



# USER MANUAL



TCD ANALYSER  
CATARC MP-R



## USER MANUAL : CATARC MP-R

REF. MU DSM 06

Version : 1

Pages : 2 of 28

Date : 2018.05.28

2018.05.28	1	Toutes	Modification into CDL
<b>DATE</b>	<b>Version</b>	<b>PAGE</b>	<b>Modifications</b>

Date	Written by pascal.fouchar	Date	Validated by vincent.le-castrec
2018.05.28	PF	2018.05.28	VLC

## SUMMARY

<b>I. GENERALITY .....</b>	<b>4</b>
<i>I. 1 PREFACE.....</i>	<i>4</i>
<i>I.2. PACKAGE CONTROL .....</i>	<i>5</i>
<i>I.3. INSTALLATION AND USE CONDITIONS .....</i>	<i>5</i>
<b>II. DESCRIPTION PART GAZ .....</b>	<b>6</b>
<i>II.1 INTRODUCTION.....</i>	<i>6</i>
<i>II.2 MEASUREMENT PRINCIPLE.....</i>	<i>6</i>
<i>II.3 GAS CIRCUIT.....</i>	<i>7</i>
<b>III. ELECTRONIC DESCRIPTION .....</b>	<b>9</b>
<i>III.1. INTRODUCTION.....</i>	<i>9</i>
<b>IV. SETTINGS .....</b>	<b>11</b>
<i>IV.1. FIRST PAGE OF SETTING.....</i>	<i>12</i>
<i>IV.2. SECOND PAGE OF SETTING.....</i>	<i>14</i>
<b>V. ELECTRICAL CONNECTIONS .....</b>	<b>19</b>
<i>V.1. CONNECTOR LOGIC INPUT WIRINGS .....</i>	<i>19</i>
<i>V.2. CONNECTOR LOGIC OUTPUT WIRINGS.....</i>	<i>20</i>
<i>V.3. CONNECTOR ANALOGUE OUTPUTS.....</i>	<i>20</i>
<i>V.4. INTERFACE.....</i>	<i>21</i>
<i>V.5. INTERFACE RS232 .....</i>	<i>21</i>
<b>VI. CALIBRATION .....</b>	<b>21</b>
<i>VI.1. CALIBRATION MANUAL/AUTOMATIC/REMOTE.....</i>	<i>21</i>
<i>VI.2. CALIBRATION GAS – HIGH VALUE GAS .....</i>	<i>22</i>
<i>VI.3. CALIBRATION GAS – LOW VALUE GAS.....</i>	<i>22</i>
<i>VI.4. COEF A AND COEF B.....</i>	<i>22</i>
<i>VI.5. MANUAL CALIBRATION .....</i>	<i>22</i>
<i>VI.6. AUTOMATIC CALIBRATION .....</i>	<i>24</i>
<i>VI.7. AUTOMATIC CALIBRATION AT FIXED HOUR .....</i>	<i>25</i>
<i>VI.8. AUTOMATIC CALIBRATION AT CONSTANT INTERVALL .....</i>	<i>26</i>
<i>VI.9. AUTOMATIC SEQUENCE OF CALIBRATION MANUALLY STARTED .....</i>	<i>26</i>
<i>VI.10 AUTOMATIC SEQUENCE OF CALIBRATION STARTED BY EXTERNAL CONTACT.....</i>	<i>26</i>
<b>VII. TECHNICAL SPECIFICATIONS.....</b>	<b>26</b>

## I. GENERALITY

### I. 1 PREFACE

Instrument model :

This instruction manual concerns gas analyser model CATARC10 MP-R.

Serial number :

Analyser serial number is mentioned on the rear panel of the unit.

Power supply :

Analyser should be powered with alternative current , voltage is indicated in this instruction manual and on the rear panel of the instrument.

Taking into account instructions :

Instructions of manual must be read entirely before instrument using .

Instructions respect:

All instructions of use must be followed in order to reach the best performances of the analyser.

Analyser location:

Analyser should be located and should operate on stable support.

Important notice to users :

After entirely instructions reading, keep manual in a safe and known place in order to be able to find it very easily.

Warranty : Instrument is warranted one year.

The warranty includes free of charge replacement of defective parts (except consumable parts) and cost of labour for service in our factory. All equipment requiring repair or replacement under this warranty shall be returned to us at our factory. Such returned equipment shall be examined by us and if it is found to be defective as a result of defective materials or workmanship, it shall be repaired or replaced as foresaid.

If one reparation on site is required by the customer, travelling and living expenses are customer dependent.

This warranty shall not apply to any equipment (or part thereof) which has been tampered with or altered after living our control, which has been repaired by anyone except us, or which has been subject to misuse, neglect, abuse, or improper use. Misuse or abuse of the equipment , or any part thereof, shall be construed to include, but shall not be limited to, damage by negligence, accident fire, or force of the elements.

This warranty does not apply to used or second hand equipment, nor extend to anyone than the original purchaser from us.

## I.2. PACKAGE CONTROL

Pull out the analyser from the original package and examine it in order to detect any kind of external damage that can occur during shipment. In case of damage, missing part or suspect situation, please contact TECORA company or its agent.

## I.3. INSTALLATION AND USE CONDITIONS

Affect the analyser to clean and well defined location. It will allow to protect the unit from any damage and will improve reliability.

The analyser should be installed on a site where it will be protected from rain (we can supply water proof cabinet in option for outside mounting). If temperature is supposed to decrease under 0°C, an heating system is necessary (don't hesitate to contact us).

Foresee 100 mm space behind the analyser in order to be able to realise gas and electrical connections without any problem.

If ambient temperature fluctuates a lot, it will be necessary to recalibrate the instrument more often than foreseen.

Avoid to install the unit in an area where there are strong vibrations or strong electromagnetic fields.

All electrical wiring will be done with shielded cable, screen connected to the earth at analyser side.

