

Industrial Portable Infrared Analyser Series GAS 3000P NDIR FLUE GAS



Up to 5 gases : NO/NO_(x) - SO₂ - CO - CO₂ - O₂
Accuracy and linearity : conform to EN 15267-3
Reference methods (SRM) :

CO (EN 15058 / EPA 10) - NDIR micro-flow

O₂ (EN 14789) - Paramagnetic (option)

SO₂ (EPA 6C) - CO₂ (EPA 3A) - NDIR micro-flow

Suitable for long term flue gas measurement at industrial combustions sources:

Power utilities, refineries, chemical plants, cement industry, blast furnace, heat treatment furnace, biogas cogeneration, waste incinerators, etc.

Suitable for compliance testing at:

Engines, turbines, boilers, furnaces, etc.

Up to 10 simultaneous measurements

5 gases: O₂%, CO₂%, CO ppm, NO/NO_x⁽¹⁾ ppm, SO₂ ppm

5 physical parameters: Tamb, Tgas, Pamb, Pdiff, gas velocity

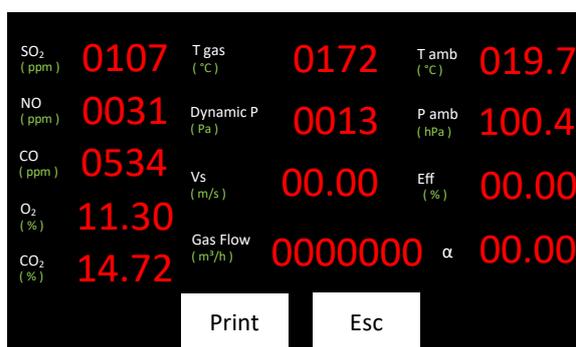
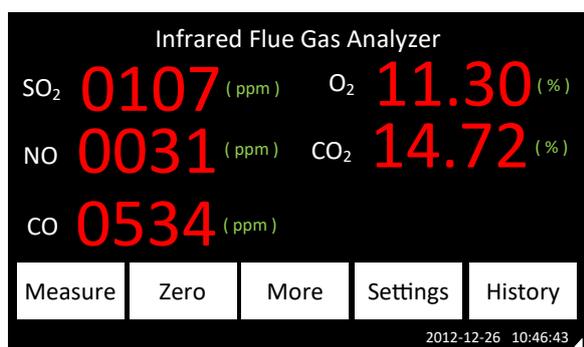
Up to 4 simultaneous calculated values

NO_x⁽¹⁾, gas flow, combustion efficiency, Excess of Air

⁽¹⁾ NO_x by calculation $NO_x = [NO \times K(NO)]$ where K coefficient is configurable by the user or by measurement with the optional portable heated catalytic converter



Powerful, robust and transportable infrared flue gas analyser for use in industry, offering similar gas analysis performances as Automatic Measurement Systems (AMS).



Recommended accessories for the gas analyser

- Heated industrial sampling probe, with heated line of 3 or 5 m.
- Portable gas sampling and pre-treatment unit with Peltier gas cooler, gas sampling pump and safety filter
- Combined Pitot / Thermocouple probe for measurements of flue gas temperature and pressure, differential pressure, gas velocity and the calculation of the gas flow.

Optional accessories for the gas analyser

- Portable NO₂ to NO catalytic converter heated at 410°C, for NO_x measurement by the infrared NO detector
- Calibration kit (set of non-refillable 58L & 110L precision gas cylinders & pressure regulator)
- Maintenance kit (spare parts and consumables)

