CONTENTS

CAUTION for all manipulation HIGH VOLTAGES inside the instrument
Don't open the alimentation box because there is the presence of high voltage until 1500 V.

I. AirTOXIC with Internal PC 5U - PRESENTATION

I.1. Introduction

The airTOXIC is a high performance gas chromatograph with photo ionization detection (PID) and an on-line sample preparation. It is designed for the analysis of BTX compounds (Benzene, Toluene, ethyl-benzene, m&p-xylene and o-xylene) in gaseous samples, in ambient (100 ppt) to emission (ppm) concentration ranges. The miniaturisation, the inertia to chemical compounds, the mobility and flexibility of this analyser have been optimised.

Thanks to an integrated CPU card allowing a dialogue with a PC, this analyser is an automate.

The chromatography software allows :

- a complete automation of the system.
- the signal acquisition, and data treatment.
- the peak identification thanks to a reference substance table.
- Data saving on the hard disk.
- trend creation allowing a visualisation of the evolution of selected peak retention times and surface (or concentration of the corresponding compounds).

This compact instrument only requires little space, power and gas (Nitrogen) when compared to conventional systems. Thanks to its high level of automation, it is suitable for continuous pollution monitoring. Therefore, the airTOXIC is suitable for in-situ operation.

I.2. General characteristics

Model : airTOXIC

Pneumatic valve : 6 ports 1/8" (A 6UWP)

Replacement rotor : SSA-6-UWP

Analytical column : metallic column, length : 30 m ref. : MXT30CE

Detector : Photo ionisation detector (PID)

Carrier gas : Nitrogen (quality 5.5)

Trap : L = 8 cm ; id = 1.5 mm

Critical orifice : 50 µm

Supply voltage : 110V

VistaChrom software

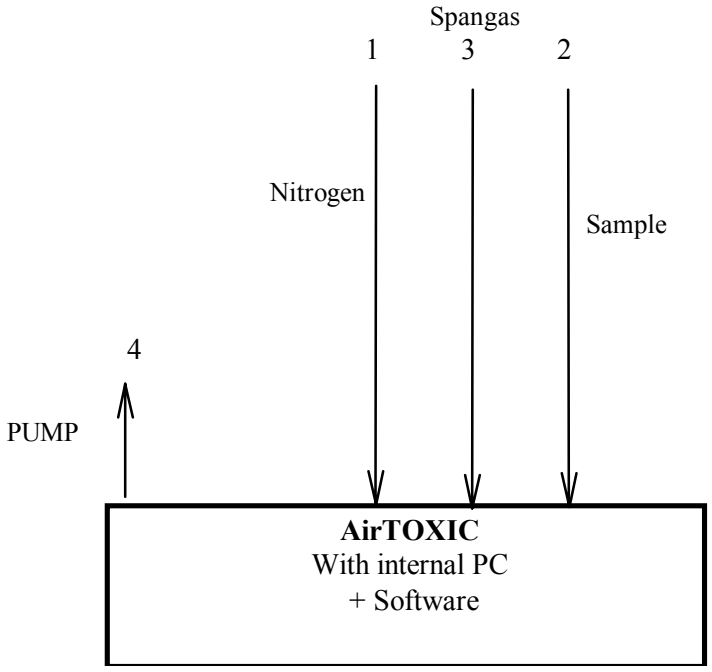
Dimension : 19", 5U

Weight : 25 kg (packed : 45 kg)

ORIGIN COUNTRY : FRANCE

CHROMATO - SUD
15 , Rue d'Artiguelongue
33240 SAINT -ANTOINE
FRANCE

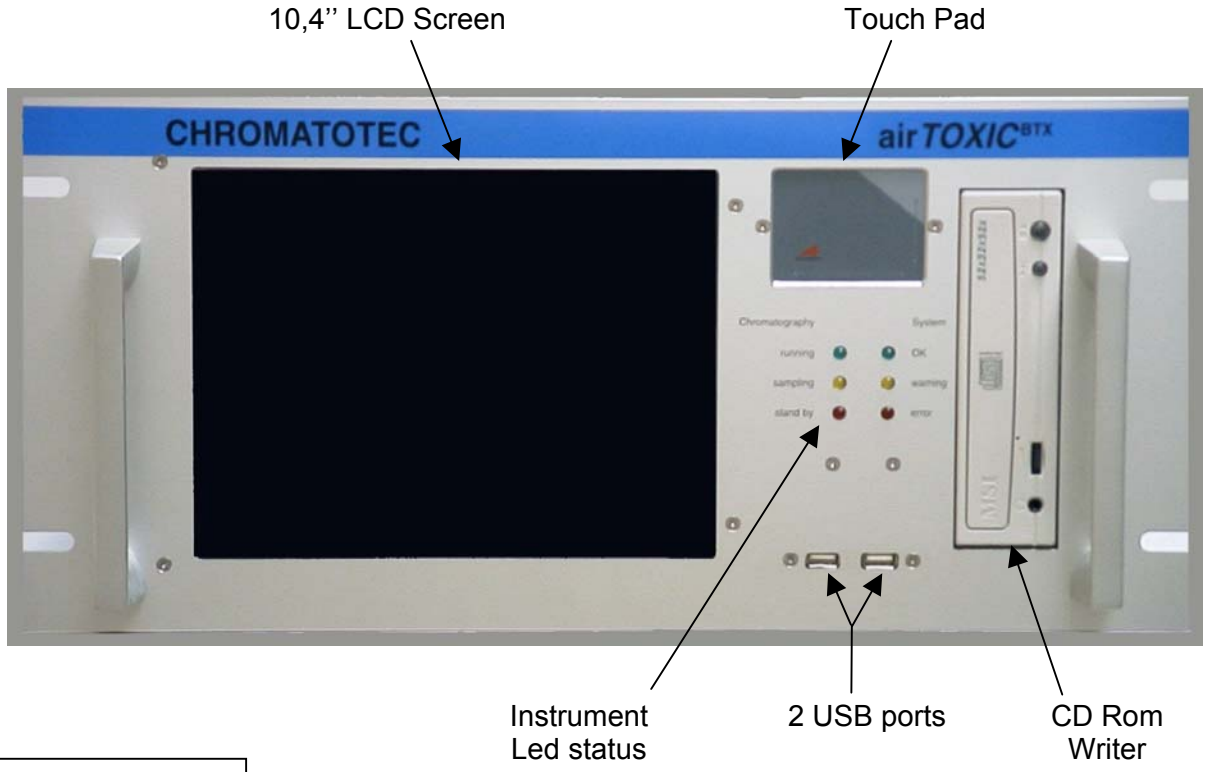
I.3. Functional diagram



Legend :

1 Nitrogen cylinder (not included) 1/8" stainless steel, swargelock.
2 Sample (ambient air...). 1/4'' stainless steel, swargelock
3 Standard gas inlet, 1/8'' stainless steel, swargelock
4 Sampling pump 1/4'' , stainless steel, swargelock.

I.4. Front Face



Size 5U :	
Length :	48,0 cm
Height :	22,0 cm
Depth :	73,0 cm

With the USB Port, you can connect a keyboard to an easy using of the internal pc.

