Online gas analysers

TETHYS INSTRUMENTS

Specialist Of UV Spectroscopy

> Innovation applied to online analysers

Tethys Instruments *is a young team of engineers developing innovative solutions around UV and IR spectroscopy.*

The team has multidisciplinary skills in optics, physics, chemistry, mechanics, electronics and software to cover all the fields necessary to develop and produce cutting-edge online analysers.
A long experience on manufacturing makes the production efficient and flexible with a high level of quality.

Several innovative technologies have been developed internally to achieve a high level of reliability and performance for online monitoring such as xenon flash lamp that gives an unparalleled lamp life-time; concave gratings coupled to 2048 pixels charge-coupled devices (CCD) for high resolution and sensitivity, high speed digital signal processor (DSP) that supports sophisticated algorithms and gives a high selectivity on the data-analysis.

Great efforts have been put on an user-friendly interface to ease the start up and the use of the analysers. Software updates and configuration backup/restore are done by USB keys on all our products.

A worldwide network of agents provides all the support required by the online instrumentation

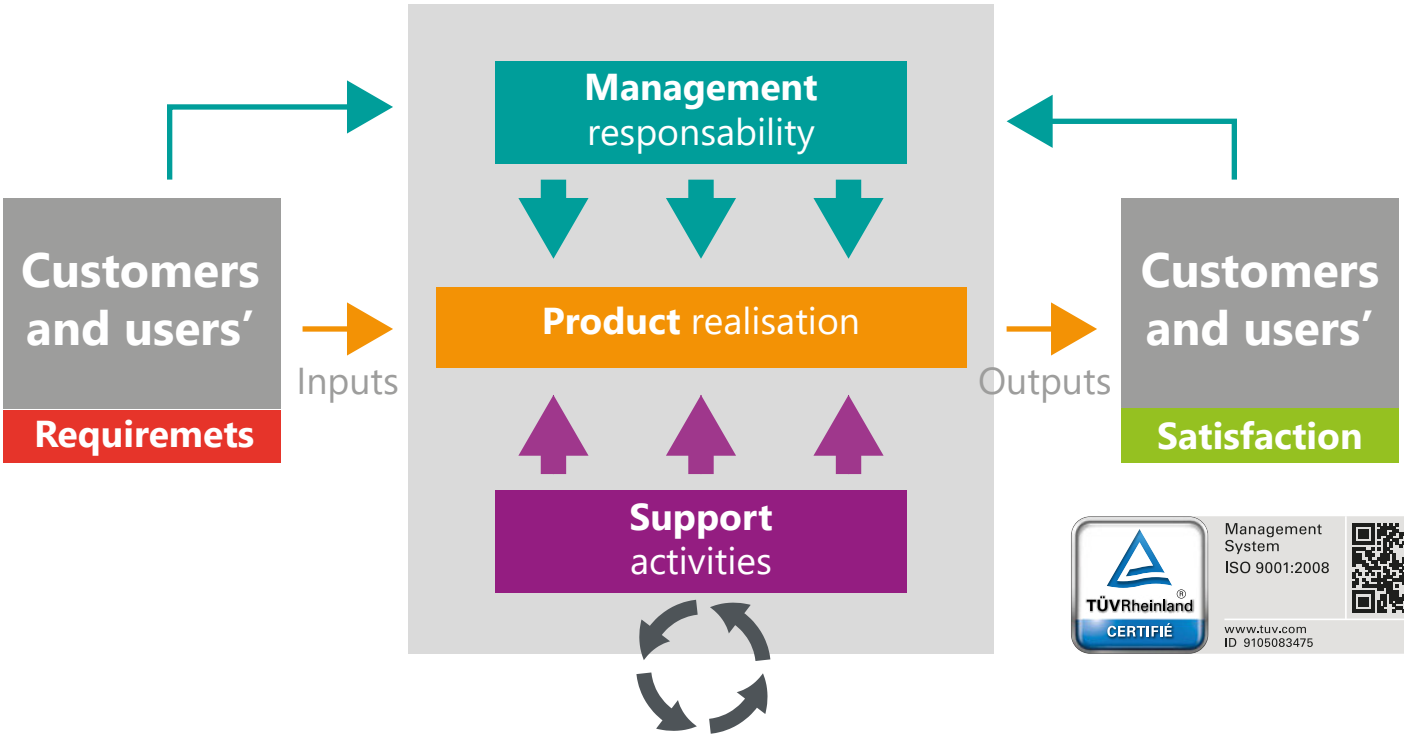
> To commit for you

***Our ambition** : to be a reference in our market of continuous monitoring analysers.*

For this, we are committed to :

