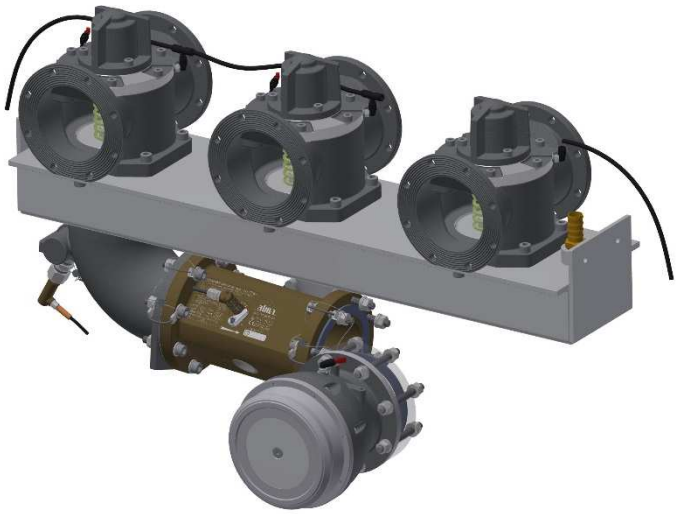
USER MANUAL

MU 7038 EN D

GRAVICOMPT MANIFOLD



Issue	Date	Nature of modifications	Written by	Approved by
D	2020/11/24	More information about the Calibration/Gauge menu and the objective low flow, Add Ticket menu, FORM DOC update	DSM	NC
C	2015/09/08	Volume conversion *[MDV399]*	DSM	XS
B	2013/05/14	Creation, new ergonomics, temperature control	DSM	AH
A	2009/10/27	Creation	DSM	XS

CONTENTS

1 GENERAL PRESENTATION AND DESCRIPTION

The GRAVICOMPT MANIFOLD is a gravity measuring system. It measures liquids other than water. You can install it on semi and rigid trucks. It enables delivery of products through a multi-compartment manifold.

The GRAVICOMPT MANIFOLD contains these parts:

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

The GRAVICOMPT MANIFOLD can:

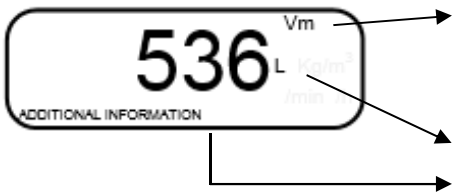
- ⇨ Manage measuring operations
- ⇨ Manage faults
- ⇨ Measure quantities of products

The optional functions are available:

- ⇨ The GRAVICOMPT MANIFOLD can control the product temperature. In that case, it shows volume in metering conditions or volume converted to the reference temperature;
- ⇨ A printer can print delivery tickets, internal totalisers, parameters, and summary and diary printings.

  NOTE: The GRAVICOMPT MANIFOLD shows the legally-binding information. The information printed by the printer has no metrological value.

The GRAVICOMPT MANIFOLD has one display:



- Volume indication
  - Vm: volume in metering conditions
  - Vb: volume converted to the reference temperature
- Volume unit
- On the prompter: Additional information
  - During measurement: compartment, product, and distribution mode
  - Out of measurement: totaliser

The GRAVICOMPT MANIFOLD has three pushbuttons:

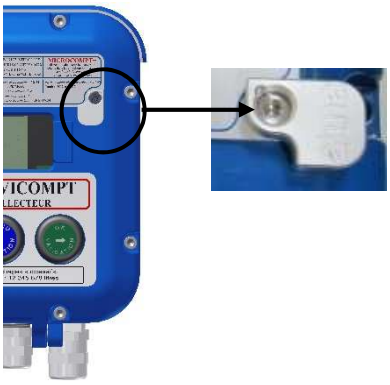
	Increment a blinking figure or letter Come back to the previous step Stop the measurement
	Select a figure, a letter or a menu
	Validate the data

2 OPERATING RECOMMENDATIONS

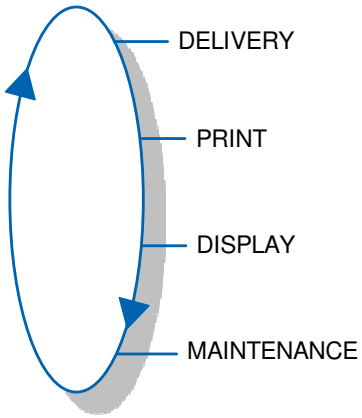
For a use of the GRAVICOMPT MANIFOLD, make sure to meet the conditions that follow:

- ⇨ 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-metering probe is placed so that it can detect the vacuity of the collector on the smallest free surface.

3 CONFIGURATION, SETTINGS, CALIBRATION

CONFIGURATION: METROLOGICAL mode	SETTINGS, CALIBRATION: SUPERVISOR mode
§ CONFIGURE THE GRAVICOMPT MANIFOLD: METROLOGICAL MODE	§ SET THE GRAVICOMPT MANIFOLD: SUPERVISOR MODE
You must configure the GRAVICOMPT MANIFOLD during commissioning and sometimes during metrological controls.	You must set the GRAVICOMPT MANIFOLD before any operation Do a check of the accuracy of the GRAVICOMPT MANIFOLD
NOTE: Only approved persons are permitted to remove the seal	**NOTE:** Only approved persons are permitted to change parameters or to make calibration.
- Unseal the cup - Remove the seal	- Put the RFID key the right side of the display 
	

4 USE THE GRAVICOMPT MANIFOLD: USER MODE

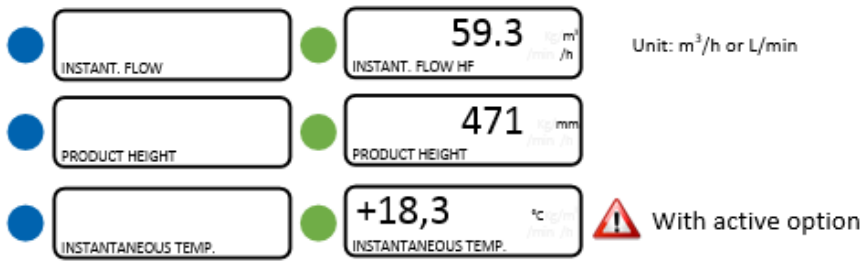


In USER mode, the GRAVICOMPT MANIFOLD displays a blinking figure which is the latest delivered quantity. On the prompter, you can see the name of the menu.