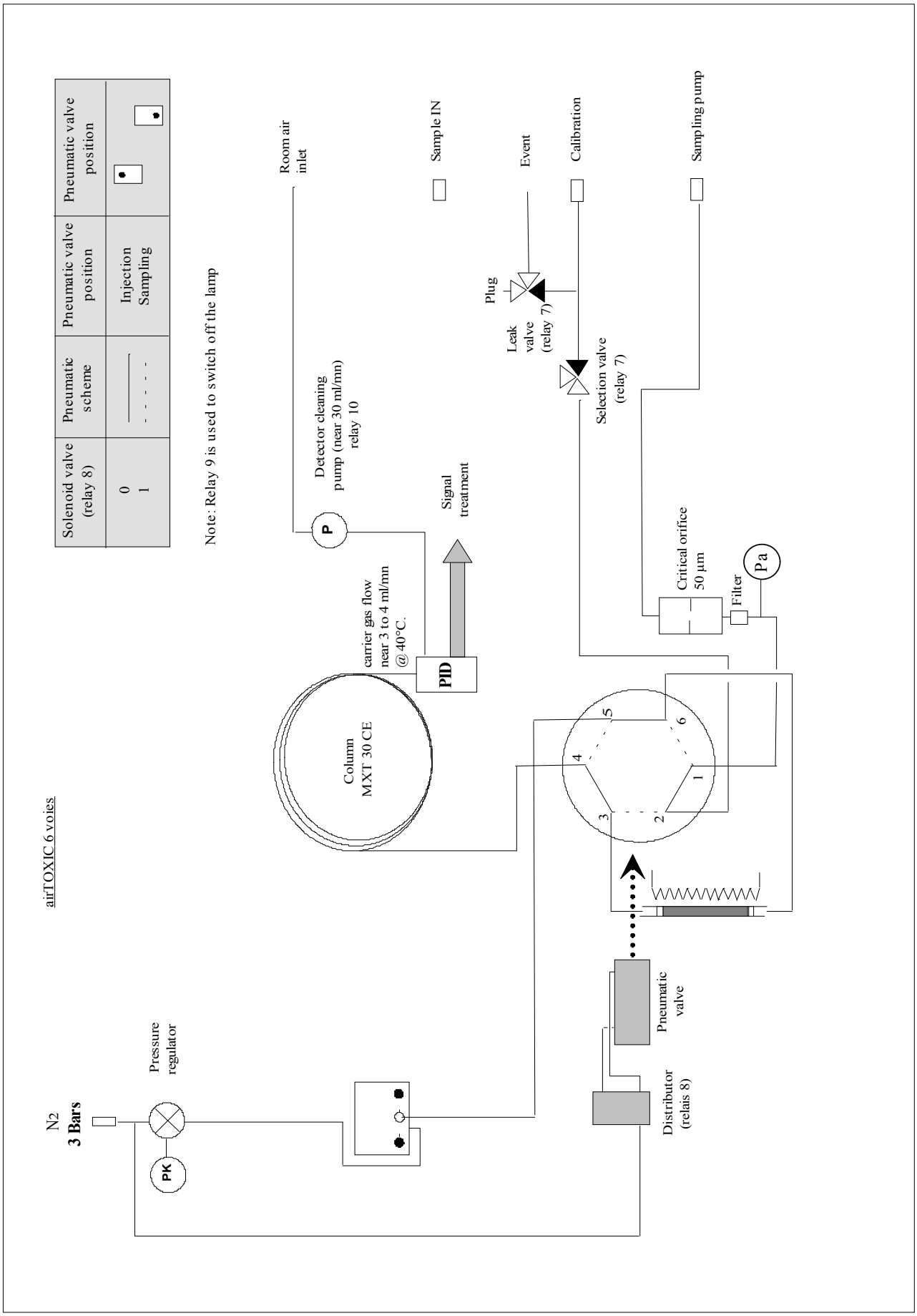
The front face of the analyser presents :

- 6 LEDS indicating the state of the Check. 3 concern the chromatograph, and 3 the communication with the PC.

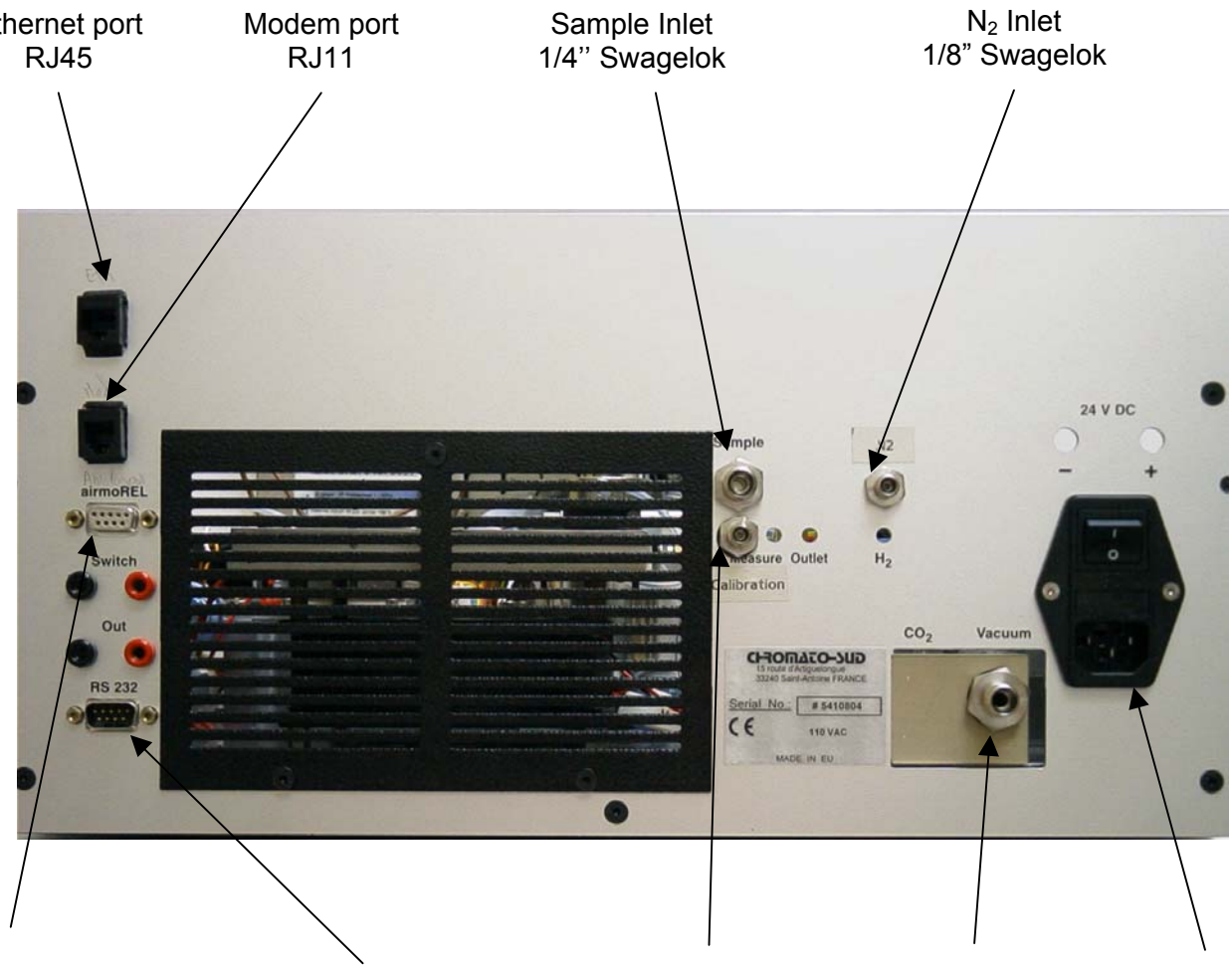
Cycle :
"Running" : the green LED is lit during the acquisition.
"Sampling" : the yellow LED is lit during sampling when the sample flow is controlled by a critical orifice.
"Stand by" : the red LED is lit when the system is in stand-by.