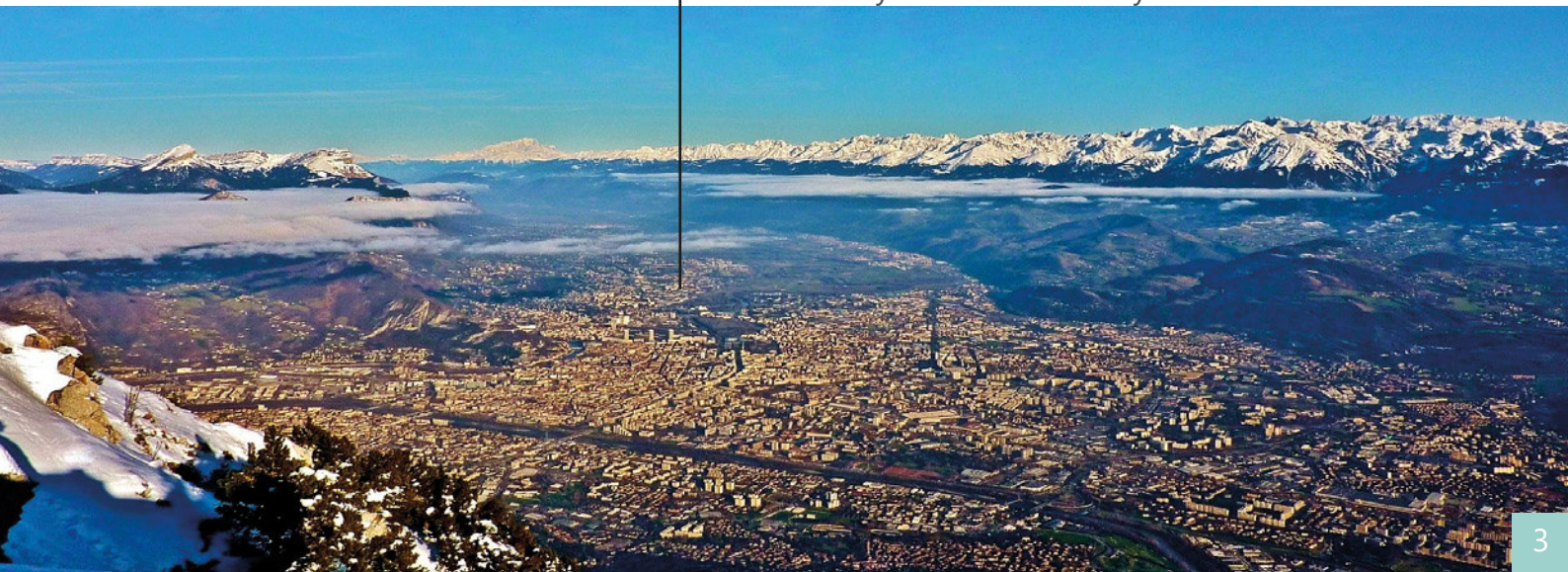
- Develop the quality and performances of our products
- Innovate to reach the expectations of our customers.
- Continuously improve our processes to satisfy our customers.
- Assure a prosperous working environment where the stability and security of our members is guaranteed.
- Contribute to the protection of the Environment by our products.

We are a young, multicultural, creative, dynamic and responsive team, who is always available and listening to the needs of our clients. The choice of a quality managing system based on the principles of the ISO 9001 International Standard is a way to fulfill our ambition and to build our commitments.