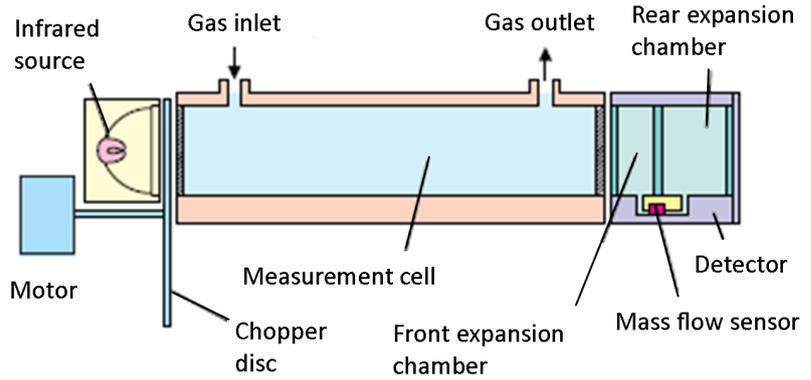
Technical specifications of the GAS 3050P NDIR Flue gas Analyser

Measured gases	5-gas configuration : NO / SO ₂ / CO / CO ₂ / O ₂ (other configurations on request)			
Gas analysis principle	NO / SO ₂ /CO /CO ₂	Non-dispersive Infrared Absorption (NDIR micro-flow)		
	NO _x	Calculated as NO _x = NO*KNO (K coefficient settable by the user)		
		Measured after catalytic conversion of NO ₂ to NO (option)		
	O ₂	Galvanic fuel cell or Paramagnetic detector (option)		
Gas Ranges	NO/SO ₂	Lowest: 0-500 ppm / Standard: 0-2000 ppm / Highest: 0-9999 ppm		
(Intermediary ranges Available on request)	CO	Lowest: 0-1000 ppm / Standard: 0-4000 ppm / Highest: 0-9999 ppm		
	CO ₂	Lowest: 0-15% / Standard: 0-25%		
	O ₂	Lowest: 0-5% / Standard: 0-25%		
Micro-flow NDIR detectors temperature regulation	Detector enclosure with temperature regulation at +55°C to provide higher measuring stability and accuracy without effect of ambient temperature variations			
Measuring mode	AUTO mode			
Factory calibration	5 points for NDIR detectors / 2 points for ECD sensor and PMG detector			
User calibration mode	2 points: zero and span (85 to 100% FS)			
Resolution	1 ppm or mg/m ³ for NO _(x) /CO/SO ₂ - 0.01% for CO ₂ /O ₂			
Accuracy	According to EN 15267-3: ≤ ± 2% FS for NO, SO ₂ , CO, CO ₂ / ≤ ± 0.3% O ₂			
Repeatability	≤ ± 1% of Full Scale value			
Span Drift	± 1% of Full Scale/day			
Zero drift (off-set)	Negligible, manual zeroing function for off-set re-alignment on pure ambient air			
Response time (T _D + T ₉₀)	≤ 15 s			
Warm up time	30 minutes			
Display	Touch screen LCD colour display			
Gas units display	On 4 to 7 digits: ppm, mg/m ³ , %, °C, Pa, hPa, m/s, m ³ /h			
Language software interface	English			
Measured parameters	Name	Principle	Range	Resolution Precision
	T _{GAS}	K-Thermocouple	0 to 600°C	0.1 °C ± 2 °C
	T _{AMB}	Thermistor	0 to 100°C	0.1 °C ± 1 °C
	P _{AMB}	Pressure transducer	70 to 120kPa	0.01kPa ± 0.5kPa or ± 2%rel
	P _{DIFF}	Pressure transducer	-50 to 50hPa	1Pa ± 2Pa or ± 5%rel
	V _S	S-type Pitot probe	3-40 m/s	0.1m/s ± 2.5%
Calculated parameters	α	Excess of air number	0-10	0.01
	E _{FF}	Combustion efficiency	0-99.99%	0.01%
	Q	Gas volume	0-1000000 m ³ /h	1m ³ /h ± 2.5%
Duct area and shape	Setting of duct shape (rectangular or circle) and area (m ²) by software			
	Used for the calculation of flue gas volume : Qm ³ /h = m ² (duct area) * V _S (m/s) * 3600			
Measuring cycle	Programmable measuring cycle (in hours)			
Fuel type selection	Choice of 9 pre-programmed fuel types + one user defined fuel type			
Sample Gas Conditions	Nominal flow	1L/min		
	Gas sampling pump	In optional portable flue gas sampling & pre-treatment unit		
	Pressure	2kPa to 50kPa		
	Temperature	Max. 50°C		
	Quality	Free of dust, water vapour and oil traces		
Operation conditions	T _{AMB} : 0 to 50°C / P _{AMB} : 86 to 108kPa / R _H : 5-85% non condensing			
Auto Measurement Time	Settable from 1 to 9999 minutes			
	The gas analyser automatically stops measuring when the set time is elapsed			
Data recording function	max. 1500 sets of 13 data , saved on USB memory key			
	Exportation to an external PC as text file.			
RS232 serial COM	For data transfer to an external PC.			
	Data can be exported as text or excel file			
	Programmable acquisition interval (in seconds)			
Mechanical	Rough aluminium casing, with shoulder trap			
	Dimensions: L450 x l 350 x h 180 mm / Weight: < 15 kg			
Power supply	240VAC - 50Hz			
Standard accessories	PC-type Power cord, 2x 2m gas tubing, USB memory stick 4GB, PT100 sensor on wire for ambient temperature (= combustion air), technical documentation on CD-ROM			

