OPERATING MANUAL

MU 7082 EN B

RPM METERING UNIT

Recovered Product Monitoring System

Document available for software 4039v1.2.3

Issue	Date	Nature of modifications	Written by	Approved by
B	2017/03/28	Removal of not applicable menus	DSM	CHR
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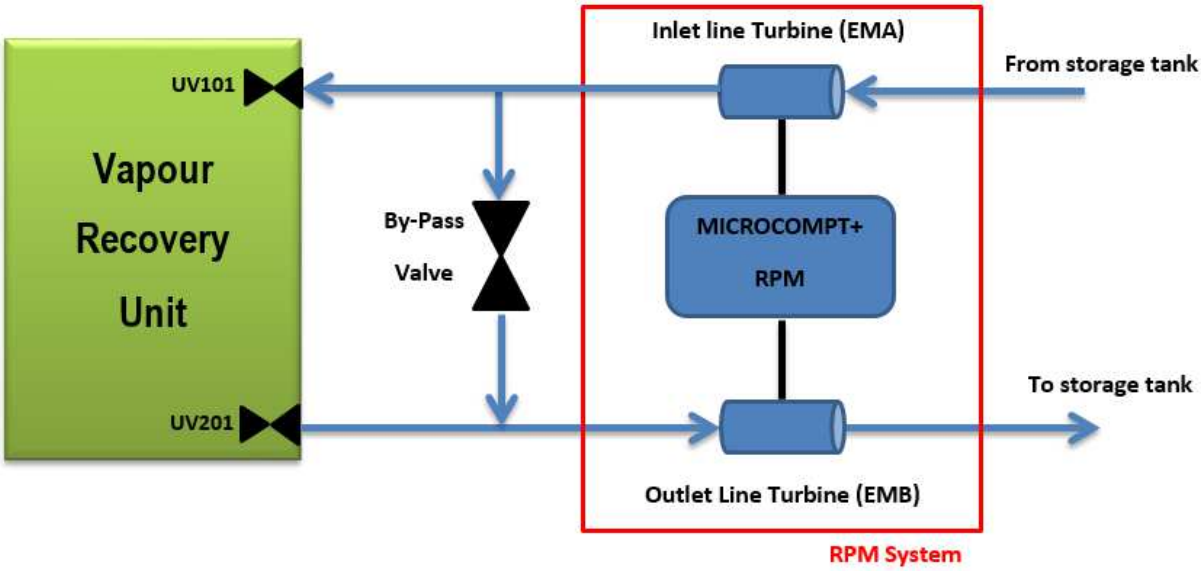
1 GENERAL PRESENTATION AND DESCRIPTION



RPM Drawing

The RPM (Recovered Product Monitoring) is used for counting recovered product. It is complementary to VRU process.

It is based on the calculator indicator MICROCOMPT+ 230VDC electronics and features. It is used to determine the amount of product recovered by the VRU by comparing the quantity of absorbent going in and out the absorption vessel.

The control of the MICROCOMPT+is made by a PLC via MODBUS communication and RS485 serial link.

The RPM system controls two measuring systems that can operate simultaneously: EMA for the inlet line and EMB for the inlet line.

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

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

It takes into account the temperature of liquid measured by a Pt100 temperature probe, and the density given by the PLC.

The MICROCOMPT+ controls a non-resettable totaliser for each measuring system (EMA and EMB). It registers accumulated volumes in metering conditions and accumulated volumes in base conditions on an index

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

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.

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

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

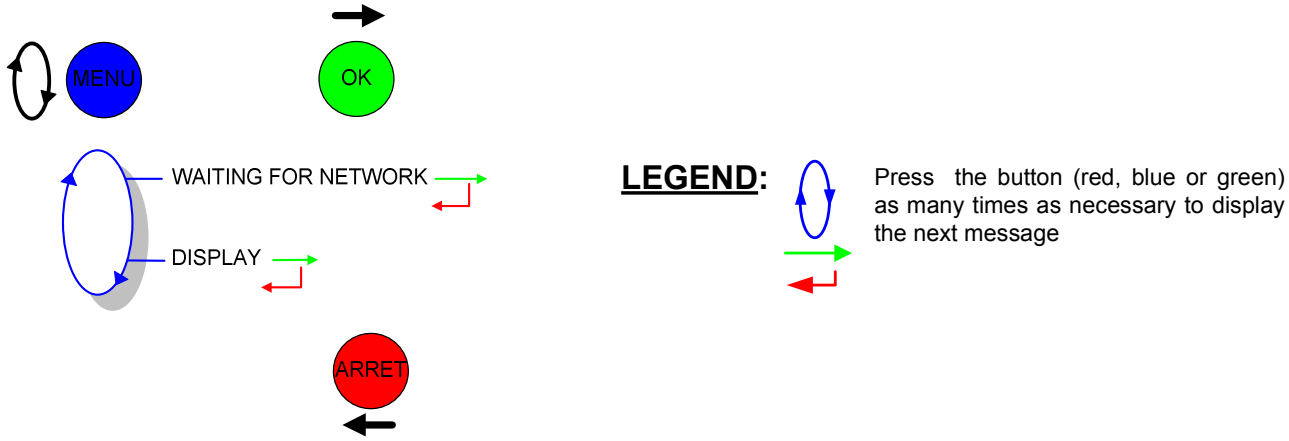
To access the METROLOGICAL mode, the MICROCOMPT+ has to be unsealed. Only an authorized person can remove the seal. It's done at the putting into use of the measuring system and sometimes during metrological controls.