The use of the GRAVICOMPT MANIFOLD depends on the hardware configuration of the truck, the features and the configuration of the equipment carried out during commissioning.

During measurement, the following information may be displayed:

- ⇨ The instantaneous high or low flow rate. The unit is m^3/h or L/min; depending on the display unit set
- ⇨ The product height (mm)
- ⇨ The temperature (°C) if it is taken into account.



Back to normal display is automatic: DO NOT PRESS RED CLEAR BUTTON TO KEEP FROM INTERRUPTING THE MEASURING OPERATION.

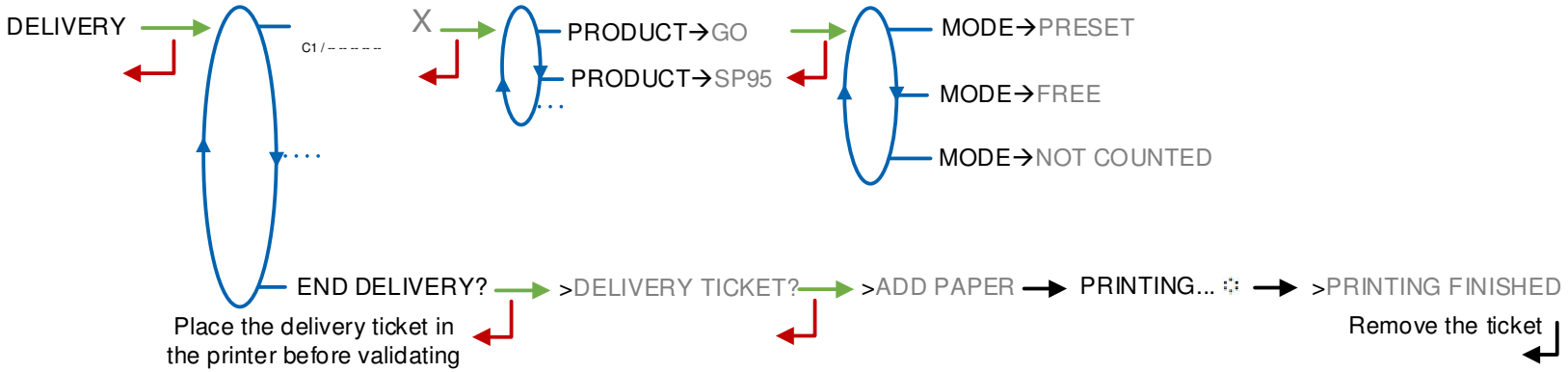
4.1 Menu DELIVERY

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

- Choose the compartment associated with the measuring system
- Choose the product
- Choose the distribution mode: preset, free or not counted

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

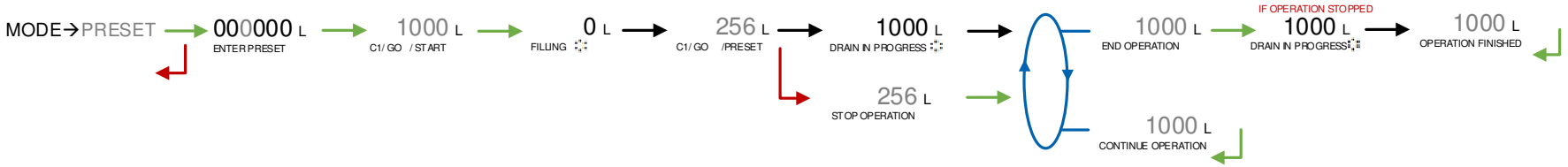
When all the operations are done, choose and validate the menu END DELIVERY?. The delivery is then completed, you can print the delivery ticket.



4.1.1 Delivery in preset mode

Validate the distribution mode MODE→PREDE and set the volume. If the preset volume is lower than the authorized volume, the measurement is invalidated at the end of the operation; it is displayed alternately with dashes: '-- -- --'.

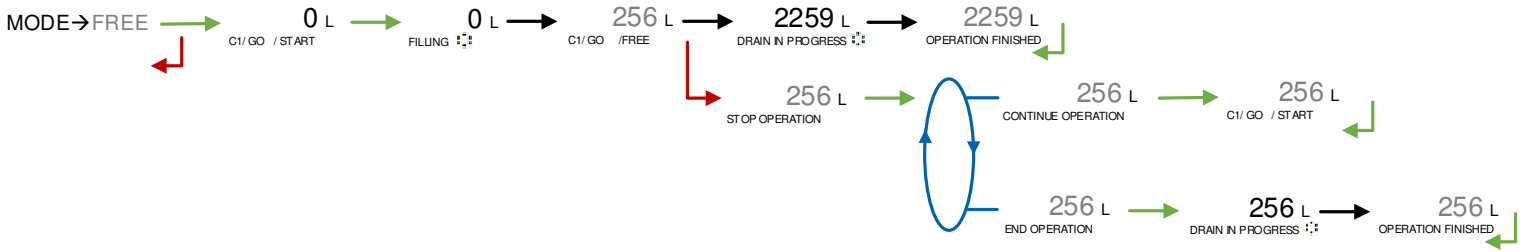
Press OK to start the unloading. Pressing the STOP button stops the unloading.



4.1.2 Delivery in free mode

Validate the distribution mode MODE→FREE.

Press OK to start the unloading and to empty the compartment. Pressing the STOP button stops the unloading.

