VERIFICATION MANUAL

MV 5013 EN A

GRAVICOMPT UNI

A	2019/07/23	Creation	DSM	XS
Issue	Date	Nature of modifications	Written by	Approved by

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1 FOREWORD

The GRAVICOMPT UNI is a measuring system for gravity measurement of liquids other than water (petrol and distillate).

If the liquid is not specified, tests are made with diesel.

The measuring system must be fit according to the requirements of the installation guides DI 019 for the GRAVICOMPT UNI and DI 021 for the GRAVICOMPT UNI MPLS.

For current use of the GRAVICOMPT UNI, see the operating manual MU 7081.

You must comply with regulations in force and with any applicable safety and security rules.

NOTE: Only approved persons are permitted to remove the seal.

The UNI has five pushbuttons:

		Lights the display during 10 seconds
	Clear	Normal mode: back to previous quantity Metrological mode: increment the flashing figure when imputing a value or return to previous menu
	Menu	Normal mode, metering off: select the menu Normal mode, metering on: display the values (immediate flow, temperature) Metrological mode: select the figure to be modified or select the menu
	Ok	Normal mode: validate the selected menu or value Metrological mode: validate the displayed value or the selected menu In case of default: acknowledge the default
	RAZ	The key is active when the UNI is autonomous. Reset the volume to zero and record the data of the last measurement

2 DEFINITIONS

MPE: Maximum Permissible Error. It depends on the regulations in force in the country where the equipment is used (in France, MPE=±0.5%) For information:

Error>0	Measured volume>Reference Volume
Error<0	Measured volume<Reference Volume

Enter the UNI Metrological mode: This must be done by an approved person in accordance with the maintenance sheet FM8505. Unseal the UNI, open it and flip the metrological switch.

Exit the Metrological mode: Flip back the metrological switch. The UNI reboots in User mode.

Partial delivery: The delivery starts by opening the unloading valve of the GRAVICOMPT UNI. By closing this valve it ends the delivery. The valve is closed before the GRAVICOMPT UNI becomes empty. **NOTE**: The piping upstream of the measuring device must be full of liquid.

Complete delivery: The delivery starts by opening the unloading valve of the GRAVICOMPT UNI. The discharge ends when the tank or the compartment and the entire piping is empty up to the unloading valve (API adapter).

Calibration report: Excel file “MV 5013 ANNEXE 3 revx.xls” used to calculate the error and to ensure the traceability of the tests.

3 CALIBRATION MEANS

3.1 Calibration mean

Calibration can be done with different type of prover (tank prover, master meter...)

If you use a tank prover, ALMA recommends using a gauge capacity of 2000 liters. The accuracy of the tank prover must be at least ±0.15% to adjust the GRAVICOMPT UNI.

If you use a master meter, its accuracy must be at least ±0.15%.

To achieve a good repeatability of results, you must comply with the requirements of the ANNEX 2.

3.2 Piping features

To calibrate the GRAVICOMPT UNI, you have to make several deliveries by gravity of a fixed volume. There must be no low point in the piping between the GRAVICOMPT UNI and the calibration mean. **The piping must have a diameter greater than or equal to 3”.**

3.3 Flow control valve

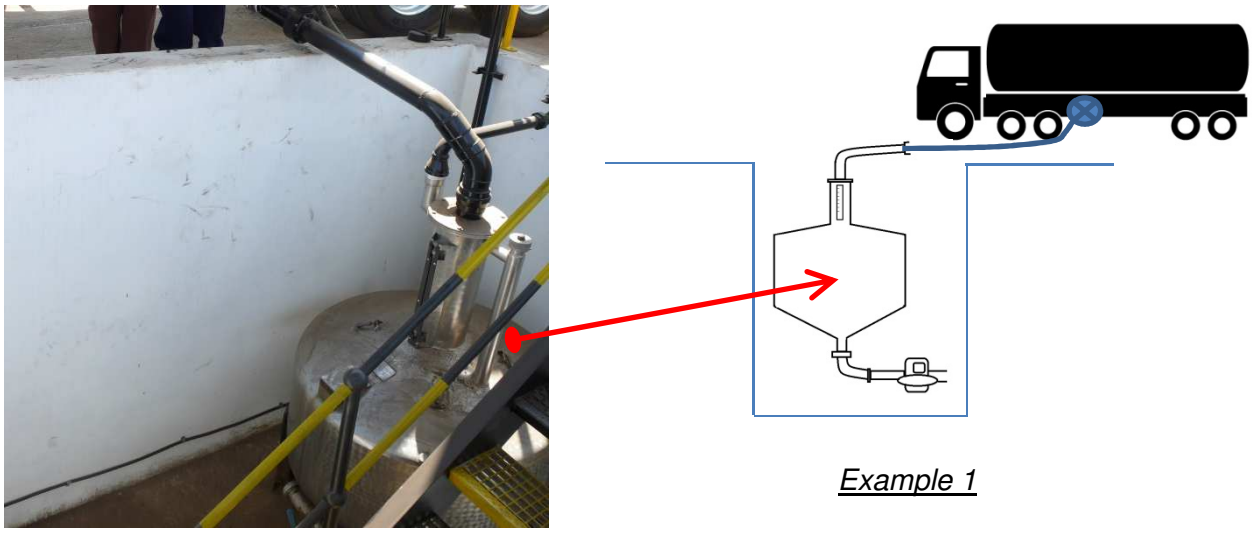
A valve at the outlet of the API adapter can be used to control the flow to reach a low flow close to 8m^3/h. ALMA recommends to get a sleeve equipped with a valve and a thermowell upstream the valve to control temperature.

Thus, the low flow tests can be done in good conditions.

3.4 Example of calibration benches

Gravity calibration bench:

The GRAVICOMPT compartment is filled with product to perform partial deliveries. For example, fill completely the 3000L tank truck compartment and only discharge 2000 liters in the tank prover.



Example 1

Calibration with master meter:

The line is always full of product. Only partial delivery must be done. The adjustment of the GRAVICOMPT UNI must be done close to ±0.1% depending on the accuracy of the master meter.

Example 2

Please contact ALMA for any help regarding the calibration bench.

Send us pictures of your calibration bench to get the best advice you need.

4 PREPARATION PHASE

4.1 Visual inspection

Make a visual inspection of the GRAVICOMT UNI. Make sure there are no visible marks or default.

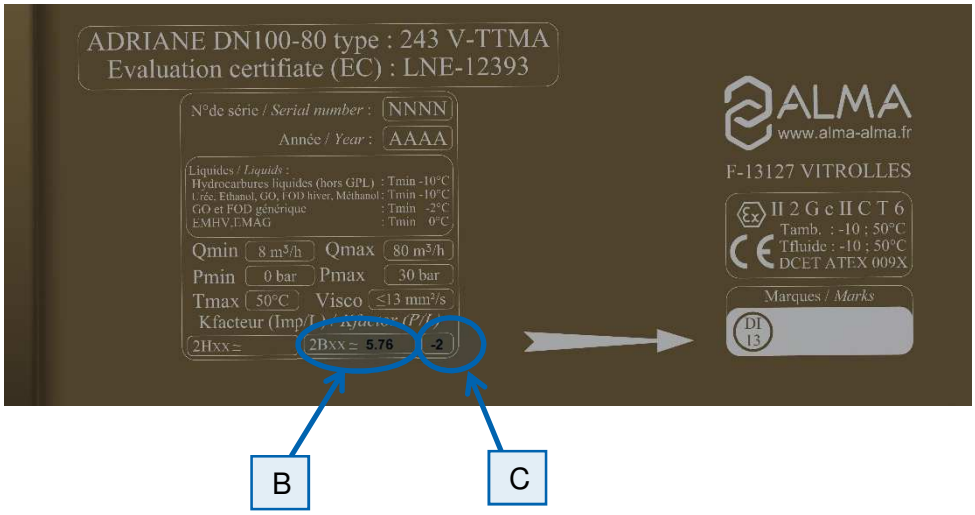
Note in the calibration report the data that follow:

The serial number A

For a MID measuring system, refer to the identification plate.

