HYDRASTAT

- 9186 -

Instruction manual

03/2001

621=191=086
Rev. C

This instrument conforms to the European Directives :

- 89/336/CEE modified by the directive 93/68/CEE
- 73/23/CEE modified by directive 93/68/CEE

CE

Warning!

There are no user-serviceable parts in either the transmitter or sensor. Only Polymetron personnel or their authorized representative should attempt repair of the system and only components expressly approved by the manufacturer should be used. Any attempt to repair the instrument in contradiction of these guidelines may result in damage to the instrument and injury to the person making the repair. It will also void the warranty and may compromise the safe operation, electrical integrity or CE compliance of the instrument.

COPYRIGHT

Polymetron S.A.

Polymetron S.A. can take no responsability for installation and/or use of its equipment if this is not done in accordance with the appropriate issue and/or amendment of the relevant manual.

The user of this manual should ensure that it is appropriate in all details to the exact equipment to be installed and/or operated. If in doubt, the user should contact Polymetron for advice.

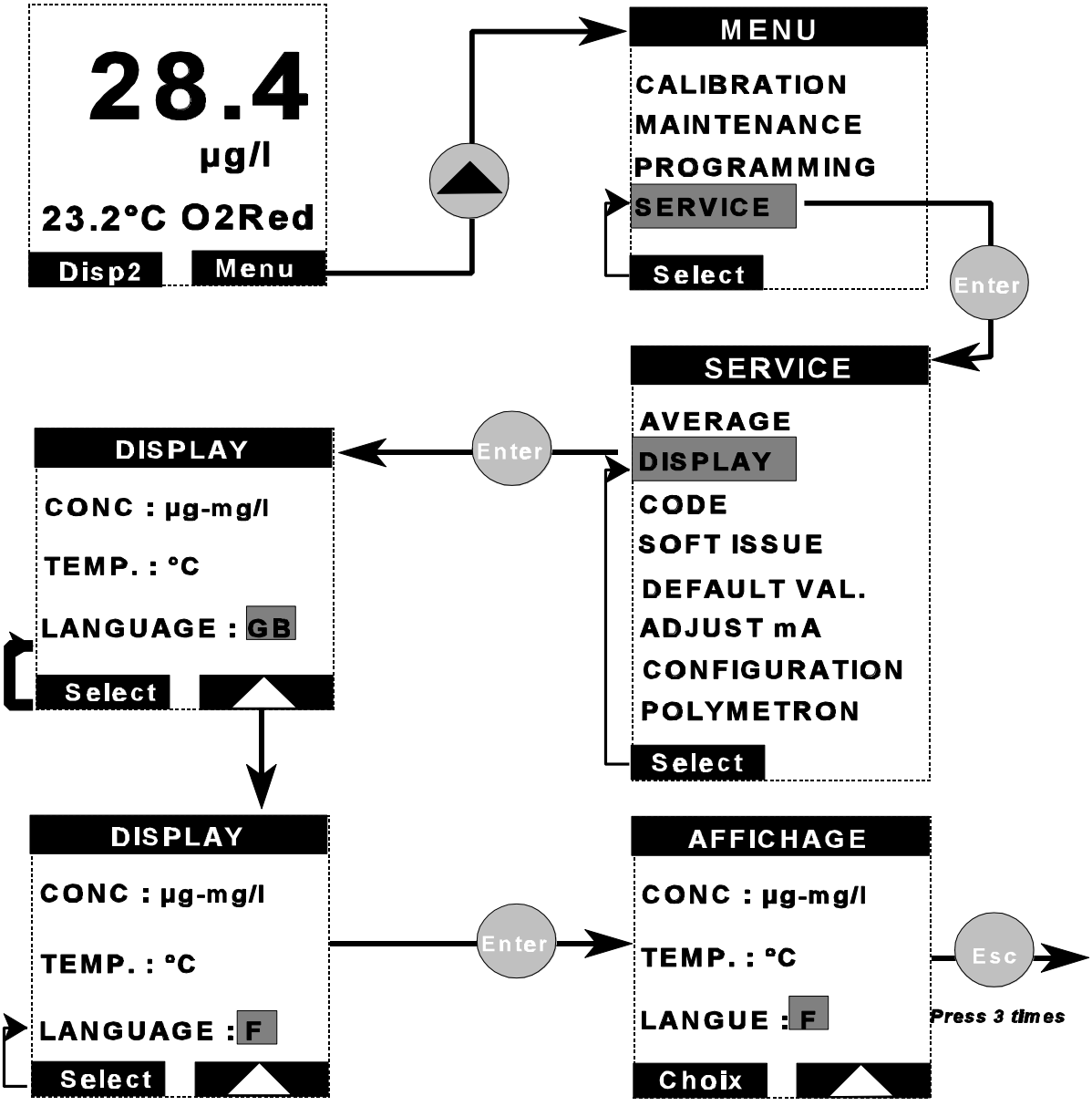
WARNING

To maintain safety standards, regular maintenance, calibration and operation of this equipment by qualified personnel is essential. Read and understand Instruction manual completely before operating or servicing. If any further details are required which do not appear in this manual contact Polymetron S.A. or their agent.

Table of contents

Changing the programming language

The programming language is English when factory-programmed, when changing the software version and when loading the default values. To change the language follow the procedure below (example for French) :



Chapter 1 : Introduction

1.1 Principle of operation

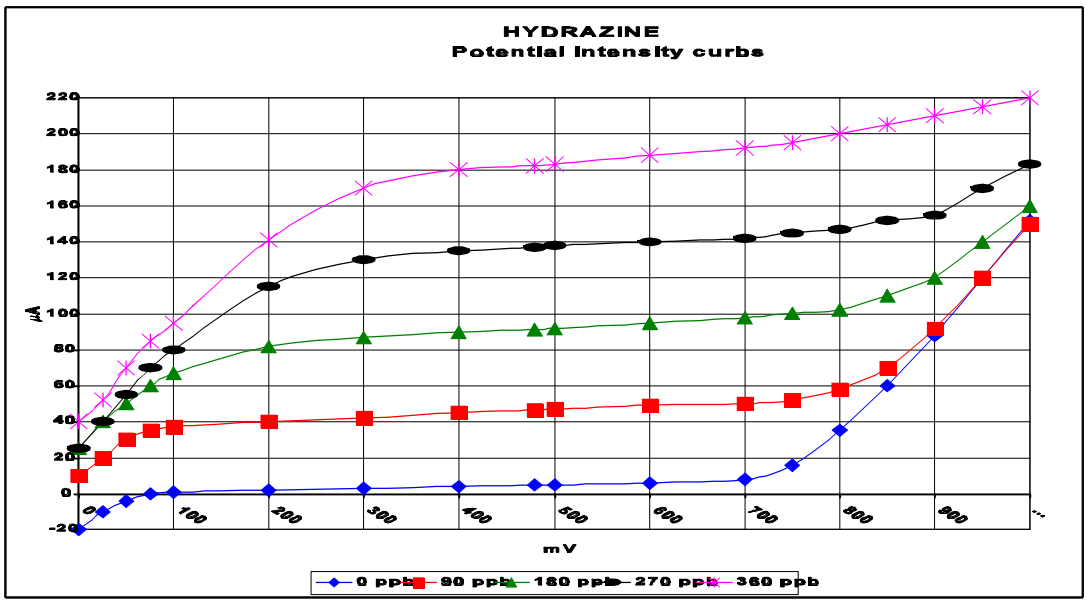
HYDRASTAT 9186 is an analyzer conceived to continuously measure the amount of disolved hydrazine and other oxygen reducers in water. The measuring principle is based on the electrochemical method of 3-electrod amperometry.

A polarization voltage (+ 480 mV) is applied between a platinum anode (working electrod) and a stainless steel cathode (counter-electrode). Hydrazine is oxidized at the surface of the platinum electrode - working electrode - and the resulting current is directly proportional to the hydrazine concentration in the range of 0 to 500 ppb N_2H_4.

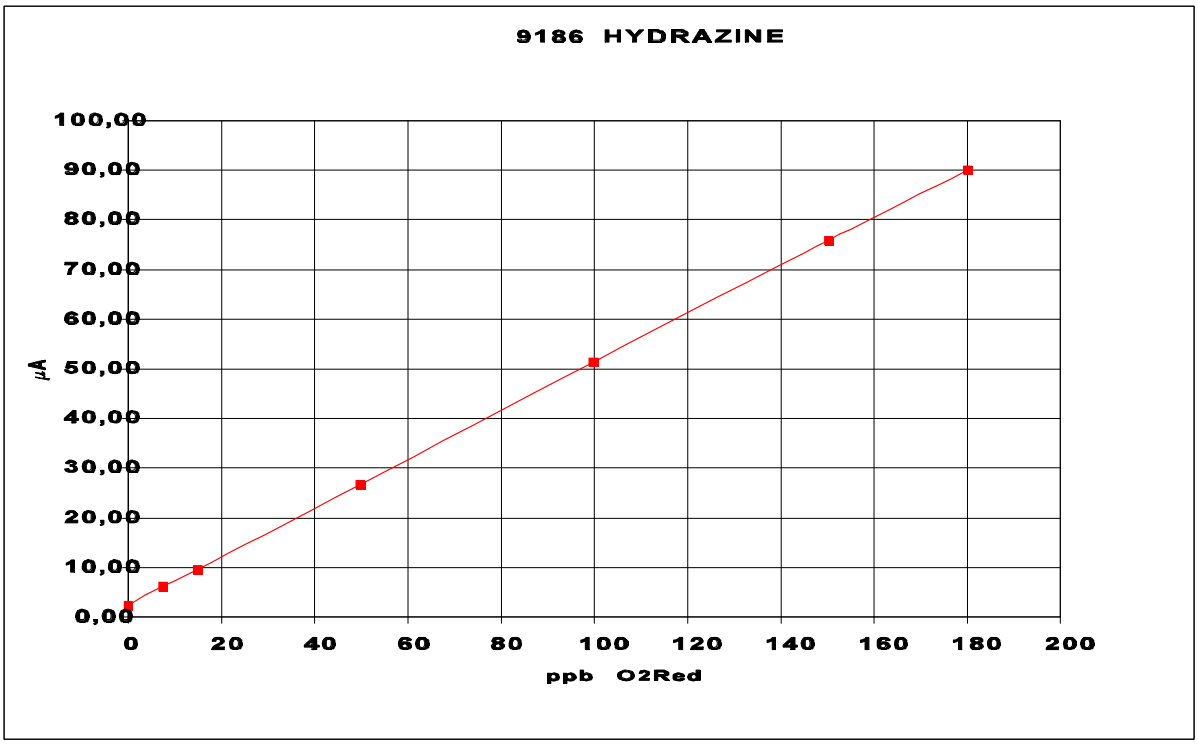
The reaction is enhanced in the alcaline environment, sample is conditioned at pH = 10,2 adding diethylamine or diisopropylamine through a Venturi tube, before the sample enters the measuring cell. Compensation of the temperature effect is achieved through a semiconductor sensor integrated to the measuring cell.
The chemical reaction is as follows :

$$(1) N_2H_4 + 4OH^- \Rightarrow N_2 + 4H_2O + 4e^-$$

The anode-cathode torque potential is kept constant par rapport à/with respect to a third electrode (reference electrode, Ag/AgCl). The system avoids interference effects resulting from the variations of water composition that appear when using the 2-electrode system.