## II. DESCRIPTION PART GAZ

### II.1 INTRODUCTION

The gas analyser model CATARC10 MP-R has been designed for simple and accurate measurements on dry and clean gas. The instrument uses thermal conductivity principle for gas content measurements in binary blending or equivalent of binary blending (example : air). It had also a catharometric detector with microthermistor designed and built by ARELCO for a good stability.

### II.2 MEASUREMENT PRINCIPLE

The gas analyser model CATARC10 MP-R could be used in a blending where the component to measure has got a far different thermal conductivity of other gas of the blending.

As you know, thermal conductivity is not a specific data of a gas. (several gases can have the same thermal conductivity). Actually, the instrument measures the difference between two thermal conductivities. So it is absolutely necessary to check that both gas of the blending have different thermal conductivities in order that the unit provides the best performances it can.

The main element of the analyser consists in the detection cell. It includes two thermistors mounted in opposition in a Wheastone bridge.

one thermistor is installed in the 'sample gas' circuit  
the other one is installed in the 'reference gas' circuit

The reference gas is usually the main gas of the blending.

The content of gas to measure is given by the difference of balance between both thermistors.

So main operations to perform are :

- balance of the bridge (zero setting)
- calibration of the bridge with calibration gas (span setting)

## **THERMAL CONDUCTIVITY DATA**

The range of the instrument is depending on the application. It has to be check with our specialist engineers.

We give just under the thermal conductivities of main gases.

The unit is : cal/(sec) (cm<sup>2</sup>) (°C/cm) 10<sup>-6</sup>. In order to convert this value in Btu/(hr) (ft<sup>2</sup>) (°F:/ft) X 10<sup>-6</sup>, multiply per 241.909.

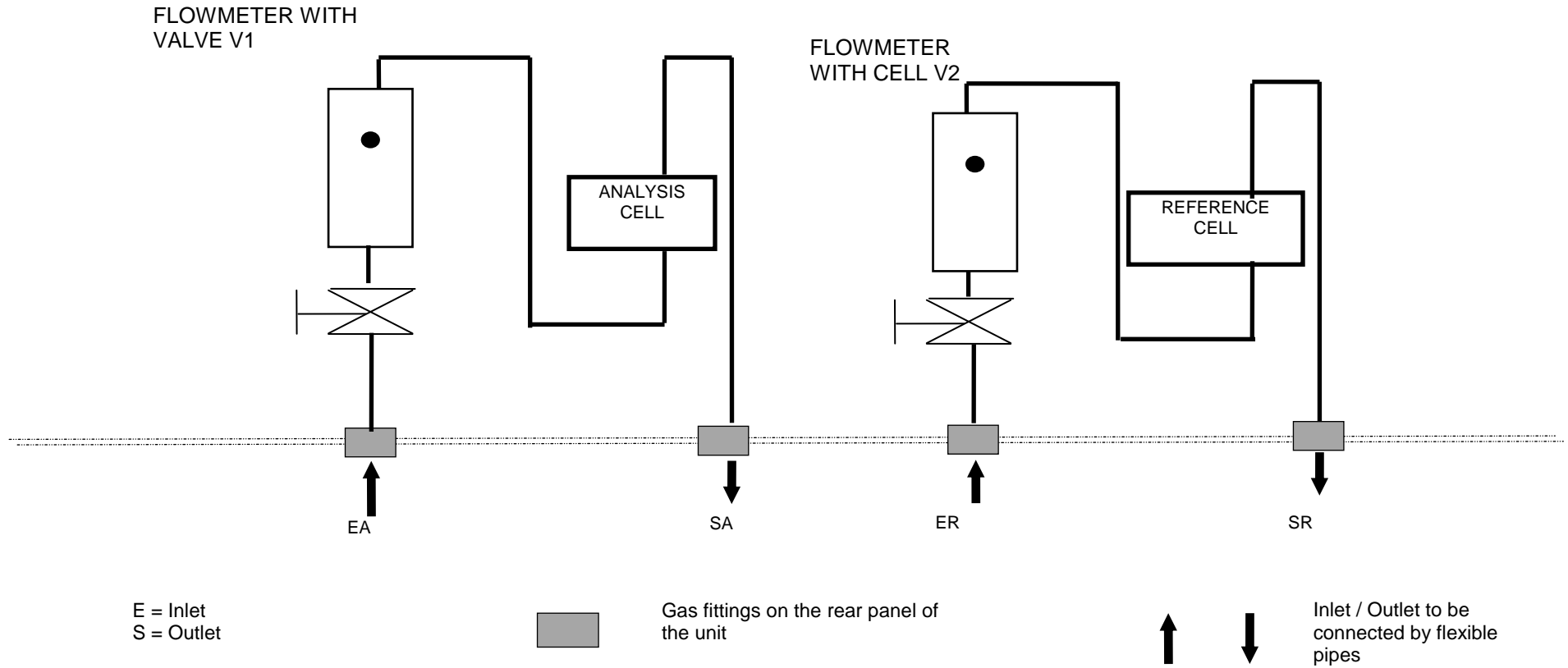
GAS	THERMAL CONDUCTIVITY	GAS	THERMAL CONDUCTIVITY
Acetylene	53.72	Ethylene	52.07
Air	64.22	Fluorine	66.12
Ammonia	61.58	Helium	368.63
Argon	44.22	Hydrogen	458.72
Bromine	11.57	Hydrogen bromide	21.49
n-Butane	40.91	Hydrogen chloride	35.12
i-Butane	41.74	Hydrogen cyanide	30.99
Carbon dioxide	41.74	Hydrogen sulphide	36.78
Carbon disulphide	19.84	Krypton	23.56
Carbon monoxide	61.99	Methane	85.54
Chlorine	21.90	Neon	118.19
Deuterium	343.01	Nitric oxide	64.06
Ethane	54.55	Nitrogen	64.06
Ethanol	36.78	Nitrous oxide	43.31
Ethylamine	39.67	Oxygen	65.91

### II.3 GAS CIRCUIT

The analyser has an 1/8" NPT female inlet and outlet. The flow must be equal from 0.2 to 0.8 L/min. The recommended flow is 0.5 L/min. The flowmeter allows a regulation of the flow in the sensor at about 100 cc/min.