The K-coefficient (Kfactor) B

The correction coefficient (kV) C of the GRAVICOMPT UNI



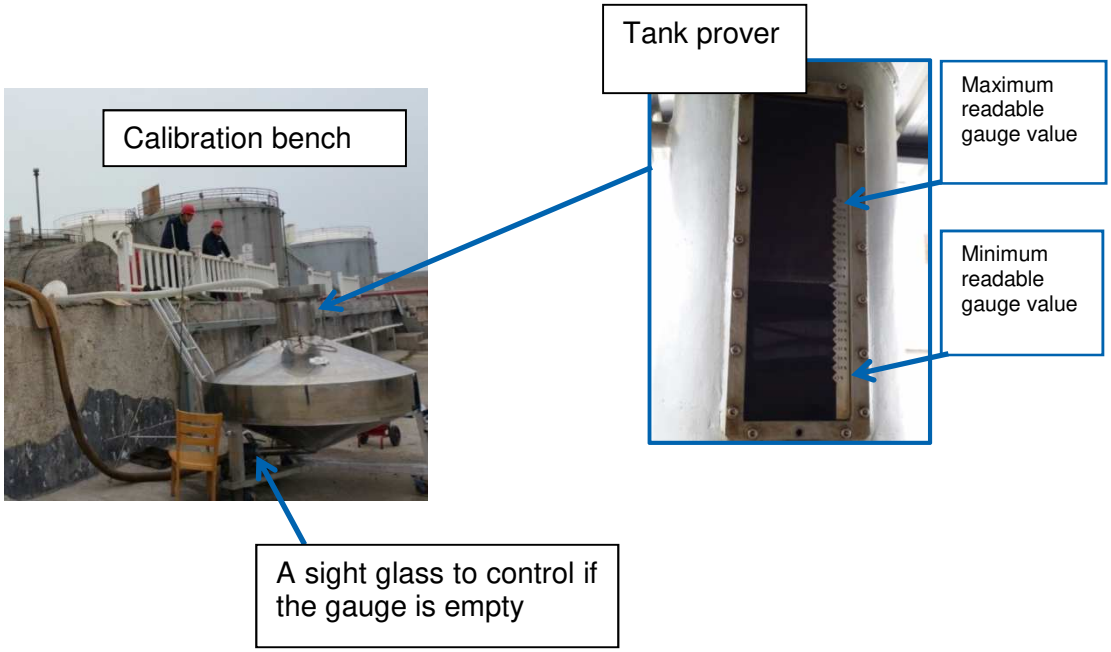
A B C

GRAVICOMPT UNI N° = (voir marquages A)	812	Coefficient (Kfacteur) = (voir marquages B)	5,76	Correction = (voir marquages C)	-2

Test	Date	Heure	Carburant	Livraison P: partielle C: complète	menu GRAVICOMPT UNI									Moyen étalon (ex: jauge)		Erreur de précision = (3-4)/4*100
					Superviseur/ Paramètre	Visualisation/ Mesurage		Superviseur/Etalonnage								
					Coefficient K	Volume brut Vm (1)	Volume converti Vb (2)	Volume Vm en 1/10è de litres (3)	Erreur (5)	Coefficient proposé (6)	Débit moyen (7)	Temp. moyenne (8)	Volume sous petit débit (9)	Température JAUGE	Volume JAUGE (4)	
1																#DIV/0!
2																#DIV/0!
3																#DIV/0!

Inspect the calibration bench:

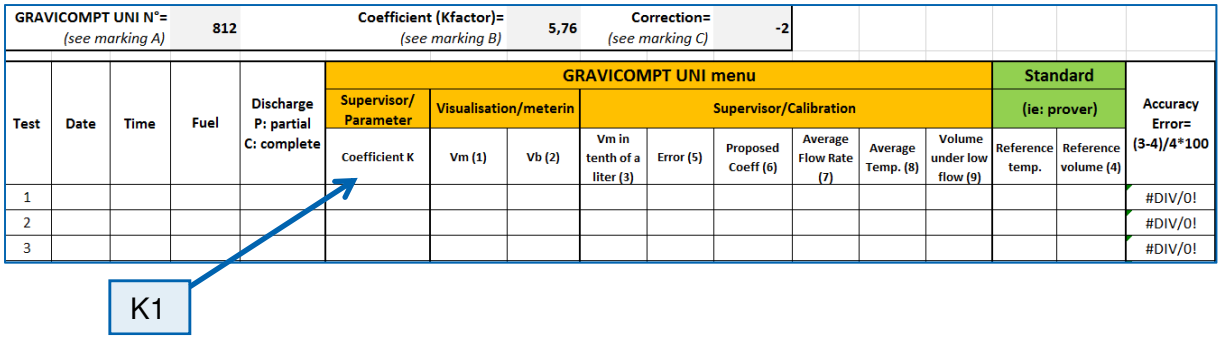
- Make sure there is no leak
- Use the relevant connection fittings to connect the flexible pipe to the GRAVICOMPT UNI.
- Make sure the unloading valve can operate easily
- Check the maximum gauge capacity and the range of readable values (min and max)
- Make sure the tank prover is empty.



4.2 Check the parameters

If necessary, power on the device. Before any change, write down the parameters SuPErVi>PArAMEt:

	Parameter	Meaning	Comment	Value
INDICATOR REFERENCE				
1	rEFErEn	Serial number of the UNI		
TURBINE				
2	turbinE	Serial number of the turbine meter.		
SCALE				
3.1	VoLuMES	Volume unit		
3.2	FLoWS	Flowrate unit		
COEFFICIENT				
4.1	CoEFF_1 or K1	Coefficient for low flow in pulses/liter	Write down the K1-coefficient value in the calibration report May be adjusted after the test. *See §6.3 and 6.5*	
4.2	FLoW_1	Default value: 0	May be adjusted *See §6.5*	
4.3	kV1	If applicable: correction coefficient in ‰ corresponding to FLoW_1 for low viscosity products	May be adjusted after the test. *See §7.3 and 7.4*	
4.4	CoEFF_2 or K2	Coefficient for high flow in pulses/liter	May be adjusted after the test. *See §6.5*	
4.5	FLoW_2	Default value: 0	May be adjusted *See §6.5*	
4.6	kV2	If applicable: correction coefficient in ‰ corresponding to FLoW_2 for low viscosity products	May be adjusted after the test. *See §7.4*	



GRAVICOMPT UNI N°= *(see marking A)*	812	Coefficient (Kfactor)= *(see marking B)*	5,76	Correction= *(see marking C)*	-2

Test	Date	Time	Fuel	Discharge P: partial C: complete	GRAVICOMPT UNI menu									Standard		Accuracy Error= (3-4)/4*100
					Supervisor/ Parameter	Visualisation/meterin		Supervisor/Calibration						(ie: prover)		
					Coefficient K	Vm (1)	Vb (2)	Vm in tenth of a liter (3)	Error (5)	Proposed Coeff (6)	Average Flow Rate (7)	Average Temp. (8)	Volume under low flow (9)	Reference temp.	Reference volume (4)	
1																#DIV/0!
2																#DIV/0!
3																#DIV/0!

