OPERATING MANUAL

MU 7038 EN C

GRAVICOMPT MANIFOLD

Relevant software 348+v2.02.XX

Issue	Date	Nature of modifications	Written by	Approved by
C	2015/09/08	Volume conversion *[MDV399]*	DSM	XS
B	2015/04/13	Creation	DSM	AH

CONTENTS

1 GENERAL PRESENTATION AND DESCRIPTION:

The GRAVICOMPT MANIFOLD is an interruptible measuring system. It is intended for delivery of liquids other than water. Liquids flow from each of the compartments of a road tanker connected to the manifold.

The GRAVICOMPT MANIFOLD measuring system is fitted with:

- ⇨ A turbine meter
- ⇨ A MICROCOMPT+ electronic calculator-indicator device
- ⇨ A differential pressure sensor
- ⇨ A gas detection sensor located upstream of the turbine meter
- ⇨ A transfer valve which regulates flow
- ⇨ Air-operated gates connecting each compartment with the manifold
- ⇨ A non-return vent valve to ensure the manifold fills and empties properly
- ⇨ A printer (option).

The calculator-indicator MICROCOMPT+ allows to display:

- ⇨ Either volume at metering conditions – Vm
- ⇨ Or volume converted to base conditions – Vb.

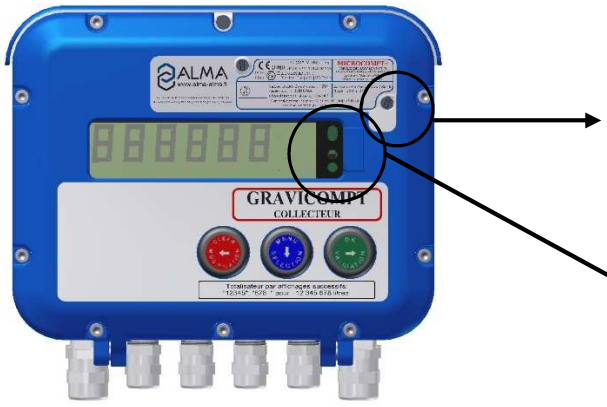
It is designed to measure volumes of liquid by gravity (pre-set or not). An option takes into account the temperature of liquid.

The calculator-indicator controls one manifold connected to up to 10 compartments with a maximum of 16 products which names are configurable

In option, it may print delivery tickets, internal totaliser, parameters, and events diary

NOTE: Information printed on the printer has no metrological value. Only the values displayed by the main indicating device providing proof.

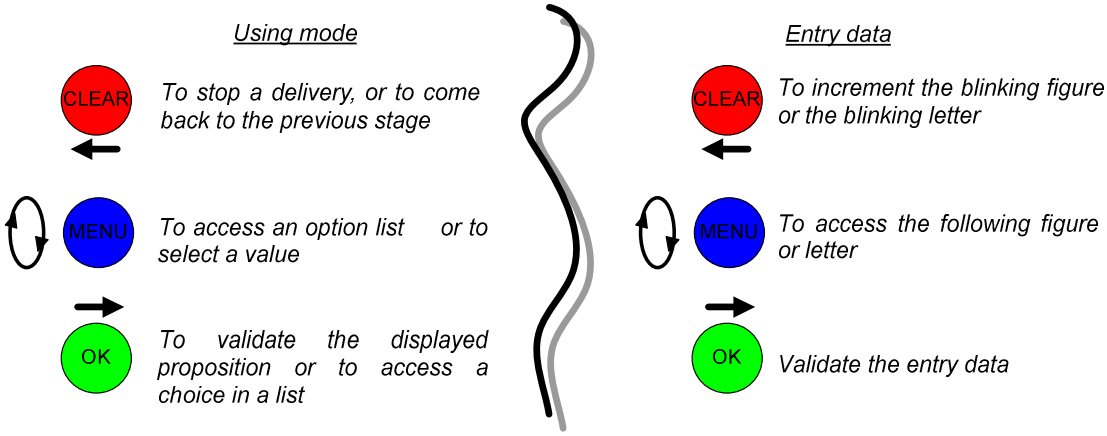
Presentation of the MICROCOMPT+ calculator-indicator:



Sealed cup protecting access to metrological functions

SUPERVISOR magnetic key to access configuration and calibration menu

Buttons function:



The MICROCOMPT+ calculator-indicator manages measuring operation and computerizes the measuring system defaults.

2 OPERATING RECOMMENDATIONS:

Before using a GRAVICOMPT MANIFOLD measuring system, the operator must ensure that the following conditions have been met:

- ⇨ The piping linking each compartment and the transfer valve must have a minimum pitching of 3%. The vehicle on which the measuring system is installed must be fitted with a device to ensure it is horizontal
- ⇨ The end-of-counting probe is placed so that it can detect the vacuity of the collector on the smallest free surface.

3 OPERATION MODES OF THE INDICATOR DEVICE:

Driver mode

This is the normal using mode in exploitation.

Refer to DRIVER MODE

Supervisor mode

To access the supervisor mode, the magnetic key must be put at the right of the MICROCOMPT display. This mode is used to set the measuring system and to access the calibration menu.

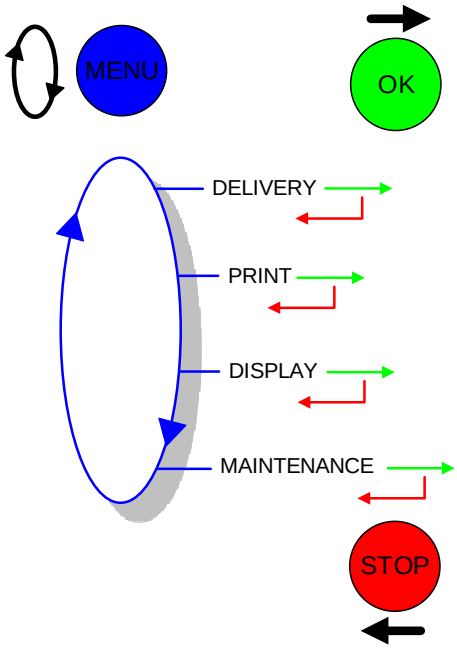
Refer to SUPERVISOR MODE for setup.

Metrological mode

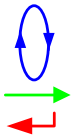
To access the METROLOGICAL mode, the MICROCOMPT has to be unsealed. Only an authorized person can remove the seal. This mode allows setting all metrological parameters. It's done at the putting into use of the measuring system and sometimes during metrological controls.

Refer to METROLOGICAL MODE for configuration.