System : A2 communication protocol (when the analyser is connected to Acquisition software and when Acquisition software is in the on-line window)
"OK" : the green LED is lit when the communication between analyser and PC is correct.
"Warning" : the yellow LED is lit to indicate something is wrong. For example, if an acquisition is running and if the software is not on the on-line menu (the acquisition is lost) (error number 1xx, cf Malfunction part of the manual).
"Error" : the red LED is lit when an important error has occurred. (error number 2xx, cf Malfunction part of the manual)

I.5. Pneumatic scheme



I.6 Back Face



Size 5U :	
Length :	42,5 cm
Height :	21,0 cm

II. OPERATING PRINCIPLE OF THE airTOXIC

II.1. Measuring principle

II.1.1. Sampling

The gas sample is drawn by an external pump through a trap, a fine tube containing porous substances, that extracts the gas components according to their affinity with these phases. For example, permanent gases and water vapour are not retained. The trap phase (Carbotrap B) is chosen so as to trap from the C5 to C10.

It is possible, if required, to add to the sample flow an exactly known amount of reference standard compounds.

The volume of gas sample is measured downstream of the adsorption section, at the level of a critical orifice and of the sampling time.

At the end of the sampling, a relay commutes directing the sample flow to the vent.

II.1.2. Injection of the sample in the analytical column (trap and desorption)

The pneumatic valve that was in "sampling" position gets in "injection" position, thereby inserting the sampling tube in the carrier gas circuit in the way opposite to the sampling way. At this time, the trap is heated to desorb the compounds. The thermodesorption is fixed at 300 °C during 60 s. The gaseous sample is introduced in the analytical column by the carrier gas flow.

II.1.3. Chromatographic separation

The analytical column is situated in an oven of which the temperature is programmed with a gradient that starts at the same time of the trap thermodesorption (injection step). The sample components elute in the column at a characteristic rate (depending of their boiling point and of their interactions with the column stationary phase). Generally, the retention time of the compounds increases with their molecular mass (boiling point).

II.1.4. Detection and data treatment

At the extremity of the column, a photo ionization detector (PID) generates an electrical signal proportional to the concentration of the sample components as they elute from the column. This electrical signal is digitised to be transferred to the CPU card where the microprocessor teats the data (integration, mass or concentration calculation, peak identification...). All parameters (data results, chromatograms, integration reports...) are then transferred via a RS-232 output where they can be displayed and retreated by the software. The digitised signal is also available as an analogue output (0-1V).

The data acquisition starts 6s after the trap thermodesorption end.

Caution : During this analysis, it is prohibited to exit the ON-LINE menu because the data would be lost. But, it is possible to reduce the software window.

The complete cycle (sampling, focusing of the compounds, injection, chromatographic analysis, detection) is repeated. The on-board microprocessor stores the data, calculates the selected compound concentrations and stores them. The compound identification is made on the basis of their retention times, and concentrations are calculated in reference to standard compound analyses.

II.2. Photoionization detector

II.2.1. Introduction and specification

The photo ionization detector PID has been designed to detect organic and some inorganic species eluted from gas columns. The PID shows high sensitivity, wide linear range and simple operation.

II.2.2. Technical data

Detection limit		- 12 x 10^{-12} g (benzene)
Sensitivity		0.3 Coulomb / g (benzene)
Linear range		> 10^5 (benzene)
Background current **		2 x 10^{-11} - 8 x 10^{-11} amps
Noise		5 x 10^{-14} amps
Ionization chamber volume		40 µl
Maximum operation Temperature	- Xe and Kr lamps	400 °C
	- H2 lamp	250 °C
Polarizing voltage of PID		9 VCC
Lamp power consumption		< 0.3 W

*** Carrier gas flow rate ~ 3-4 ml/min. PID temperature – 140 °C, Kr/MgF_2 lamp.**

**** depends on the type of the lamp.**

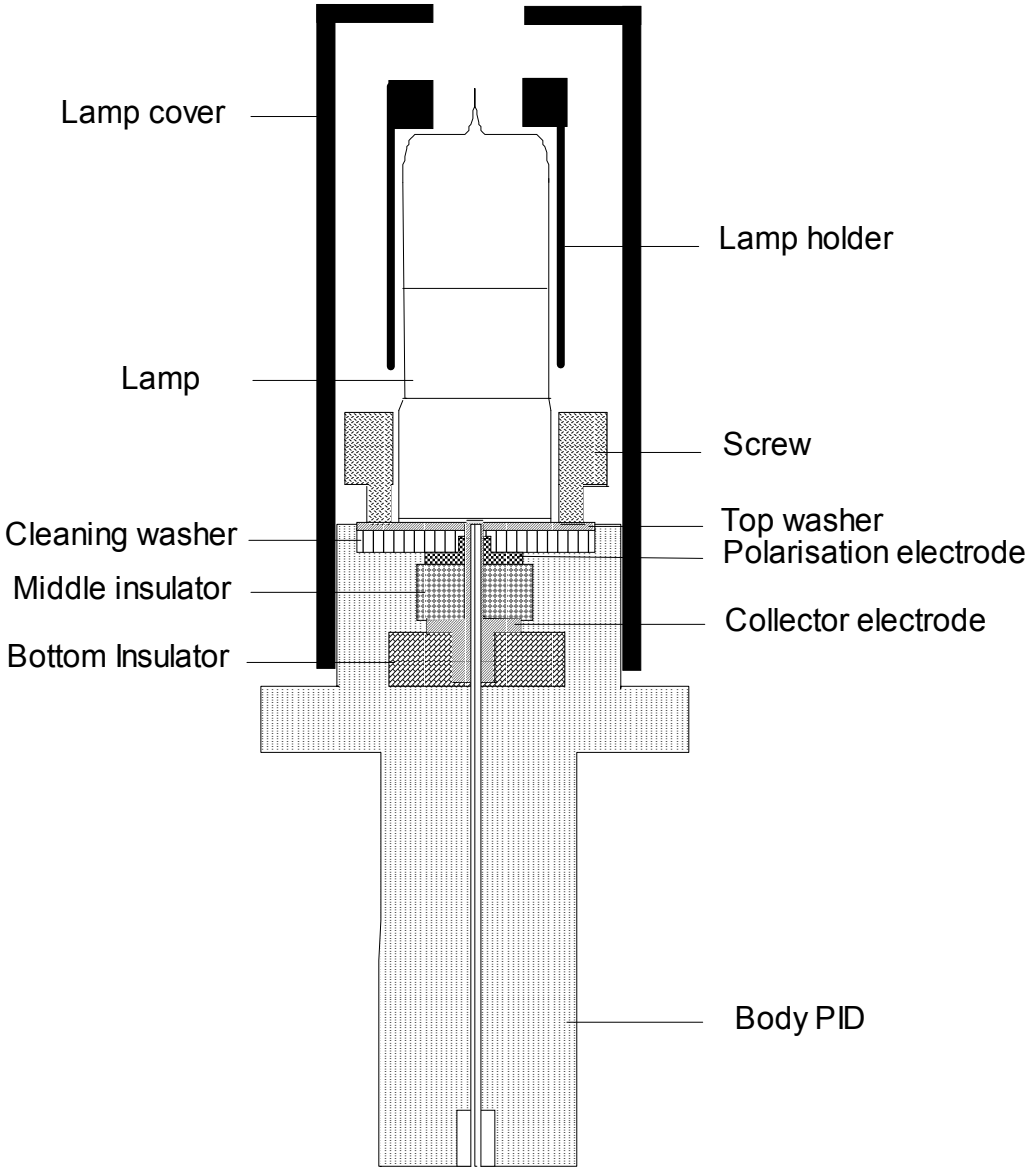
II.2.3. Design and operation

THE PID operation is based on ionization of compounds by means of UV-radiation. Kr, Xe, or H_2 glow discharge lamps are used as the source of such radiation. The lamp emit the photons with the energies from 10.0 eV to 10.6 eV which pass through a special into an ionization chamber, where part of photons are absorbed by the eluted species. The compounds with ionization energies less than photon energy are ionized. The ion current produced in ionization chamber is proportional to the concentration measured compounds.