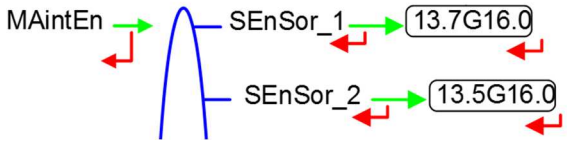
K1

	Parameter	Meaning	Comment	Value
PRODUCT (for each product)				
4.1	nAME	The name of the product		
4.2	MVtb	The product density	Set 000 to remove the product from the list displayed in user mode	
4.3	CorrEct	on for product with MVtb<750Kg/m^3 oFF otherwise		
FLOWRATES				
5.1	MiniMuM	Minimum flowrate of the turbine 8m^3/h		
5.2	MAXiMuM	Maximum flowrate of the turbine 80m^3/h		
VOLUMES				
6.1	MiniMuM	Minimum quantity 200L		
6.2	Add_VoL	End of metering volume Default value: 0	May be adjusted after the test. *See §6.4*	
6.3	dELAY	Volume in low flow Default value: 0		
6.4	CLASS	Accuracy class 0.5		
DIRECTION				
7.1	EnAbLE	on if the counter is configured to detect flow direction		
7.2	KdirEct	Additional correction coefficient for 'loading' direction	May be adjusted after the test. *See §8.3*	
7.3	dirdiSP	on if display of the counter and memorization of volumes for 'loading' direction is active		
TEMPERATURE				
8.3	rEF_tEM	Reference temperature value if the option is on (15 or 20°C) oFF if the option is not active		
GAS SENSORS				
9.1	SEnSorS	on if the UNI operates with gas sensors		
THRESHOLDS				
10.1	rCS_Min	Factory set 0.03	DO NOT CHANGE	
10.2	rCS_MAX	Factory set 0.65	DO NOT CHANGE	
DATE AND TIME				
11.1	dAtE	Current date		
11.2	tiME	Current time	The menu SuPErVi>SEASon of USER mode can also be used to change from summer to winter time (and back again)	

	Parameter	Meaning	Comment	Value
AUTOMATIC RECORDING				
12.1	Aut SAV	Time required at the end of measurement before automatic recording of the measurement data. Value between 0 and 999s (see MU 7081)	The volume is reset after X seconds after the flow has stopped (zero flow)	
MPLS				
13.1	EnAbLE	oFF for GRAVICOMPT UNI on for GRAVICOMPT UNI MPLS, *If on:*	Activate only with the MPLS module (option)	
13.2	MPLS_Id	Serial number of the MPLS		
13.3	n_PLAtE	Vehicule registry number		
13.4	L_LF_HF	Flowrate beyond which the UNI switches from low to high flowrate	DO NOT CHANGE	
13.5	V_HF_LF	Volume beyond which the UNI switches from high to low flowrate	DO NOT CHANGE	
13.8	PrESS	Inactive		

4.3 Check the gas sensors status

Check the status of the gas sensors SEnSor_1 and SEnSor_2 through the menu **SuPErVi>MAintEn**:



With empty piping, the sensors are dry so Y=G (Gas) and xx.x≈zz.z

If Y=L (Liquid), the sensor is wet.

Example: 14.4G15.2 or 10.3L15.2

Left-hand value: instantaneous current in mA

Right-hand value: stored current in mA

Middle letter: G for Gas and L for Liquid

5 CONDITIONING OF THE MEASURING SYSTEM AND CALIBRATION MEAN

Before starting the measuring tests, the measuring system and the calibration mean must be put in operating conditions. When using a tank prover, it enables to realize a preliminary operation: fill the tank prover and then empty it completely.

It's done to stabilize the temperature of the entire calibration bench: piping, measuring device, tank prover...

This must be done at the beginning of each working day or after a rather long shutdown period. Otherwise there should be an uncertainty in measurement on the first result of verification.

GRAVICOMPT UNI MPLS: To adjust the accuracy of the preset loaded volume, ALMA recommends to do several successive preset operations (for example 5 times 200 liters instead of 1000 liters).

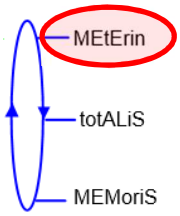
GRAVICOMPT UNI: Start a manual delivery.

In case of alarm during delivery, refer to the list of alarms in MU 7081, the alarm is no longer visible during the next delivery.

Do not take these results into account.

Plug the calibration mean to the tanker.

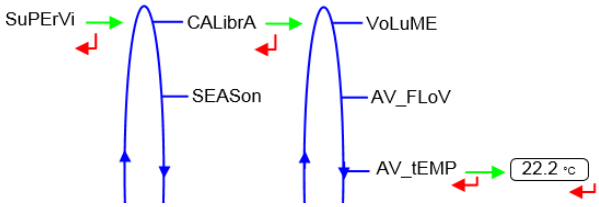
1. Display the menu **MEtErin**



2. Start delivery:

GRAVICOMPT UNI	GRAVICOMPT UNI MPLS
• Press RAZ or wait the automatic reset of the volume • Choose the product • Fully open the valve to start the delivery • Close the valve when the gauge volume is reached (1000L for example) • Press RAZ or wait the reset of the volume	• Activate the authorization with the relevant device (on-off switch for example). This action resets the meter and tests the display unit. • Choose the product • Choose the delivery mode (preset or free) • Enter the volume (if preset) • In free mode stop the delivery with the UNI red button to close the valve • Remove the authorization to stop the delivery. This causes end of measurement and data recording

3. Note the average temperature through the menu SuPErVi>CALibrA>AV_tEMP.



Compare it to the gauge temperature. The authorized value varies according to the local regulation, ALMA recommends T_{gauge}-$T_{average}$<±0.5°C. If this condition is not met, see maintenance sheet FM8509 'Adjustment of temperature in the UNI indicator device'

4. Prepare the calibration bench for a partial delivery:
   - ❍ Empty the calibration mean
   - ❍ Fill the compartment.

6 CONTROL AND ADJUSTMENT OF METERING COEFFICIENTS

The tests depend on the final use of the measuring system. See attached flow chart.

6.1 Preparation phase for a partial delivery

Prepare the calibration bench for a partial delivery:

- Empty the calibration mean
- Fill the compartment

The volume loaded in the compartment must be greater than the maximum value indicated on the calibration mean (between 300 and 500 liters more than the standard volume).

6.2 Check the parameters

Check the conditions: meter coefficients K1=K2 (CoEFF_1= CoEFF_2) and FLoW_1=FLoW_2=0

6.3 High-flow test for partial delivery

The unloading valve must be open and close quickly and always the same way for all the tests.

