# OPERATING MANUAL

# MU 7036 EN H

# MICROCOMPT+ LOADING TERMINAL DEVICE



| | | | | |
|---|---|---|---|---|
| H | 2015/10/19 | Creation *[MDV434]* | DSM | SH |
| Issue | Date | Nature of modifications | Written by | Approved by |

# CONTENTS

# 1 GENERAL PRESENTATION AND DESCRIPTION

The electronic calculator-indicating device MICROCOMPT+ for loading terminal is intended to be fitted on measuring systems to measure liquids other than water such as hydrocarbons. It is usually used for loading tank trucks or rail tankers.

It can be used for top loading and bottom loading. Specific functions are identified **BOTTOM** or **TOP,** later in the document.

The electronic calculator-indicating MICROCOMPT+ terminal device calculates and displays:

- ⇨ Either volume (or mass) in metering conditions – Vm
- ⇨ Or volume converted to base conditions – Vb.

It can take into account the temperature of liquid when it's measured by a PT100 temperature sensor, and the density when it's acquired by a density transducer.

The DUAL version calculates and displays volume in metering conditions or mass, measured by **two measuring systems that can operate simultaneously**: EMA for the principal product and EMB for the secondary product (for blending or metrological denaturation).

For **BOTTOM** and **TOP** applications, there may be metrological denaturation. In that case the denaturation can be systematic or optional (the basic product is delivered without any denaturant or with a single and regulated denaturant rate). Note: additivation, dyeing and non-metrological denaturation are made with injectors #3 to #6.

If injection is not systematic, pollution of the basic product with the injected product is avoided by the use of an anti-pollution valve.

The MICROCOMPT+ controls a non-resettable totaliser for each measuring system (EMA and EMB).

It memorizes and secures measurement information, which is read from the user interface.

It registers accumulated masses or volumes in metering conditions and/or accumulated volumes in base conditions on an index.

Two serial links are available to communicate with external equipment (mechanical printer, supervision device).

The front of the MICROCOMPT+ is made of:

- ⇨ A liquid crystal display (LCD) which is used to display a 6-digit signed quantity and pictograms for units
- ⇨ A prompter: line of 20-alphanumeric characters for comments
- ⇨ 3 pushbuttons
- ⇨ A metrological electronic seal
- ⇨ An internal switch operated with an ALMA magnetic key.

NOTE: If MICROCOMPT+ communicates with a system via µConfig, the message 'UCONFIG…' appears on the prompter. µConfig is an optional additional tool on PC to access the MICROCOMPT's configuration.

The electronic calculator-indicating device MICROCOMPT+ has a flameproof case.


Sealed cup protecting access to metrological functions

SUPERVISOR ALMA magnetic key to access configuration and calibration menu

## 2 OPERATING MODES OF THE INDICATING DEVICE

***USER MODE***

This mode is for ongoing operations of the device.

Refer to USER MODE.

***SUPERVISOR MODE***

To access the SUPERVISOR mode, the ALMA magnetic key must be set at the right of the MICROCOMPT+ display. This mode is used to set or change parameters for ongoing operations of the device.

Refer to SUPERVISOR MODE for setup.

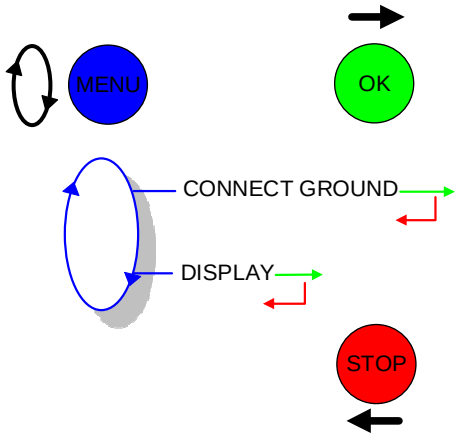
***METROLOGICAL MODE***

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

This mode allows setting all functional and metrological parameters. The physical characteristics of the equipment, its instrumentation and its use are taken into account

Refer to METROLOGICAL MODE for configuration.

# 3 USER MODE




## 3.1 Loading

Loading authorization is given by the MICROCOMPT+ on condition that the loading security devices are connected. The loading authorization must have been received by the MICROCOMPT+ from the main computer (communication mode=connected).

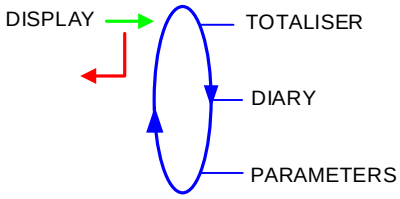
Loading security devices are different according to the installation and application:

**BOTTOM.** Main security devices are: ground, overfill probe, vapor arm, loading arm, authorization.

**TOP.** Main security devices are: ground, arm position, authorization.

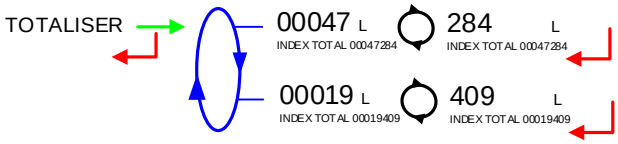
In case of disconnection, the MICROCOMPT+ displays the related alarm alternatively with le volume already loaded. Reconnect the device and press green pushbutton to acknowledge the alarm.

## 3.2 Menu DISPLAY




### 3.2.1 Menu TOTALISER

Totalisers for the principal product (EMA) and the secondary product (EMB) are displayed in this menu. Pictograms indicate the concerned measuring system.



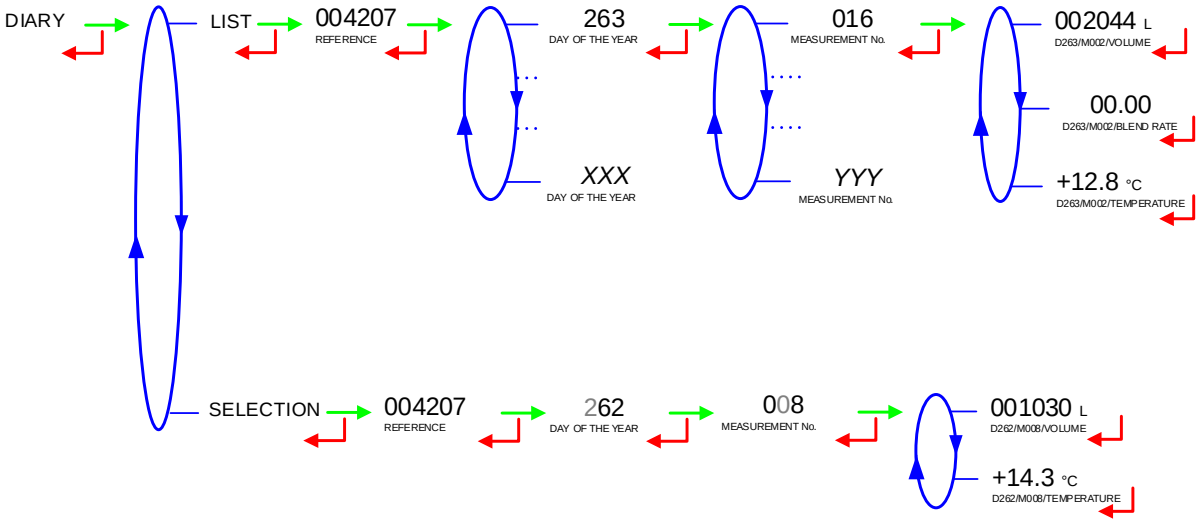

### 3.2.2 Menu DIARY

Display sequence of measurement results memorized by the MICROCOMPT+

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

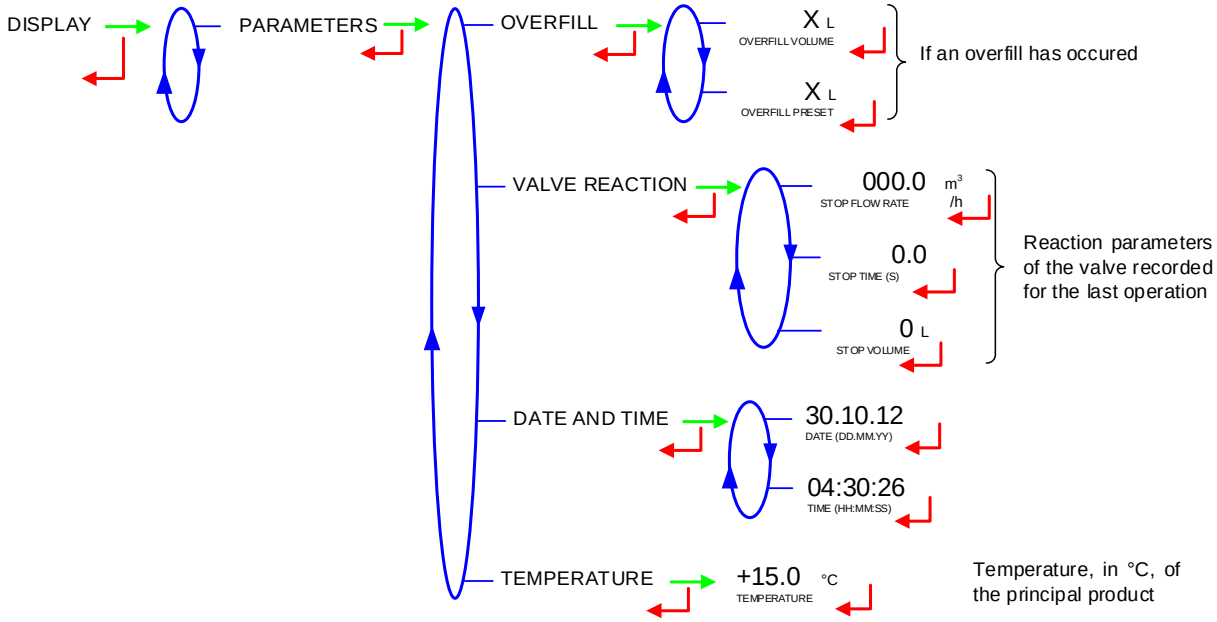
SELECTION: Display a specific measurement by selecting the day number

For each measurement, are displayed: the measured volume, the blending rate (with EMB) and the temperature (with active option).



### 3.2.3 Menu PARAMETERS

The parameters that are displayed depend on the MICROCOMPT+ configuration.