At + 480 mV, the cell current is linearly proportional to the hydrazine concentration :



1.2 Main characteristics

- Range 0-500 ppb hydrazine
  0-100 ppb carbohydrazine
- Automatic temperature compensation
- Programmable alarm levels, outputs on relays
- 4-20 mA, 0-20 mA analogue outputs(standard) and RS485 (option)

1.3 Technical characteristics

SAMPLE	
Number of channels	1
Temperature	5-45°C
Working pressure	0.5-6 bar (7~89 psi)
Flow	10 l/h < flow < 15 l/h - 12 l/h advised
ELECTRICAL CHARACTERISTICS	
Mains	● ***Standard version :*** 100-240 VAC, 50/60 Hz ● ***Low voltage version :*** 13-30 VAC, 50/60 Hz 18-42 VDC
Maximum power consumption	25 VA
Connections	2.5 mm² screw terminal
Fuse	on cartridge
ANALYSIS	
Measuring range	0-500 ppb dissolved N2H4 0-100 ppb carbohydrazine
Sensibility	< 0.2 ppb
Repeatability	< ± 2% of measurement or 1 ppb whichever is greater
Detection limit	negligible
Response time (90 %)	< 60s
Ambient temperature	5-45 C / 41-113°F
Calibration	Electrical zero - set automatically, or with hydrazine-free water, or with a chemical zero cartridge (option) Slope calibration by comparison with a laboratory measurement
Temperature compensation	5-45°C (41-113°F)
TRANSMITTER	
Display	Display in concentration units Direct display of the concentration or cell current in µA Display of the sample temperature in C/°F Programming via menus

Analog outputs	800 Ohms maximum load 2 x 0/4-20 mA isolated from input signal, - for measure or temperature - mode : linear, bi-linear - accuracy : 0.1 mA
Alarms	- Number : 4 - Functions : limit - system alarm - timer - Hysteresis : 0-10% - Delay : 0-999 s - Breaking power : 250 VAC, 3A maximum 30 VDC, 0.5A maximum on a resistive charge
RS485 (option)	Speed : 300-9600 bauds Galvanically insulated Number of stations : 32 maximum Protocole : JBUS/MODBUS
transmitter protection	IP 65 (NEMA 4X in option)
Error reports	Cell current > 999 µA Sample temperature > 45 C(113°F) or < 5 C (41°F) Slope calibration error Zero calibration error (offset)

ELECTROMAGNETIC COMPATIBILY

Immunity against electromagnetic interferences	EN 50082-2 and EN 50082-1
Electromagnetic emission	EN 50081-1 and EN 50081-2
Low voltage standard	IEC61010-1

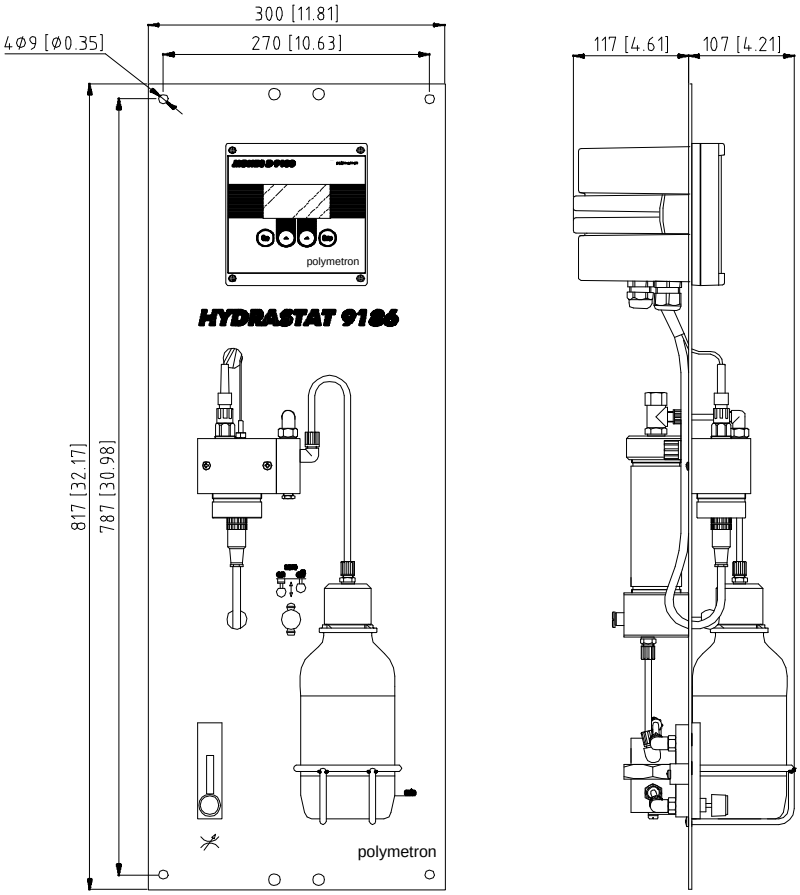
MATERIALS

Working electrode	Platinum
Counter-electrode	Stainless steel
Reference	Ag/AgCl/KCl 0.1 M
Measuring cell	Acrylic
Transmitter	Aluminium + polyester painting

MAINTENANCE

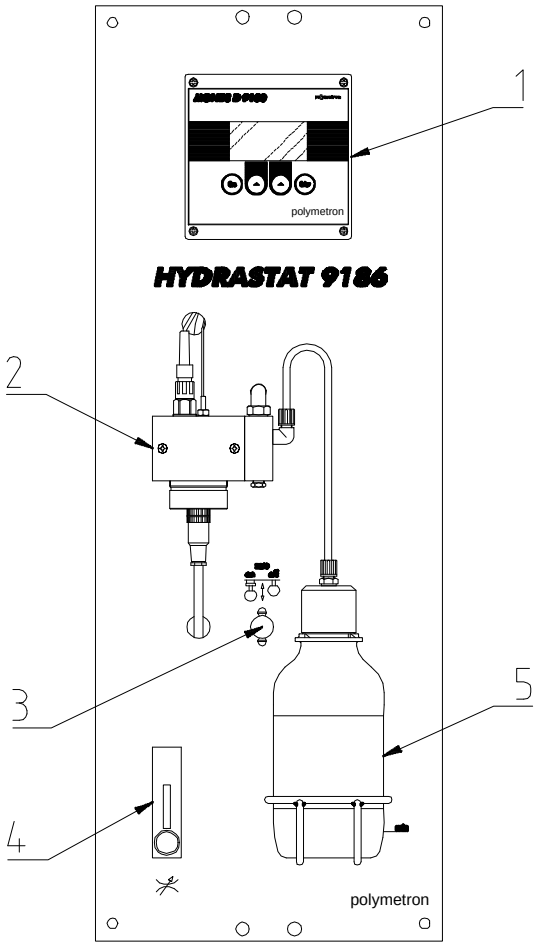
Monthly maintenance	● filling in of the conditioning bottle ● Visual check of the filter or of the zero cartridge ● Visual check of the platinum electrode - eventual deposit ● calibration

1.4 Dimensions



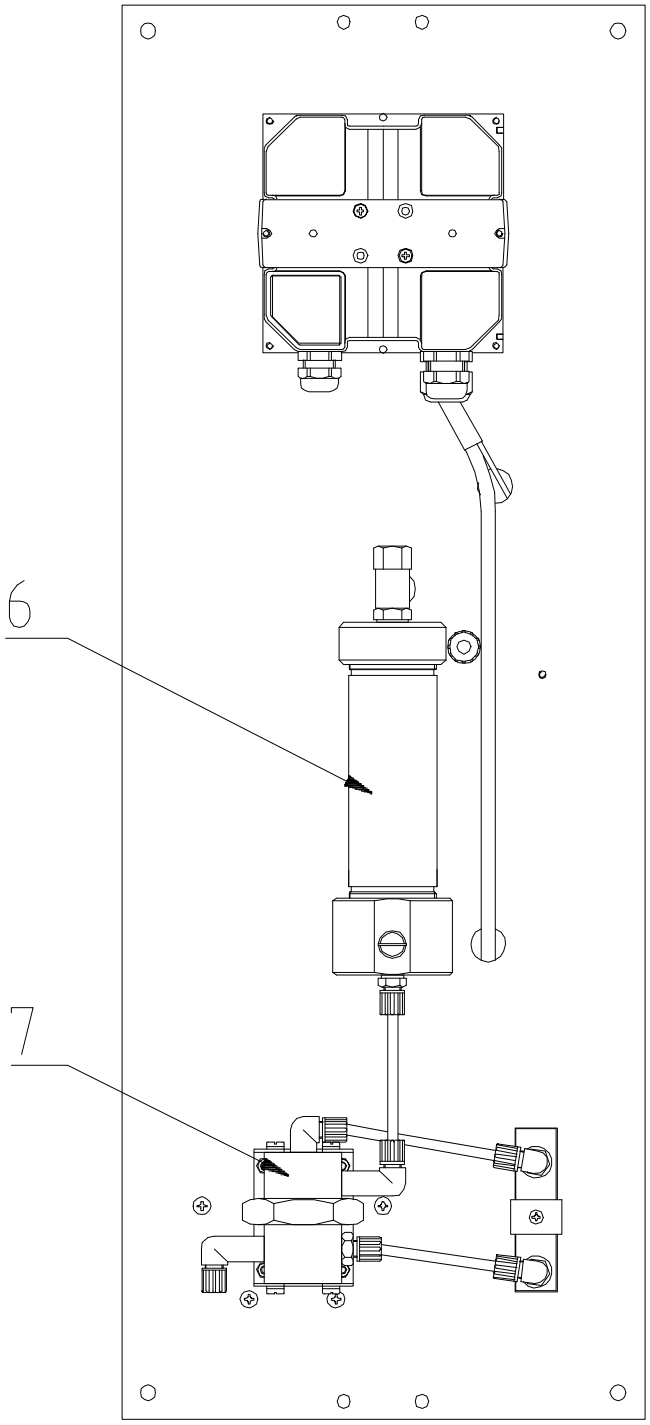
Chapter 2 : Description of the analyser

2.1 Front side of the analyser



1 : Transmitter MONEC D9180	**4 : Flow meter**
2 : Measuring cell	**5 : Conditioning bottle**
3 : Activation/deactivation button of the chemical zero (option)	

2.2 Back side of the analyzer



6 : Chemical zero cartridge (option)	**7 : Pressure regulator**

2.3 Transmitter

2.3.1 Presentation of the transmitter

The electronic unit amplifies the signal of the amperometric measuring cell and converts it into a direct digital readout in ppm, mg/l, ppb, µg/l, °C and °F. The transmitter comprises the following items :

- Potentiostat which maintains the working electrode potential constant
- Amperometric measuring module
- Analog multiplexer
- Microprocessor unit

Principle :

