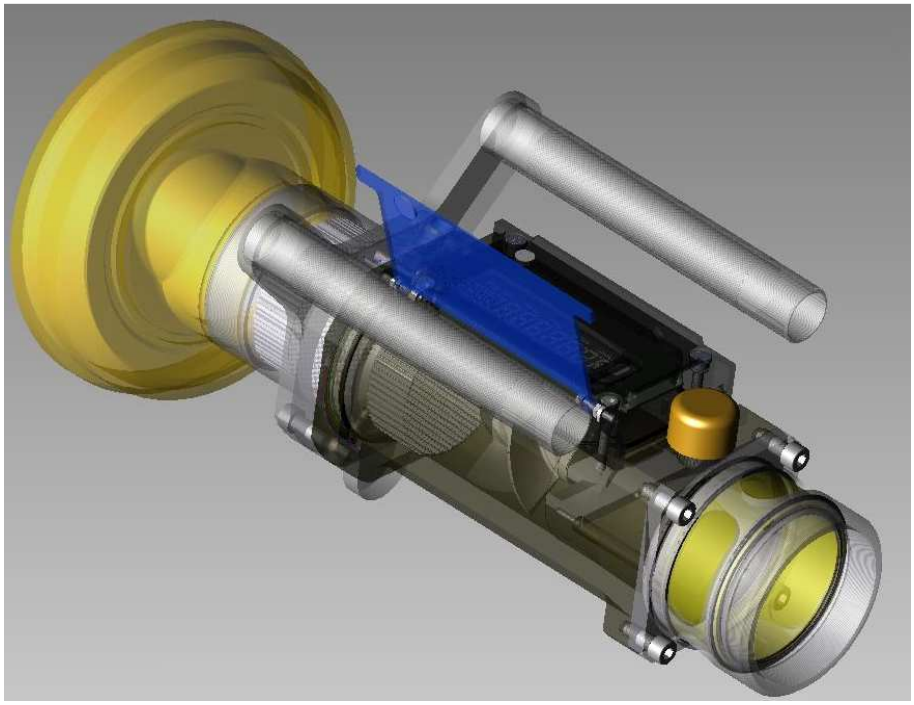
OPERATING MANUAL

AUTONOMOUS FLEXICOMPT+

MEASURING SYSTEM FOR GRAVITY MEASUREMENT



Document available for software: 434 from version: 1.05

Rev.	Date	Nature of modifications	Writter	Approb.
F	06/09/12	'IR-USB KEY' removal procedure, updating menus MAINTENANCE and VMFT	DSM	XS
D	24/04/12	'IR-USB KEY' option	DSM	XS
C	22/09/11	Updating with software 434 V1.05 (Vm and Vb)	DSM	XS
A	26/02/09	Creation – Replace MM5014-EN-4	FM	DSM

SUMMARY

1. GENERAL PRESENTATION AND DESCRIPTION 3
2. USER RECOMMENDATIONS 4
3. IGNITION AND OPERATION 5
4. USER MODE 5
4.1 METERING MENU 5
4.1.1 FLOWRATE NOT NULL 5
4.1.2 FLOWRATE TO ZERO 6
4.1.3 IR-USB KEY OPTION: TRANSFER MEASUREMENT RESULTS TO THE KEY ... 6
4.2 VISUALISATION MENU 7
4.2.1 METERING SUBMENU 7
4.2.2 TOTALISER SUBMENU 8
4.2.3 MEMORISATION SUBMENU 8
4.3 SUPERVISOR MENU 9
4.3.1 CALIBRATION SUBMENU 9
4.3.2 SEASON SUBMENU 9
4.3.3 PARAMETERS SUBMENU 10
4.3.4 MAINTENANCE SUBMENU 11
4.3.5 TRANSFER SUBMENU – OPTION 11
4.4 FAULTS LIST 12
5. METROLOGICAL MODE 13
5.1 REFERENCE, TURBINE, COEFFICIENT, VMFT 14
5.2 FLOW RATES, VOLUMES 14
5.3 TEMPERATURE, GAS DETECTORS, THRESHOLDS, DATE, MPLS 15
6. TRANSFER DATA TO A PC – OPTION 16

1. GENERAL PRESENTATION AND DESCRIPTION

The AUTONOMOUS FLEXICOMPT+ is intended to the gravity measurement of products other than water on various installations.

It can:

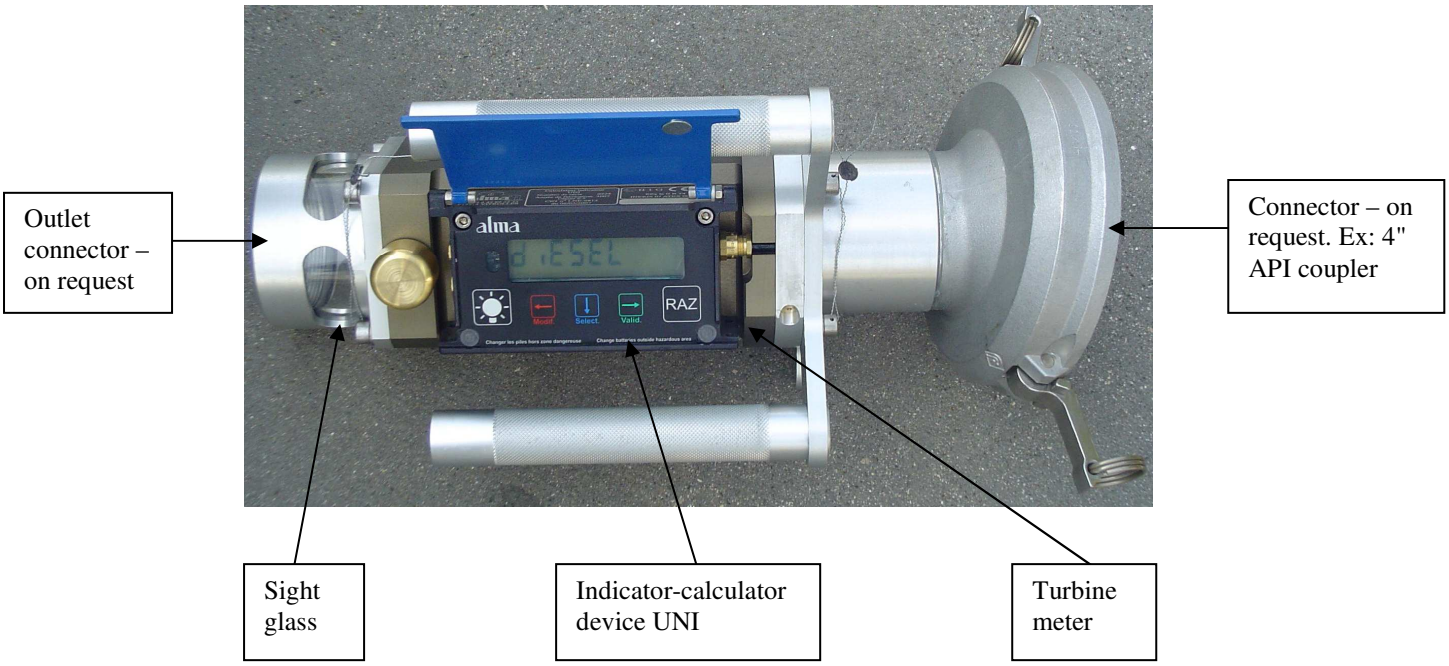
- measure products when they are delivered to the station,
- monitor the reception of products (lorry/wagon),
- split compartments,
- measure product returns,
- and issue tank charts.