4 DRIVER MODE:



LEGEND:



Press the button (red, blue or green) as many times as necessary to display the next message

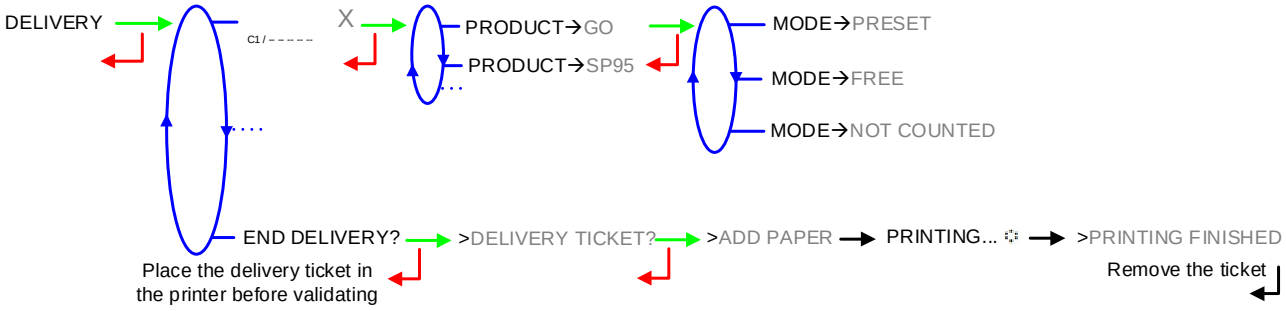
4.1 Menu DELIVERY

A delivery includes several operations. An operation includes the following stages:

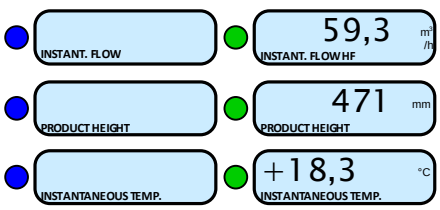
- Selection of the compartment
- Selection of the product
- Selection of the distribution mode: preset, free or not counted.

At the end of an operation, press **MENU** to start a new operation.

At the end of the delivery, choose the menu END DELIVERY? Validate with **OK**.



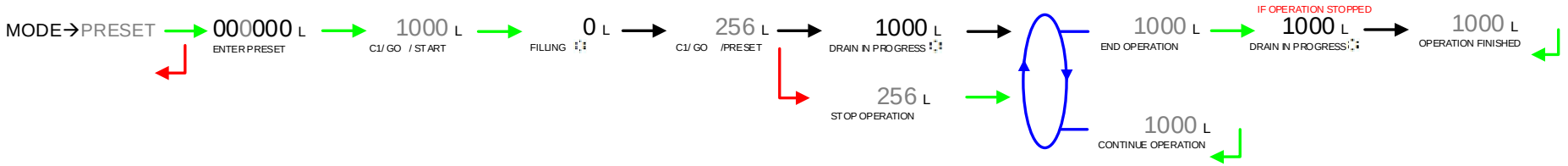
During the measurement, some information may be displayed by pressing **MENU**:



Back to normal display is automatic.
DON'T PRESS **STOP** PUSHBUTTON.

4.1.1 Delivery in preset mode

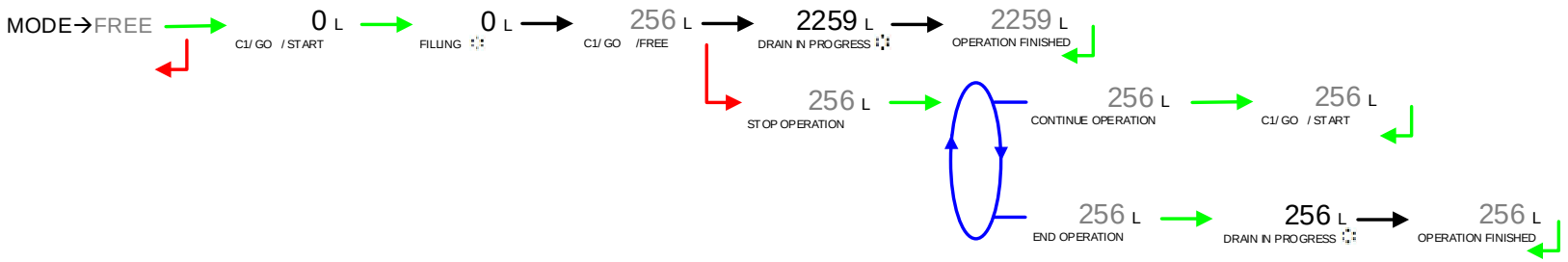
Validate the delivery mode **MODE→PRESET** and set the volume. Pressing OK makes the preset unloading begin. If the preset volume is lower than the authorised volume, the measurement will be invalidated at the end of the operation; it will be displayed alternately with dashes: '-- -- --'.



4.1.2 Delivery in FREE mode

Validate the distribution mode **MODE→FREE**.

Pressing **OK** makes the unloading begin in order to empty the compartment. Pressing the **STOP** button stops the unloading.

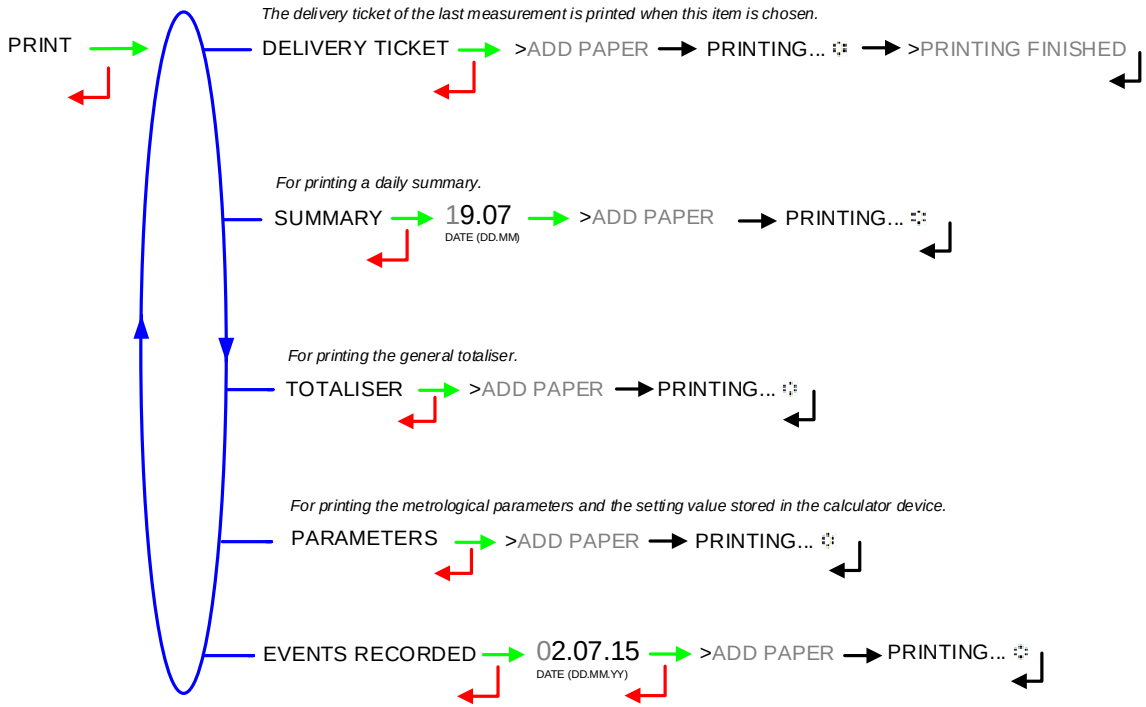


4.1.3 Delivery in not-counted mode

Validate the distribution mode **MODE→NOT COUNTED**. The unloaded volume is not verified by the measuring system (measuring container). This delivery mode is used when the end of counting probe is out of order).

