# VERIFICATION MANUAL

# MV 5010 EN A

# CMA TRONIQUE

| | | | | |
|---|---|---|---|---|
| A | 2016/10/24 | Creation | DSM | PJ |
| Issue | Date | Nature of modifications | Written by | Approved by |

# SOMMAIRE

# 1 FOREWORD:

Please refer to the CMATRONIQUE operating manual MU 7034 for current use of the calculator device.

Verification operations must be performed in compliance with current regulations, it is particularly timely to bring

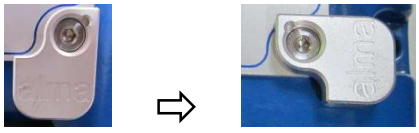
- ⇨ **The initial verification report** of the relevant ADRIANE turbine meter.
- ⇨ **A standard to control the accuracy of the measuring system.** It must be in line with national standards and the uncertainty in measurement must be less than 1/3 of the appropriate MPE. As far as possible, Alma encourages the use of a calibration gauge of at least 1000 litres-capacity and which is in line with a national standard.
- ⇨ **The temperature-correction table of the standard.**

# 2 DEFINITIONS:

**MPE**: Maximum permissible error. It depends on the regulation of the country where the equipment has been put into use (MPE in France = ± 0.5%).

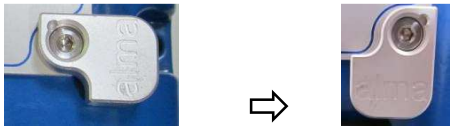
**Low flow height**: Height threshold, in mm, set up for each compartment for a CMATRONIQUE. Below this threshold, the delivery will be done in low flowrate. The reference point is the tapping axis of the differential pressure transmitter (e.g. "00635" for a 635mm-height from the tap point)

**Switch the Microcompt+ to Metrological mode**: Remove the seal and turn the magnet to the right.



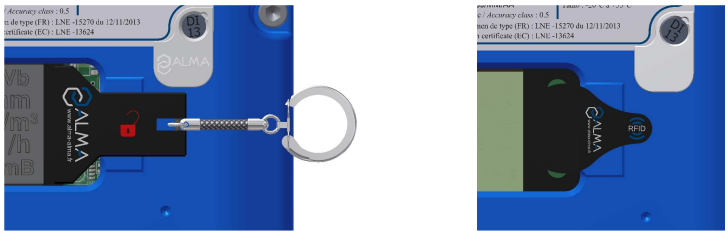
Protected ⇨ Metrological

**Exit the Metrological mode**: Replace the magnet, the Microcompt+ reboots.



Metrological ⇨ Protected

**Switch the Microcompt+ to Supervisor mode**: Use the magnetic or the RFID key.



# 3 PRELIMINARY TESTS:

Take the operating manual MU 7034.

Print the parameters before beginning configuration.

## 3.1 Check METROLOGICAL parameters

| | Parameter | Action | Comments |
|---|---|---|---|
| INDICATOR REFERENCE | | | |
| 1 | Reference | Check the serial number on the Microcompt+ identification plate. | |
| CONFIGURATION | | | |
| 2.1 | Distribution line | Check that the number of distribution ways is set up according to the truck configuration. | |
| 2.2.1 | Transmission | Set up according to the truck configuration. | |
| 2.2.2.1 | Overfill protection / Truck probe (embedded) | Set up according to the truck configuration. | |
| 2.2.2.2 | Overfill protection / Customer probe (external) | Set up according to the truck configuration (if the truck is equipped with a customer tank probe controlling system) | Check the type of the overfill protection probe technology (5 or 2 wires) |
| 2.3.1 | Flap | Activate according to the truck configuration. (if the truck controls manifold flaps) | |
| 2.3.2 | Return | Activate according to the truck configuration. (if the truck is equipped with a product return system) | |
| 2.3.3 | Probe | Set up according to the truck configuration. | Controls compartment probe during product movement. |
| 2.4.1 | Low flow height | Enter a consistent value by measuring the height between the pressure sensor and the compartment bottom. | Those parameters will be adjusted after the test. *Cf. § 5.3* |
| 2.4.2 | Finish height | Don't change the default value. | Those parameters could be adjusted after the test. *Cf. § 5.3* |
| 2.5 | Mode | Select « PUMPED » | |
| 2.6 | Unit and accuracy | Check the configuration matches the truck owner's requirements. Otherwise, correct it. | Choose m3/h or l/min |
| 2.7 | Conversion | Activate and set up according to the truck owner's requirements and to the truck configuration (for this option the temperature probe is mandatory. | Volumes temperature compensation. |
| EMA (PUMP MODE) | | | |
| 3.1.1.1 | LF coefficient (K1) | Meter coefficient | See meter inscriptions and/or meter test certificate. . May be adjusted after test. *Cf. § 5.2* |
| 3.1.1.2 | Low flowrate/K1 (Q1) | The value must be at zero. | May be adjusted after test. *Cf. § 5.2* |
| 3.1.1.3 | HF coefficient (K2) | It must be the same value than K1 | May be adjusted after test. *Cf. § 5.1* |