The AUTONOMOUS FLEXICOMPT+ includes:

- an intrinsic security indicator-calculator device, type UNI, powered by 2 lithium batteries (4 years life expectancy) fastened to the hydraulic sleeve,
- a hydraulic measuring sleeve composed of:
  - an ALMA turbine meter, type ADRIANE DN80-80,
  - a sight glass located downstream of the turbine meter,
  - a vacuum breaker valve,
- an appropriate connector: a 4" coupler to connect onto the API adapter, a DN80 quick coupling to connect the unloading hose or any other connector (TODO, aviation,…)
- an appropriate unloading connector: a quick coupling to connect the unloading hose or any other connector (TODO, aviation,…).

The AUTONOMOUS FLEXICOMPT+ may be connected to a temperature probe.

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 indicator-calculator device, type UNI guarantees the metering operations and manages the faults linked with the metering system.

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

On the front of the UNI, you can see five buttons:

BP5 Light the display during 10 seconds

BP4

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

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

BP2

Normal mode: validate the selected menu or value
METROLOGICAL mode: validate the displayed value
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 using the AUTONOMOUS FLEXICOMPT+ in gravity mode, the operator must make sure that all of the following conditions are satisfied:

- the tank operating position does not differ by +/- 2° (dependant from tank design, refer to tank manufacturer) from the horizontal reference position (to avoid product retention)
- when measuring, FLEXICOMPT is fixed on the API outlet of the tank at an angle of 15° minimum to the horizontal;
- the unloading hose must be installed to ensure an easy outflow during delivery (without product retention, avoid high points). The maximum length of the discharge hose (3'' diameter) is 12 meters;
- the operator must remain beside the metering system during delivery to stop the flow, if necessary, by closing the API valve on the outlet of the tank compartment .

NB: the AUTONOMOUS FLEXICOMPT+ cannot be used for pumped applications.

3. IGNITION AND OPERATION

The AUTONOMOUS FLEXICOMPT+ measuring system operates with an empty hose. The operator connects hydraulic sleeve to the API adaptor and then connects the hose to the sleeve outlet.

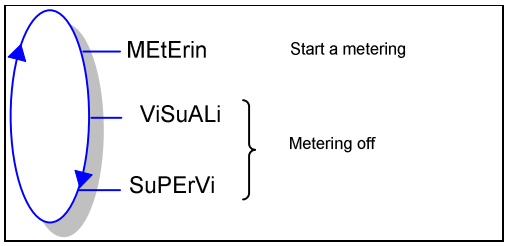
The operating procedure is as follows:

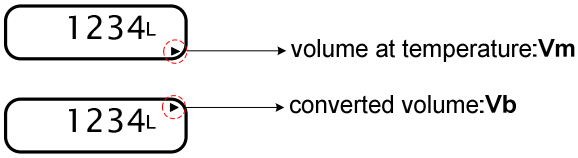
- After having reset the indicator to 0 (BP1 RAZ), the operator turns the outlet release lever on the compartment to be emptied. The metering starts as soon as the indicator – calculator device records impulses coming from the turbine. The metered volume is continually displayed on the indicator-calculator device.

- For partial emptying:
  The operator stops metering by closing the compartment outlet valve. The metering stops when the indicator-calculator device notes that the two gas detectors are wet and flow rate is to zero.

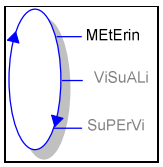
- For complete emptying:
  The operating procedure is identical to the partial emptying procedure but there is no voluntary action on the compartment outlet valve.

4. USER MODE

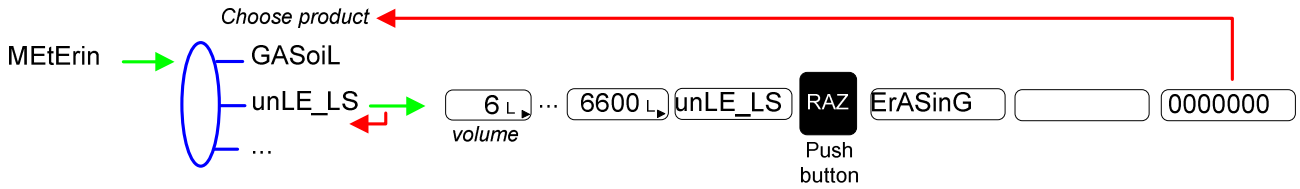




The UNI metering can be either on or off. Metering is ON between the first command level after initialisation or resetting the current volume to zero, and resetting the current volume to zero.



4.1 METERING MENU



4.1.1 FLOWRATE NOT NULL

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.

4.1.2 FLOWRATE TO ZERO

If the flow is zero, pressing BP1 RAZ allows the recording of the last measurement data and reset the volume to zero.

