RH PROBE

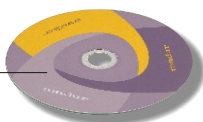


IN-LINE FILTER

GAS PROBE L=150MM



SOFTWARE  
& DOCUMENTS CD



RS232C CABLE



# GA-12

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

ANALYSER	VERSION A	VERSION B		
	WITH REPLACEABLE AA BATTERIES	WITH BUILT-IN LI-ION BATTERY		
Dimensions (W * H * D)	245 mm * 116 mm * 47 mm			
Weight (without accessories & batteries)	470 g	510 g		
Housing material	ABS case, rubber protective boot (optional)			
Operating conditions	T: 10°C ÷ 50°C, RH: 5% ÷ 90% (non-condensing)			
Storing temperature	-20°C ÷ 55°C			
Power supply	4 * AA battery (alkaline or Ni-Cd or Ni-MH)	Built-in Li-ion battery (3,6 V, 1600 mAh)		
Operating time	Up to 60 hours	Up to 16 hours		
Number of gas sensors	2-3			
Memory for results	for 64 measurements reports			
Display	Graphical LCD 128 * 64, with variable contrast and LED backlighting			
Gas pump	Diaphragm, max 0,6 ÷ 0,9l/min			
Printer	External thermal IR printer MCP 8850 with charger			
Communication interface with PC computer	RS-232C			
Gas probe: length   hose length   temp. range	150mm   2m   300°C max			
Gas filtering	In-line filter included in the gas probe hose			
<b>MEASUREMENTS</b>				
Variable	Method	Range   Resolution	Accuracy	Time (T90)
T <sub>gas</sub> - gas temperature	K-type thermocouple	-10 ÷ 1000°C   0,1°C	± 2°C	10 sec
T <sub>amb</sub> 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 (optional)	Indirect, with Pitot tube & pressure sensor	1 ÷ 50 m/s   0,1 m/s	0,3 m/s abs. or 5% rel.	10 sec
RH - relative humidity	SHT11 capacitive polymer sensor (special probe needed)	5 ÷ 95%   1%	± 5% rel.	30 sec
Lambda λ - excess air number	Calculated	1 ÷ 10   0,01	± 5% rel.	10 sec
qA - stack loss	Calculated	0 ÷ 100%   0,1%	± 5% rel.	10 sec
Eta - η combustion efficiency	Calculated	0 ÷ 120%   0,1%	± 5% rel.	10 sec

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Method	Range   Resolution	Accuracy	Time (T <sub>90</sub> )	Conformity
<b>O<sub>2</sub> - OXYGEN</b>				
O2 - A2 electrochemical sensor	20,95%   0,01%	± 0,01% abs. or 5% rel.	45 sec	EN 50379; CTM-030
O2 - A2 electrochemical sensor	25,00%   0,01%	± 0,01% abs. or 5% rel.	45 sec	EN 50379; CTM-030
<b>CO - CARBON MONOXIDE</b>				
CO - AF electrochemical sensor	2 000 ppm   0,1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-030
CO - AF electrochemical sensor	4 000 ppm   1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-030
CO - AF electrochemical sensor	20 000 ppm   1 ppm	± 10 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-030
CO - AE electrochemical sensor	10%   0,001%	± 0,005% abs. or 5% rel.	45 sec	EN 50379; CTM-030
CO - AX electrochemical sensor with low H <sub>2</sub> cross sensitivity	4 000 ppm   1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-030
<b>NO - NITRIC OXIDE</b>				
NO - AE electrochemical sensor	2 000 ppm   0,1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-030
<b>NO<sub>2</sub> - NITROGEN DIOXIDE</b>				
NO2 - AE electrochemical sensor	1 000 ppm   0,1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379; CTM-030
<b>SO<sub>2</sub> - SULPHUR DIOXIDE</b>				
SO2 - AE Electrochemical sensor	2 000 ppm   0,1 ppm	± 5 ppm abs. or 5% rel.	45 sec	EN 50379
<b>H<sub>2</sub>S- HYDROGEN SULPHIDE</b>				
H2S - AE electrochemical sensor	2 000 ppm   0,1 ppm	± 5 ppm abs. or 5% rel.	45 sec	

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## STANDARD EQUIPMENT

SUPPLIED ALONG WITH THE DEVICE

- Carrying case made of HDPE for analyser and accessories
- 4 \* AA alkaline batteries OR built-in Li-ion battery + mains adapter
- 2,5m RS-232C communication cable with DB9 female connector
- Software CD with programmes and manuals

## ADDITIONAL EQUIPMENT

NECESSARY FOR THE ANALYSER TO WORK

- Gas probe 150mm or 250mm

Complete gas probe (L=150mm or L=250mm, OD=8mm). Made of stainless steel, equipped with K-type thermocouple. Delivered with fastening cone, in-line filter and 2,0m gas-electric line with 4-pin male plug.