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

The MICROCOMPT+ waits demand from PLC to start the “Batch Mode” or the “Calibration Mode”.



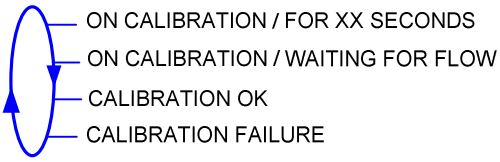
3.1 Calibration mode

The “Calibration Mode” is used before each “batch mode” in order to make a calibration between the two turbines. The calibration maximum time is 30 seconds in order to do not impact the VRU process. Calibration begins as soon as the MICROCOMPT+ detects a stable flow.

The procedure allow to determine the coefficient that can be displayed and set in the menu SUPERVISOR>CONFIGURATION>VRU CALIBRATION. The coefficient default value is 1 meaning that EMA and EMB count exactly the same.

MICROCOMPT+ has to be in exploitation mode, it displays MICROCOMPT READY.

Calibration procedure is triggered by the PLC. The MICROCOMPT+ displays information about the ongoing calibration: Waiting for flow, coefficient current value, duration of the procedure etc.



In this procedure, we're looking for a 'tunnel' in which the following requirements are met:

- Throughout the 'tunnel', flow variation between EMA (INLET) and EMB (OUTLET) shall not exceed the given limitation: parameter CALIB. MAX PERCENT set in mode SUPERVISOR>CONFIGURATION
- The 'tunnel' duration is at least equal to the parameter SECONDS IN CALIB. set in mode SUPERVISOR>CONFIGURATION

If a 'tunnel' is detected, the calibration coefficient is fixed according to flowrate ratio observed between EMA (INLET) and EMB (OUTLET)

A maximum time of 30 seconds is given by the VRU for calibration. If any 'tunnel' is detected within 30 seconds, calibration has failed.

3.2 Batch mode

The “Batch Mode” is used when the VRU “Circulation Mode” is active and a calibration has already been done.

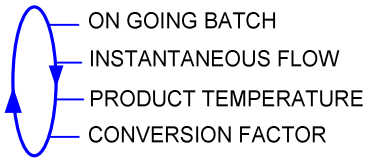
At the end of the batch, the MICROCOMPT+ compares the inlet volume (EMA) and the outlet volume (EMB). Difference between the two quantities gives the recovered product of hydrocarbons by the VRU. For example:

Volume inlet turbine : 20000 L

Volume outlet turbine : 20020 L

Recovered volume : 20 L

In exploitation mode the MICROCOMPT+ displays the volume converted to base conditions (Vb) with the message ONGOING BATCH

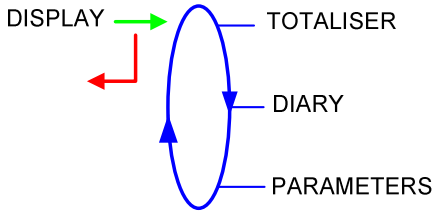


Use the blue MENU BUTTON to display the following information:

- Instantaneous flowrate in high or low flowrate (m^3/h or L/min; depending on the display unit set)
- The temperature (°C) if it is taken into account
- The conversion factor

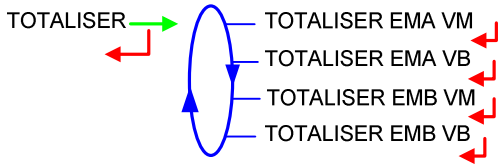
Back to normal display is automatic: DO NOT PRESS RED CLEAR BUTTON TO KEEP FROM INTERRUPTING DELIVERY.

3.3 Menu DISPLAY



3.3.1 Sub-menu TOTALISER

Display of totaliser of volume in metering conditions (Vm), and totaliser of volume converted to base conditions (Vb) for both measuring systems EMA (INLET) and EMB (OUTLET).