4.1.3 IR-USB KEY OPTION: TRANSFER MEASUREMENT RESULTS TO THE KEY

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

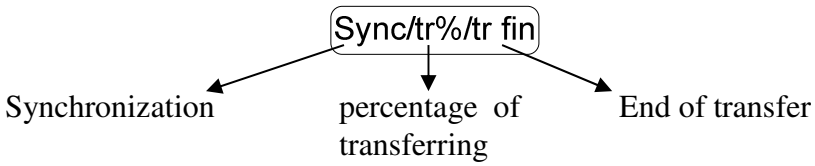
Transfer measurement results to the key:

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

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

<u>ATTENTION</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.

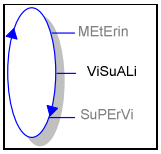
3. Wait the end of transfer and display of message:



The file format is '.csv'.

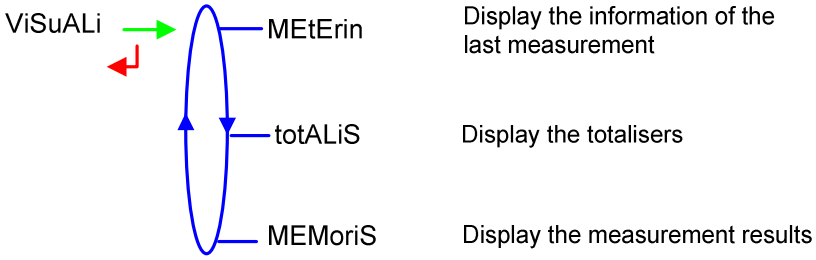
4. Remove the key

Transfer files to a PC, see §6.



4.2 VISUALISATION MENU

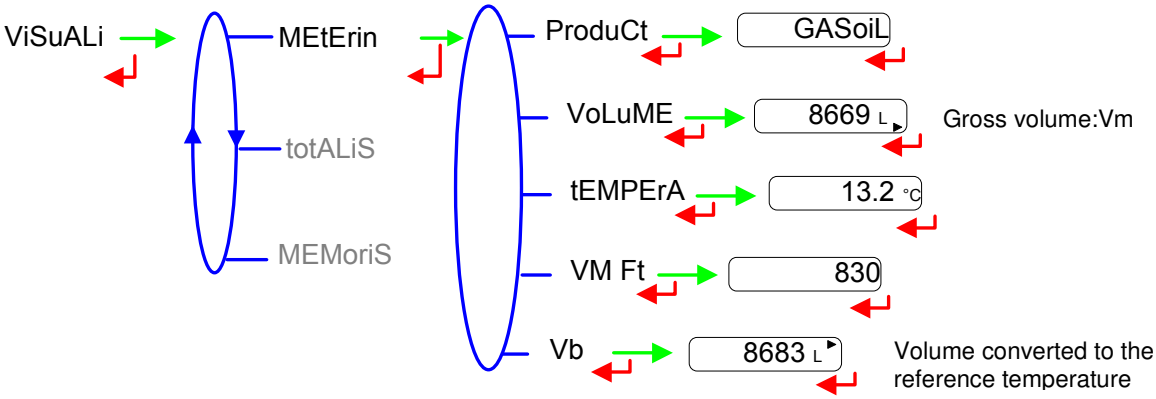
The operator can access various menus and sub-menus by using
BP3 select the menu,
BP2 validate the displayed menu or value,
BP4 return to the previous menu.



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

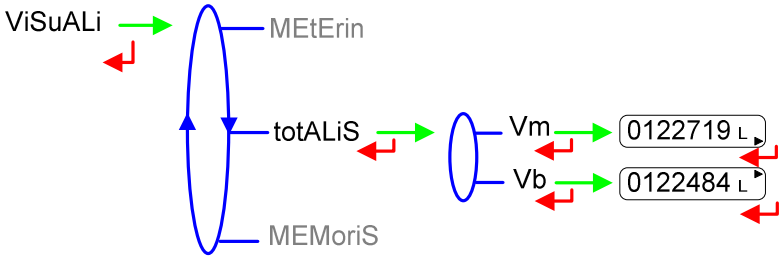
4.2.1 METERING SUBMENU

This menu displays the information of the last measurement.



