PCF Elettronica's Mod. 2001/C

Portable HOT FID
VOC/CH_4 monitor

Particularly suited for
VOC and METHANE monitoring
at emissions

Showing an exclusive micro Hot FID

(Last release July 26th 2016)

CONTENTS

1.0 FOREWORDS

The FID detector is generally known as the most linear and stable sensor for detection of organic compounds. Particularly in environmental monitoring, where a mix of hydrocarbons are present in the sample, the measuring equipment requires a detector possibly equally sensitive to all types of compound. For this matter the FID is the detector that mostly meets the needs.
The Mod. 2001 portable VOC monitor has been studied, developed and manufactured to monitor Volatile Organic Carbon (VOC) as well as Methane fraction (CH_4) at emissions.
The methane fraction separation is carried out through an hot scrubber column, while carbon compounds are detected in a specially developed Flame Ionisation Detector (FID detector).
PCF Elettronica's FID detector is very well known for its stability as well as for its low maintenance in the time.

It's generally known that organic compounds in hydrogen flame ionise. The quantity of carbon ions generated are proportional to the total quantity of carbon passing through the hydrogen flame.

The carbon (methane) equivalent concept.
In the environment there is very high number of different organic compounds so the response of the instrument detector cannot be referred to a single compound. The measurements must be considered in terms of equivalent response, .i.e. the response of the detector is "normalised" (referred to) to a single compound.
The characteristics of FID detector, i.e approximately proportional to organic carbon concentration in the sample, makes the purpose easy. At first approximation the same concentration in air of compounds with different carbon atom number responds proportionally to the number of atoms in the molecule, so

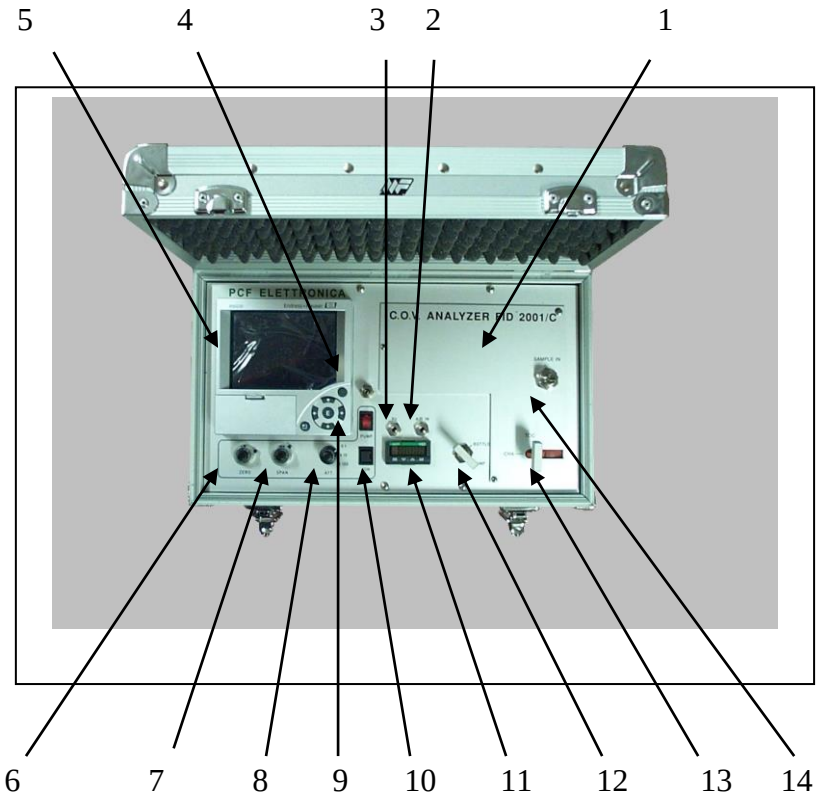
Concentration ppm	Species	FID response
1	CH_4	1
1	C_2H_6	2
1	C_3H_8	3
1	C_6H_6	6

In other words, once the instrument response is normalised to methane, 1 ppm of propane will approximately generate a signal as 3 ppm of methane.

1.1 General description

PCF Elettronica Mod. 2001 portable VOC/CH_4 monitor is an extremely simple instrument studied, developed and manufactured for operation at emissions or industrial installations where just the power supply and the hole for the insertion of the probe must be available.