The PID assembly is shown in Fig.1. It involved a body with gas inlet (10), ionization chamber (2) and VUV-lamp (4). Metal spacer (3) is placed between the ionization chamber and the lamp. Lamp housing (5), spring and Teflon sleeve (7) are used to keep the lamp against the spacer. Lamp housing is connected to detector body by means of bayonet joint. The coaxial electrodes (8) in the ionization chamber are separated from each other and metallic parts of the detector by means of ceramic insulators (9). One of the electrodes is connected to the PID power supply, another –to the electrometer. The electrical leads of UV-lamp are brought out through the hole in the top of housing and connected to the lamp power supply.

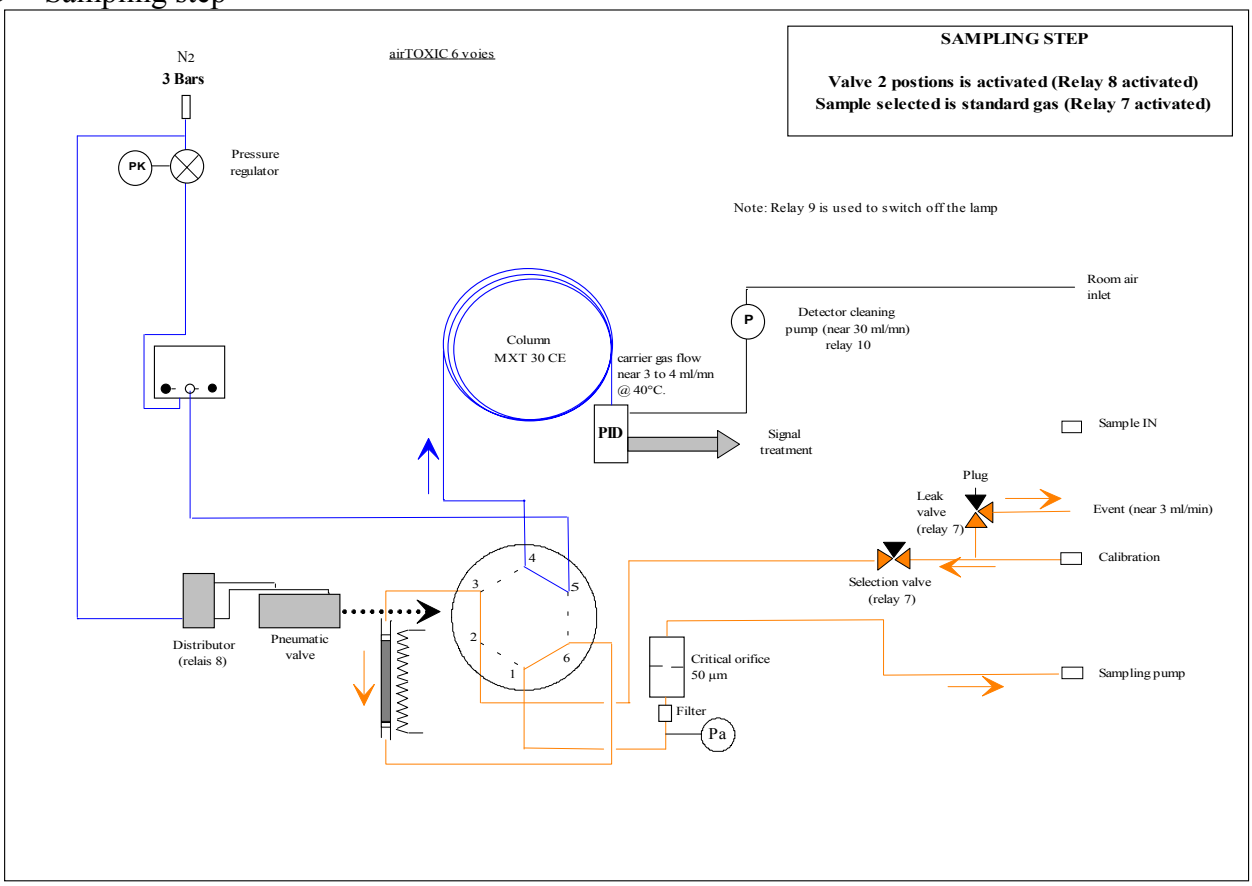
The power supply board provides the stable current of 0.2 – 1.0 mA for lamp ignition and operating and the polarizing voltage of 9 V for PID.