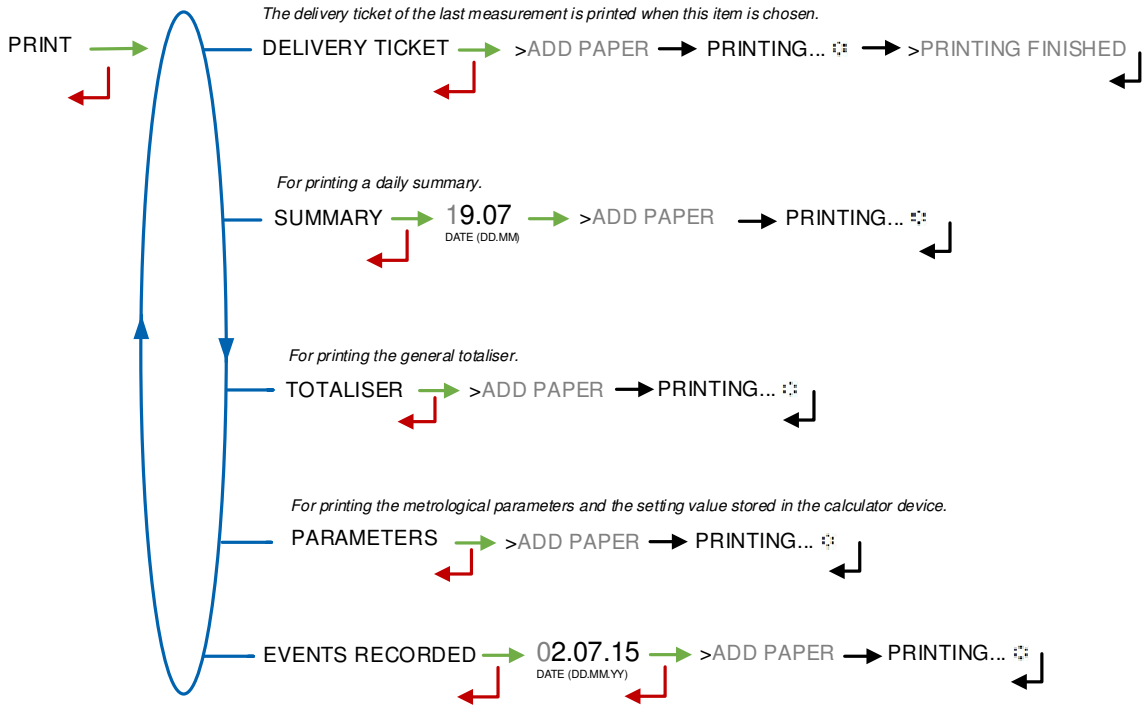


4.1.3 Delivery in not-counted mode

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

Apply regulations in force

4.2 Menu PRINT



4.3 Menu DISPLAY

This menu is available in standby mode or when you stop temporarily the measurement. You can see the totaliser value and the measurement results.

4.3.1 Sub-menu TOTALISER

General totaliser expressed in liters.

4.3.2 Sub-menu MEMORISATION

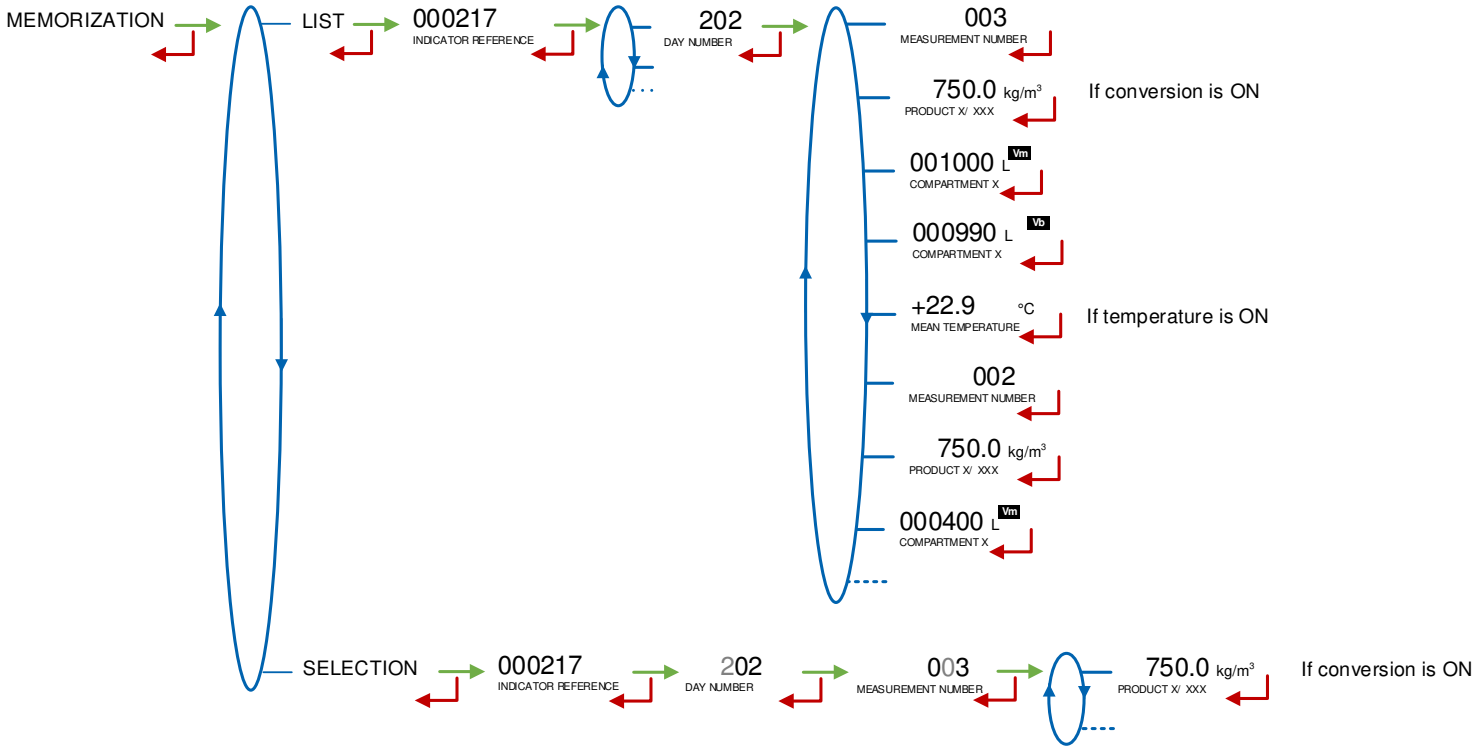
You can read all the measurement results stored by the GRAVICOMPT MANIFOLD. That can be done in two ways:

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

DAY SELECTION: Display a specific measurement by selecting the day number and the measurement number.