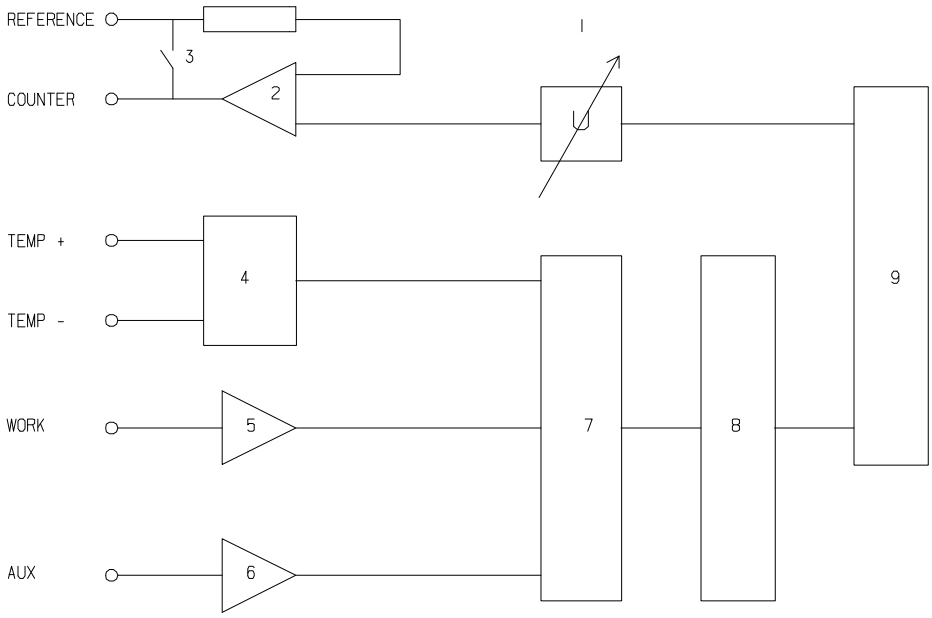
The analog multiplexer allows measurements to be acquired from the measuring cell, temperature sensor and internal checkpoints. Further, the microprocessor operates the relays, the RS485 interface (optional) and the analog outputs.

The unit has an automatic built-in concentration-autoranging feature and a microprocessor-operated calibration routine.

The output of the potentiostat is monitored for possible overdriving of the potentiostat-output stage. This condition can occur with the connections to the measuring cell open, inoperable

electrodes or a defective reference electrode.

Transmitter synoptic below is as follows :



1 : Programmable potentiostat	**6 : Auxiliary input**
2 : Polarization voltage amplifier	**7 : Multiplexer**
3 : Reversing switch for the electrode operation	**8 : A/D converter**
4 : Temperature measurement circuit	**9 : Microprocessor**
5 : Measurement circuit current amplifier	

2.3.2 Application fields

Easy-to-use (installation, programming), this instrument equipped with a microprocessor is suitable for controlling hydrazine additions into boiler water.

Chapter 3 : Installation of the instrument

3.1 Unpacking

The analyzer should be unpacked with great care. Make sure not to loose any accesory when unpacking.

3.2 Inspection

The analyzer has been factory-checked and tested prior to shipment, it is however advisable to inspect all parts immediately upon receipt for any damage which may have occured during shipment. A damaged shipping container may indicate internal damage which may not be immediately obvious. If there is any evidence of damage, keep the shipping container and refer to your local agent or to :

Polymetron S.A.
Z.I. des Richardets
33, rue du Ballon
93160 NOISY-LE-GRAND

3.3 Mounting and connections

The instrument only requires junction of sample, cell reject and power supply.

CAUTION !

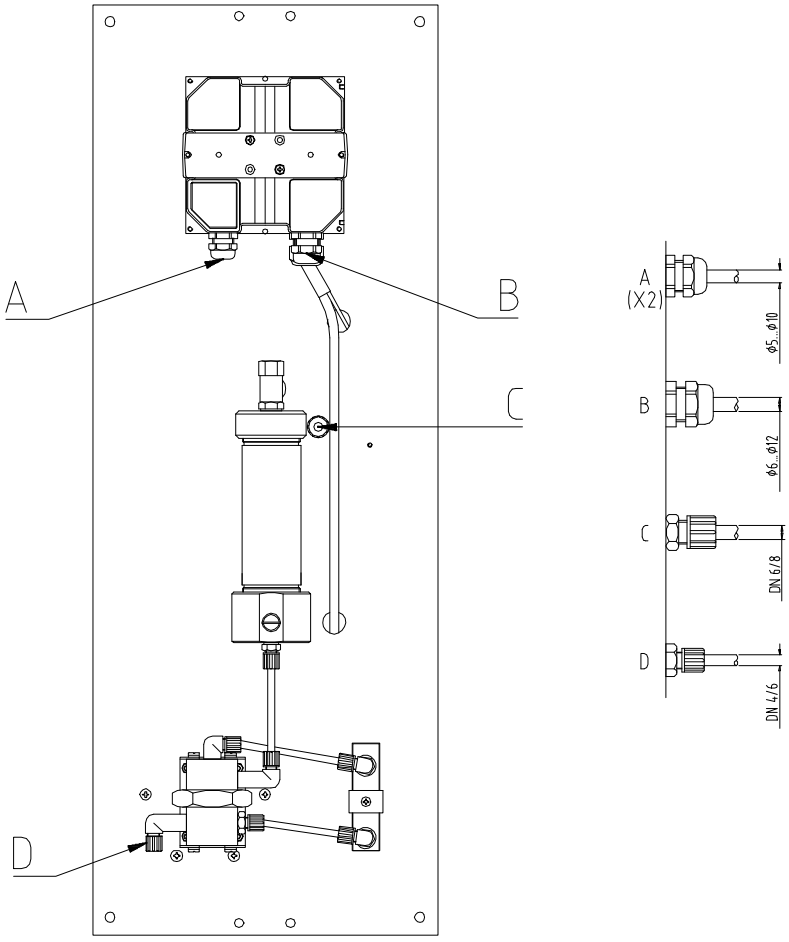
Mounting should be done by qualified service personnel only. No power should be applied until the installation is complete and checked.

3.4 Location

The analyzer should be located in a accessible site.

The site should permit the access for any checking or maintenance operation.

3.5 Hydraulic connections



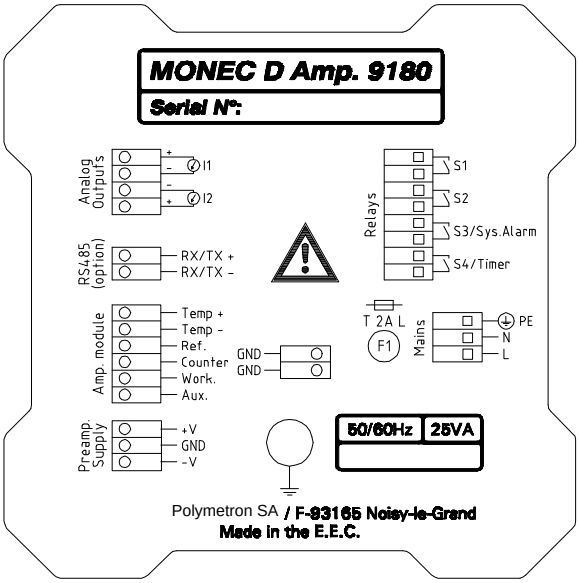
A : 2 glands PG11 - Power supply - Outputs (analog, RS485, alarms)	**C :** Sample output
B : 1 gland PG13 - Outputs (analog, RS485, alarms)	**D :** Sample input

3.6 Electric connections

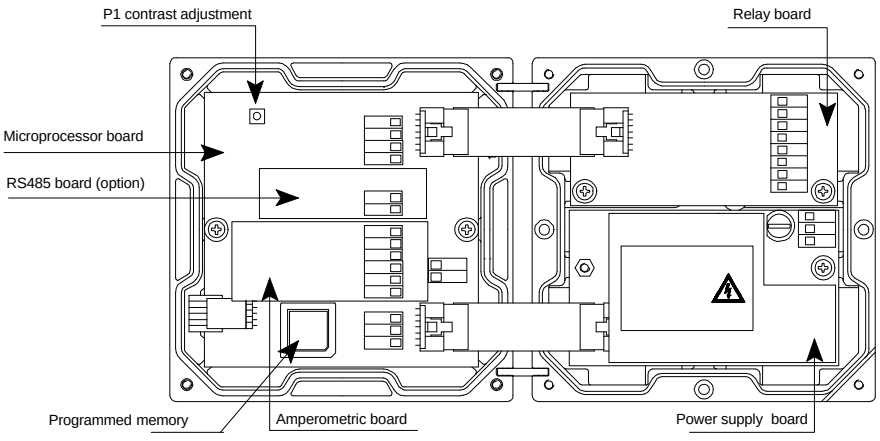
◘ MONEC

Do not switch on the instrument until completion of the installation.

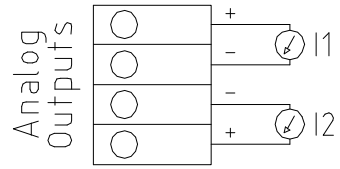
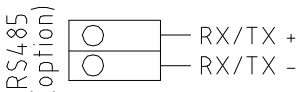
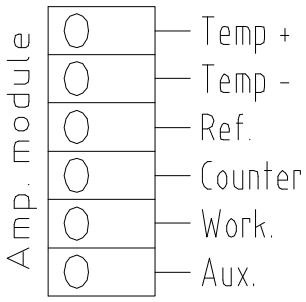
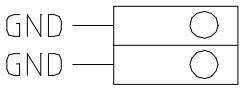
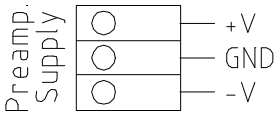
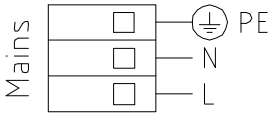
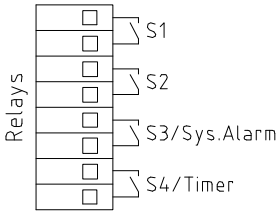
An aluminium shielding inside the MONEC gives a detailled description of the different terminals and their connections to external elements :



☞ *The different terminals represented on the right side are accessible by removing the shielding.*



3.7 Description of the different terminals

0/4-20 mA outputs galvanically insulated 	**Description**		**Connection**
	0-20 mA or 4-20 mA (n°1) [+]		**user**
	0-20 mA or 4-20 mA (n°1) [-]		**user**
	0-20 mA or 4-20 mA (n°2) [-]		**user**
	0-20 mA or 4-20 mA (n°2) [+]		**user**
	**option RS485**		**user**
			user
amperometric module 	**Description**	**Colour**	**Connection**
	temperature sensor [+]	**black**	**temp +**
	temperature sensor [-]	**blue**	**temp -**
	reference	**transparent**	**ref**
	Counter electrode (anode)	**grey**	**counter**
	Working electrode (cathode)	**white with an orange socket**	**work**
	Auxiliary input		**not used**
	External shield	**white+white socket**	**shielding**
	**Internal shield**	**white+white socket**	**GND**
	**Not used for the hydrazine measurement**		**n.c.**
	**Mains, 100...240 VAC 50/60 Hz or 24 V AC/DC (special version)**		
	**Descriptiion**		**connection**
	alarm 1, simple contact		**user**
	alarm 2, simple contact		**user**
	alarm 3 or system alarm, simple contact		**user**
	alarm 4 or timer, simple contact		**user**

☞ Electrical connections should remain dry to ensure a proper operation of the instrument.
Check the creeping of the cables when opening the transmitter.
☞ It is required to use shielded cables. This shielding should be connected to the central protective earth.