The gas pressure must be contained between 0.9 and 1.1 bar (absolute). In case of a higher pressure, use a pressure regulator at the inlet of the instrument. In case of a lower pressure, use a pump. It must be placed above the instrument. Like that, the gas will be pushed in the analyser (cf. scheme).

### GAS CONNECTION (sensor integrated in the analyser)



This document is the property of Tecora and can not be duplicated without permission



---

## III. ELECTRONIC DESCRIPTION

### III.1. INTRODUCTION

The analyser integrates a microprocessor electronic designed to answer at the market's inquiries.

The tactile screen allows to see quickly the totality of the essential parameters : gas content, barometric pressure (option), temperature regulation, alarms status...

The analyser incorporate a internal function for data memorization (350 data) extendable by a SRAM card (option) which assures on top of that a total control of the analyser (alarm threshold, error message, calibration, modification of the configuration...)

A parallel output allows to connect the device to a printer (output on listing). The RS232 output permits to connect a PC for the acquisition of the measurements under "terminal" in WINDOWS.

The calibration of the analyser can be done with manual or automatic sequence, according to user configurable protocol.

The alarms and the other logical signal are available on SUB D connectors (5V/100 mA maximum). A separated interface box allows to make use of these informations with SPDT contacts or direct supplying of these components.

#### III.1.1. PASSWORD

The modification of the parameters seen in the menu is protected with a password.

**Protection A:** press during 6 seconds on indication . (dot) on the right of the zero.

The indication – on the left of the zero will be changed on <-. The protection is inactive in this page.

**Protection B:** the code is 4875.

### III.1.2. TOUCH SENSITIVE DISPLAY

The user has to press on the good item to select it. It is recommended not to use any pen or hard point for this operation. The touch sensitive display could be damaged.



### III.1.3. Principal display

On the power on, the analyser displays :

- the program version
- the device model
- the time
- the TECORA phone number
- the TECORA fax number

the device switches over to the principal screen of data « routine screen »

The « routine screen » gives indications about:

- the measurement
- alarm status
- operating phase of the device in coherence with its general parameters (made in our manufactory for some tasks, or set by the user for available functions in several menu pages and accessible by "MENU" touch in the bottom right corner of the screen)

It contains :

- the time
- measured gas content
- threshold alarm and flow
- informations in relation with
  - sensor thermostatisation
  - calibration

On the power on, the device has to stabilize the sensor temperature before doing optimal measurements.

It runs with a heating phase, indicated on the screen by a message « heating » on the top of the screen.

In a first time, the difference of temperature between the real temperature of the sensor and the instruction ( fixed in our manufactory at +45°C ) is big.

The message “heating” is activated. The temperature indication of the sensor is displayed on the range from 0 to +60°C.

When the temperature is near +45°C; the temperature of the sensor displays a window which indicates the temperature difference in a band of temperature about +/- 5%.

From this moment, the heating line is replaced by the message “SENSOR READY IN ... MINUTES” with the count of the last time.

This temporisation allows to assure a good homogeneity of temperature at the level of the sensor for better measurements.

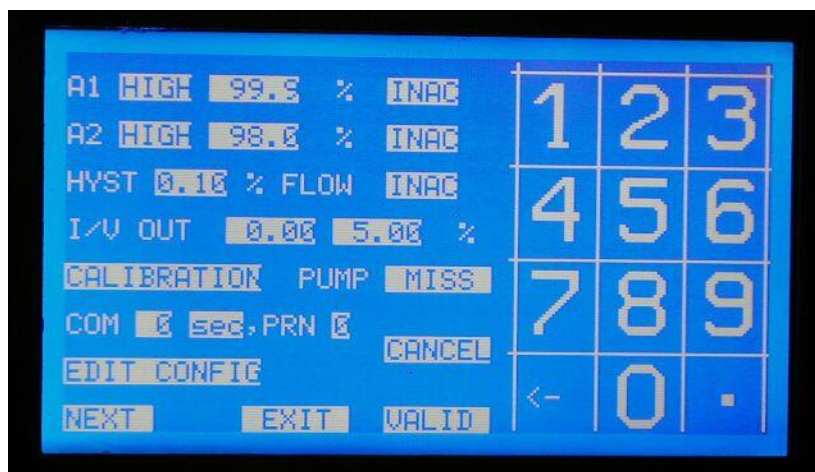
At the end of the count, the messages concerning the startup phase disappear.

The device is on analysis routine and general function, in conformity with the last setting realized.

Nota: in case of brief shutdown (< 1'), the analyser restart if the sensor temperature doesn't drift. In the opposite, the routine is reactivated ( When it restart, the screen displays a page of several characters during its initialization phase.)

## IV. SETTINGS

From this routine screen, enter to the first page of the menu by the key “MENU” on the bottom right.



## IV.1. FIRST PAGE OF SETTING

The first page allows to set :

- the threshold alarm A1
- the threshold alarm A2
- the flow alarm
- the range for the function of analogic outputs (dilated range)
  - the command of optionnal external pump
  - serial port parameters
  - printer port parameters
- access to calibration menu
- edition of current configuration

### IV.1.1. SETTING OF A1 and A2 THRESHOLD ALARM

- working sense HIGH or LOW, by successive pressing on the corresponding zone, then VALID to confirm.  
HIGH means alarm situation if the measure is higher than the instructions.
- threshold, in %, adjustable from 0.0 to 100.0%. After pressing on corresponding zone, take hold of by numeric keypad, then VALID to confirm.
- working mode NORM, MEMO, INAC, then successive pressing on the corresponding zone, then VALID to confirm.

