OPERATING MANUAL

ELECTRONIC CALCULATOR-INDICATING DEVICE UNI

AS A PART OF MEASURING SYSTEMS FOR MEASUREMENT OF LIQUIDS OTHER THAN WATER

Rev.	Date	Nature of modifications	Writter	Approb.
C	13/08/29	Creation	DSM	AH

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1. GENERAL PRESENTATION AND DESCRIPTION

The ALMA UNI electronic calculator-indicator is intended for interruptible or non-interruptible systems for measuring the volume of liquids other than water. It can be installed in measuring systems mounted on tank trucks.

The UNI device is powered by two batteries.

The calculator is available in two different versions:

- ⇨ Version 1 mounted directly on an ALMA ADRIANE turbine measuring device,
- ⇨ Version 2 in an independent case, then it is connected to an ALMA 2B00 pulse emitter.

When necessary, the ALMA UNI electronic calculator-indicator includes:

- ⇨ A 3-wires PT100 temperature sensor (example CT1001),
- ⇨ And/or two ALMA DG gas detectors type Honneywell LLE105000.

The 'IR-USB KEY' option is used to transfer measurements results and parameters to a key. The data may be downloaded from the key to a PC through USB cable.

The ALMA UNI electronic calculator-indicator guarantees the metering operations and manages alarms from the measuring system.

The operating temperature for the UNI is between -20°C and +50°C.

On its front face, the UNI device has a LCD backlight protected by a glass to display measurement information which can be read from the user interface. The five buttons have the following functions:

BP5 Light the display during 10 seconds

BP4 Normal mode: return to previous menu
METROLOGICAL mode: increment the flashing figure when imputing a value or return to previous menu

BP3 Normal mode, metering off: select the menu
Normal mode, metering on: display the values (immediate flow, temperature)
METROLOGICAL mode: select the figure to be modified or select the menu

BP2 Normal mode: validate the selected menu or value
METROLOGICAL mode: validate the displayed value or validate the selected menu
In case of default: acknowledge the default

BP1 Reset the volume to zero before a new measurement. The data of the last measurement are then recorded

2 USER RECOMMENDATIONS

When it is not used, it's better to close the UNI cover.

The front face glass must be regularly cleaned for easy readability and better communication with the IR-USB key.

The display "Battery" indicates that the batteries must be changed. Batteries must be changed in a non-explosive area. The verification seals have to be broken by authorised personnel only. The substitution of the batteries is done by removing the box by the 4 screws and by accessing the electronic board:

Proceed to the substitution of the batteries one after the other:

- ⇨ Remove the first one and put a new battery
- ⇨ Remove the second one and put another new battery

Removal of 2 batteries leads to loose stored data.

Respect polarization.

The UNI ATEX certification requires the following batteries:

- ⇨ **Lithium battery SAFT LS 14500 C**
- ⇨ **Lithium battery SONNENSCHEIN SL-760**

3 OPERATION

The ALMA UNI electronic calculator-indicator performs the following functions:

- It ensures the acquisition and processing of the pulses from the pulse emitter or from the electronic card's coils.
- It calculates and displays volume in metering conditions based on Kfactor determined during the calibration of the turbine, corrected during the calibration of the measuring system.
  In some cases, this volume in metering conditions can be corrected depending on the flow rate and/or the type of liquid measured.
- If required, it calculates and displays the mean temperature of the liquid when it is measured by a PT 100 temperature sensor.
- If required, it calculates and displays volume converted to base conditions. Volume is calculated by taking into account the mean temperature of the liquid during metering. Using a standard conversion formula, the conversion factor can be calculated according to density in base conditions.
  Density is entered manually prior to metering via the METROLOGICAL Mode.
- The UNI device volume is reset to zero manually.
- It memorizes and secures measurement information, which can be read from the user interface of the calculator-indicator.
- If the measuring system is interruptible, it presets the volume to be delivered.
- It registers accumulated volumes in metering conditions, including when the calculator-indicator is in alarm.

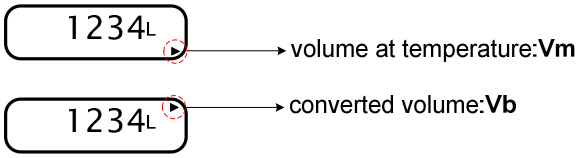
The UNI calculator-indicator has 3 operation levels: USER, SUPERVISOR and the METROLOGICAL mode for the configuration of the device by authorized personnel.

4 USER MODE

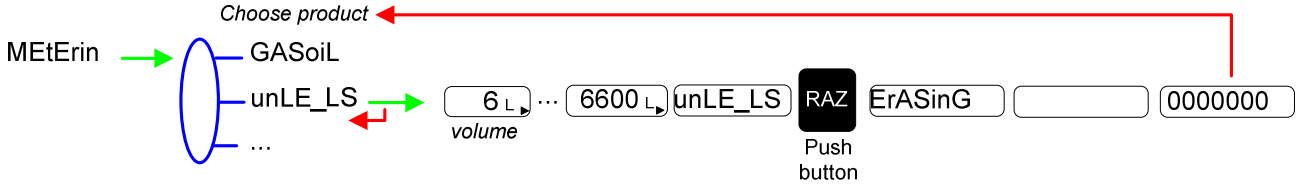
The UNI can be either ON or OFF metering. Metering is ON between the first command level after initialisation or resetting the current volume to zero, and resetting the current volume to zero.

The calculator indicates the displayed quantity by selecting the symbol at the right of the value. When a volume is displayed, the two arrows located on the right of the display screen enable the calculator to indicate if it is a:

- Volume in base conditions. In this case, only the “L” and the arrow in front of Vb appear on the display screen.
- Volume in measuring conditions. In this case, only the “L” and the arrow in front of Vm appear on the display screen.



Example:



4.1 Visualisation of values during delivery

Use BP3 to display flow rate and temperature during measuring (flow>0). Press:

⇨ One time for flow rate,
⇨ Two times for temperature.

Display returns automatically to the current volume.

4.2 Reset

At zero flow conditions, press BP1 RAZ to record the last measurement data and to reset the volume to zero.

4.3 Transfer of measurement results to the IR-USB key (option)

The ‘IR-USB KEY’ option allows to transferring measurements results and parameters to the key. Then, data can be used on a PC.

The transfer of the measurement results of the N last days is possible when flow rate is zero. N value has to be set in SUPERVISOR menu.