ordering codes:

gas probe L = 150mm - E-SON1200



## OPTIONAL EQUIPMENT & SPARE PARTS

- Portable printer and printer paper

Portable printer (battery operated), communicates with the analyser via wireless HP-IR interface. Allows to print measurements results instantly on the 58mm thermal paper. The printer is delivered together with 4 Ni-MH rechargeable batteries, mains adapter (for batteries charging) and single roll of paper.

ordering codes:

printer - M20-2DHP2

thermal paper roll - V-THP5701

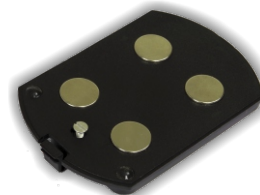


- Magnetic holder

Modified battery cover with magnets installed in it. This magnetic holder allows to attach the analyser to the metal parts of the boiler, what makes the operation with the analyser even simpler. Replaces the standard battery cover. Delivered with fixing screw.

ordering code:

Z12-MAGN-HOLD



- Leatherette casing

Soft casing (just for the analyser) made from leatherette, protects the analyser during transport.

ordering code:

M12-ETUI1

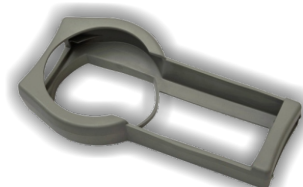


## OPTIONAL EQUIPMENT & SPARE PARTS

- Rubber protector

Special rubber protector for the analyser's casing. Protects the analyser against hits and blows.

ordering code:  
Z12-RUBBER-001



- Ambient temperature sensor

This ambient PT500 temperature sensor on a 3m cable is used for measurement of the boiler's inlet air.

ordering code:  
Z12-SENS-TEMP



- Anchor cone for PT-500 ambient temperature sensor

This cone allows fitting the temperature sensor into holes with different diameter.

ordering code:  
Z14-CONE-PT500



- Magnetic holder for PT500 sensor

This magnetic holder allows to safely hang the sensor on a metal surface.

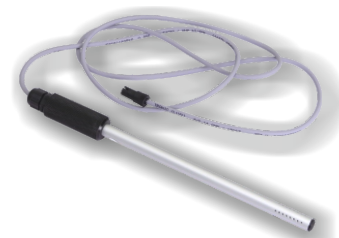
ordering code:  
Z14-MAGN-PT500



- RH and ambient temperature probe

Probe for RH and ambient temperature measurements.  
Not-suitable for inside stack measurements (working temperature up to 120°C).

ordering code:  
Z14-SON-HUM



- 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.

ordering codes:  
pitot tube 800mm - Z00-PITOT-8002  
pitot tube 500mm - Z00-PITOT-5002



- RS232C to USB converter

2,5m cable that allows to connect the analyser (its RS232C port) with USB port in PC computer (especially valuable when PC is not equipped with COM port).

ordering code:  
Z12-USB-ADAP



- Bluetooth communication module

Module connected to the analyser's RS232C port, allows to communicate with PC computer over Bluetooth protocol.

ordering code:  
Z12-BLUE-TOOTH



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- AA alkaline batteries or Ni-MH AA rechargeable batteries

Alkaline batteries, 1,5V, size AA/ Rechargeable batteries Ni-MH, 1,2V, size AA, 2000mAh (or better)

Remember the rechargeable batteries need external charger (cannot be charged inside the analyser).

ordering codes:

alkaline batteries- 590E0150A.M  
rechargeable batteries - 590D1216A.M



- Li-ion rechargeable battery

Rechargeable batteries Li-ion, 3,6V, 1600mAh (or better).

Spare part for the B version analysers.

ordering code:

Z14-BAT-CHARGER\_02



- Pressure test kit

Pressure test kit allows to perform leakage test of the pneumatic / gas installations.

Requires analyser's differential pressure sensor to operate.

ordering code:

Z12-LEAK-TEST-KIT



- In-line filter

In-line filter for all the types of GA-12 probes.

Spare part for gas probes.

ordering code:

Z14-FILTER-INLINE



- In-line filter insert 20µm

In-line filter insert for all the types of GA-12 probes.

ordering code:

V-FELM252



- 4-pin male plug 719 series or equivalent

4-pin plug for all the types of GA-12 probes.

ordering code:

513N7194C



- 4-pin male plug 719 to 7-pin female socket adapter

4-pin plug to 7-pin female socket adapter. Enables use of all the types of GA-21<sup>plus</sup> probes with GA-12 analyser.

ordering code:

Z12-PROBE-ADAPTER



- Mains adapter for Li-ion battery charging

For use only with the B-version of GA-12 (with built-in Li-ion battery). The mains plug has to be ordered separately.