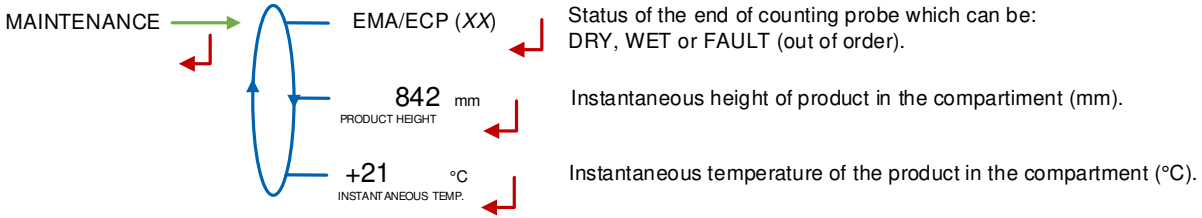
For each measurement, you can read:

- The number and the name of the product
- The measured volume
- The density, with active option
- The temperature, with active option



4.4 Menu MAINTENANCE

Display depends on the configuration of the GRAVICOMPT MANIFOLD

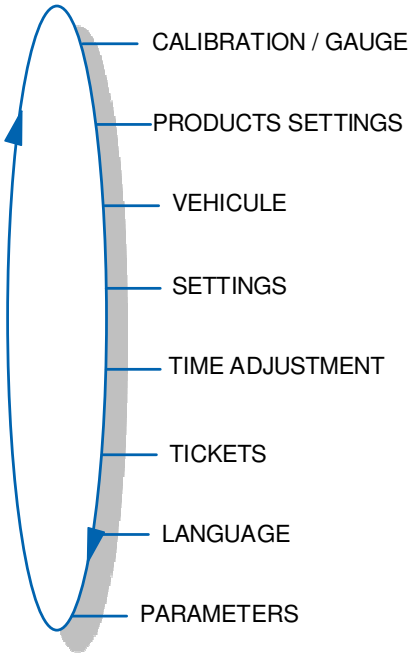


4.5 List of alarms

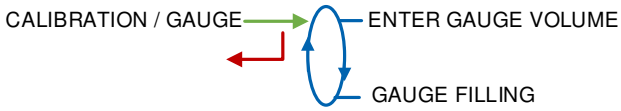
Apparition of a default makes the pouring stop by closing the transfer valve. At the same time, the MICROCOMPT+ displays the associated alarm message. The operator must deal with the default and then validate the alarm.

	DISPLAY	MEANING	ACTION
USER	STOP OPERATION	Intentional interruption of the operation	Continue, stop or finish the operation
	PRINTER DEFAULT	Communication with the printer lost	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 (RFID key)
REPARATOR – 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	Problem with temperature or with density configuration / 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 DEFAULT	Temperature determination failure	Check the temperature probe status / If steady alarm, see a reparator for trouble shooting
REPARATOR - BLOCKING	MEMORY LOST (PILE)	Loss of saved memory	Substitution of the backup battery
	MEMORY LOST	Error on SIM memorization	Enter and exit the METROLOGICAL 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 (RFID key)
	GAS DEFAULT	Air detected during high flow process	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	SIM memory full	Substitution of the AFSEC+ electronic card

5 SET THE GRAVICOMPT MANIFOLD: SUPERVISOR MODE



5.1 Menu CALIBRATION/GAUGE



5.1.1 Sub-menu ENTER GAUGE VOLUME

This menu is used to do a check of the accuracy of the measuring system. The MICROCOMPT+ calculates the measuring device error, the new corrected coefficient and the average flow. Cases in which this menu is used are as follows:

⇨ At the end of a delivery

First, fill the gauge (USER mode) in high or low flow with predetermination of the volume.

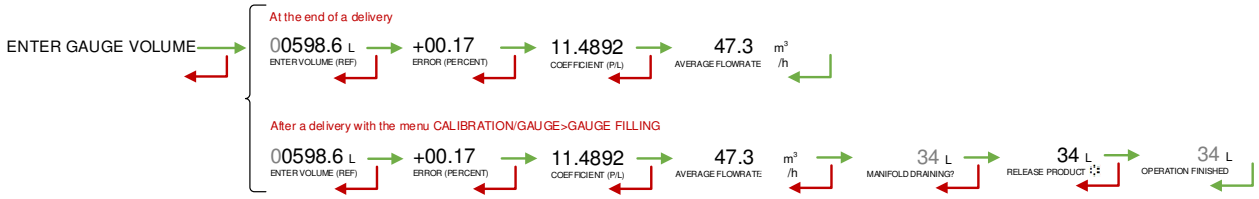
Switch to SUPERVISOR mode, select CALIBRATION/GAUGE>ENTER GAUGE VOLUME and validate. Then follow the sequence below.

⇨ After a delivery with the menu CALIBRATION/GAUGE>GAUGE FILLING.

In that case, the access to the sequence below is automatic (see §5.1.2) Then the product in the manifold is released.

Enter the reference volume (read on the gauge and corrected), then validate. The MICROCOMPT+ displays the information that follows:

- The signed error in % between the counted volume and the volume read on the gauge
- The coefficient revised as a function of the error
- The average flow of the delivery



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; but at the end of the operation, the manifold is not drained.

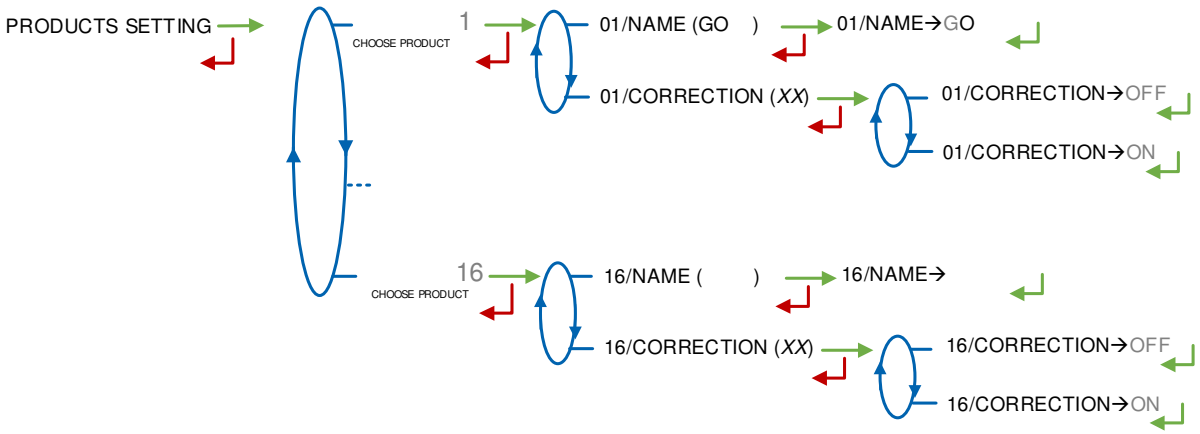
At the end of the operation, press OK to display again the menu ENTER GAUGE VOLUME.