3.8 Mains connection

Electrical connection should be performed only by qualified personnel. The power supply accepts 100-240 VAC ± 10 %, (50/60 Hz) without changes in configuration. The terminal block for power connections can be lifted from its header for easier installation. For safety reasons, it is required to observe the precautions below :

- Use a three core mains supply cord (2 core + PE) rated for the maximum equipment current
- The instrument should be connected to the power supply by means of a breaker located close to the instrument and be identified. The supply shall be fitted with an overcurrent protection device rated at 20 Amp maximum
- This breaker should switch off phase and neutral in case of electrical problems or when the user wish to service the instrument. However the power supply earth must always be connected.

Before servicing the instrument, ensure that the power supply is switched off.

3.9 Starting the transmitter

Before switching on the transmitter, make sure the site voltage corresponds to the instrument voltage indicated on the identification plate.

3.10 Adjusting the display contrast

If the contrast on the display screen is not sufficient, you can adjust it with the potentiometer P1 (blue colour, see figure on page 3-3) which is located on the left top of the CPU board (after opening the enclosure).

Chapter 4 : Using the instrument

4.1 Front panel keys

The display may be programmed to indicate :

- Sample concentration
- Sample temperature
- Diffusion current
- Access codes
- Programming arguments

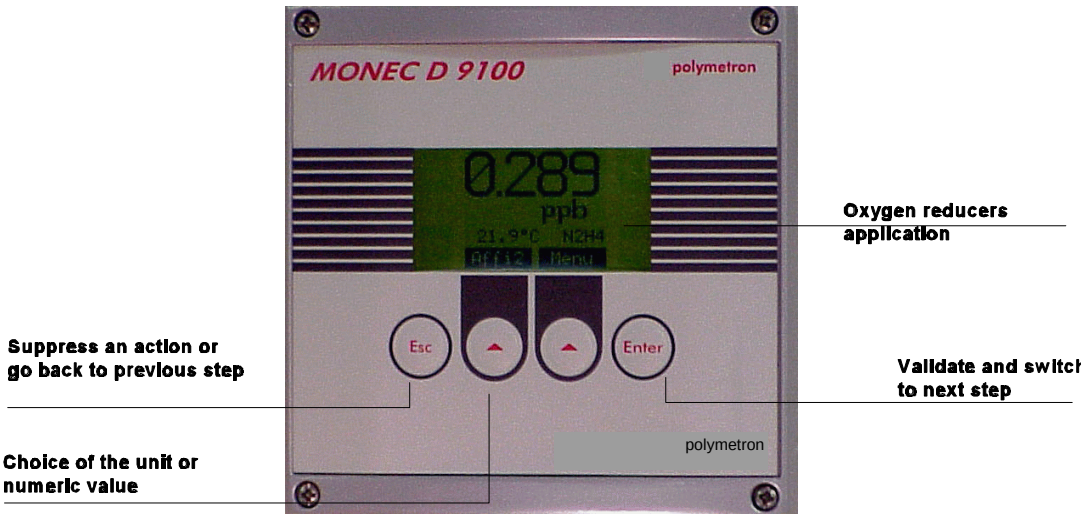
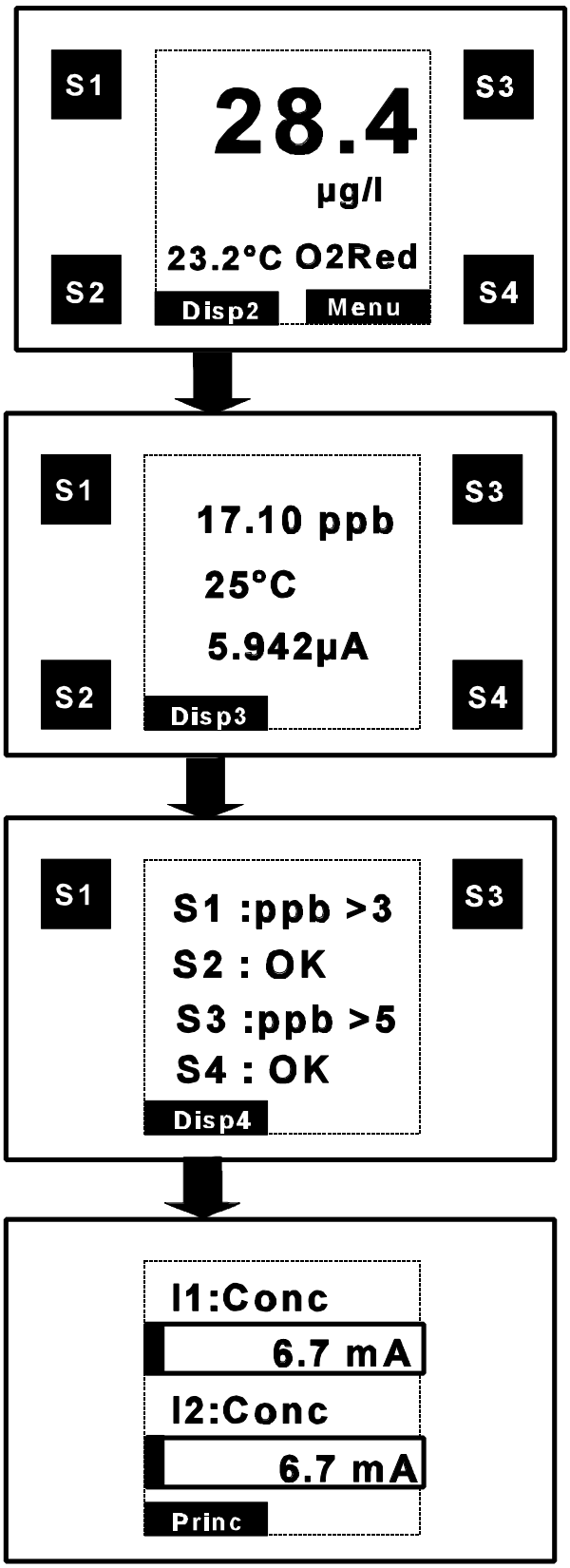


Figure 4-1 : Front panel

4.2 Display screens 1 to 4 (continuously refreshed)



28.4 µg/l : concentration measurement (µg/l unit)
23.2°C : temperature measurement
O2Red : application
S1...S4 : alarm status (invisible if alarm inactive).

Display of the measurement parameters :
Concentration
Temperature
Cell current

S1...S4 : alarm status
In this case relays S1 and S3 are activated.

Analog output assignment and level

4.3 Description of the function keys

The function keys below have their signification highlighted at the bottom of the screen :

	**Modify a parameter**
Select	**Scrolling in a list of menus**
Main	**Go back to the main display**
Menu	**Display the main menu**
Disp2	**Display screen 2**
Disp3	**Display screen 3**
Disp4	**Display screen 4**
OK	**Validate the measure during the calibration**
Yes	**Confirm a command**
-	**Decrease a value**
+	**Increase a value**

4.4 Icons

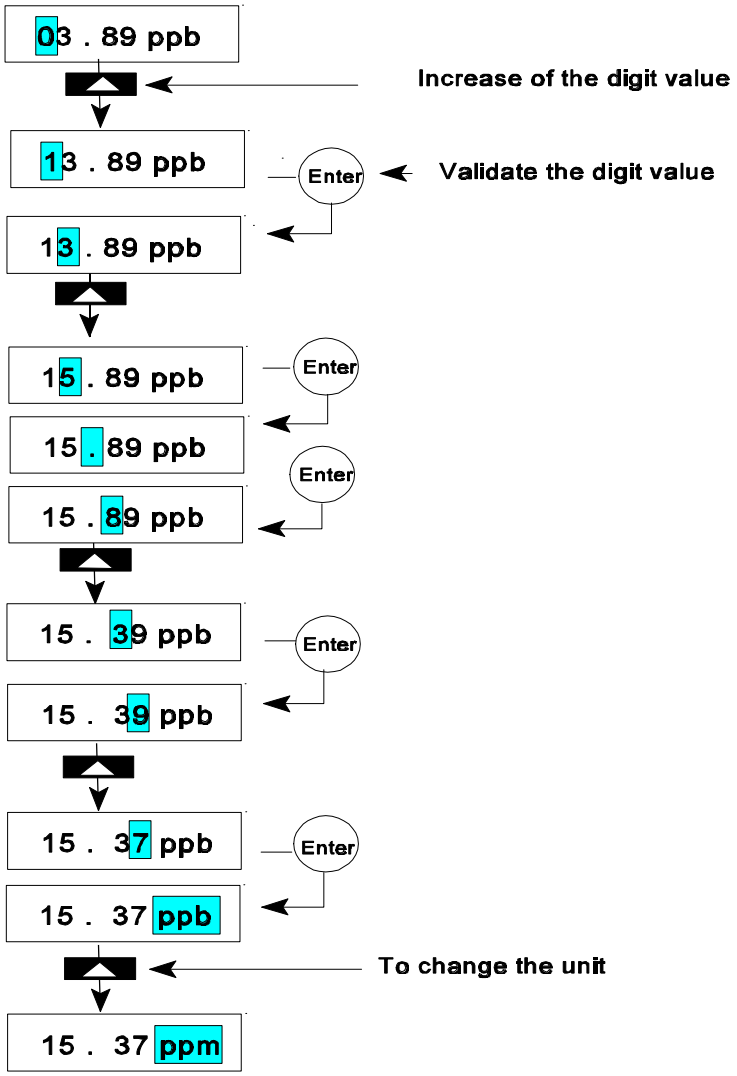
 Symbol of waiting or instrument reset

 Alarm system for relay S3

 Timer symbol : countdown

4.5 Enter or modify a value

The highlighted digit can be modified with the key ▲ .
Each digit can be validated by pressing ENTER. Repeat both operations for each digit.
Example :