| | | | |
|---|---|---|---|
| 3.1.1.4 | High flowrate/K2 (Q2) | The value must be at zero. | May be adjusted after test. *Cf. § 5.1 et 5.2* |
| 3.2 | Correction (thousandth) | Correction (thousandth ‰ ) applied to certain products (particularly gasoline | See meter inscriptions and/or meter test certificate. |
| 3.3.1 | Minimum flowrate | Make sure the value is consistent with the measuring device. | See meter inscriptions and/or meter test certificate. |
| 3.3.2 | Maximum flowrate | Make sure the value is consistent with the measuring device. | See meter inscriptions and/or meter test certificate. |
| 3.4 | Minimum quantity | At least 200 L. | |
| 3.5 | Manifold volume | Enter a value consistent with the manifold size. | Volume between manifold flaps and delivery valve.. May be adjusted after test. *Cf. § 5.4* |
| 3.6 | Temperature | Make sure that the temperature probe is calibrated. Otherwise calibration must be done at -20°C and +50°C. | Use a Pt100 temperature probe simulator. Cf. FM8510 |
| EMBEDDED COMPUTING | | | |
| 4.1 | Embedded computing | Activate or not the embedded computing according to the truck configuration. | Association by serial link |
| 4.1.1 | EC (printer) | Indicate if the embedded computing has its own printer or not. | |
| DATE AND TIME | | | |
| 5 | Date and time | Set the current date and time. | |

## 3.2 Check supervisor parameters

| | Parameter | Action | Comments |
|---|---|---|---|
| CALIBRATION / GAUGE | | | |
| 6 | Calibration / Gauge | Nothing to configure. | This menu is used to adjust the parameters during the test. |
| PRODUCTS SETTINGS (for each product) | | | |
| 7.1 | Name | Enter the product name. | |
| 7.2 | Product type | Set up the product characteristics. | (dye, additive, 10PPM) |
| 7.3 | Unit price | Set up according to the use of the truck. | |
| 7.4 | Price in | Set up according to the use of the truck. | |
| 7.5 | Default unit price | Set up according to the use of the truck. | |
| 7.6 | VAT rate | Set up according to the use of the truck. | |
| 7.7 | Additive settings | Set the values in that cases:<br>The product must be additivated upstream or downstream of the measuring device and if the truck is equipped for it. | |
| 7.8 | Correction | Activate according to the product. | If required, the correction that will be applied is the one set for the parameter 3.2 of the metrological mode. |

| | | | |
|---|---|---|---|
| VEHICLE | | | |
| 8 | Vehicle | Enter the vehicle identification. | EX : License plate |
| SETTINGS | | | |
| 9.1.1 | End low flow volume | Enter the volume according to the truck configuration. | May be adjusted after test. *Cf. § 4.2* |
| 9.1.2 | Complete purge | Enter the volume according to the truck configuration. | May be adjusted after test. *Cf. § 5.4.1* |
| 9.1.3 | Short purge | Enter the volume according to the truck configuration. | May be adjusted after test. *Cf. § 5.4.3* |
| 9.2.1 | LF-HF flowrate | Don't change the default value. | |
| 9.2.2 | Objective flowrate | Don't change the default value. | |
| 9.3.1 | Time before guaranty | Don't change the default value. | |
| 9.3.2 | Blowing time | Don't change the default value. | |
| 9.3.3 | Pump at zero flow | Don't change the default value. | |
| 9.4 | Backup value | Don't change the default value. | |
| TIME ADJUSTEMENT | | | |
| 10 | Time adjustment | Adjust the time if necessary. | |
| PRINTER SETTINGS | | | |
| 11.1 | Ticket | If a ticket lot is downloaded in the calculator, choose the customer ticket. | |
| 11.2 | Order | Enter the order for the cheque, according to the use of the truck. | |
| 11.3 | Forced ticket | Activate according to the use of the truck. | |
| 11.4 | Summary | Choose 'NORMAL'. | |
| LANGUAGE | | | |
| 12 | Language | Choose the language according to the use of the truck. | |

Check parameters list after printing.