Mode NORM : the alarm is a fugitive type. She goes over to alarm position or come back to out alarm situation according to the current conditions.

Mode MEMO : the alarm is a memorized type. She goes over to alarm position and keep this position until its receipt which is done by the same key in this page of menu by pressing on ACQ then VALID.

Mode INAC : the alarm is inactive.

Nota : the routine screen indicates the chosen alarm mode by the following display :

A1 NORM	A1 at the right of the measurement,
A1 MEMO	A1 on white background at the right of the measurement,
A1 INAC	A1 not displayed.

- The alarm status is indicated by a flashing white square near the concerned alarm when it is activated.
- HYST (hysteresis) common to A1 and A2, adjustable from 0.00 to 9.99% of the programmed threshold.

#### IV.1.2. FLOW ALARM

This alarm can be set like A1 and A2. It is activated by an external contact held open during 15 seconds minimum.

#### IV.1.3. ANALOGUE OUTPUTS SETTING 0/10 V and 4/20 mA IN DILATED RANGE

In front of I/V OUT, the first digit fits to the bottom of the range and the second to the top of the range. In order to modify, press on the concerning zone, take hold off by numeric keypad then VALID. A minimum gap of 2% is required. The device will refuse any incoherent programmation.

#### IV.1.4. EXTERNAL PUMP COMMAND

By successive pressing on the concerning zone, then VALID to confirm.

Nota : this command put at disposal a 5V level on the connector TOR OUT at the back of the analyser.

#### IV.1.5. COM SETTING

The user should send the measurements stamped with the hour and date on COM1 (RS232) for communication to a PC under Terminal for example and to the printer. Set the intervall by pressing on the concerning zone, from 0 to 99 (Do the same for time unit, hour, minut and second) then VALID to confirm.

#### IV.1.6. PRINT SETTING

It allows to declare a parallel printer, by pressing on the concerning zone. 0 = no printer, 1 = printer installed.

Nota : The printings are set like COM.

#### IV.1.7. EDIT CONFIG CHOISE.

It allows to print the general configuration of the analyser. Press on the concerning zone then VALID. This edition is sent to the PC.

#### IV.1.8. CALIBRATION CHOICE

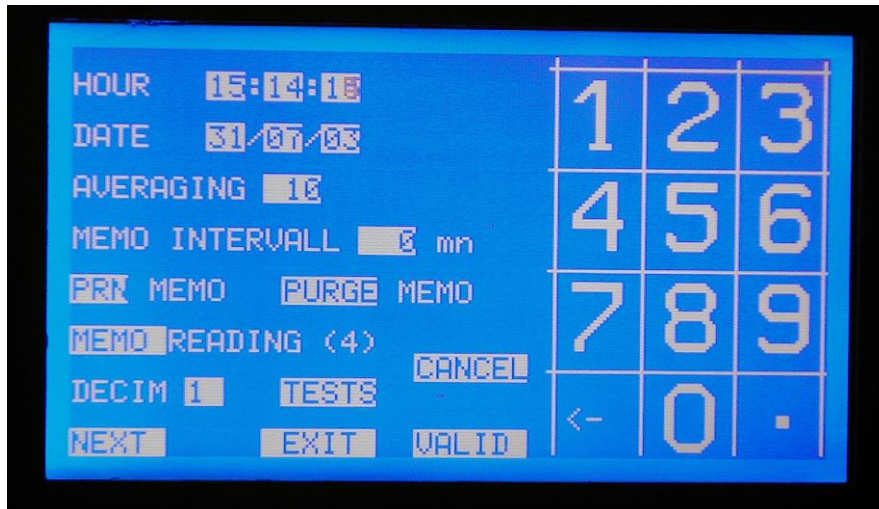
It allows to access to sub menus concerning the calibration. ( see calibration paragraph).

Nota : The CANCEL key allows to cancel the current capture and to keep an old data.

The EXIT key displays the routine screen.

The NEXT key allows to access to the second page of settings.

## IV.2. SECOND PAGE OF SETTING



### IV.2.1. TIME AND DATE SETTING

Press on the concerning zone, key the right value with the numeric keypad, then VALID to confirm.

### IV.2.2. AVERAGING MEASUREMENTS

Press on the concerning zone, key the right value with the numeric keypad, then VALID to confirm.

It is a filter of measurements. it is adjustable from 0 to 25 (normal value 15). The measurements are filtered by a sliding average, i.e. last x measurements.

### IV.2.3. MEMO INTERVALL

The device is equipped with a memory which allows the storage of the 350 last measurements. MEMO INTERVALL makes possible to choose the storage frequency, defined in intervalls expressed in minutes, adjustable from 0 to 720 minutes (12 hours). For a programmation 0, the memorization is inactive. To set the right intervall, press on the concerning zone, key the value on the numeric keypad, then VALID to confirm.

### IV.2.4. PRINTING MEMO

To print the contents of the memory, press on the concerning zone, then VALID to begin the printing.

### IV.2.5. PURGE MEMO

This command allows to empty the contents of the memory.

N.B. : the number of measurements stored is indicated between parenthesis at the right of the reading MEMO.

#### IV.2.6. MEMO READING

▲ It allows to display the contents of the memory with the navigation using the keys ▲ and ▼ .

#### IV.2.7. DECIM

Option for the choice of display of the measurement with 1 or 2 decimal number, by successive pressing on the concerning zone.

#### IV.2.8. TESTS

It is a menu which allows the access to the visualization of the state of following interfaces:

- Input/Output Logic In/Out
- Analog input/output
- Internal sensor

These data are interesting in case of problem on the device.  
However, almost of them aren't in user domain except the above data.