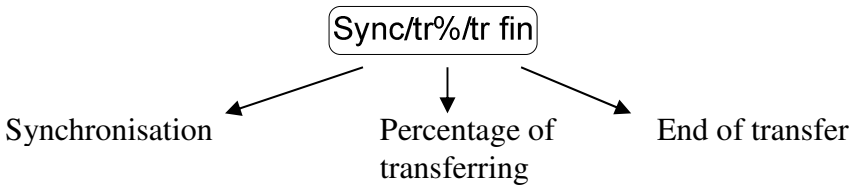
Transfer measurement results to the key:

1. Place the key on the UNI indicator such as shown below:

2. Press <u>simultaneously</u> on RAZ and Select.

<u>WARNING</u>: if it's not made that way, it may change the product for the following unloading so check the product before starting a new one.

3. Wait for the end of transfer and display of message:

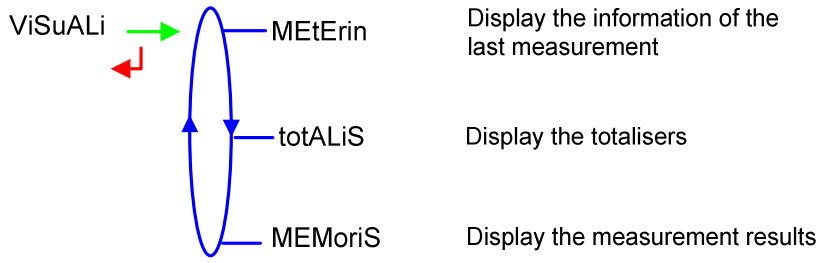


The file format is '.csv'.

4. Remove the key

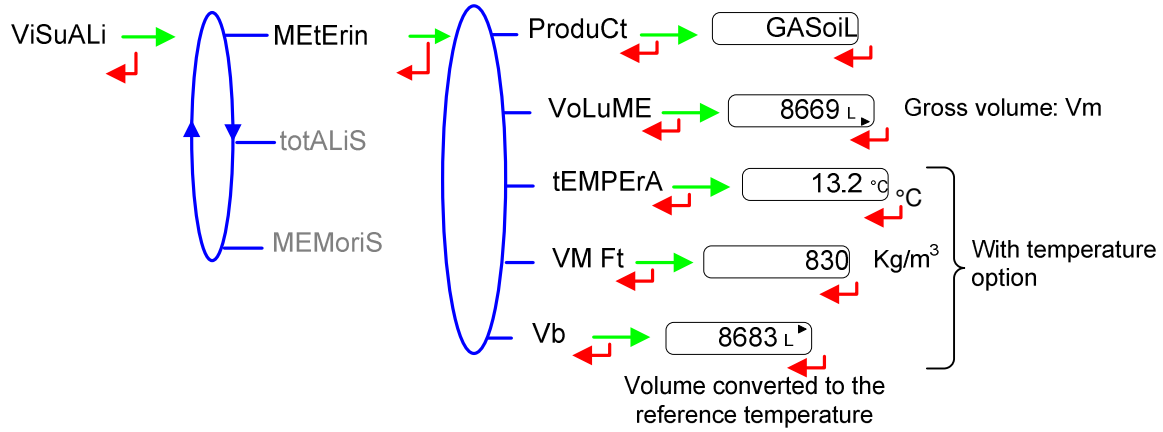
Transfer files to a PC, see §6.

4.4 Menu VISUALISATION

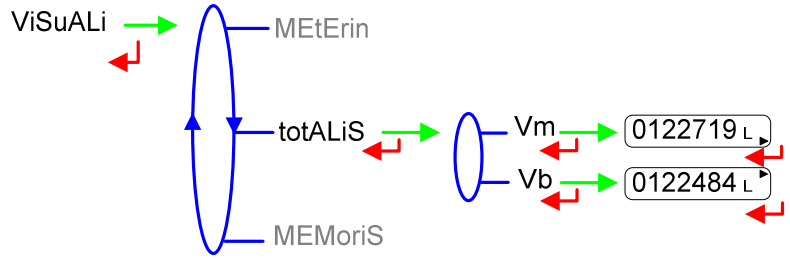


If the values are preceded by this display '-------'; it means they are no longer guaranteed.