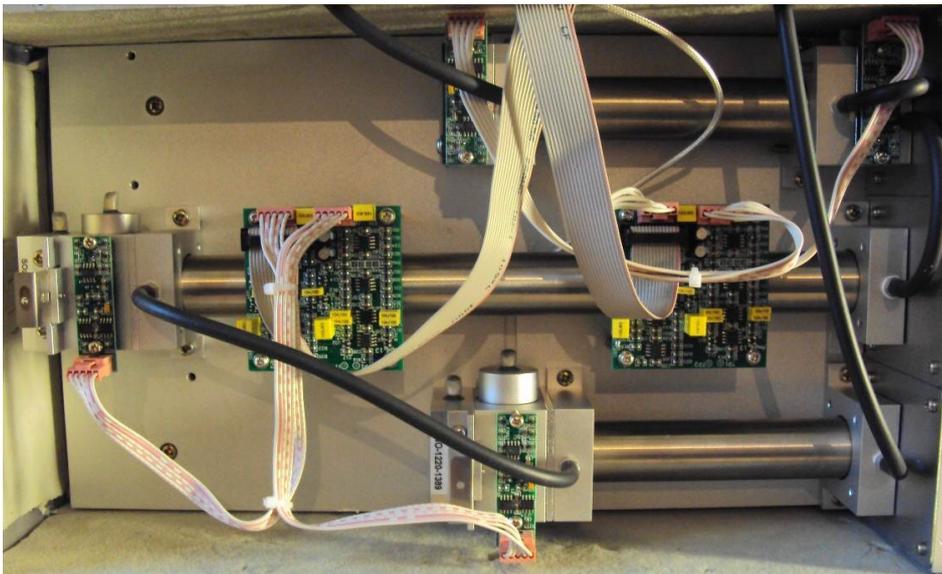
The micro-flow NDIR technology

Operation principle

The micro-flow NDIR detector measures gas concentration based on the principle that each type of gas component shows a unique absorption line spectrum in the infrared region. The instrument consists of an infrared light source, a chopper motor, a measurement cell and a detector filled with a gas mixture containing the reference gas. The infrared light source emits infrared light in all directions. The light emitted forward is transmitted and reflected into the detectors.