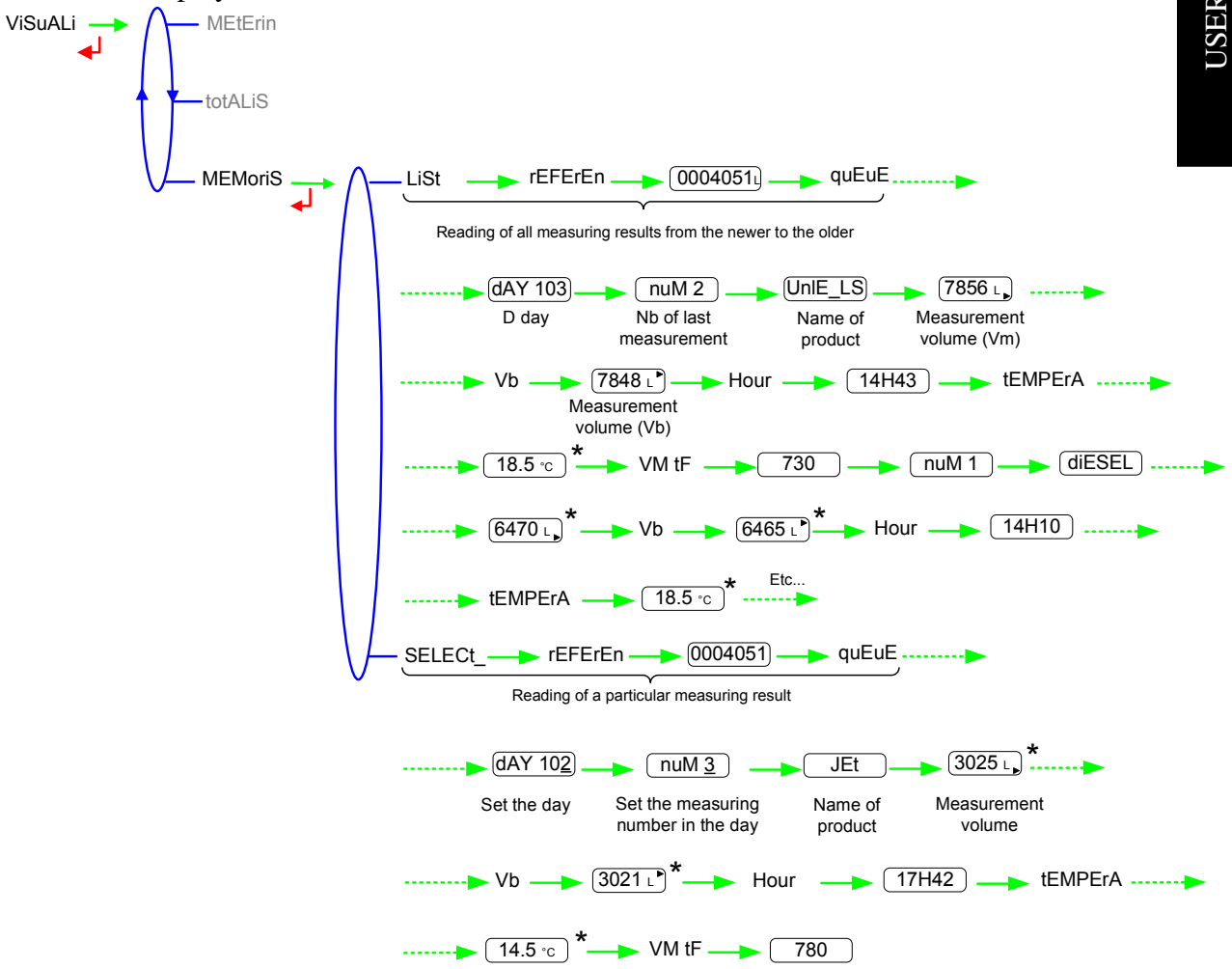
4.2.2 TOTALISER SUBMENU

This menu displays the totalisers.

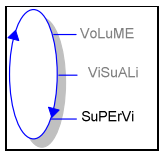


4.2.3 MEMORISATION SUBMENU

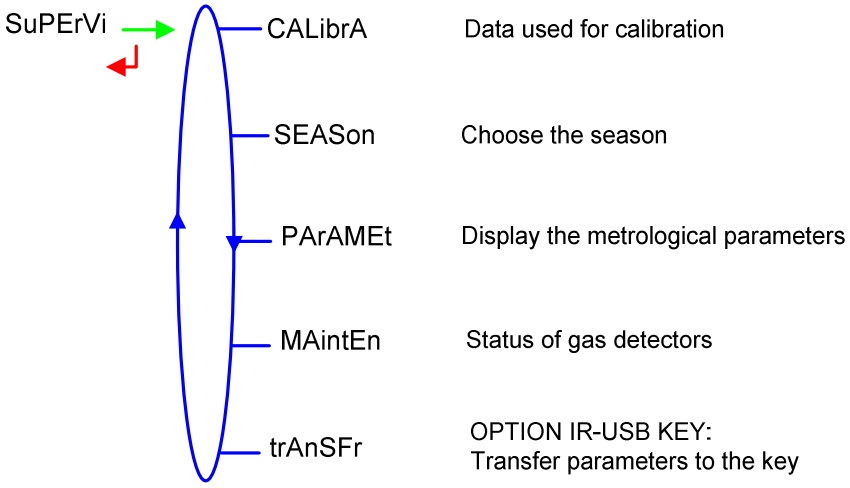
This menu displays the measurements results.



