OPERATING MANUAL

MU 7058 EN E

LPG LOADING MICROCOMPT+

Issue	Date	Nature of modifications	Written by	Approved by
E	2018/02/05	Creation *[MDV591]*	DSM	SH

CONTENTS

1 GENERAL PRESENTATION AND DESCRIPTION

The electronic calculator-indicating device LPG MICROCOMPT+ for loading terminal is intended to be fitted on measuring systems to measure liquefied gases under pressure.

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

- ⇨ Either volume in metering conditions – VM. The pictogram 'Vm' appears at the right-hand side of the display
- ⇨ Or volume converted to base conditions – VBASE. The pictogram 'Vb' appears at the right-hand side of the display
- ⇨ Or mass – MASS. No pictogram.

It can take into account the temperature of liquid when it's measured by a Pt100 temperature sensor and density when a density meter is instrumented. Density is not a metrological value, it's displayed during pouring and available for network data.

Furthermore, the density set-value given by the control device (main computer) is used for volume conversion. In case of wrong data, the value set in SUPERVISOR mode via the menu PRODUCTS>BACKUP MV15 is taken into account.

The MICROCOMPT+ controls a non-resettable totaliser. It memorizes cumulated volume (or mass) in metering conditions and/or in base conditions.

Two serial links are available to communicate with external equipment (control and supervision devices).

The electronic calculator-indicating device ensures the following functions: preset, control of flowrate, automatism and securities related to the truck loading or unloading terminal.

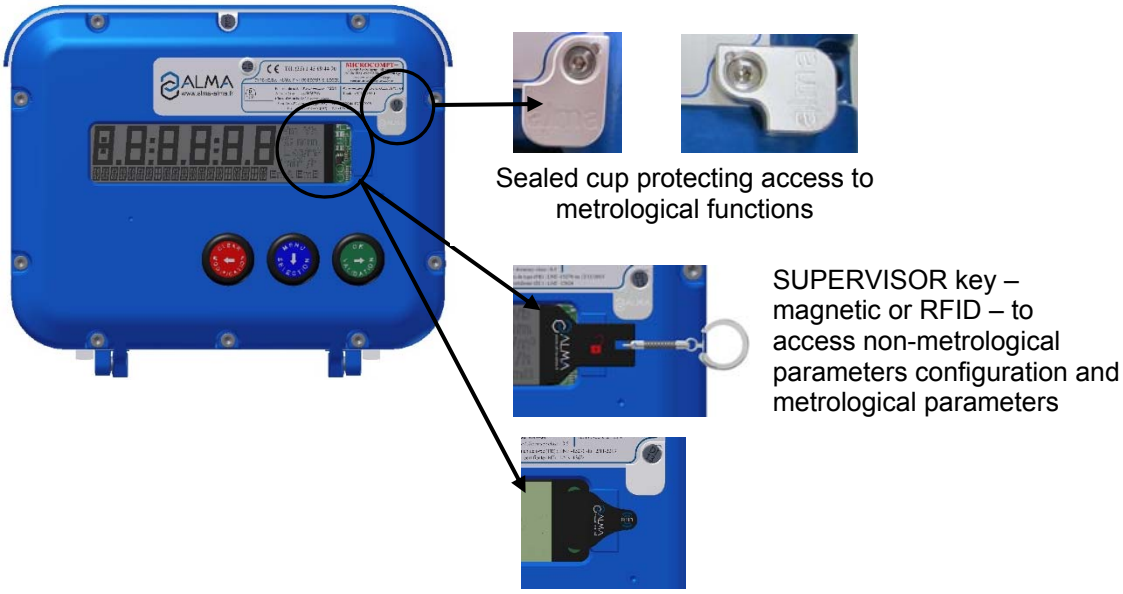
It provides a safe autonomous operating mode (without supervision or control system). This mode allows to control automatism and security devices: ground, arm contact…

Control and supervision information is handled by the Modbus RS485 network.

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. Its front face 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.



2 CONFIGURATION, SETTING AND CALIBRATION

2.1 Configuration

The configuration of the MICROCOMPT+ is made by an authorized person only.

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

To access the METROLOGICAL mode, the MICROCOMPT+ has to be unsealed. Then turn the electronic sealed located at the right of the LCD display.

Refer to METROLOGICAL MODE.

2.2 Setting

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

Before using the device for the first time, enter the value of the parameters such as:

- Products: name, quality
- Communication
- Setting of the analog valve
- Display language

Refer to SUPERVISOR MODE for setup.

2.3 Use

This is the normal using mode in exploitation.

Refer to USER MODE.

3 USER MODE

3.1 Loading

The LPG MICROCOMPT+ displays STATION IN REST with the blinking quantity measured during the last operation.

3.2 In operation

To manage the operations, the MICROCOMPT+ follows the steps:

- MICROCOMPT+ is at rest
- The operator prepares and validates an operation (loading or unloading)
- Operation is managed
- Operation is ended and the operator takes all actions needed to put back the station in rest.

The actions required at each step and transitions between these steps depend on the device configuration.

From the rest position, an operation may start by pressing OK (in autonomous mode) or by receiving an authorisation from the network (connected mode).

Preparation of an operation includes validation of several items, according to the configuration:

- Connected mode: validate operation number, operation (loading or unloading and preset quantity) and preset entry if required;
- Autonomous: choose the above items
- Semi-connected: refer to the menu MODE (in SUPERVISOR mode)

Preparation of the operation continues with control of the security devices. The MICROCOMPT+ displays the required actions: CONNECT GROUND, CONNECT LIQUID ARM, etc.

Operation can only start if all the security devices are connected. Pressing the dead-man device makes flowing.

During delivery, security devices are controlled. Unconformity make default appear and stop the operation. The MICROCOMPT+ displays the related alarm with the quantity already loaded. Reconnect the device and press green pushbutton to acknowledge the alarm.

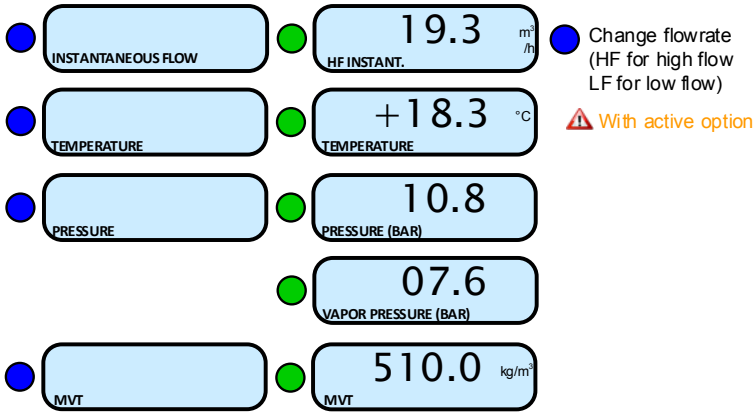
Operation can start again: CONTINUE OPERATION? or be ended: END OPERATION?

At the end of the operation, the MICROCOMPT+ displays the actions needed to put back the station in rest.

During pouring, the following information may be displayed:

- The instantaneous flow rate in m^3/h
- The temperature (°C) if it is taken into account
- The line pressure in bar
- The vapor pressure in bar
- The density in m^3/h (non-metrological information).