The infrared light emitted backward is reflected by a reflecting surface and is added to the infrared light emitted forward. Arranged between the infrared light source and measuring cell is a chopper blade which rotates to modulate the infrared light beam at regular frequency. The modulated infrared light beam thus formed passes through the measuring cell filled with a sample gas where the light energy is partially absorbed or attenuated before it reaches the front chamber of the detector. Both the front and rear chambers of the detector are filled with the gas component to be measured. The infrared light energy is partially absorbed in the front chamber and residual light is absorbed in the rear chamber, thereby increasing pressure in both chambers. Since the detector is designed to produce a pressure difference between the front and rear chambers, a micro gas flow is produced through a path connecting these chambers with each other. This micro flow is converted into an AC electrical signal by a mass flow sensor arranged in the path connecting the chambers with each other. The AC signal is amplified and rectified to a DC voltage; after linearization it is applied to the output preamplifier of the display module. The detector shows an output signal with the greatest amplitude when zero gas is flowing in the measuring cell. Amplitude is reduced as the concentration of measured gas component increases



NDIR micro-flow detectors



Chopper motors

Dual-chamber design:

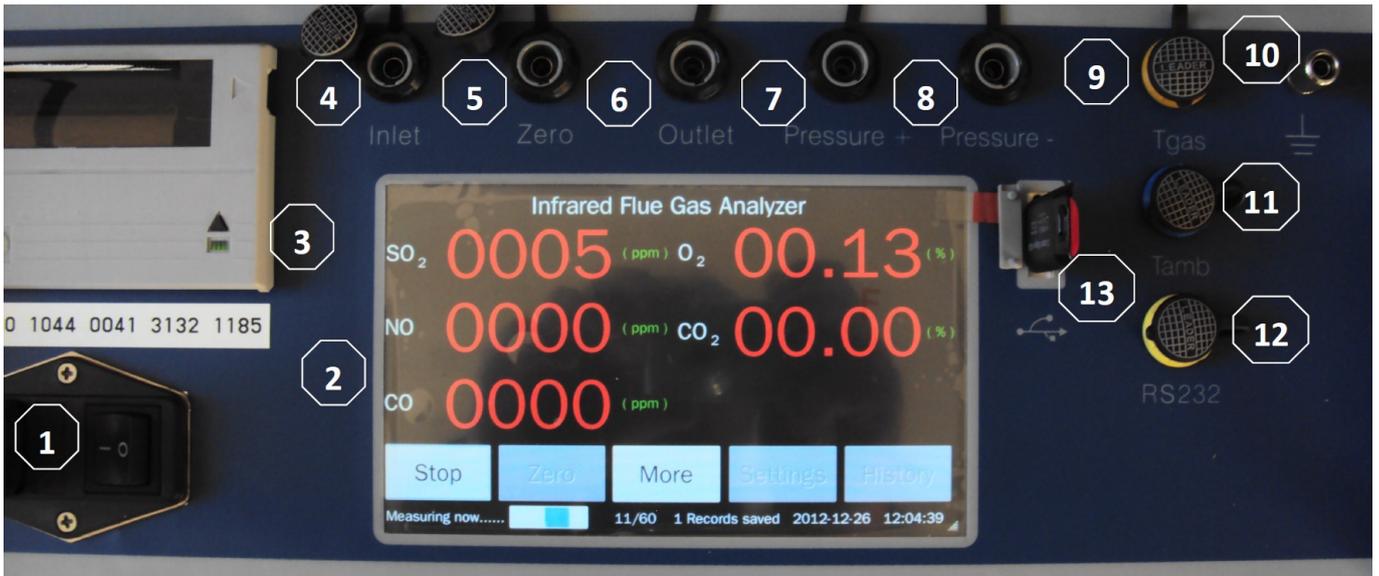
- Allows for sharp filtering at the target wavelength
- Provides very good resolution between CO and CO₂
- Improves temperature and pressure compensations.
- Highly reduces the sensitivity to moisture of NO and SO₂ measures.
- Enables accurate ppm range measurement of CO, NO and SO₂
- Reduces off-set drift
- Reduces interferences: whenever the absorption spectrum of a back-ground gas overlaps the spectrum of the target gas, the pressure rises in the front and rear chambers of the detector cancel each other minimizing any response to the interference gases.