6.3.1 High-flow test for partial delivery

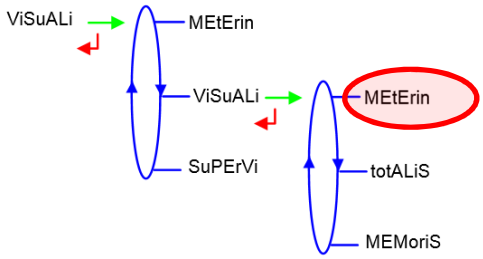
1. Display the menu **MEtErin**
2. Start delivery

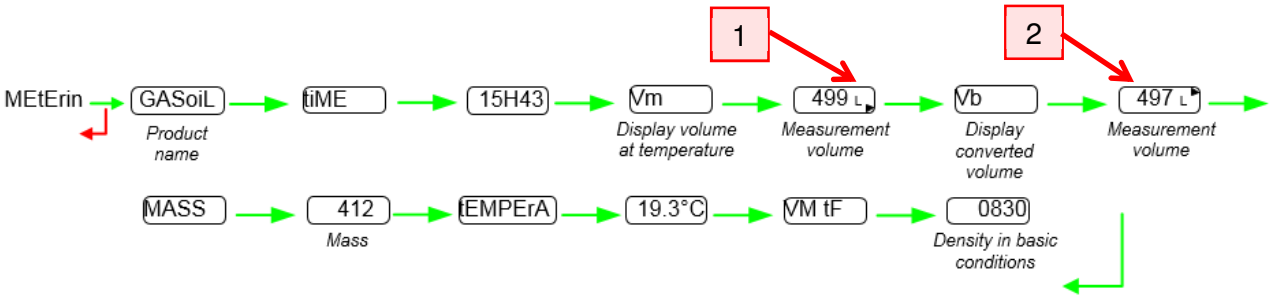
GRAVICOMPT UNI	GRAVICOMPT UNI MPLS
• Press RAZ or wait the automatic reset of the volume • Choose the product • Fully open the valve to start the delivery • Close the valve to stop delivery • Press RAZ or wait the reset of the volume	• Activate the authorization with the relevant device (on-off switch for example). This action tests the display unit and resets the meter. • Choose the product • Choose the delivery mode (preset or free) • Enter the volume (if preset) • In free mode stop the delivery with the UNI red button to close the valve • Remove the authorization to stop the delivery. This causes the end of measurement and data recording

The measurement is recorded in the GRAVICOMPT UNI

6.3.2 Calculation of the high-flow error

1. Choose the menu **ViSuALi>MEtErin**



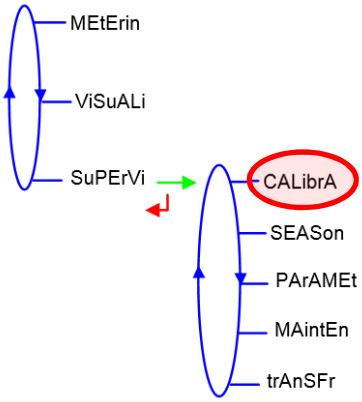


Write down in the calibration report:

The value gross volume Vm 1

The value converted volume Vb 2

2. Choose the menu **SuPErVi>CALibrA**



In the calibration report:

Write down the value gross volume Vm in deciliters 3

Replace the value Vm by the reference volume read on the calibration mean 4
Write it down

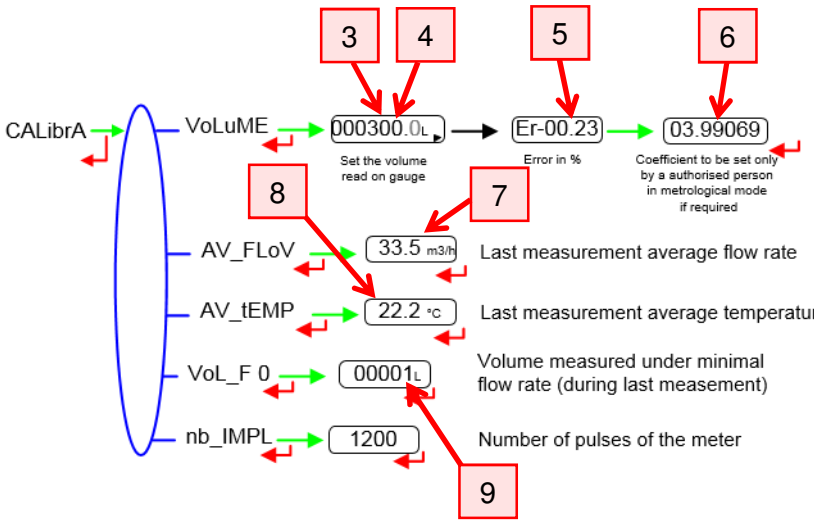
Write down the value error in % 5

Write down the proposed coefficient 6

Select AV_FLoV and write down the average flow value 7

Select AV_tEMP and write down the average temperature value 8

Select VoL_F 0 and write down the volume value 9



GRAVICOMPT UNI N°= 812 (see marking A) | Coefficient (Kfactor)= 576 (see marking B) | Correction= -2 (see marking C)

Test	Date	Time	Fuel	Discharge P: partial C: complete	GRAVICOMPT UNI menu									Standard		Accuracy Error= (3-4)/4*100	Comments
					Supervisor/ Parameter	Visualisation/meterin		Supervisor/Calibration						(ie: prover)			
					Coefficient K	Vm (1)	Vb (2)	Vm in tenth of a liter (3)	Error (5)	Proposed Coeff (6)	Average Flow Rate (7)	Average Temp. (8)	Volume under low flow (9)	Reference temp.	Reference volume (4)		
1	20-mars	10:00	GAZOLE	P	5,76	1998,0	**2003,0**	1998,2	-0,07%	5,75789	35,0	13,2	0,0	13	1999,5	-0,07%	
2	20-mars	10:20	GAZOLE	P	5,76	1998,0	**2003,0**	1998,6	-0,07%	5,75794	35,0	13,3	0,0	13	2000	-0,07%	
3	20-mars	11:00	GAZOLE	P	5,7579	2000,0	**2004,0**	1999,8	-0,01%	5,75781	35,0	13,4	0,0	13,5	2000	-0,01%	adjustment Kfactor

1 2 3 5 6 7 8 9 4

3. You can make several high-flow tests
4. If necessary, adjust the high-flow coefficient.

6.3.3 Adjustment of the high-flow coefficient

If necessary, the K-coefficient is adjusted to meet the requested accuracy.

The adjustment is done after at least three partial delivery with a satisfactory repeatability. This precaution confirms the need to adjust the coefficient.

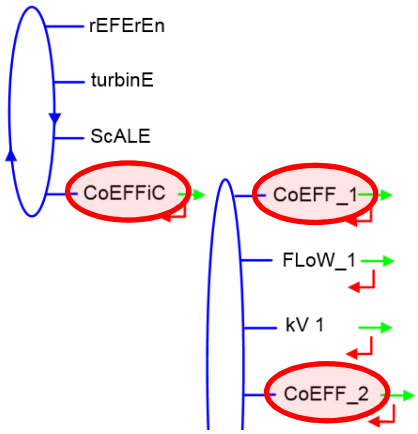
NOTE: Only approved persons are permitted to adjust the coefficient.

REMINDER:

Reduce the volume of the next delivery compared to the volume of the calibration mean ↓ **V**	Increase the coefficient ↑ **K**
Increase the volume of the next delivery compared to the volume of the calibration mean ↑ **V**	Reduce the coefficient ↓ **K**

Set the coefficient:

1. Enter the UNI Metrological mode
2. Choose the menu **CoEFFiC** and validate. **CoEFF_1** is displayed



3. Enter the K-coefficient previously calculated and validate. This value is automatically written in **CoEFF_2**
4. Exit the Metrological mode. In case of alarm, refer to the list in user manual MU 7081
5. Close the UNI according to the recommendations of the maintenance sheet FM8505
6. Do a verification partial delivery.

NOTE: To improve the results you can use flow linearization. So, make a low-flow test as described at §6.5

6.4 High-flow test for complete delivery

6.4.1 Preparation phase for a complete delivery

This test is done by emptying the compartment in the prover. The loaded volume must be within the measuring range on the prover.

Ex.: Fill the compartment with 2000 liters if the measuring range of the prover is included between 1990 and 2010 liters.

6.4.2 High-flow test for complete delivery

A complete delivery is done to control the accuracy for this delivery mode. According to the type of delivery, the error achieved during this test can be different than the error calculated during the partial delivery test. However, it must not justify the change of the K-coefficient.