4.4.1 Sub-menu METERING

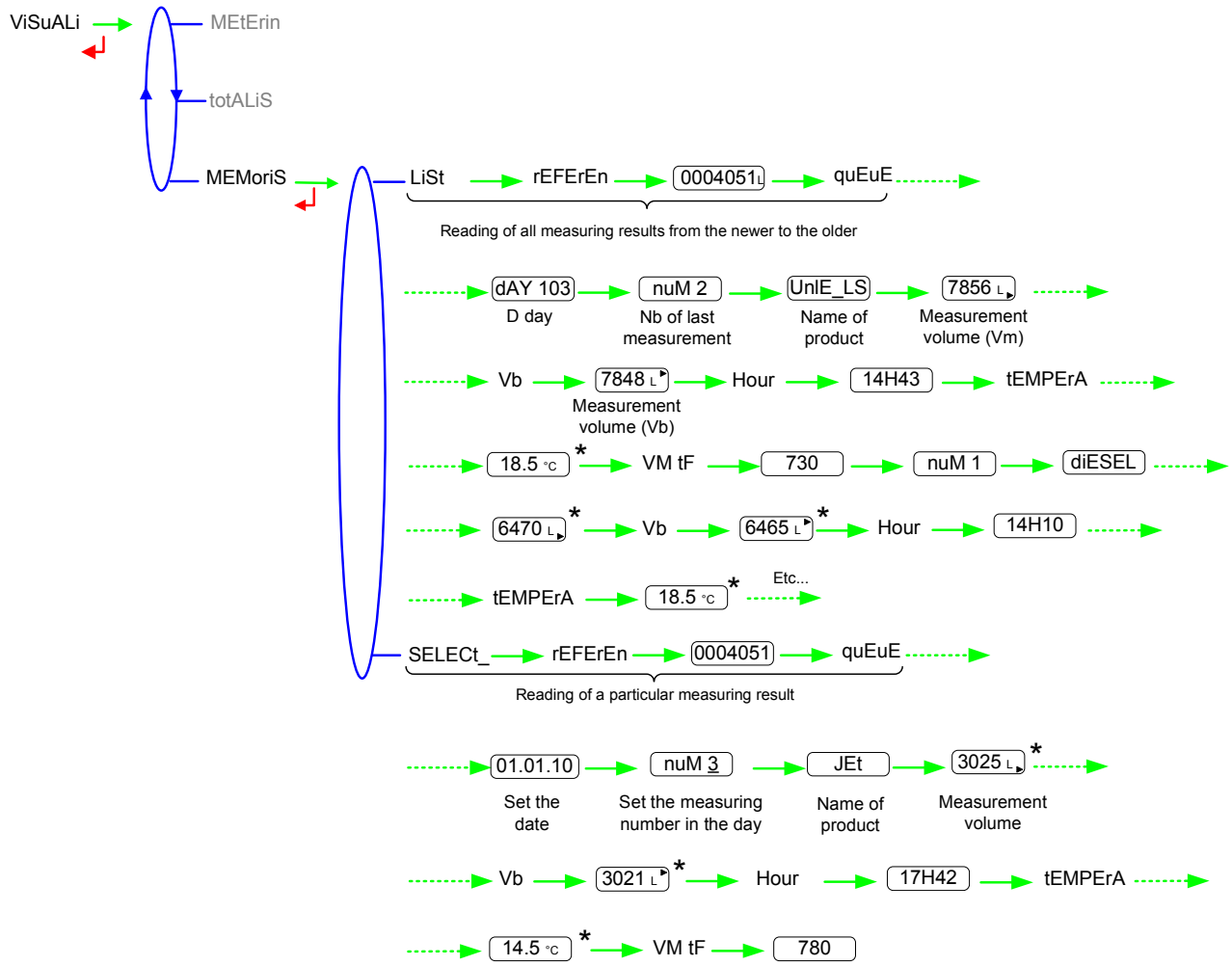


4.4.2 Sub-menu TOTALISER



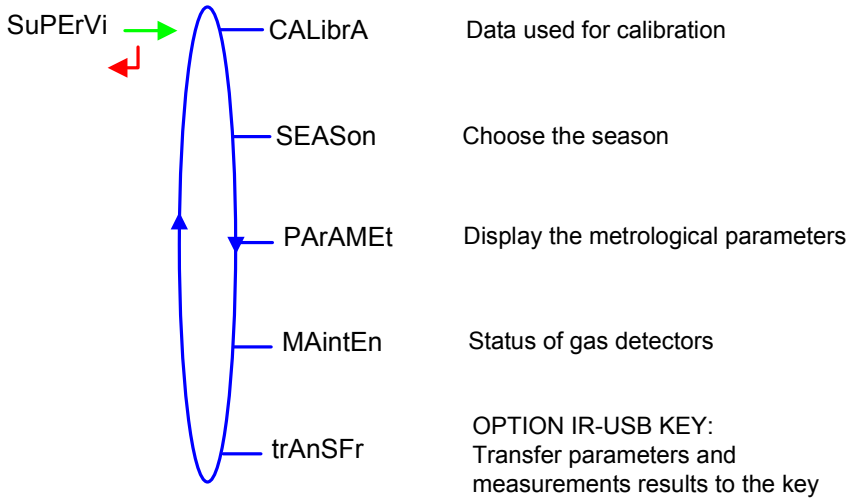
4.4.3 Sub-menu MEMORISATION

The temperature, the converted volume and the density are only displayed if the temperature option is activated.



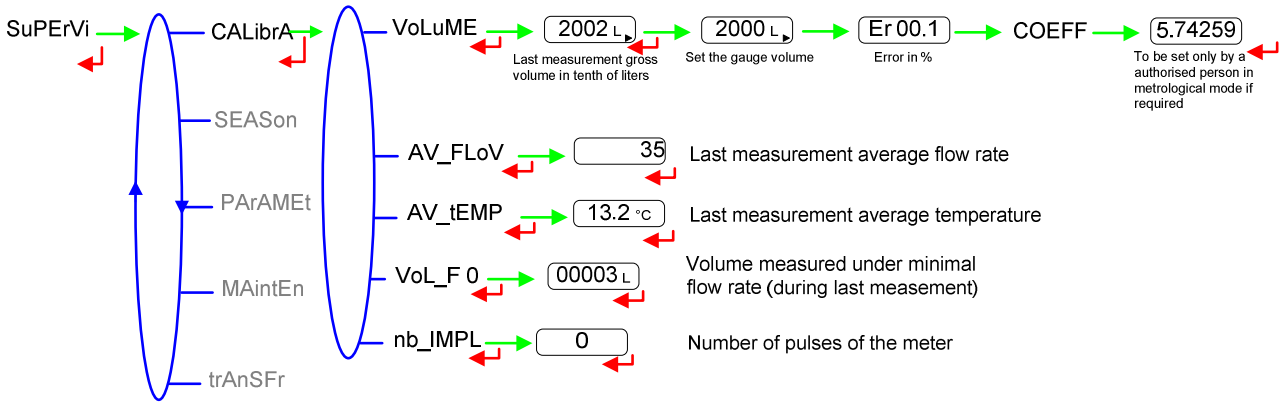
*These values may be preceded by this display: -------
Its means they are no longer guaranteed

4.5 Menu SUPERVISOR



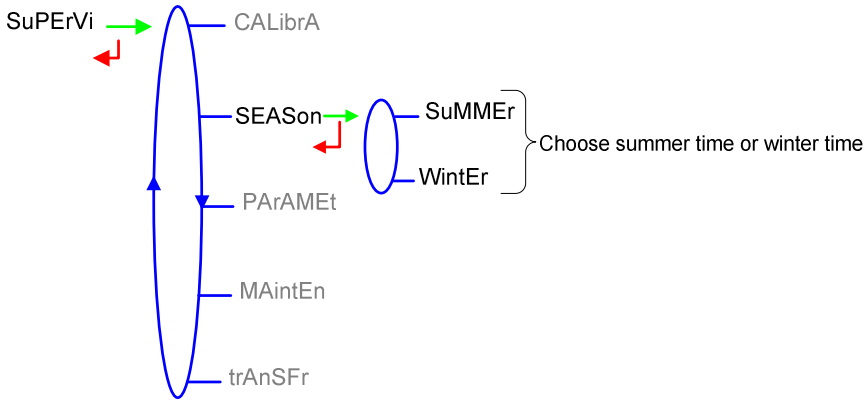
4.5.1 Sub-menu CALIBRATION

Check the measuring system accuracy during the calibration with a gauge.