## 4 FUNCTIONING TEST (CONDITIONING) :

Before starting the measuring tests, the measuring system and the standard must be put in operating conditions.

The conditioning enables to check that pump hydraulic pressure is between 3 and 3.5 bar when nozzle is closed and between 7 and 8 bars at full flow.

If pressure is not inside those limits, adjust mechanical by-pass or adjust parameters for increment of air exhaust to bypass (INPUT PULSE TIMING or TPSIA) in the calculator.

When a gauge is used, the conditioning operation consists in filling the gauge and then emptying it completely before using it.

### 4.1 Test

Plug the standard to the tank. Start several consecutive preset operations by choosing the pumped distribution mode; the sum of preset volumes must correspond to the standard (or the gauge) volume. In this way, the predetermination will be adjusted over the tests.

If alarms appear during delivery, refer to the list of alarms in the MU7034-operating manual to solve the problem, then control the alarm does not appear anymore during the next predetermination.

### 4.2 Adjustment of the end-low flow volume, if necessary

At the end of the test, the end-low flow volume may be adjusted *(Cf Supervisor parameters table)*.

If the flowrate is too important at the end of predetermination, the end-low flow volume must be increased.

Otherwise, if the delivery is too long to finish, the end-low flow volume must be reduced.

## 5 CONTROL AND AJUSTMENT OF THE METERING-PARAMETERS:

### 5.1 High-flow pumped test

#### 5.1.1 Test

From User mode:

- ⇨ Choose the "DISCHARGE" menu,
- ⇨ Select PUMPED MODE COUNTED (optional),
- ⇨ Choose the compartment which volume is greater than the standard's one.
- ⇨ Select the product
- ⇨ Select HOSE 1 (optional).
- ⇨ Choose the preset delivery mode.
- ⇨ Enter a preset volume equal to the standard's one
- ⇨ Start delivery.
  When the preset volume is reached, the Microcompt+ displays "END DELIVERY". Validate twice

#### 5.1.2 Calculation of the error

- ⇨ Switch the Microcompt+ to Supervisor mode.
- ⇨ Enter the menu "CALIBRATION/GAUGE" and select the menu "ENTER GAUGE VOLUME".
- ⇨ The Microcompt+ displays "ENTER VOLUME (REF)". Enter the temperature-compensated volume of the gauge or the standard.
- ⇨ Move on to the next menu, the Microcompt+ displays the error in % (write it down).
- ⇨ Move on to the next menu, the Microcompt+ displays the new coefficient (write it down).

Warning : This coefficient will be optimized in order to bring the error to the nearest 0. It must be taken into account only when the EMT are centered over zero.

Otherwise, do not take it into account.

- ⇨ Move on to the next menu, the Microcompt+ displays the average flowrate of the test (write it down). Validate the menu to return to "CALIBRATION/GAUGE".
- ⇨ Exit the Supervisor mode by removing the magnetic key.

#### 5.1.3 Adjustment of the new pumped-high flow-coefficient (K2), if necessary

If the error is greater than the regulatory tolerance, the metrological pumped-high flow-coefficient (K2) of the measuring device has to be adjusted. Then use the calibration menu of the SUPERVISOR mode to determine the new coefficient. Please note that the coefficient calculated by the system will be close to zero error.

Here is the formula to calculate the new coefficient K'.

Here is the formula to calculate the new coefficient K':

K' = K *(1+E/100)/(1+E'/100)

With E' = objective error in %

E = test error in %

K= coefficient before test.

- ⇨ Switch the Microcompt+ to Metrological mode. It displays "REFERENCE".
- ⇨ Select the menu "EMA (PUMP MODE)" and then "METER COEFFICIENT"
- ⇨ Choose "HF COEFFICIENT (K2)" *(Cf 3.1.1.3 Metrological parameters table)*.
- ⇨ Enter the new coefficient and validate.
- ⇨ Choose "LF COEFFICIENT (K1)" *(Cf 3.1.1.1 Metrological parameters table)*.
- ⇨ Enter the same coefficient than K2 and validate.
- ⇨ Exit the Metrological mode.