Simply follow the indications below:

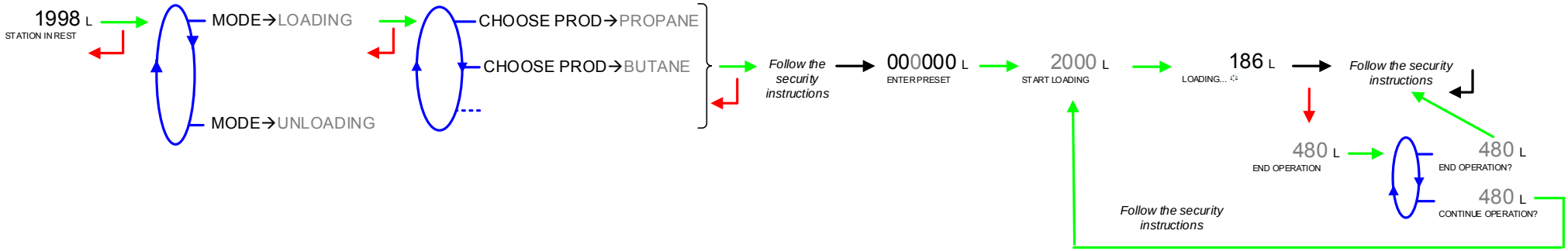


Back to normal display is automatic:
DO NOT PRESS RED CLEAR BUTTON TO KEEP FROM INTERRUPTING DELIVERY.

According to the configuration of the installation, the MICROCOMPT+ dialogues are different. The principal cases are described in the following chapter:

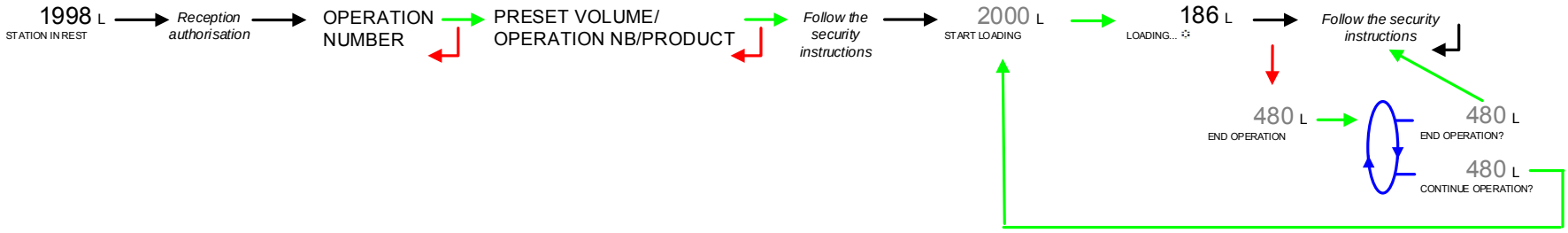
- Autonomous mode with preset quantity entry
- Connected mode with preset quantity entry
- Connected mode with receipt of the preset quantity

3.2.1 Autonomous mode with manual preset

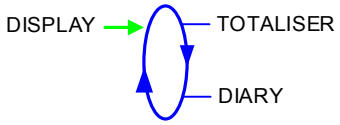


3.2.2 Connected mode with manual preset (without validation of operation)

3.2.3 Connected mode with automatic preset (with validation of operation)

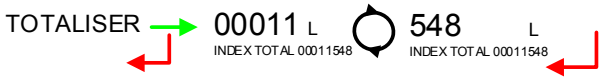


3.3 Menu DISPLAY



3.3.1 Sub-menu TOTALISER

This menu displays the general totaliser.

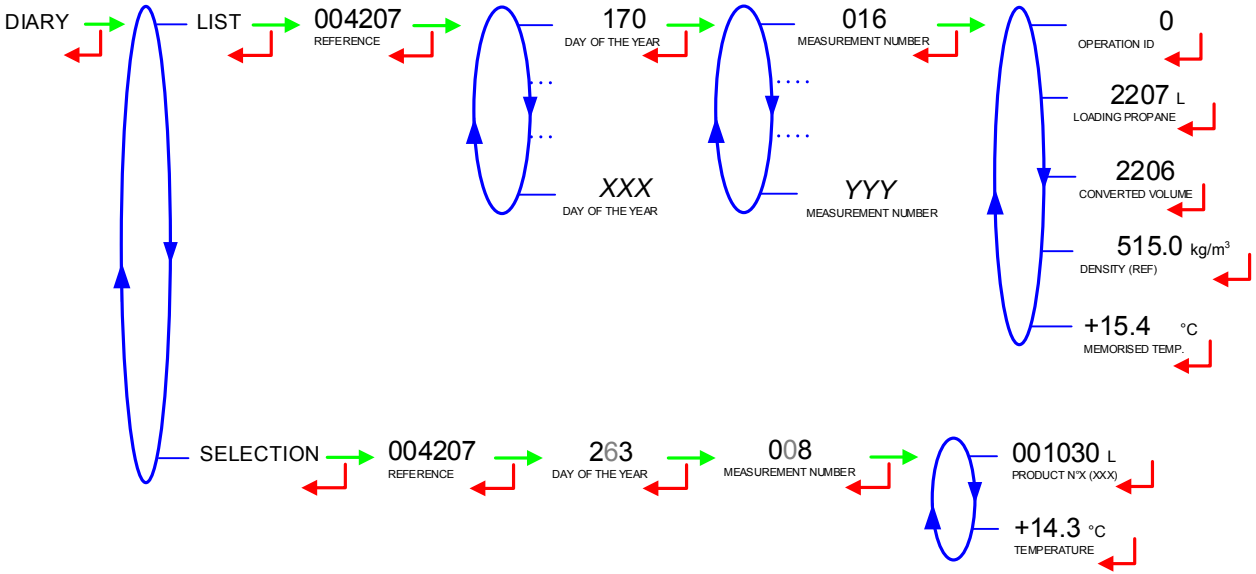


3.3.2 Sub-menu DIARY

Display sequence of 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

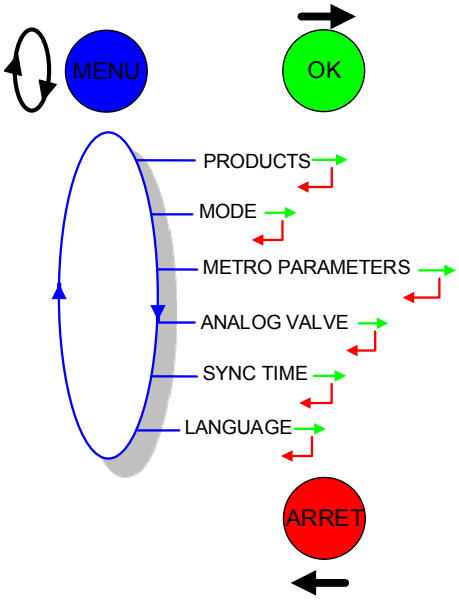
SELECTION: Display a specific measurement by selecting the day number