4.6 Warnings

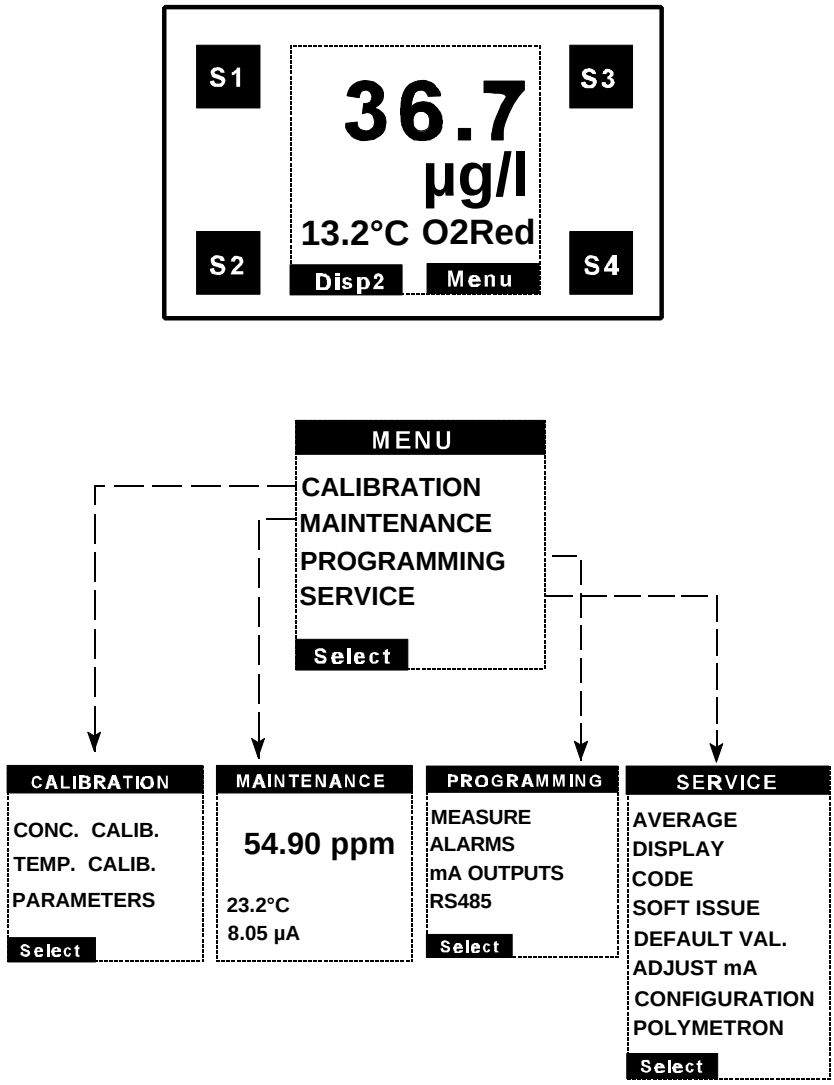
Note 1 : If you do not use the keyboard for at least 10 minutes, the instrument returns to the measuring mode.

Note 2 : An access code may be required for the calibration, programming and service menu (see § CODE menu).

Possibility to display a negative first digit "-"
Possibility to display a "." for the other digits.

Chapter 5 : Programming the transmitter

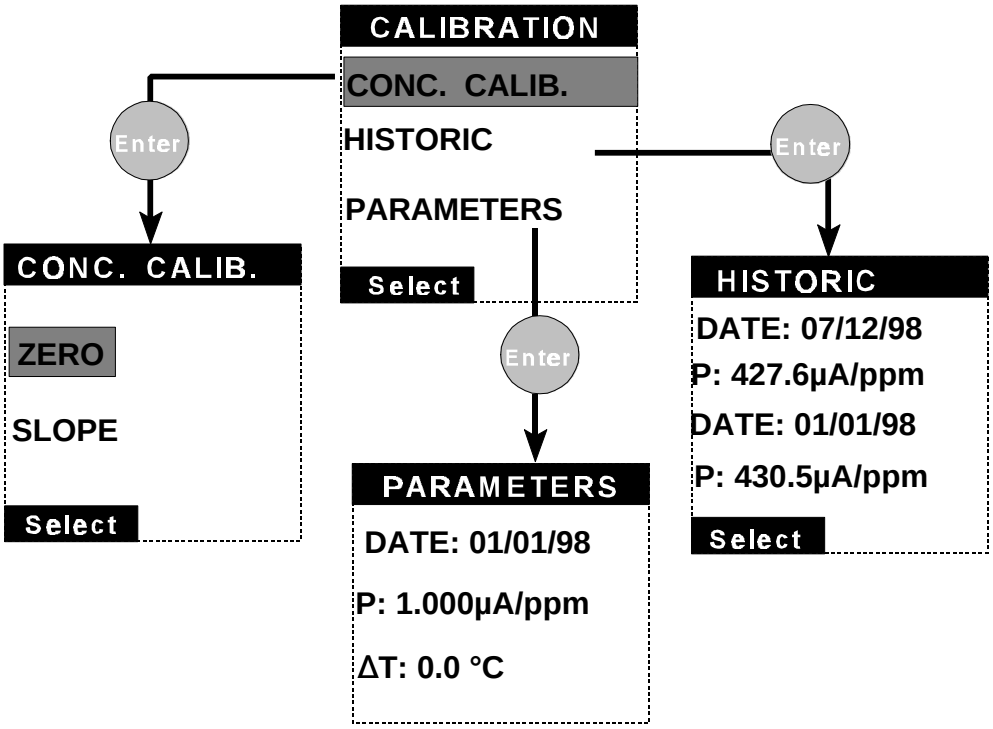
5.1 Main menu



5.1.1 CALIBRATION menu

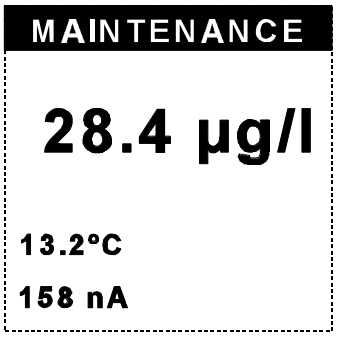
☞ Any calibration should follow the procedure below :
Configuration of the calibration characteristics in the "PROGRAMMING" menu.
Realization of the calibration via the "EXECUTION" menu.

An access code may be required if it has been programmed (See §5.1.4.3 CODE Menu)
See chapter 6 for a detailled programming of the calibrations.
Some menus may appear in function of the way some parameters have been programmed.



PARAMETERS		
DATE	xx/xx/xx	Date of the previous calibration. The programmed date is not automatically updated.
ZERO	XXXX nA	Offset value
P	x.xxx µA/ppm	Slope value
ΔT	x.x°C	Gap between the theoretical temperature (sensor curve) T_h and the temperature measured T_m : $\Delta T = T_h - T_m$
HISTORIC : if there has not been any calibration, the window is empty		
P	**xxx.x µA/ppm**	**value of the penultimate calculated slope**
P	**xxx.x µA/ppm**	**value of the antepenultimate calculated slope**

5.1.2 MAINTENANCE menu

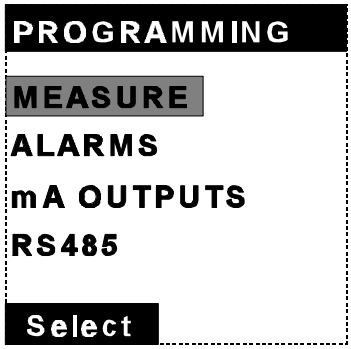


Used for any maintenance operation in the instrument. The transmitter continues to display the measured variables.

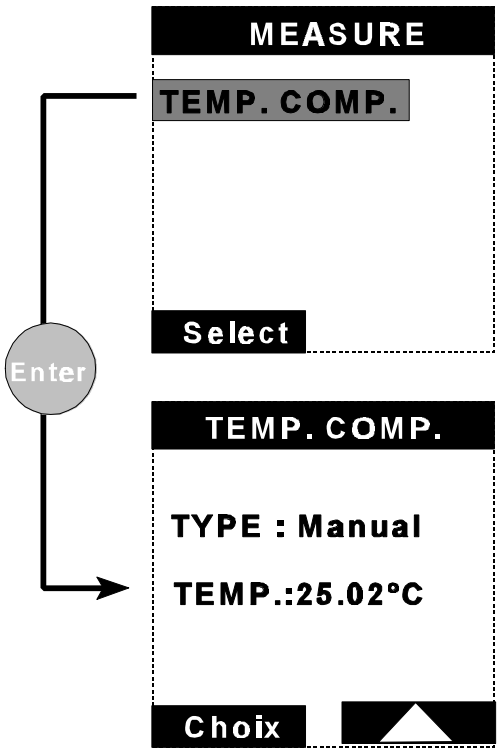
The relay status is not modified.
The analog output value depends on the configuration in the mA OUTPUTS/SPECIAL PROG. /MAINTENANCE menu.

5.1.3 PROGRAMMING menu

An access code may be required.(See § 5.1.4.3 CODE menu)



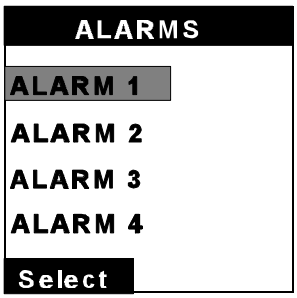
51.3.1 MEASURE menu



TEMPERATURE COMPENSATION		
TYPE	- Auto - Manual	Choice of a temperature measurement with automatic compensation or with a manual compensation ***If you have chosen a manual temperature compensation, the TEMP. CALIB. Menu is not accessible anymore.***
TEMP.	- xx.x°C	Possibility to enter the sample temperature in a manual compensation **mode**

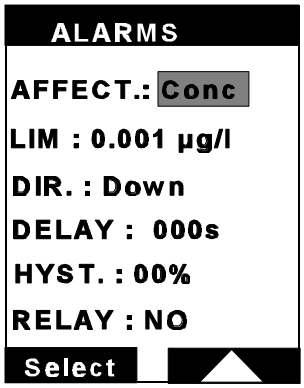
5.1.3.2 ALARMS menu

Relays S1...S4 may be assigned to the limit, alarm system or timer functions.



➲LIMIT FUNCTION :

The alarm relays are activated if the comparison of the measured value with the programmed limit meets the alarm function condition (up or down). Limits are programmed according to the following programming variables :

ALARMS 1 .... 4 (LIMIT)			
	AFFECT	-Conc. - no -°C/°F	Use of a limit on the measure, on the temperature or no use of a limit.
	LIM	xxxx	Enter a limit value
	DIR.	-Up -Down	Choice of the direction
	DELAY	xxxs	Temporisation time before the relay is commutated (in seconds)**.**
	HYST.	XX%	Definition of the hysteresis limit in % (10% max.) The hysteresis operates only on one side of the limit. The hysteresis is below the limit for the up alarm and above the limit for the down alarm.
	RELAY	-NO -NC	Relay normally open or normally closed

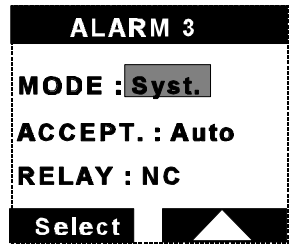
➲ ALARM SYSTEM FUNCTION :

The relay S3 can be used to indicate that the analyser has detected a faulty functioning.
It is required to connect the relay S3 to an external alarm system to control the faults traced by the analyser.

The relay S3 is activated as soon as a default appears.

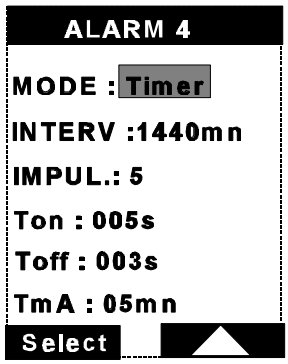
With manual acknowledgment, the relay remains activated even if the default disappears. Press ENTER to disactivate the relay and the error message.

With automatic acknowledgment, the relay and the error message are desactivated as the default disappears.

ALARM 3 (ALARM SYSTEM)			
	MODE	-No -Limit -Syst.	The alarm S3 may be programmed as a limit function (See paragraph above) or as an alarm system function
	ACCEPT	-Auto -Manu	In the case of an alarm system, choice between a manual (key ENTER) or automatic acknowledgment
	RELAY	-NO -NC	Choice of S3 normally open or normally closed.