##### IV.2.8.1. LOGIC INPUT / OUTPUT

On the analyser, the state 0 fits to the closed contact and the state 1 for the opened contact for the inputs. For the outputs, the state 1 fits to the logical state 5V and 0 to the logical level 0V.

It is possible to run the alarm outputs of the analyser in positive or passive security. This setting is applied to the alarm relays A1 and A2 and to the relays connected with the state CALIBRATION, ANALYSER DEFAULT, and MEASUREMENTS NOT VALID.

In order to modify the running mode, report to the section CHOICE OF THE RUNNING MODE OF THE SPDT RELAYS.

The positive security is called NOR. The passive security is called INV.  
The separated interface box is available to directly work on the outputs.

### Settings of the outputs TOR

CALIBRATION IN PROGRESS ( from 1 to 9 of SUB D) “ETAL”.

This output is activated when the calibration phasis. It is active during all the sample period, increased of time of Frozen Out.

On the other hand, if there is a CAL ABORTED during automatic calibration, It becomes flashing at 1 Hz. This situation is delocked by a calibration realized with success, In preference in manual,.for the well understanding of the validity of it and understand the cause of the last abort of calibration.

NOT VALID MEASUREMENT (3 and 11 of SUB D) “NVM”

This output is activated as soon as the user isn't in the routine screen, or the analyser is in preheating phasis, or the user is in the phasis FROZEN OUT (see previous section). This information allows to emit caution on the quality of the signals in progress available on ANALOGIC outputs, on screen and on PC.

ANALYSER DEFAULT (4 and 12 of SUB D) “DEF”

This output is activated in case of internal default of the analyser :

- Temperaturee of regulation out of limit
- Signal of sensor out of limit
- Flow default if it is activated
- Internal power supply default

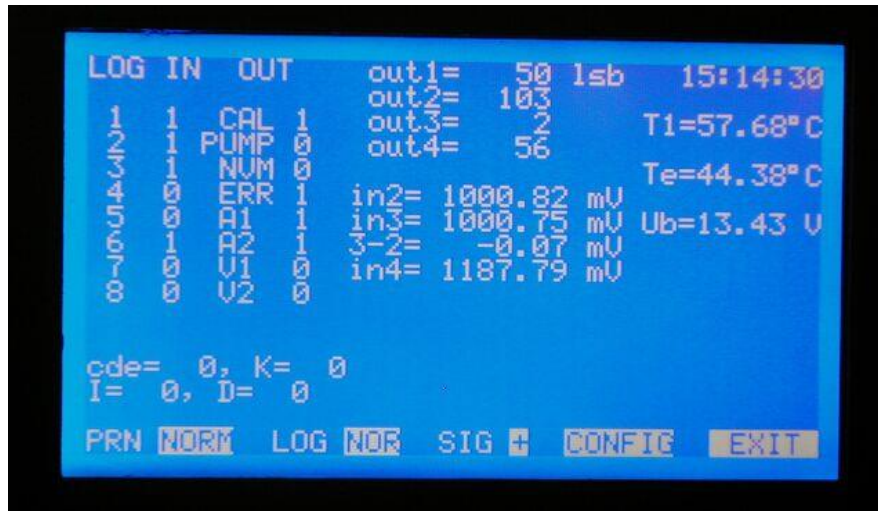
EV1 COMMAND (7 and 15 of SUB D) “V1”

This output is activated in calibration phasis, during the period HIGH GAS, and allows the selection of calibration gas low and high.

EV2 COMMAND (8 and 15 of SUB D) “V2”

This output is activated in calibration phasis, during the period LOW GAS, and allows the selection of calibration gas low and high.





Logic Input	Object	
1	Flow default	If SPDT contact closed, flow OK
2	Calibration external command	: SPDT contact closed during 10 s
3	not modified	
4	not modified	
5	not modified	
6	not modified	
7	not modified	
8	not modified	

Logic Outputs	Object	Positive security state	Passive
CAL	Calibration	Voltage 5V (Out of calibration)	0V
PUMP	Pump	Voltage 5V for external pump	5V
NVM	Mesurement not valid	Voltage 5V in case of valid measurement	0V
DEF	Analyser default	Voltage 5V out of default	0V
A1	Alarm A1	Voltage 5V out of alarm	0V
A2	Alarm A2	Voltage 5V out of alarm	0V
V1	Electrovalve 1 (choice between zero gas and standart gas)	Voltage 5V for standart choice	5V
V2	Electrovalve 2 (choice between EV1 and sample gas)	Voltage 5V for EV1 choice	5V

#### IV.2.8.2. CHOICE OF PRINTING MODE "PRN"

- Normal printing : date, gas content
- Test printing : date, gas content , sensor brut signal, barometric pressure (in option), sensor temperature, instruction temperature

Others events are printed (preheating, calibration, default...)

In order to choose the option normal printing or test printing, from the routine screen, press on MENU then NEXT. Then press on TESTS and on the indication TEST or NORM situated on the right of PRN (at the bottom-left of the screen) by choosing by successive pressing. This setting concern the data sent to the printer and the PC.

#### IV.2.8.3. CHOICE OF RUNNING MODE

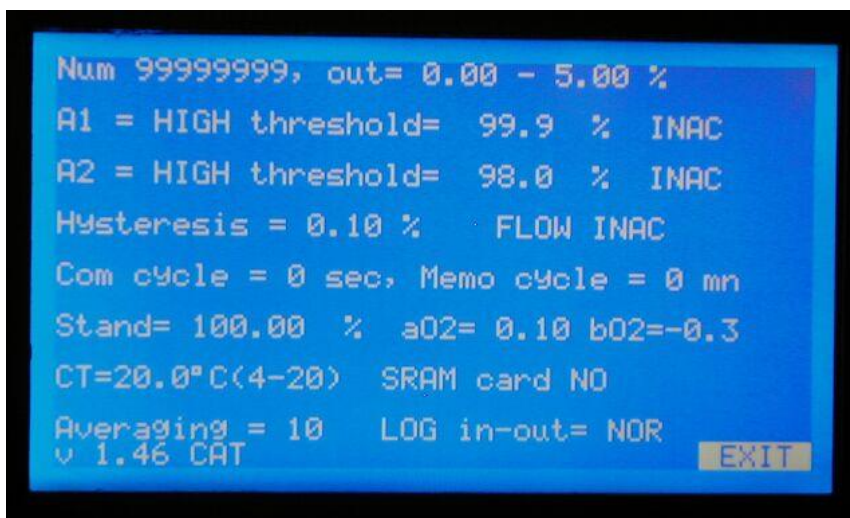
It is possible to run the outputs in positive security or passive. This setting is applied to the alarm outputs A1 and A2 and to the outputs CALIBRATION STATUS, ANALYSER DEFAULT and NOT VALID MEASUREMENTS.