5.2 Menu PRODUCT SETTINGS

You can configure 16 different products.

For the five first products, default names are proposed.

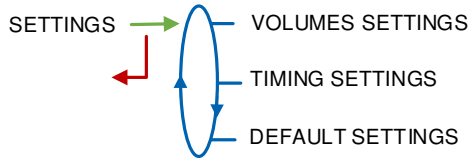
To remove a product, enter blank space as product name. Maximum number of characters: 5.



5.3 Menu VEHICLE

Record the vehicle registry number on which the GRAVICOMPT MANIFOLD is installed. This number is printed on delivery tickets…

5.4 Menu SETTINGS

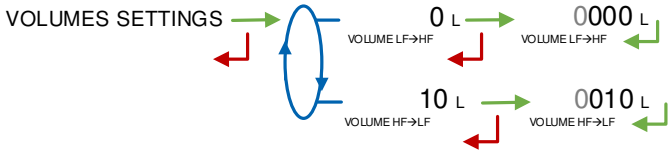


5.4.1 Sub-menu VOLUMES SETTINGS

You can set the volume parameters that follow:

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

HF→LF VOLUME: 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

You can set the timing parameters that follow:

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

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

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

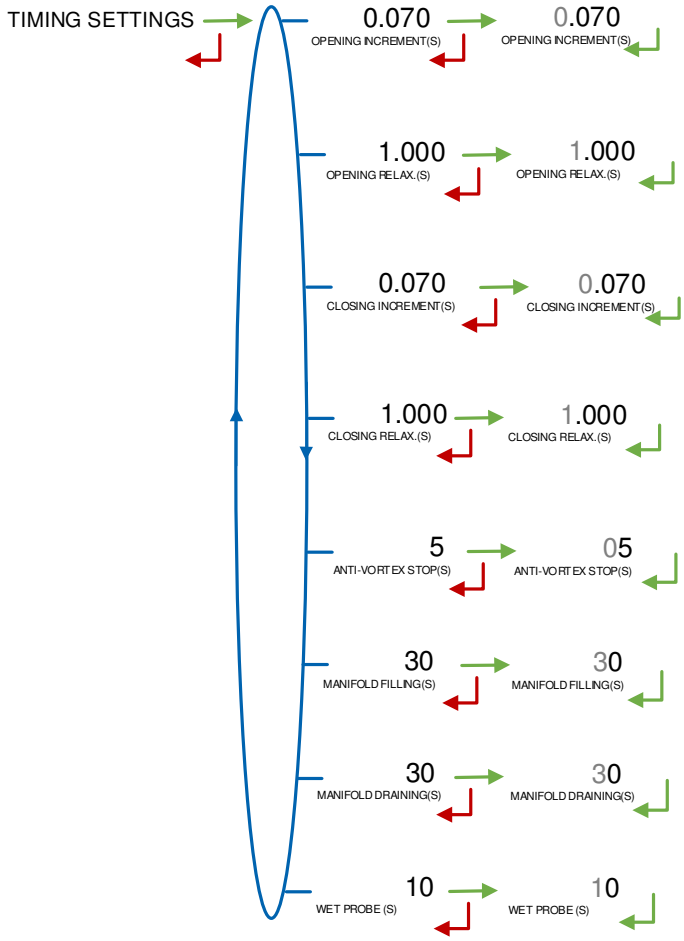
CLOSING RELAX.(S): Set the relaxation duration between two API adapter closing command increments (in seconds). Maximum value: 3.999 seconds. Default value: 1 second

ANTI-VORTEX STOP(S): Set the API adapter closing duration after an anti-vortex breakdown. Minimum value: 5 seconds. Maximum value: 99 seconds. Default value: 5 seconds

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

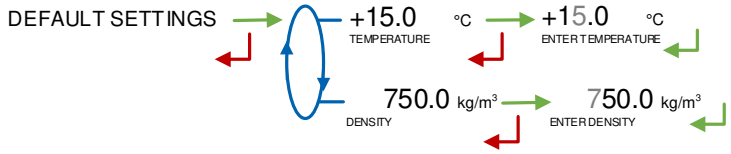
MANIFOLD DRAINING(S): Set the manifold draining duration (in seconds). Minimum value: 20 seconds. Maximum value: 59 seconds. Default value: 30 seconds

WET PROBE: Set the maximum duration before the end-of-metering sensor becomes wet (in seconds). Minimum value: 20 seconds. Maximum value: 99 seconds. Default value: 20 seconds



5.4.3 Sub-menu DEFAULT SETTINGS

This menu allows setting the temperature and density default values when conversion is on.

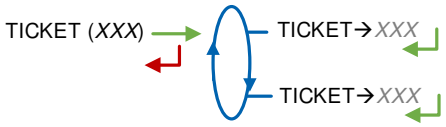


5.5 Menu TIME ADJUSTMENT

Date and time are set in METROLOGICAL mode. You can adjust time (±2h) one time a day. Use French format, for example: 14.41 means 2.41 pm.

5.6 Menu TICKET

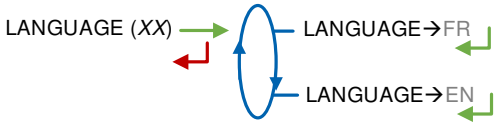
Choose the ticket format for printing of the delivery ticket.



5.7 Menu LANGUAGE

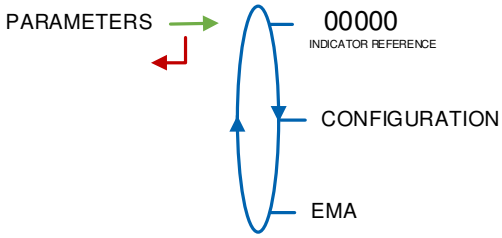
Select the display language. This menu is available if a translation catalogue is uploaded in the MICROCOMPT+.

The message INCORRECT CATALOG appears in the event that no catalogue is uploaded.