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

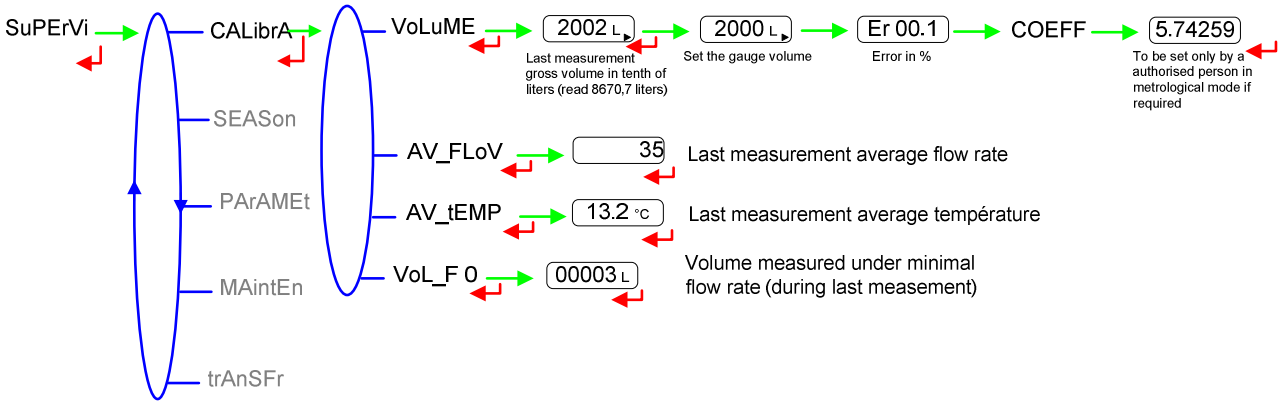


4.3 SUPERVISOR MENU



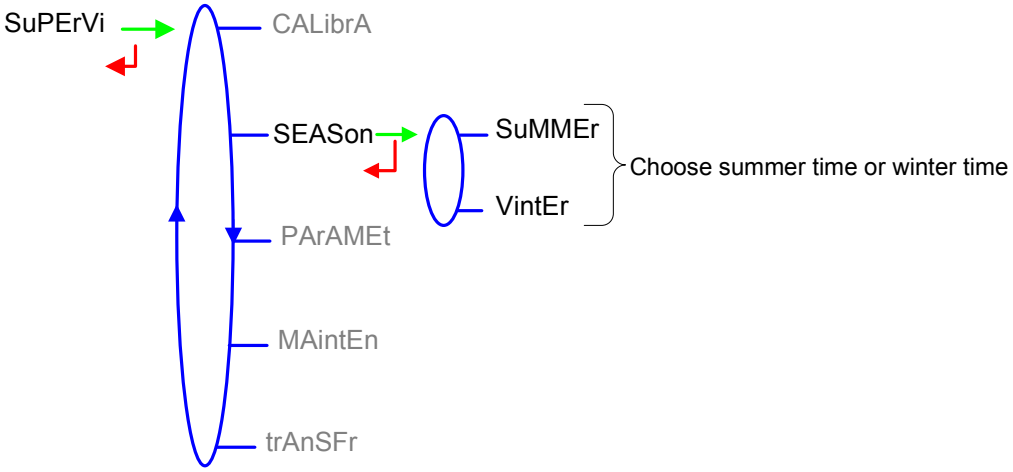
USER

4.3.1 CALIBRATION SUBMENU



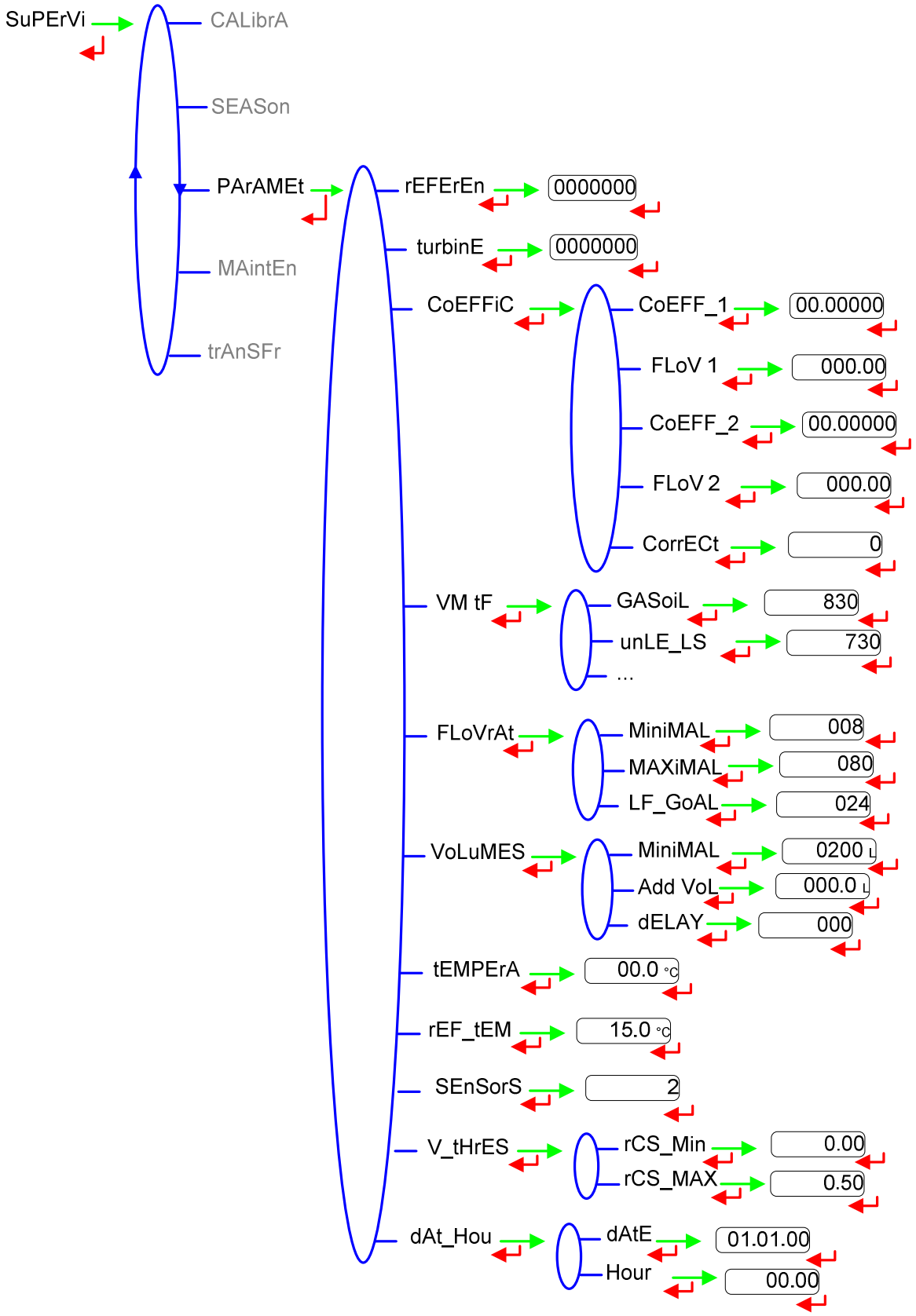
4.3.2 SEASON SUBMENU

This menu is for choosing season.



4.3.3 PARAMETERS SUBMENU

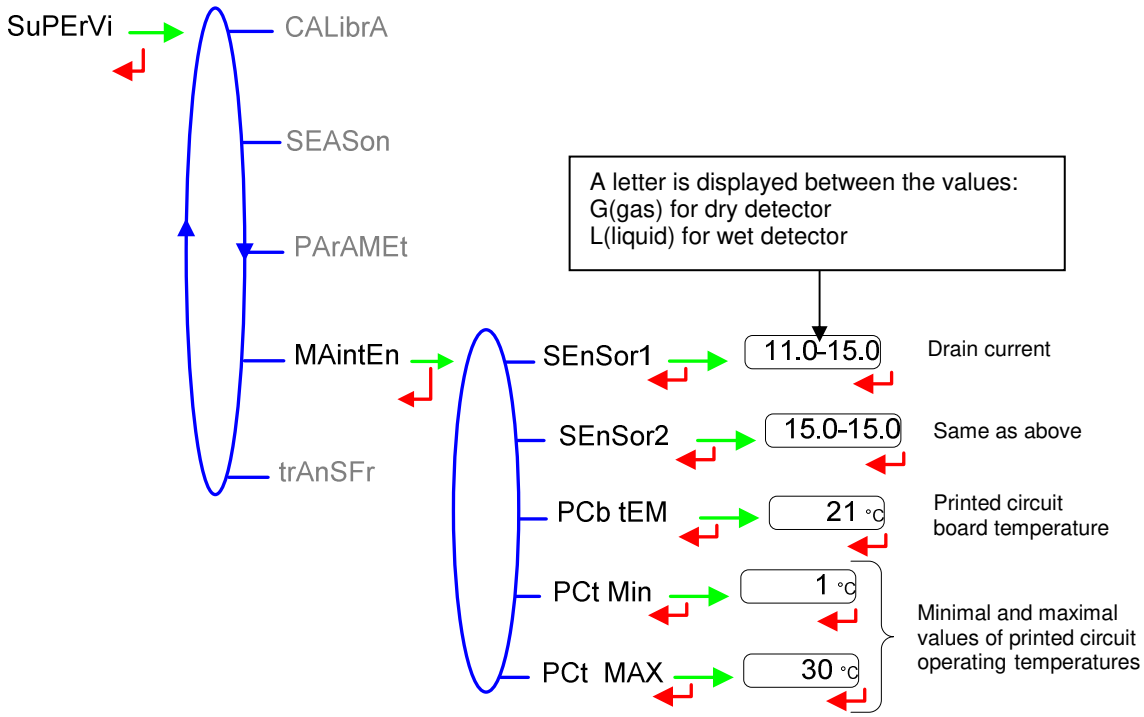
This menu displays the parameters set in METROLOGICAL mode and gives the product temperature.