Remember to follow any regulations in force

4.2 Menu PRINT



4.3 Menu DISPLAY

4.3.1 Sub-menu TOTALISER

Visualization of the general totaliser.

General totaliser displayed in liters.

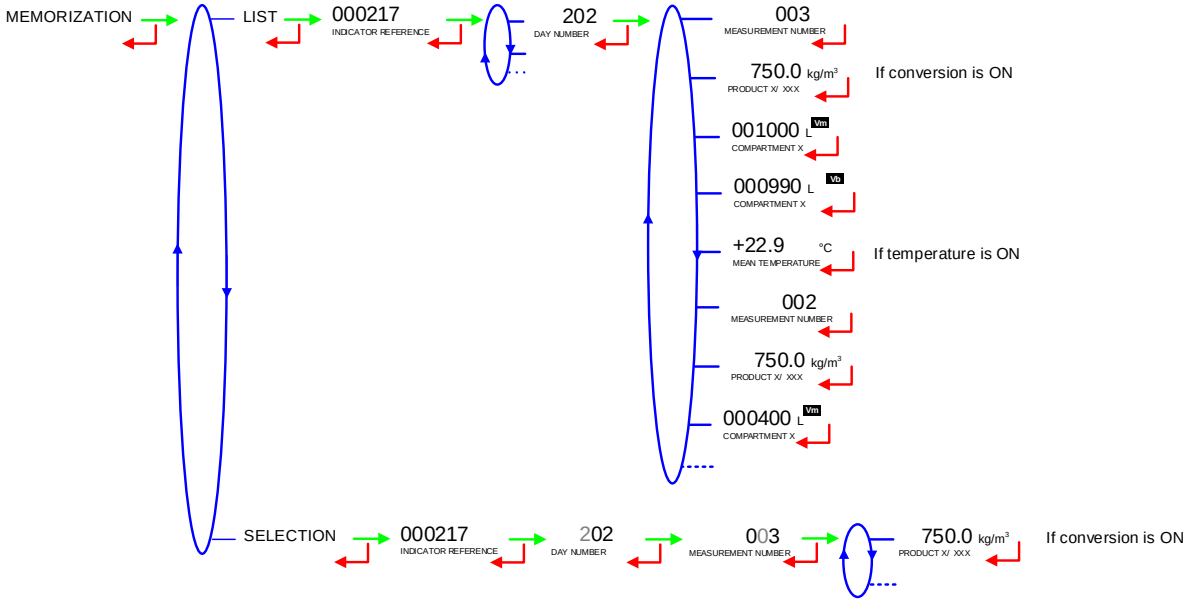
4.3.2 Sub-menu MEMORIZATION

This menu is available in stand-by mode or during an intermediate stop. It allows the proofreading of all the measurement results stored by the GRAVICOMPT MANIFOLD. That can be done in two ways:

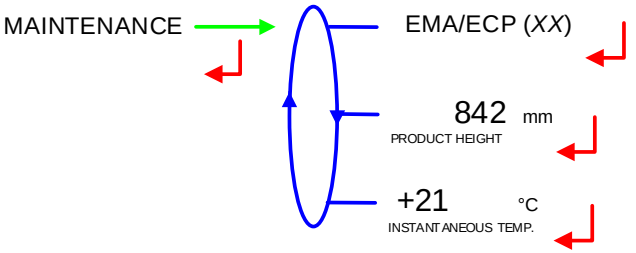
LIST: Display all the measurement details recorded, from the newest to the oldest, sorted by day then by measurement number.

SELECTION: Display a specific measurement by selecting the day number

For each measurement, are displayed: the number and the name of the product, the measured volume, temperature and density with active options.



4.4 Menu MAINTENANCE



Status of the end of counting probe which can be:
DRY, WET or FAULT (out of order).

Instantaneous height of product in the compartiment (mm).

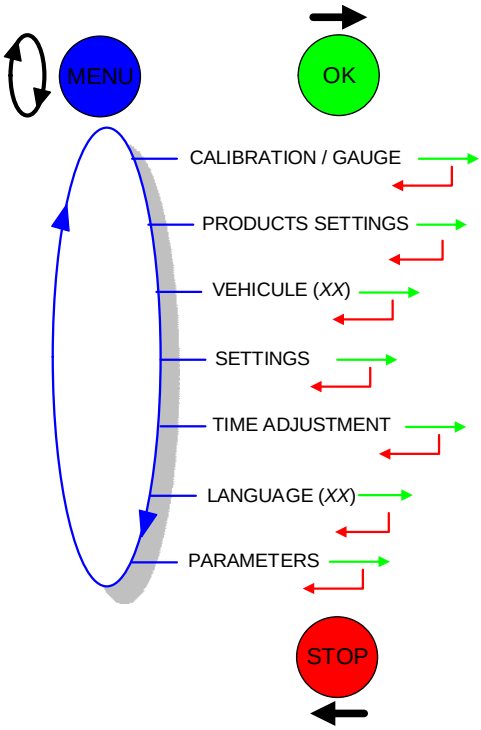
Instantaneous temperature of the product in the compartment (°C).

4.5 List of alarms

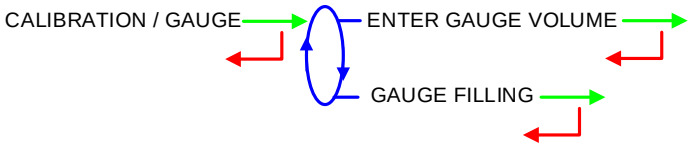
Apparition of a default makes the pouring stop by closing the transfer valve. At the same time, the MICROCOMPT+ displays the associated alarm message. The operator must deal with the default and then validate the alarm.

		DISPLAY	MEANING	ACTION
USER		STOP OPERATION	Intentional interruption of discharge	Continue, stop or finish the operation
		PRINTER DEFAULT	No more communication with the printer	Check the connection cable, on-off switch and fuse
		POWER SUPPLY PROBLEM	Power outage during operation	Check the cause / Restore power supply
		ZERO FLOW DEFAULT	Zero flow	Check if the pulse transmitter is powered (red indicators)
		LOW FLOW DEFAULT	Low flowrate (less than 4m^3/h)	Check the hydraulic system (valve, strainer, nozzle…)
		HIGH FLOW DEFAULT	High flowrate (greater than maximum flowrate)	Check the parameters / Reduce flowrate
		METERING PROBLEM	Metering problem with the measuring device	Check if the pulse transmitter is powered (red indicators)
		MANIFOLD NOT EMPTY	The manifold is not empty at the beginning of the operation	Follow the manifold release sequence
		FLAP LEAK DEFAULT	Product leakage from a flap	Check the flap
		DIARY DEFAULT	Reset of the events diary	Acknowledge the alarm, check the date in supervisor mode (supervisor key)
REPAIRER	NON BLOCKING	DISPLAY DEFAULT	Problem with display card	If steady alarm, substitution of the display card
		WATCHDOG DEFAULT	Fault with display or power card or AFSEC+ card	Switch on-off the MICROCOMPT+ / If steady alarm, substitution of the faulty card
		VOLUME CONVER DEFAULT	Problem during volume conversion	If steady alarm, substitution of the AFSEC+ electronic card
		TOTALISER LOST	Loss of totaliser	Substitution of the backup battery
		END DG DEFAULT	End of pouring probe out of order	If steady alarm, see a reparator for trouble shooting
		PRESSURE DEFAULT	Pressure determination failure	If steady alarm, see a reparator for trouble shooting
		TEMPERATURE FAULT	Temperature determination failure	Check the temperature probe status / If steady alarm, see a reparator for trouble shooting
	BLOCKING	MEMORY LOST (PILE)	Loss of saved memory	Substitution of the backup battery
		MEMORY LOST	Delivery diary lost	Enter and exit the METRO mode / If steady alarm, substitution of the backup battery
		DATE AND TIME LOST	Loss of date and time	Set date and time in supervisor mode (supervisor key)
		GAS DEFAULT	Détection d'air en phase de grand débit	If steady alarm, see a reparator for trouble shooting
		PROM DEFAULT	Loss of software or resident integrity	Substitution of the AFSEC+ electronic card
		RAM DEFAULT	Saved memory fault	Substitution of the AFSEC+ electronic card
		EEPROM MEMORY LOST	Loss of metrological configuration	Substitution of the AFSEC+ electronic card
		MEMORY OVER LOADED	Delivery diary is full	Substitution of the AFSEC+ electronic card