1. Display the menu **MEtErin**
2. Start delivery

GRAVICOMPT UNI	GRAVICOMPT UNI MPLS
• Press RAZ or wait the automatic reset of the volume • Choose the product • Fully open the valve to start the delivery • When the measurement is completed and the volume is blinking, close the unloading valve • Press RAZ or wait the reset of the volume	• Activate the authorization with the relevant device (on-off switch for example). This action tests the display unit and resets the meter. • Choose the product • Choose the delivery mode (preset or free) • Enter the volume (if preset) • In free mode stop the delivery with the UNI red button to close the valve • Remove the authorization to stop the delivery. This causes the end of measurement and data recording

The measurement is recorded in the GRAVICOMPT UNI

6.4.3 Calculation of the high-flow error

1. Follow the steps 1 and 2 of §6.3.2 and write down the results on the calibration report
2. You can make several high-flow tests
3. If necessary, adjust the additional volume, see § below

If the results are not satisfactory after two adjustments of the additional volume, do a low-flow partial test (see §6.5).

Comment: For a specific GRAVICOMPT UNI, the error due to air mixture at the end of a complete delivery does not depend on the delivered volume. It means that the error decreases when the delivery volume increases. Ex.: A 4 liters error at the end of delivery for 2000 liters or 20000 liters corresponds to the respective rates 0.2% or 0.02%

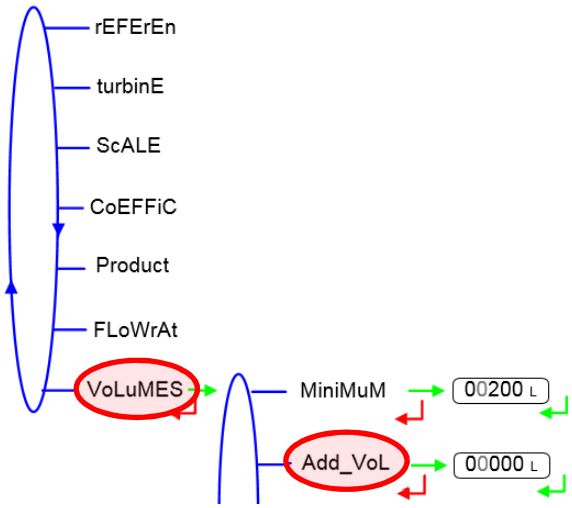
6.4.4 Adjustment of the additional volume

If necessary, the additional volume **Add_VoL** is adjusted to meet the requested accuracy. It corresponds to the volume between the turbine and the transfer point. This volume is automatically added at the end of the delivery with a complete drain. Reduce or increase this volume to adjust the result of a complete delivery.

The adjustment is done after at least two complete delivery with a satisfactory repeatability. This precaution confirms the need to adjust the volume.

NOTE: Only approved persons are permitted to adjust the additional volume.

1. Enter the UNI Metrological mode
2. Choose the menu **VoLuMES** and validate. Choose the menu **Add_VoL** and validate.



3. Enter the additional volume and validate.
4. Exit the Metrological mode. In case of alarm, refer to the list in user manual MU 7081
5. Close the UNI according to the recommendations of the maintenance sheet FM8505
6. Do one or several complete delivery to control the accuracy of the measuring system.

6.5 Low-flow test for partial delivery (if required)

The volume loaded in the compartment must be greater than the maximum value indicated on the tank prover.

The unloading valve must be open and close quickly and always the same way for all the tests.

6.5.1 Conditioning of the low-flow control valve

Throttle the flow with the valve downstream the GRAVICOMPT UNI.

6.5.2 Low-flow test for partial delivery

1. Display the menu **MEtErin**
2. Start delivery

GRAVICOMPT UNI	GRAVICOMPT UNI MPLS
• Press RAZ or wait the automatic reset of the volume • Choose the product • Slightly open the valve to start the delivery • Close the valve before appearance of air to stop delivery • Press RAZ or wait the reset of the volume	• Activate the authorization with the relevant device (on-off switch for example). This action tests the display unit and resets the meter. • Choose the product • Choose the delivery mode (preset or free) • Enter the volume (if preset) • In free mode stop the delivery with the UNI red button to close the valve

	• Remove the authorization to stop the delivery. This causes the end of measurement and data recording

The measurement is recorded in the GRAVICOMPT UNI

6.5.3 Calculation of the low-flow error

1. Follow the steps 1 and 2 of §6.3.2 and write down the results on the calibration report
2. You can make several low-flow tests
3. If necessary, adjust the low-flow coefficient.

6.5.4 Adjustment of K1 and K2 coefficients and setting of flow

Adjust K1 and K2 coefficients and set the flow values.

The adjustment is done after at least three partial delivery with a satisfactory repeatability. This precaution confirms the need to adjust the coefficient.

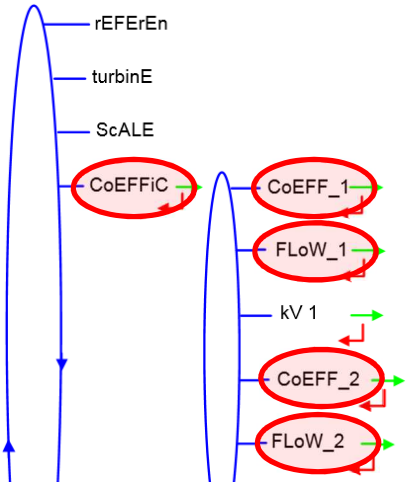
NOTE: Only approved persons are permitted to adjust the coefficient and to set the flow values.

REMINDER:

Reduce the volume of the next delivery compared to the volume of the calibration mean ↓ **V**	Increase the coefficient ↑ **K**
Increase the volume of the next delivery compared to the volume of the calibration mean ↑ **V**	Reduce the coefficient ↓ **K**

Set the coefficients:

1. Enter the UNI Metrological mode
2. Choose the menu **CoEFFiC** and validate. **CoEFF_1** is displayed. Validate
3. Enter the K-coefficient calculated for the low-flow test and validate
4. Choose the menu **FLoW_1** and validate
5. Enter the low-flow of the test as Qmin<FLoW_1<FLoW_2<Qmax. Validate
6. Choose the menu **CoEFF_2** and validate
7. Enter the K-coefficient calculated for the high-flow test and validate
8. Choose the menu **FLoW_2** and validate
9. Enter the average high-flow of the tests performed previously as Qmin<FLoW_1<FLoW_2<Qmax. Validate



10. Exit the Metrological mode. In case of alarm, refer to the list in user manual MU 7081
11. Close the UNI according to the recommendations of the maintenance sheet FM8505
12. Do at least a verification partial low-flow delivery.
13. If necessary, adjust again K1 and FLoW_1
14. Do a complete delivery to control the accuracy of the adjusted measuring system (see §6.4).

7 CONTROL AND ADJUSTMENT OF THE CORRECTION COEFFICIENTS (IF REQUIRED)

The tests described in this section are done if the GRAVICOMPT UNI is used to measure products which density is lower than 750Kg/m^3. See attached flow chart.

According to the configuration, do the tests that follow:

Coefficient to verify or to adjust	Type of test (MV<750Kg/m^3)
kV1=kV2	Single flow test (operating flow). See §7.4
kV2 for high flow kV1 for low flow	Two-flow test (high and low flow). See §7.5

7.1 Preparation phase for a partial delivery

Prepare the calibration bench for a partial delivery:

- Empty the calibration mean
- Fill the compartment

The volume loaded in the compartment must be greater than the maximum value indicated on the calibration mean (between 300 and 500 liters more than the standard volume).