1.2 Mod. 2001 portable VOC/CH_4 monitor



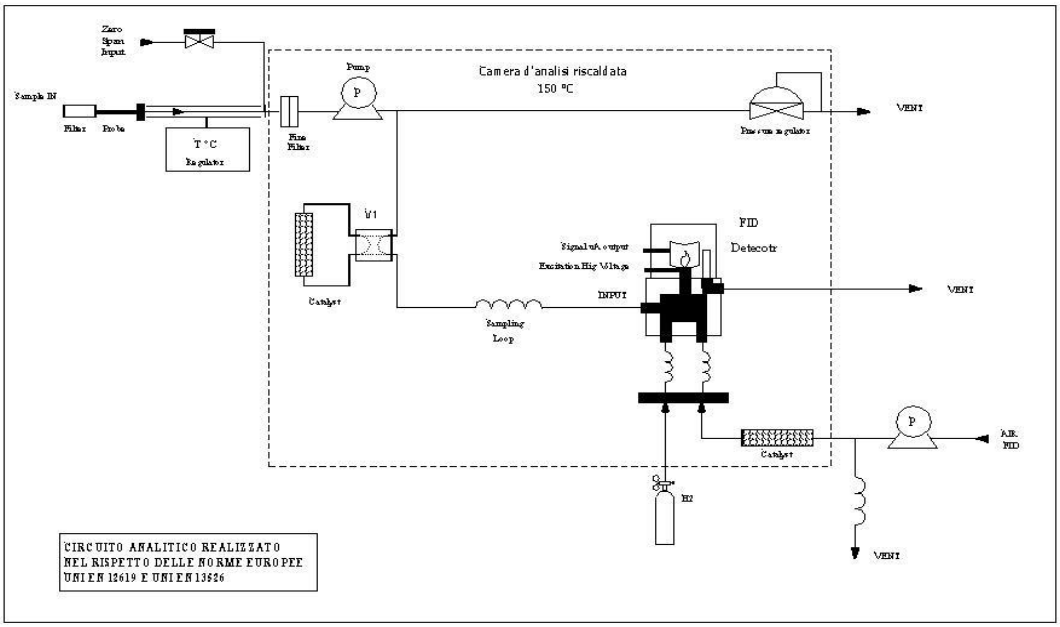
SOV TOC 2001

Figure captions

1- Heated analysis chamber and "Sample in" pneumatic connection for the insertion of the heat traced sample line
2- Pneumatic connection for intake of air supply to FID detector, compression and recirculation is guaranteed by in mounted air compressor
3- Pneumatic connection of FID supply hydrogen (from a gas cylinder)
4- Air supply to FID detector, from a UPP gas chromatographic type air cylinder (optional)
5- Video graphic display (144 x 144 mm)
6- Zero signal regulation potentiometer knob

7- Span signal adjustment potentiometer knob
8- Switch for attenuation of full range signal
9- Activation switch of gas sampling heated pump.
10- IGN push button, to activate FID. A nearby LED shows the condition of flame ON.
11- Heated pump and analysis chamber termoregulator
12- Manual lever to switch from air compressor to external gas cylinder and vice versa to FID
13- Manual lever (TOC/CH_4) to switch from Total VOC to CH_4 mode and vice versa

1.3 Analytical circuit **(according to European UNI EN 12619 AND UNI EN 13526 regulations)**



2.0 WORKING PRINCIPLE

PCF Elettronica Mod. 2001 portable VOC monitor, along with its SS sampling probe and heat traced sampling line was studied, developed and manufactured for continuous source monitoring of VOC/CH_4, detection procedure according to CEE CEN 264 # 326 as well as UNI EN 12619 and UNI 13526 regulations.
The instrument operates fully automatically and unattended, according to intended application fields it works within a wide range of temperatures and water contents of sample (in any case **no condensed water** should be present) with no detectable influence for the measured values.Sample is sucked through a variable SS probe with ceramic filter on the tip (probe is built according to UNI 10263 directive), a heat traced PTFE line kept at fix temperature between 150 – 180 °C and finally an heated head pump. A second heated filter in sintered stainless steel protects sample capillary in front of detector.
Sample is continuously fed to FID detector, therefore response time is very low with no time interval due to the sampling by capillary loop.
Sample route from the ceramic filter inserted into the stack gas through the sampling probe, the Teflon line, the sucking pump and finally FID detector is kept at high controlled temperature to avoid any condensation.
Methane fraction can be detected continuously, by a simple manual insertion of a selective scrubber that will scrub and convert all hydrocarbons but methane into CO_2, not detected by FID detector.
Data are displayed and recorded on a modern video graphic unit in built in the analyser. All information and data may be downloaded either on PC or on a in built Flash Memory driver.

All monitor components are mounted in a small (some 400 x 300 x 150 mm (16” x 12” x 6” WxDxH) reinforced and ventilated aluminium box with carrying strip.

Visualized data on video graphic display are available to be displayed and /or elaborated as follows:

- Recording on strip chart recorder
- Back up memory storage, followed by PC management
- Real time display of concentration curves at emission

The standard configuration for the correct operation at the measuring site includes:

- Mod. 2001 FID monitor
- SS sampling probe
- 3 m heat trace sampling line (different lengths are available on request)

The hydrogen gas cylinder (the zero air, necessary for FID supply is generated within the instrument).