TÜVRheinland CERTIFIÉ
Management System ISO 9001:2008
www.tuv.com ID 9105083475

Tethys is located in Meylan near Grenoble since 2003



> Products

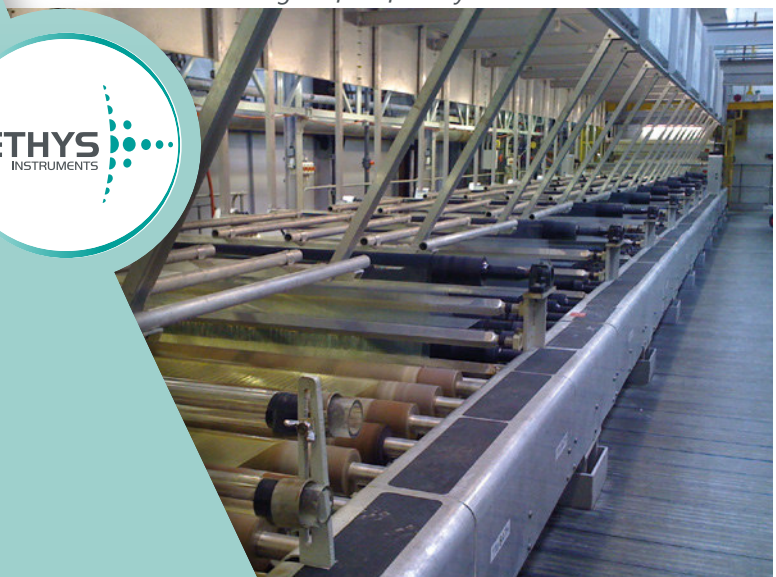
CEM 400

CEM 500

EXM 400

EXM 500

H2S & CS2 monitoring on film factory



H2S monitoring on chemical plant

> Applications

CEM 400

CEM 500

EXM 400

EXM 500

	NH3	NOx	SO2	H2S	CS2	Benzene	Toluene	Xylene	NCL3
Power Plants	●	●	●						
Chemical Plants				●	●	●	●	●	●
Petro Chemical Plants	●	●	●	●		●	●	●	
Bio Reactors				●					
Metal Industries	●	●							