3.4 List of alarms

		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 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)
		LEVEL PROBE FAULT	High level probe is wet	Dry out the wet probe or end measurement
		PROBE DISCONNECTED	Problem with the level probe signal	Check the level probe
		NO AUTHORISATION	No more loading authorisation	Check the reason on the control device
		GROUND FAULT	Loss of ground signal	Check the connection of the ground device
		DEADMAN SWITCH	The deadman switch is not connected	Check the deadman switch
		LIQUID ARM FAULT	Loss of liquid arm signal in operation	Check the connection of the liquid arm
		LIQUID ARM POSITION	Liquid loading arm in high-position	Check the liquid loading arm position
		GAS ARM FAULT	Loss of gas arm signal in operation	Check the connection of the gas arm
		GAS ARM POSITION	Gas arm in high-position	Check the gas arm position
		LEAKAGE FAULT	Metering detection without measurement	Check the tightness of the loading valve
		TANK FULL	The tank is full of product	End measurement
		LIQUID LINE POSITION	Mismatch between the status awaited and the actual status of the liquid line valve	Check the hydraulic system
		L-L SECUR. POSITION	Mismatch between the status awaited and the actual status of the liquid line security valve	Check the hydraulic system
		R-L SECUR. POSITION	Mismatch between the status awaited and the actual status of the return line security valve (unloading)	Check the hydraulic system
		GAS SECUR. POSITION	Mismatch between the status awaited and the actual status of the gas line security valve	Check the hydraulic system
		GATE POSITION	Problem with the gate position	Check the hydraulic system
		PRODUCT SELECTION	Problem with the product selection valve	Check the hydraulic system
		GAS DETECTED	Detection of gas	Make a purge (manual or automatic)
		VAPOR PRESSURE FAULT	Problem with the vapor pressure	Check the hydraulic system
		LINE PRESSURE FAULT	Problem with downstream pressure	Check the hydraulic system
		ARM PRESSURE FAULT	Problem with the arm pressure	Check the hydraulic system
		LSL FAULT	Low switch level of the tank	Fill the tank
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	Substitution of the backup battery
		TEMPERATURE FAULT	Temperature determination failure	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
		FILTER FAULT	Filter fouling	The pressure switch and the product line must be cleaned
	BLOCKING	MEMORY LOST (CELL)	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
		DENSITY FAULT	Density out of range	Check the curve in METROLOGICAL mode

4 SUPERVISOR MODE



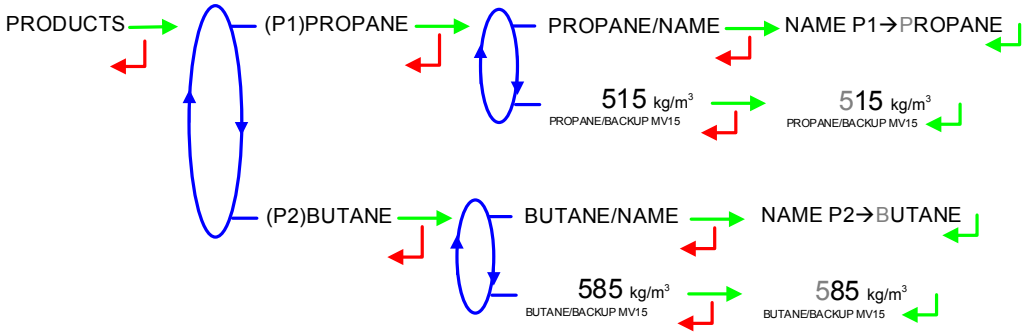
SUPERVISOR magnetic key

SUPERVISOR RFID key

4.1 Menu PRODUCTS

NAME: Validate or enter the name of the selected product

BACKUP MV15: Validate or enter the backup density for the selected product.



4.2 Menu MODE

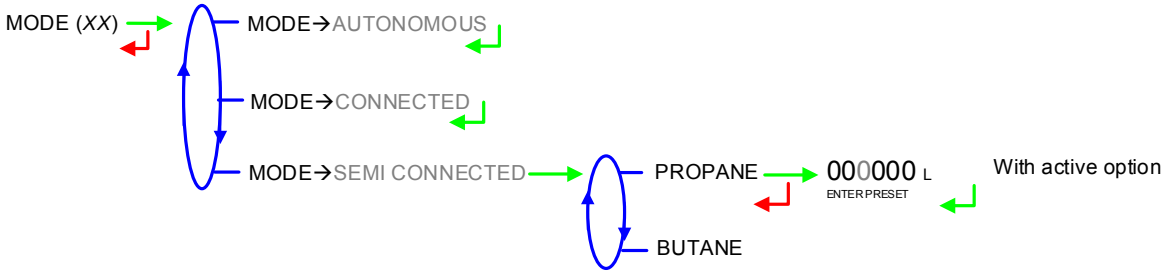
This menu allows to define the configuration of the communication with the control device (main computer). If it's done in METROLOGICAL mode (METRO>CONFIGURATION>COMMUNICATION>MODE→SUPERVISOR), it has priority. It also may be define by this menu.

AUTONOMOUS: Autonomous operating mode. The automated functions work in an autonomous way. Nevertheless, any Modbus request is being processed except the written requests for authorisation, secured record or forcing default

CONNECTED: Operating mode with the control device (main computer). The automated functions are managed by the orders sent via SESAME II protocol. No communication

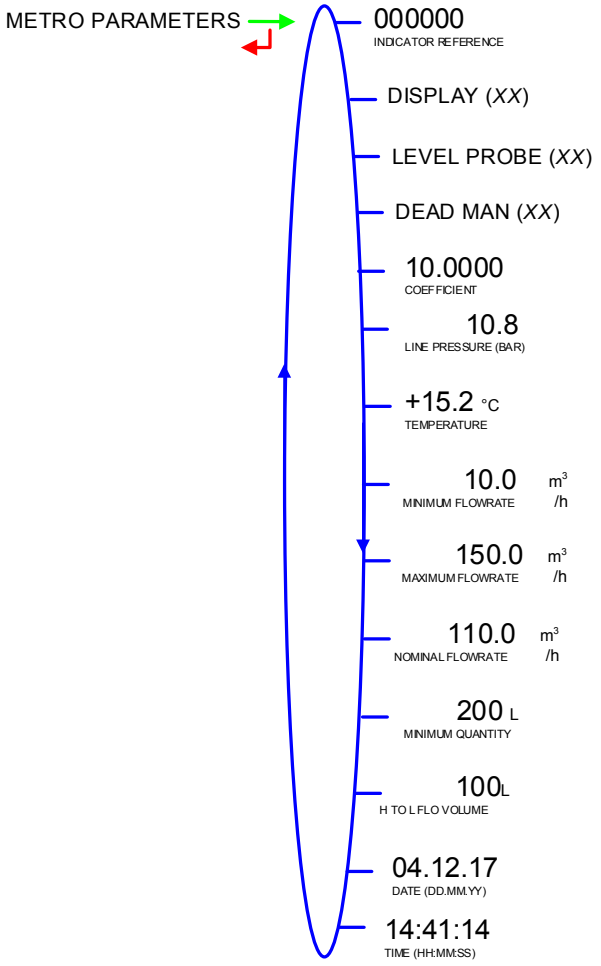
for more than 2 minutes leads to a COMMUNICATION FAULT that prohibits to perform any operation

SEMI CONNECTED: Specific operating mode. This is an option available only with specific software configurations. This mode is the same as the connected one except that product and quota are set locally in SUPERVISOR mode. It is used to perform a spot loading operation. Once validating the menu, choose product (PROPANE or BUTANE), enter preset quantity (ENTER PRESET); measurement starts immediately. When quota is reached, the MICROCOMPT+ switches to connected mode and invalids this specific operating mode.