2.1 Description of FID detector measuring principle

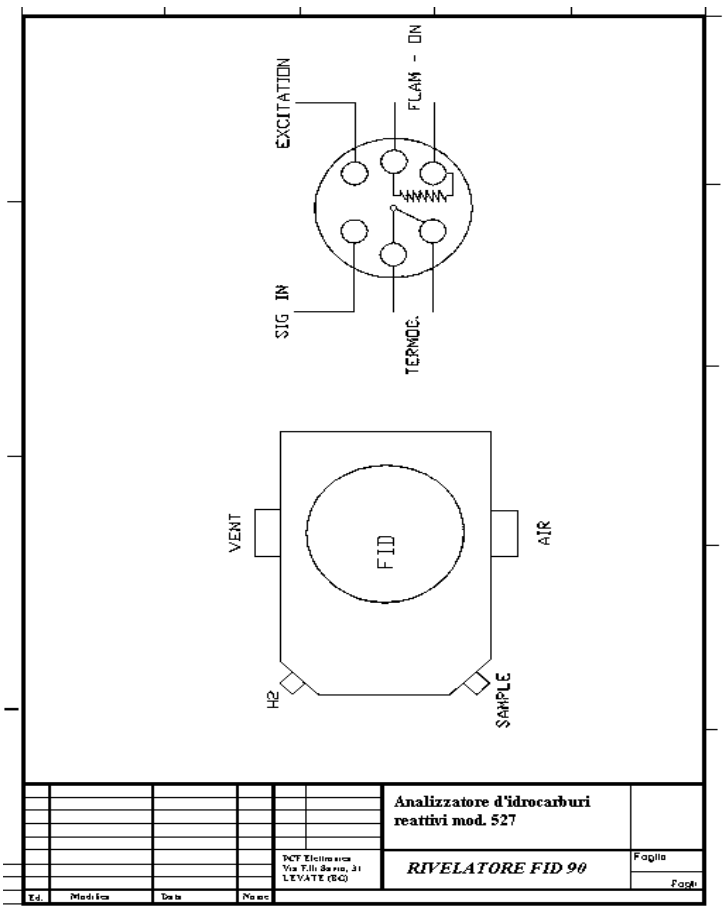
Consistent quantity of ions proportional to concentration of organic carbon in the sample. The actual structure of FID detector shows the mixing of hydrogen with gas sample; then the combustible mixture is burnt at the extremity of a small nozzle in an oxygenated environment (pure air in a large stoichiometric excess). The electric charges generated by the combustion of the organic matter in the sample are collected by a polarised couple of electrodes and converted into electrical micro current. The ionisation currents through an electrometer generate a voltage drop at the output proportional to the current in the flame.
The changes in polarisation of the flame show up as voltage changes of the electrometer output, then are transferred to a display or a pen recorder as measurements of carbon content.

3.0 TECHNICAL SPECIFICATIONS

- Measuring ranges : 0-100 ppm or mg/m^3
  : 0-1,000 ppm or mg/m^3
  : 0-10,000 ppm or mg/m^3
  (other ranges possible on request)
- Methane fraction separation : by manual insertion of deviation valve
- Background noise : ± 1% of full scale deflection (FSD)
- Linearity : ± 1% of FSD
- Lower Detectable Limit (LDL) : 1% of FSD
- Zero stability (24 hours) : ± 1% of FSD
- Span drift (24 hours) : ± 1% of FSD
- Response time : 1 second
- Lag time : 2 seconds
- Precision : ± 1% od FSD
- Sample flow rate : 800 ml/min.
- Operating temperature : 0 - 40 °C
- Digital display : 320 x 200 pixel 5.5” colour TFT = LCD graphic video display
- Data storage : in built 128 Mbytes FM or more
- Data management : standard SW package for 95/98/NT Windows
- Instrument configuration : from front panel
- Services Hydrogen : ≅ IP 25 ml/min from external gas cylinder
  Air : ≅ 200 ml/min from in built generator
- Suggested calibration gas cylinder : 30 ppm CH_4+10 ppm propane, **air balance**
- Mounting : reinforced aluminium case with strip for easy transportable configuration
- Dimensions : 400x300x150 mm (16"x12"x 6", WxDxH)
- Weight : 9.5 Kg
- Standard power supply : 220/110 Vac, 50/60 Hz (to be specified in order)
- Power consumption : 500 VA
- Pneumatic connections : 1/4" or 4/6 mm, 1/2 mm plastic or SS tubings

Standard supply includes the 316 SS sampling probe, according to UNI 10286 norms, as well as 3 m heat traced sampling line.