➲ TIMER FUNCTION :

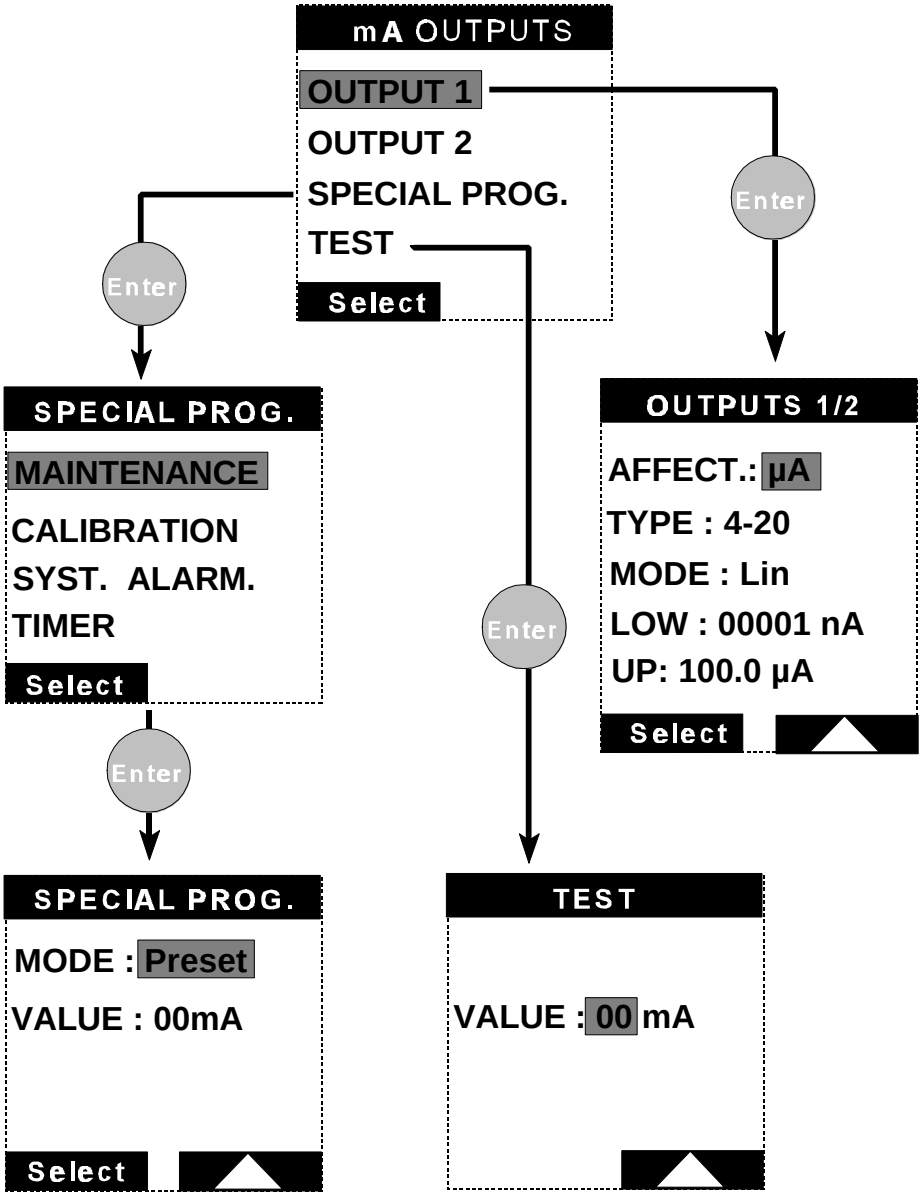
Relay S4 may be affected to a timer function.

ALARM 4 (TIMER)			
	MODE	-No -Limit -Timer	Choice between a limit (see parameters above) or a timer function for alarm 4.
	INTERV	XXXXmn	Interval between 2 active cycles (in minutes).
	IMPUL.	X	Number of pulses during an active cycle.
	Ton	XXXs	Adjustment of the relay active time (in seconds) for each pulse.
	Toff	XXXs	Adjustment of the relay inactive time (in seconds) for each pulse.
	TmA	XXmn	Hold time for the analog outputs after each cycle. ☞ *The analog output status depends on the configuration of the menu mA OUTPUTS/SPECIAL PROG./TIMER*

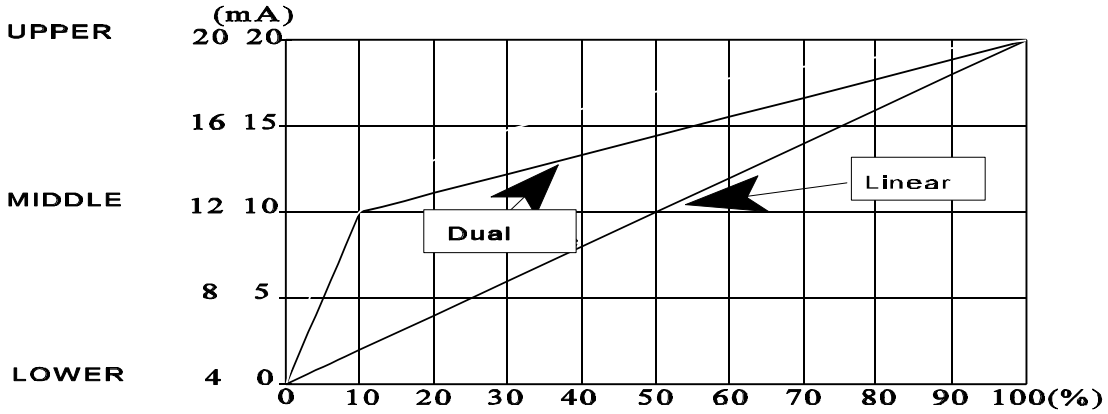
5.1.3.3 mA OUTPUTS menu

The analog output signals allow the transmission of the measurements from the analyser to any external control system.

It is highly recommended to use shielded cable for the output signals, connected to the earth terminal on the shielding of the Hydrastat.

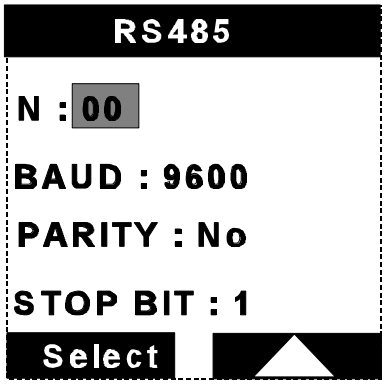


OUTPUT 1/2		
AFFECT	- Conc. - µA - °C/°F	Choice of the analog output allocation to the cell current, to the concentration or to the temperature measurement.
TYPE	0/20 4/20	Choice of the analog output type
MODE	- Lin - Dual	Choice between a linear or dual range (see drawing on next page).
LOWER	XXXX	Bottom of the scale value
MIDD.	XXXX	Mid-scale value (only in ***dual mode)***
UPPER	XXXX	Top of the scale value
SPECIAL PROG.		
MODE	- last - preset - live	Characterictics of the analog output during calibration, alarm system, maintenance or timer active cycles : frozen to the latest stored before any operation listed above, forced to a preset value, live measurement.
VALUE	XX	Preset value (0 to 21 mA)
TEST		Test the analog outputs by steps of 1 mA (0-21 mA)



5.1.3.4 RS485 Menu

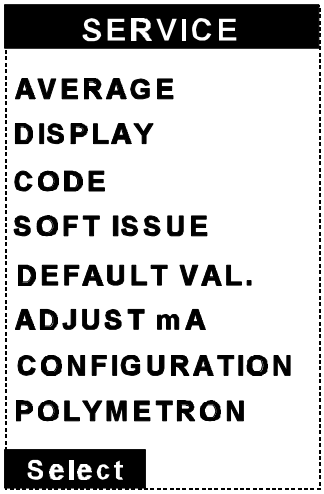
If the RS485 optional board is installed on your transmitter, program the parameters of the menu below.
The RS485 optional board enables the connexion between your analyser and a digital communication system. The Communication protocol is JBUS/MODBUS. Refer to the instruction manual "JBUS/MODBUS communication" (part number : 621=991=000) for further details and to Appendix 4 for the address list.



RS485		
N°	XX	MONEC number (0-32)
BAUD	- 300 - 600 - 1200 - 2400 - 4800 - 9600	Transmission speed in baud
PARITY	- No - Odd - Even	Without parity bit With odd parity bit With even parity bit
BIT STOP	- 1 - 2	1 bit stop 2 bit stop

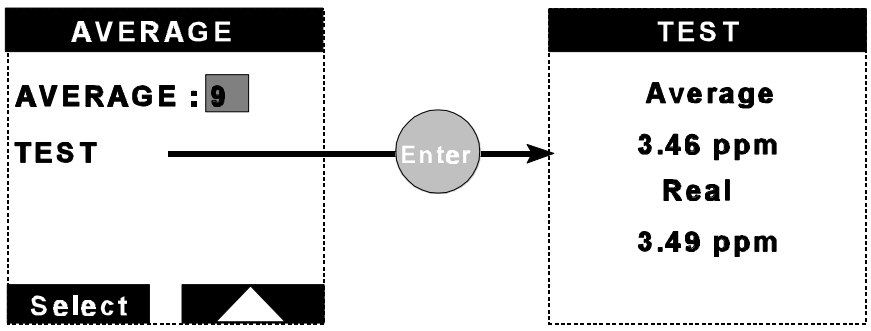
5.1.4 SERVICE Menu

An access code may be required if it has been programmed (see §5.2.4.3 CODE Menu)

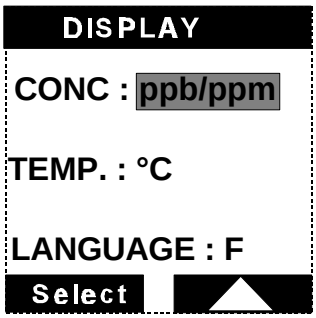


5.1.4.1 AVERAGE Menu

The measurement cycle lasts 4 seconds.		
AVERAGE		Program a moving average on the concentration measurement
AVERAGE	**X**	Define the number of measurements to calculate the average.
TEST		Display the difference between a measurement obtained with and without average.



5.1.4.2 DISPLAY Menu

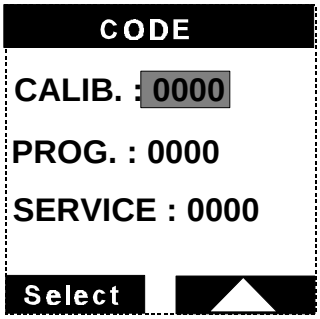


DISPLAY		
CONC	- ppb/ppm - µg-mg/l -%sat	Choice of the concentration unit
TEMP.	- °C - °F	Choice of the temperature unit
LANGUAGE	 - F - GB - D - SP - I	Choice of the language : - French - English - German - Spanish - Italian

5.1.4.3 CODE Menu

Protection codes may be programmed to access the PROGRAMMING, CALIBRATION, SERVICE menus.

This code may be desactivated by programming 0000.