4.3 Menu METRO PARAMETERS

This menu is used to visualise the parameters set in METROLOGICAL mode.



4.4 Menu ANALOG VALVE

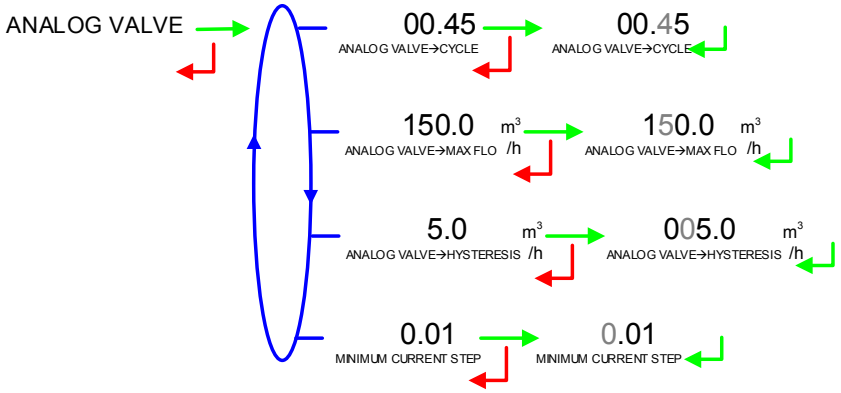
The analog valve is calibrated in METROLOGICAL mode. This menu is used to adjust the parameters of the 4-20mA analog valve.

ANALOG VALVE-CYCLE: Cycle time in seconds which cannot be lower than 300ms. Default value: 2s

ANALOG VALVE-MAX FLO: Maximum flowrate when the valve is totally open

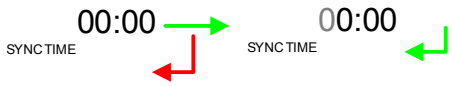
ANALOG VALVE-HYSTERESIS: Maximum permissible deviation between the set-flowrate and real value of flow in m^3/h.

MINIMUM CURRENT STEP: Minimum current step per cycle (default value: 1mA).



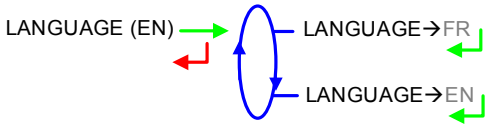
4.5 Menu SYNC TIME

Set the time for data synchronisation.

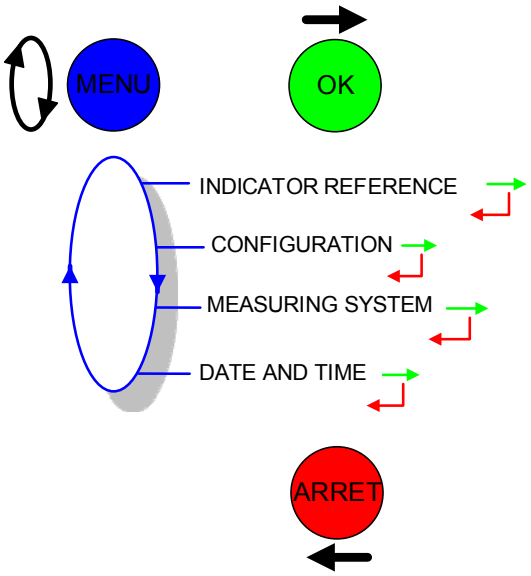


4.6 Menu LANGUAGE

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



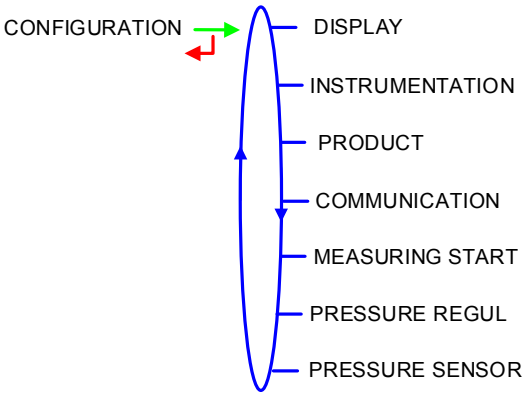
5 METROLOGICAL MODE



5.1 Menu INDICATOR REFERENCE

Set the MICROCOMPT+ serial number (5 figures) then the slave number which is used by devices that communicate with the MICROCOMPT+ by using the Modbus protocol (µConfig configuration tool, supervisor, and control device).

5.2 Menu CONFIGURATION



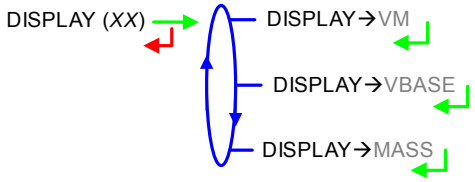
5.2.1 Sub-menu DISPLAY

Choose the type for displayed quantity.

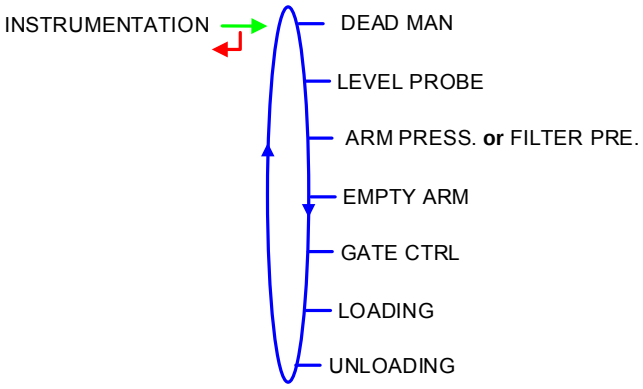
DISPLAY→VM: Display the volume in metering conditions

DISPLAY→VBASE: Display the volume converted to base conditions

DISPLAY→MASS: Display the mass.

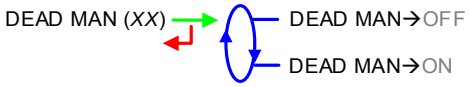


5.2.2 Sub-menu INSTRUMENTATION

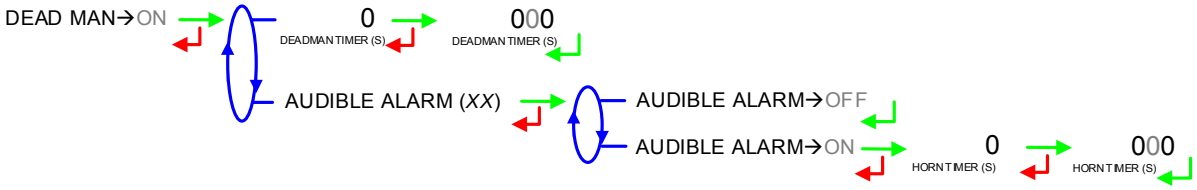


5.2.2.1 Dead man

Operation with or without dead-man switch.