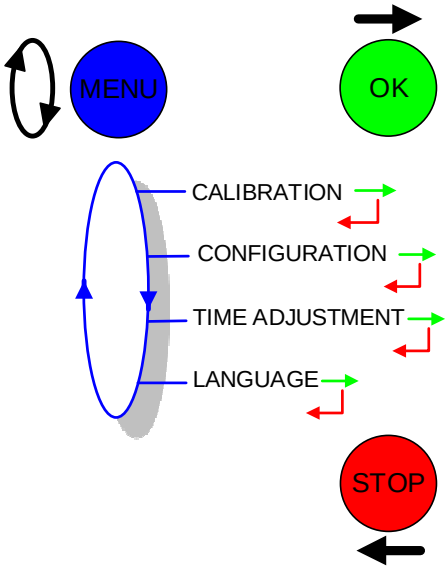


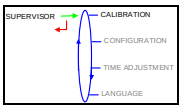

## 3.3 List of alarms

| BOTTOM | | DISPLAY | MEANING | ACTION |
|---|---|---|---|---|
| USER | | STOP LOADING | Intentional interruption of the loading operation | Continue or stop the loading operation |
| | | EMERGENCY STOP | Detection of an emergency stop | Check the status of the emergency stop |
| | | COMMUNICATION FAULT | Absence of communication network | Check the status on the control device |
| | | POWER SUPPLY PROBLEM | Power outage during discharge | Check the cause / Restore power supply |
| | | LOW FLOW FAULT | Low flowrate (less than minimum flowrate) | Check the parameters / Check the hydraulic system (valve, strainer, nozzle…) |
| | | HIGH FLOW FAULT | High flowrate (greater than maximum flowrate) | Check the hydraulic system (valve, pumping) |
| | | ZERO FLOW FAULT | Zero flow principal product | Check the hydraulic system (safety valve) |
| | | METERING PROBLEM | Metering problem with the principal measuring device | Check if the pulse transmitter is powered (red indicators) |
| | | OVERFILL FAULT | Over-filling of the compartment | Dry out the wet probe or end measurement |
| | | MANDATORY END | Measurement end is required | End operation |
| | | NO MORE AUTHORISATION | No more loading authorisation | Check the reason on the control device |
| | | GROUND FAULT | Loss of ground signal | Check the connection of the dead-man switch |
| | | VAPOR ARM FAULT | Loss of vapor arm signal | Check the connection of the vapor arm |
| | | TICKET FAULT | No ticket in the local mechanical printer | Check the ticket is well-positioned |
| | | DTQM FAULT | Stop requested by the DTQM system | Deal with the problem on the DTQM/LR system |
| | | LEAKAGE FAULT | Metering detection without measurement | Check the tightness of the loading valve |
| | | SAMPLING FAULT | Problem with the sampler | Check the status of the sampler |
| | | SELECTION QUALITY | No product selected | Choose a product |
| | | GAS DETECTED | Detection of gas (principal product circuit EMA) | Make a purge (manual or automatic) |
| | | EMB METERING PROBLEM | Metering problem with the secondary measuring device | Check if the pulse transmitter is powered (red indicators) |
| | | EMB NO FLOWRATE | Zero flow (secondary measuring system) | Check the hydraulic system (safety valve) |
| | | BLENDING RATE FAULT | Inappropriate blending ratio | Check the blending rate set in metrological mode |
| | | EMB LEAKAGE FAULT | Metering detection without injection of secondary product | Check the hydraulic system of the denaturant |
| | | BLENDER FAULT | Problem with the denaturant electronic device | Check the denaturant electronic device |
| | | EMB UNDERFLOW | Flowrate less than the min. flowrate set in metrological mode | Check the hydraulic system (valve, strainer, nozzle…) |
| | | EMB HIGH FLOW | Flowrate greater than the max. flowrate set in metrological mode | Check the hydraulic system (valve, pumping) |
| | | EMB GAS FAULT | Detection of gas (secondary product circuit EMB) | Make a purge (manual or automatic) |
| | | BLENDER GAS FAULT | Detection of gas | Make a purge (manual or automatic) |
| | | DENATUR. TANK EMPTY | Denaturant unavailable | Fill the tank with denaturant |
| | | NO DYEING | Dyeing null | Check the additive hydraulic system |
| | | DYE LEAKAGE | Metering detection without injection | Check the additive hydraulic system |
| | | DYEING <---> | Dyeing rate too low | Check the additive hydraulic system |
| | | DYEING <+++> | Dyeing rate too high | Check the additive hydraulic system |
| | | NO ADDITIVATION | Additivation null | Check the additive hydraulic system |
| | | ADDITIVE LEAKAGE | Metering detection without injection | Check the additive hydraulic system |
| | | ADDITIVATION <---> | Additivation rate too low | Check the additive hydraulic system |
| | | ADDITIVATION <+++> | Additivation rate too high | Check the additive hydraulic system |
| | | ADDITIVATION FAULT | Problem with the additivation electronic device | Check the additivation electronic device |
| | | DIARY FAULT | Reset of the events diary | Acknowledge the alarm, check the date in supervisor mode |
| | | LINE RINSING FAULT | Rinsing cycle not finished by the injector | Wait for the end of the rinsing cycle. Blocking default if the injector is for denaturant (see ANTI BLENDING configuration) |
| | | INJECT. LEAKAGE | Metering detection on injector XX without injection | Check the additive hydraulic system |
| REPARATOR | NON BLOCKING | DISPLAY FAULT | Problem with display card | If steady alarm, substitution of the display card |
| | | WATCHDOG FAULT | Fault with display or power card or AFSEC+ card | If steady alarm, substitution of the faulty card |
| | | VOLUME CONVER. FAULT | Problem during conversion of volume | If steady alarm, substitution of the AFSEC+ electronic card |
| | | TOTALISER LOST | Loss of totaliser EMA | Substitution of the backup battery |
| | | EMB TOTALISER LOST | Loss of totaliser EMB | Substitution of the backup battery |
| | | TEMPERATURE FAULT | Temperature determination failure EMA | If steady alarm, see a reparator for trouble shooting |
| | | EMB TEMP FAULT | Temperature determination failure EMB | If steady alarm, see a reparator for trouble shooting |
| | | VALVE FAULT | Inappropriate reaction of the EMA control valve | If steady alarm, inspect the autorization valve |
| | | EMB VALVE FAULT | Inappropriate reaction of the EMB control valve | If steady alarm, check the control valve |
| | | FILTER FAULT | Filter fouling | The pressure switch and the product line must be cleaned |
| | | ANTI-POLLUTION VALVE | Mismatch between the status awaited and the actual status of the antipollution valve | Check the status of the antipollution valve |
| | | INJECT CONFIG FAULT | Disparity between metrological parameters values | Remove the disparity |
| | | DYEING CONFIG FAULT | Disparity between metrological parameters values | Remove the disparity |
| | BLOCKING | PRINTER FAULT <-> | Problem with the IT2 mechanical printer | If steady alarm, inspect the printer |
| | | PRINTER FAULT <+> | Problem with the IT2 mechanical printer | If steady alarm, inspect the printer |
| | | MEMORY LOST (PILE) | Loss of saved memory | Substitution of the backup battery |
| | | MEMORY LOST | Error on SIM memorization | Enter and exit the METRO mode / If steady alarm, substitution of the backup battery |
| | | COEFFICIENTS FAULT | Deviation between coefficient LF/HF greater than 0.5% | Modification of the low flow coefficient (K1) |
| | | PROM FAULT | Loss of software or resident integrity | Substitution of the AFSEC+ electronic card |
| | | RAM FAULT | 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 | Loading diary is full | Substitution of the AFSEC+ electronic card |
| | | DATE AND TIME LOST | Loss of date and time | Set date and time in supervisor mode (supervisor key) |
| | | POWER BOARD FAULT | Disparity between the software and the version of the power supply board | Remove the disparity |
| | | GAS DETECTOR FAULT | Problem with the EMA gas detector | Check the gas detector |
| | | EMB DETECTOR FAULT | Problem with the EMB gas detector | Check the gas detector |
| | | VISCOSITY FAULT | Viscosity out of range | Check the curve in METROLOGICAL mode |

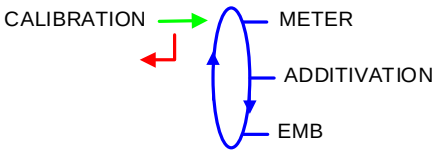
| TOP | | DISPLAY | MEANING | ACTION |
|---|---|---|---|---|
| USER | | STOP LOADING | Intentional interruption of the loading operation | Continue or stop the loading operation |
| | | EMERGENCY STOP | Detection of an emergency stop | Check the status of the emergency stop |
| | | COMMUNICATION FAULT | Absence of communication network | Check the status on the control device |
| | | POWER SUPPLY PROBLEM | Power outage during discharge | Check the cause / Restore power supply |
| | | LOW FLOW FAULT | Low flowrate (less than minimum flowrate) | Check the parameters / Check the hydraulic system (valve, strainer, nozzle…) |
| | | HIGH FLOW FAULT | High flowrate (greater than maximum flowrate) | Check the hydraulic system (valve, pumping) |
| | | ZERO FLOW FAULT | Zero flow principal product | Check the hydraulic system (safety valve) |
| | | METERING PROBLEM | Metering problem with the principal measuring device | Check if the pulse transmitter is powered (red indicators) |
| | | OVERFILL FAULT | Over-filling of the compartment | Dry out the wet probe or end measurement |
| | | MANDATORY END | Measurement end is required | End operation |
| | | NO MORE AUTHORISATION | No more loading authorisation | Check the reason on the control device |
| | | GROUND FAULT | Loss of ground signal | Check the connection of the dead-man switch |
| | | TICKET FAULT | No ticket in the local mechanical printer | Check the ticket is well-positioned |
| | | ARM POSITION FAULT | Loading arm in high-position | Check the loading arm position |
| | | ARM DIRECTION FAULT | Problem with the direction of the arm in low-position | Check the loading arm direction (left or right) |
| | | DIRECTION /2 RACKS | Detection of a loading arm on both sides of the rack | Check the loading arm direction (left or right) |
| | | DEAD MAN SWITCH | The dead man switch is not connected | Check the dead man switch |
| | | LEAKAGE FAULT | Metering detection without measurement | Check the tightness of the loading valve |
| | | SAMPLING FAULT | Problem with the sampler | Check the status of the sampler |
| | | SELECTION QUALITY | No product selected | Choose a product |
| | | GAS DETECTED | Detection of gas (principal product circuit EMA) | Make a purge (manual or automatic) |
| | | EMB METERING PROBLEM | Metering problem with the secondary measuring device | Check if the pulse transmitter is powered (red indicators) |
| | | EMB NO FLOWRATE | Zero flow (secondary measuring system) | Check the hydraulic system (safety valve) |
| | | BLENDING RATE FAULT | Inappropriate blending ratio | Check the blending rate set in metrological mode |
| | | EMB LEAKAGE FAULT | Metering detection without injection of secondary product | Check the hydraulic system of the denaturant |
| | | BLENDER FAULT | Problem with the denaturant electronic device | Check the denaturant electronic device |
| | | EMB UNDERFLOW | Flowrate less than the min. flowrate set in metrological mode | Check the hydraulic system (valve, strainer, nozzle…) |
| | | EMB HIGH FLOW | Flowrate greater than the max. flowrate set in metrological mode | Check the hydraulic system (valve, pumping) |
| | | EMB GAS FAULT | Detection of gas (secondary product circuit EMB) | Make a purge (manual or automatic) |
| | | BLENDER GAS FAULT | Detection of gas | Make a purge (manual or automatic) |
| | | DENATUR. TANK EMPTY | Denaturant unavailable | Fill the tank with denaturant |
| | | NO DYEING | Dyeing null | Check the additive hydraulic system |
| | | DYE LEAKAGE | Metering detection without injection | Check the additive hydraulic system |
| | | DYEING <---> | Dyeing rate too low | Check the additive hydraulic system |
| | | DYEING <+++> | Dyeing rate too high | Check the additive hydraulic system |
| | | NO ADDITIVATION | Additivation null | Check the additive hydraulic system |
| | | ADDITIVE LEAKAGE | Metering detection without injection | Check the additive hydraulic system |
| | | ADDITIVATION <---> | Additivation rate too low | Check the additive hydraulic system |
| | | ADDITIVATION <+++> | Additivation rate too high | Check the additive hydraulic system |
| | | ADDITIVATION FAULT | Problem with the additivation electronic device | Check the additivation electronic device |
| | | DIARY FAULT | Reset of the events diary | Acknowledge the alarm, check the date in supervisor mode |
| | | LINE RINSING FAULT | Rinsing cycle not finished by the injector | Wait for the end of the rinsing cycle. Blocking default if the injector is for denaturant (see ANTI BLENDING configuration) |
| | | INJECT. LEAKAGE | Metering detection on injector XX without injection | Check the additive hydraulic system |
| REPARATOR | NON BLOCKING | DISPLAY FAULT | Problem with display card | If steady alarm, substitution of the display card |
| | | WATCHDOG FAULT | Fault with display or power card or AFSEC+ card | If steady alarm, substitution of the faulty card |
| | | VOLUME CONVER. FAULT | Problem during conversion of volume | If steady alarm, substitution of the AFSEC+ electronic card |
| | | TOTALISER LOST | Loss of totaliser EMA | Substitution of the backup battery |
| | | EMB TOTALISER LOST | Loss of totaliser EMB | Substitution of the backup battery |
| | | TEMPERATURE FAULT | Temperature determination failure EMA | If steady alarm, see a reparator for trouble shooting |
| | | EMB TEMP FAULT | Temperature determination failure EMB | If steady alarm, see a reparator for trouble shooting |
| | | VALVE FAULT | Inappropriate reaction of the EMA control valve | If steady alarm, inspect the autorization valve |
| | | EMB VALVE FAULT | Inappropriate reaction of the EMB control valve | If steady alarm, check the control valve |
| | | FILTER FAULT | Filter fouling | The pressure switch and the product line must be cleaned |
| | | ANTI-POLLUTION VALVE | Mismatch between the status awaited and the actual status of the antipollution valve | Check the status of the antipollution valve |
| | | INJECT CONFIG FAULT | Disparity between metrological parameters values | Remove the disparity |
| | | DYEING CONFIG FAULT | Disparity between metrological parameters values | Remove the disparity |
| | BLOCKING | PRINTER FAULT <-> | Problem with the IT2 mechanical printer | If steady alarm, inspect the printer |
| | | PRINTER FAULT <+> | Problem with the IT2 mechanical printer | If steady alarm, inspect the printer |
| | | MEMORY LOST (PILE) | Loss of saved memory | Substitution of the backup battery |
| | | MEMORY LOST | Error on SIM memorization | Enter and exit the METRO mode / If steady alarm, substitution of the backup battery |
| | | COEFFICIENTS FAULT | Deviation between coefficient LF/HF greater than 0.5% | Modification of the low flow coefficient (K1) |
| | | PROM FAULT | Loss of software or resident integrity | Substitution of the AFSEC+ electronic card |
| | | RAM FAULT | 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 | Loading diary is full | Substitution of the AFSEC+ electronic card |
| | | DATE AND TIME LOST | Loss of date and time | Set date and time in supervisor mode (supervisor key) |
| | | POWER BOARD FAULT | Disparity between the software and the version of the power supply board | Remove the disparity |
| | | GAS DETECTOR FAULT | Problem with the EMA gas detector | Check the gas detector |
| | | EMB DETECTOR FAULT | Problem with the EMB gas detector | Check the gas detector |
| | | VISCOSITY FAULT | Viscosity out of range | Check the curve in METROLOGICAL mode |

# 4 SUPERVISOR MODE




## 4.1 Menu CALIBRATION

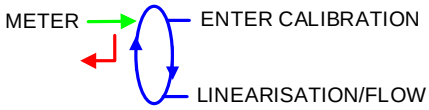



### 4.1.1 Sub-menu METER

This menu allows you to check the accuracy of the measuring system by calculating the measuring device error and the new corrected coefficient. It is possible then to linearize the curve on 2 measuring points.

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

In this menu the volume which is displayed is the volume at metering conditions (one decimal point) even if volume conversion is activated and whatever the principal quantity (Vb or Vm) is.




Display the last measurement details for EMA or EMB.
Allow to apply a set-flowrate for the next measurement

Display and configurate the flow correction points

#### 4.1.1.1 Enter calibration

Calibration is proposed for both measuring systems:

EMA (for principal product)

EMB (for secondary product).

First, fill the gauge (USER mode) in high or low flow with or without predetermination of the volume.

Switch to SUPERVISOR mode, choose CALIBRATION>METER>ENTER CALIBRATION and validate.

Enter the reference volume (read on the gauge and corrected), then validate.

The following information is then displayed:

- The signed error in (%)
- The coefficient revised as a function of the error

Enter a new flow rate value if necessary. This set-flowrate is taken into account by the MICROCOMPT+ for the next operation only, thus avoiding the seal removal.