The positive security is called NOR. The passive security is called INV.

Press on indication NOR or INV situated on the right of LOG (on the bottom of the screen), by choosing by successive pressings. The status LOG OUT reverse immediately. ( log pressing during 5 seconds).

#### IV.2.8.4. VIZUALISATION OF THE CONFIGURATION

It is possible to see the complete configuration of the analyser. Press on CONFIG (on the bottom of the screen). The configuration displays automatically. The indication NUM correspond to the srial number of the analyser. The other indications show the effective setting of the analyser.



When a SRAM card reader is installed on the analyser, the information is given here. The memory capacity is bigger (several thousands of values). For an acquisition frequency of 5 minutes and a SRAM card of 256 Kb, the device has a record

autonomy about 6 months (this period depends of the events number automatically recorded on the device: default, calibration,...).

If the card reader SRAM is not installed, the device displays SRAM CARD NOT INSTALLED

If the card reader SRAM is installed, the device displays SRAM CARD INSTALLED and BATTERY Ok.

## V. ELECTRICAL CONNECTIONS

The electric wirings are at the back panel of the analyser. The following connectors are present :

- Power supply IEC plug
- LOGIC input SUB-D, 15 pins, male
- LOGIC outputs SUB-D, 15 pins, female
- Parallel printer port SUB-D, 25 pins, female
- Analogic outputs SUB-D, 37 pins, female
- RS232 serial interface, COM1 SUB-D, 9 pins, male

The others connectors aren't affected or missing.

The standard power supply of the device is 230 V/50-60 Hz. cf signaletic label of the device in case of doubt on the power voltage.

### V.1. CONNECTOR LOGIC INPUT WIRINGS

DESIGNATION	BORNE
Flow default	1
Flow default	9
Calibration remote	2
Calibration remote	10
non affected	autres

## V.2. CONNECTOR LOGIC OUTPUT WIRINGS

DESIGNATION	BORNE
Current calibration/default +	1
Current calibration/default -	9
External pump command +	2
External pump command -	10
Not valid measurements +	3
Not valid measurements -	11
Analyser default +	4
Analyser default +	12
Alarm A1 +	5
Alarm A1 -	13
Alarm A2 +	6
Alarm A2 -	14
EV1 command (zero/calibration) +	7
EV1 command (zero/ calibration) -	15
EV2 command (sample/EV1) +	8
EV2 command (sample/EV1) -	15

## V.3. CONNECTOR ANALOGUE OUTPUTS

DESIGNATION	BORNE	FROM VERSION V1-V4
4/20 mA range 0 à 100 % +	1	1
4/20 mA range 0 à 100 % -	20	20
4/20 mA dilated range +	3	3
4/20 mA dilated range -	22	22
0/ V range 0 à 100 % +	12	16
0/ V range 0 à 100 % -	31	35
0/ V dilated range +	14	18
0/ V dilated range -	33	37
non affected	others	

## V.4. INTERFACE

It is a separated box of the analyser which allows to deliver, for LOG outputs, contacts for direct power supply of pumps and electrovalves.

This box is planned for mounting on DIN (see specific manual).

## V.5. INTERFACE RS232

It allows the wiring to a PC for the recovery of data under TERMINAL.

The data are present on the current configuration (timing programmed on COM)

RS232 Format : 9600 bauds  
datum bit : 8  
without parity  
stop bit : 1

Wiring of SUB-D, 9 pins, male : T X pin3, R X pin2, GND pin5.

## VI. CALIBRATION

The calibration of the device can be manual or automatic.

### VI.1. CALIBRATION MANUAL/AUTOMATIC/REMOTE

The choice between manual calibration, automatic or remote (external) is done like this:

From the routine screen, press on MENU then CALIBRATION.

Press on MANU (or AUTO or EXT). The symbol > appears near the choice. Press several times to modify the calibration type. Press on VALID to confirm the choice, then EXIT to return to the routine display with this new setting.

**Manual calibration :** It is a manual sequence of instruction of calibration gas on the analyser. This sequence is commanded by a manual action on tactile screen.

**Automatic calibration :** It is an automatic sequence of introduction of calibration gas on the analyser. This sequence can be activated :

- by the device at fixed hour (ex : all days at 09.00 am)
- or by the device at constant interval (ex : all the 24 hours)
- or by a manual action on tactile screen
- or by an external command (closure of the contact during 10 seconds minimum)

## VI.2. CALIBRATION GAS – HIGH VALUE GAS

It is the gas for the top of the range. It is recommended to use the mixing of gas near the wanted value.

Don't forget that you have to respect the pressure and the recommended flow.

From the routine screen, press on MENU, then on CALIBRATION, and pass on MANU mode.

Press on the indication located near HIGH GAS. The symbol >--- appears near it. Key the new value of the gas. If it is absurd (ex : 123%), the device refuse the new value and keep the old one. Press on VALID to confirm the choice then press on EXIT to return to the principal display with this new setting.