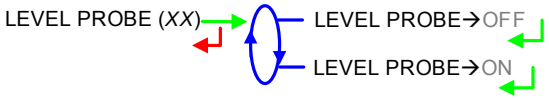


If the function is active, the menus are used to configure the relevant timers.



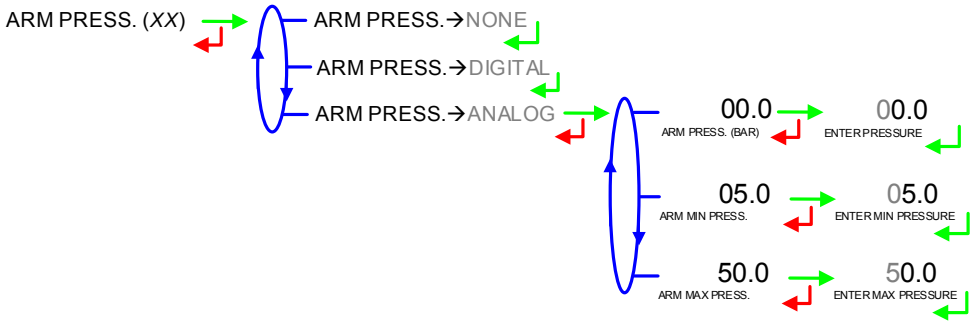
5.2.2.2 Level probe

Operation with or without level probe.

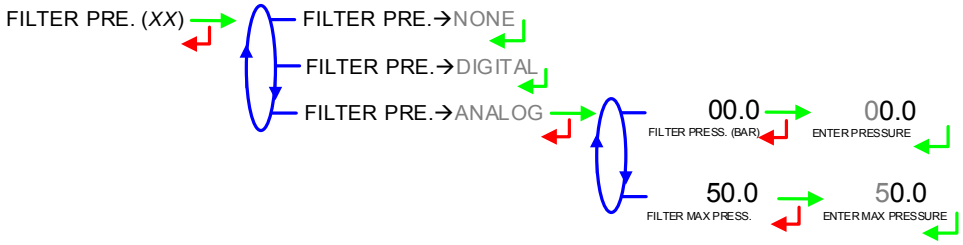


5.2.2.3 Arm pressure or filter pressure

According to the model, this menu is used to configure the arm pressure or the clogging filter.

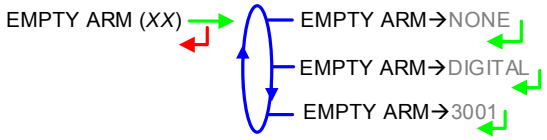


Or:



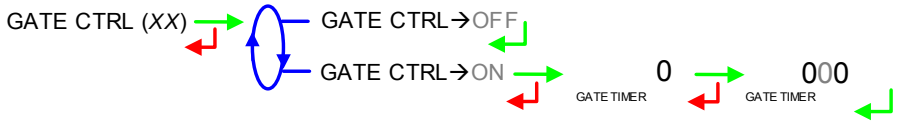
5.2.2.4 Empty arm

Operation with or without empty arm detection control.



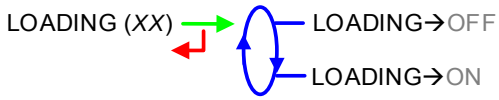
5.2.2.5 Gate control

Operation with or without control of the gate. If the function is active, enter the gate timer.

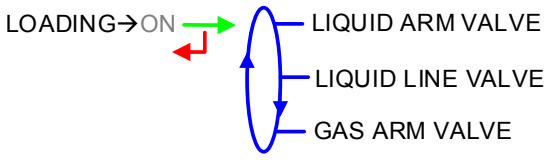


5.2.2.6 Loading

This menu is used to configure the loading valve control.

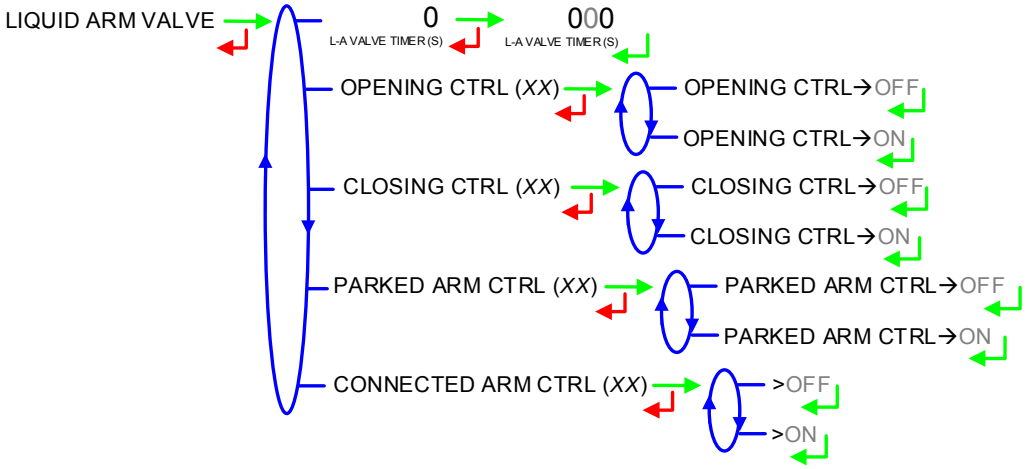


If the function is active, the following parameters must be set for the 3 valves:



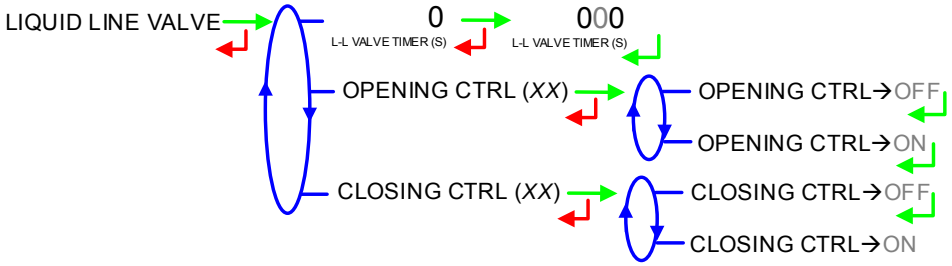
LIQUID ARM VALVE:

- **L-A VALVE TIMER**: Default value 10 seconds to decide upon a potential position mismatch of the liquid arm valve
- **OPENING CTRL**: Open-position sensor (ON/OFF)
- **CLOSING CTRL**: Closed-position sensor (ON/OFF)
- **PARKED ARM CTRL**: Parked arm sensor (ON/OFF)
- **CONNECTED ARM CTRL**: Connected arm sensor (ON/OFF)



LIQUID LINE VALVE:

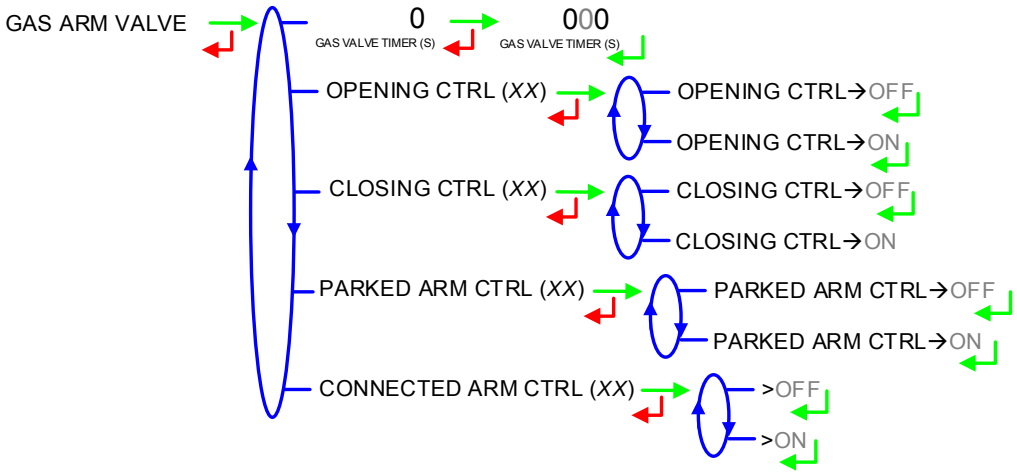
- **L-L VALVE TIMER**: Default value 10 seconds to decide upon a potential position mismatch of the liquid line valve
- **OPENING CTRL**: Open-position sensor (ON/OFF)
- **CLOSING CTRL**: Closed-position sensor (ON/OFF)



GAS ARM VALVE:

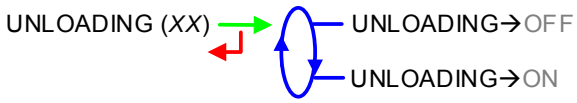
- **GAS VALVE TIMER**: Default value 10 seconds to decide upon a potential position mismatch of the gas arm valve
- **OPENING CTRL**: Open-position sensor (ON/OFF)
- **CLOSING CTRL**: Closed-position sensor (ON/OFF)

- **PARKED ARM CTRL**: Parked arm sensor (ON/OFF)
- **CONNECTED ARM CTRL**: Connected arm sensor (ON/OFF).



5.2.2.7 Unloading

This menu is used to configure the unloading valve control.

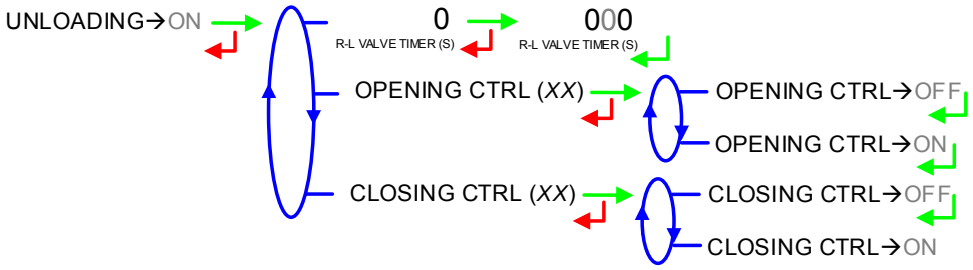


If the function is active, the following parameters must be set:

R-L VALVE TIMER: Default value 10 seconds to decide upon a potential position mismatch of the return line valve (R-L)

OPENING CTRL: Open-position sensor (ON/OFF)

CLOSING CTRL: Closed-position sensor (ON/OFF)



5.2.3 Sub-menu PRODUCT

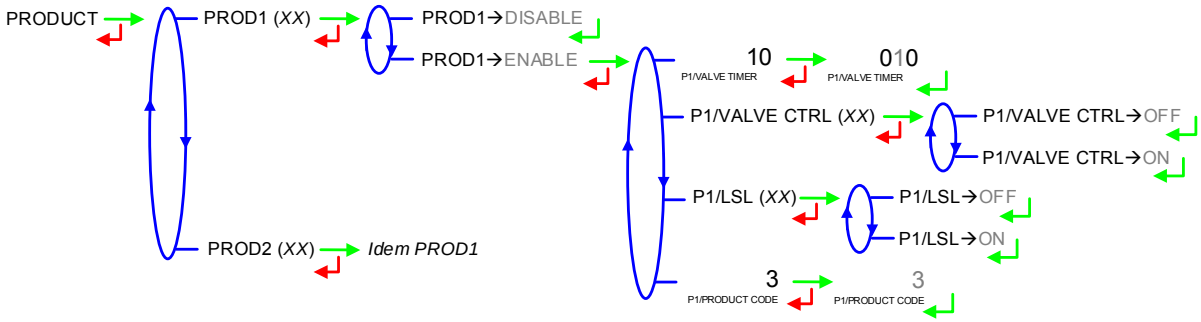
This menu is used to define a maximum of 2 products (below *X*=1 or 2)

P*X*/VALVE TIMER: Default value 10 seconds to decide upon a potential position mismatch of the valve associated to product #*X*

P*X*/VALVE CTRL: Control of the valve associated to product #*X* (ON/OFF)

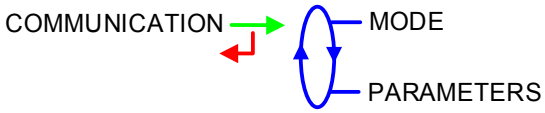
P*X*/LSL: Control of the LSL input associated to product #*X*

P*X*/ PRODUCT CODE: Enter the code associated to product #*X*



5.2.4 Sub-menu COMMUNICATION

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



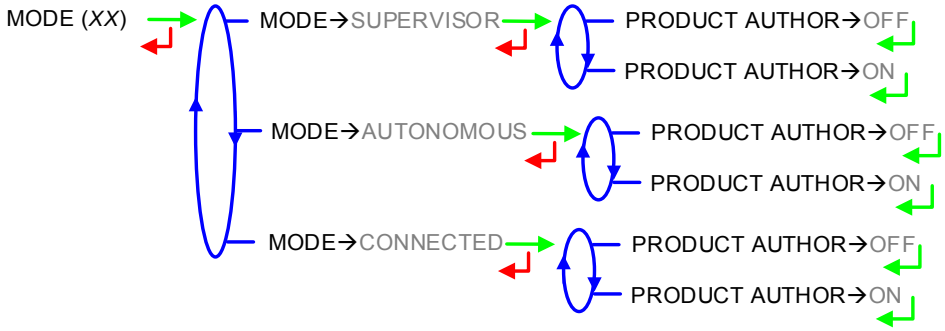
5.2.4.1 Mode

Communication mode with the control device (main computer):

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

AUTONOMOUS: The MICROCOMPT+ operates in autonomous mode (security management) with or without the useful authorisation. The automated functions work in an autonomous way. The measurement start and stop are done locally