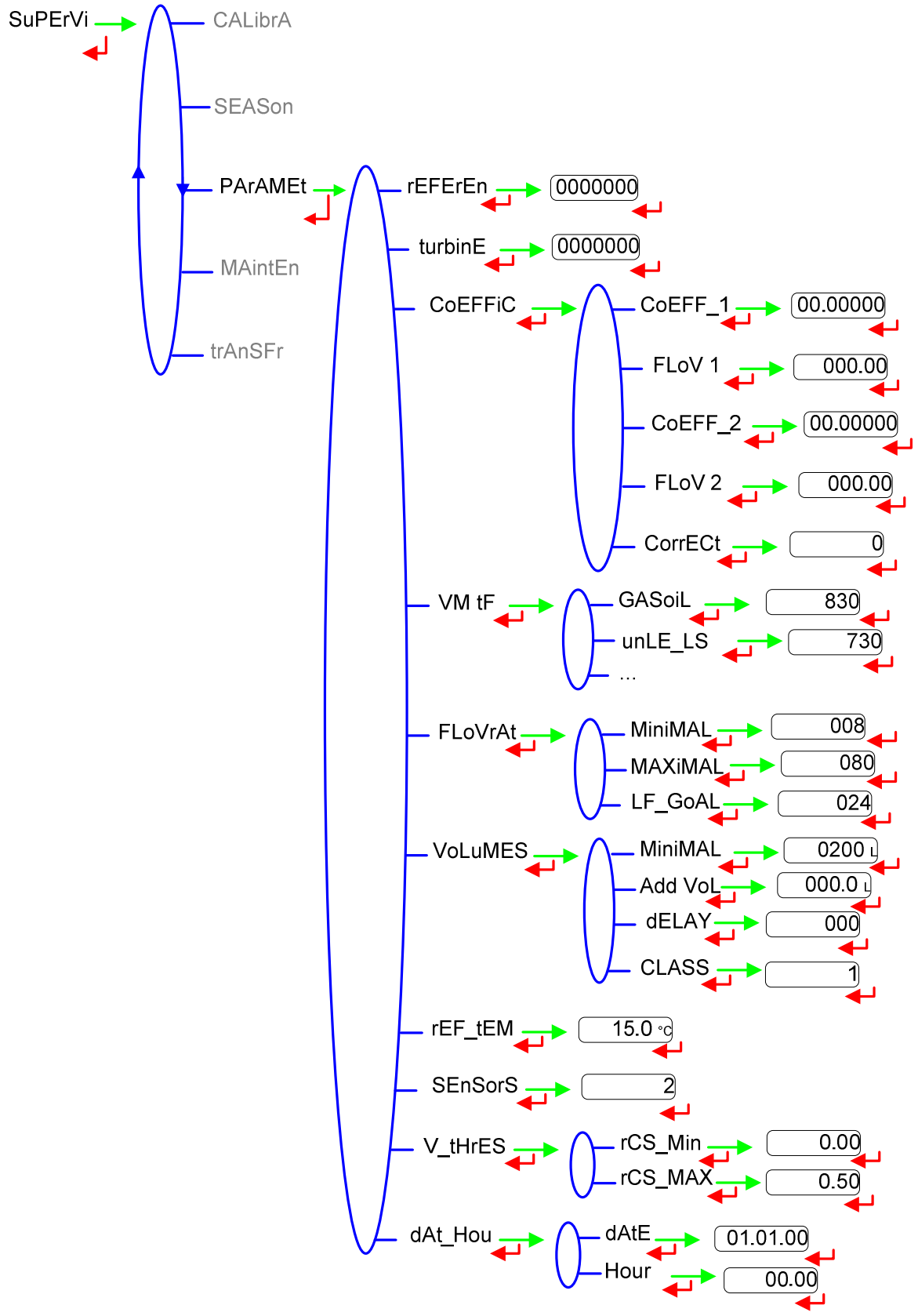
4.5.2 Sub-menu SEASON

Choose the season in order to change from summer to winter time (and back again).



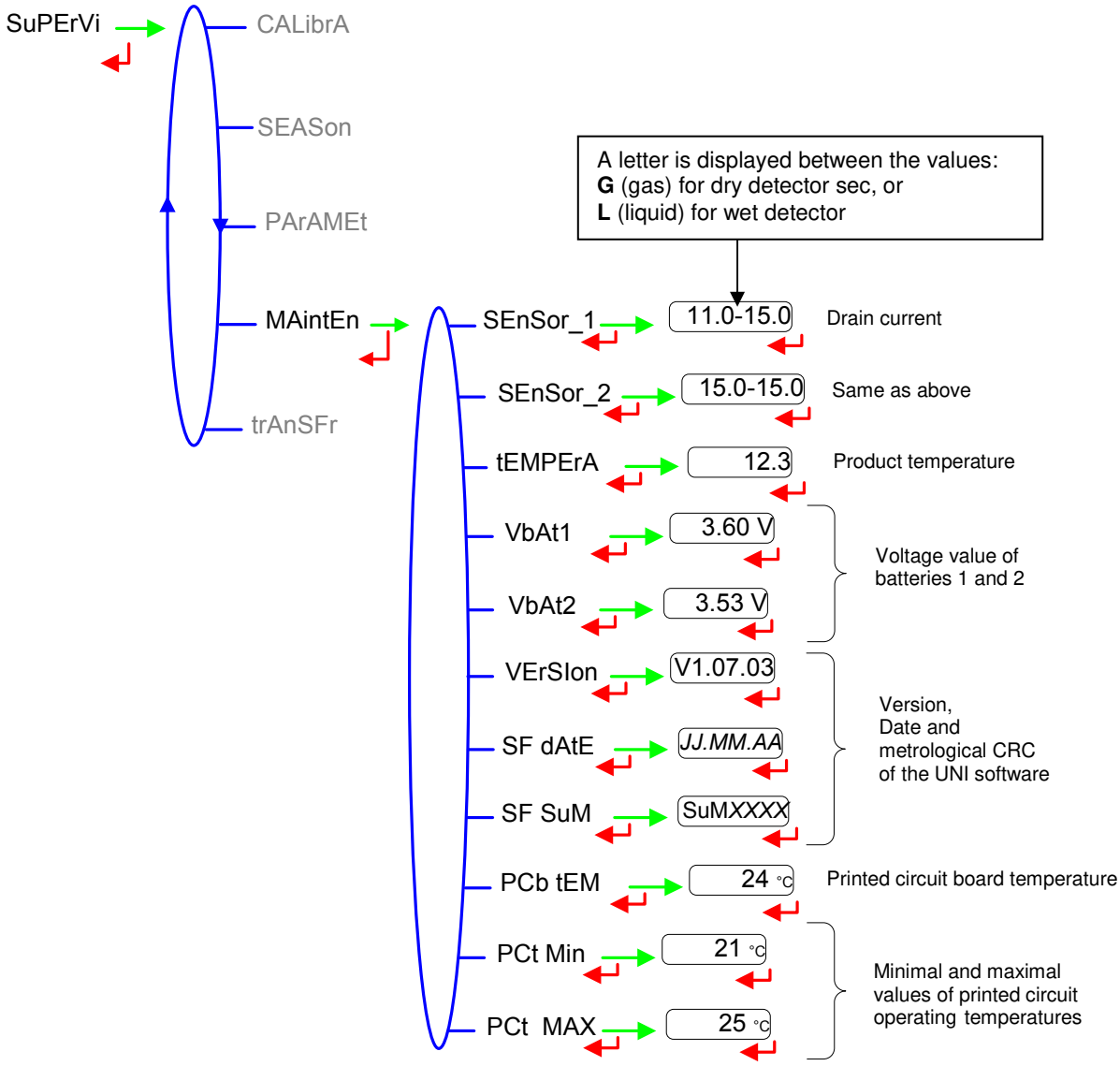
4.5.3 Sub-menu PARAMETERS

This menu displays the parameters set in METROLOGICAL mode.