4.0 FLAME IONISATION DETECTOR (FID)



The FID is the core of the NMH analyser.
It shows a central nozzle that receives through a capillary hydrogen, about 25 ml/min, again through a capillary the nozzle is reached by carrier gas including sample compounds.
The nozzle is polarised, from an external power supply by a positive voltage of 300 Vdc with very low electrical currents. A metallic ring on the top of the nozzle collect the ionisation current and takes it to the input of electrometer circuit.
An air flow rate of about 250 ml/min, controlled by a third capillary, is supplied to the detector as combustion gas. Normally quality of the combustion air must be very good (carbon content lower than 0.1 ppm) and stable in the time, with the risk of jeopardising the measurements qualities. For emission applications quality of combustion air can be slightly lower (a concentration of 1 ppm of HC could be acceptable)
Inside the detector are further located a Nickel spiral for the automatic switching of the flame as well as a thermo sensor that detects when the flame is ON or OFF therefore command the automatic switching off the hydrogen flow when the flame is OUT.

5.0 COMMISSIONING AND STARTING UP THE INSTRUMENT

5.1 Commissioning

- Connect the H_2 adduction gas from the two stages gas reducer of H_2 gas cylinder to the relevant connection located on the cover of analysis chamber and adequately indicted.
- Connect the heat traced line adducting gas sample to the instrument sample connection. The plug of the heating resistance must be connected to relevant socket located at the right bottom side of the instrument.
- Plug in the power supply cable to mains (220 V 50 Hz, 500 VA).

5.2 Starting up

- Switch mains switch to ON position, switching ON of the instrument. Green bulb will be lighted.
- Wait some 20 minutes for the heating up and the conditioning of the instrument.
- Check that the manual switch for switching of air supply to FID detector is set to correct position according to the selected supply of combustion air to the monitor, namely whether by UPP air gas cylinder or by in built air compressor and selective scrubber).
- Open the H_2 gas cylinder regulating the hydrogen pressure supply to the correct value indicate in the final test table.
- Check that manual switching valve from Total VOC to CH_4 fraction is set to the desired working mode.
- Switch on the sample pump **(Attention please, do not switch on the sample pump when instrument is cool, its Teflon head works properly only when heated up, working cool could cause its seizing).**
  See also foot note at the end of this section.
- Press IGN push button and keep it pressed till IGN “OK” appears on the video graphic display. Wait about 20-30 seconds.
- If flame stays ON, “Fiamma (Flame) OK”should be indicated on video graphic display.
- In case on video graphic display IGN “Off” is shown, it means that FID flame is not correctly switched on. Repeat the above described operations till flame is correctly switched on.
- With the flame switched on wait some 10 minutes for the stabilisation of the electronics of instrument then zero the display with the ZERO potentiometer knob, making sure that the instrument is sampling clean ambient air (see Chap. 6).
- Insert the sampling Probe into the sampling hole.

NOTE

1- The sample sucking pump is PC controlled. Therefore the pump can be activated only with the read temperature is higher than 150°C. Then switch on the pump only when the temperature is higher than 150°C. Be very careful in switching on the pump, eventually repeat the operation in sequence different times.
2- FID air consumption is about 200 ml/min. In case the solution with air gas cylinder is chosen as option, please use an adequate UPP gas cylinder (suggested gas cylinder capacity, 5 l).

In case the heated pump does not start up leave the switch on "OFF" position and contact the service people.

3.3 Switching off the monitor

- Extract the sampling probe from the duct/stack
- Leave the monitor to operate for about ten minutes in ambient air (clean and dry sample).
- Move Pump switch lever on to "OFF" position.
- Close the tap of hydrogen gas cylinder
- Move the mains switch lever to "OFF" position.

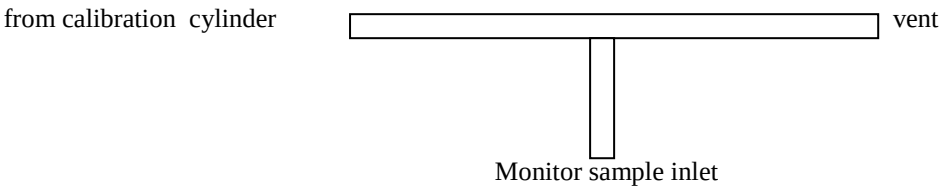
6.0 MONITOR CALIBRATION PROCEDURES (ZERO AND SPAN)

6.1 ZERO calibration

1- it's important to perform the zero calibration both for the Total VOC and for CH_4 operating mode, as the electronic zeroes could not be equal.
2- In case the zeroes are not at the same level (e.g. in ZERO Total VOC mode = 4.00 while in ZERO CH_4 mode = 3.20, with a difference between the two zeros values equal 0.80 notches). During next SPAN calibration it will be mandatory to position ZERO potentiometer knob 0,80 value lower when calibration is switched from Total VOC SPAN to CH_4 SPAN.
3- Position manual valve for switching between Total VOC and CH_4 into the desired position (e.g. Total VOC, TOC SOV).
4- Make sure that the monitor is sucking clean air and wait 2-3 minutes for stabilisation.
5- Zero the display with the ZERO knob.
6- Repeat, if desired, same operations 3 to 5 in CH_4 mode.