II.2.4. Lamp Scheme

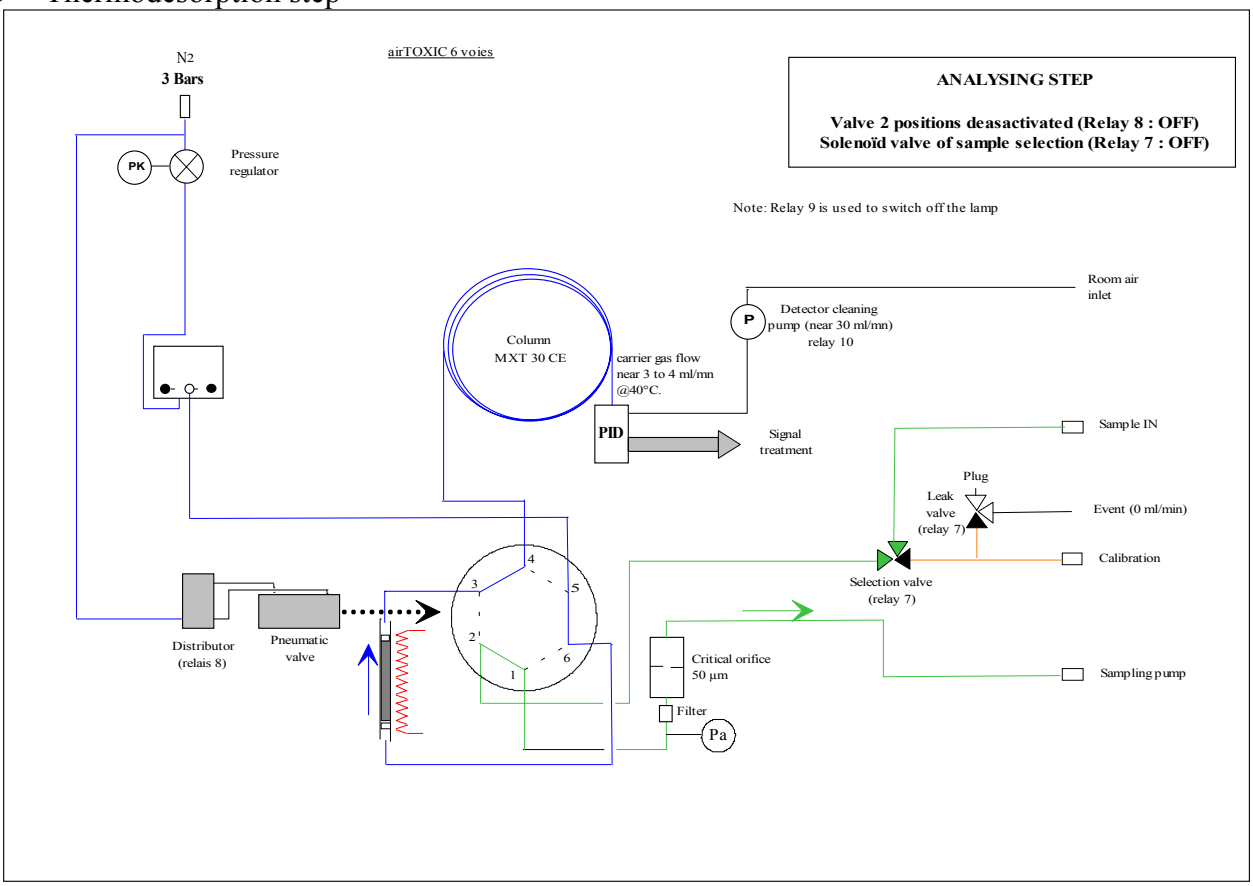


II.3. Schematic visualisation of gas flows during an analysis cycle

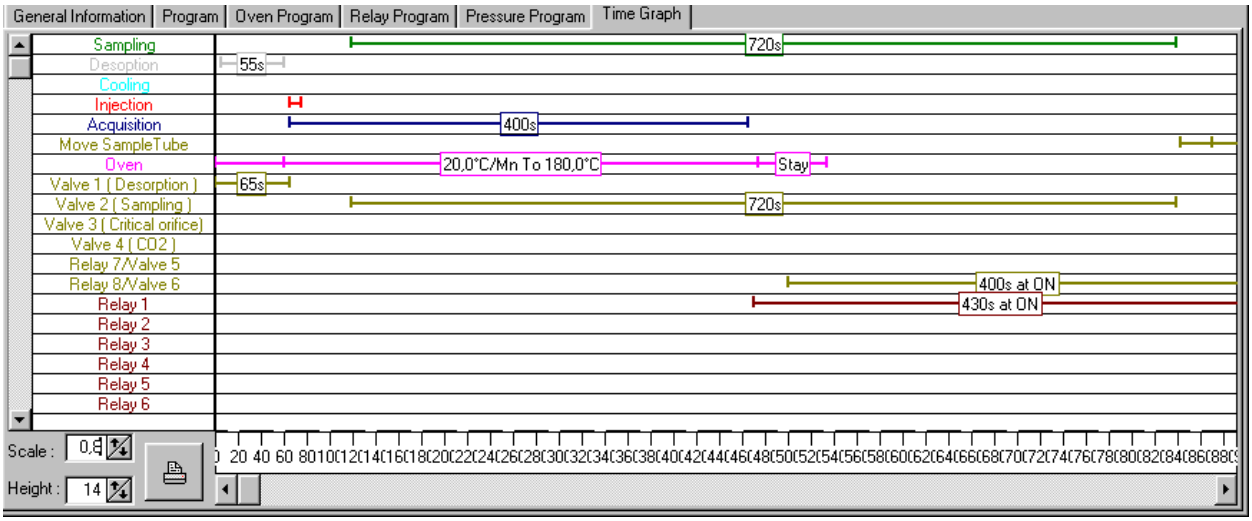
➢ Sampling step



➢ Thermodesorption step



II.4. Example of analysis cycle



III. DETECTOR INSTALLATION

III.1. Precautions

A voltage on the lamp power supply board and on the lamp electrodes reaches -780 VCC. Turn power off the instrument with the two positions switch under the cover when assembling or disassembling the detector. Don't use the main swith on the rear face if the PC is on.

No contact can be tolerated between any element of lamp power supply board and metal parts of chromatograph. Be careful when installing the board inside the device.

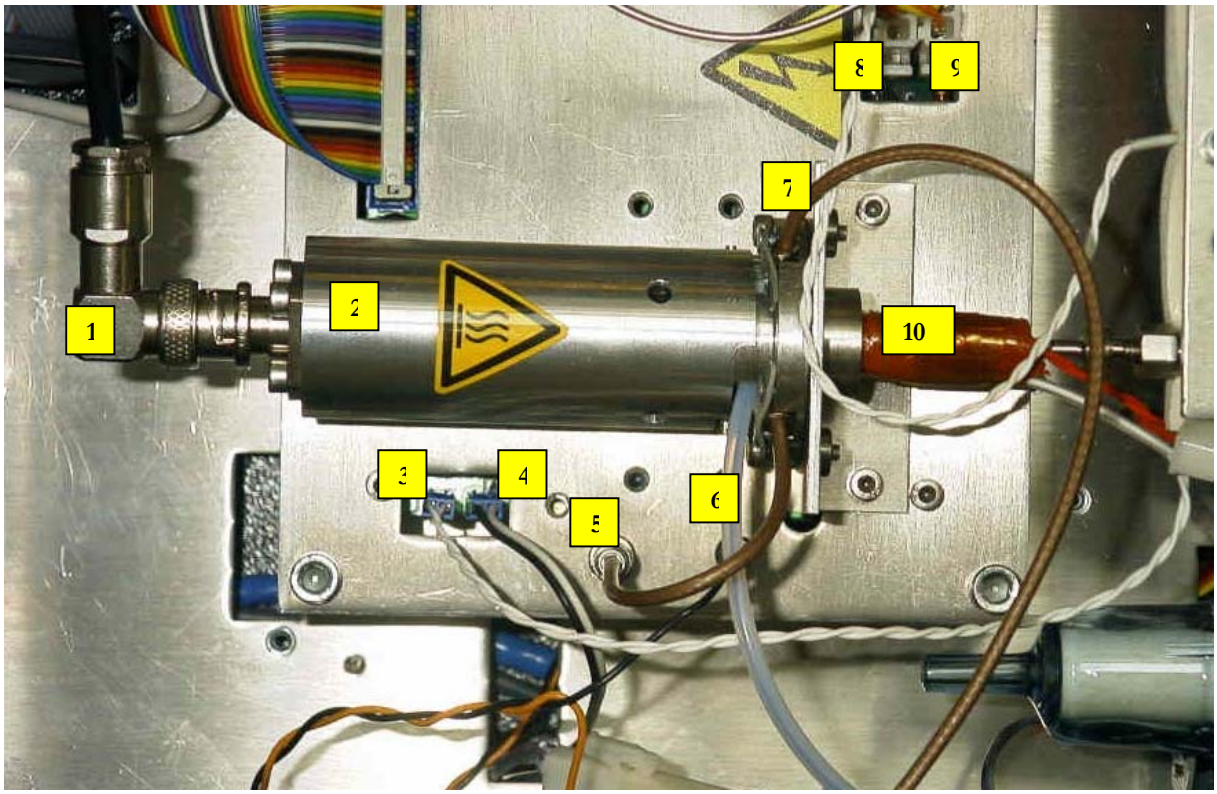
The PID is a non-destructive detector. Take care in analysing of hazardous and / or toxic compounds.

III.2. Detector mounting

The PID body is mounted on a metallic support fixed with screws. It is heated by a heating resistor. VUV-lamp in housing is located on the detector body with bay-net joint. The lamp current is near 200µA.

CAUTION : Do not push down lamp housing too strongly. Lamp window can be destructed.

III.3. Detector connecting



1) High voltage cable

This cable supplies the tube with high voltage around -780V. This voltage can be set on the High Voltage housing.