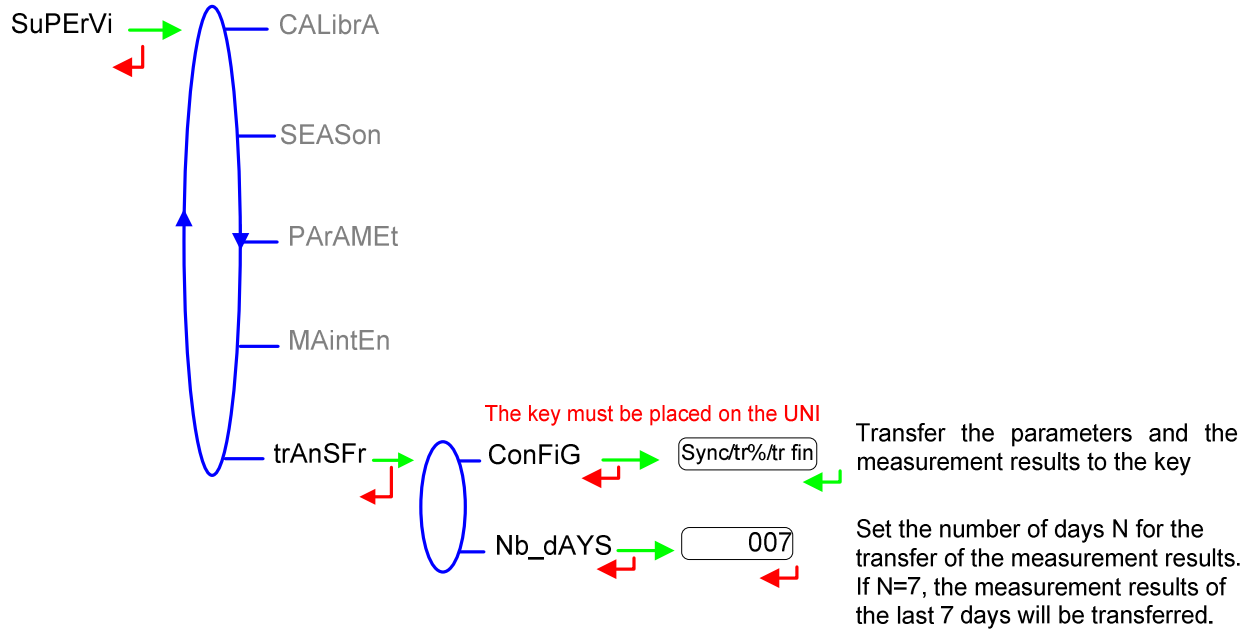
4.5.4 Sub-menu MAINTENANCE

This menu displays the drain current (mA) of each gas detector and the reference current set in METROLOGICAL mode, as well as the product temperature.



4.5.5 Sub-menu TRANSFER

This sub-menu is available with the 'IR-USB KEY' option. It is used to transfer to the key the parameters set in METROLOGICAL mode and the measurement results and to download it to a PC. The file format is '.csv'. Transfer files to a PC, see §6.



4.6 Faults list

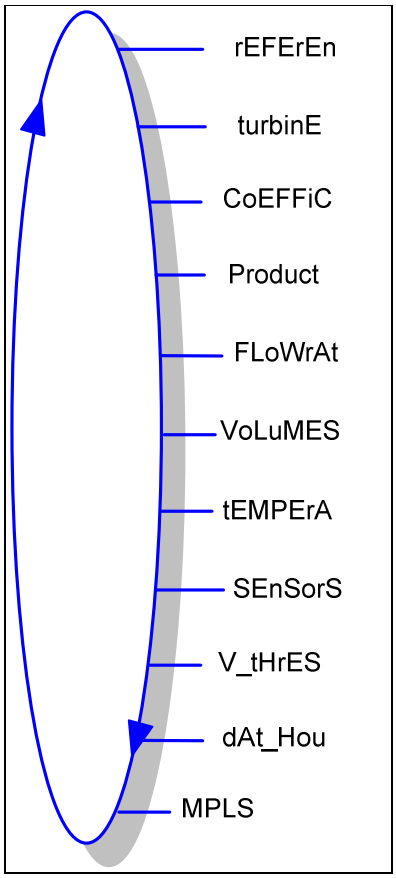
Should a fault occur, the UNI displays the word "ALArM" and the fault title on the display (using some or all of the seven digits) followed by the displayed value . The operator acknowledges the fault by pressing down BP2 (even when pouring). Apart from battery related faults, persistent faults cannot be acknowledged.

Once the fault is acknowledged, the selected value is displayed alternately with "-------" to indicate that the measured values are no longer guaranteed.

ALARME	DEFAUT
ProGrAM	Error on the checksum of the metrological data
rAM	Metrological configuration RAM fault
Faults acknowledgeable in METROLOGICAL mode	
MEtro_	Configuration loss
COEFF_	Coefficient fault (disparity between parameter values)
dAtE	Date loss
FLoV_	Flow setting fault (disparity between parameter values)
FrEQ_	Frequency fault (disparity between parameter values)
MEMoriS	Bad writing into the memory

ALARME	DEFAUT
Faults acknowledgeable	
dEF_MEM	Loss of backup data concerning the last measurement
SEnSor_1	High gas detector fault (GDh)
SEnSor _2	Low gas detector fault (GDl)
LoW_FLo	Flow rate less than the setting minimal flow rate
HiGH_FL	Flow rate greater than the setting maximal flowrate
LF_HIGH	Flow rate greater than 20m^3/h when GDh is dry
GAS	GDh is wet but GDl is dry
doG	Watch dog fault
overFLo	Volume greater than 9 999 999 liters
MEtEr_	Discordance between the two metering channels
bobinE	Loss of pulse transmitter signal
dEF CoM	Communication fault on the IRDA link
totAL	Totaliser fault
diSPLAy	LCD display fault
FuLL	Saturation of secured memorisation: more than 99 measurements per day
bAttErY	Low battery (see §2 User recommendations)
tEMPErA	Temperature less than -20°C or greater than 50°C

5. METROLOGICAL MODE



The configuration parameters can only be modified after the processor configuration switch on the electronic card has been switched over. Only authorized personnel can modify these parameters. Exit the METROLOGICAL mode thanks to the switch; the device is then reset.