## VI.3. CALIBRATION GAS – LOW VALUE GAS

It is the gas for the zero gas or for the bottom of the range. It is recommended to use Nitrogen. Respect the pressure and recommended flow.

## VI.4. COEF A AND COEF B

They are two coefficients calculated by the analyser during the calibration. They enter in the equation  $Y = AX + B$ . The user don't operate on it. However, it is possible to manually key them or reinitialize. It is interesting in order to have the coefficients if they were lost because of a bad manipulation or when the user don't have enough calibration gas.

Key the protection code (4875). For each number, appears a star on the bottom right. The values of coefficients A and B are underlined.

Press on the value of the coefficient to modify. The symbol >--- appears near the indication. Key the new value (max value : 9.9999). If the value is absurd (ex : 123), the analyser refuse the new value and keep the old one.

Press on VALID to confirm the choice then on EXIT to return to the display of the routine screen with this new setting.

Nota : By command INIT, the reinitialisation set  $A = 0.1000$  and  $B = 00.00$

## VI.5. MANUAL CALIBRATION

From the routine screen, press on MENU. Then press on CALIBRATION. Check that MANU is selected. On the contrary case, select MANU (see precedent section).

Press another time on CALIBRATION.

Verify that the HIGH GAS and LOW GAS on the used calibration bottle gas.

### LOW GAS :

The analyser ask if the operator want to calibrate the bottom of the range. In case of refusal (Zero gas not available or control make recently), press on REJECT.

If not, press on YES to start the calibration of the “zero”. A count of time begin and is displayed. Dots are moving in the indication zone near the ZERO GAS. The count last one hour max. Valid the calibration of LOW GAS by pressing on VALID as soon as the measurement is stabilized (10 to 15 ‘ for a good stability). The value of the zero gas is taken in account. If the zero gas is wrong (leak, bottle mistake...), the device indicate NO CALIBRATION and the count continue. This allows to verify the zero gas sent to the analyser or check the mounting and re-valid. By pressing on IGNORED, it does not take in account the value. The old value is kept. However, it is possible to force the memorization of the coefficeints by pressing on FORCE (Not recommended because it supposes a risk of wrong coefficient setting).

If none action is done during a one hour period, the device leaves the calibration mode and the old values are kept.

#### HIGH GAS :

The analyser ask if the operator want to calibrate the top of the range. In case of refusal (High gas not available or control make recently), press on REJECT.

If not, press on YES to start the calibration of the top of the range. A count of time begin and is displayed. Dots are moving in the indication zone near the HIGH GAS. The count last one hour max. Valid the calibration of HIGH GAS by pressing on VALID as soon as the measurement is stabilized (10 to 15 ‘ for a good stability). The device display COEF CALCUL and the value of the high gas is taken in account. If the high gas is wrong (leak, bottle mistake...), the device indicate NO CALIBRATION and the count continue. This allows to verify the zero gas sent to the analyser or check the mounting and re-valid. By pressing on IGNORED, it does not take in account the value. The old value is kept. However, it is possible to force the memorization of the coefficeints by pressing on FORCE (Not recommended because it supposes a risk of wrong coefficient setting). In the case of an important drift of calibration coefficients is observed, the device indicates COEF DRIFT, and purposes FORCE or IGNORED. The operator has to take a decision; if he decides to IGNORE, the old coefficients are conserved; if he decides to FORCE, these new coefficients are applied.

If none action is done during a one hour period, the device leaves the calibration mode and the old values are kept.

## VI.6. AUTOMATIC CALIBRATION

Reminder : The automatic calibration sequence can be run like that

- by the device at fixed hour (ex : all days at 09.00 am)
- or by the device at constant intervall (ex : all the 24 hours)
- or by a manual action on tactile screen
- or by an extern command (closure of the contact during 10 seconds minimum)

The following parameters are common to the 3 calibration mode :  
value of the zero gas, value of the gas of the top of range, period of calibration run,  
minimal time, analogic outputs hold.

### LOW GAS :

It is the gas for the zero gas or for the bottom of the range. To modify this parameter, follow the instructions given on CALIBRATION GAS, LOW VALUE GAS.

### HIGH GAS :

It is the gas for the for the top of the range. To modify this parameter, follow the instructions given on CALIBRATION GAS, HIGH VALUE GAS

### *LOW T*

It is the duration of streaming of the low gas.

Modification of parameter low T :

Press on the indication loaded on the right of low T. The symbol >--- appears near it. Key the new value ( in minutes, below or equal to 59). If it the new value is higher than 59, the device refuse the new value and keep the old one. Press on VALID to confirm the choice then press on EXIT to return to the principal display without modifying this setting. If the user does not want the high gas to circulate on the device, enter 0 minute.

### *HIGH T*

It is the duration of streaming of the high gas.

Modification of parameter high T:

Press on the indication loaded on the right of high T.

The symbol >--- appears in front of the indication. Enter the new value (in minutes - less than or equal to 59). If the value is greater than 59 minutes, the unit refuses the new value and keep the old one.

Press on VALID to confirm the choice or press on EXIT to return to the main screen without changing the setting. If the user does not want the high gas to circulate in the device, enter 0 minutes.

### *MINI T*

After a power cut, the device will re-start and re-begin its running procedure. The complete specifications of the analyser were reached only after one hour. The analyser, by programming, can eventually run automatic calibration without reaching these specifications. It is not recommended.

In order to avoid it, it is possible to program a T mini duration which allowsto cancel automatic calibration before this period. The duration T mini can be set between 0



and 24 hours. In the menu CALIBRATION, press on the the indication at the right of T mini. The symbol >--- appears near the indication ?. Key the new value ( in hour, below or equal 24). If the value is higher than 24, the device refuse the new value and keep the old one. Press on VALID to confirm the choice or on EXIT to return to the routine screen without modifying the setting.