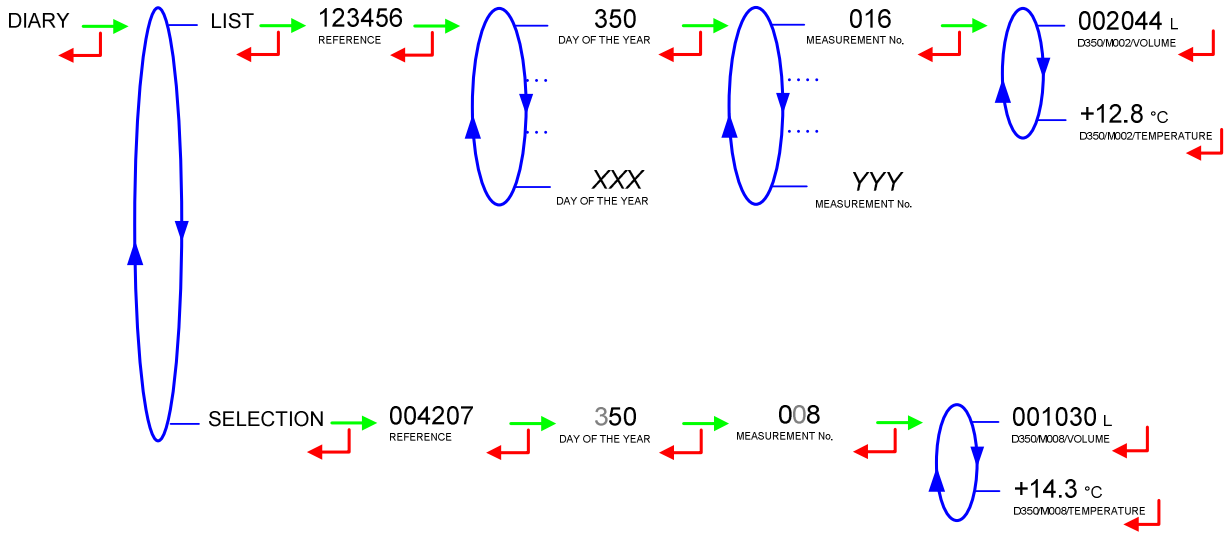


3.3.2 Sub-menu DIARY

It allows the proofreading of all the measurement results stored by the MICROCOMPT+. That can be done in two ways:

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

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

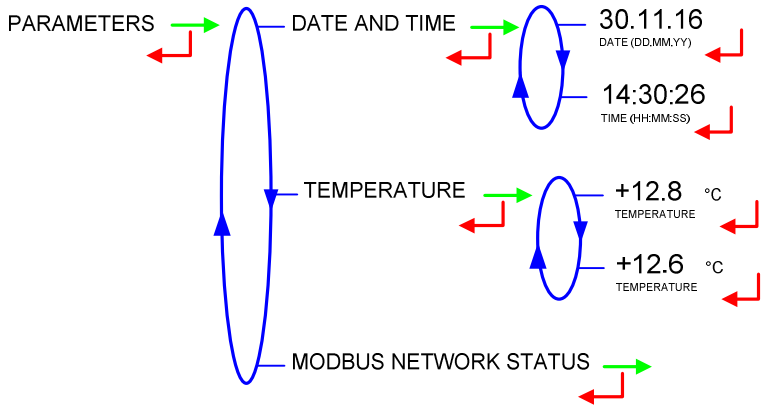


3.3.3 Sub-menu PARAMETERS

DATE AND TIME: Visualisation of date and time

TEMPERATURE: Visualisation of the inlet product temperature (pictogram EmA is displayed) and the outlet product temperature (pictogram EmB is displayed)

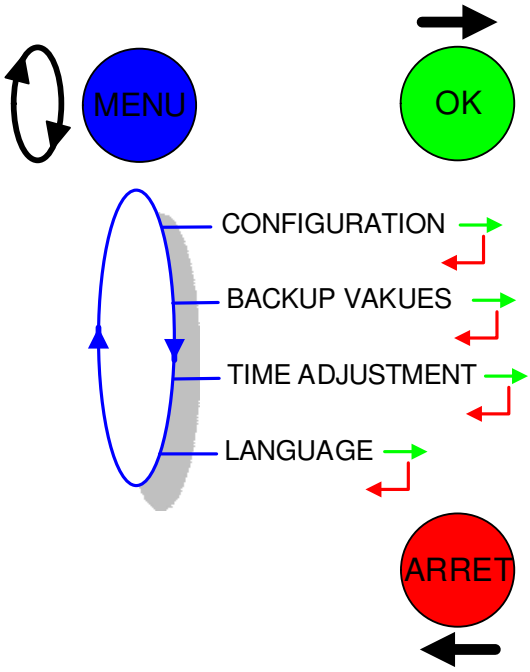
MODBUS NETWORK STATUS: Status of the MODBUS network.

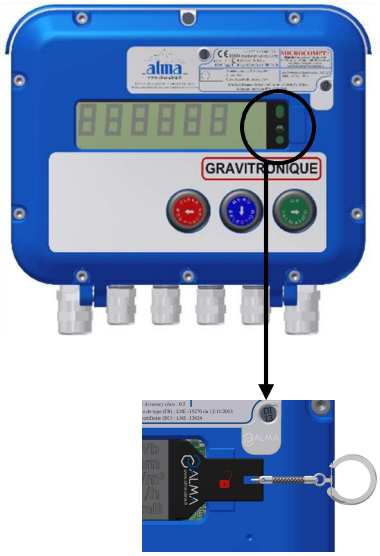


3.4 List of alarms

		DISPLAY	MEANING	ACTION
USER		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 inlet measuring device	Check if the pulse transmitter is powered (red indicators)
		LEAKAGE FAULT	Metering detection without measurement	Check the tightness of the loading valve
		EMB METERING PROBLEM	Metering problem with the outlet measuring device	Check if the pulse transmitter is powered (red indicators)
		EMB NO FLOWRATE	Zero flow (outlet measuring system)	Check the hydraulic system (safety valve)
		EMB LEAKAGE FAULT	Metering detection without injection (outlet line)	Check the hydraulic system
		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)
		DIARY FAULT	Reset of the events diary	Acknowledge the alarm, check the date in supervisor mode
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
	BLOCKING	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