5 SUPERVISOR MODE:



5.1 Menu CALIBRATION



5.1.1 Sub-menu ENTER GAUGE VOLUME

This menu allows you to check the accuracy of the measuring system by calculating the measuring device error and the new corrected coefficient.

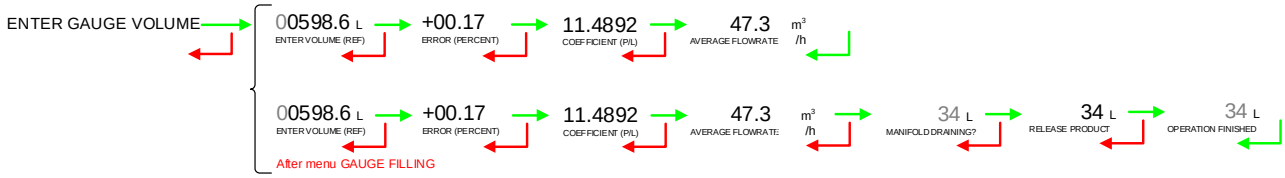
First, use the GAUGE FILLING menu to calibrate the measuring system.

Enter the volume read on the gauge and validate. The following information is then displayed:

- The signed error in %
- The coefficient revised as a function of the error
- The average flow of the delivery

Each of these values is shown step by step and by pressing the green button **OK**.

Then the product in the manifold is released.



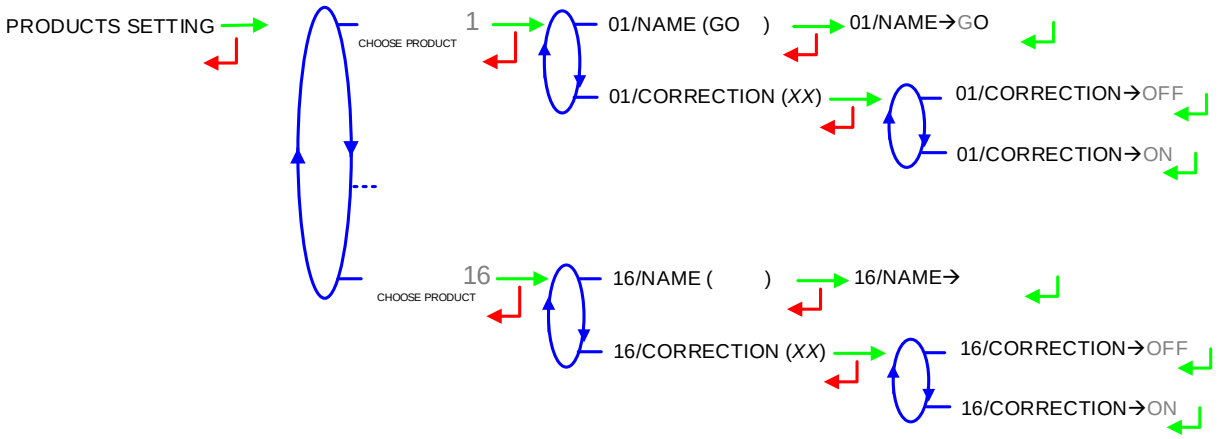
5.1.2 Sub-menu GAUGE FILLING

This menu is used for filling the gauge with keeping the manifold full of product. Use it the same way as the user mode; at the end of the operation, the manifold is not drained.

At the end of the operation, the display returns to ENTER GAUGE VOLUME menu after pressing the green button **OK**.

5.2 Menu PRODUCTS SETTING

Definition of products. For the 5 first products, default names are proposed. To remove a product, enter blank space as name product. Maximum number of characters: 5



5.3 Menu VEHICLE

Set the vehicle registry number on which the GRAVICOMPT MANIFOLD is installed. This number will be printed on delivery tickets, invoices…

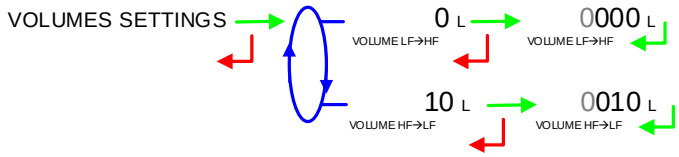
5.4 Menu SETTINGS

5.4.1 Sub-menu VOLUMES SETTINGS

This menu allows setting the volume parameters:

VOLUME LF→HF: Set the volume (in liters) beyond which the MICROCOMPT+ controls the high flowrate at the beginning of the measurement. Example: "0030" for 30 litres.

VOLUME HF→LF: Set the volume (in liters) beyond which the MICROCOMPT+ controls the low flowrate at the end of a preset measurement when the end of counting probe is still wet.



5.4.2 Sub-menu TIMING SETTINGS

This menu allows setting the duration parameters:

OPENING INCREMENT(S): Set the command increment duration of the API adapter opening valve (in seconds). Minimal value: 0.03 second. Maximal value: 3.999 seconds. Default value: 0.070 second (70 millisecondes).

OPENING RELAX.(S): Set the relaxation duration between two API adapter opening command increments (in seconds). Maximal value: 3.999 seconds. Default value: 1 second.

CLOSING INCREMENT(S): Set the command increment duration of the API adapter closing valve (in seconds). Maximal value: 3.999 seconds. Default value: 0.070 second (70 millisecondes).