7.2 Single flow test for partial delivery

7.2.1 Check the parameters

Verify the conditions that follow: K1=K2 and FLoW_1=FLoW_2=0

7.2.2 Operating flow test for partial delivery

Follow the procedure given in §6.3.1. At step 2, choose a product with a low density, such as unleaded petrol.

7.2.3 Calculation of the operating flow error

1. Follow the steps 1 and 2 of §6.3.2 and write down the results on the calibration report
2. You can make several tests at operating flow
3. If necessary, adjust the correction coefficient

7.2.4 Adjustment of the correction coefficient kV1=kV2

If necessary, the correction coefficient is adjusted to meet the requested accuracy with petrol. **Do not change the K-coefficient.**

The adjustment is done after at least three partial delivery with a satisfactory repeatability. This precaution confirms the need to adjust the coefficient.

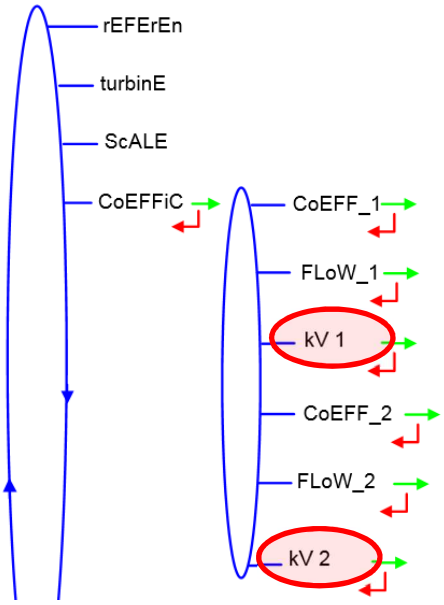
NOTE: Only approved persons are permitted to adjust the coefficient.

REMINDER:

Reduce the volume of the next delivery compared to the volume of the calibration mean *Example: enter"1" to decrease the volume by about 0.1%* ↓ **V**	Increase the correction coefficient ↑ **kV**
Increase the volume of the next delivery compared to the volume of the calibration mean *Example: enter "-3" to increase the volume by about 0.3%* ↑ **V**	Reduce the correction coefficient ↓ **kV**

Set the coefficient:

1. Enter the UNI Metrological mode
2. Choose the menu **CoEFFiC** and validate. **CoEFF_1** is displayed. Validate
3. Choose **kV1** and validate



4. Correction coefficient (from -9‰ to 9‰). In case of negative error, use Select to put a minus sign in front of the digit. Validate. This value is automatically written in **kV2**
5. Exit the Metrological mode. In case of alarm, refer to the list in user manual MU 7081
6. Close the UNI according to the recommendations of the maintenance sheet FM8505
7. Do a verification partial delivery.

7.3 Two flow test

7.3.1 Check the parameters

Verify the conditions that follow: K1≠K2 and FLoW_1≠FLoW_2

7.3.2 High-flow test for partial delivery

Necessary precondition: K1≠K2 and FLoW_1≠FLoW_2

Follow the procedure given in §6.3.1. At step 2, choose a low viscosity product, such as unleaded petrol.

7.3.3 Calculation of the high-flow error

1. Follow the steps 1 and 2 of §6.3.2 and write down the results on the calibration report
2. You can make several high-flow tests
3. If necessary, adjust the correction coefficient

7.3.4 Adjustment of the correction coefficient kV2

If necessary, the correction coefficient is adjusted to meet the requested accuracy with petrol. **Do not change the K-coefficient.**

The adjustment is done after at least three partial delivery with a satisfactory repeatability. This precaution confirms the need to adjust the coefficient.

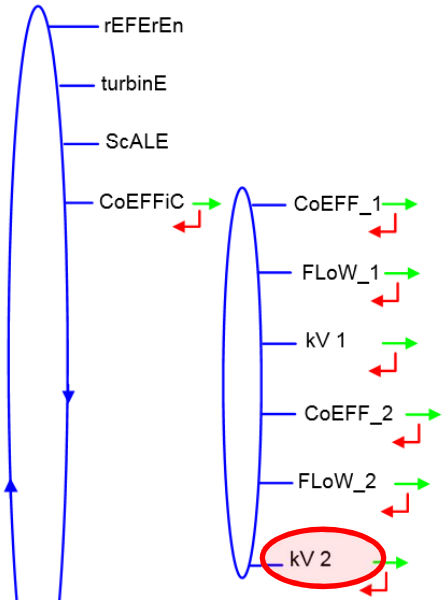
NOTE: Only approved persons are permitted to adjust the coefficient.

REMINDER:

Reduce the volume of the next delivery compared to the volume of the calibration mean *Example: enter"1" to decrease the volume by about 0.1%* ↓ **V**	Increase the correction coefficient ↑ **kV**
Increase the volume of the next delivery compared to the volume of the calibration mean *Example: enter "-3" to increase the volume by about 0.3%* ↑ **V**	Reduce the correction coefficient ↓ **kV**

Set the coefficient:

1. Enter the UNI Metrological mode
2. Choose the menu **CoEFFiC** and validate. **CoEFF_1** is displayed. Validate
3. Choose **kV2** and validate



4. Correction coefficient (from -9‰ to 9‰). In case of negative error, use Select to put a minus sign in front of the digit. Validate
5. Exit the Metrological mode. In case of alarm, refer to the list in user manual MU 7081
6. Close the UNI according to the recommendations of the maintenance sheet FM8505
7. Do a verification partial delivery.

7.3.5 Set the low-flow control valve

Throttle the flow to approach as close as possible to the value **FLoW_1** recorded at the end of the partial low-flow delivery (§6.5).

7.3.6 Low-flow test for partial delivery

Follow the procedure given in §6.5.2. At step 2, choose a low viscosity product, such as unleaded petrol.

7.3.7 Calculation of the low-flow error

1. Follow the steps 1 and 2 of §6.3.2 and write down the results on the calibration report
2. You can make several low-flow tests
3. If necessary, adjust the correction coefficient.

7.3.8 Adjustment of the correction coefficient kV1≠kV2

If necessary, the correction coefficient is adjusted to meet the requested accuracy with petrol. **Do not change the K-coefficient.**

The adjustment is done after at least three partial delivery with a satisfactory repeatability. This precaution confirms the need to adjust the coefficient.

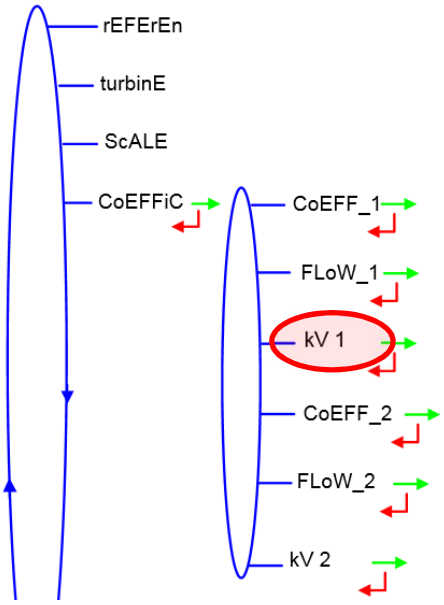
NOTE: Only approved persons are permitted to adjust the coefficient.