4 SUPERVISOR MODE





SUPERVISOR
magnetic key

4.1 Menu CONFIGURATION

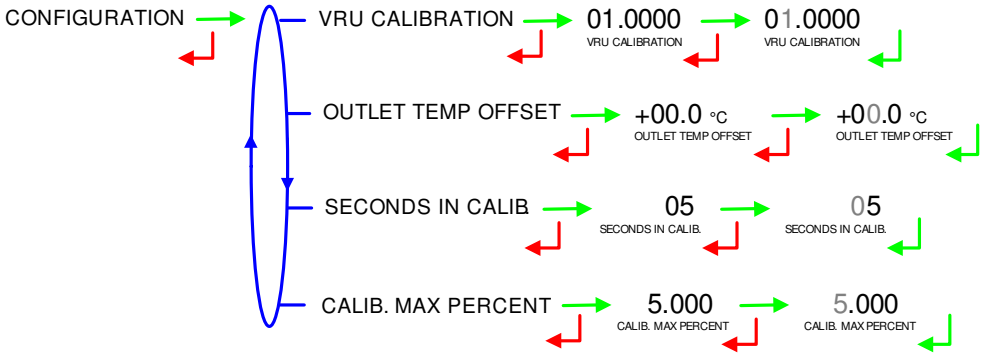
Pictograms EmA and EmB are displayed. The entered values are valid for both measuring systems.

VRU CALIBRATION: Coefficient based on the calibration procedure. Default value: 1.0

OUTLET TEMP OFFSET: Correction applied to the temperature value for EMB. Deviation observed between EMA (INLET) and EMB (OUTLET) after volume conversion, may be corrected by modifying this parameter. Default value: 0°C

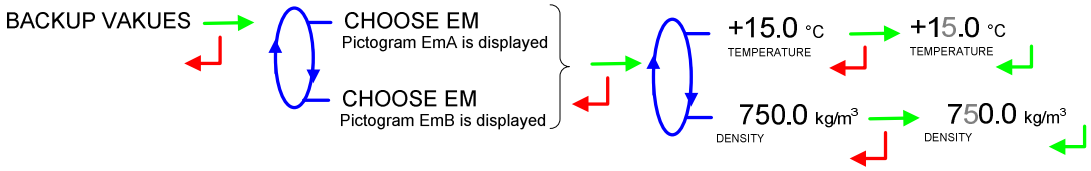
SECONDS IN CALIB.: In calibration, length of time during which both flowrates EMA (INLET) and EMB (OUTLET) have to be stable. Default value: 10 seconds

CALIB. MAX PERCENT: Maximum admissible variation between EMA flowrate (INLET) and EMB flowrate (OUTLET) during calibration procedure. Default value: 1%



4.2 Menu BACKUP VALUES

This menu allows setting the backup values for temperature and density after having chosen the measuring system. The relative pictogram is displayed then.

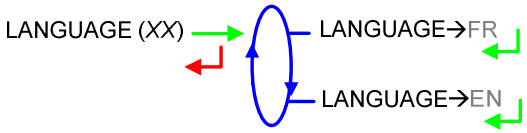


4.3 Menu TIME ADJUSTMENT

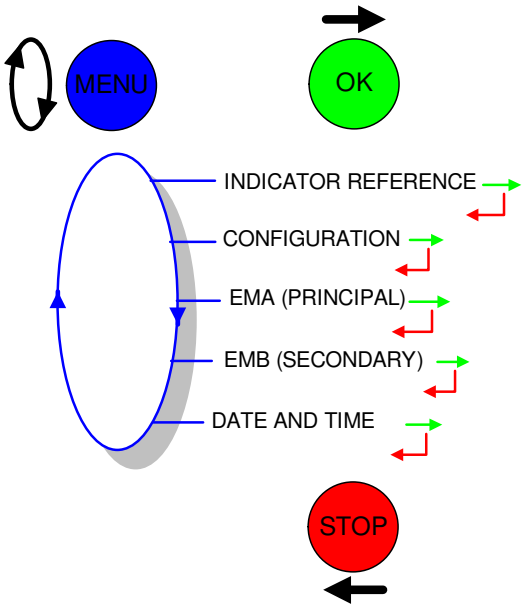
Date and time are set in METROLOGICAL mode. The hour may be adjusted (±2h) one time a day through this menu (use French format: 14.41 means 2.41 pm).

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+.