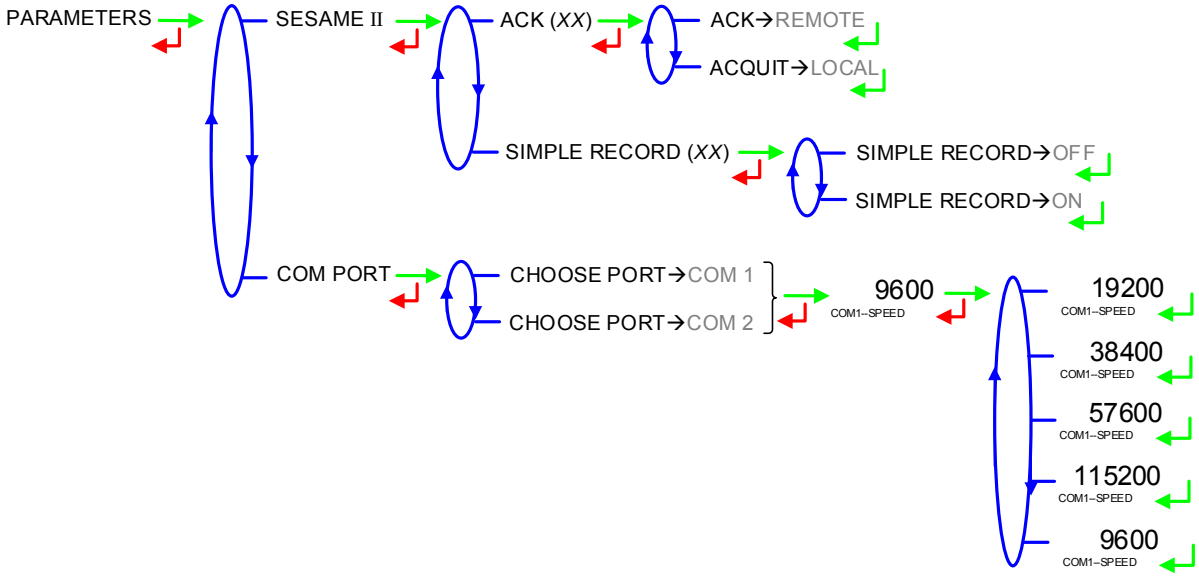
CONNECTED: Operating mode with the control device (main computer) with or without the useful authorisation. The automated functions are managed by the orders sent via SESAME II protocol. At the rest position, a complete loading authorisation must be received with the following information: operation, product and preset quantity. At the end of measurement, a SESAME II time slice is required to return to rest position. No communication for more than 2 minutes leads to a COMMUNICATION FAULT that prohibits to perform any operation.



5.2.4.2 Parameters

SESAME II: Communication over the ALMA SESAME II network. Definition of the communication protocol

PORT COM: Definition of the serial links COM1 (RS232C) or COM2 (RS485) one after the other



5.2.5 Sub-menu MEASURING START

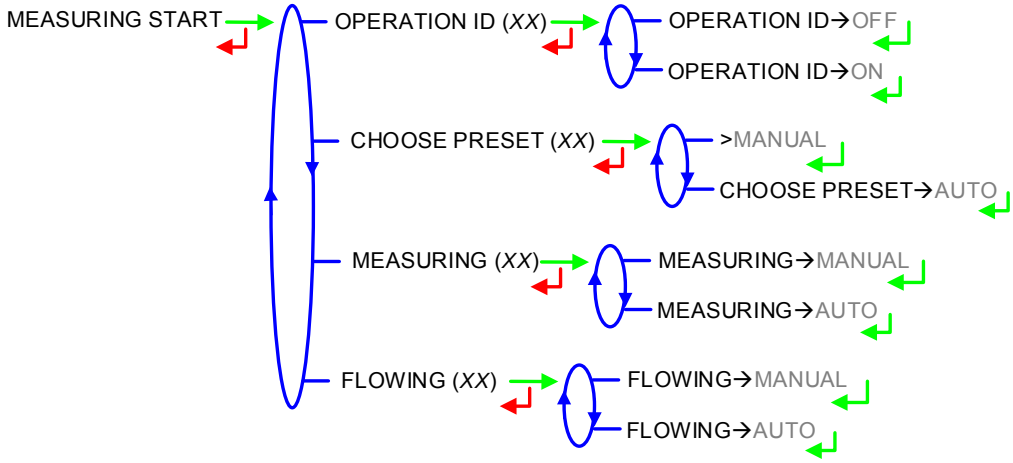
This menu is used to choose the MICROCOMPT+ operating mode before the measurement starts.

OPERATION ID: Input mask* for operation identifier. It defines the format of data to limit input errors. The operation identifier is set by the user before starting loading. If the mask is set to '39999', the value set in USER mode may not exceed '4000'.

CHOOSE PRESET: Configuration for the preset quantity

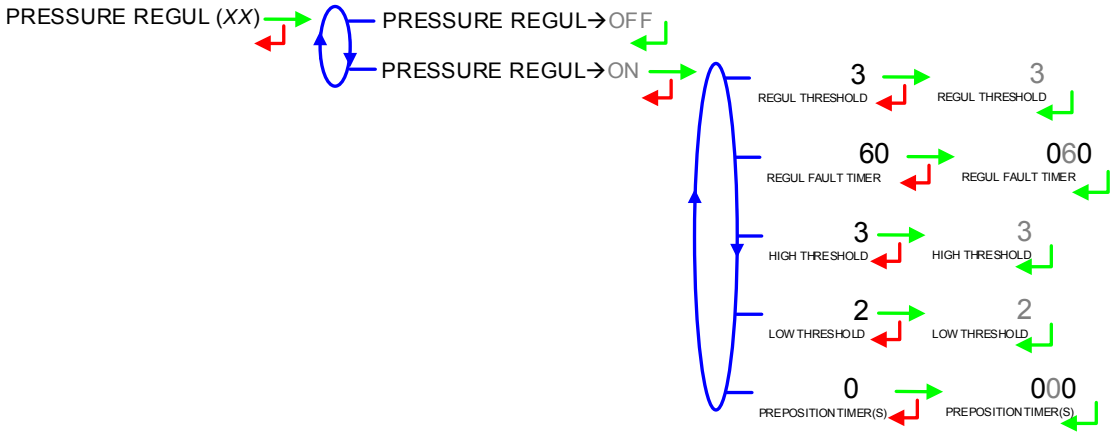
MEASURING: Condition for the MICROCOMPT+ to start measuring

FLOWING: Condition for the MICROCOMPT+ to start flowing



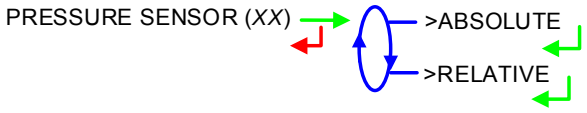
5.2.6 Sub-menu PRESSURE REGULATION

This menu is used to activate the pressure regulation or not. If the function is active, the following parameters must be set:

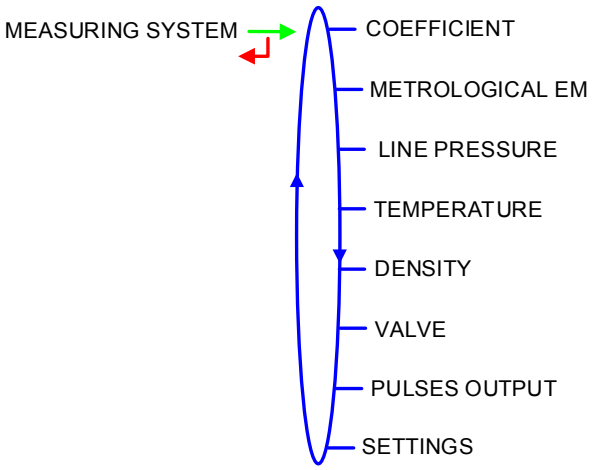


5.2.7 Sub-menu PRESSURE SENSOR

This menu is used to define whether pressure is absolute or relative.