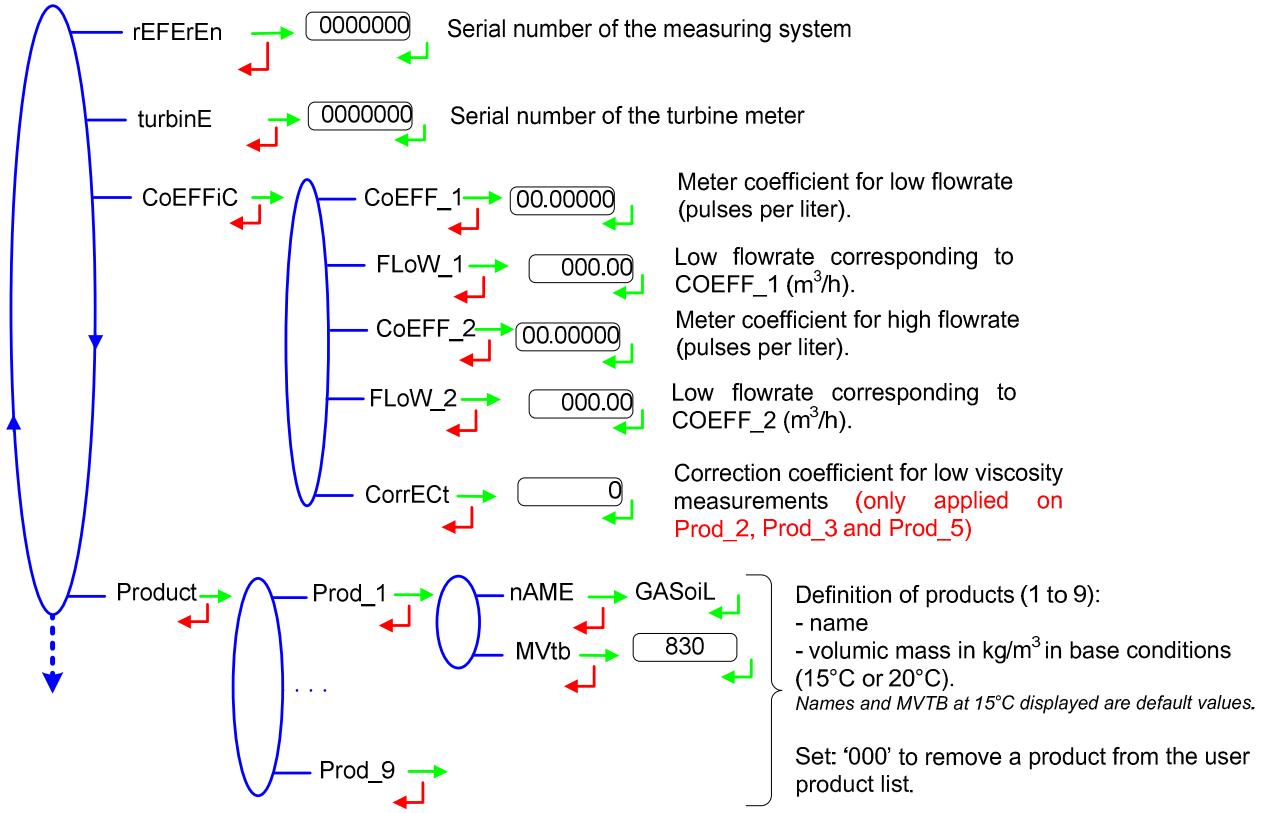
IMPORTANT

Setup should be done under cover, metering off, with dry gas detectors.

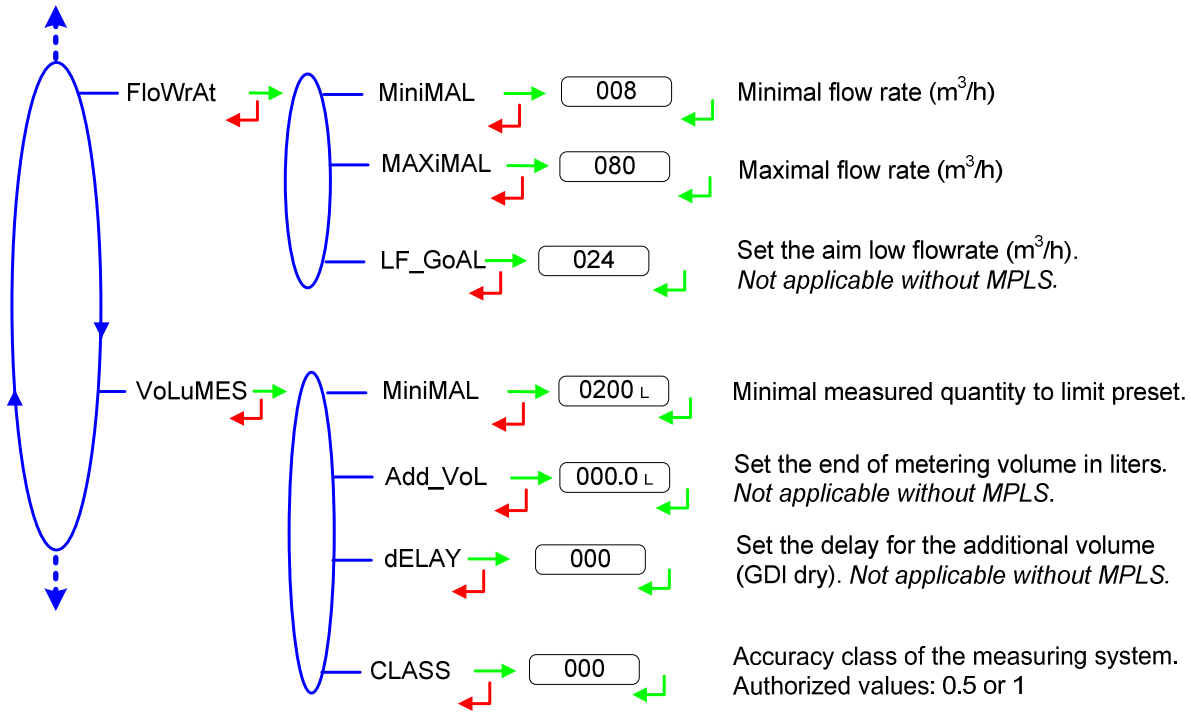
The configuration of 'Vm' or 'Vb' volume is made thanks to a menu which is available as soon as the temperature option has been set to 'YES'.

5.1 Menus REFERENCE, TURBINE, COEFFICIENT, PRODUCTS

A correction can be applied for low viscosity measurements. The correction coefficient can be applied on three products: Prod_2, Prod_3, and Prod_5.