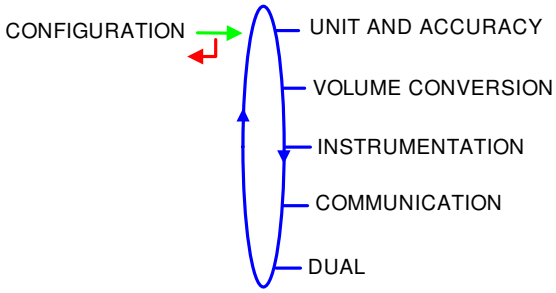
5 METROLOGICAL MODE



5.1 Menu INDICATOR REFERENCE

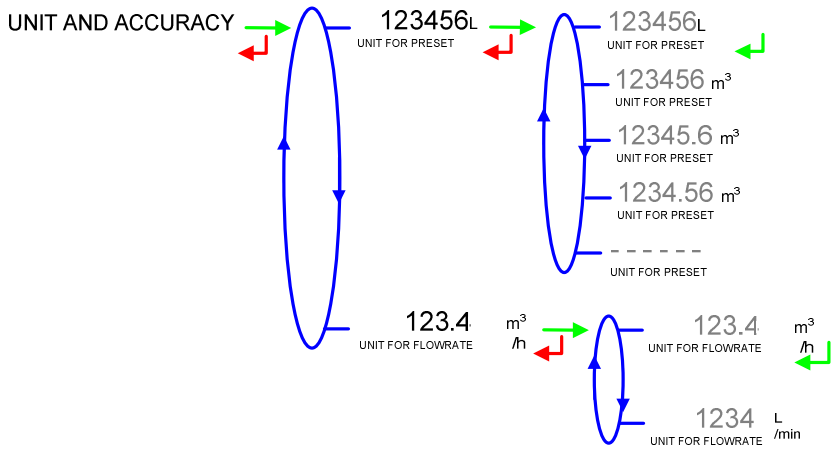
Set the MICROCOMPT+ serial number then the slave number. Here, the MICROCOMPT+ slave number is always 5

5.2 Menu CONFIGURATION



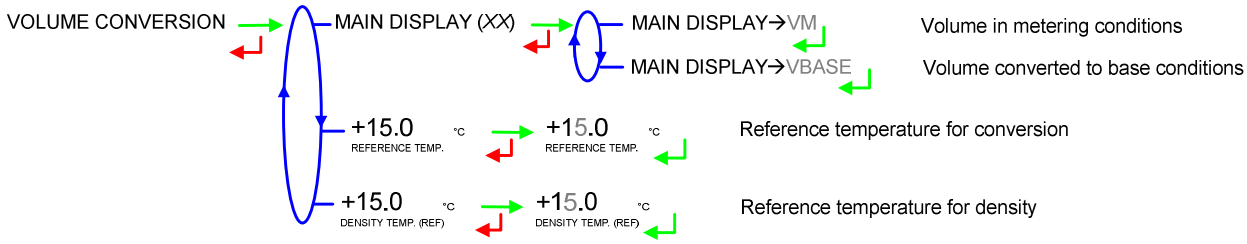
5.2.1 Sub-menu UNIT AND ACCURACY

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



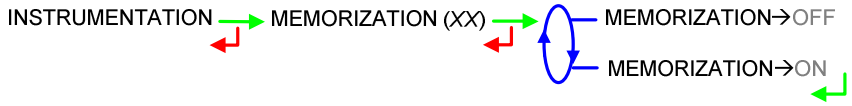
5.2.2 Sub-menu VOLUME CONVERSION

Choose the volume main display. Choose MAIN DISPLAY→VM



5.2.3 Sub-menu INSTRUMENTATION

Operation with or without memorization. Choose MEMORIZATION→ON



5.2.4 Sub-menu COMMUNICATION

Two communication ports are available on the MICROCOMPT+.

COM1 : RS485 port

COM2 : RS485 port used for communication with the VRU PLC which is the master of the network.

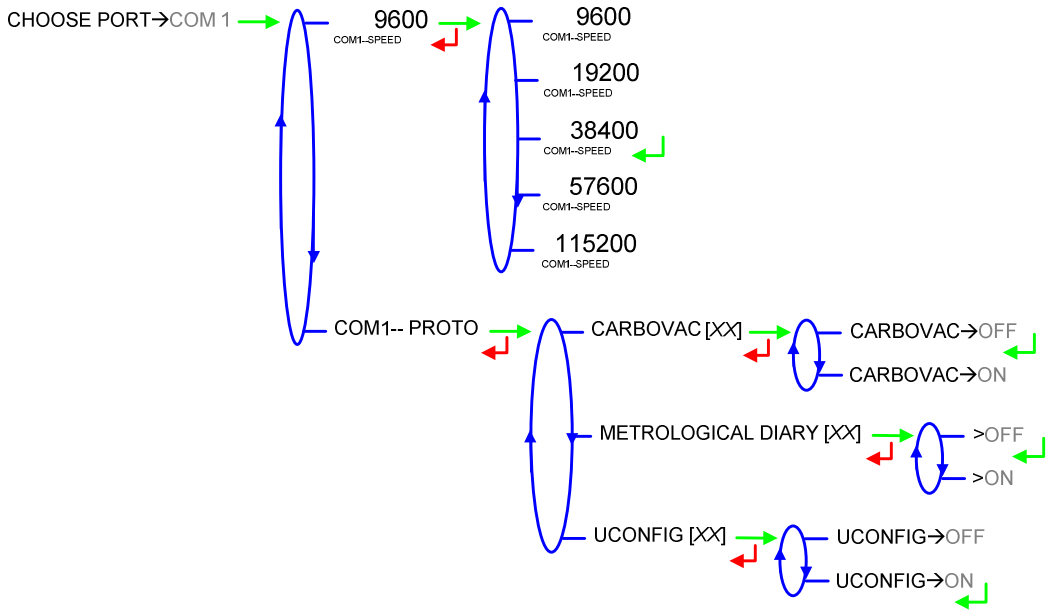
For each communication port, set the speed and the communication protocol. Any protocols are MODBUS data protocol and use the slave number set in INDICATOR REFERENCE menu. Several protocols can be configured on a same link. Configuration of the protocols:

CARBOVAC: Communication over a PLC protocol

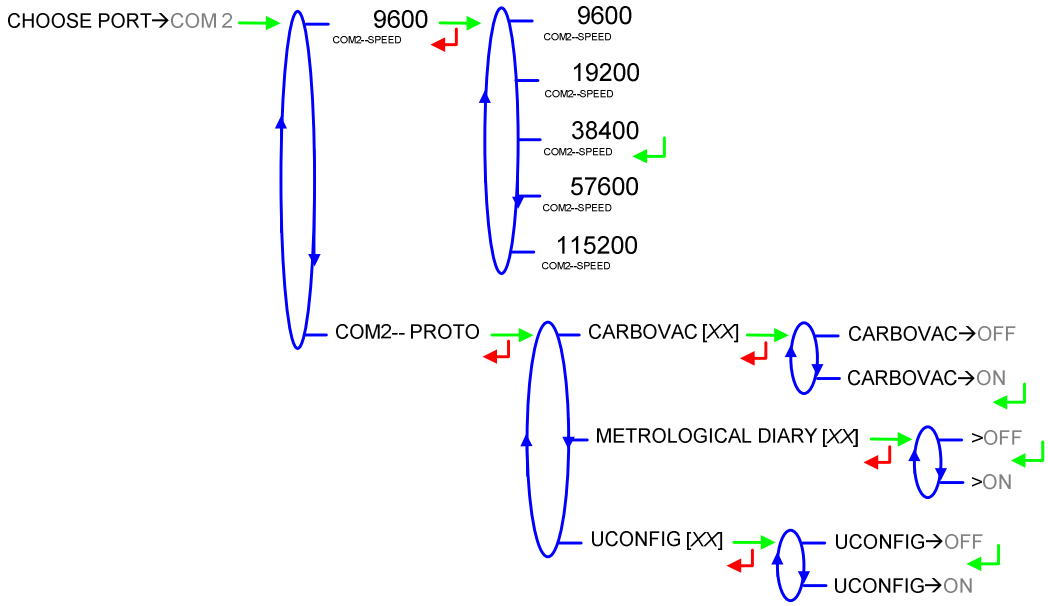
J METRO: Communication over a metrological diary to retrieve measurement data on the control device (main computer)

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

Port COM1: choose COM1--SPEED: 38400 bauds and COM1--PROTO: UCONFIG→ON



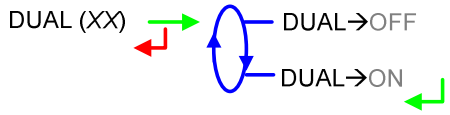
Port COM2: choose COM2—VITESSE: 38400 bauds and COM2--PROTO: CARBOVAC→ON



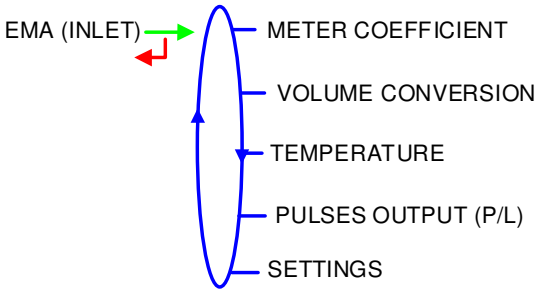
5.2.5 Sub-menu DUAL

This menu is used for DUAL version to activate the secondary measuring system called EMB which is available for the outlet line.

Choose DUAL→ON.