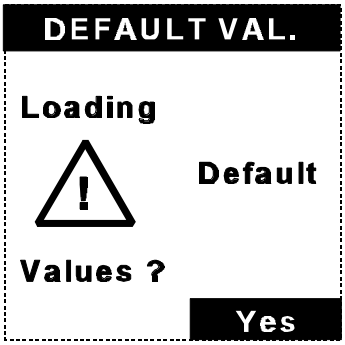
CODE		
CALIB.	XXXX	Access code to calibration
PROG.	XXXX	Access code to the “PROGRAMMING” menu
SERVICE	XXXX	Access code to the “SERVICE” menu

If you have forgotten your access code, press simultaneously ESC and ENTER to enter the selected menu.

5.1.4.4 SOFT VERSION Menu

This menu displays the software version installed in the instrument.

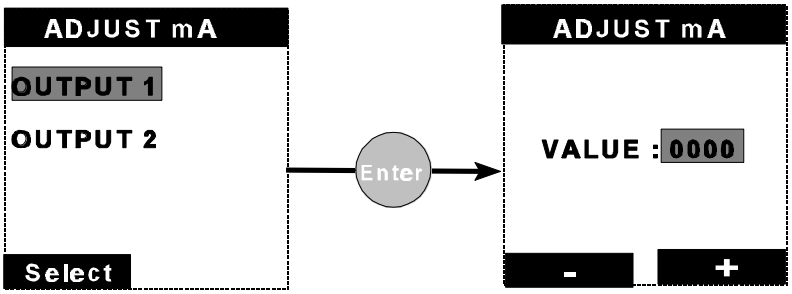
5.1.4.5 DEFAULT VAL. Menu



If you press YES, you load the default values and you lose both the current programmed values and calibration parameters.

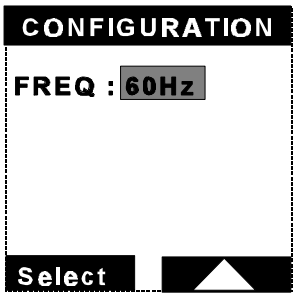
5.1.4.6 mA ADJUST menu

The analog output signals are factory-adjusted (upper limit : 20mA). However if you discover a drift of the 20 mA on one of the outputs, it is required to execute the menu below. Connect an ammeter to the analog output terminals and adjust the value till you read 20.0 mA on the amperemeter.



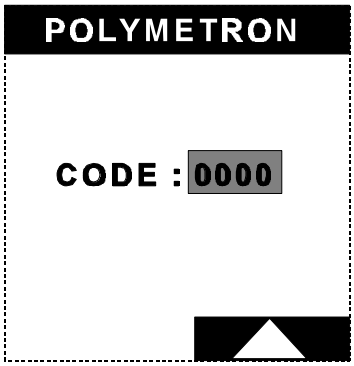
☞ **The value displayed does not correspond to a mA value.**

5.1.4.7 CONFIGURATION menu



You can program the mains supply frequency at 50 or 60Hz.

5.1.4.8 POLYMETRON menu

	**This menu is reserved to POLYMETRON qualified personnel.**

Chapter 6 : Calibrating the instrument

NOTE
See chapter 5 for programming the commands.

REMARK
Any result (calibration or measurement) is always brought back to the reference temperature (25°C, 77°F). If the sample temperature is different from the reference temperature, it is required to execute a temperature compensation which can be either manual or automatic.

6.1. Calibration of the temperature sensor

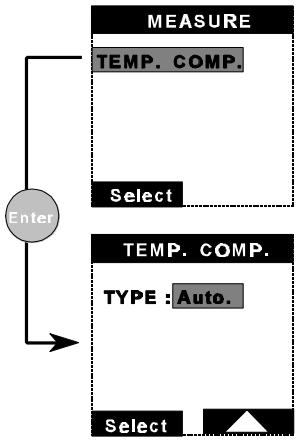
The temperature sensor is located under the platinum anode. It is factory-preadjusted but needs to be calibrated in the sample on site. This calibration must be realised before the hydrazine measurement calibration (slope + zero).

6.1.1.Automatic temperature compensation

The sensor measures continuously the sample temperature. The concentration values are automatically calculated in function of the reference temperature (25 °C) by a preprogrammed compensation law in the transmitter.

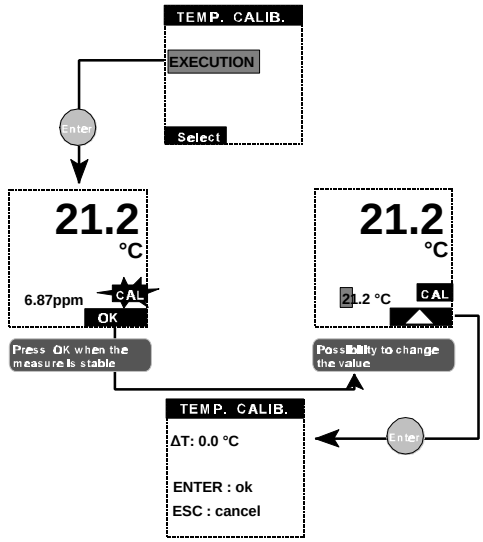
Follow the procedure below :

❶ PROGRAMMING



Choice of an **automatic** temperature compensation.

❷ EXECUTION

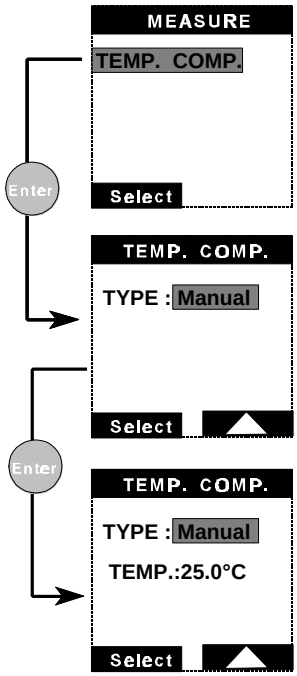


The execution is realised with the CALIBRATION menu.

Enter the sample temperature value in °C.
Press OK to adjust the temperature displayed to the actual value of the sample temperature measured with a precise thermometer.
The gap between the calibration and the theoretical response curve of the sensor is given for information.

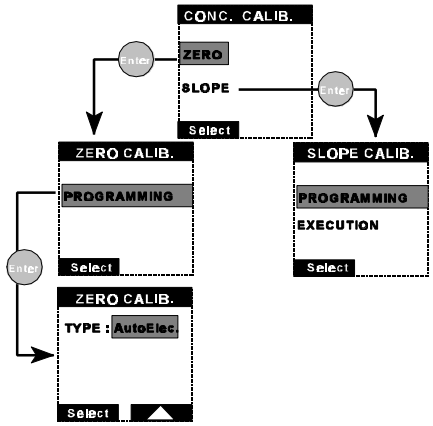
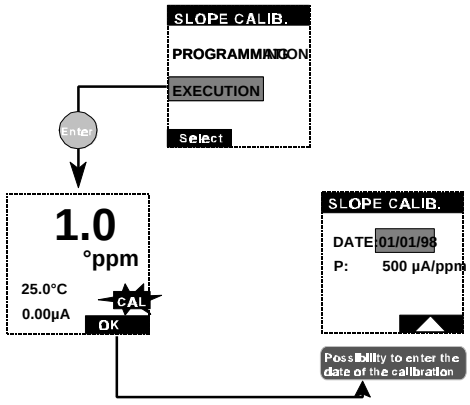
6.1.2. Manual temperature compensation

This type of temperature compensation should be used only if your sample temperature is constant.

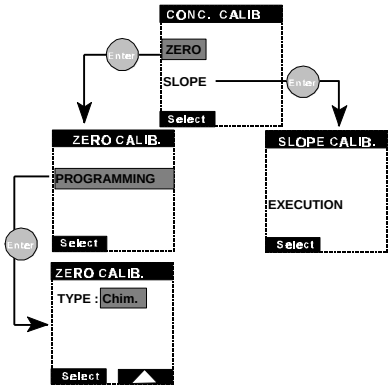
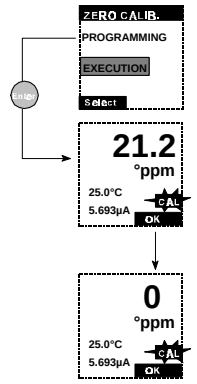
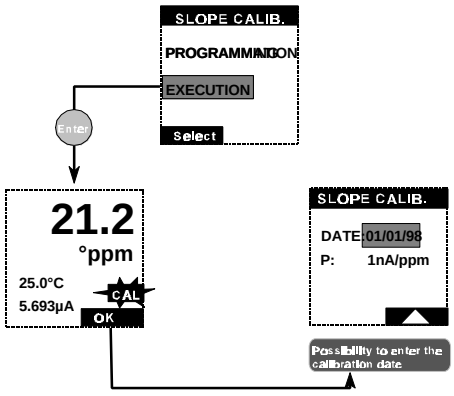
❶ PROGRAMMING	
	Choice of the **manual** temperature compensation. Enter your sample temperature.
❷ EXECUTION	
	Not applicable under a manual temperature compensation mode.

6.2. Calibration of the measurement

6.2.1. Slope calibration + electrical zero

❶ PROGRAMMING	
	Choice of an electrical zero. Note : the electrical zero is carried out automatically by the transmitter at a regular frequency.
❷ EXECUTION	
	Press ENTER, the “CAL” message flashes and indicates the instrument is in calibrating mode. Wait until the current is stabilized then press OK. You can adjust the concentration value one digit after the other with the function key to the value you found with the reference method of analysis. The analyzer displays the date of the previous calibration and the newly calculated slope. The standard slope amounts to 500µA/ppm. However the analiser accepts a value measured with ± 50%. Modify the date if necessary. Press Enter to validate the new calibration parameters.

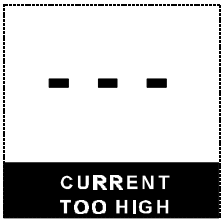
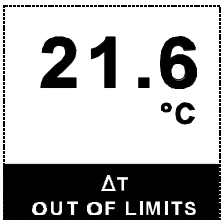
6.2.2. Slope calibration + chemical zero

❶ PROGRAMMING	
	Choice of the chemical zero Choice of the slope
❷ EXECUTION	
	**ZERO :** Make sure the sample contains no hydrazine pulling the button which activates the chemical zero cartridge. Press ENTER, the “CAL” message flashes and indicates the instrument is under calibrating mode. Wait for **the current stabilisation** and press **OK** to validate the calibration. The instrument displays zero.
	**SLOPE** : Use a sample containing hydrazine. Press ENTER, the “CAL” message flashes and indicates the instrument is in calibrating mode. Wait until the current is stabilized then press OK to validate the calibration. You can adjust the concentration value one digit after the other with the function key to the value you found with the reference method of analysis. The analyzer displays the date of the previous calibration and the newly calculated slope. The standard slope amounts to 500µA/ppm. However the analyzer accepts a value measured with ± 50%. Modify the date if necessary. Press Enter to validate the calibration.

Chapter 7 : Error messages

☞ ***In case of errors, measurements are replaced by dashes "- - -".***

Error messages	Description
Error messages during a measurement	
- - - CONCENTRATION TOO HIGH	The concentration value is out of the limits. Check the current value and the calibration parameters.
- - - CONCENTRATION TOO LOW	The concentration value is out of the limits. Check the current value and the calibration parameters.
- - - TEMPERATURE ERROR	The sample temperature is out of the limits. Check the cable polarity. Check if there is any short-circuit or open circuit, or water inside probe connector.
- - - CURRENT TOO LOW	The current value is out of the limits. Check the electrode and its connections.