6.2 SPAN calibration

1- Disconnect the heat traced line from the inlet connection of monitor.
2- Check the zero unless was just performed.
3- Set the switch "Pompa Sample" ("Sample Pump") to "OFF".
4- Make sure that manual switching valve from Total VOC (SOV TOC) to CH4 mode and vice versa is set for the desired mode (take always into account the correct positioning of ZERO potentiometer knob).
5- Connect the output of two stage reducer of gas calibration cylinder. The connection must be performed under vent condition, i.e. at atmospheric pressure:



The suggested calibration mixture is the same used in our laboratories to perform the final checking of the instrument and outlined in the "instrument final check record"
6- Move the "Pompa Sample ("Sample Pump") on to "ON" position, instrument will start sucking the ambient air.
7- Open standard gas cylinder tap to guarantee an excess of STD (Standard, calibration, gas) through the vent terminal of "T" tube.

8- Wait for about 60 seconds for measurement stabilisation then set, by "SPAN" potentiometer knob, the indicated measured value to the correct STD, calibration, value of gas cylinder.

Example:
Suppose the STD, standard or calibration gas mixture, contains 40 ppm of methane (CH_4) and 10 ppm of C_3H_8 (propane).
We must keep in mind that 1 ppm of propane (C_3H_8) corresponds to 3 ppm of methane (CH_4) as having three carbon atoms in each molecule it produces a response three times higher in the FID detector (FID detector response is approximately proportional to the content of carbon atoms independently from chemical bonding)

Therefore 10 ppm of propane (C_3H_8) are approximately equivalent to 30 ppm of methane (CH_4).
In our calibration mixture we will count 40 ppm methane + 30 ppm equivalent of propane = 70 ppm methane (Carbon) equivalent.

The instrument must be set calibrated to Total VOC = 70 ppm
Or as alternative:

$$70 * \frac{12 \text{ (Carbon Molecular Weight)}}{22{,}414 \text{ (Molecular Volume)}} = 37{,}45 \text{ mg/Nm}^3 \text{ VOC}$$

NOTE:
1- *whenever the methane (CH4)operating mode is selected by the manual switching valve (TOC/CH4), for the theoretical concentration, the concentration value of propane (C_3H_8) must not be taken into consideration as it is totally converted into CO2 by the catalytic hot scrubber.*
2- *The calibration gas cylinder mixture must always be balanced with air, as the nitrogen could produce a lower signal In the FID detector. For emission applications, suggested gas cylinder mixture for calibration is 40 pp of methane (CH4) + 10 ppm of propane (C_3H_8) with air balance.*

9- Once set the signal displayed to the correct calibration (standard) value, close the tap of calibration gas cylinder, then move the "Pompa Sample" switch to "OFF" position.
10- Wait about two minutes then zero the display with ZERO knob potentiometer.
11- Disconnect the T tube for the calibration of monitor from sample inlet and connect to the same inlet the heat traced line carrying the sample gas under measurement.

12- Move the "Pompa Sample" switch on to "ON" position.
13- Now the monitor is correctly set to perform measurements of Total SOVs.

7.0 METHANE FRACTION MEASUREMENT

Whenever operator need to switch from Total VOC (TOC SOV) measurements to methane (CH_4) fraction measurements and vice versa he must follow the following steps:

1- Move "Pompa Sample" ("Sample Pump") switch on to "OFF" position.
2- Position lever of manual valve switching on to CH_4 (Methane mode).
3- Check that flame of FID monitors is still ON (alarm light on PC).
4- In case the FID flame is switched off carry out the sequence for the correct ignition:
    i) press IGN push button
    ii) keep it pressed till on PC the "fiamma OK" is shown
    iii) wait for further 20-30 seconds before regular operations.
5- If the flame stays on, no message will be shown on PC.
6- In case the message "Allarme fiamma spenta" ("Alarm flame off") will be shown again, it means that flame is not stably on. Please repeat the operations (see above pos. 4) of flame ignition till the flame is stably on.
7- Bring lever of "Pompa Sample ("Sample Pump") switch on to position "ON".
8- Now the instrument is ready for measuring in CH_4 mode.

NOTE:

It's always a good attitude, whenever the switching from Total VOC (TOC SOV) to CH4 mode and vice versa takes place, to perform a ZERO and SPAN calibration.

8.0 MONITOR MAINTENANCE PROCEDURES

All the operations described in the present section must be performed with mains power supply to the instrument OFF (disconnect the mains plug) and with the H_2, Air, Span service gases intercepted by the main manometers on the gas cylinders.