USER

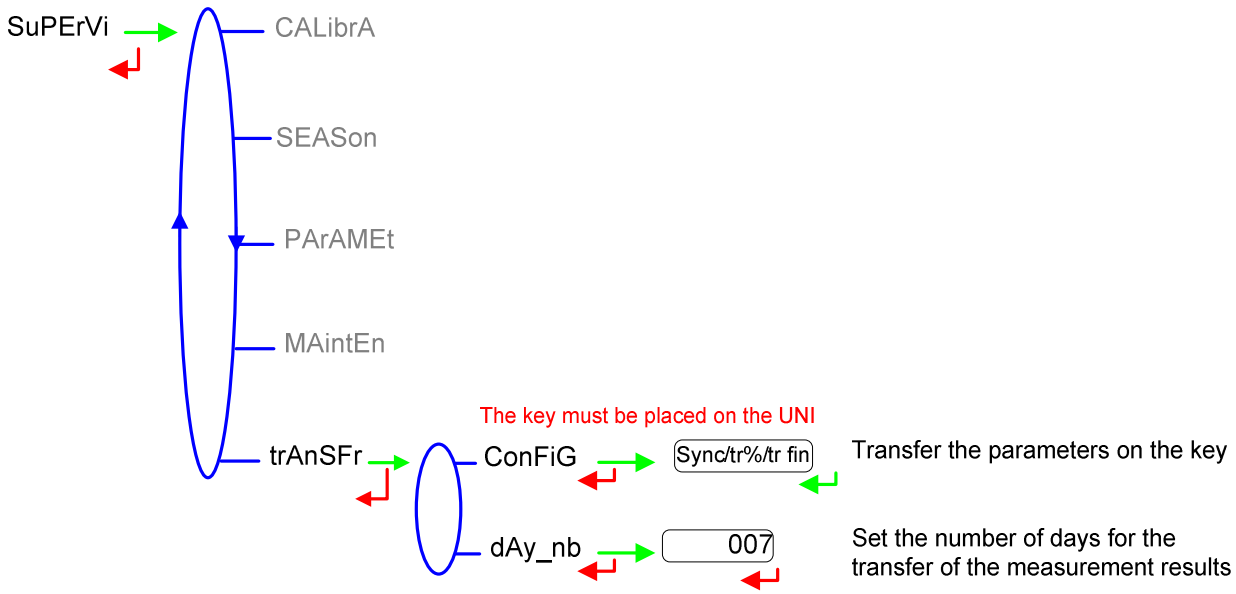
4.3.4 MAINTENANCE SUBMENU

This menu displays the drain current (mA) of the gas detectors and the reference current set in METROLOGICAL mode.



4.3.5 TRANSFER SUBMENU – OPTION

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



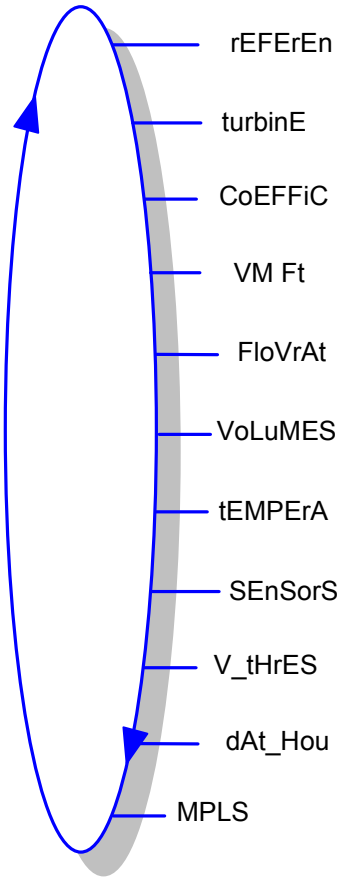
4.4 FAULTS LIST

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.

ALARM	FAULT
ProGrAM	Checksum program fault
rAM	Metrological configuration RAM fault
Faults acknowledgeable in METROLOGICAL mode	
MEtro_	Configuration loss
COEFF_	Coefficient fault
dAtE	Date loss
FLoV_	Flow setting fault
FrEQ_	Frequency fault
MEMoriS	Memory fault
Faults acknowledgeable	
dEF_MEM	Loss of backup data concerning the last measurement
SEnSor1	High gas detector fault (GDh)
SEnSor2	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 above Qmin
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	Battery fault
tEMPErA	Temperature less than -20°C or greater than 50°C