5.3 Menu measuring system EMA (INLET)

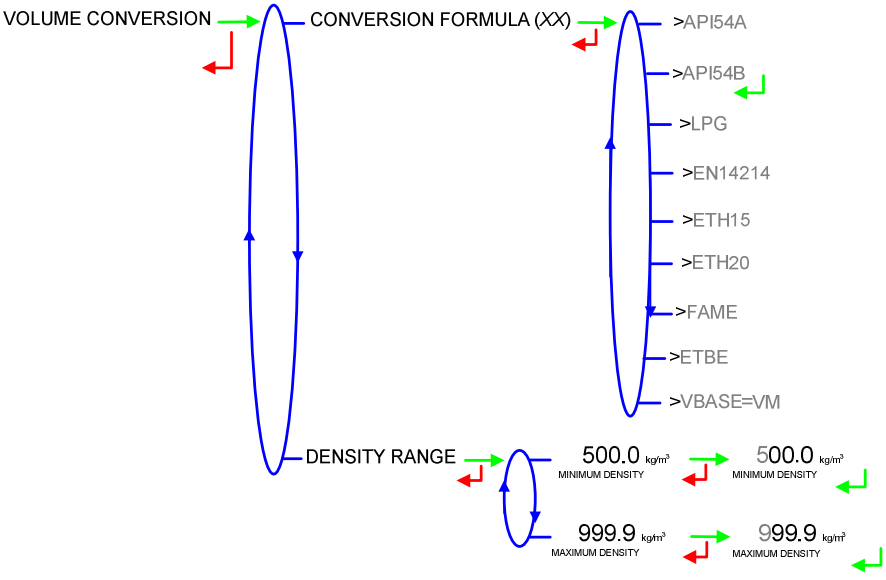


5.3.1 Sub-menu METER COEFFICIENT

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

5.3.2 Sub-menu VOLUME CONVERSION

This menu is used to choose the conversion formula according to the product and to define the density range. Choose the conversion formula >API54B

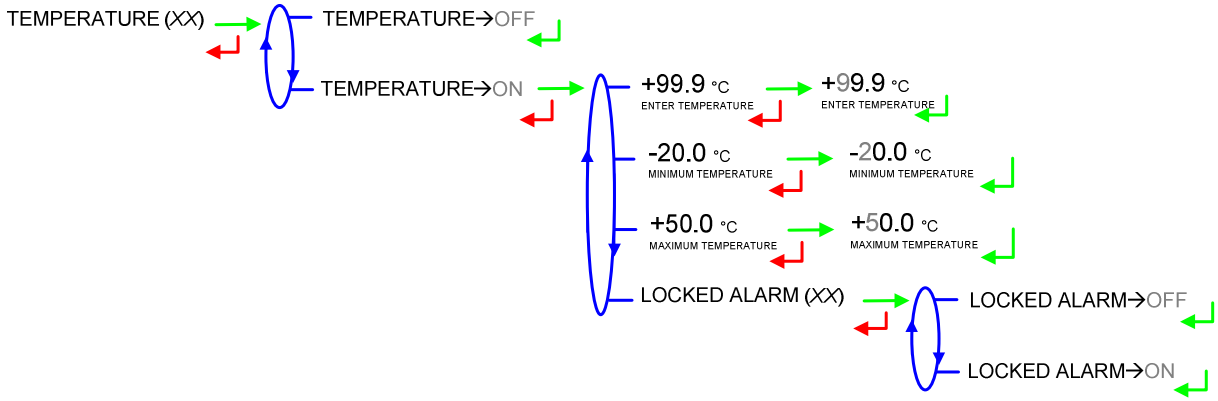


5.3.3 Sub-menu TEMPERATURE

This menu is used to calibrate the temperature into the MICROCOMPT+ for EMA. Choose TEMPERATURE→ON

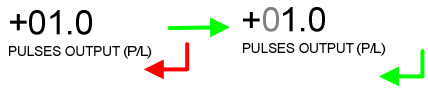
Depending on the probe, it's possible to:

- 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. Choose LOCKED ALARM→ON

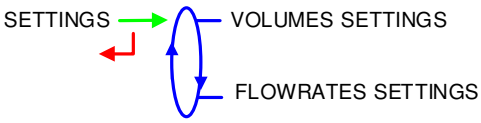


5.3.4 Sub-menu PULSES OUTPUT

Copy out the volume measured by EMA. Enter the number of pulses that the MICROCOMPT+ must generate for each counted display-unit.



5.3.5 Sub-menu SETTINGS



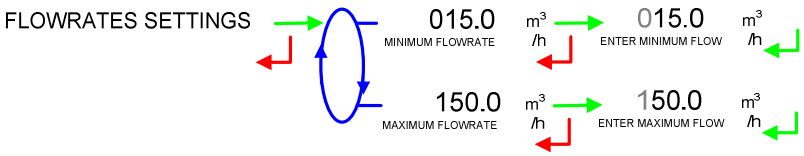
5.3.5.1 Volumes settings

Set the minimum quantity

5.3.5.2 Flowrates settings

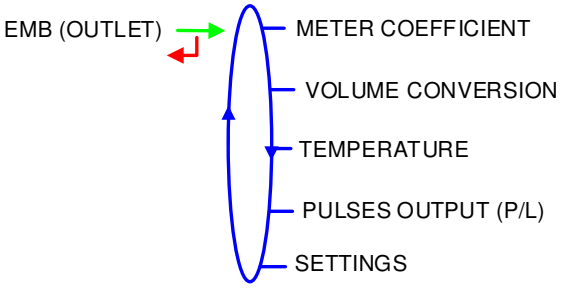
MINIMUM FLOWRATE: Minimum flowrate below which an alarm is triggered

MAXIMUM FLOWRATE: Maximum flowrate above which an alarm is triggered



5.4 Menu measuring system EMB (OUTLET)

This function is active when CONFIGURATION>DUAL is ON. The secondary measuring system EMB is available for the outlet line.