ordering codes:

adapter without mains plug - 196B2001A  
EU (European) plug - 196B2011A  
US plug - 196B2021A  
UK plug - 196B2031A  
AUS (Australian) plug - 196B2051A



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## FRONT PANEL

## GA-12 VS GA-12plus

### SIZE COMPARISON



128\*64 MONOCHROMATIC DISPLAY  
WITH BACK-LIGHT

ON BUTTON / FUNCTION KEY

7 NAVIGATION AND  
FUNCTION KEYS

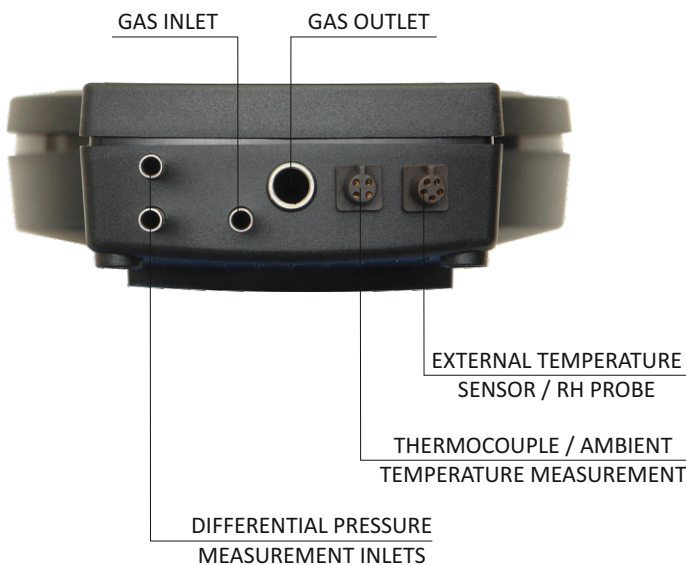
INSTANT  
PRINTOUT KEY

OFF BUTTON

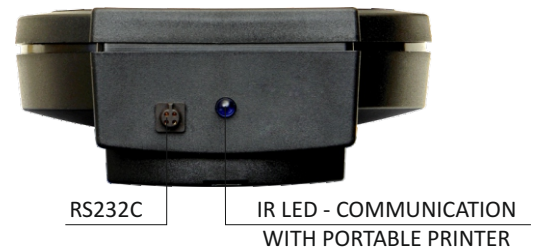


## BOTTOM VIEW

## TOP VIEW



### A VERSION WITH AA REPLACEABLE BATTERIES



### B VERSION WITH BUILT-IN FIXED LI-ION BATTERY





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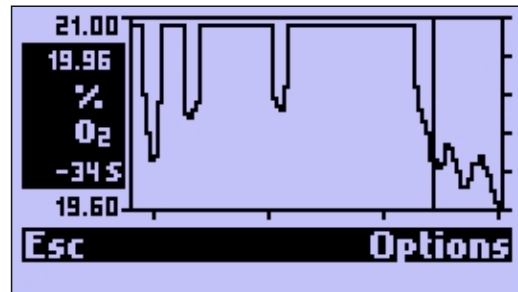
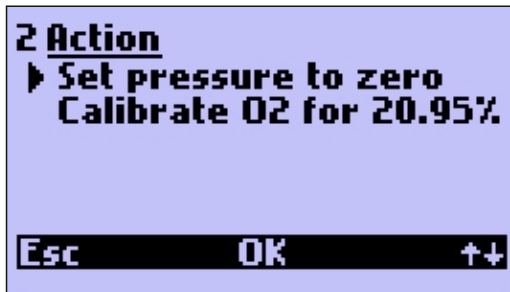
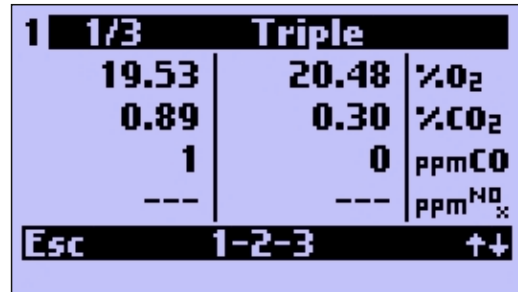
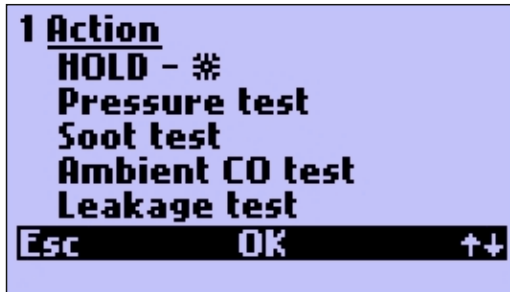
TECHNICAL DATA

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## EXAMPLE PRINTSCREENS



## EXAMPLE SCREENSHOTS FROM THE PROGRAMME