5. METROLOGICAL MODE

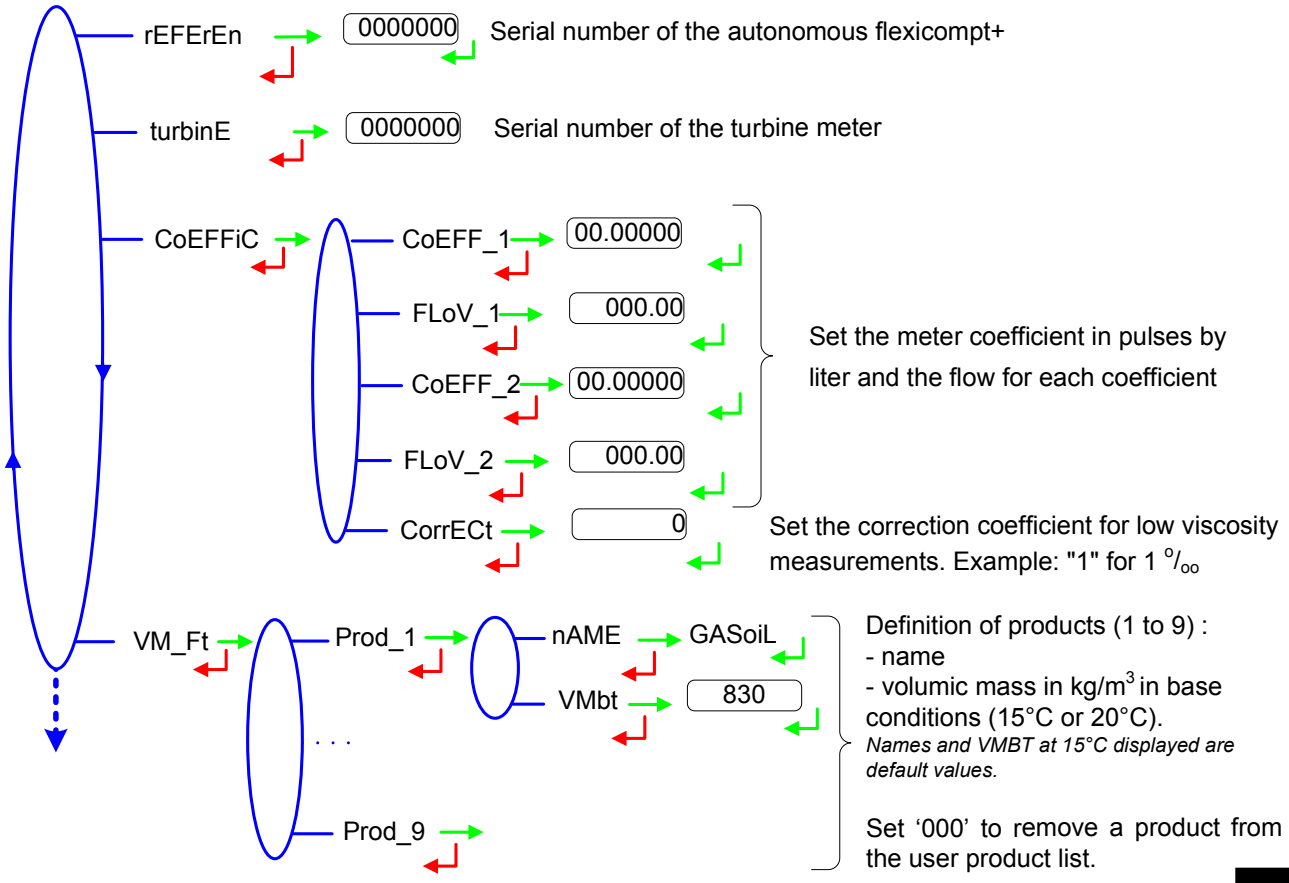


The configuration parameters can only be modified after the processor configuration switch on the electronic card has been switched over. Only authorized personnel can modify these parameters. All other interventions must be carried out by authorised personnel since the metrological character of the AUTONOMOUS FLEXICOMPT+ may be modified.

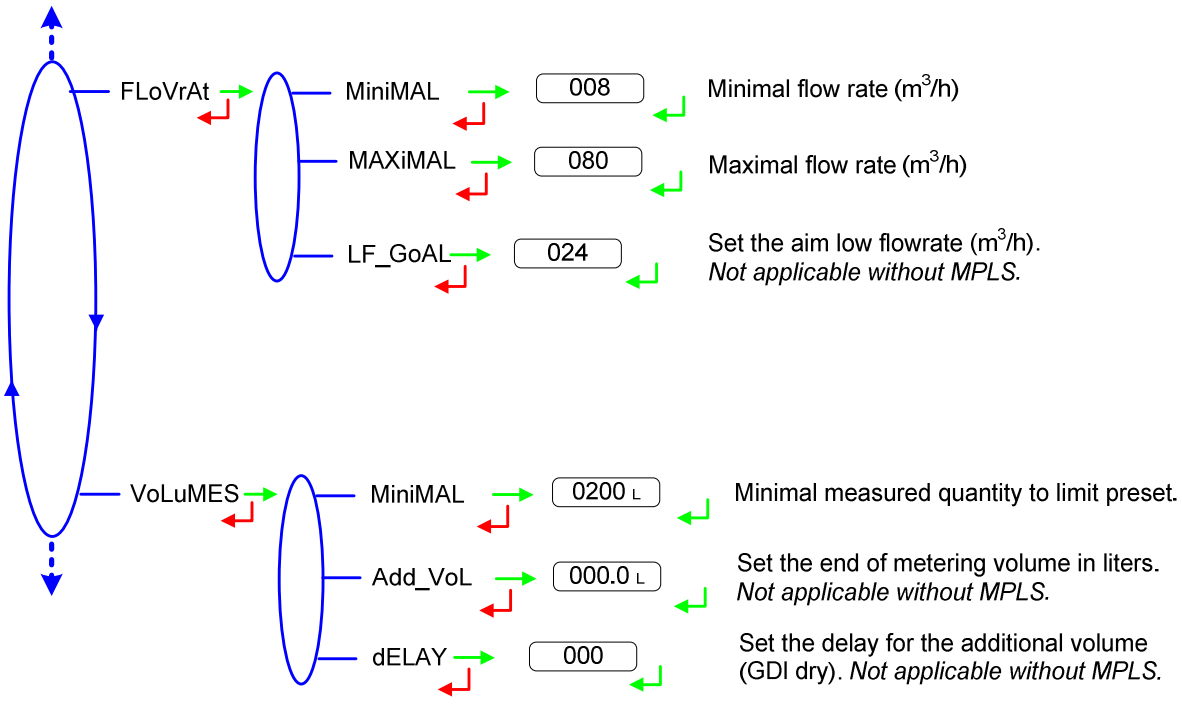
IMPORTANT

Setup should be done under cover, metering off, with dry gas detectors (see § 4.2.2.4).