NH3 monitoring on DeNox process

H2S monitoring on CO2 production plant

CS2 & H2S monitoring on chemical plant

> Applications: DeNOx process

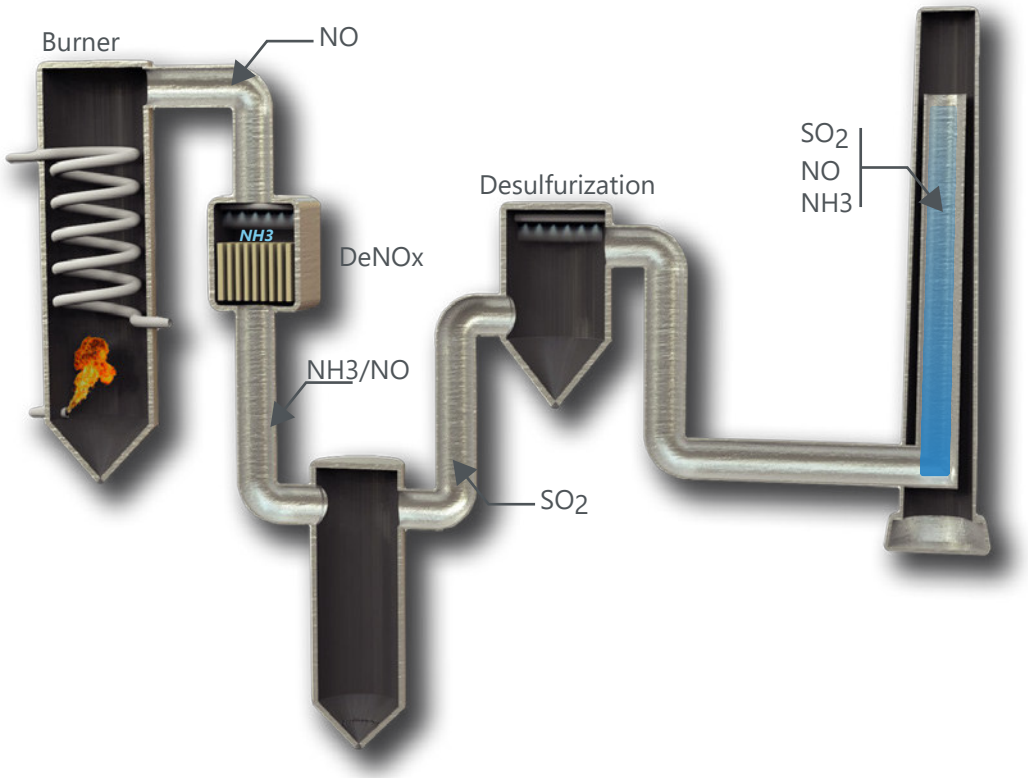
for thermal power plants

Nitrogen oxides (NOx) are formed at high temperature in the combustion process and constitute a major air pollutant, causing lung illnesses and acid rains. The nitrogen monoxide (NO), largely predominant in the flue gas, can be efficiently reduced by reaction with ammonia according to the reaction :

$$4\ NO + 4\ NH_3 + O_2 \rightarrow 4\ N_2 + 6\ H_2O$$

Ammonia concentration must be carefully monitored because excess of ammonia lead to the formation of ammonium salts , especially ammonium bisulphate, that is very corrosive and may produce clogging on the flue gas circuit. Ammonia is also a significant atmospheric pollutant.

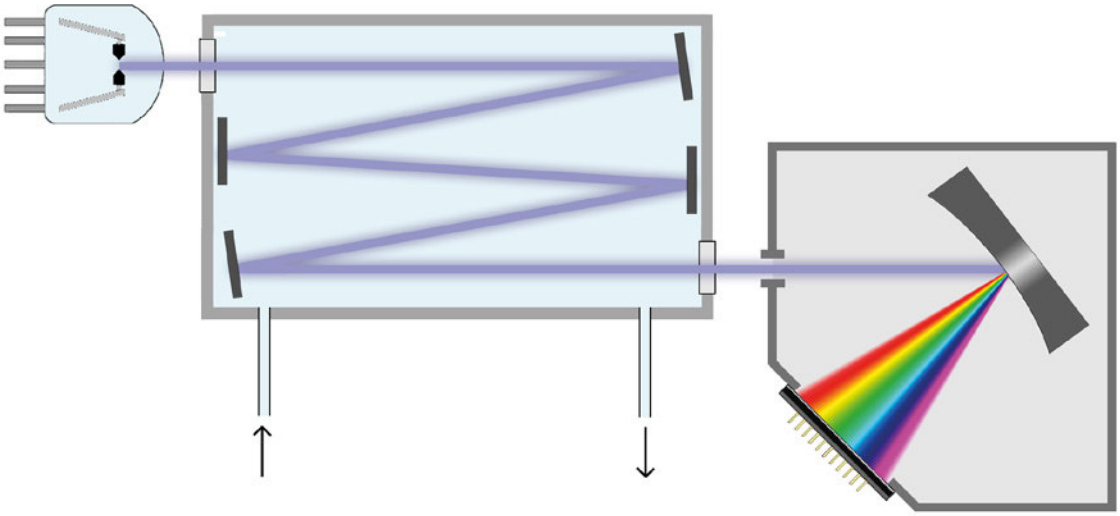
Coal power plants produce a high amount of sulphur dioxide (SO2) as sulphur is contained in the coal. Desulphurisation process requires to follow the SO2 concentration before and after the process.



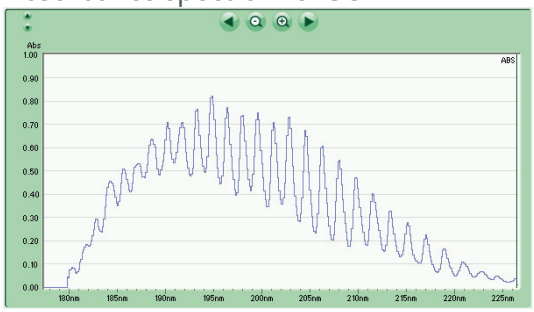
NH3 for DeNOx on Energy-from-Waste facility, Canada