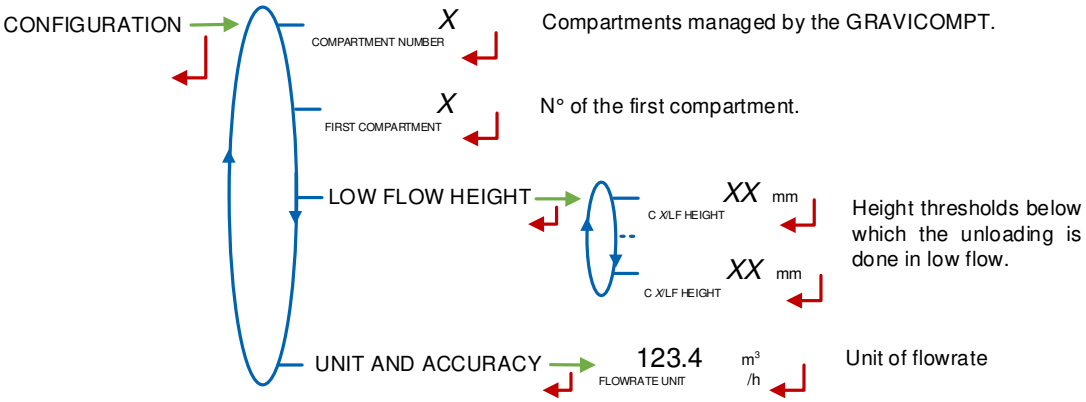
5.8 Menu PARAMETERS

This menu shows the parameters set in METROLOGICAL mode.



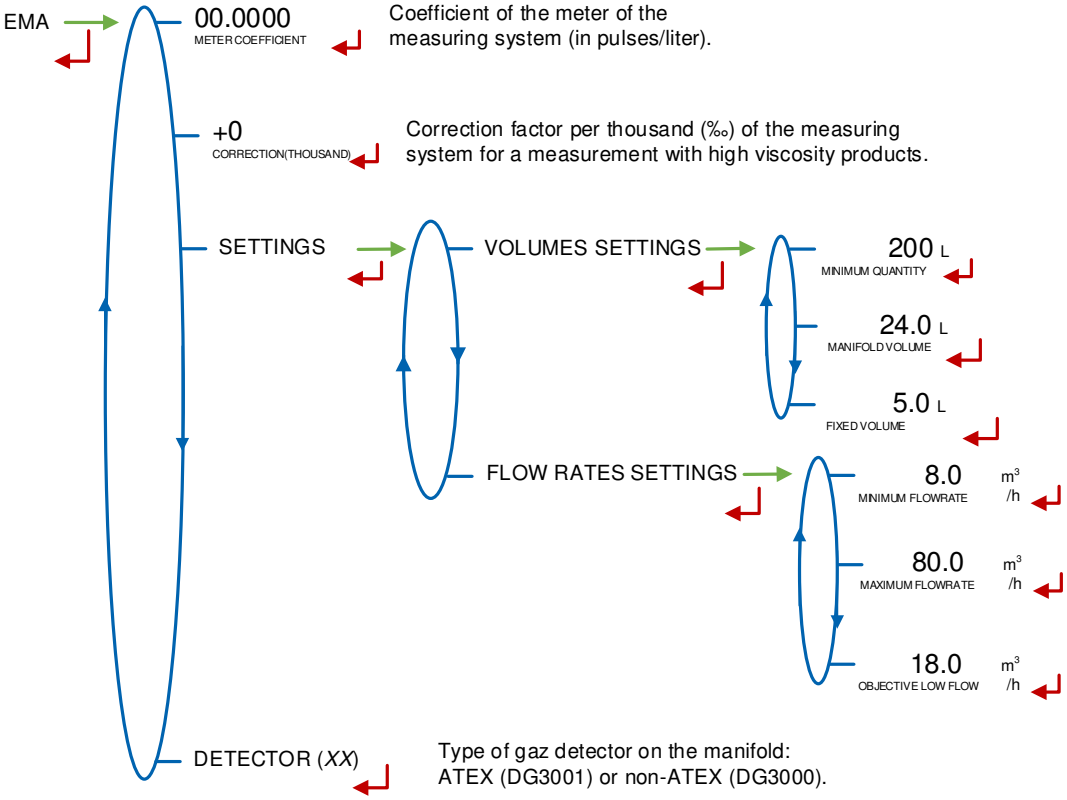
5.8.1 Sub-menu CONFIGURATION

See the METROLOGICAL mode section for meaning of the parameters.

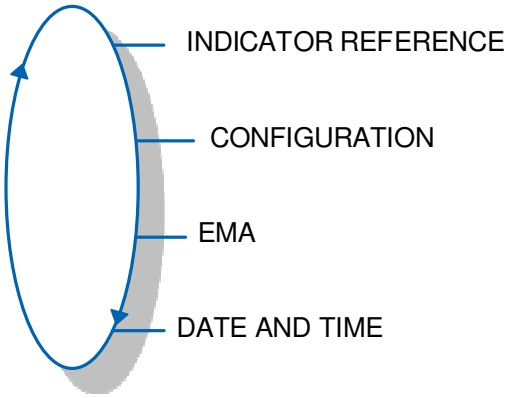


5.8.2 Sub-menu EMA

See the METROLOGICAL mode section for meaning of the parameters.

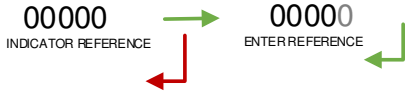


6 § CONFIGURE THE GRAVICOMPT MANIFOLD: METROLOGICAL MODE

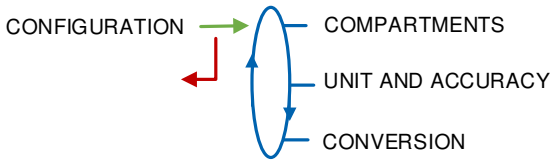


6.1 Menu INDICATOR REFERENCE

Record the MICROCOMPT+ serial number (alphanumeric value).