Micro-flow NDIR detector is the best choice for industrial flue gas monitoring applications



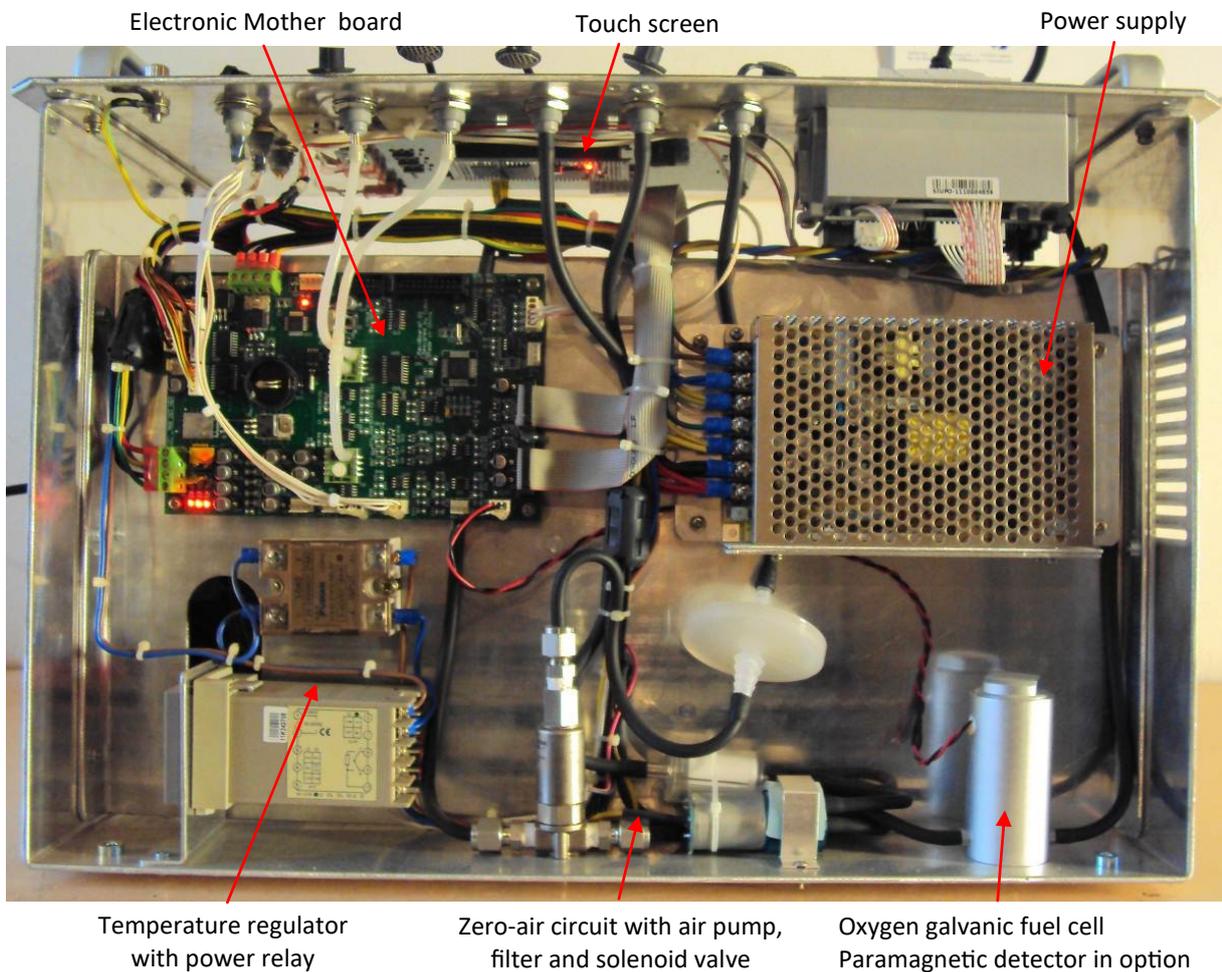
Temperature regulation (+55°C) of NDIR Micro-flow detectors for CO, CO₂, NO and SO₂