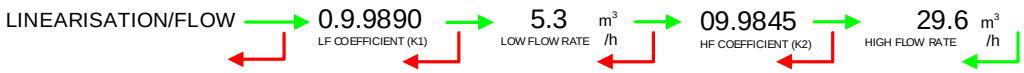

### 4.1.1.2 Linearisation/Flow

This menu is used to make a flow-correction for two measuring points (at low and high flowrate). The MICROCOMPT+ stores flowrate and coefficient calibrated values in order to define both correction points: at low and high flowrate. Linearisation is proposed only for the principal product (EMA).

When you validate the menu LINEARISARION/FLOW, the calibrated values are displayed; you need to unseal the MICROCOMPT+ to switch in METROLOGICAL mode and enter the values via the EMA>METER COEFFICIENT menu.

To linearize the curve, two tests are necessary. Follow the instructions:

- Fill the gauge in high flow $[flow_{min} \times 3] \leq$ high flow $< [flow_{max}]$, and enter the volume read on the gauge in the menu CALIBRATION>ENTER CALIBRATION as described above
- Fill the gauge in low flow $[flow_{min}] \leq$ low flow $\leq flow_{min} \times 1.5]$, enter the volume read on the gauge in the menu CALIBRATION>ENTER CALIBRATION as described above
- Choose CALIBRATION>METER>LINEARISATION/FLOW and validate. It is then possible to see the coefficients and the flow rates data for the two tests carried out.

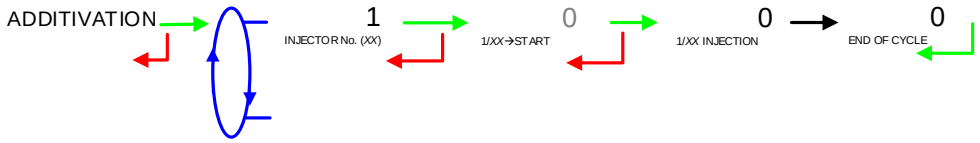



If the procedure has failed, the following alarms may be displayed:

- LARGE GAP K1/K2: Correction between both measuring points >0.5%
- FLOWS TOO CLOSE: High flowrate value is out of range. It needs to be: $[flow_{min} \times 3] \leq$ high flow $< [flow_{max}]$
- LO-FLOW OUT OF RANGE: Low flowrate value is out of range. It needs to be: $[flow_{min}] \leq$ low flow $\leq flow_{min} \times 1.5]$
- ONLY ONE GAUGE: One of the tests has not been done (at low or high flowrate)
- NO VALID GAUGE: Both tests have not been done (at low or high flowrate).

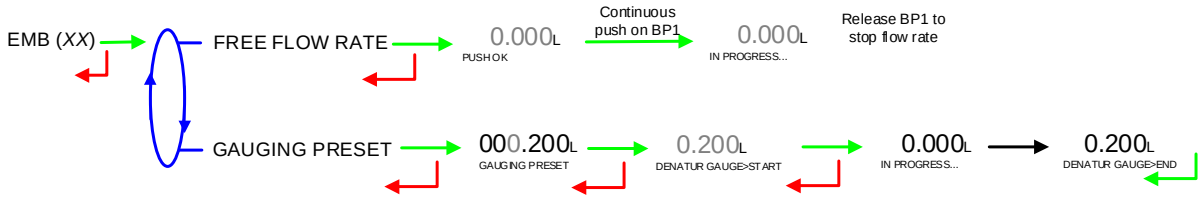
### 4.1.2 Sub-menu ADDITIVATION

This menu is used to calibrate the injectors, except the MICRO-BLEND one. At the end of the calibration procedure, enter the true volume to correct the injector coefficient.




### 4.1.3 Sub-menu EMB

When calibrating an injector of, the MICROCOMPT+ must be unsealed to set the new coefficient which is a metrological parameter.




STEP 1: Conditioning of the gauge

SUPERVISOR>CALIBRATION>EMB (DENATURANT)>FREE FLOW RATE: press green BP1 at least 2 seconds to let denaturant flow. Release BP1 to stop flow.

→ Technician Pushbutton: lets the denaturant flow (gauge conditioning)

STEP 2: Gauging

SUPERVISOR>CALIBRATION>EMB (DENATURANT)>GAUGING PRESET: set the preset volume (Unit: Litre; scale interval: millilitre)

→ Technician Pushbutton: starts the injection of one dose of denaturant inside the gauge

→ MICROCOMPT+: stops automatically the injection

→ Technician Pushbutton: measures the volume in the gauge.

STEP 3: Calibration

SUPERVISOR>CALIBRATION>METER>ENTER CALIBRATION>CHOOSE EM: choose EMB, enter volume and error. The new coefficient is displayed.

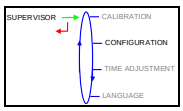
→ Technician Pushbutton: sets volume and error in the MICROCOMPT+

→ MICROCOMPT+ calculates and displays of the new coefficient.

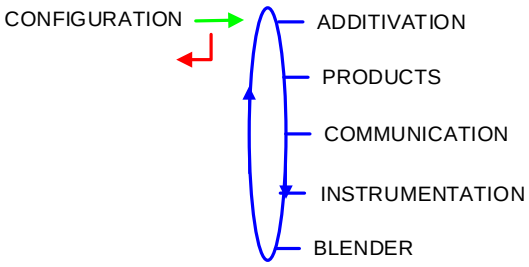
STEP 4: Coefficient memorisation.

METRO>EMB (DENATURANT)>COEFFICIENT (P/L): enter the new coefficient.

→ Technician Pushbutton: sets the new coefficient in the MICROCOMPT+.



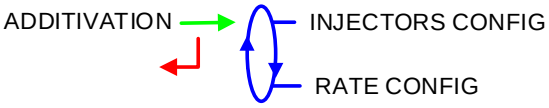

## 4.2 Menu CONFIGURATION




### 4.2.1 Sub-menu ADDITIVATION

This menu is for the additivation configuration:

- INJECTORS CONFIG: configuration of the injectors
- RATE CONFIG: configuration of the additivation general parameters.



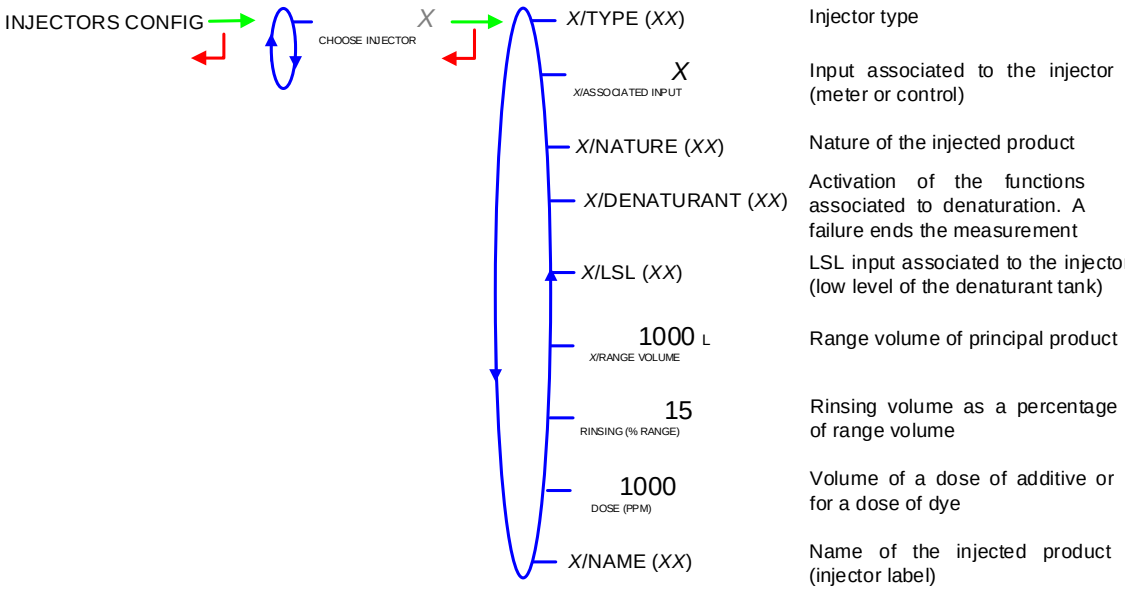

#### 4.2.1.1 Injectors configuration

Configuration of the injectors. There may be up to 6 injectors depending on the device configurations and options.

In DUAL version, injectors 1 and 2 are not configurable. However, the name of the injected product may be changed. The other parameters, set in METROLOGICAL mode for denaturation, are on read-only access.

Injectors 3 to 6 are used for additivation, dyeing and non-metrological denaturation.

But if dyeing is forced (METROLOGICAL configuration), values are on read-only access.



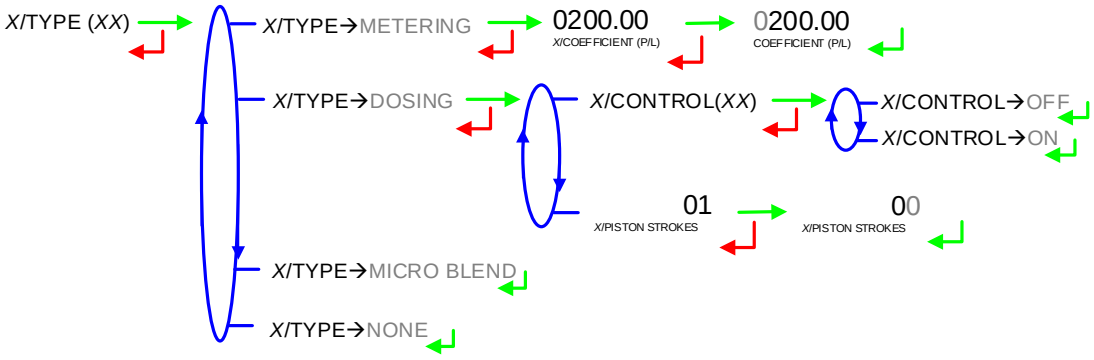
*a) Type*

Choose the injector type:

METERING: metering-type injector (MIV or PAM).

DOSING: dosing-type injector with or without feedback control (GATE PACK, HYROLEC). Enter the piston strokes needed to inject the dose.

MICRO BLEND: MICRO-BLEND-type injector connected on COM1.

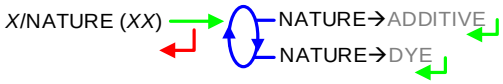



*b) Associated input*

Choose the input associated to the injector (meter or control).

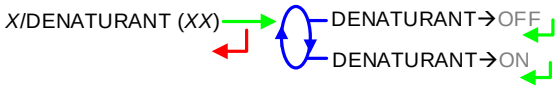

*c) Nature*

Choose the nature of the injected product: additive or dye.



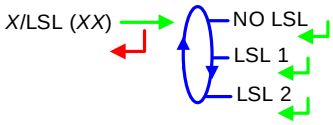

*d) Denaturant*

Choose ON to manage denaturation and to activate the anti-fraud and anti-blending functions.




*e) LSL*

Choose the LSL input associated to the injector of additive, dye or denaturant.



*f) Range volume*

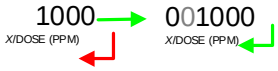
Enter the range volume. It needs to be between 200-500 litres of principal product.


*g) Rinsing (% range)*

Enter the rinsing volume as a percentage of the range volume. It needs to be between 10-30%.

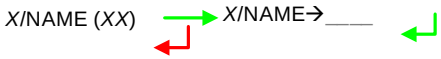

*h) Dose*

Enter the volume (in millilitres) of the dose to be injected for 1000 litres of product.



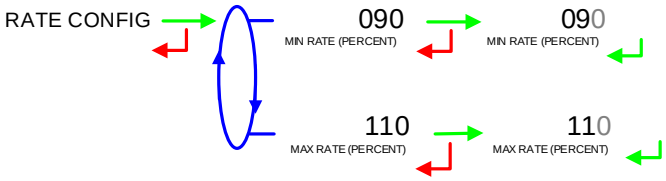

*i) Name*

Enter the name of the injected product (6 characters).

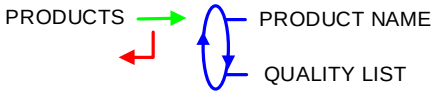



#### 4.2.1.2 Rate configuration

This menu is used to configure the additivation minimum and maximum rates beyond which an alarm is triggered.




### 4.2.2 Sub-menu PRODUCTS




Name of the product that the MICROCOMPT+ displays in USER mode when pre-measuring conditions are met.

Configuration of quality elements (product, additive, dye).

#### 4.2.2.1 Product name

Enter the name of the principal product. Default display: NONE

#### 4.2.2.2 Quality list

**In autonomous operating mode**, quality configuration allows additivation and/or dyeing (according to option). Before beginning measurement, the MICROCOMPT+ displays a list to choose the quality to load.

In case of blending, enter the blending rate using menu (QUAL1)/BLENDER.