	The current value is out of the limits. Check there is no short-circuit on the measuring line. Check the polarization voltage.
Error messages during a calibration	
	The temperature difference between the calibration and the sensor theoretical response is superior to the programmed limit. Limits : ± 20°C

Appendix 1 : Default values

CALIBRATION	
CONC. CALIB. OFFSET Type : AutoElec.	**PARAMETERS** DATE :01/01/98 ZERO : 0 nA S : 0 nA/ppm ΔT : 0.0 °C
PROGRAMMING	
MEASURE	
COMP. TEMP. SENSOR : NTC TYPE : Auto	
ALARMS	
ALARMS S1/S2/S4 AFFECT. : Conc. LIM. : 0.00 ppb DIR. : Low DELAY : 000 s HYST. : 00% RELAY : NO	**ALARM S3** AFFECT. : System ACQUIT : Auto RELAY : NF
mA OUTPUTS	
OUTPUT 1 AFFECT. : Conc. TYPE : 4-20 MODE : Lin. LOW : 0.000 ppm UP : 1.000 ppm	**OUTPUT 2** AFFECT. : Conc. TYPE : 4-20 MODE : Lin. LOW : 0.000 ppm UP : 1.000 ppm
SPECIAL PROG.	
MAINTENANCE MODE : memo	**CALIBRATION** MODE : memo
TIMER MODE : memo	**ALARM SYSTEM** MODE : memo

RS485

No : 0
BAUD : 9600
PARITY : No
STOP BIT : 1

SERVICE

AVERAGE

AVERAGE : 1

DISPLAY

DISPLAY
CONC. : ppb/ppm
TEMP. : °C
LANGUAGE : GB

CODE

CODE
CALIB. : 0000
PROG. : 0000
SERVICE : 0000

CONFIGURATION

CONFIGURATION
FREQ. : 50 Hz

Appendix 2 : Spare parts list

Spare-parts kit for 2 years : 09186=A=8000		
Description	Code	Quantity
Filter	363877,06000	6
Reference electrode	368429,00000	1
Venturi injection nozzle	359090,00024	1
Plastic cleaning beads	588801,75008	7
4 x 6 mm PE tubing	151575,00006	2 m

Spare-parts list of the Hydrastat elements	
Description	Code
TRANSMITTER	
EPROM	09180=A=600
Fuse	295=100=6200
RS 485 board in option	09125=A=0485
CPU board with display	09125=A=1000
100-240 Vac supply board	09125=A=2000
13-30 Vac or 18-42 Vac supply board	09125=A=2020
Analog board for 9180	09180=A=1501
MONEC D9180 with software	09180=A=0100
MONEC D9180 (RS485) with software	09180=A=0111
MONEC D9180 (low tension supply) with software	09180=A=0120
MONEC D9180 (low tension supply + RS485) with software	09180=A=0131
MEASURING CELL	09186=A=0100
Reference electrode	368429,00000
Working electrode	09186=A=0300
Raccord coudé entrée G1/8 DN 4/6	359103,10070

Raccord droit sortie G1/8 DN6/8	359103,10055
Bouchon NPT1/8	431=201=018
Conditioning bottle with equipment	09186=A=0200
Brown glass bottle	490=010=011
Porous cartridge	09073=C=0340
Raccord G1/8 DN4/6	359103,10065
Régulateur de pression équipé	09186=A=0400
Raccord droit entrée G1/4 DN4/6	587=006=002
Raccord coudé court intermédiaire G1/4 DN4/6	359103,10072
raccord coudé long sortie G1/4 DN4/6	587=906=002
Débitmètre	694=000=001
Raccord coudé NPT1/8 DN4/6	359103,10170
OPTION	
Cartridge for chemical zero calibration	09186=A=0600
USER MANUAL	
User manual in French	621=091=186
User manual in English	621=191=086

Appendix 3 : Security data sheet

Diisopropylamine

PRODUCT IDENTIFICATION
Product code : 803646 Product name : diisopropylamine for synthesis FSD No : 30220
COMPOSITION/COMPONENTS INFORMATION
Numéro cas : 108-18-9 **Masse moléculaire : 101.19** **Formule brute : C6H15N** **No-Index-CE : 612-048-00-5** **Numéro EINECS : 203-558-5**
DANGER IDENTIFICATION
Easily inflammable. Irritating in case of inhalation, contact with the eyes, the skin.
FIRST AID MEASURES
In case of contact with the skin, immediately flush with copious amounts of water while removing contaminated clothing and shoes. Assure adequate flushing (for at least 10 minutes) of the eyes by separating the eyelids with fingers. Consult a specialist. If inhaled, remove to fresh air. If swallowed, wash out mouth with water provided person is conscious, try to make the person vomit. Call a physician immediately.
FIRE FIGHTING MEASURES
Appropriate extinguishing media : water, CO2, foam, powder. Specific danger : combustible vapor heavier than the air. Explosive mixture may appear in contact with the air. Keep away from ignition sources. In case of fire, Nox may form.
ACCIDENTAL RELEASE MEASURES
Use an absorbant for liquids - i.e. Chemizorb (R), Rhonesec (R) to collect the released product. Wash spill site.

HANDLING AND STORAGE

Handling : no other specification
Storage :Stock the container hermetically closed in a cold, dry, air-sealed area. Take measures to avoid electrostatic accumulation

EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory system protection : necessary in case of vapor formation. Use a K filter (following DIN 3181) for ammonia and aminated organic derivates.
Hands protection : necessary
Eyes protection : necessary
Industrial hygienic measure : take off any contaminated clothe.Preventive protection of the skin is recommended. Wash your hands after handling.

PHYSICAL AND CHEMICAL PROPERTIES

Aspect : liquid
Color : colourless
Odor : amine-like
Ph : not applicable
Melting temperature : -96°C
Ebullition temperature : 83-84°C
Self-ignition temperature : 295°C - DIN 51794
Ignition point : -17°C - DIN 51755
Explosion limit in the air : lower : 1.5 vol%
Upper : 8.5 vol%
Vapour pressure : (20°C) 100 hPa
Density : (20°C) 0.72 g/cm^3
Solubility in soluble water (20°C) / soluble organic solvents (20°C)

STABILITY AND REACTIVITY

Conditions to avoid : none
Materials to avoid : oxidants, acids
Other information : hygroscopic, sensitive to air

TOXICOLOGICAL INFORMATION

Acute toxicity : DL50 (if swallowed, [rat]) = 770 mg/kg
Other toxicological information : irritates the skin, the eyes, the mucous. Symptoms of exposure may include coughing, shortness of breath. Danger of skin resorption.

ECOLOGICAL INFORMATION

Do not reject into natural water, waste water or on the ground.

DISPOSAL CONSIDERATIONS

Contact a licensed professional waste disposal service to dispose of this material.

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide.

Appendix 4 : RS485 MODBUS-JBUS addressing

CALIBRATION menu		
/CONC. CALIB.		
/ZERO		
/PROGRAMMING		
/Type	**(0:ElecAuto, 1:Chemical)**	**0121**
/EXECUTION		
/SLOPE		
/EXECUTION		
/TEMP. CALIB..		
/EXECUTION		
/PARAMETERS		
MEASURE menu		
/ TEMP. COMP.		
/Type	(0:Manual,1:Auto)	**1220**
/Temp.		**1230**
ALARMS menu		
/ALARM1		
/Affect	**(0:conc, 1:°C/°F, 2:No)**	**2120**
/Lim.		**2130**
/Dir.	**(0:Low, 1:Up)**	**2140**
/Delay		**2150**
/Hyst.		**2160**
/Relay	**(0:N.O., 1:N.C.)**	**2170**
/ALARM2		
/Affect	**(0:conc, 1:°C/°F, 2:No)**	**2220**
/Lim.		**2230**
/Dir.	**(0:Low, 1:Up)**	**2240**
/Delay		**2250**
/Hyst.		**2260**
/Relay	**(0:N.O., 1:N.C.)**	**2270**
/ALARM3		
/Mode	**(0:Limit, 1:Syst, 2:No)**	**2310**
/Affect	**(0:conc, 1:°C/°F, 2:No)**	**2320**
/Lim.		**2330**
/Dir.	**(0:Bas, 1:Haut)**	**2340**
/Delay		**2350**
/Hyst.		**2360**
/Relay	**(0:N.O., 1:N.C.)**	**2370**
/Accept		**2380**

/ALARM4		
/Mode	(0:Manu, 1:Auto)	2410
/Affect		2420
/Lim.	(0:Limit, 1:Timer, 2:No)	2430
/Dir.	(0:conc, 1:°C/°F, 2:No)	2440
/Delay		2450
/Hyst.	(0:Low, 1:Up)	2460
/Relay		2470
/Interv		2401
/Impul.	(0;N.O., 1:N.C.)	2402
/Ton		2403
/Toff		2404
/TmA		2405
mA OUTPUTS menu		
/OUTPUT1		
/Affect	(0:µA, 1:°C/°F, 2.conc)	4110
/Type	(0:0/20mA, 1:4/20mA)	4120
/ Mode	(0:lin, 1:dual)	4150
/Low		4130
/ Mid.		4160
/Upp.		4140
/OUTPUT2		
/Affect	(0:µA, 1:°C/°F, 2:conc)	4210
/Type	(0:0/20mA, 1:4/20mA)	4220
/Mode	(0:lin, 1:dual)	4250
/Low		4230
/Mid.		4260
/Upp.		4240
/SPECIALPROG.		
/MAINTENANCE		
/Mode	(0:Live, 1:Last, Preset)	4311
/Value		4312
/CALIBRATION		
/Mode	(0:Live, 1:Last, 2:Preset)	4321
/Value		4322
/SYST. ALARM		
/Mode	(0:Live, 1:Last, 2:Preset)	4331
/Value		4332
/TIMER		
/Mode	(0:Live, 1:last, 2:Preset)	4341
/Value		4342
/TEST		
RS485 menu		
/N°		5100
/Baud	(0:300, 1:600, 2:1200, 3:2400,	5200
/Parity	4:4800, 5:9600)	5300
/Stop bit	(0:No, 1:Odd, 2:Even)	5400
	(0:1bit, 2:2bits)	

SERVICE menu		
/AVERAGE		
/Average	(0:0,...10:10)	7210
/TEST		
/DISPLAY		
/Conc.	(0:ppb-ppm, 1:µg-mg/l, 2:%sat.))	7360
/Temp	(0:°C, 1:°F)	7320
/Language	(0;F, 1:GB, 2:D, 3:Sp, 4:I)	7330
/CODE		
/Calib.		7410
/Program		7420
/Service		7430
/SOFT ISSUE		
/DEFAULT VAL.		
/ADJUST mA		
/OUTPUT1		
/OUTPUT2		
/CONFIGURATION		
/Freq	(0:60HZ, 1:50Hz)	7810

Values measured :
Adr 0000 : concentration value
Adr 0002 : temperature value
Adr 0004 :current value
Adr 0006 : auxiliary measured value