6.2 Menu CONFIGURATION



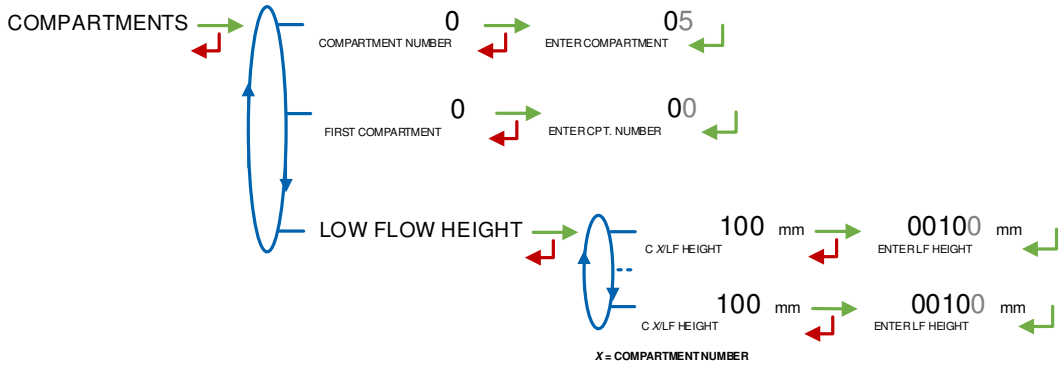
6.2.1 Sub-menu COMPARTMENTS

This menu is used to set the configuration of the compartments.

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

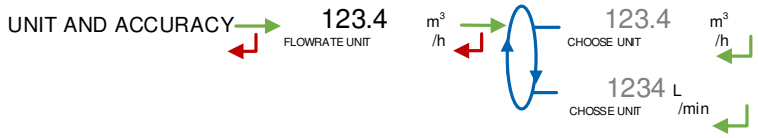
FIRST COMPARTMENT: Set the first compartment to determine which compartments will be useful. Record '04' to use the compartments 4, 5 and 6.

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: record '00635' for a 635mm height from the tap point).



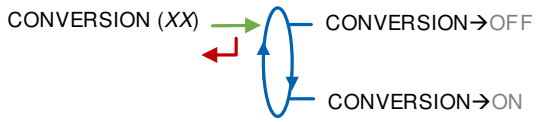
6.2.2 Sub-menu UNIT AND ACCURACY

Choose the unit of the flow rate that will be displayed and printed.



6.2.3 Sub-menu CONVERSION

The GRAVICOMPT MANIFOLD can operate with conversion or without conversion.



Changing the status forces the reset of the metrological diary by causing a MEMORY LOST fault.

When conversion is active, the following parameters must be set:

MAIN DISPLAY: Select the type for displayed quantity

VM: volume in metering conditions

VB: volume converted to the reference temperature

REFERENCE TEMP.: Record the reference temperature for conversion. Default value: 15°C for the most common conversion.

DENSITY TEMP (REF): Record the reference temperature for set up densities. Default value: 15°C for density at 15°C (MV15).

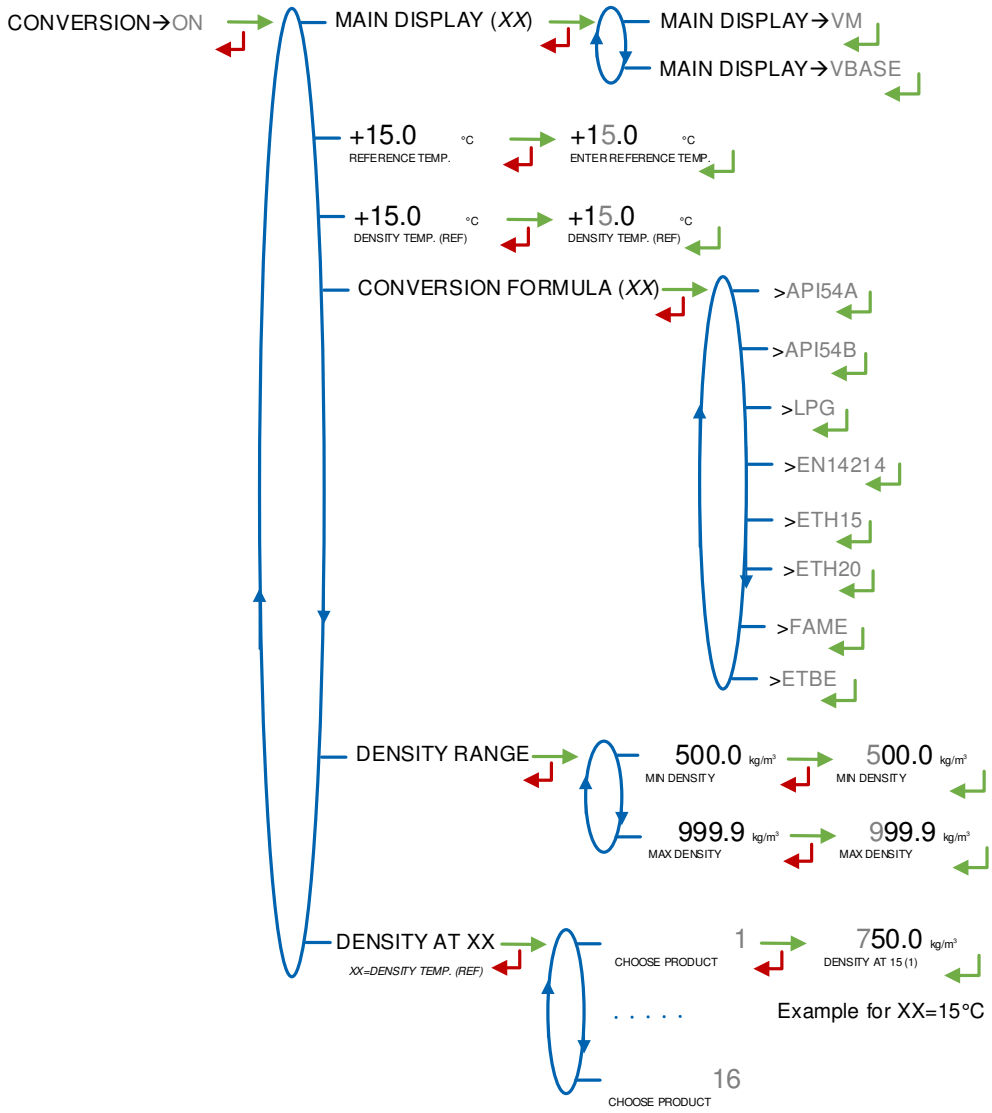
Changing one of the reference temperature values resets the metrological diary by causing a MEMORY LOST fault.