Front panel of the gas analyser and interfaces



- ① 220 VAC plug with POWER ON switch
 - ② LCD touch screen with backlight function (English software interface for configuration and calibration)
 - ③ In-built printer (**CANCELLED**)
 - ④ Gas inlet port ⑤ Zero air inlet port ⑥ Gas outlet port ⑦ Pressure + port ⑧ Pressure - port
 - ⑨ Flue gas temperature port ⑩ Earth connection ⑪ Ambient temperature port ⑫ RS232 (reserved use to manufacturer)
 - ⑬ USB port for USB Memory stick 4GB (to export recorded data from internal memory to USB memory stick)
- Data are exported as .txt file that can be easily reworked in Excel Table or Graphics using the Microsoft Office suite.

Internal view of the gas analyser



Industrial gas sampling probe model GAS 3000P Probe

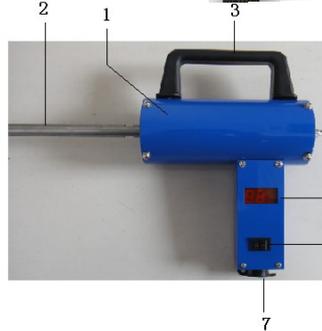
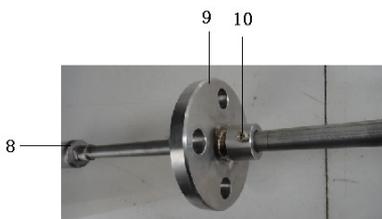
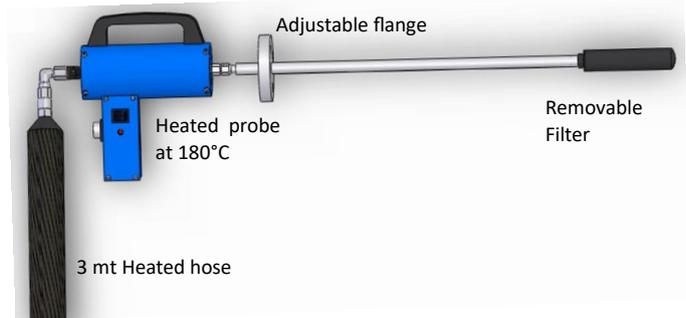


Gas sampling probe for flue gas temperature $\geq 180^{\circ}\text{C}$ and $\leq 300^{\circ}\text{C}$ (600°C in option), including:

- Powered by the GAS 3000P COOLER unit
- Heated probe @ 180°C, with display of the temperature
- Un-heated removable sampling pipe $\varnothing 8\text{mm}$ in stainless steel AISI316, for flue gas temperature from 180 to 300°C max; standard insertion length 1200 mm, adaptable with the adjustable flange; other lengths up to 2500mm on request
- Removable and washable end of pipe filter, 5 μm , stainless steel, max. flue gas temperature 300°C (600°C in option)

- With flange for probe fixation on an existing sampling point on the stack; with a locking screw to adjust the insertion length of the sampling pipe and filter to the duct diameter of the stack.
- Probe weight : ± 3 kg

The gas sampling probe GAS 3000P PROBE is designed for use with our GAS 3000P COOLER unit



1. Sampling probe (heated at 180°C)
2. High temperature stainless steel pipe
3. Probe handle
4. Socket to heated hose
5. Heating temperature indication
6. Power switch On/Off
7. 4-pin connector for 24 VDC power supply
8. Removable stainless steel filter (5 μm)
9. Adjustable flange
10. Flange blocking screw

Delivered with 3m heated hose (5m in option)

- Sample gas tubing OD6/4mm in FEP*
- Black silk braid wear-resistant protective jacket, OD36mm
- Temperature adjustable from the GAS 3000P COOLER unit (factory setting 130°C; max. recommended setting 150°C)
- Power consumption: 80~100W/m.
- Pneumatic and electrical connectors for connection to the portable pre-treatment unit GAS 3000P COOLER

*FEP is a modified PTFE (Teflon) type keeping PTFE properties: excellent heat resistance, chemical stability, dielectric constant, non-gas reactive and good mechanical resistance.