In case of additive injection, use the menu (QUAL1)/ADDITIVE to specify:

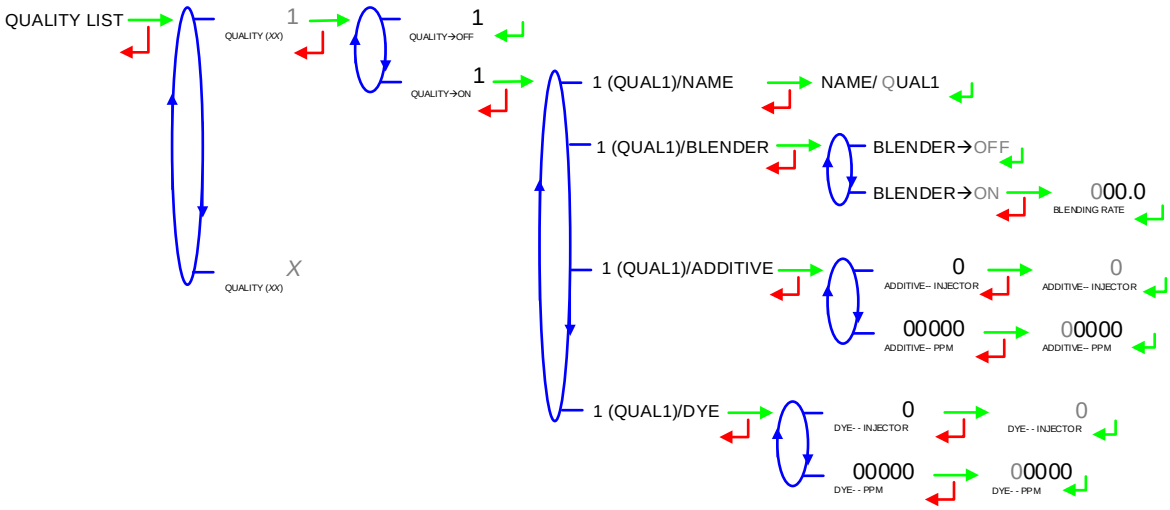
INJECTOR: the number of the injector assigned

PPM: the additivation rate for 1000 litres of principal product

In case of dye injection, use the menu (QUAL1)/DYE to specify:

INJECTOR: the number of the injector assigned

PPM: the additivation rate for 1000 litres of principal product.



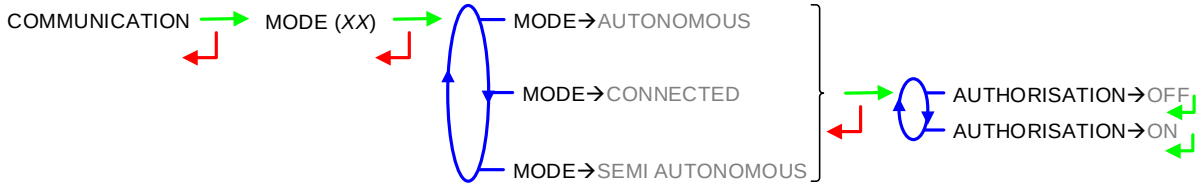

### 4.2.3 Sub-menu COMMUNICATION

This menu allows to configure the communication with the control device (main computer) if it has not been done in METROLOGICAL mode (METRO>CONFIGURATION>COMMUNICATION>MODE→SUPERVISOR).

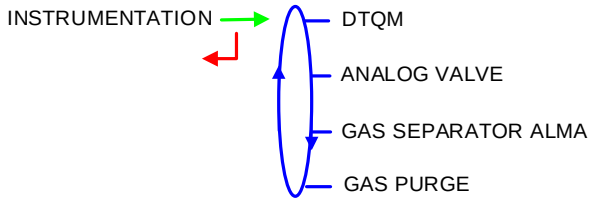
AUTONOMOUS: The MICROCOMPT+ operates in autonomous mode (security management) with or without the useful authorisation.

CONNECTED: The MICROCOMPT+ operates with the control device (main computer) with or without the useful authorisation

SEMI AUTONOMOUS: The MICROCOMPT+ operates in autonomous mode (security management) with or without the useful authorisation. The MICROCOMPT+ takes into account the authorisation given by the control device if connected.

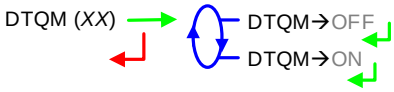


### 4.2.4 Sub-menu INSTRUMENTATION



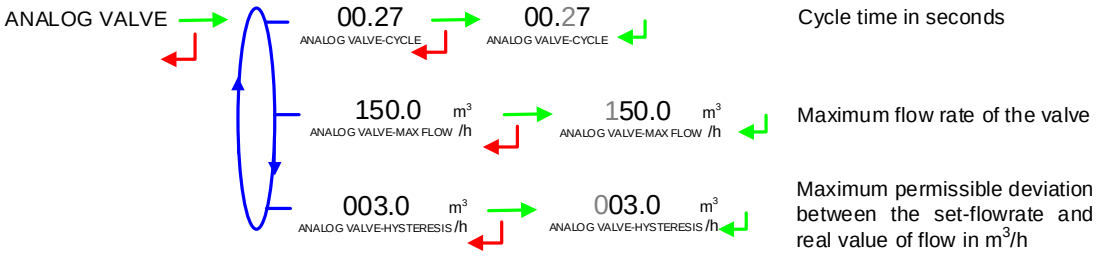

#### 4.2.4.1 DTQM - **BOTTOM**

If the external sealing device on the loading station breaks down, this menu is used to disable the DTQM input. The MICROCOMPT+ enables it again when the problem is solved.




#### 4.2.4.2 Analog valve

This menu is used to adjust the parameters of the 4-20mA analog valve

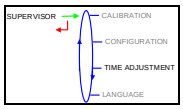



#### 4.2.4.3 Gas separator ALMA


#### 4.2.4.4 Gas purge

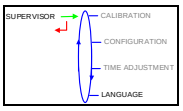

### 4.2.5 Sub-menu BLENDER

This menu is useful in DUAL version, if the secondary measuring system has been activated as a blender in METROLOGICAL mode (except when the value is given by the main computer SESAME II). Enter the blending rate.



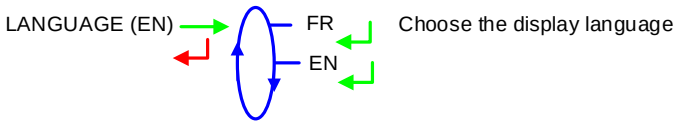

## 4.3 Menu TIME ADJUSTMENT

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

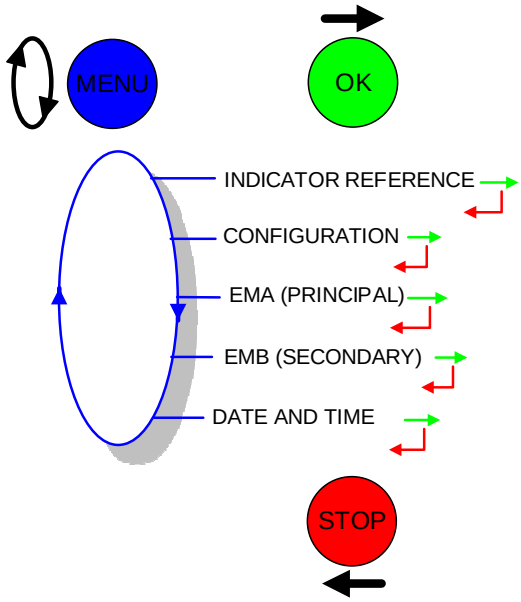




## 4.4 Menu LANGUAGE

This menu allows you to choose the display language. It is available if a translation catalogue has been uploaded in the MICROCOMPT+.

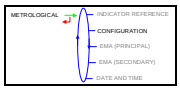


# 5 METROLOGICAL MODE

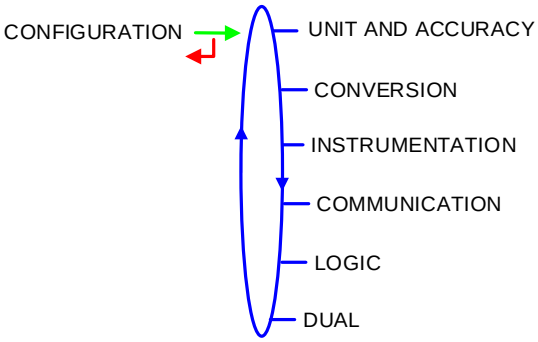




## 5.1 Menu INDICATOR REFERENCE

Set the MICROCOMPT+ serial number then the slave number.

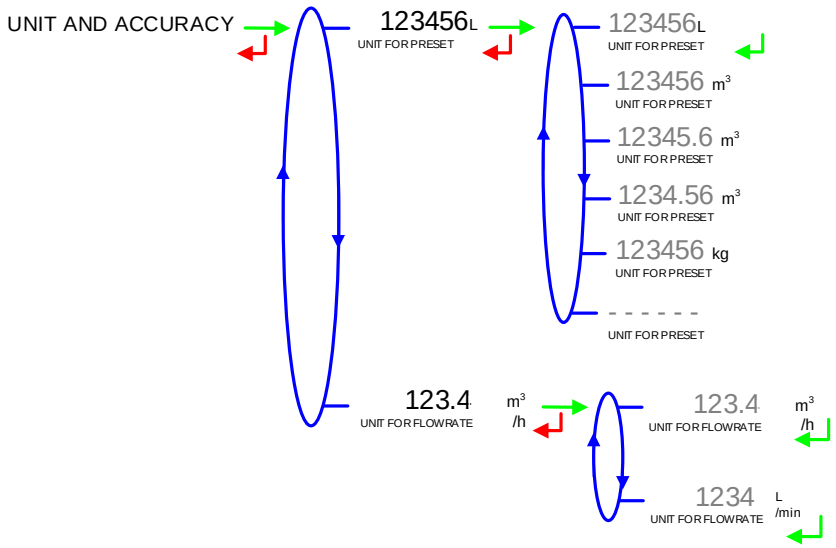



## 5.2 Menu CONFIGURATION

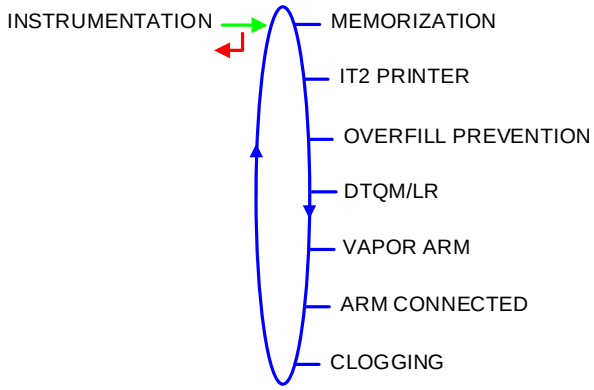


### 5.2.1 Sub-menu UNIT AND ACCURACY

Choose volume unit and flow rate unit that will be displayed and printed.

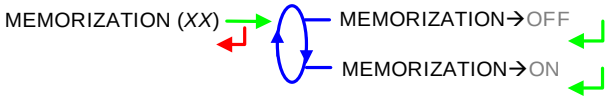



### 5.2.2 Sub-menu INSTRUMENTATION




#### 5.2.2.1 Memorization

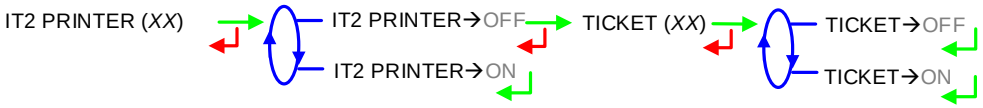
Operation with or without memorization.



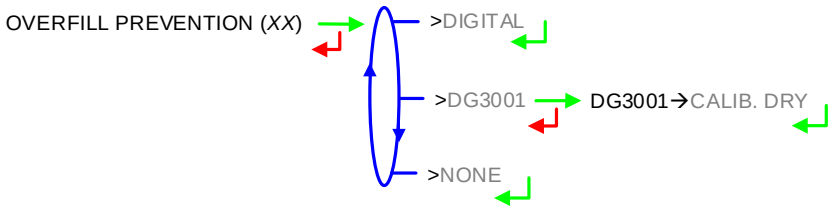

#### 5.2.2.2 IT2 mechanical printer

GNR VERSION: not used.

Operation with or without IT2 ticket mechanical printer. Specify whether another ticket printing device is connected.



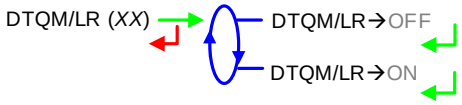
#### 5.2.2.3 Overfill prevention




#### 5.2.2.4 DTQM - **BOTTOM**

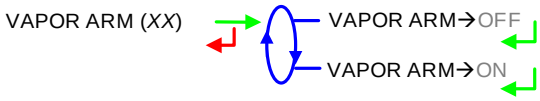
Operation with or without DTQM.

In case of failure of the DTQM electronic seal, the input can be disabled in SUPERVISOR mode (CONFIGURATION>INSTRUMENTATION>DTQM).



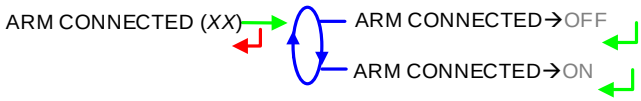

#### 5.2.2.5 Vapor arm - **BOTTOM**

Operation with or without vapor arm.



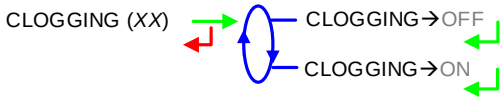

#### 5.2.2.6 Arm connected - **BOTTOM**

Operation with or without control of the loading arm connection to the truck.



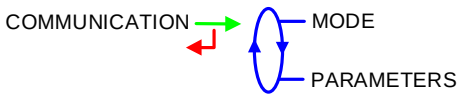

#### 5.2.2.7 Clogging

Operation with or without control of the clogging filter fouling.




### 5.2.3 Sub-menu COMMUNICATION

This menu allows to configure the communication with the control device (main computer).



#### 5.2.3.1 Mode

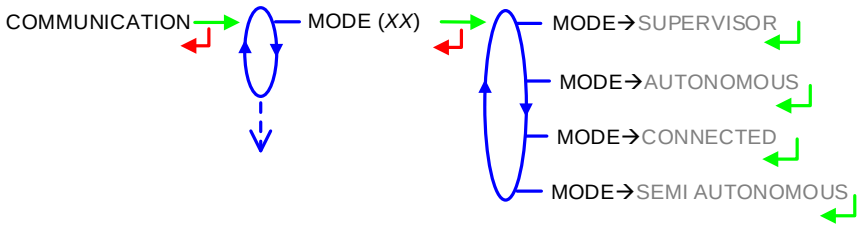
Communication mode with the control device (main computer):

SUPERVISOR: The choice will be done in SUPERVISOR mode (CONFIGURATION>COMMUNICATION>MODE).