5.1 REFERENCE, TURBINE, COEFFICIENT, VMFT

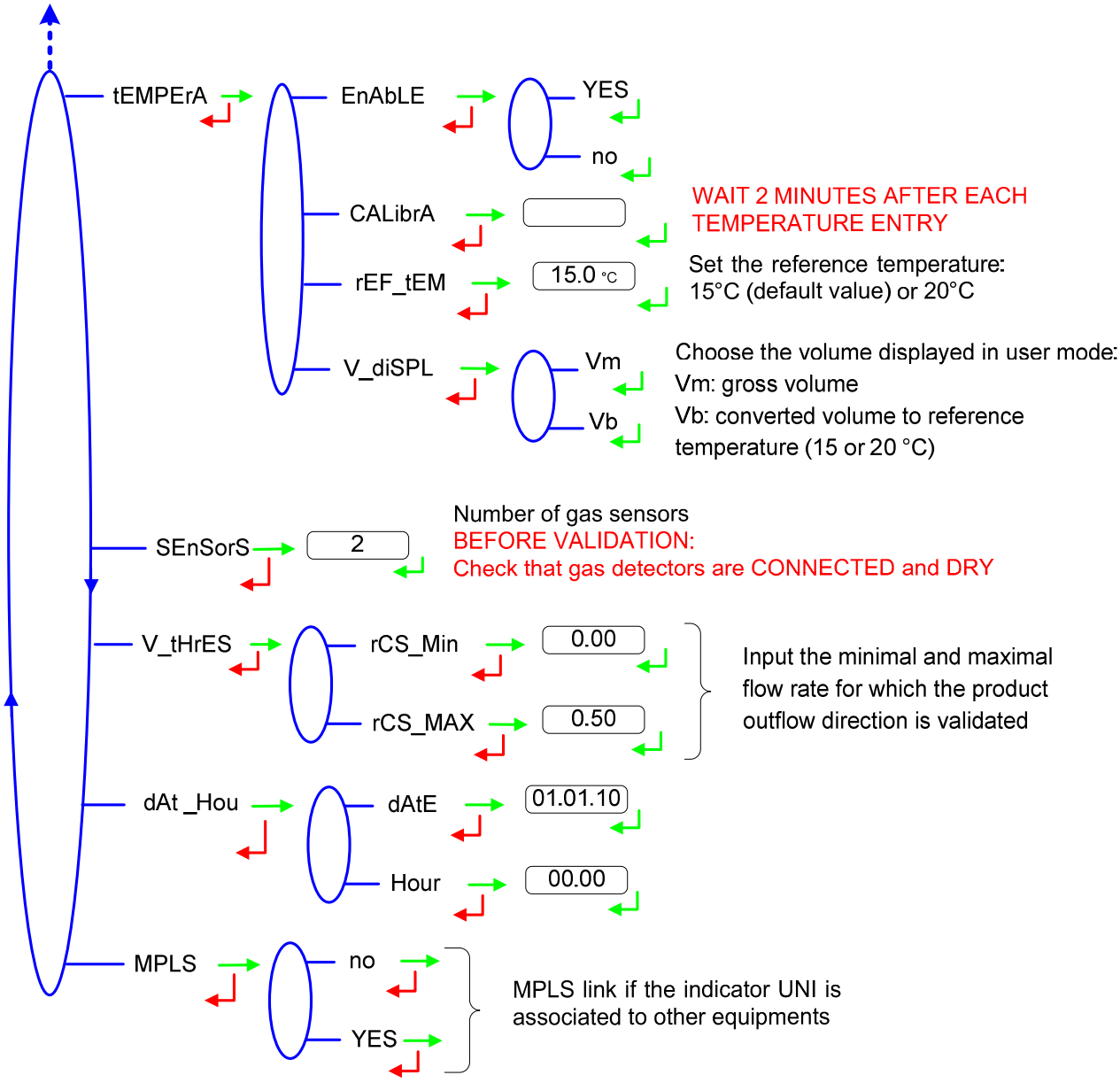


5.2 FLOW RATES, VOLUMES



METROLOGICAL

5.3 TEMPERATURE, GAS DETECTORS, THRESHOLDS, DATE, MPLS



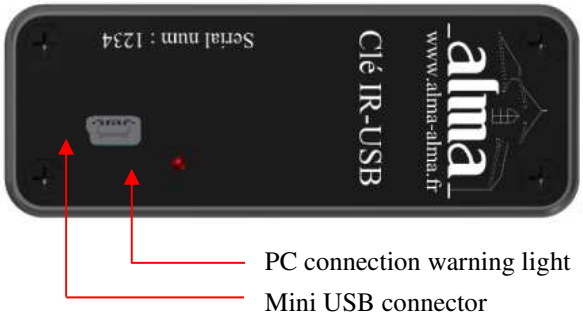
METROLOGICAL

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 cable to the key
2. Connect the 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 AUTONOMOUS FLEXICOMPT+ reference number.
   The parameters files are named 'P0000123' where 123 is the AUTONOMOUS FLEXICOMPT+ reference number.

   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 D	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			

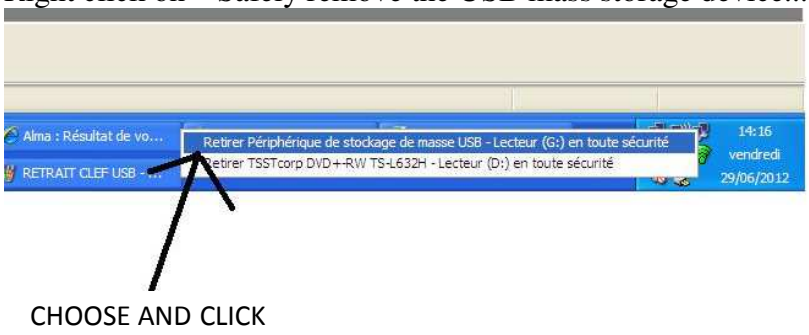
P0000002

File P0000123

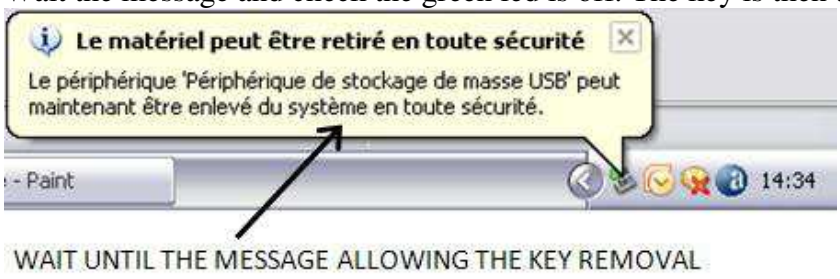
FOLLOW THE INDICATION BELOW TO REMOVE THE KEY:

- 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.