5.2 Menus FLOWRATES, VOLUMES

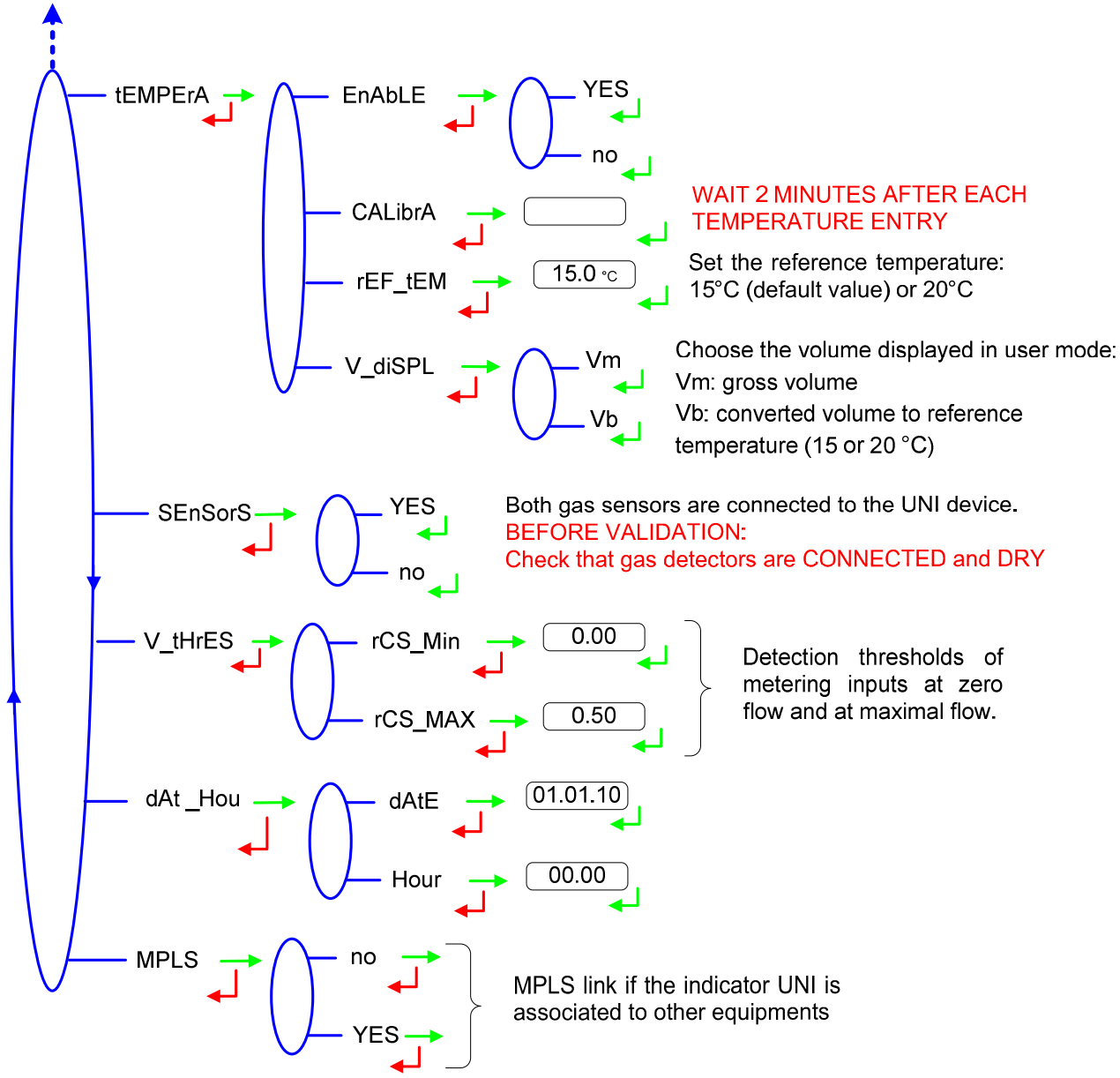


5.3 Menus TEMPERATURE, GAS DETECTOR, THRESHOLDS, DATE, MPLS

The temperature calibration can be done either on two measuring points or on a single measuring point (menu CALibrA).

⇨ Two temperature measuring points:
The measure must be done outside the range -20 to +50°C. First point: T<-20°C; second point: T>50°C.

⇨ Single temperature measuring point:
The measure must be done in the range -20 to +50°C.