AUTONOMOUS: The MICROCOMPT+ operates in autonomous mode (security management) with or without the useful authorisation.

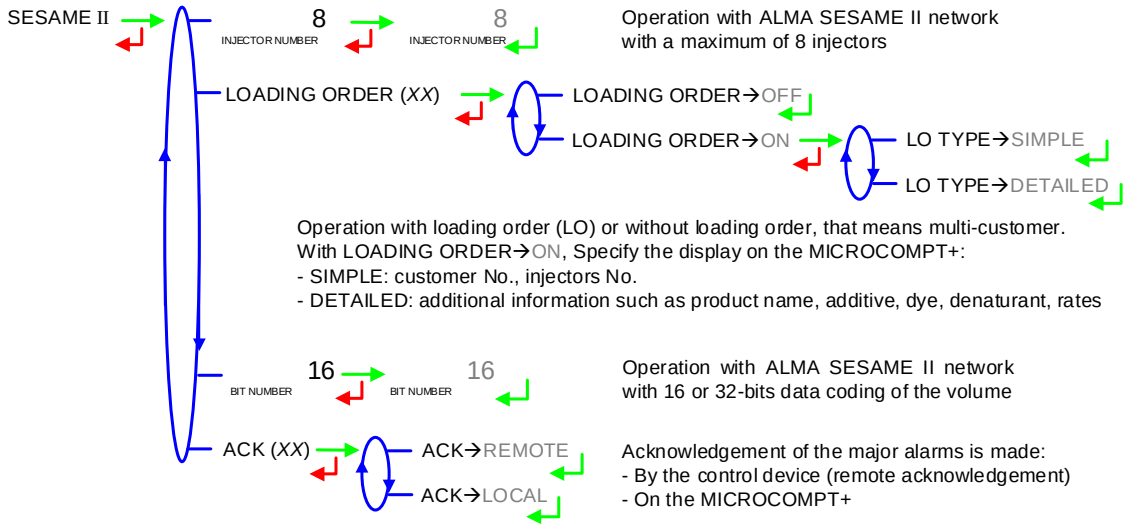
CONNECTED: The MICROCOMPT+ operates with the control device (main computer) with or without the useful authorisation

SEMI AUTONOMOUS: The MICROCOMPT+ operates in autonomous mode (security management) with or without the useful authorisation. The MICROCOMPT+ takes into account the authorisation given by the control device if connected.




#### 5.2.3.2 Parameters

*a) SESAME II*




*b) Communication port*

Two communication ports are available on the MICROCOMPT+.

COM1: RS485 port. If COM1 is already used to control an MICRO-BLEND additivation device, a ticket mechanical printer or a mass flowmeter, COM1 configuration is useless

COM2: RS485 port

Any protocols are MODBUS data protocol and use the slave number set in INDICATOR REFERENCE menu.

Several protocols can be configured on a same link.

Configuration of the protocols:

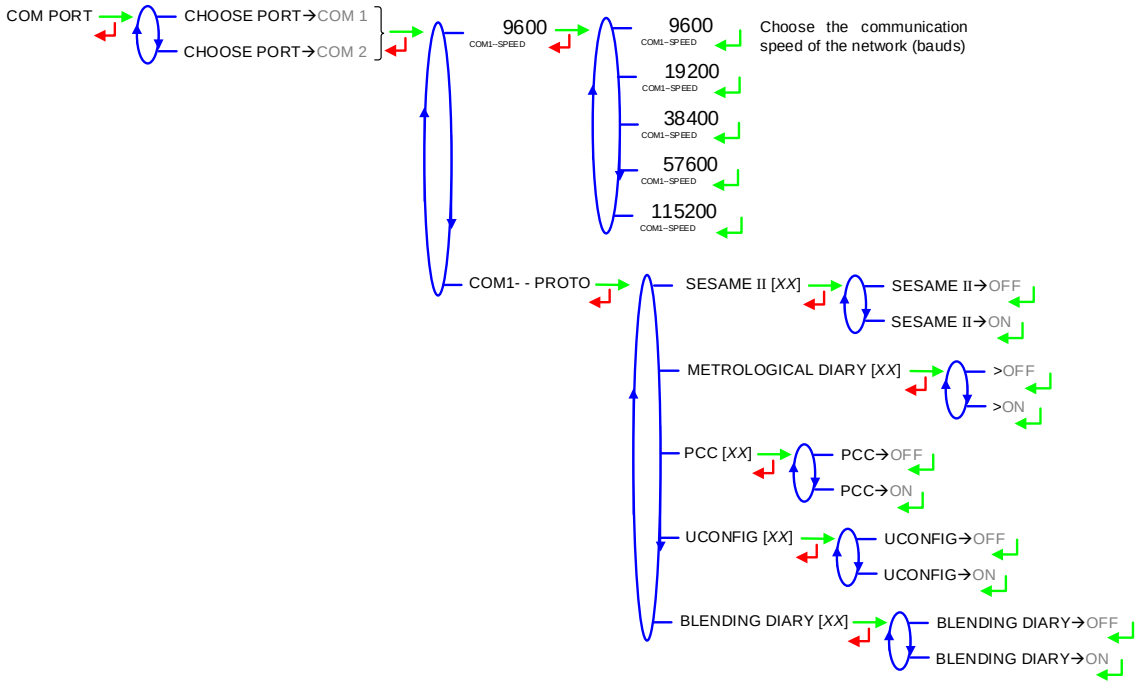
SESAME II: Communication over the ALMA SESAME II network

J METRO: Communication over a metrological diary to retrieve measurement data on the control device (main computer)

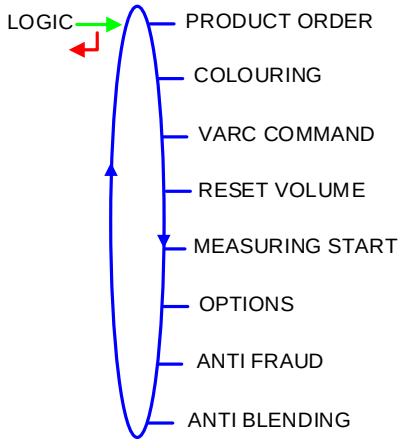
PCC: Communication with a PC/PCC on the metrological network

UCONFIG: Communication over the ALMA protocol µConfig. It is useful to transferring data between MICROCOMPT+ and the control device (main computer

J BLEND: Blending data of the last operation




### 5.2.4 Sub-menu LOGIC

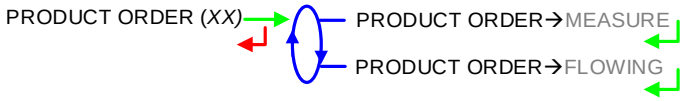


#### 5.2.4.1 Product order

Configuration of 'product request'.

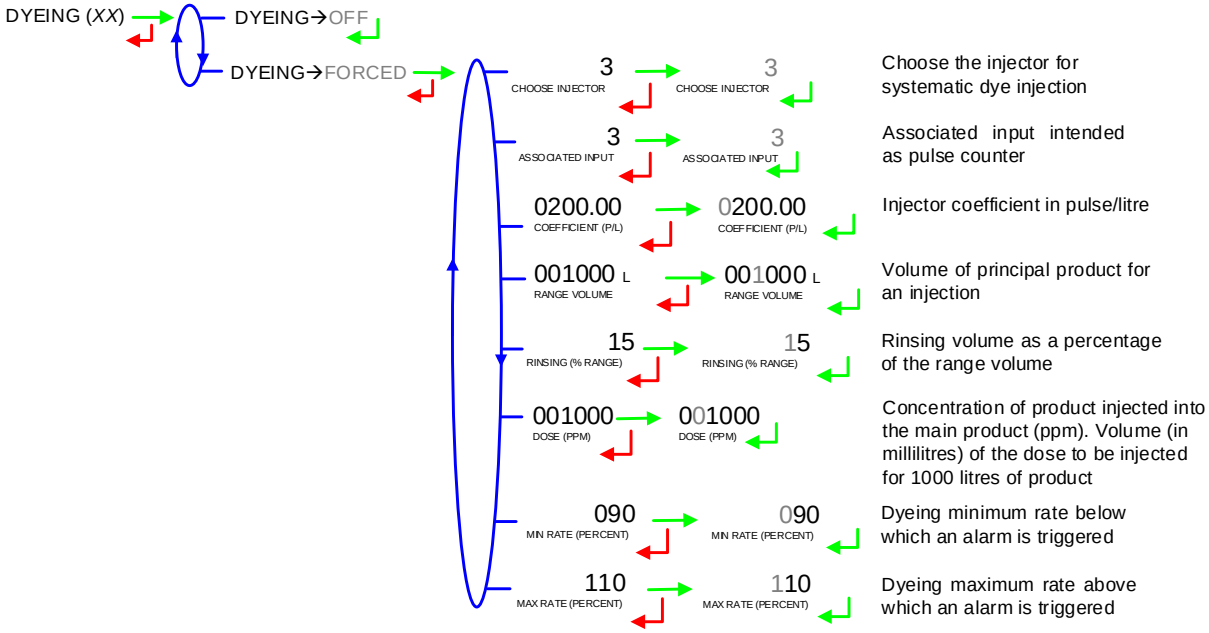
MEASURE: 'Product request' is activated from preset validation to measurement end.

FLOWING: 'Product request' is activated when the valve is operated. The pump starts within 5 seconds (timer).



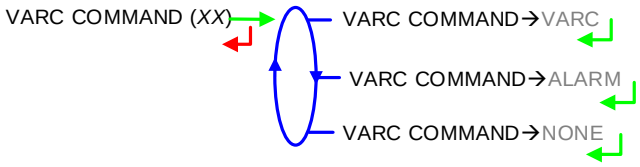

#### 5.2.4.2 Dyeing

This menu is used to activate and configure dyeing.




#### 5.2.4.3 VARC command

The VARC-output can be used to trigger the safety valve or an alarm.



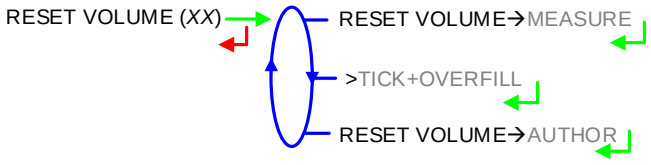

#### 5.2.4.4 Reset volume – **BOTTOM**

This menu is used to configure the triggering event that resets the MICROCOMPT+ partial counter.

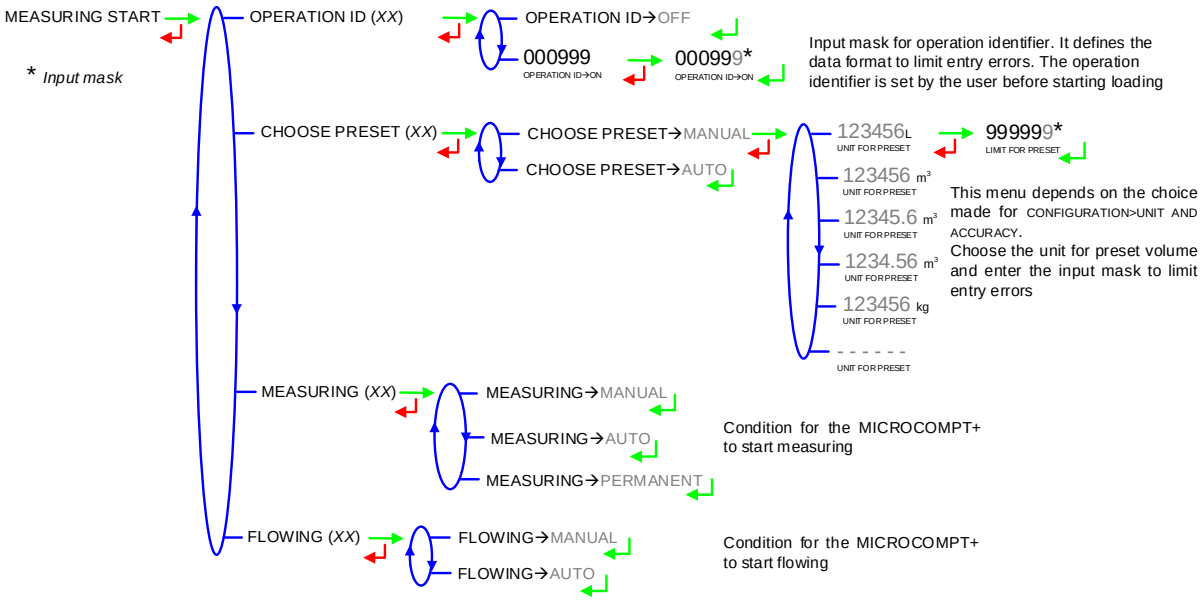
MEASURE: Reset over measurement ends

TICK+OVERFILL: Reset over disconnection of loading security devices (ground, overfill probe…)

AUTHOR: Reset over authorisation lost

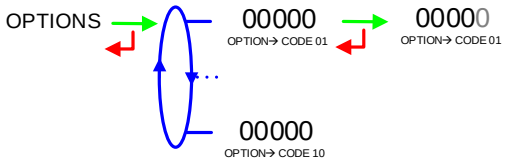



### 5.2.4.5 Measuring start



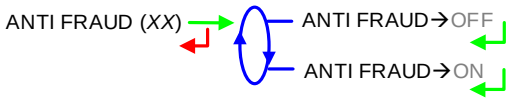

### 5.2.4.6 Options

Refer to the ANNEXE to have explanations about the codes for the MICROCOMPT+ options configuration



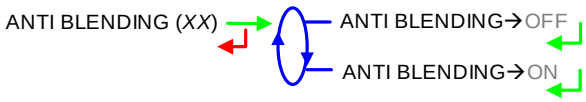

### 5.2.4.7 Anti-fraud

A presumption of a change of compartment is considered as a fraud. This menu allows you to activate additional injections of denaturant in the case of fraud.