8.1 Suggested maintenance schedule

Basically PCF Elettronica's Mod. 2001 is a very simple VOC monitor with tested parts to last years without maintenance.
For a good performance in the field it is suggested to commission the instrument since the beginning with the correct gas qualities and pressure as well as to check regularly its working conditions.

For a good commissioning of the instrument we recommend:
- standard tool case
- digital multi meter and

Time	Operations	Actions (if necessary)
Commissioning	Check: Power Supply Gas Supplies (quality and pressure) Service gas pressure	
Monthly	Sample flow	Replace or clean filters Front filter and/or Sintered filter
Every 3 months	Sample flow	
	Membrane pump	Rebuild pump
Every 6 months	Calibration check	Change coefficients
Every year	Scrubbing efficiency	Replace catalyst
	Check	
	H_2 capillary	Replace
	Air capillary	
	Carrier capillary	

8.2 Trouble shooting

Events	Actions
Completely dead display:	
- Check the mains power supply	Connect power supply
- Check the fuse on the power supply socket	Eventually replace the fuse
- Check display lamps	Replace lamps if necessary
- Micro processor PCB not working	Replace micro processor PCB
The flame does not ignite LED always on	
- Wrong hydrogen and air pressures	Check hydrogen and air supply and set the correct hydrogen and air pressures
- Lack of hydrogen supply	Check hydrogen cylinder, opening tap an pressure
- Clogged H_2 or Air capillaries	Check flow rate and replace if necessary
- FID air compressor not working	Either maintain or replace air compressor
- Ignition spiral is broken	Replace FID
- FID thermocouple broken	Replace FID
- Transformer not working	Replace transformer
- Auxiliary services PCB is not working	Replace auxiliary services PCB
Dead output signals	
- FID detector not working	Replace FID detector
- Electrometer board not working	Replace electrometer board
- Auxiliary services PCB not working	Replace auxiliary services PCB
RS 232 signal working , 0-10 Vdc sig not present	
- Check external connection	Restore external connection
- Electrometer PCB not working	Replace electrometer PCB

Lack of FID air gas pressure

- Supply air cylinder (if present) empty or with closed interception valve	Open the gas cylinder or replace it
- FID air compressor not working	Either maintain or replace FID air compressor
- Leakage in the relevant circuit	Find and mend the leakage
- Pressure regulator not working	Replace pressure regulator
- Manometer not working	Replace manometer

Lack of FID Air pressure

- Supply air cylinder either empty or with closed interception valve	Open the gas cylinder or replace it
- Leakage in the relevant circuit	Find and mend the leakage
- Pressure regulator not working	Replace pressure regulator
- Manometer not working	Replace manometer
- Auxiliary services PCB not working	Replace auxiliary services PCB

No circulation of sample gas

- Sample adduction line either interrupted or clogged	Maintain heat trace sample line and/or probe ceramic filter
- Sampling pump not working	Either maintain or replace sampling pump
- Auxiliary services card not working	Replace auxiliary services PCB

9.0 SPARE PARTS

Code Number	Description
095020114	Sample capillary
095020115	Hydrogen capillary
095020116	Air capillary
095020120	Catalytic scrubber (HC into CO_2)
095020121	Scrubber sub assembly
095020125	FID detector sub assembly
095020127	Air compressor oil less pump
095020128	Sample sucking heated head pump
095020130	Red LED
095020132	Return push button
095020133	Lever switch
095020134	Zero and Span potentiometer
095020135	Display micro processor PCB
095020136	Power supply transformer
095020137	Mains power supply socket
095020138	Cooling fan
095020141	Electrometer PCB
095020144	Auxiliary services PCB
095020146	Stabilised Power Supply PCB
095020147	Display micro processor PCB
095020150	PT 100 temperature detector
095020152	FID detector heating resistance
095020153	Catalytic converter heating resistance
095020155	Sintered filter
095020156	Sampling probe ceramic filter
095020157	Ceramic filter gasket
095020160	TOC – CH4 three way manual valve
095020163	ZERO – SPAN potentiometer
095020164	Multi turn potentiometer knob
095020170	SS sampling probe
095020180	Heat traced sampling line (standard length 3 m)

Suggested consumables set (including)

09510213	N.1 Carrier gas capillary
	N.1 in built air compressor rebuild kit
09514126	N.1 Sampling pump rebuild kit

Suggested spare parts set (including)

09510943	N.1 Chromatographic column
09510221	N.1 Pressure regulator
09510115	N.1 Rotation valve

PCF ELECTRONICA
MOD. 2001
Portable HOT FID VOC/THC/CH_4 MONITOR

FINAL CHECK RECORD

H_2	Gas cylinder pressure	……	Bar
	To FID, flow rate	..……..	ml/min
AIR	To FID, flow rate	…..……..	ml/min
SAMPLE	To FID, flow rate	……..	ml/min

OVEN : …… °C

CALIBRATION PARAMETERS

Calibration mixture used to calibrate the monitor: CH_4 + C_3H_8, air balance

Gas cylinder: …….. Certification N# …….