### 5.1.4 Control test

After the adjustment of the measuring device coefficient, do a control test by following the stages §5.1.1 and 5.1.2.

## 5.2 Low-flow pumped test

The low flow to be respected during this test must not overpass 1,5 times the minimum flowrate of the measuring system. To achieve this, flowrate will be limited by action on the nozzle.

### 5.2.1 Test

From User mode

- ⇨ Choose the "DISCHARGE" menu,
- ⇨ Select PUMPED MODE COUNTED (optional),
- ⇨ Choose a compartment which volume is greater than the preset's one.
- ⇨ Select the product,
- ⇨ Select HOSE 1 (optional).
- ⇨ Choose the preset delivery mode.
- ⇨ Enter a preset volume smaller than the one contained in compartment.
- ⇨ When the Microcompt+ displays "START DELIVERY HF", press once blue pushbutton to choose "START DELIVERY LF". The delivery starts.
- ⇨ Limit the flowrate between 1 and 1,5 times the minimum flowrate of the measuring system by acting quickly on the nozzle.
- ⇨ When the preset volume is reached, the Microcompt+ displays "END DELIVERY". Validate twice.

### 5.2.2 Calculation of the error

- ⇨ Switch the Microcompt+ to Supervisor mode.
- ⇨ Choose the menu "CALIBRATION/GAUGE"
- ⇨ Select the menu "ENTER GAUGE VOLUME".
- ⇨ The Microcompt+ displays "ENTER VOLUME (REF)".
- ⇨ Enter the temperature-compensated volume of the standard.
- ⇨ Move on to the next menu, the Microcompt+ displays the error in % (write it down).

⇨ Move on to the next menu, the Microcompt+ displays the new coefficient (write it down).

Warning : This coefficient will be optimized in order to bring the error to the nearest 0. It must be taken into account only when the EMT are centered over zero.

Otherwise, do not take it into account.

⇨ Move on to the next menu, the Microcompt+ displays the average flowrate of the test (write it down). Validate the menu to return to "CALIBRATION/GAUGE".
⇨ Exit the Supervisor mode by removing the magnetic key.

### 5.2.3 Adjustment of the new pumped-low flow-coefficient (K1), if necessary

If the error is greater than the regulatory tolerance, the metrological pumped-low flow-coefficient (K1) of the measuring device has to be adjusted. Then use the calibration menu of the SUPERVISOR mode to determine the new coefficient. Please note that the coefficient calculated by the system will be close to zero error.

⇨ Switch the Microcompt+ to Metrological mode. It displays "REFERENCE".
⇨ Select the menu "EMA (PUMP MODE)" and then "METER COEFFICIENT".
⇨ Choose "LF COEFFICIENT (K1)" *(Cf 3.1.1.1 Metrological parameters table)*.
⇨ Enter the new coefficient and validate.
⇨ Choose the menu "LOW FLOWRATE/K1 (Q1)" *(Cf 3.1.1.2 Metrological parameters table)*.
⇨ Enter the flowrate written during the test in low flowrate.
⇨ Choose the menu "HIGH FLOWRATE/K2 (Q2)" *(Cf 3.1.1.4 Metrological parameters table).* Enter the flowrate written during the test in high flowrate §5.1.2.
⇨ Exit the Metrological mode.

### 5.2.4 Control test

After the adjustment of the measuring device coefficient, do a control test by following the stages §5.2.1 and 5.2.2.

## 5.3 Pumped test with complete draining

### 5.3.1 Test

Do a complete delivery of the smallest compartment with the shortest piping? Use the ‘free’ delivery mode (without volume preset). At the end of the test, the end-of-counting gas detector is dry.

From User mode,

⇨ choose the "DISCHARGE" menu,
⇨ Select PUMPED MODE COUNTED (optional),
⇨ Choose the smallest compartment which volume is a bit lower than the standard’s (or the gauge’s) one.
⇨ Select the product,
⇨ Select HOSE 1 (optional).
⇨ Choose the free delivery mode.
⇨ Start delivery.
⇨ During the test, control the volume for which the Microcompt+ switches in low flowrate.
⇨ At the end of the test:

- If there's air in the sight glass, and the volume counted between the switch in low flowrate and the end of delivery is important, the end-height must be increased.
- If there's air in the sight glass, and the volume counted between the switch in low flowrate and the end of delivery is too small, the low flow-height must be increased.
- If the volume counted between the switch in low flowrate and the end of delivery is too important, the low flow-height must be reduced.