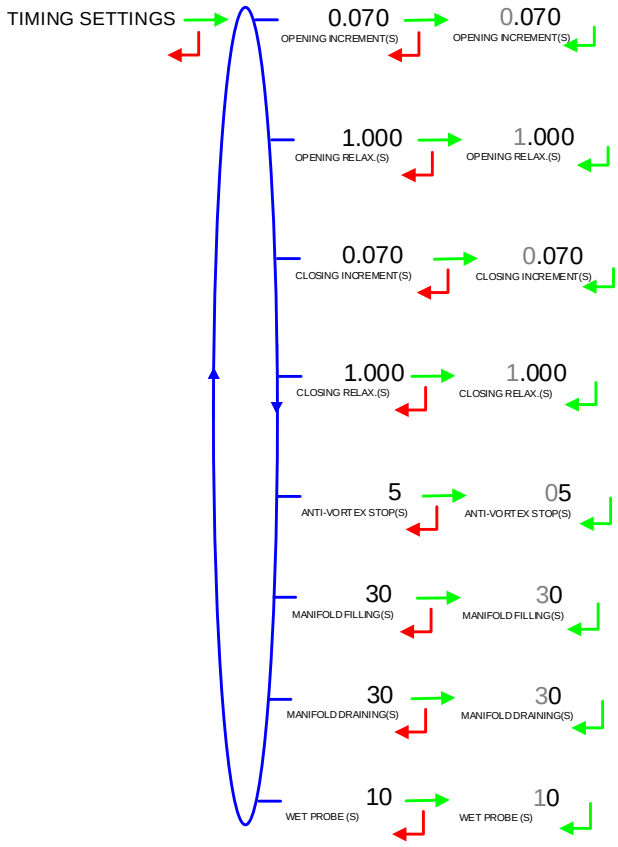
CLOSING RELAX.(S): Set the relaxation duration between two API adapter closing command increments (in seconds). Maximal value: 3.999 seconds. Default value: 1 second.

ANTI-VORTEX STOP(S): Set the API adapter closing duration after an ANTI-VORTEX breakdown. Minimal value: 5 seconds. Maximal value: 99 seconds. Default value: 5 seconds.

MANIFOLD FILLING(S): Set the manifold filling duration (in seconds). Minimal value: 20 seconds. Maximal value: 59 seconds. Default value: 30 seconds.

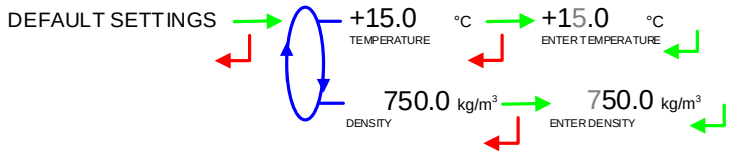
MANIFOLD DRAINING(S): Set the manifold draining duration (in seconds). Minimal value: 20 seconds. Maximal value: 59 seconds. Default value: 30 seconds.

WET PROBE: Set the maximum duration before the end of counting probe become wet (in seconds). Minimal value: 20 seconds. Maximal value: 99 seconds. Default value: 10 seconds.



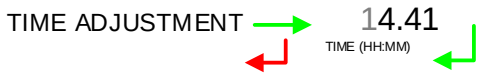
5.4.3 Sub-menu DEFAULT SETTINGS

This menu allows setting the temperature and density default values when CONVERSION is ON.



5.5 Menu TIME ADJUSTMENT

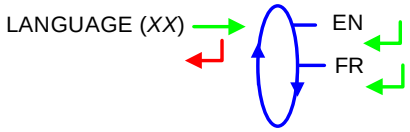
Date and time are set in METROLOGICAL mode. The hour may be adjusted (±2h) one time a day through this menu.



e.g. 14.14 means 2:41 pm

5.6 Menu LANGUAGE

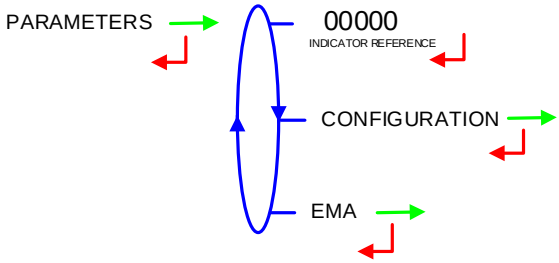
This menu is available if a translation catalogue has been uploaded in the MICROCOMPT+. The message “INCORRECT TRANSLATION CATALOG” appears in the event that no catalogue is uploaded.



Choose the display language.

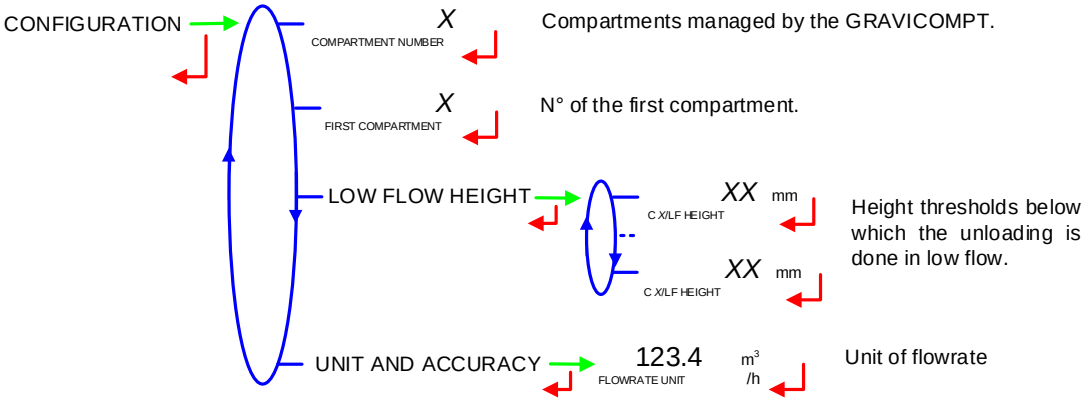
5.7 Menu PARAMETERS

This menu allows displaying the parameters set in METROLOGICAL MODE. See the related chapter for the meaning.