Dilution device: THERMO ELECTRON Mod. 146 Dilution system

Traceable
gas mixture: CH_4 _____ ppm VOC _____ mg/Nm^3
C3H8_____ ppm VOC _____ mg/Nm^3

Traceable
gas mixture: Total (CH_4+$C_3H_{8)}$ _____ ppm VOC _____ mg/Nm^3

Measure
gas mixture: Total (CH_4+$C_3H_{8)}$ _____ ppm VOC _____ mg/Nm^3

Set point of SPAN: _____Notches
Set point of ZERO: _____Notches

Service Engineer…….. Date:…….

APPENDIX 1

GAS CONNECTIONS

1- CAUTION WITH THE HYDROGEN SOURCE (VERY IMPORTANT !)

ATTENTION! DO NOT APPLY A PRESSURE HIGHER THAN THE INDICATED ONE:

H_2= 3,0 Bar max.

Air (optional) = 5,0 Bar max.

When wiring the hydrogen supply pipe to the analyzer it is necessary to be very careful. The connection **must be manually scewed** and only at the end, when you are sure that the fitting is screwed to the end, it must be blocked with the key (8 mm) provided.

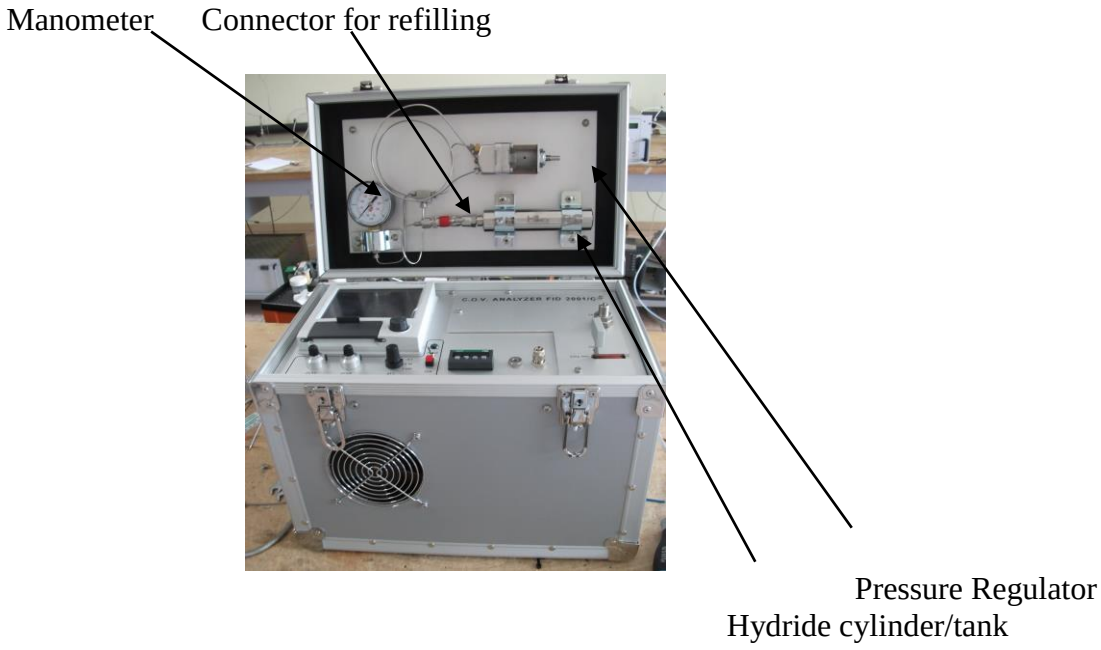
You do not have to force for any reason the connection plug to avoid damaging the screw of the same and necessitate its replacement with the consequent impossibility to use the instrument as well as to avoid hydrogen losses.

The customer must make sure that all the hydrogen cylinders used are in compliance with the safety standards laid down for the accommodation of the same.

AN INSTRUMENT UNCORRECTLY INSTALLED IS UNABLE TO PROPERLY OPERATE AND MAY BE A DANGER FOR THE OPERATOR

2- THE HYDRIDE CARTRIDGE, in built in the instrument

The hydride cartridge is foreseen as option as constitution of the compressed H2 mini cylinder-



APPENDIX 2

HYDRIDE CYLINDER WITH HYDROGEN RELEASE AT LOW PRESSURE

QUICK START MANUAL

[Note: as the hydride cylinder is not of our production it could slightly change in dimensions and/or specifications]