2) Lamp cover

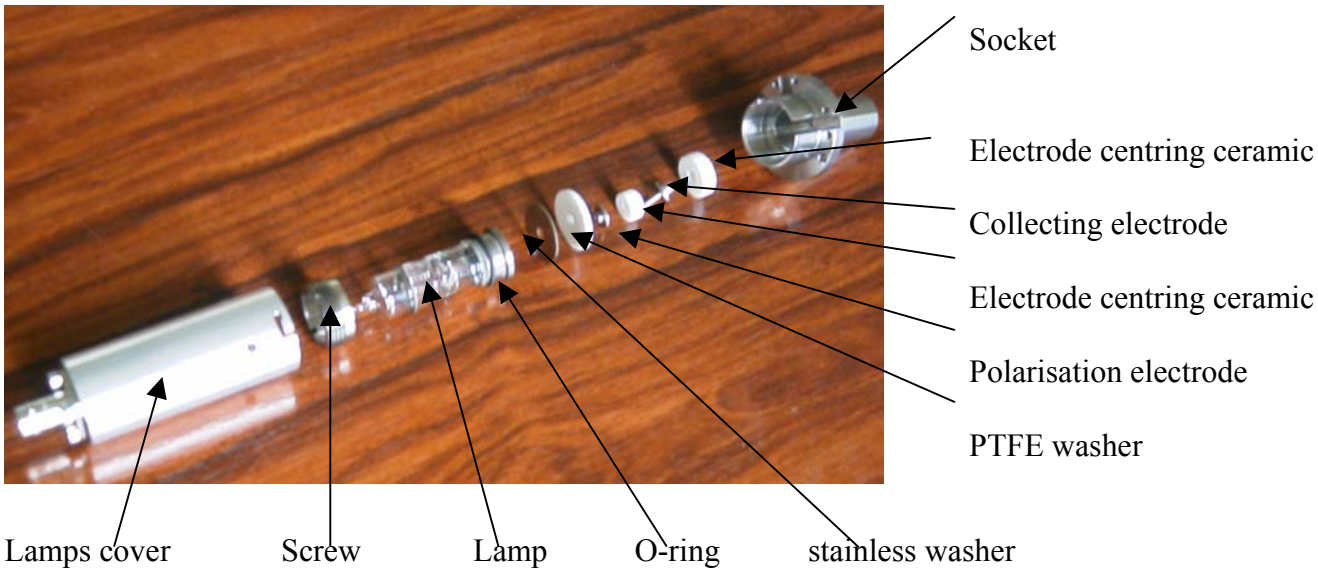
Never remove this cover when power on. Before to remove the lamp, switch off the instrument.

9) Electrode signal

It is connected to the electrode in the detector. The current wich goes through this cable is very low (some µV) and it is amplified by the electrometer board.

10) Air cleaning tube
This tube brings 30 to 40 ml/mn of air comes to the lamp window to clean it during cycle.
11) Socket
12) Detector Heater
Its function is to heat the detector at 140°C.Its resistor is around 10 Ω and it is supplied by the Power Board Pwm signal.
13) Polarisation
This electrode polarises the detector with voltage of 9,3V. This voltage comes from the High voltage housing and it can not be adjusted.

Detector assembly



III.4. Detector switching

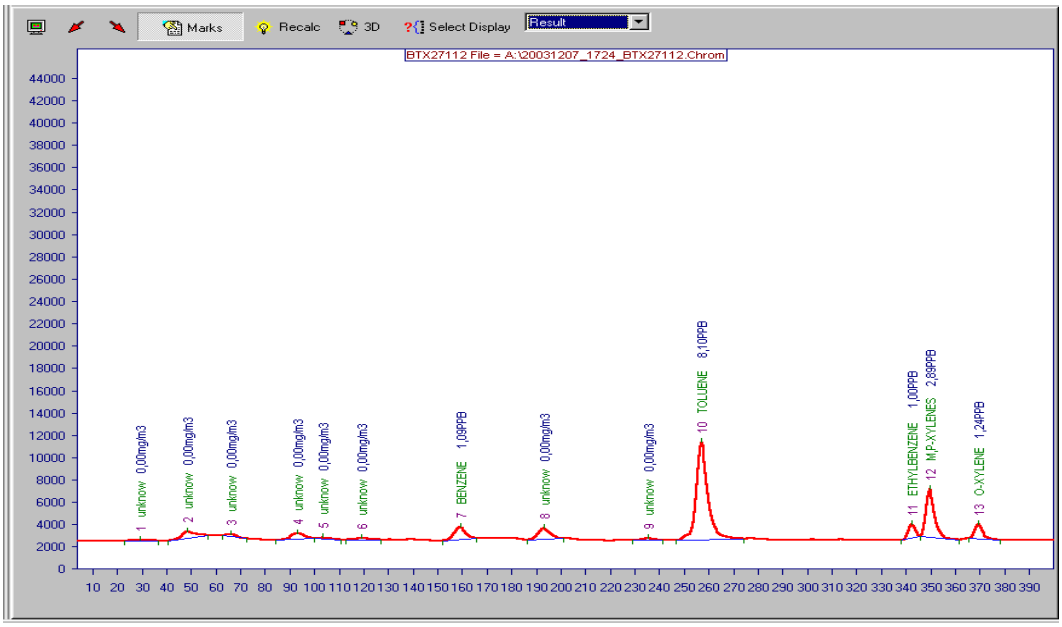
The detector is switched on as soon the instrument is powered up. A violet – blue light appears inside the lamp.

IV. CHROMATOGRAM - TEST

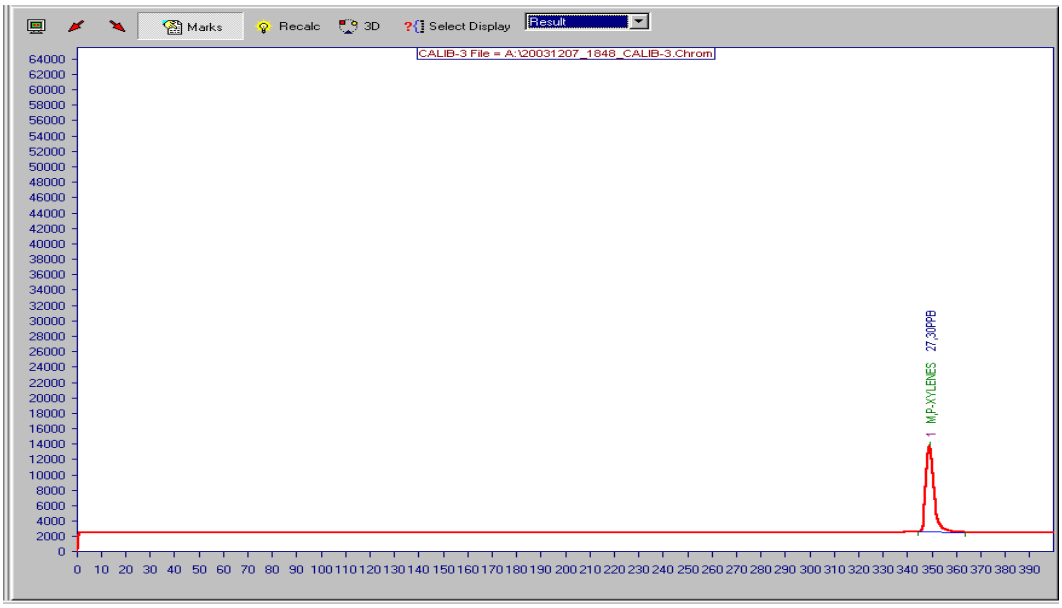
Analytical conditions :

- Cycle duration : 15 minutes
- Trapping at ambient temperature
- Trap desorption : duration 60 seconds, at 300°C
- Carrier gas : Nitrogen 5.5 at 3 to 4 ml/min. Head column pressure near 1,26 Bar.
- Oven temperature : 40 to 42 °C (0 min) at 2 °C/min - 42 to 180°C (1 min) at 20°C/min.
- Acquisition duration : 400 seconds.

➢ Sample : 165 ml of ambient air



➢ Sample : m-xylene Standard compound



V. INSTALLING THE airTOXIC

V.1. Electrical supply

This instrument is supplied with 110VAC.

The supply must be able to deliver the following power :
110 VAC (+/- 10 %)
Power : 400W
Fuse : 15A

Power uptake :

- Standby : approximately 80 W
- Normal operation : approximately 140 W
- Short duration peak : approximately 360 W.