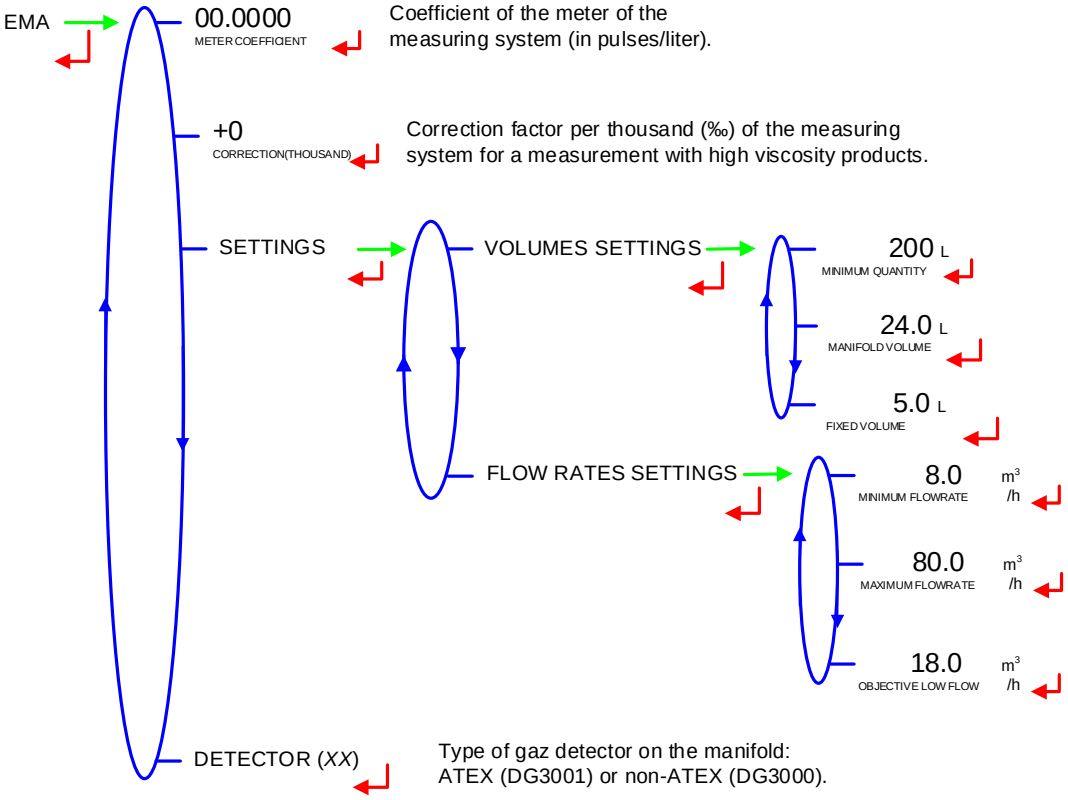
5.7.1 Sub-menu CONFIGURATION

See the METROLOGICAL MODE chapter for the meaning of each parameter.

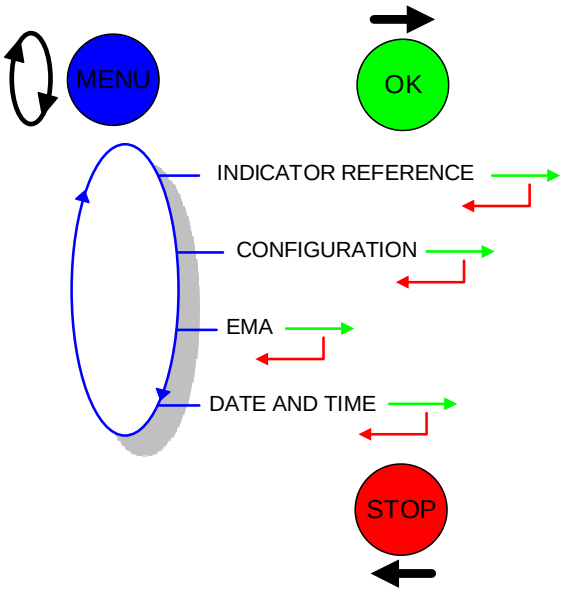


5.7.2 Sub-menu measuring system EMA

See the METROLOGICAL MODE chapter for the meaning of each parameter.



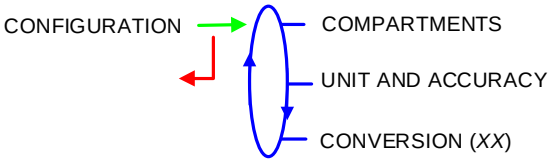
6 METROLOGICAL MODE:



6.1 Menu INDICATOR REFERENCE

Set the GRAVICOMPT serial number (5 numeric values).

6.2 Menu CONFIGURATION



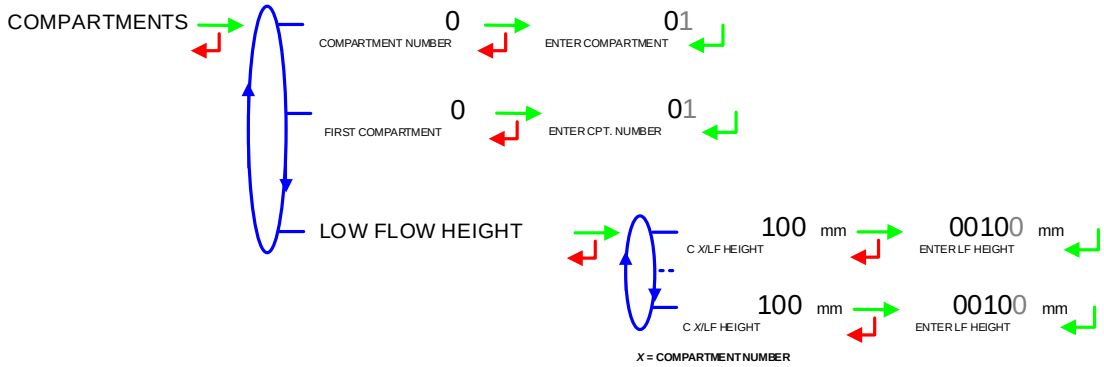
6.2.1 Sub-menu COMPARTMENTS

This menu is to describe the compartments configuration.

COMPARTMENT NUMBER: Set the compartments number depending on the measuring system (maximum 7 or 10).

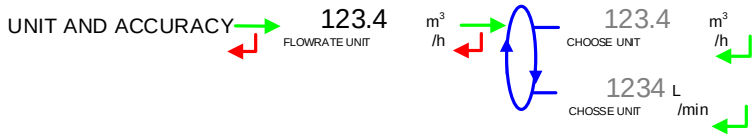
FIRST COMPARTMENT: Set the first compartment to determine which compartments will be useful.

LOW FLOW HEIGHT: Set the compartment height threshold in mm. Below this threshold, the unloading will be done in low flow. The reference zero is the tapping of the differential pressure transmitter. (Example: set "00635" for a 635mm height from the tap point).