5.3 Menu MEASURING SYSTEM

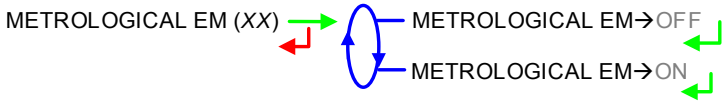


5.3.1 Sub-menu COEFFICIENT

This menu is used to set the coefficient of the measuring system meter (pulses/litre)

5.3.2 Sub-menu METROLOGICAL EM

This menu is used to define whether the measuring system is metrological.

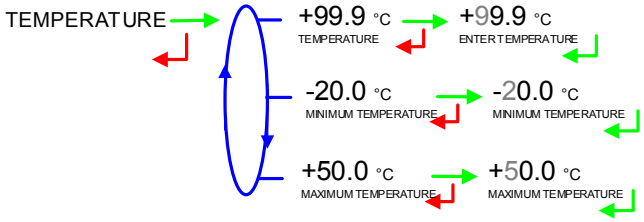


5.3.3 Sub-menu LINE PRESSURE

5.3.4 Sub-menu TEMPERATURE

This menu is used to:

- Calibrate the curve,
- Set the minimum temperature below which an alarm is triggered
- Set the maximum temperature above which an alarm is triggered



5.3.5 Sub-menu DENSITY

Choose whether density is taken into account, for information only. If the function is active, calibrate the density at temperature in kg/m³ by setting the value given by the density meter. That must done at least for 2 different measurement points.

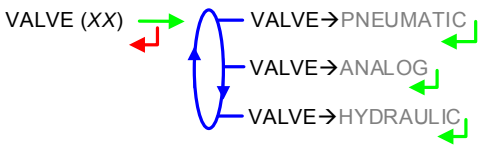
5.3.6 Sub-menu VALVE

This menu is used to define the valve type:

PNEUMATIC: Incremental pneumatic valve

ANALOG: Analog valve 4-20mA

HYDRAULIC: Incremental hydraulic valve

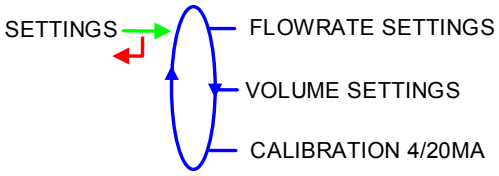


5.3.7 Sub-menu PULSES OUTPUT

Copy out the partial quantity measured by EMA.

Enter the number of pulses that the MICROCOMPT+ must generate for each display-unit counted in the totaliser. Enter a null value to disable the function.

5.3.8 Sub-menu SETTINGS

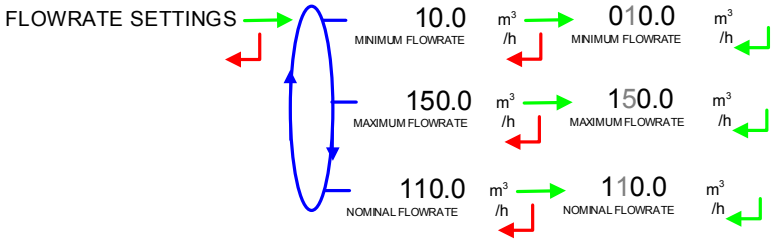


5.3.8.1 Flowrate settings

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.



5.3.8.2 Volume settings

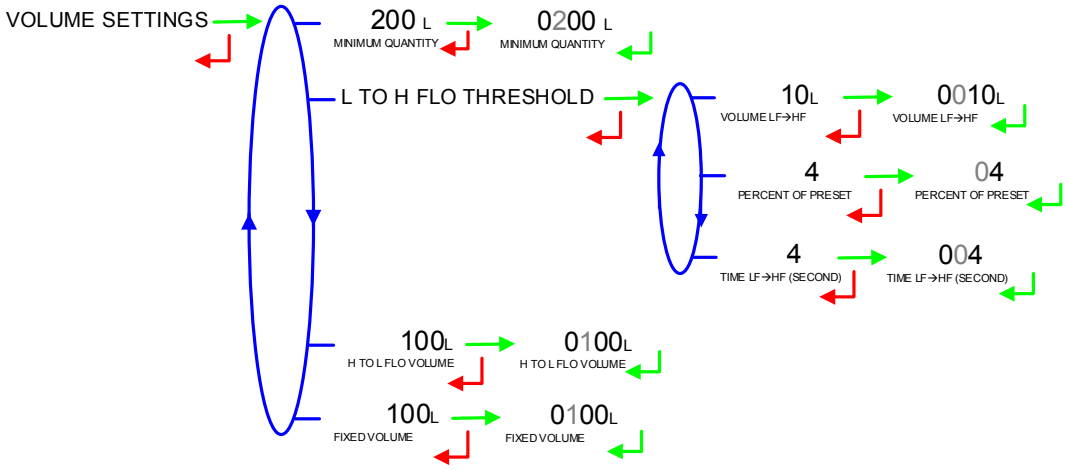
MINIMUM QUANTITY: Set the minimum quantity

L TO H FLO THRESHOLD:

- **VOLUME LF→HF**: Volume beyond which the MICROCOMPT+ switches from low to high flowrate
- **PERCENT OF PRESET**: Threshold of transition from low to high flowrate
- **TIME LF→HF (SECOND)**: Time beyond which the MICROCOMPT+ switches from low to high flowrate

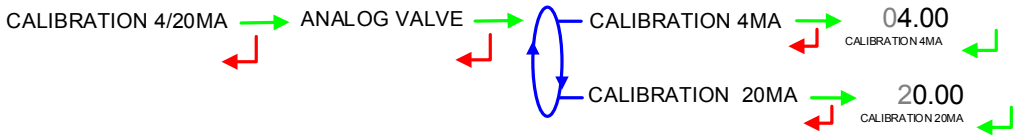
H TO L FLO VOLUME: Set the quantity beyond which the MICROCOMPT+ drives the low flowrate at the end of a preset measurement.

FIXED VOLUME: Volume quantity (volume that is not delivered to the customer).



5.3.8.3 Calibration 4/20mA

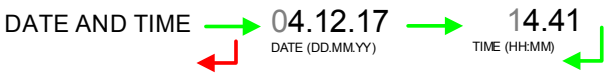
Configuration of the current range of the 4-20 mA output, mainly to regulate the analog valve properly.



Note: This dialog remains frozen displaying 'ANALOG VALVE' as longer as a measuring system is being configured with this kind of valve. This is to prevent any unintentional flowing during the calibration.

5.4 Menu DATE AND TIME

Enter the day, the month and the year and then set the time (24-hour format).



RELATED DOCUMENTS

GU 7058	Operating guide LPG MICROCOMPT+
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
FM 8011	Configuration of jumpers and adjustment of metering thresholds on the AFSEC+ electronic board
FM 8013	Replacement of the backup batteries on the AFSEC+ electronic board
FM 8510	Adjustment of a temperature chain on MICROCOMPT+