REMINDER:

Reduce the volume of the next delivery compared to the volume of the calibration mean *Example: enter"1" to decrease the volume by about 0.1%* ↓ **V**	Increase the correction coefficient ↑ **kV**
Increase the volume of the next delivery compared to the volume of the calibration mean *Example: enter "-3" to increase the volume by about 0.3%* ↑ **V**	Reduce the correction coefficient ↓ **kV**

Set the coefficient:

1. Enter the UNI Metrological mode
2. Choose the menu **CoEFFiC** and validate. **CoEFF_1** is displayed.Validate
3. Choose **kV1** and validate



4. Correction coefficient (from -9‰ to 9‰). In case of negative error, use Select to put a minus sign in front of the digit. Validate
5. Exit the Metrological mode. In case of alarm, refer to the list in user manual MU 7081
6. Close the UNI according to the recommendations of the maintenance sheet FM8505
7. Do a verification partial delivery.

8 CONTROL AND ADJUSTMENT OF THE DIRECTION COEFFICIENT (IF REQUIRED)

This step is useful if the GRAVICOMPT UNI is configured to detect flow direction. See attached flow chart.

You can use the meter of the loading arm to perform this test. You can also use an Etalcompt API as a calibration mean.

NOTE: Measured volumes are not guaranteed.

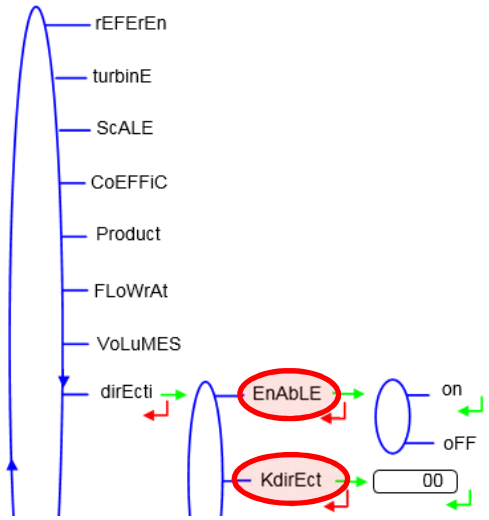
8.1 Preparation phase for loading

Follow the usual tank-truck loading procedure

8.2 Check the parameters

In the menu SuPErVi>PArAMEt, make sure the feature is active: EnAbLE→on.

Write down the value coefficient KdirEct.



8.3 Loading test

8.3.1 Test

1. Display the menu **MEtErin**
2. Start loading

GRAVICOMPT UNI	GRAVICOMPT UNI MPLS
• Press RAZ or wait the automatic reset of the volume • Choose the product • Start measurement on the arm meter	• Activate the authorization • Choose the product • Start measurement on the arm meter • Remove the authorization when the loading is done

8.3.2 Calculation of the error

1. Use the formula that follows to find out the error in %:

$$Error = \frac{V_{UNI} - V_{REF}}{V_{REF}}$$

V_{REF}: Volume displayed on the master meter (arm meter, Etalcompt API or other available mean)

2. If necessary, adjust the coefficient KdirECt.

8.3.3 Adjustment of the coefficient KdirECt

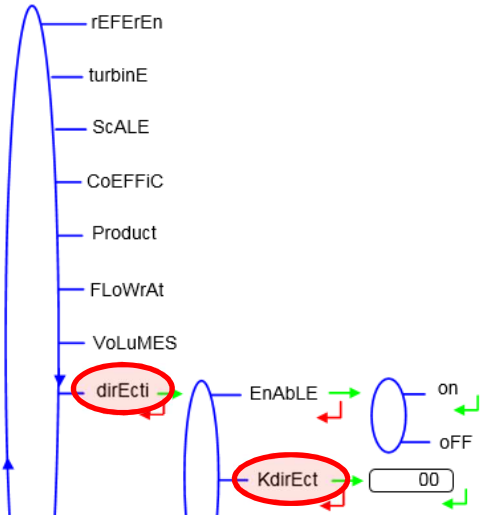
If necessary, the coefficient KdirEct is adjusted to meet the requested accuracy.

The adjustment is done after at least three loading with a satisfactory repeatability. This precaution confirms the need to adjust the coefficient.

NOTE: Only approved persons are permitted to adjust the coefficient.

Do not change the K and kV-coefficients.

1. Enter the UNI Metrological mode:
2. Choose the menu **dirEcti** and validate. **EnAbLE** is displayed. Validate



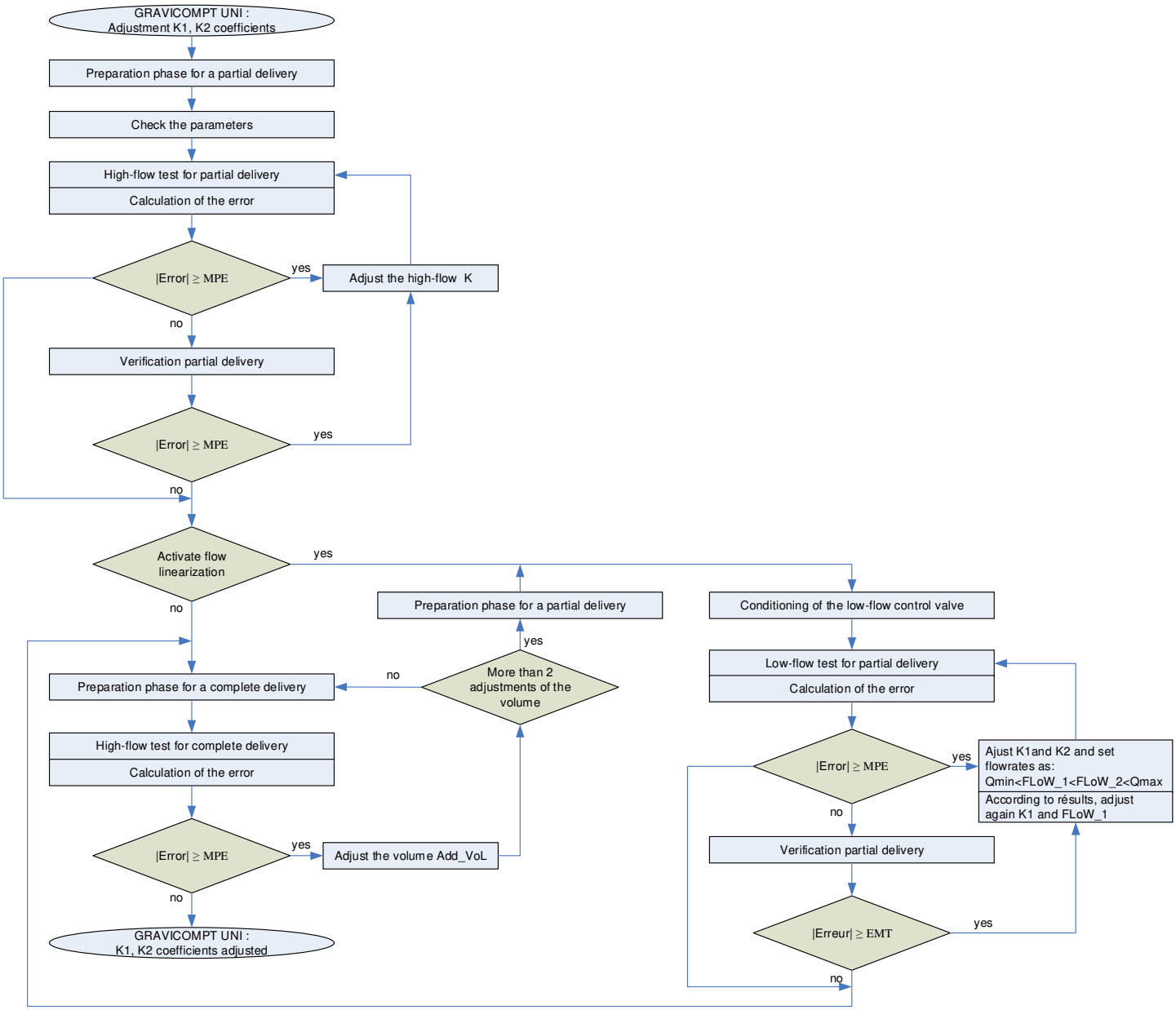
3. You can adjust the coefficient (from -50 to 50). Use the formula that follows to find out the new coefficient:

   $$KdirEcti_n = KdirEcti_{n-1} + \frac{V_{UNI} - V_{REF}}{V_{REF}}$$

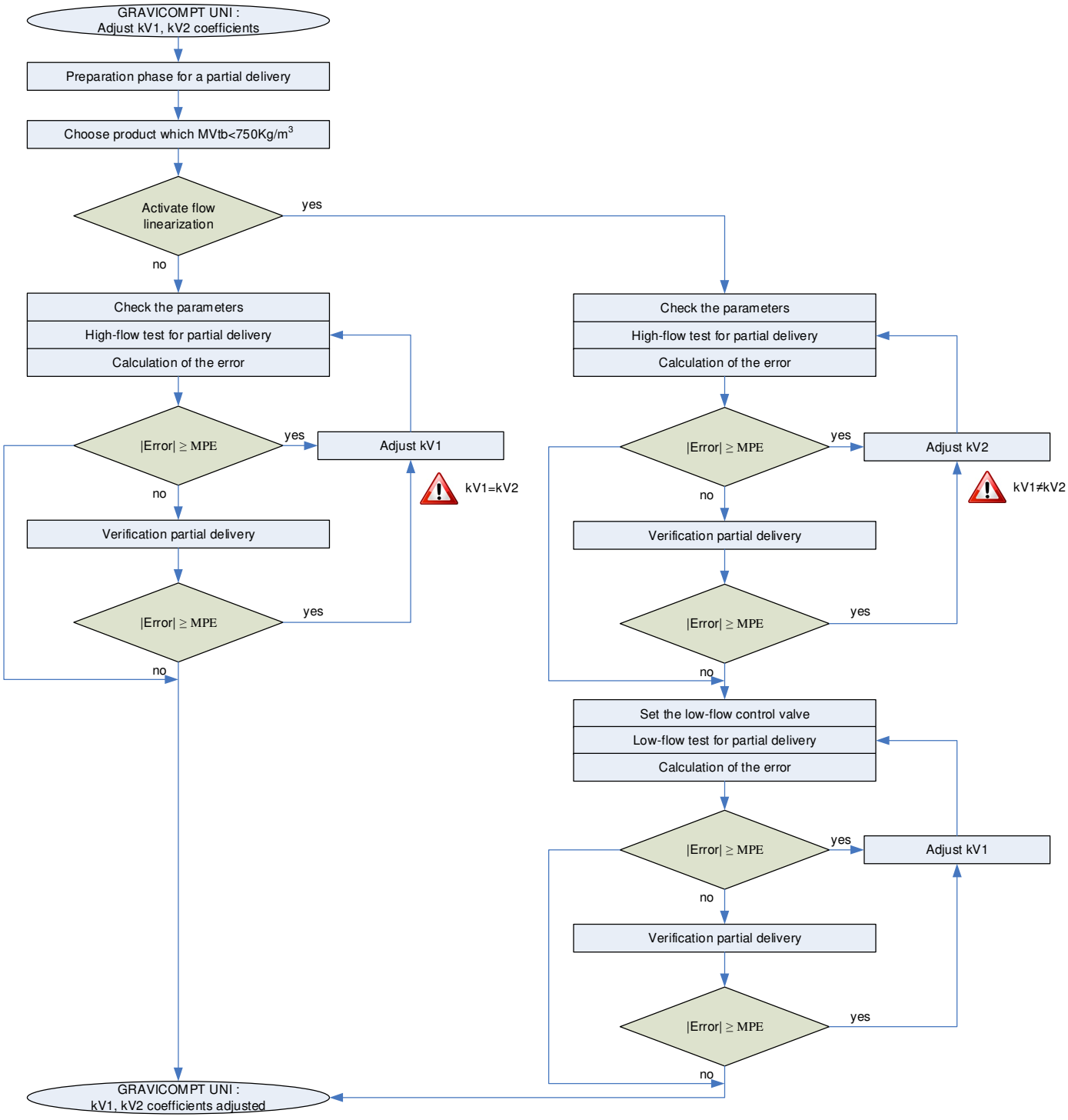
   Use Select to put a minus sign in front of the digit. Validate
4. Do a verification test.

ANNEX 1: Flow charts

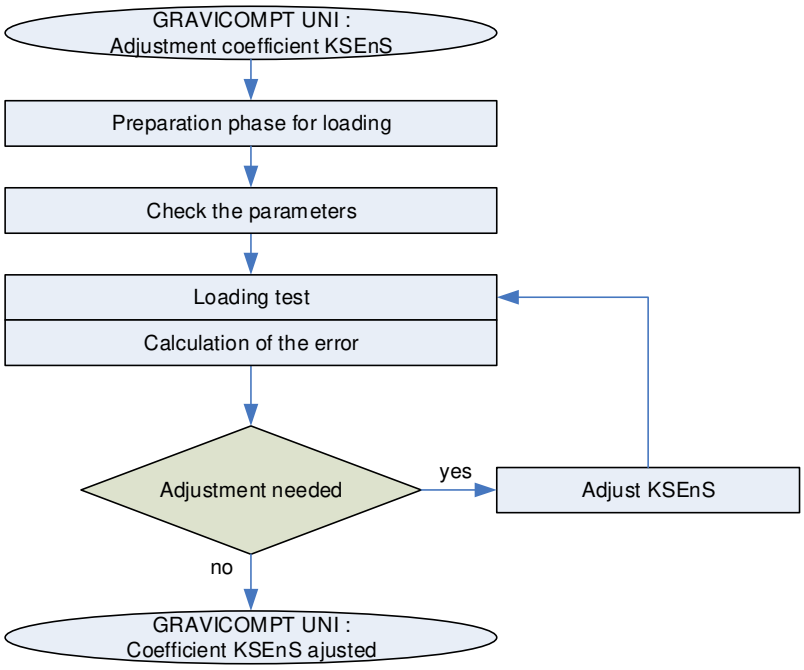
Control and adjustment of the metering coefficients (description in §6)



Control and adjustment of the correction coefficients (description in §7)



Control and adjustment of the direction coefficient (description in §8)



ANNEX 2: Precaution to ensure a good repeatability

The repeatability of the tests can be upgraded. Avoid any action or effects that can impact the measurement.

- ⇨ Use a clean product. No dirt.
- ⇨ The foam that appears when the product is pumped back to the tank must have disappeared before you start a new test.
- ⇨ Open quickly the unloading valve (only one time) and close it quickly (only one time)
- ⇨ Do not regulate the flow during delivery
- ⇨ Do not try to reach a given volume by opening the unloading valve several times or by closing it softly to reduce the flow.
- ⇨ Try to repeat as faithfully as possible the same delivery procedure for each test:

Wait the same duration:

- ❍ For disappearance of foam
- ❍ To consider the gauge is empty
- ❍ To consider the upper tank as empty (ONLY FOR COMPLETE DELIVERY)

Deliver the same volume

- ⇨ Do not take into account the first test or the test made after a 2 hours long pause
- ⇨ Cancel every results with default, alarm, error or leak that occur during the delivery

ANNEX 3: Calibration report GRAVICOMPT UNI ALMA

Fill the Excel file ‘MV 5013 ANNEXE 3 rev1.xls’