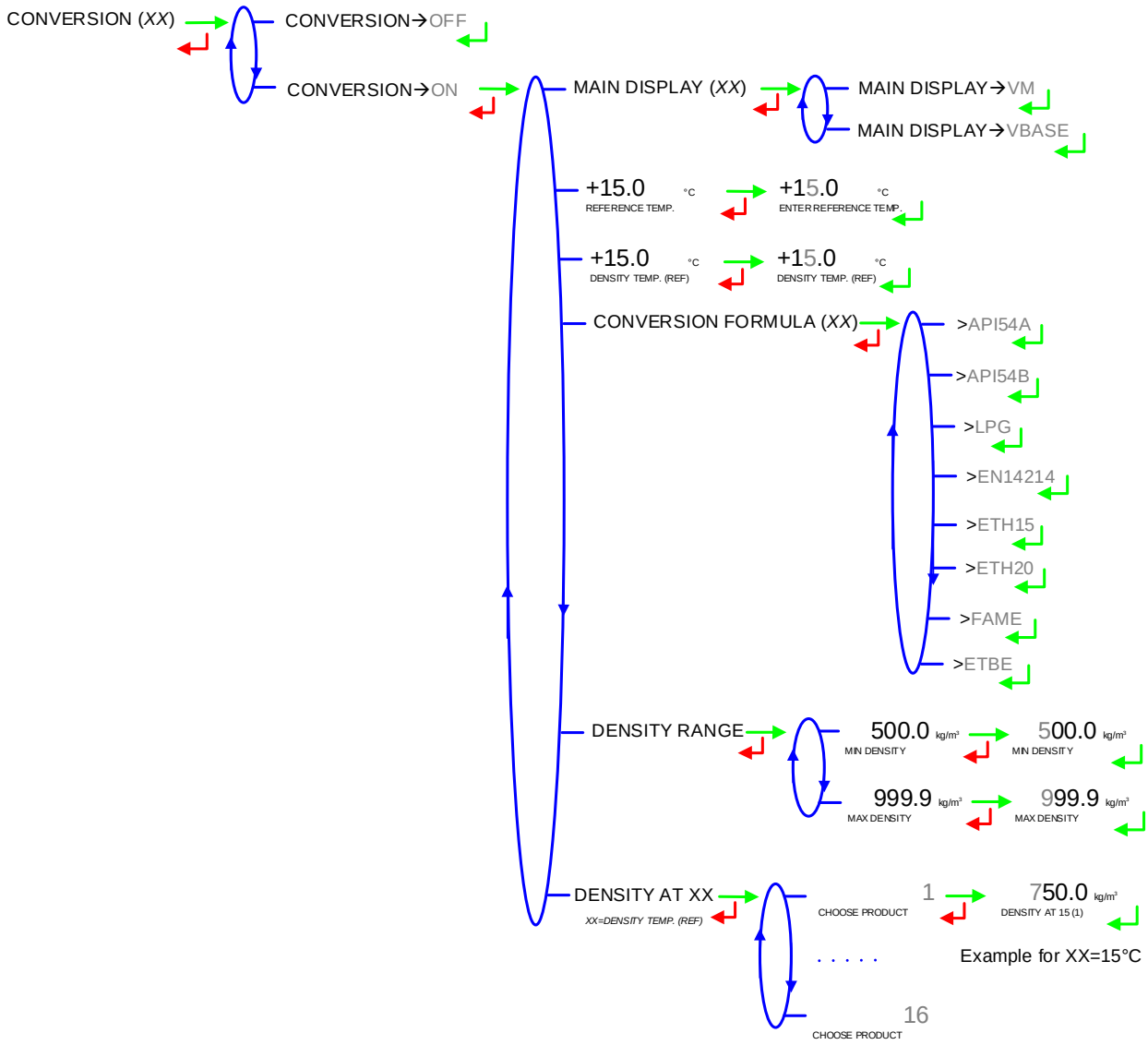


6.2.2 Sub -menu UNIT AND ACCURACY

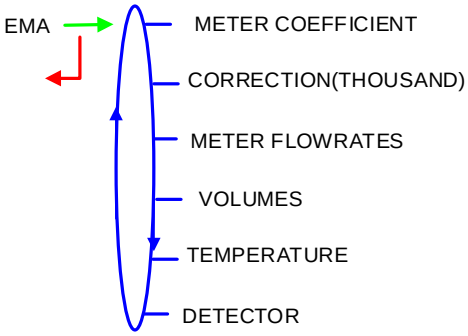
Choose the flow rate unit which is displayed and printed.



6.2.3 Sub-menu CONVERSION



6.3 Menu measuring system EMA

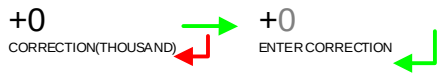


6.3.1 Sub-menu METER COEFFICIENT

Set the meter coefficient of the measuring system in pulse per liter (p/l).

6.3.2 Sub-menu CORRECTION

Set the correction factor per thousand (‰) of the measuring system for a measurement with high viscosity products.

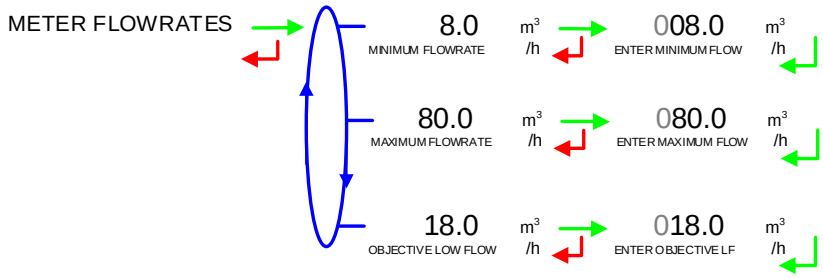


6.3.3 Sub-menu METER FLOWRATES

MINIMUM FLOWRATE: Set the metrological minimal flowrate of the measuring system in m^3/h or L/ m^3 depending on the configured flow unit.

MAXIMUM FLOWRATE: Set the metrological maximal flowrate of the measuring system in m^3/h or L/ m^3 depending on the configured flow unit.

OBJECTIVE LOW FLOW: Set the objective low flow in m^3/h. In low flow phases, a regulation will be done around this value with a tolerance of ±3m^3/h. This value increased by 3 must be less than the maximum flowrate.

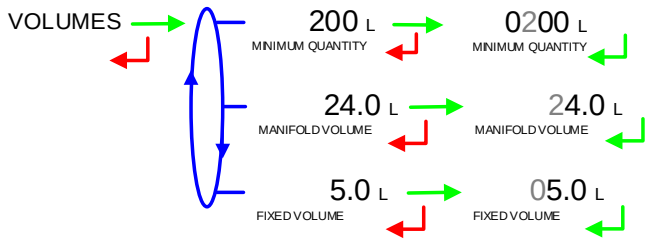


6.3.4 Sub-menu VOLUMES

MINIMUM QUANTITY: Set, in liters, the minimum measured quantity of the measuring system to guaranty the measurement (authorized volume)

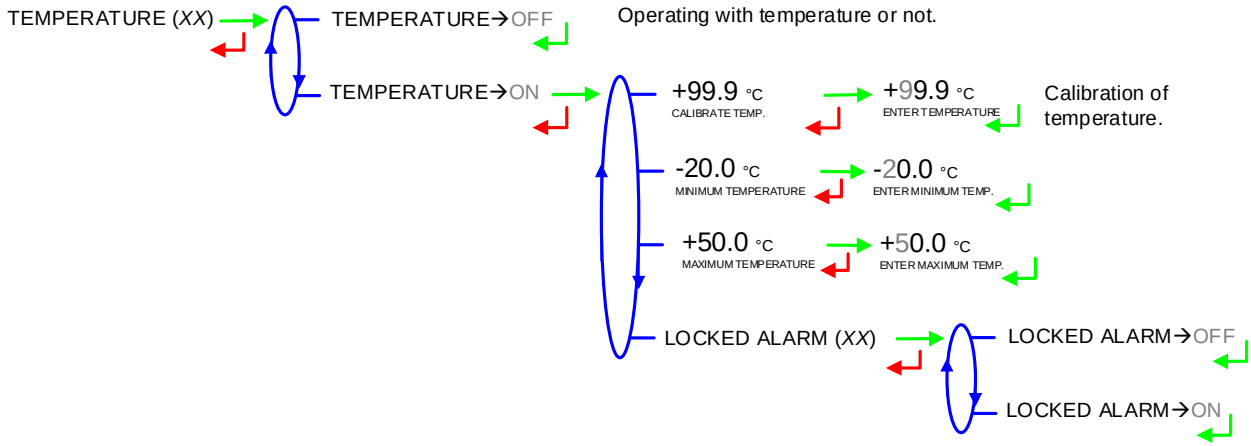
MANIFOLD VOLUME: Set the volume of the manifold in liters (depends on the compartments number).

FIXED VOLUME: Set the end of counting fixed volume of the measuring system in liters.