These values are for guidance only. The actual power uptake varies with the maximum oven temperature, PID temperature and calibration plug-in unit.

V.2. Gas supply and connections

V.2.1. Warning

The gas supply tubing diameters must be sufficiently large so that the required inlet pressure at the instrument is maintained even under worst-case conditions (such as maximum gas flow rate at maximum ambient air).

All tubing used must be clean, debarred, and free of sward and dust. The use of virgin tubing is recommended. Tubing which has previously been in contact with liquids is not suitable. The following materials have proven themselves suitable :

- Nitrogen : stainless steel**, 1/8″**, HPLC grade.
- Stainless steel**, 1/8″**, HPLC grade (standard gas)
- Sample inlet : glass, 10 mm, or PFA, **1/4″**.
- Standard gas inlet : glass, 5 mm, or PFA, **1/8″**
- Pump : **1/4″** (grade not important).

Before pressurising the tubing for the first time, all connections must be checked for correctness of assembly and leak tightness.

For a better stability of gas flows, it is recommended that double pressure release valves are used with gas bottles. These pressure regulators must be free of plastic (i.e. GC or ultra-high purity gas quality).

All gas supplies are controlled on the airTOXIC. The use of unsuitable pressure-reducing valves would result in the entry of contaminating hydrocarbons into the measuring system, resulting in incorrect measurement values.

See on § I-6 Gas and power supply connectors on the instrument rear panel.

The following information refers to the values measured at the inlet connectors to the airTOXIC.

V.2.2. Nitrogen

Nitrogen is used as carrier gas and for the pneumatic actuator.

- Nitrogen (5.5 quality recommended).
- Inlet pressure : **3 bars**
- Consumption for carrier gas : **3 to 4 ml/min**
- Connector : **1/8 ″**, stainless steel, swagelock.

V.2.3. Air

Ambient air is used as gas for the self cleaning of the lamp and for the internal calibration system.

- Ambient air with dust filter
- Consumption : ≈ **30-40 ml/min** (for self cleaning)

V.2.4. Sample

V.2.4.1. Sampling system

An adequate vacuum supply is required to aspirate the sample into the instrument and for the sample volume measurement.

- Vacuum : **800 hPa** (200 hPa maximum at the vacuum outlet).
- Pump flow : **1 to 2 l/min**.
- Connector : **1/4″**, stainless steel, swagelock.

The gas sample must be made available at the instrument inlet ("Sample", 1/4" stainless steel, swagelock) under some defined conditions. It must not contain any liquids. It is recommended that the sample be brought to the instrument through generously dimensioned glass tubing. Metal tubing should be kept as short as possible.

In order to carry out the sample volume measurement, some conditions must be fulfilled. The lower the inlet pressure is the less sample gas flows into the instrument. The pressure at the inlet connector must be at least 800 hPa.

V.2.4.2. Sample

The sample gas must contain no liquids or particles.

If gas at high temperature and of high relative humidity is being sampled, there exists the danger that condensation may occur in the instrument. This must be prevented by diluting the sample with dry gas.

If the sample gas contains fine dust this must be removed by using a suitably fine glass wool or glass frit filter in the sample pass. However Such a filter must not, cause a pressure drop by more than 50 hPa.

The filter must be frequently changed, since the slightest accumulation of dust can lead to the absorption of certain components in the sample.

All methods of sample filtering have some effect on the measurement. It is essential in all cases to check that the compound to be analysed actually passes through the filter. (This can be done by making test measurement with reference samples before and after the filter and comparing the results).

- The flow is fixed by a critical orifice.
- Connector : **1/4″**, stainless steel, swagelock.

V.2.5. Calibration Gas

The calibration gas will be introduced in the analyser at atmospheric pressure. The instrument measure the sample volume introduced in the analyser with the PA Card. This volume measurement is depending on the critical pressure. This pressure will be always little like ambient pressure.
In any case, you have to use a T at the instrument inlet to have a correct pressure measurement.
Connector : 1/8'' swargelock stainless steel
Sampling flow is fixed by the critical orifice. The instrument takes the needed volume and the rest of the standard flow will be connected to an EVENT.

V.3. Signal and data cabling

Data cable : RS 232, 9600 Baud. Maximum permissible cable length : 15 meters
Connector 9 pole submin. Type D, male / female.
Inside the instrument.

Analogue output : 0-1 V, 500 ohms output impedance
Two 4 mm diameter banana plug sockets (black : -; red : +).
Short circuits protection.

Switching output : Isolated relay switch controlled by CPU microprocessor.
Switching capacity 100 mA at 24 V
Two 4 mm diameter banana plug.

V.4. Mechanical installation and operation position

The usual lack of space in instrumentation cabins, vehicles and measurement stations results necessary in the installation of the various measuring systems in close proximity to each other. Despite this, it is essential to ensure that a sufficient supply of cooling air is available to the instrument at all times. Usually, cooler conditions are found in the lower levels of large systems. Under no circumstances should an instrument with large power consumption be placed directly below the AIRTOXIC.

V.5. Environmental conditions

The permitted ambient temperature range for operation of the instrument is **+10 to +35°C**.

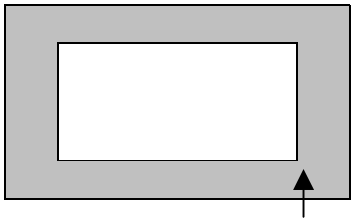
Do not forget that the internal temperature of the instrument is 5 to 8 °C higher than ambient. Therefore the lowest permissible oven temperature lies about 5 °C above ambient, an important point when operating at elevated room temperature, expect extended cooling times.

VI. Touch pad using

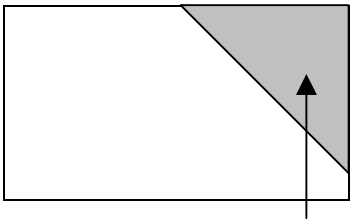
No finger pressure is required. To move the cursor you simply move your finger across the touchpad. Tap once on the pad to “click” twice to “double-click”, and tap and hold to drag, and highlight.
When the user’s finger encounters the edge of the pad during a drag, draw, or highlight operation, the user may lift and reposition their finger (similar to repositioning a mouse on a mousepad). Thus, the user is always in control and is never required to “steer” as the cursor begins to coast in the direction of the finger.

The overlay incorporates two distinct levels of texturing. This dual textured surface is used to define the areas on the touchpad where the GlideExtend and Right Taps features may be actived during typical user operations (see figure 1). The GlideExtend region provides valuable tactile feedback during drag, draw, and highlight operations, signalling to the user they may now lift and reposition their finger away from the edge of the touchpad while GlideExtend is engaged. Similary, the coarser texture of the Right Taps area alerts the user that tapping in this area will result in a secondary button input (right “click”). The Right Taps area is also visually delineated by a change in color.

Figure 1 :



GlideExtend Textured Area



Right Taps Textured Area

VII. STARTING THE airTOXIC

Before turning on the supply gas (Nitrogen), you must verify that the pressure reducing valve is turned off because the pressure regulator inside the instrument is pre-adjusted and a big pressure variation are very dangerous for the pre-adjustments.