### 5.3.2 Adjustment of the finish height, if necessary

⇨ Switch the Microcompt+ to Metrological mode. It displays "REFERENCE".
⇨ Select the menu "CONFIGURATION",
⇨ Select the menu "CMA OPTION", validate ON
⇨ Choose "FINISH HEIGHT" *(Cf 2.4.2 Metrological parameters table)*
⇨ Enter the value according to the test result.
⇨ Exit the Metrological mode.

### 5.3.3 Adjustment of the low flow height, if necessary

⇨ Switch the Microcompt+ to Metrological mode. It displays "REFERENCE".
⇨ Select the menu "CONFIGURATION",
⇨ Select the menu "CMA OPTION", validate ON.
⇨ Choose "LOW FLOW HEIGHT" *(Cf 2.4.1 Metrological parameters table)*
⇨ Enter the value according to the test result.
⇨ Exit the Metrological mode.

## 5.4 Pumped test with purge and adjustment of the volumes of complete and short purge, if necessary

To perform these tests, two qualities of product are necessary with two different colours.

### 5.4.1 Test with complete purge volume

For this test, the basic product must be pushed with a noble product; for example, replace a dyed product by a colourless product. First, make a preset delivery of dyed product to make sure that the pumped hydraulic part is filled with this product. The preset volume must be greater than the manifold volume and greater than the minimum quantity.

⇨ From User mode, choose the "DISCHARGE" menu.
⇨ Choose a compartment filled with dyed product.
⇨ Validate the proposed product (the dyed one)
⇨ Choose the "PRESET+PURGE" delivery mode
⇨ Enter a preset volume.
⇨ Choose a colourless product that will push the dyed product Select the compartment filled with the colourless product.
⇨ Start delivery
⇨ When the manifold purge is completed and the colourless compartment flap is open, look at the nozzle: the product colour must change.
⇨ The Microcompt+ displays "DELIVERY FINISHED". Validate.

If the volume of colourless product through the nozzle is too important, the complete purge volume must be reduced.

If the colourless product didn't flow through the nozzle, the complete purge volume must be increased.

### 5.4.2 Adjustment of the complete purge volume, if necessary

- ⇨ Switch the Microcompt+ to Supervisor mode.
- ⇨ Select the menu "SETTINGS".
- ⇨ Choose "VOLUMES SETTINGS".
- ⇨ Choose "COMPLETE PURGE"
- ⇨ Enter the complete purge volume.
- ⇨ Exit the Supervisor mode.

### 5.4.3 Test with short purge volume

For this test, the noble product must be pushed with a basic product; for example, replace a colourless product by a dyed product. The hydraulic part might be filled with a colourless product (from the previous test). Otherwise, begin with a delivery of colourless product.

- ⇨ From User mode, choose the "DISCHARGE" menu.
- ⇨ Choose a compartment filled with a colourless product.
- ⇨ Validate the proposed product
- ⇨ Choose the "PRESET+PURGE" delivery mode
- ⇨ Enter the preset volume.
- ⇨ Choose a dyed product that will push the colourless product. Select the compartment filled with the dyed product.
- ⇨ Start delivery
- ⇨ When the manifold purge is completed and the dyed compartment flap is open, look at the nozzle: the product colour must change, look at the volume display when colour changes (write it down).
- ⇨ The Microcompt+ displays " DISCHARGE FINISHED". Validate.

If you saw dyed product through the nozzle, the short purge volume must be reduced.

### 5.4.4 Adjustment of the short purge volume, if necessary

- ⇨ Switch the Microcompt+ to Supervisor mode.
- ⇨ Select the menu "SETTINGS".
- ⇨ Choose "VOLUMES SETTINGS".
- ⇨ Choose "SHORT PURGE"
- ⇨ Enter the short purge volume.
- ⇨ Exit the Supervisor mode.

### 5.4.5 Control test with complete purge

Make a control test following the sequence 5.4.1

### 5.4.6 Control test with short purge

Make a control test following the sequence 5.4.3

## ANNEX

CALIBRATION FLOWCHART OF ALMA CMATRONIQUE MODEL MEaSURING SYSTEM