6.3.5 Sub-menu TEMPERATURE

This menu os an option. It is used to calibrate the temperature into the MICROCOMPT+. Refer to FM 8510.

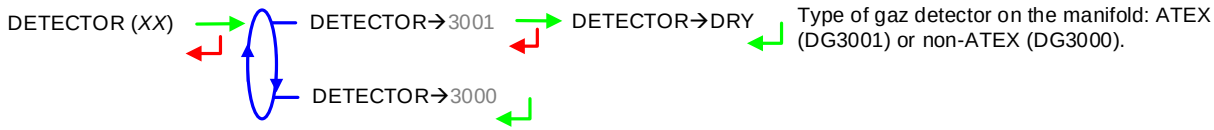


6.3.6 Sub-menu DETECTOR

Set the gas detector model for the end-of-counting probe:

3001: ATEX gas detector which status needs to be validated. The end-of-counting probe must be dry before validating the 'dry' status.

3000: Non ATEX gas detector.



6.4 Menu DATE AND TIME

ANNEXE

SUMMARY:

Print the daily summary

```
GRAVICOMPT 348+.000 BOARD v1r8
VERSION 02.02.00 OF 30.06.15
VEHICULE:  AA-000-AA
INDICATOR:  03000
PRINTED ON THE 21/07/15 at 10h20


SUMMARY
OF MEASUREMENTS OF 21/07/15
DAY 202   003 MEMORISED RESULTS


**** DAILY TOTALISERS ****

GO        (1) :        00009908 L
SP95      (2) :        00000000 L
E-10      (3) :        00000000 L
SP98      (4) :        00000000 L
FOD       (5) :        00008066 L

TOTAL FROM 1 TO 16 :          00017974 L




********** SUMMARY **********
N     CPT     PRODUCT     TEMP     VOLUME
001    3       (1) GO     22.9°C    *00316 L
002    3       (1) GO     22.9°C     01000 L
003    4      (5) FOD     22.9°C     01500 L
004    4      (5) FOD     22.9°C     00020 L
005    4      (5) FOD     22.9°C     01400 L
006    3       (1) GO     22.9°C     02539 L
007    3       (1) GO     22.9°C    *02200 L

* : NO GUARANTEED DELIVERY
```

If the Temperature option is not activated, FLOW is printed instead of the product temperature 'TEMP'.

PARAMETERS:

Print the calculator parameters

```
GRAVICOMPT 348+.000 BOARD v1r8
VERSION 02.02.00 OF 30.06.15
VEHICULE:  AA-000-AA
INDICATOR:  03000
PRINTED ON THE 21/07/15 at 10h20


********** PARAMETERS **********

COMPARTMENT NUMBER      : 5
INDEX BEGINNING         : 1
LF HEIGHT (MM):
C1 (1234) C2(1234) C3(1234) C4(1234)
C5 (1234)
HEIGHT                  : 470 MM   Instantaneous Height
FLOWRATE UNIT           : M3/H
COEFFICIENT             : 02.9000 P/L
CORRECTION COEFF        : +0 °/oo
MIN FLOW:    8.0 / MAX  : 80.0 M3/H
OBJECTIVE LOW FLOW      : 18.0 M3/H
MINIMUM QUANTITY        :    200 L
MANIFOLD VOLUME         :   24.0 L
FIXED VOLUME            :    5.0 L
TEMPERATURE             :     ON
GAS DETECTOR            : DG3001
CONVERSION              : VB
CONVERSION FORMULA      : API54B
MIN DENSI:500.0 / MAX   :999.9 KG/M3
PRODUCT   NAME   CORRECT  DENSITY
 PROD 1    GO      OFF     750.0 KG/M3
 PROD 2    SP95    ON      750.0 KG/M3
 PROD 3    E-10    ON      750.0 KG/M3
 PROD 4    SP98    ON      750.0 KG/M3
 PROD 5    FOD     OFF     750.0 KG/M3
VOLUMES :
 LOW TO HIGH FLOW    :     30 L
 HIGH TO LOW FLOW    :     10 L
TIMING:
 OPENING INCREMENT       :0.070 S
 OPENING RELAX.          :1.000 S
 CLOSING INCREMENT       :0.070 S
 CLOSING RELAX.          :1.000 S
 WET PROBE               :10 S
 ANTI-VORTEX STOP        : 5 S
 MANIFOLD FILLING        :30 S
 MANIFOLD DRAINING       :30 S
STOP FLOW AT 9.8 M3/H
```

TOTALISER:

Print the general totaliser

```
GRAVICOMPT 348+.000 BOARD v1r8
VERSION 02.02.00 OF 30.06.15
VEHICULE:  AA-000-AA
INDICATOR:  03000
PRINTED ON THE 21/07/15 at 10h20



********** TOTALISER **********

GENERAL TOTALISER:      00056638  L
```

EVENTS RECORDED:

Print the events recorded

```
GRAVICOMPT 348+.000 BOARD v1r8
VERSION 02.02.00 OF 30.06.15
VEHICULE:  AA-000-AA
INDICATOR:  03000
PRINTED ON THE 26/07/15 at 15h50
EVENTS OF          21/07/15




25 RECORD(S)

14:49:55 TEMPERATURE DEFAULT
14:49:53 USER MODE
14:30:03 SWITCH ON
14:24:33 RESET APPLICATION
...


09:47:15 METROLOGICAL MODE
09:47:06 DATE MODIFICATION
09:42:57 PARAM@10=            195
09:12:36 PARAM@  9=              1
08:59:02 PARAM@26=             13
08:58:57 PARAM@24=              1
```

DELIVERY ORDER :

```
GRAVICOMPT 348+.000 BOARD v1r8
VERSION 02.02.00 OF 30.06.15
VEHICULE:  AA-000-AA
INDICATOR:  03000
PRINTED ON THE 22/07/15 at 9h42

********** DELIVERY **********

DELIVERY 001

COMPARTMENT     : 1
PRODUCT         : GO
MEASUREMENT 1   : 00400 LITERS
MEASUREMENT 2   : 01000 LITERS
MEASUREMENT 3   : 01000 LITERS
                  ----------
TOTAL CPT 1     : 02400 LITERS

IN CASE OF DISPUTE, THE MEASUREMENT
RESULTS STORED BY THE MAIN
INDICATING DEVICE PROVIDING PROOF
```

RELATED DOCUMENTS

GU 7038	User Guide
MV 5006	Verification Guide
FM 8000	Replacement of the backup batteries on the AFSEC and AFSEC+ electronic board
FM 8001	Diagnostic support for power supply failure
FM 8002	Diagnostic support for a display failure
FM 8003	Diagnostic support for DEB_0 or ZERO FLOW DEFAULT alarm
FM 8004	Diagnostic support for GAS or PRESENCE GAS alarm
FM 8005	Diagnostic support for METERING PROBLEM alarm
FM 8007	Diagnostic support for MEMORY LOST or DEF MEMO alarm
FM 8008	Diagnostic support for DATE alarm
FM 8010	Diagnostic support for EEPROM MEMORY LOST alarm
FM 8011	Configuration of jumpers and adjustment of metering thresholds on the AFSEC+ electronic board
FM 8510	Adjustment of a temperature chain in a MICROCOMPT+