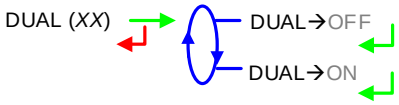

### 5.2.4.8 Anti-blending

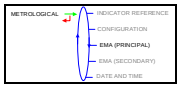
This menu allows you to activate or not control and appearance of a rinsing-default of the line at the beginning of a measurement



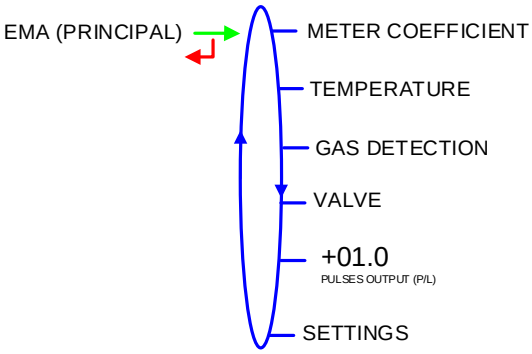
### 5.2.5 Sub-menu DUAL

This menu is used for DUAL version to activate the secondary measuring system called EMB which is available for blending or metrological denaturation.

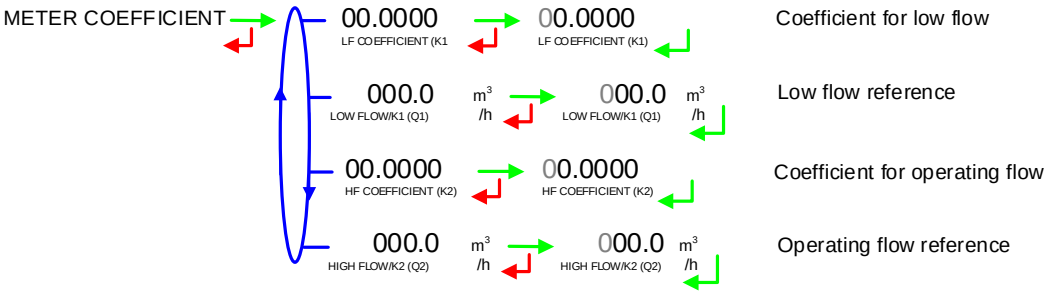



## 5.3 Menu MEASURING SYSTEM EMA (PRINCIPAL)



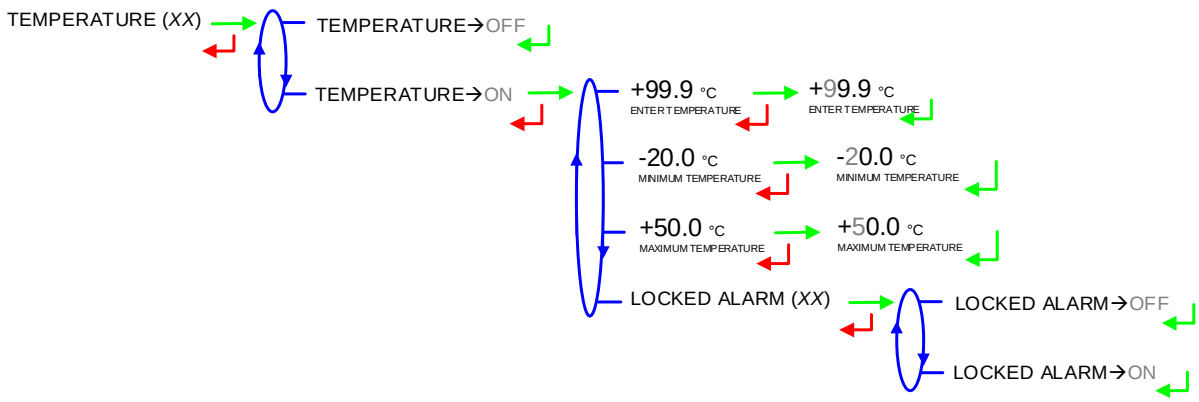

### 5.3.1 Sub-menu METER COEFFICIENT




### 5.3.2 Sub-menu TEMPERATURE

This menu is used to calibrate the temperature into the MICROCOMPT+ for EMA.
Depending on the probe, it's possible to:

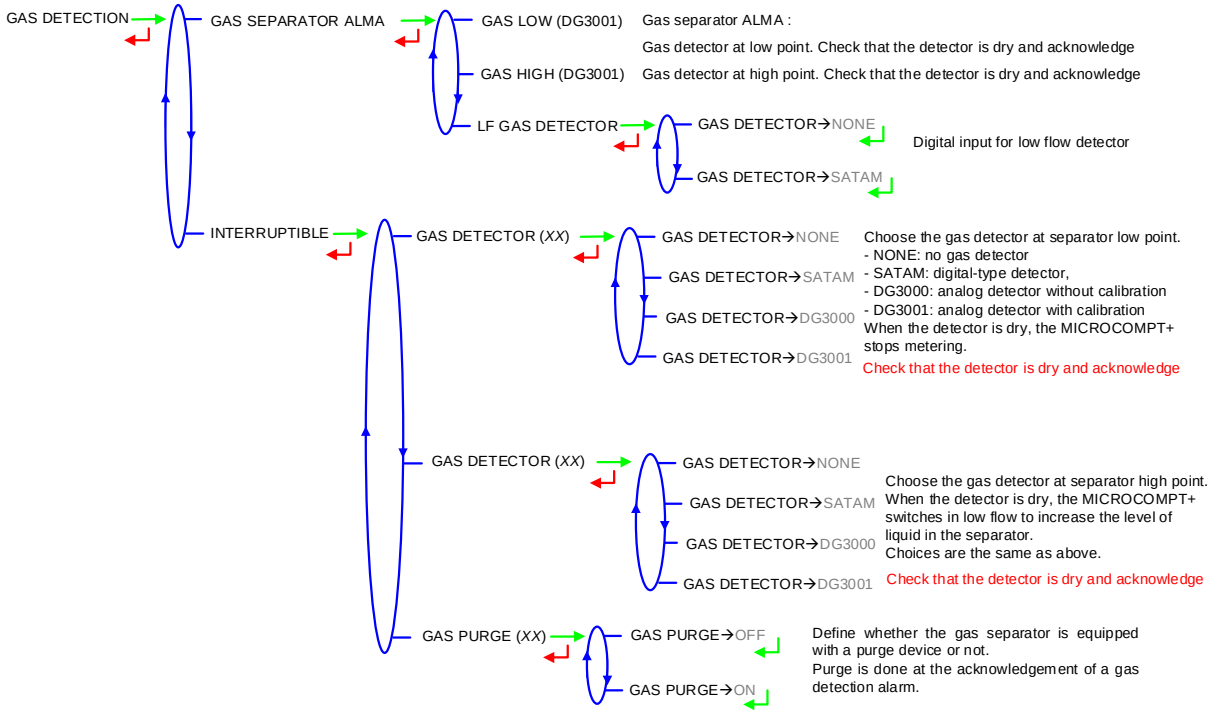
- Calibrate temperature,
- Set the minimum temperature below which an alarm is triggered
- Set the maximum temperature above which an alarm is triggered
- Decide whether the alarm is locked or not.




### 5.3.3 Sub-menu GAS DETECTION

This menu is used to define the gas separator type:

- GAS SEPARATOR ALMA: Check the status of the separator gas detectors. Specify a possible low flow detector.
- INTERRUPTIBLE: Define what kind of gas detectors the separator is equipped with and if a purge device is available.



### 5.3.4 Sub-menu VALVE

This menu is used to define the valve type:

HYDRAULIC: BROOKS-type hydraulic valve (incremental)

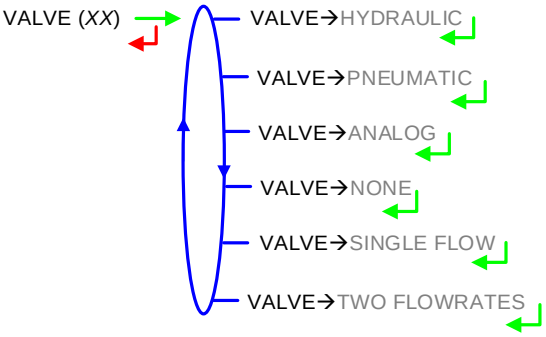
PNEUMATIC: CAMFLEX-type pneumatic valve (incremental)

ANALOG: Analog valve (0-20mA or 4-20mA)

NONE: No valve

SINGLE FLOW: Solenoid-type valve (digital without flow control)

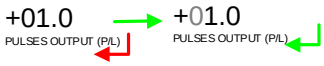
TWO FLOWRATES: Two-stage valve (digital with 2-flow control)




### 5.3.5 Sub-menu PULSES OUTPUT

Copy out the volume measured by EMA.

Enter the number of pulses that the MICROCOMPT+ must generate for each counted display-unit.




### 5.3.6 Sub-menu SETTINGS

#### 5.3.6.1 Volumes settings

This menu allows you to configure the volume set values.

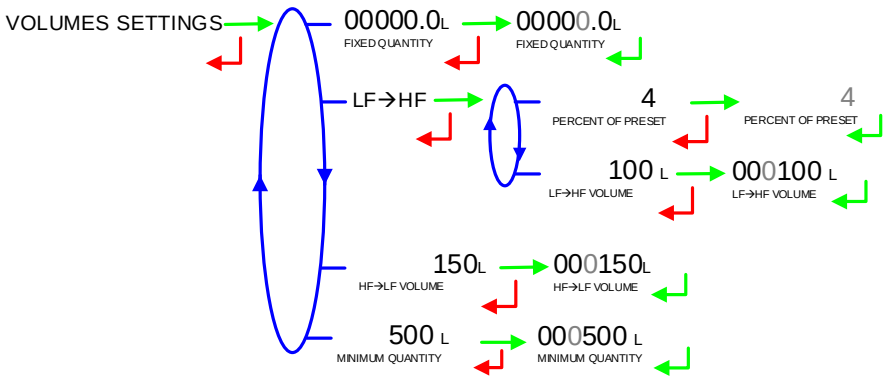
FIXED QUANTITY: Set the fixed quantity (volume that is not delivered to the customer)

LF→HF:

- PERCENT OF PRESET – **BOTTOM**: Set percent of preset (between 0 and 6%). The threshold of transition from low to high flowrate corresponds to the sum of the volume PERCENT OF PRESET added with the LF→HF VOLUME
- LF→HF VOLUME: Set the volume in liters, beyond which the MICROCOMPT+ switches from low to high flowrate.

HF→LF VOLUME: Set the volume in liters, beyond which the MICROCOMPT+ drives the low flowrate at the end of a preset measurement.

MINIMUM QUANTITY: Set the minimum quantity

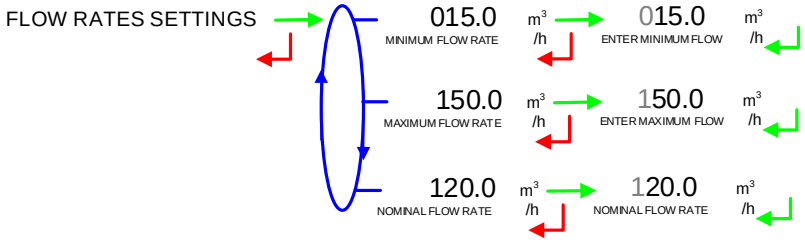



#### 5.3.6.2 Flow rates settings

MINIMUM FLOWRATE: Minimum flowrate below which an alarm is triggered

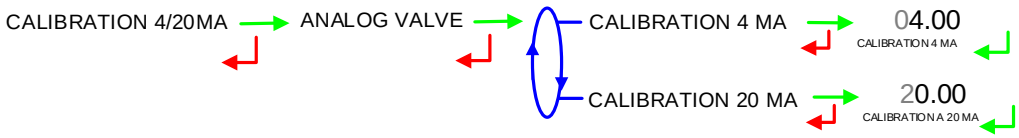
MAXIMUM FLOWRATE: Maximum flowrate above which an alarm is triggered

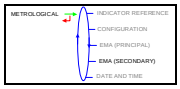
NOMINAL FLOWRATE: Set-flowrate relating to high flowrate regulation.




#### 5.3.6.3 Calibration analog valve

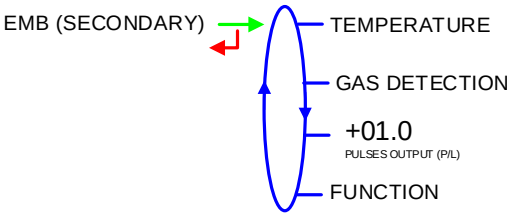
Configuration of the current range of the 4-20 mA output to control the analog valve.



## 5.4 Menu MEASURING SYSTEM EMB (SECONDARY)

This function is active when CONFIGURATION>DUAL is ON. The secondary measuring system EMB is available for blending or metrological denaturation.