Check that all the tubes are connected correctly and gas tight.

a) Set the Nitrogen pressure at **3 bars**. Switch on the sample vacuum pump. Connect to the VENT the outlet of the sampling pump and the outlet of the Standard T.
b) Switch on the Main Power Supply (Back Face)
c) When the airTOXIC is on the green LED "**OK**" and the red LED "**STAND BY**" light. It is possible that errors occurred before the instrument was last switched off, in this case, the error information will have been saved by the system. If this is case, the yellow LED "**WARNING**" or the red LED "**ERROR**" will light immediately after the instrument is switched on again. The error number will be sent to the computer before or by latest the end of the first chromatogram. When the airTOXIC is switch on, the initial parameters are charged in the instrument. These parameters are :
   - Oven temperature : 40 °C
   - PID temperature : 140 °C
   - Column pressure : ≈ 1,26 B

   These parameters are fixed and should not be modified.

d) In the same time, the PC is switched on. Windows XP starts with **Chromatotec** user "pass word" : **CETOMRIA** and the PC opens automatically the vistachrom software. You select the "**super user**" level and you type **1234** as Password.
e) You log on the instrument with and the PC  . Start the analysis with the touchpad  . The first cycle permits to initialize the system.

VIII. STOP THE airTOXIC

In any case, before SHUT DOWN the power supply with the main SWITCH on the rear panel. It will be necessary to correctly stop the instrument at the end of the method, wait some minutes until the LEDS "stand by" and "ok" **are lit, and stop correctly the internal PC.**

VIII.1. Classical stop

- Click on the icon  . In this case, the analyser stops at the end of the analysing method. Wait some minutes unil the LEDs "stand by" and "ok" of the RS 232 card light before close vistachrom software.
- In any case, the LEDs "stand by" and "ok" of the RS 232 card must be lit and any other.
- When the oven temperature is near 40°C, LOG OFF the instrument with the icon  . BE CAREFUL, if the icon is yellow, the instrument is in function and doesn't be shut down.
- When the instrument is LOG OFF and in stand by position (the LEDs "stand by" and "ok" of the RS 232 card must be lit), no communication subsists with the software and the instrument can be switched off with the internal POWER SUPPLY.
- You will have stopped all software before SHUTING DOWN the GC and PC

VIII.2. Emergency stop

Sometimes, an error occurs cause by the system or by a human manipulation during communication between the instrument and the PC. It is possible to completely loose or not the communication with the instrument. In any case, the alone response will be to make a RESET of the instrument and of the PC. Two possibilities :

VIII.2.1. Software reset

- **STOP THE MEASURE** at the end of the method on the ON LINE window with the icon  .
- Wait some minutes to obtain the initial parameters of the oven (40**°C**), **sampling off**, **Desorption of the TRAP**, etc. (***See the EXPLANATIONS in the §VIII.1.*** **-**).
- **LOG OFF** the instrument with the icon  .
- **CLOSE** the aquisition software.
- **START THE ServiceGC** Software.
- **Select the serial number of your instrument and the communication port.**
- **Click on LOG ON.**
- Click on **RESET** button (*Service GC*) the leds "**Stand By**", "**Error**" and "**Ok**"on the RS232 Card must be lit.
- When the **dialog activity** icon blink, the instrument communicates with the PC and you can transfer the Setup with the **Transfert setup** button**.** The led "**Error**" will be lit off.
- **Stop** the ***ServiceGC*** utilitary with the ***Close*** button**.**
- Restart **acquisition software and LOG ON** with  .
- Load the working sequence with  and restart the analyser with  .

Sometimes, a software RESET is not sufficient and a hardware RESET will be necessary.

VIII.2.2. Hardware reset

- Stop the measure with  . Wait some minutes to obtain the initial parameters of the oven (**40°C**), **sampling off**, **Desorption of the TRAP**. If the communication is impossible with the acquisition software, (use Service GC utility to STOP analyse).
- SHUT DOWN only the instrument. For this manipulation, you have to open the cover and use the 2 positions switch inside the instrument and disconnect the battery on the CPU Card.

CAUTION : UNDER THE COVER THERE IS A HIGH VOLTAGE POWER TO TAKE GUARD WITH VARIOUS ELECTRIC CONNECTIONS.

- **Wait some minutes** to cleaning all the memory of the CPU Card. **During this manipulation, it will be recommended to make a PC RESTART**.
- **Reconnect** the battery on the CPU board
- **SWITCH ON** the instrument. The leds "**Stand By**", "**Error**" and "**Ok**"on the RS232 Card must be lit
- **START** the **ServiceGC** Software.
- **Select the serial number of your instrument and the communication port.**
- **Click on LOG ON button.**
- The **Transfert setup** is automatic and the led "**Error**" will be lit off.
- **Stop** the ***ServiceGC*** utility with the ***Close*** button and **Restart** the acquisition software.
- **LOG ON** the instrument with  and Load the working sequence with the icon  and start the measure with the icon  .

In any case, the first cycle only permits to initialise the instrument. It will have no TRAP desorption, no acquisition during this cycle, etc.

IX. PID CLEANING

Lamp window cleaning is required due to high column bleed or condensation of high boiling compounds.

CAUTION : Do not dissemble detector when hot or when line power is on.

IX.1. Lamp window cleaning

- Turn off the lamp and oven if necessary. Allow the detector to cool ambient temperature.
- Disconnect bayonet joint and carefully remove lamp housing from the lamp.
- Add a drop of acetone to window and wipe it with a clean cotton material for 2-3 minutes, then add a drop of ethanol and wipe for 2-3 minutes.
- When the lamp window is contaminated too strongly (no response or it is reduced dramatically) clean it by HF aqueous solution then rinse with water.

CAUTION : Lamp window can be also cleaned by conditioning the detector in oxygen flow when the lamp is on.

- Dry the window in air.
- Carefully place the lamp housing with the lamp on the detector body and connect bayonet joint.

IX.2. Cleaning of PID internal components

The parts to be cleaned are those which are in contact with analyts :

- Ionization chamber
- VUV Lamp
- Gas inlet

CAUTION :
PID internal components requires in cleaning just when the baseline noise and drift cannot be decreased by any other ways.

- Before dissembling the detector, try to clean it by conditioning in the carrier gas flow at 190 °C for 24 hours.
- Do not wash the ceramic insulators (when highly contaminating they must be replaced).
- Disconnect bayonet 3 and remove the lamp housing with lamp.
- Remove the nut and remove screws which fixed electrodes and take the spacer, insulators and electrodes out of the detector body.

CAUTION : Use the tweezers for handling ceramic internal component to avoid contamination.

- Clean the electrodes and gas inlet using acetone, chloroform and ethanol.
- Install the insulators, electrodes into the detector body and drive by the screws, install metal spacer and lock with nut.
- Install lamp housing with the lamp.

X. LAMP REPLACEMENT

- Remove the lamp housing with the lamp.
- Disconnect the lamp leads from the lamp and remove it from the housing.
- Install the other lamp to housing, bring its wires out through the hole in the top of housing and connect them to the power supply leads (refer fig.1).
- Place the lamp housing with lamp to detector body and connect bayonet joint.

XI. TROUBLE SHOOTING GUIDE

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTION
Absence of background current.	Power supply or lamp failure.	Measure a current in power supply terminal without lamp and voltage on the lamp. If power supply is in working order replace the lamp.
Low background current.	Lamp failure.	Replace the lamp.
	Contaminated lamp window.	Clean the lamp window.
High background current.	Lamp failure.	Replace the lamp.
	Dirty carrier gas and / or dirty associated fluidic components.	Replace gas supply.
		Use a charcoal / molecular sieves trap in gas line.
		Clean or replace dirty components.
	Column bleed.	Reduce oven temperature or use another liquid phase.
	Contaminated detector.	Condition PID at 190 °C for 24 hours with carrier gas.
		Clean the detector.
Low response.	Loose SC column connection.	Tighten column connection.
	Carrier gas flow rate too high.	Decrease carrier as flowrate.
Noise baseline.	Detector signal cable and / or shielded connection are heated to high temperature.	Put the cable and shield away from heat sources.
	Poor ground.	Check the ground of detector.
	Contaminated detector	Clean the detector.