> Multipath Flow Cell for low Emission

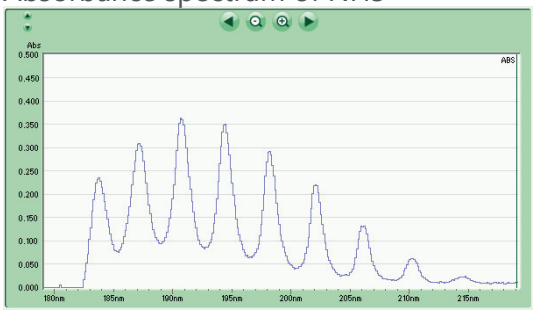
Nitrogen oxides (NOx) and sulphur dioxide (SO2) need also to be monitored at low level on the stack to fit the regulations. Tethys Instruments has developed recently a multipath flow cell to fit with the most severe regulations where NO and SO2 do not exceed 50 mg/m3 and 30 mg/m3 respectively.



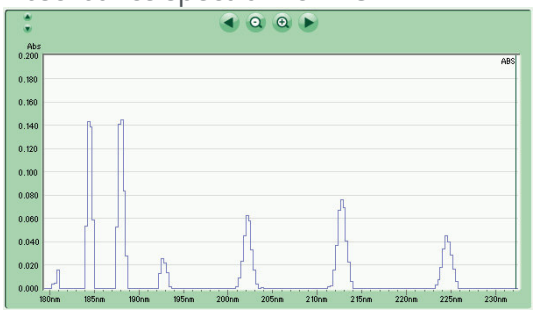
Absorbance spectrum of SO2



Absorbance spectrum of NH3



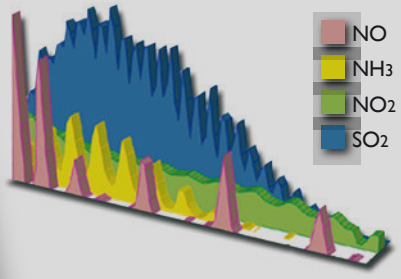
Absorbance spectrum of NO



> Technical description

Optical Principle : UV Spectroscopy

- UV spectroscopy assures a very robust and highly reliable measurement system with very low maintenance (no moving parts).
- The UV source is a Xenon flash lamp, which is characterized by its high lifetime (1 to 3 years) and thermal stability, minimizing measurement drift.
- Different gas flow cells are available from 40 mm to 1200 mm in order to be adapted to different concentration ranges.
- The spectrograph is based on a concave grating in order to minimize opto-mechanics. The spectrum is recorded in 512 or 2018 pixels diode array or CCD.
- A calibration of the background signal is automatically done on ZERO air or nitrogen with an adjustable period (if possible every 2 or 4 hours but once per day remains acceptable).

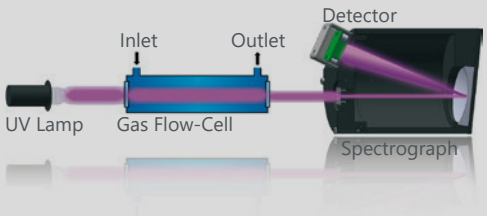


Multi-Gas Configuration

Several gases can be measured in a same analyser if the sample gas composition is compatible with the selected algorithms and wavelengths.

The analyser gives high measurement selectivity thanks to the recognition of the specific UV absorption spectrum of gases by using proprietary algorithms.

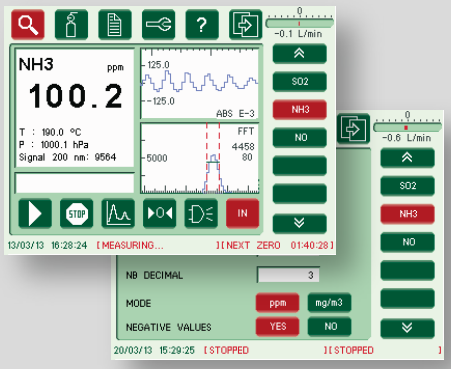
UV Spectroscopy



User-Friendly Interface

A colour touch screen display interface allows the user to easily navigate through a number of screens that are used to set and check all of the operating conditions of the instrument.

A protective film limits the risk to damage the surface of the touch screen, especially against solvent and corrosive liquid.



No Interference With CO, CO_2 and CH_4

Those major emission gases have no UV absorption, therefore they don't interfere with the measured gases.