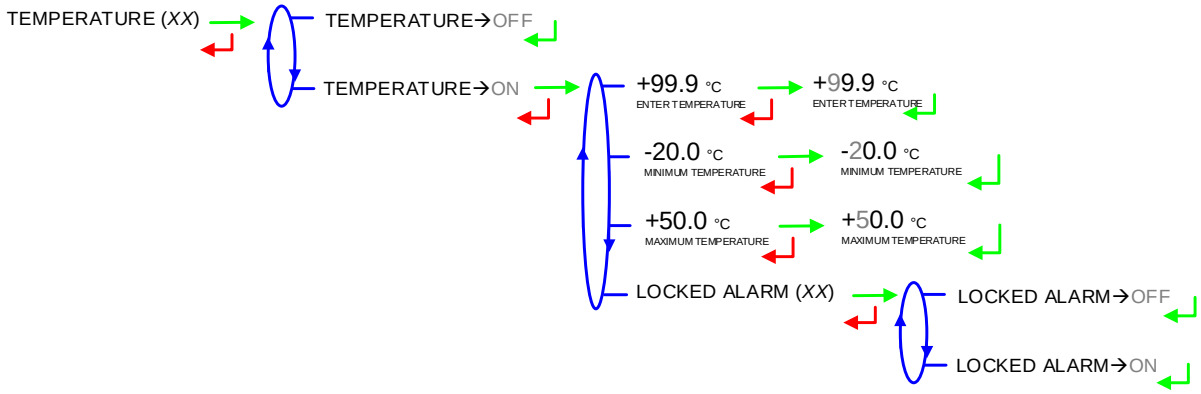

### 5.4.1 Sub-menu TEMPERATURE

This menu is used to calibrate the temperature into the MICROCOMPT+ for EMB.

Depending on the probe, it's possible to:

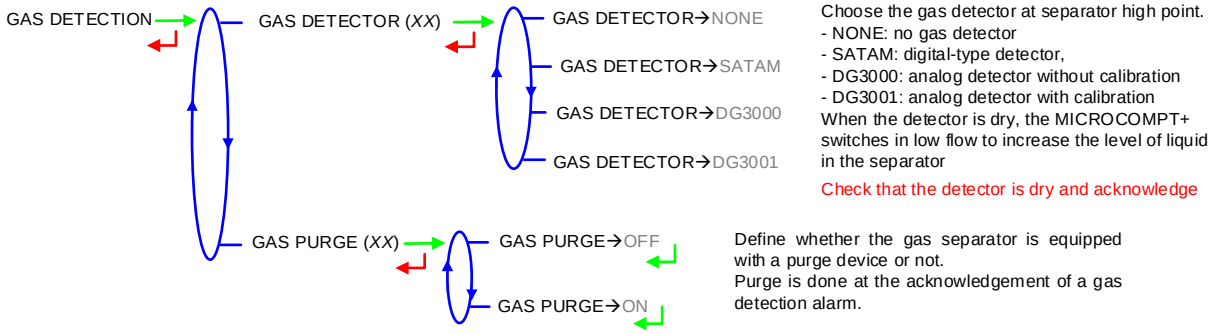
- Calibrate temperature,

- Set the minimum temperature below which an alarm is triggered
- Set the maximum temperature above which an alarm is triggered
- Decide whether the alarm is locked or not.




### 5.4.2 Sub-menu GAS DETECTION

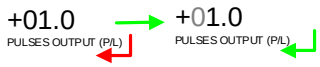
- GAS SEPARATOR: Define what kind of gas detector the separator is equipped with.
- GAS PURGE: Define whether a purge device is available or not.




### 5.4.3 Sub-menu PULSES OUTPUT

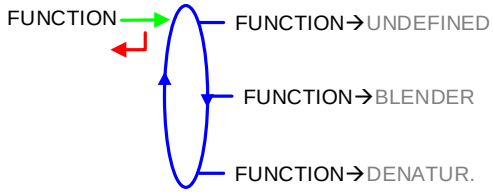
Copy out the volume measured by EMB.

Enter the number of pulses that the MICROCOMPT+ must generate for each counted display-unit.

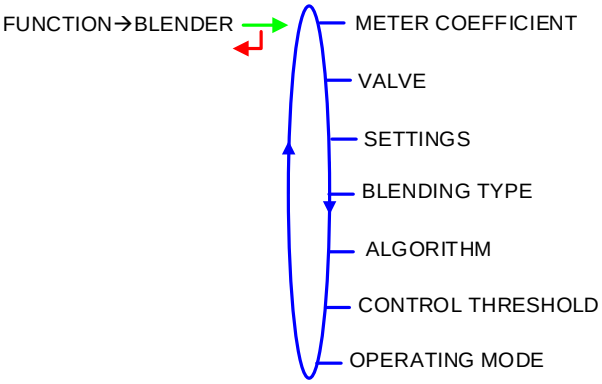



### 5.4.4 Sous-menu FUNCTION

Define whether EMB is used for blending or for metrological denaturation.



#### 5.4.4.1 Function→blender




*a) Meter coefficient*


*b) Valve*

This menu is used to define the valve type:

HYDRAULIC: BROOKS-type hydraulic valve (incremental)

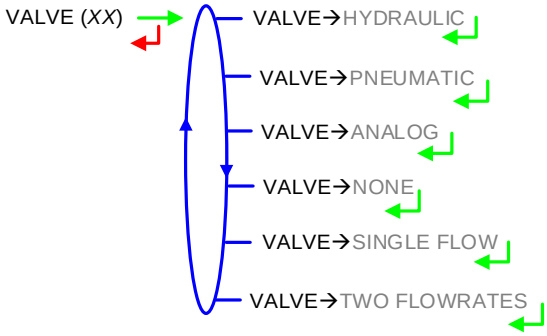
PNEUMATIC: CAMFLEX-type pneumatic valve (incremental)

ANALOG: Analog valve (0-20mA or 4-20mA)

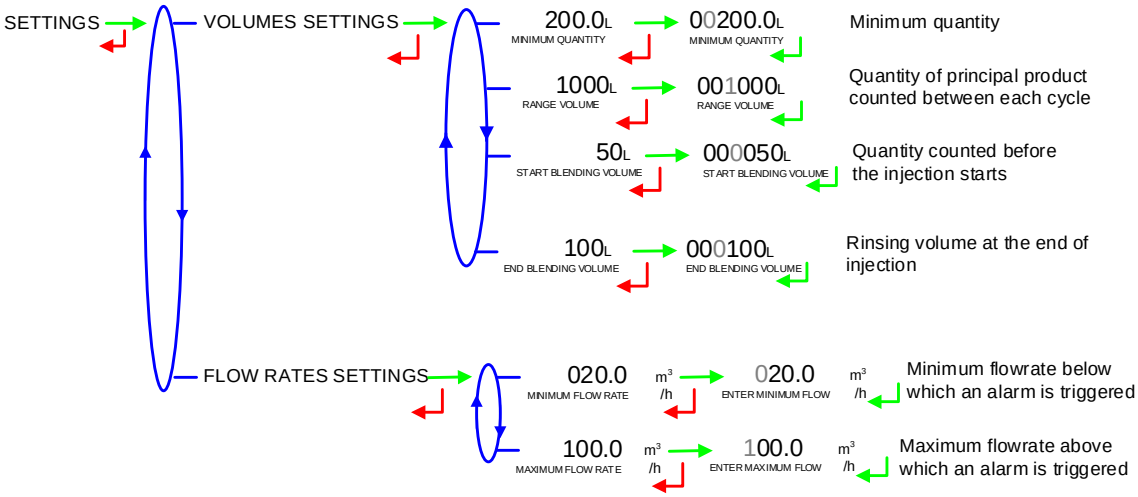
NONE: No valve

SINGLE FLOW: Solenoid-type valve (digital without flow control)

TWO FLOWRATES: Two-stage valve (digital with 2-flow control)



### c) *Settings*

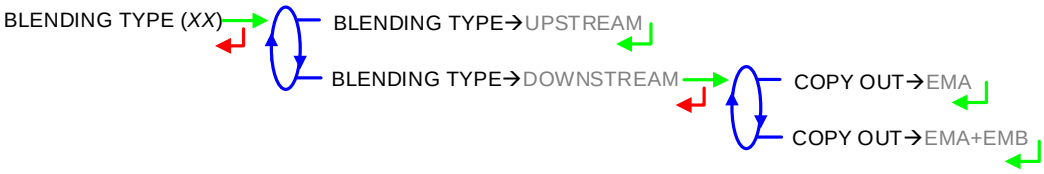



### d) *Blending type*

Define the hydraulic assembly for blending:

UPSTREAM: The blending of principal and secondary products is made upstream the transfer point. Products are counted together.

DOWNSTREAM: The blending of principal and secondary products is made downstream the EMA transfer point. Products are counted separately. A choice is given for calculation and copy out of the overall volume: EMA or EMA+EMB which is a non-metrological sum. Note: the values are not guaranteed (displayed alternately with dashes) when the blending rate is greater than 5%.



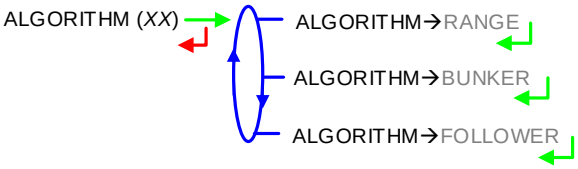

### e) *Algorithm*

Regulation for blending function can be made in different ways according to blending algorithm:

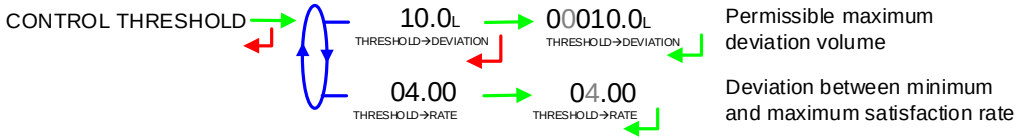
RANGE: Blending is made by range of principal product

BUNKER: The bunker mode is a variation of the range mode: the preset volume is used as the unique range volume

FOLLOWER: Blending for a regulation on the final goal.



*f) Control thresholds*




*g) Operating mode*

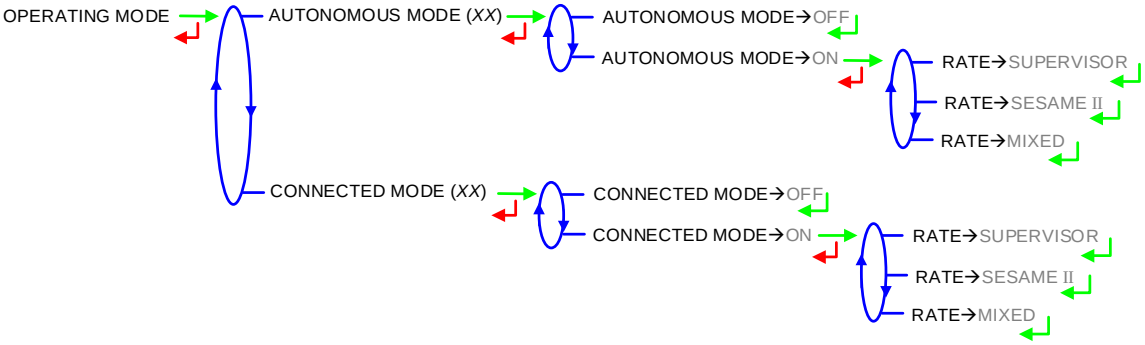
Define and activate the operating mode. No activation means no blending.

The blending is ordered in different ways:

SUPERVISOR: Systematic blending is made in accordance with the blending rate set in SUPERVISOR mode

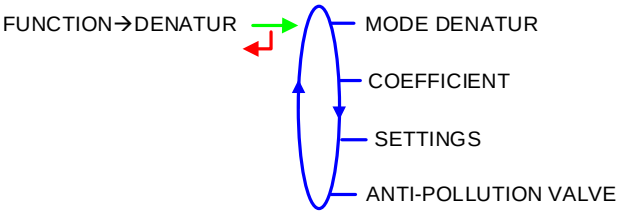
SESAME: Blending is made in accordance with the instruction of the SESAME II main computer

MIXED: Blending is made if required by the SESAME II main computer, in accordance with the blending rate set in SUPERVISOR mode.




5.4.4.2 Function→denaturant

In case of metrological denaturation, the volume unit automatically set is the litre, with a precision of one thousandth of a litre.

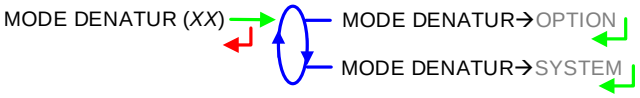


*a) Mode denaturant*

Metrological denaturation may be optional or systematic:

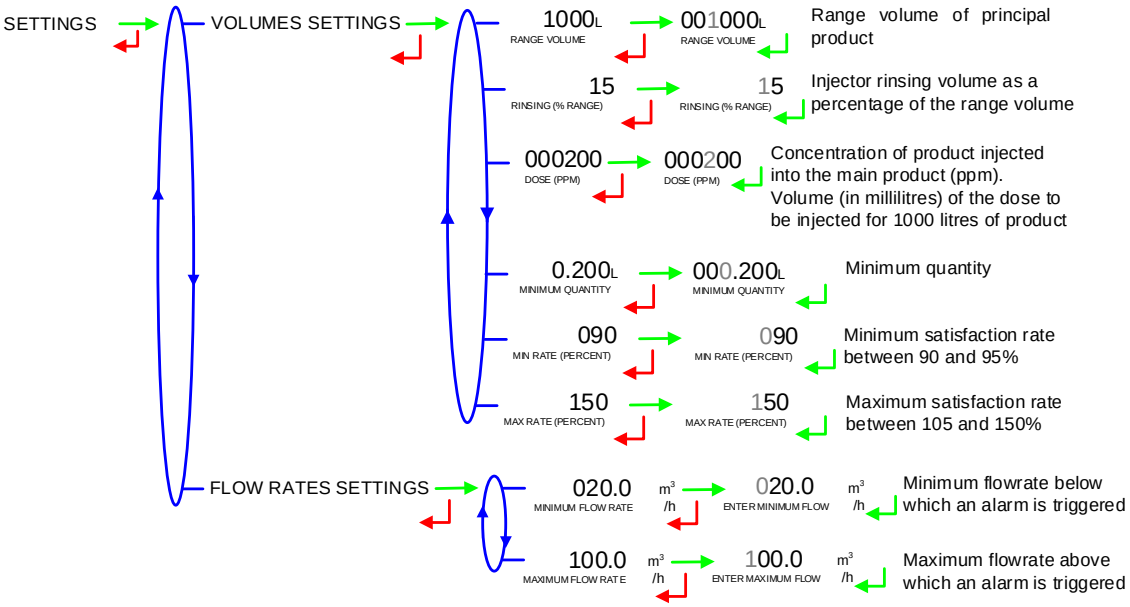
OPTION: requested by SESAME II network or through the quality control

SYSTEM: with any EMA measurements.