#### *FROZEN Out*

During the calibration, the analogue outputs can be hold to the value that they had before the begin of the calibration. It is called “freeze of the values”. The duration of this period is adjustable and allows to wait a ne sampling before reactivating the outputs.

In the menu CALIBRATION, press on the indication at the right of FROZEN out. The symbol >--- appears. Key the new value (in minutes, below or equal to 59). If the value exceed 59, the device refuse the new value and keep the old one. Press on VALID to confirm the choice or on EXIT to return to the routine screen without modifying the setting. If the operator does not want the analogue outputs to be hold, key 0 minute.

### VI.7. AUTOMATIC CALIBRATION AT FIXED HOUR

The calibration can be set to run at fixed hour. Ex : all the days at 09.00 am.

Press on CALIBRATION.

Check that the AUTO mode is selected.

Set the activation hour (indcation FIXED HOUR).

Press on the indication located at the right of FIXED HOUR. The symbol >--- apperas near the indication. Key the new value (ex : 9 for 09.00 am). If the value is absurde (ex : 30), the analyser refuse the new value and keep the old one. Press on VALID to confirm the choice or on EXIT to return the routine screen without modifying the setting. The value 99 disable this function.

Check the values for the calibration gas. Modify them if necessary.

Check the duration of streaming gas. Modify it if necessary.

Check the value of T mini. Modify it if necessary.

The device is ready to do the calibration sequency at fixed hour. The electrovalves (external of the analyser) are driven by the analyser fdollowing the programmed settings.

Description of a sequence.

At fixed hour (ex : 09.00 am) the device begin a sequence. It displays CALIBRATION (Low T = xx') and the left sweeping time. During this period, the low gas is introduced in the analyser. At the end of the streaming duration, the low gas value is taken in account.

If the zero gas is wrong (leak, bottle error,...), the device refuses the calibration and displays CAL REFUSE. The calibration sequence is stopped. The device does not allow the introduction of a high gas ans the old values are kept.

The device displays AUTO CALIBRATION ( High T = xx') and the remaining calibration time in seconds. During this period, the high gas is introduced in the analyser. At the end of this streaming period, the value of low gas is taken in account then the device displays COEF CALCUL.

If the high gas is wrong (leak, bottle error,...), the device refuses the calibration and displays CAL REFUSE. The old values are kept.

Nota : If the parameter high T is set to 0, the device does not execute the introduction sequence of the high gas. When the automatic calibration sequence is started at fixed hour, the operator can stop it at every moment. From the routine screen, press on MENU. The screen relative to the calibration is displayed. Then press on CANCEL. The device leaves the calibration screen and return to the routine screen.

## VI.8. AUTOMATIC CALIBRATION AT CONSTANT INTERVALL

The calibration can be programmed at constant intervall.

Ex : all the 48 hours.

Press on calibration.

Check if the AUTO mode is selected.

Set the time intervall. Press on the indication located at the right of INTERVALL. The symbol >--- appears. Key the new value (ex : 48). The maximal time intervall is 999 hours.

Press on VALID to confirm the choice or on EXIT to return to the routine screen without modifying the setting.

Check the parameter FIXED HOUR if you want a synchronization or not. Check the values for the calibration gas. Modify it if necessary.

Check the value T mini. Modify it if necessary.

Check the value FROZEN out. Modify it if necessary.

The analyser is ready to do the calibration sequence at constant time intervall. The first calibration sequence starts at the first full hour (according analyser clock).

## VI.9. AUTOMATIC SEQUENCE OF CALIBRATION MANUALLY STARTED

The automatic sequence of calibration can be manually started. Press on the indication START located at the right of CAL CDE (Calibration command) to run the automatic sequence of calibration.

## VI.10 AUTOMATIC SEQUENCE OF CALIBRATION STARTED BY EXTERNAL CONTACT

Check that the EXT mode is programmed and start by contact hold 15 seconds minimum.

## VII. TECHNICAL SPECIFICATIONS

Measuring ranges : according to the application

---

Display	: Tactile screen with liquid crystals
Analogue Output	: 0 - 1 V full scale, impedance min. 1 k $\Omega$ 4 – 20 mA full scale, non isolated from 0 – 1 V output signal, impedance max. 500 $\Omega$
Digital Output	: Parallel output for printer, RS232 output
Alarms	: 2 threshold alarms, default sensor alarm, calibration (in progress or fault), flow fault (with external flow detector, option), outputs TTL 5V to relay with interface box,
Accuracy	: +/- 1 % of full scale (ex: +/- 1% H2 in range 0-100% H2 in N2)
Response time	: T 90 = 30 s, depending on the application
Flow	: 40 l/h
Inlet gas pressure	: max. 1 barg
Sensor heating temperature	: + 45°C
Sampling	: gas should be clean and dry, 0<RH<95%
Operating temperature	: -10 °C to + 45 °C (other possible)
Storage temperature	: - 20°C to + 60 °C
Integrated flowmeters	: 0-60 l/h with valve
Gas circuit connections	: 1/8"NPT female or compression fittings for tube 4/6 mm
Power supply	: 115/230VAC – 50/60Hz
External dimensions	: rack 19", 3U, depth 350 mm
Weight	: 10 kg



COMBUSTION / ÉMISSION DEPARTMENT



INDUSTRIAL CONTROL DEPARTMENT



HYGIENE HEALTH AND ENVIRONMENT DEPARTMENT



SERVICE AND LOGISTIC DEPARTMENT

CDL-Carrefour du Laboratoire  
Siège social : Rue Anne Gacon-Village Entreprise St Henri Bât. n°23, 13016 Marseille  
Tél. +33 (0)4 91 03 66 69– Fax +33 (0)4 91 46 58 47  
S .A.S. AU CAPITAL DE 24 000 € – R.C.S. Marseille B377847546– SIRET 37784754600027 TVA FR 68377847546  
Atelier CDL - Tecora: 10 rue de la Prairie 91140 Villebon sur Yvette