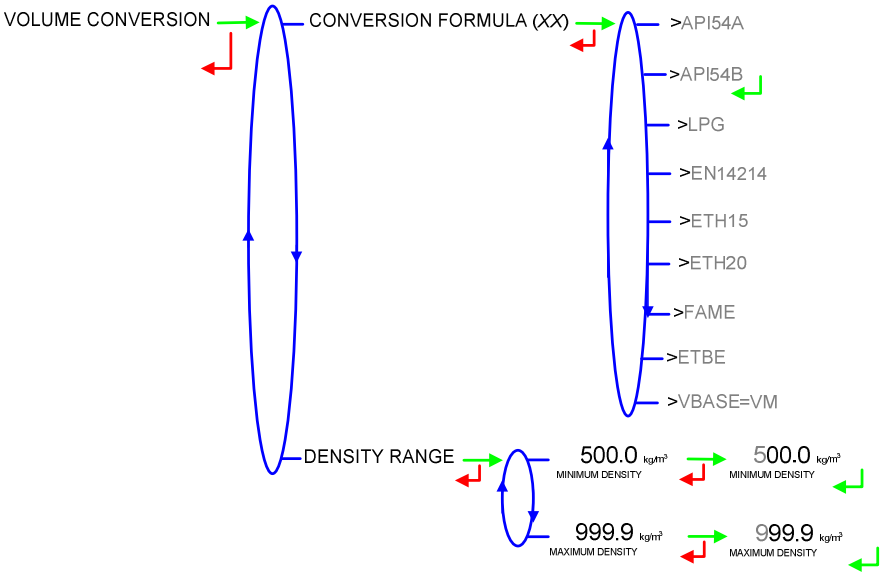


5.4.1 Sub-menu METER COEFFICIENT

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

5.4.2 Sub-menu VOLUME CONVERSION

This menu is used to choose the conversion formula according to the product and to define the density range. Choose the conversion formula >API54B

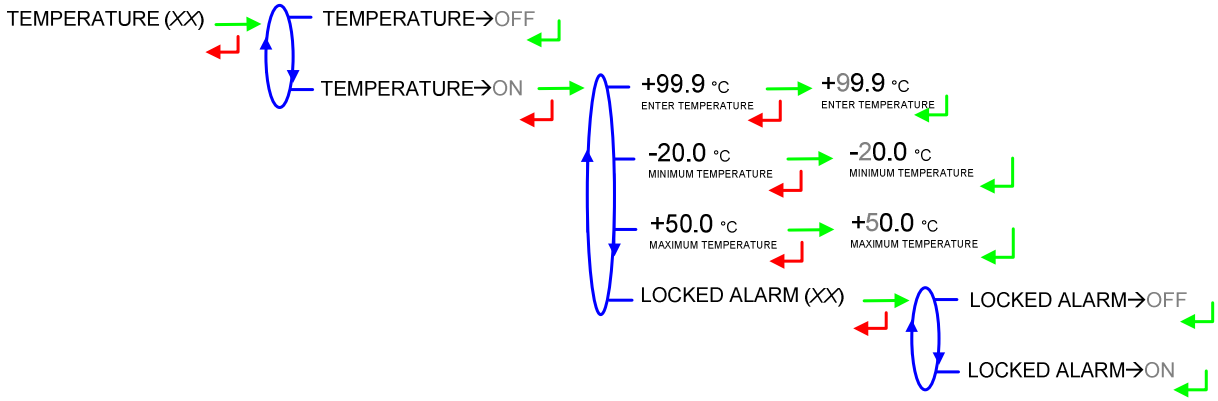


5.4.3 Sub-menu TEMPERATURE

This menu is used to calibrate the temperature into the MICROCOMPT+ for EMB. Choose TEMPERATURE→ON

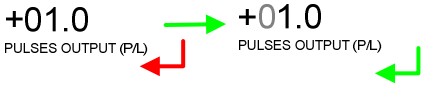
Depending on the probe, it's possible to:

- 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. Choose LOCKED ALARM→ON



5.4.4 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.



5.4.5 Sub-menu SETTINGS

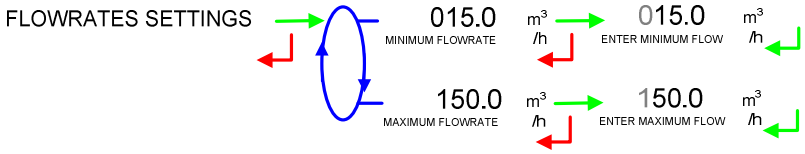
5.4.5.1 Volumes settings

Set the minimum quantity

5.4.5.2 Flowrates settings

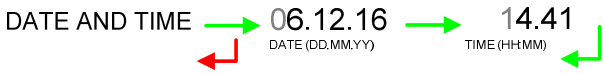
MINIMUM FLOWRATE: Minimum flowrate below which an alarm is triggered

MAXIMUM FLOWRATE: Maximum flowrate above which an alarm is triggered



5.5 Menu DATE AND TIME

Enter the day, the month and the year and then enter the time at French format (e.g. 14.41 means 2.41 pm).



RELATED DOCUMENTS

DI 106	Installation guide kit RPM
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 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+