Gas Circuit

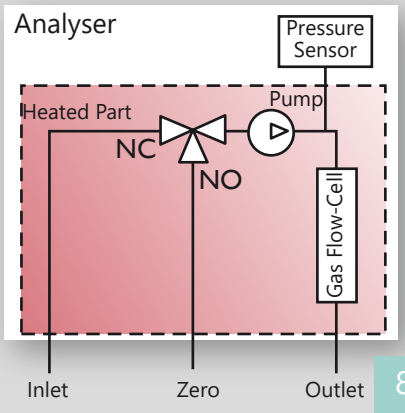
Three gas connections are available on the rear panel of the analyser :

- Inlet for the sample
- Zero air or nitrogen
- Outlet for sample or zero

Inlet and zero are connected to a 3-way solenoide valve. When the automatic zero is activated, the solenoid valve switches the flow cell on zero air. A pressure sensor takes the pressure of measured gas to compensate it and to give a flow indication.

All the gas circuit is in a heated compartment controlled within +/- 0.5 °C at an adjustable temperature between 40 C and 190 C (or 240 C on the CEM500-L).

An optional pump may be included before the gas flow cell in order to pump the sample as well as the zero gas that may be ambiant air for most of the applications.



> Gas specifications

Parameters	Range (ppm) *Higher range available on request*	Range (mg/m3) *Higher range available on request*	Detection Limit *Typical Detection limit as 3x sigma on zero gas, 60 sec response time at 90%,*	 *CEM 400*	 *CEM 500*	 *CEM 500-L*	 *EXM 400*	 *EXM 500*
NH3 Ammonia	0 - 10 ppm 0 - 10 ppm 0 - 100 ppm 0 - 1000 ppm	0 - 7 mg/m3 0 - 7 mg/m3 0 - 70 mg/m3 0 - 700 mg/m3	0.01 ppm 0.1 ppm 0.1 ppm 0.1 ppm	● ● ●	● ● ●	● ●	● ● ●	● ● ●
NO Nitrogen oxide	0 - 80 ppm 0 - 2000 ppm	0 - 100 mg/m3 0 - 2500 mg/m3	0.5 ppm 3 ppm	● ●	● ●	● ●	● ●	● ●
NO2 Nitrogen dioxide	0 - 200ppm 0 - 2000 ppm	0 - 400 mg/m3 0 - 4000 mg/m3	2 ppm 10 ppm	● ●	● ●	● ●	● ●	● ●
SO2 Sulfur dioxide	0 - 30 ppm 0 - 1000 ppm	0 - 100 mg/m3 0 - 3000 mg/m3	0.05 ppm 0.5 ppm	● ●	● ●	● ●	● ●	● ●
H2S Hydrogen sulfide	0 - 100 ppm 0 - 500 ppm	0 - 150 mg/m3 0 - 750 mg/m3	0.1 ppm 0.5 ppm	● ●	● ●	● ●	● ●	● ●
CS2 Carbon disulfide	0 - 20 ppm 0 - 100 ppm	0 - 60 mg/m3 0 - 300 mg/m3		● ●	● ●	● ●	● ●	● ●
C6H6 Benzene	0 - 20 ppm 0 - 100 ppm	0 - 60 mg/m3 0 - 300 mg/m3		● ●	● ●	● ●	● ●	● ●
C7H8 Toluene	0 - 5 ppm 0 - 30 ppm	0 - 20 mg/m3 0 - 100 mg/m3		● ●	● ●	● ●	● ●	● ●
C8H10 Xylene	0 - 5 ppm 0 - 30 ppm	0 - 20 mg/m3 0 - 150 mg/m3		● ●	● ●	● ●	● ●	● ●
C2H2 Acetylene	0 - 1000 ppm 0 - 5000 ppm	0 - 1000mg/m3 0 - 5000 mg/m3		● ●	● ●	● ●	● ●	● ●
NCL3 Nitrogen trichloride	0 - 20ppm 0 - 100 ppm	0 - 100 mg/m3 0 - 500 mg/m3		● ●	● ●	● ●	● ●	● ●