CONVERSION FORMULA: The choice of the conversion formula causes an implicit definition of valid density and temperature ranges to guarantee the conversion result. See the table below to select the conversion table that corresponds to type of fuel used:

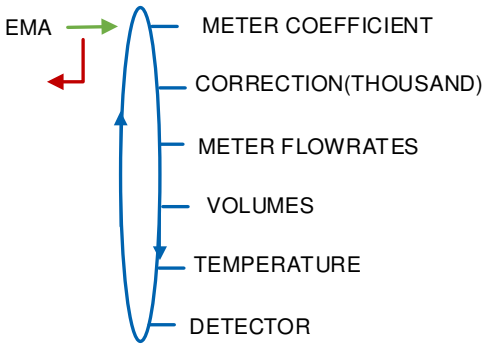
Product	Conversion formula
Crude products	API54A
Refined products	API54B
LPG and bitumen	LPG
Blended biofuels	EN14214
Ethanol at 15°C	ETH15
Ethanol at 20°C	ETH20
Fatty acid methyl esters	FAME
Ethyl tert-butyl ether	ETBE

DENSITY RANGE: Enter the density minimum and maximum values

DENSITY AT XX: For each product, record the product density at XX°C in Kg/m^3.



6.3 Menu measuring system EMA



6.3.1 Sub-menu METER COEFFICIENT

Enter the coefficient of the measuring system meter (pulses/liter).

6.3.2 Sub-menu CORRECTION

Set the correction factor per thousand (‰) of the GRAVICOMPT MANIFOLD for a measurement with high viscosity products. See the marking of the turbine meter or see the ALMA calibration certificate.

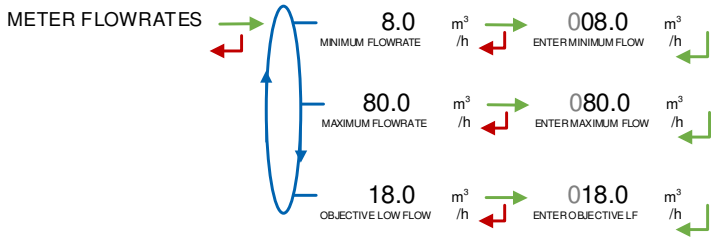
6.3.3 Sub-menu METER FLOWRATES

MINIMUM FLOWRATE: Set the metrological minimum flowrate of the GRAVICOMPT MANIFOLD in m3/h or l/min. You can select the flow unit in the menu CONFIGURATION>UNIT AND ACCURACY.

MAXIMUM FLOWRATE: Set the metrological maximum flowrate of the GRAVICOMPT MANIFOLD in m^3/h or l/min. You can select the flow unit in the menu CONFIGURATION>UNIT AND ACCURACY.

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.

If the valve used for unloading is a double poppet stage valve, the objective flowrate is the same as the maximum flowrate.

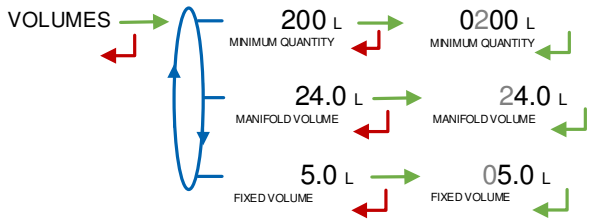


6.3.4 Sub-menu VOLUMES

MINIMUM QUANTITY: Set, in liters, the minimum measured quantity of the GRAVICOMPT MANIFOLD to guaranty the measurement (authorized volume).

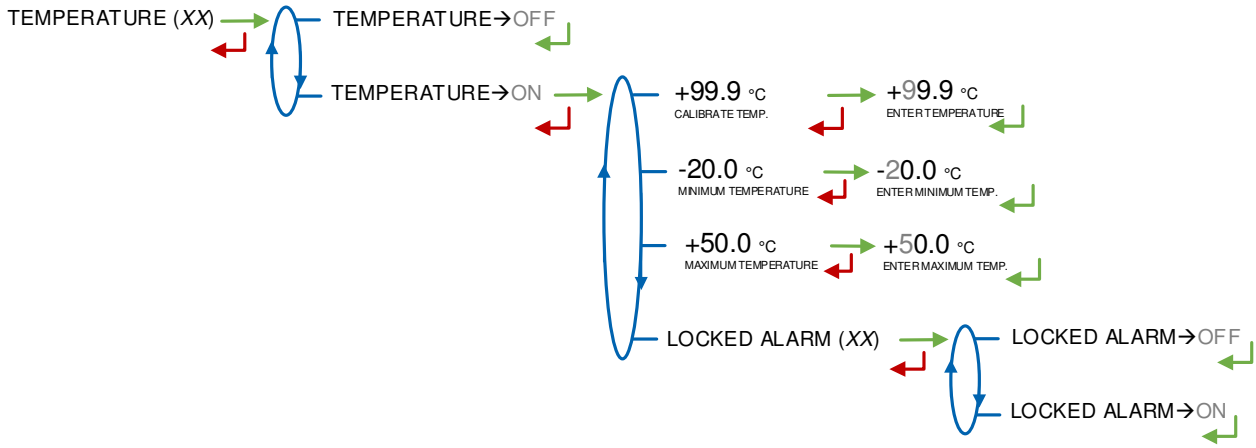
MANIFOLD VOLUME: Set the volume of the manifold in liters (depends on the compartments number).

FIXED VOLUME: Set the end of counting fixed volume of the GRAVICOMPT MANIFOLD in liters.



6.3.5 Sub-menu TEMPERATURE

This menu is an option. It is used to calibrate the temperature into the MICROCOMPT+. See maintenance sheet FM 8510.

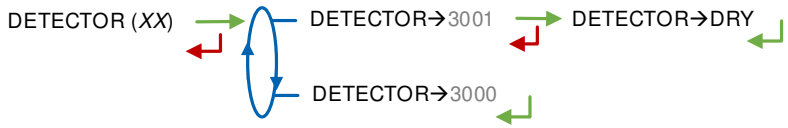


6.3.6 Sub-menu DETECTOR

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

3001: ATEX gas detector. Make sure the end-of-counting probe is dry, then validate.

3000: Non ATEX gas detector.



6.4 Menu DATE AND TIME

Record the date. Then record the time at French format and validate (e.g. 14.41 means 2.41 pm).

ANNEX 3: PRINTINGS

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 TICKET:

```
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 manual
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 a 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+