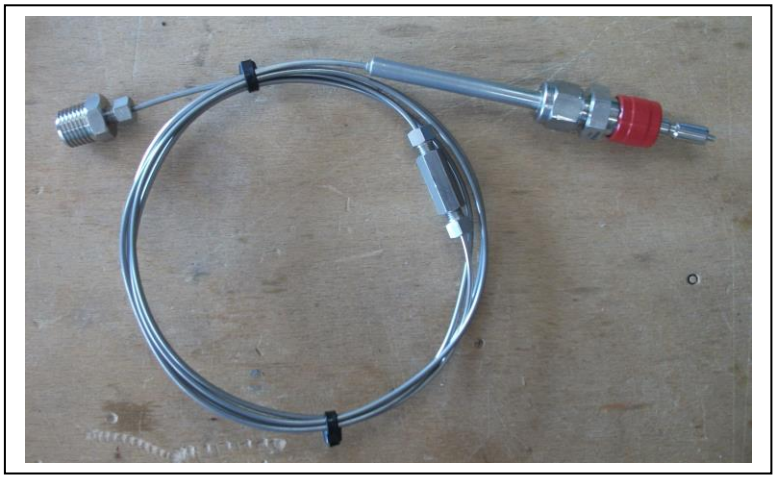
A) Hydrogen refilling procedure

1. Place the hydrides cartridge as to facilitate connection to a hydrogen source such as pressurized cylinders or electrolysers compatible (hydrogen generators).
   Avoid working in awkward positions with short tubes.
2. Open the black knob of the hydride cartridge safety valve by turning it clockwise.
3. Purge a small amount of air/hydrogen mixture from the **special pipe** connected to the source of hydrogen, by the use of the supplied interception valve, or by a short pressure applied to the end supplied male connector, **before connecting it to the hydride cylinder**. This should eliminate polluting gases such as nitrogen or oxygen present in the air.
4. Connect the hydrogen source through the appropriate pipe and a provided pressure regulator, ensuring that the chosen source (cylinder or H_2 generator) has a minimum pressure of 10-15 bars. Use a pressure regulator with dual-stage secondary stage that reaches at least 30 bar to speed up charging. **Never exceed 30 bar pressure, this could cause irreparable damage to the device.**
5. If possible, gently place the hydride cylinder in a bath of cold water (10-15 ° C), preferably in a horizontal position, ensuring that the filling hose is not choked and that the quick connector at the connection point is not under water .
6. If applicable, gradually increase the pressure up to a maximum of 30 bar (keep still around 20 bar). The cartridge should start to heat to effect the adsorption of hydrogen and for the increase of pressure.
7. When immersed in a water bath, as to completely fill the cylinder, keep the water temperature the more possibly also constant with the progress of charging. The walls of the cylinder will heat up and consequently also the water will warm.
8. If the refilling is via industry standard cylinders at pressures of 25 bar, after about 20 minutes the cartridge will be charged. Otherwise the cartridge will be charged after about 30 minutes, if the process is carried out with pressures of 15 bar. In the case of charging with H_2 generators, wait until the hydrogen flow toward the cartridge falls in the neighbourhood of 10-20 cc/min; at that point you will have the certainty of the filled cartridge.
9. Disconnect the quick coupler from the cylinder by pulling out the female attack ring on the cartridge. Do not force in any way the connector; eventually in the event of difficulty in extracting, pull out at the same time the male connector or, even better, contact our. Technical Support.
   Always close, when not in use, the cartridge black knob, turning it clockwise.

B) Hydrogen desorption procedure

1. Connect the quick coupling kit by connecting an end of the same to the quick connection of the cylinder and the other to the device you want to cater.
2. Open the black knob of the hydride cartridge safety valve by turning it counter clock wise.
3. Turn on the device to cater, in our case FID detector, to begin to use the stored hydrogen.
4. After use close the hydride cartridge safety valve black knob by turning it clockwise and disconnect it as in step 9 of the charging.

The Hydride Device mounted on the aluminium cover inside the VOC portable monitor



The Hydride Device with the special supplied pipe for the connection to primary H_2 source (H_2 Gas Cylinder or H_2 Generator)

C) Description of an hydride cylinder

The technical characteristic of supplied cylinder may change without notice. The definitive specifications of the installed hydride cylinder will be described in the enclosed operating manual to the instrument.

Model: MyH2 80
Normal capacity: 7 g (0,08 Nm_3) Hydrogen gas
Hydrides powder: AB_2
External volume: 0,17 liters
Internal volume 0,15 liters
Diameter: 5 cm
Height: 18 cm
Weight of product: 1,3 kg
Maximum refilling pressure: 30 bar
Maximum tested pressure: 100 bar
Suggested maximum refilling pressure: 20bar
Cooling minimum temperature for refill: > 5° C
Maximum operative temperature: < 65° C
Recommended hydrogen purity grade 5.0 (99.999%)
Minimum hydrogen purity grade 4.5 (99.995%)
Flow: < 500ml/min
Certification: CE, compliant ISO 16111