*b) Meter coefficient*


*c) Settings*




*d) Anti-pollution valve*

This menu is used to configure the control of the anti-pollution valve.

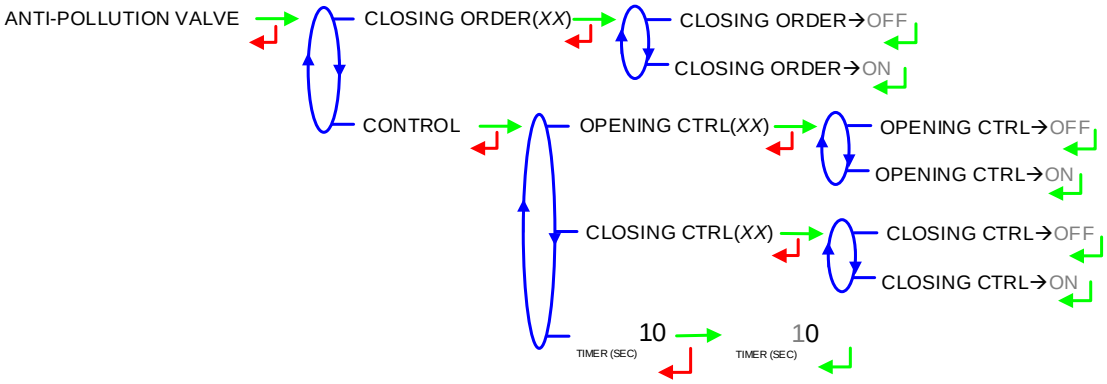
CLOSING ORDER: TOR output used to send a closing order to the valve

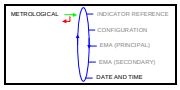
CONTROL: control of the anti-pollution valve

OPENING CTRL: feedback control of the open position sensor

CLOSING CTRL: feedback control of the close position sensor

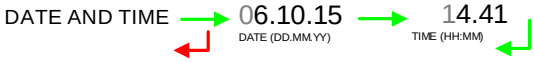
TIMER: 10 seconds-timer to decide on a possible position deviation (default value)




## 5.5 Menu DATE AND TIME

Enter the day, the month and the year and then enter the time.




e.g. 14.41 means 2.41 pm

## ANNEXE

Each code sets specific operation according to the following tables:

Cod 01

| Option | Meaning |
|---|---|
| **X**oooo | **TOR input** for gas detection on EMA:<br>**1**: EMA standard Gas TOR input<br>**2**: (ALIM_V3 only) Gas TOR input for switch in low flow<br>**3**: Idem 1 + 2<br>**Any other value**: Void |
| o**X**ooo | Authorization becomes emergency shutdown:<br>**1**: 'authorization' input is managed as an emergency shutdown<br>**2**: Idem 1, reverse input polarity<br>**Any other value**: Void |
| oo**X**oo | Use of sub-totalisers:<br>**1**: Control and display of 'products' sub-totalisers in accordance with denaturation<br>**2**: Display of totalisers per injector<br>**3**: Idem 1 + 2<br>**Any other value**: No display |
| ooo**XX** | Configuration for quality control in autonomous mode:<br>**99**: Activation of the quality control mode (list in supervisor mode): before beginning measurement, the MICROCOMPT+ displays a list to choose the quality in autonomous mode<br>**88**: Activation of the quality control mode (list in supervisor mode): quality is automatically determined in accordance with the authorization TOR inputs. WARNING: ALIM_V3 only<br>**Any other value**: Detail above |
| ooo**X**o | Code for additive injector in autonomous mode:<br>**0**: No additive injection in autonomous mode<br>**8, 9**: See above<br>**n**: The injector #n is used for additivation in autonomous mode |
| oooo**X** | Code for dye injector in autonomous mode:<br>As above for dye injection |

Cod 02 – **TOP.**

The Cod02 allows activation of the dead-man switch control

| Option | Meaning |
|---|---|
| **XXX**oo | The dead-man switch is activated if Cod02 = XXXoo is different from '000'<br><br>If Cod03 = oXooo with 'dead-man' function in volume:<br>• **Volume x 100** for dead-man switch control.<br><br>If Cod03 = oXooo with 'dead-man' function in duration:<br>• **Time in seconds** for dead-man switch control.<br><br>*Note: The dead-man switch control may be disabled in some cases – See below* |
| ooo**XX** | If Cod03 = oXooo with 'dead-man' function in volume:<br>• **Volume x 10 in low flow** for dead-man switch.<br><br>If Cod03 = oXooo with 'dead-man' function in duration:<br>• **Time in seconds x 10 in low flow** for dead-man switch. |

- ⇨ The 'dead-man switch' function is activated if Cod02 = **XXX**oo is non-zero
- ⇨ The option 'configuration in duration' changes the functionality (see Cod03 = o**X**ooo below)
- ⇨ The option 'dead-man switch' bypass doesn't disable the functionality (see Cod03 = o**X**ooo below)
- ⇨ It is therefore possible to instrument a dead-man switch that is not active for automation (disabled with Cod03) but which is used for the 'dead-man control' functionality
- ⇨ If 'dead-man switch' is forced by the network SESAME II, the functionality is disable (see Cod03 = oooo**X** below)
- ⇨ The 'self-service' mode can be considered for this functionality (see Cod03 = **X**oooo below)

If the functionality is enable:

1. The MICROCOMPT+ checks the transition of status of the 'dead-man switch' before:
   - Volume is XXX00 litres (Cod02 = **XXX**oo)
   - Or duration is XXX seconds (Cod02 = **XXX**oo and Cod03 = o**X**ooo is at least 4)

   Otherwise, the MICROCOMPT+ forces a low flow, uses factory option ALERTE_HOMME_MORT_ON if described, and proceeds to stage 2

2. Following stage 1, the MICROCOMPT+ checks the transition of status of the 'dead-man switch' before:
   - Volume is XX00 litres (Cod02 = ooo**XX**)
   - Or duration is XX seconds (Cod02 = ooo**XX** and Cod03 = o**X**ooo is at least 4)

   Otherwise the default 46 = DEAD MAN SWITCH appears.

Cod 03 – **TOP.**

<table>
<tr><th>Option</th><th>Meaning</th></tr>
<tr><td>Xoooo</td><td>Top single side:<br>1: The MICROCOMPT+ has only a left side<br>2: The MICROCOMPT+ has only a right side<br>4: The dead-man switch functionality (see Cod02) is enable only with 'free-service' mode<br>5: Idem 4 + 1<br>6: Idem 4 + 2<br>Any other value: Top bi-side. Dead-man switch control according to Cod02 without any change</td></tr>
<tr><td>oXooo</td><td>Top loading MICROCOMPT+ only:
<table>
<tr><th></th><th>Bypass SECURIM</th><th>Bypass Dead-man switch</th><th>Function 'dead-man'</th></tr>
<tr><td>0</td><td>-</td><td>-</td><td>Volume</td></tr>
<tr><td>1</td><td>ON</td><td>-</td><td>Volume</td></tr>
<tr><td>2</td><td>-</td><td>ON</td><td>Volume</td></tr>
<tr><td>3</td><td>ON</td><td>ON</td><td>Volume</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>Duration</td></tr>
<tr><td>5</td><td>ON</td><td>-</td><td>Duration</td></tr>
<tr><td>6</td><td>-</td><td>ON</td><td>Duration</td></tr>
<tr><td>7</td><td>ON</td><td>ON</td><td>Duration</td></tr>
</table>
Any other value: Idem modulo 8</td></tr>
<tr><td>ooXoo</td><td>Top loading MICROCOMPT+ only:<br>1: Ground (left or right) forcing via network SESAME II. Physical ground is uploaded in the network SESAME II<br>2: Idem 1 with the requirement to remove forcing between each measurement<br>5: Idem 1 but the 'logical ground' is uploaded in the network SESAME II (final combination between physical ground and forcing)<br>Any other value: No ground forcing<br>Note: Forcing is not taken into account with a single-side configuration (see above)</td></tr>
<tr><td>oooXo</td><td>Top loading MICROCOMPT+ only:<br>1: Forcing of the arm direction (left, right or locking) via network SESAME II<br>2: Idem 1 with the requirement to remove forcing between each measurement<br>Any other value: No forcing of the arm direction<br>Note: Forcing is not taken into account with a single-side configuration (see above)</td></tr>
<tr><td>ooooX</td><td>Top loading MICROCOMPT+ only:<br>1: Forcing of the arm down-position or dead-man switch via network SESAME II<br>2: Idem 1 with the requirement to remove forcing between each measurement<br>3: Idem 1 with a prohibition on forcing arm down-position and dead-man switch simultaneously<br>4: Idem 1 + 2 + 3<br>Any other value: No forcing<br>Note: Forcing of dead-man switch via network SESAME II is void if dead-man switch is forced to TRUE elsewhere (see above)<br>Note 2: Forcing of dead-man switch disables control of dead-man switch (see above)</td></tr>
</table>

Cod 04

| Option | Meaning |
|---|---|
| **X**oooo | Bitmask on the 3 authorization inputs for quality selection, in autonomous mode:<br>**1 à 7:** Bitmask to apply on inputs #1, #2, #3 with respectively bits 0, 1 and 2 of the mask<br>*Example: Mask = 1 means that input #1 is used, Mask = 3 means that inputs #1 and #2 are used*<br>**Any other value**: Same as Mask = 7 (the 3 inputs are used) |
| o**X**ooo | **1:** Activates the display of the additive name and displays « BLEND » on the prompter if the blender is requested during a measurement. Displays the dye name if there's enough place on the prompter.<br>**2:** Activate the display of rate details on the prompter during a measurement<br>**Any other value**: Void |
| oo**X**oo | **1:** The presence of the PCC is not required. If the PCC is present but not working, starting a measurement is impossible<br>**Any other value**: PCC is metrological. Its presence is necessary ; it must communicates to the MICROCOMPT+ it is operational to enable a measurement |
| ooo**X**o | **≠0:** Activates the EMB information update on the network SESAME II if EMB is set for metrological denaturation<br>**0:** No EMB information on the network SESAME II if metrological configuration |
| oooo**X** | **1:** Prohibits MODBUS writings on COM1<br>**2:** Prohibits MODBUS writings on COM2<br>**3:** Prohibits MODBUS writings on COM1 and COM2<br>**Any other value**: Void |

Cod 05

| Option | Meaning |
|---|---|
| **X**oooo | If X is non-zero, the MICROCOMPT+ is allowed to top up the level |
| o**X**ooo | If X is non-zero, the MICROCOMPT+ is allowed to blend without waiting for EMA to switch in high flow |
| oo**X**oo | The MICROCOMPT+ makes a blending according to the inverse algorithm (downstream assembly with a required rate greater than the ratio of the flow rates EMA/EMB).<br>If X is non-zero, the MICROCOMPT+ changes its functionalities as follows:<br>• The rinsing may not be equal to the rinsing volume, if this volume is greater than the volume EMA to be loaded<br>• No pollution control of the line due to the lack of rinsing after activation of a 'high rate' blending |
| ooo**XX** | Gives the number of seconds of the 'dead man' function with the pushbutton used for top up (checks the pushbutton is released cyclically)<br>If XX=0, the 'dead man' control for top up function is disabled<br>**For BOTTOM applications**, XX=0 allows to top up the level by pressing BP1 |

Cod 06

| Option | Meaning |
|---|---|
| oooo**X** | **1:** The request for the injector 1 pump remains active during a stop |
| ooo**X**o | **1: Specify a 'wide' preset end coefficient:**<br>• The time before the control of the valve closure is extended (100 seconds instead of 10)<br>• The duration of the control of the valve closure is reduced (5 seconds instead of 15)<br>• The maximum value of the preset end coefficient is multiplied by 16<br>• Disable the default 'VALVE' |
| oo**X**oo | **1:** Reverse the polarity of the LSL inputs |
| o**X**ooo | **1:** Disable display |

Cod 07

| Option | Meaning | Note |
|---|---|---|
| oo**XYZ** | **000:** No 'addit tou' injector (injection of all doses from the first range)<br>**Otherwise:** XYZ allows to activate the i-eme injector (i = 1 to 8) by adding the value $2^{(i-1)}$ to this figure<br>Example:<br>XYZ = 1 only the injector #1 is 'addit tou'<br>XYZ = 1 + 2 = 3 for the injectors #1 et #2,<br>XYZ = 1 + 2 + 4 = 5 for the injectors #1, #2 et #3, etc. | *Temporary code pending establishment of a configuration menu* |
| o**X**ooo | **1:** Remove the VARC control in case of any injector leakage | |

Cod 08 to Cod 10

Not used

## RELATED DOCUMENTS

| | |
|---|---|
| GU 7036_1 | Operating guide MICROCOMPT+ FOR BOTTOM LOADING |
| GU 7036_2 | Operating guide MICROCOMPT+ FOR TOP LOADING |
| GU 7036_3 | Operating guide MICROCOMPT+ FOR BOTTOM LOADING BLENDER/DENATURANT |
| GU 7036_4 | Operating guide MICROCOMPT+ FOR TOP LOADING BLENDER/DENATURANT |
| FM 8000 | Replacement of the backup batteries on the 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 |
| FM 8011 | Configuration of jumpers and adjustment of metering thresholds on the AFSEC+ electronic board |
| FM 8500 | Adjustment of an BOTTOM MICROCOMPT+ |
| FM 8510 | Adjustment of a temperature chain on MICROCOMPT+ |