> Dimensions

> CEM 400

410.00

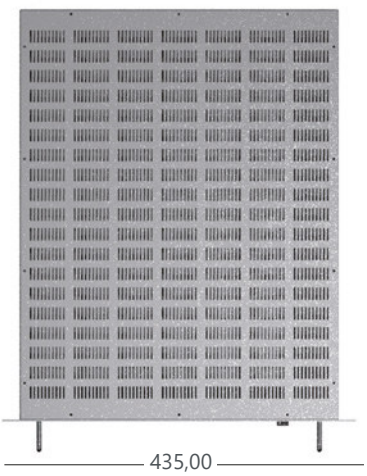
255,00

> CEM 500

345

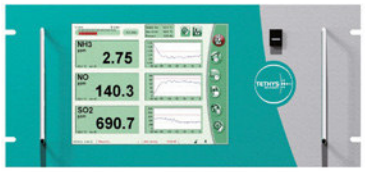
260

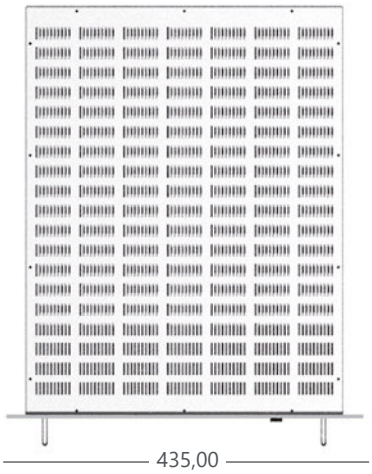
> EXM 400



435,00

> EXM 500





435,00

> General specifications

Specifications	Descriptive	 CEM 400	 CEM 500	 CEM 500-L	 EXM 400	 EXM 500
Data storage	5000 measurements for all parameters	●	●	●	●	●
Interfaces	Interface RS232 (MODBUS, AK and http / HTML5 protocol) Interface RS232 (MODBUS, AK) USB Port (for memory stick) External WIFI interface IEEE 802.11 b (option) External Eternet 10 Base-T interface IEEE 802.3 (option) Internal WIFI interface IEEE 802.11 b (option) Internal Eternet 10 Base-T interface IEEE 802.3 (option)	● ● ● ● 	 ● ● ● ●	 ● ● ● ●	● ● ● ● 	 ● ● ● ●
Signals	1 to 8 analog outputs 4-20 mA opto-isolated (option) 1 to 4 relay contacts programmable (option)	● ●	● ●	● ●	● ●	● ●
Display	LCD colour screen (TFT) with LED backlight 320x240 pixels LCD colour screen (TFT) with LED backlight 640x480 pixels	● 	 ●	 ●	● 	 ●
Power supply	110-240 VAC / 1000 VA / 50-60Hz	●	●	●	●	●
Operatings limits	0 to 40 °C, less than 90% as relative humidity	●	●	●	●	●
CE standards	Electromagnetic compatibility and safety EN 61010-1, IEC 61010-1 / EN 61326, IEC 61326	●	●	●	●	●
Enclosure	Stainless steel IP65 with coating, Wall mounting Rack 19" 3U, coated steel, IP00 Rack 19" 5U, coated steel, IP00	●	●	●	 ●	 ●
Dimensions	410 x 571 x 255 mm (H x W x D) 345 x 525 x 260 mm Rack 19" 3U (DxWxH : 560mm x 435mm x 132 mm) Rack 19" 5U (DxWxH : 560mm x 435mm x 220mm)	●	 ●	 ●	 ●	 ●
Weight	25 kg 30 kg	●	 ●	 ●	●	●
Sampling gas	Pressure : 0 – 2 Bar Absolute (0 – 2000 hPa Absolute) Flow : 0.1 to 10 l/min Temperature : ambiant to 400 C° Fittings : Swagelok, stainless steel 316 for tube OD ¼'' (6.4 mm)	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●	● ● ● ●
Zero gas	Pressure : 0 – 2 Bar Absolute (0 – 2000 hPa Absolute) Flow : 0.1 to 10 l/min Fittings : Swagelok, stainless steel 316 for tube OD ¼'' (6.4 mm)	● ● ●	● ● ●	● ● ●	● ● ●	● ● ●

> They Trust In Us

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