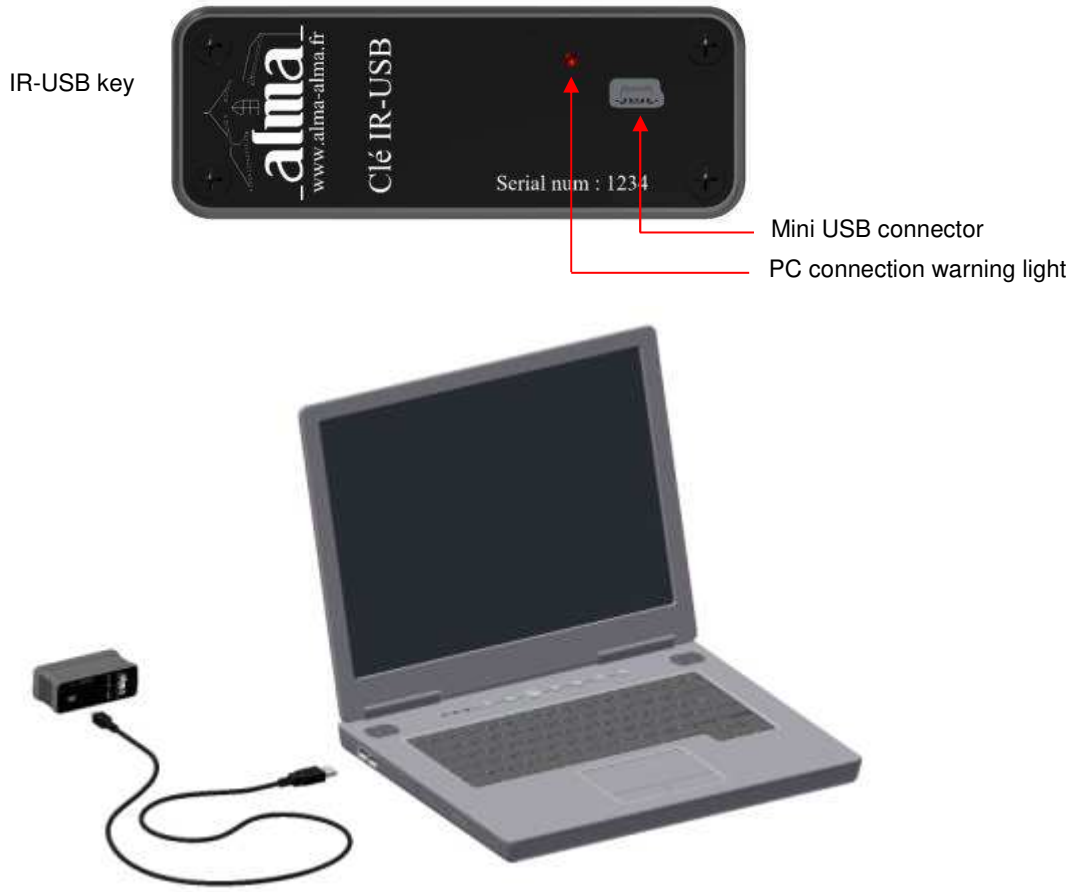


6. TRANSFER DATA TO A PC (OPTION)

The 'IR-USB KEY' option is used to transfer measurements results and parameters to a key. The data may be downloaded from the key to a PC through USB cable.

----------Read instructions up to the end of this section----------

Transfer files from the key to a PC:



1. Connect the USB 2.0 cable to the key
2. Connect the USB 2.0 cable to the PC

A green led on the key lights on to indicate that it is detected by the PC.

3. Access the key directory (see PC documentation)

The measurements results files are named 'M0000123' where 123 is the reference number of the meter or of the measuring system.

The parameters files are named 'P0000123' where 123 is the reference number of the meter or of the measuring system.

Files should be renamed before being stored in the backup directory.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Measurements summary of UNI n° 0000002 edited 03/23/2012 at 02:27														
2	Vm UNI total	787418	L												
3	Vb UNI total	793840	L												
4	USB key batt	3.62	V	OK											
5															
6	Day Number	Measureme	Date	Hour	Product	Measured V	Basic Volum	Temperature	Weight (Kg)	Displayed De	DEF_MEM	DOG	OVERFLO	METER	LOW_FLO
7															
8	83	1	03/23/2012	00:07	PETROL	10	N/A	99.9	N/A						
9	82	5	03/22/2012	06:15	BUTANE	30	31	0.0	18						
10	82	4	03/22/2012	06:14	BUTANE	4	N/A	No	N/A						
11	82	3	03/22/2012	00:04	PETROL	20	N/A	No	N/A						
12	82	2	03/22/2012	00:03	DIESEL	21	21	19.4	17						
13	82	1	03/22/2012	00:02	DIESEL	7	7	18.5	5						
14	81	2	03/21/2012	23:59	UNLEADE	4	4	16.2	2						
15	81	1	03/21/2012	23:58	UNLE_LS	5	N/A	No	N/A						
16															

File M0000123

	A	B	C	D	E	F
1	UNI Parameters n°0000002 edited 03/23/2012 at 02:27					
2	Software version	438 v01.00.01				
3	Software date	04/22/2012				
4	USB key battery voltage	3.62	V			
5	Meter serial number	0				
6	K1 Coefficient (Low Flow)	4.00000	imp/L	Low Flow Q1	00.0	m3/h
7	K2 Coefficient (High Flow)	4.00000	imp/L	High Flow Q2	00.0	m3/h
8	Viscosity correction factor (0.1%)	0				
9	Rcsmin (%)	0.00				
10	Rcsmax (%)	50.00				
11	Product 1	GASOIL		Basic Density	830	Kg/m3
12	Product 2	UNLE_LS		Basic Density	730	Kg/m3
13	Product 3	UNLEADE		Basic Density	730	Kg/m3
14	Product 4	DIESEL		Basic Density	840	Kg/m3
15	Product 5	PETROL		Basic Density	740	Kg/m3
16	Product 6	JET		Basic Density	780	Kg/m3
17	Product 7	PROPANE		Basic Density	515	Kg/m3
18	Product 8	BUTANE		Basic Density	585	Kg/m3
19	Product 9	LPG		Basic Density	550	Kg/m3
20	Minimum flow rate	8	m3/h			
21	Maximum flow rate	80	m3/h			
22	Objective flow rate	24	m3/h			
23	Minimum Measured Quantity	200	L			
24	Added volume	0	L			
25	Delay	0	L			
26	Accuracy Class	0.5				
27	Displayed Volume	Vm				
28	Basic Temperature	15.0	°C			
29	PT100 slope	7.769698e-03				
30	PT100 Y intercept	89.432	Ohm			
31	Reference current DG1 Dry	16.0	mA			
32	Reference current DG2 Dry	16.0	mA			
33	LCD contrast (%)	38.00				
34	MPLS	No				
35	Min Ci temperature	15.0	°C			
36	Max Ci temperature	35.0	°C			

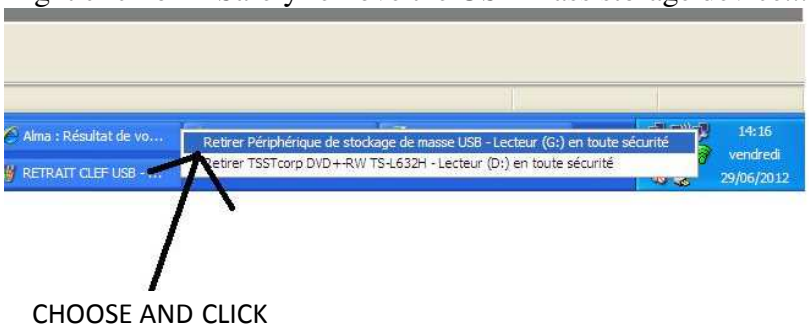
P0000002

File P0000123

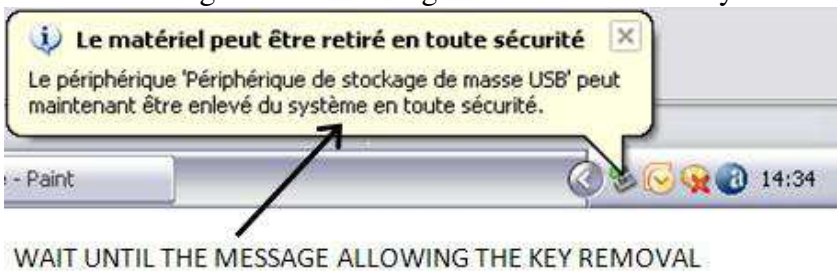
FOLLOW THE INDICATION BELOW TO REMOVE THE KEY:

- Left click on the icon at the right hand corner of the task bar.

- Right click on « Safely remove the USB mass storage device... »



- Wait the message and check the green led is off. The key is then turned off.



- Disconnect the USB cable from the PC.