OD36mm



3 mt Heated hose

S - Type Pitot probe with thermocouple



S-type Pitot probe for dynamic and differential pressure measurement.

Thermocouple for flue gas temperature measurement.

Material : stainless steel

Probe insertion length : 1250 mm.

KP factor : 0,85-0,87

Delivered with :



2x 3m silicone pressure tubing with connector for connection to P+/P- ports of the gas analyser

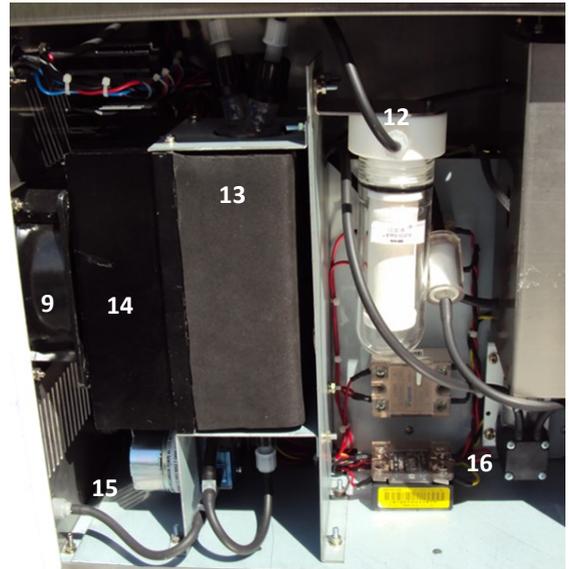


3m electrical cable for connection of the thermocouple to the Tgas port of the gas analyser

Portable gas sampling & pre-treatment unit GAS 3000P COOLER

Combustion and emission processes usually generates wet and dust loaded exhaust gases that need to be pre-treated before being analysed by the flue gas analyser. The portable gas pre-treatment unit model **GAS 3000P COOLER** is dedicated for use in industrial environment and includes:

- A rough stainless steel enclosure with handle and rubber feet
- Peltier gas cooler (70W) with peristaltic pump
- Particulate filter down to 0.1µm
- Gas sampling pump (-350mbar @1L/min) with ON/OFF push-button
- Flow meter with needle valve
- Digital temperature controllers for heated line and Peltier gas cooler
- Internal forced ventilation
- Electrical and pneumatic connections
- Operational after max. 10 min (for Tamb = 25°C)



n°	Description
1	Thermostat cooler, factory setting +4°C
2	Thermostat heated line, Factory setting 150°C
3	Flowmeter 0-1.5L/min
4	Gas OUT connector
5	Push button for gas sampling pump activation
6	Gas IN (heated line connector) - Max. Tgas: 180°C
7	Electrical connector for heating gas sampling line
8	Drain for continuous removal of condensate
9	Internal forced ventilation
10	Ventilation grids
11	Handle for gas cooler transportation
12	Particulate filter 0.1µm
13	Peltier gas cooler 70W, dew point +4°C ± 0.2°C @ 25°C
14	Metal plate heat exchanger gas cooler
15	Peristaltic pump
16	Gas sampling pump 1L/min @ 350 mbar suction pressure

Portable GAS 3000P HNOx Converter

Proven and largely diffused technology for the continue measurement of NOx (= NO + NO₂) in industrial combustion applications (required when NO₂ content is > 5% of NOx) by the NDIR NO detector after conversion of NO₂ into NO by an external catalytic converter.

- Conversion efficiency ≥ 95% with new catalytic cartridge @1L/min and 400°C
- Gas flow rate: nominal 1L/min
- Converter temperature: adjustable from 390°C to 410°C
- Temperature regulation accuracy: ±1°C
- Ambient operating temperature: 5°C ~+50°C
- IN/OUT gas connectors: OD6mm
- Power supply: 220VAC 50Hz - 420W
- Integrated in a IP65 suitcase, weight : ± 6kg

Non contractual pictures and technical specifications - Modifications possible without notification
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