OPERATING MANUAL

MU 7033 EN I

FLEXICOMPT AUTONOME+

Issue	Date	Nature of modifications	Written by	Approved by
I	2015/12/10	Merged with MM9003 - Creation of maintenance sheets	DSM	XS
H	2014/01/13	Use of the key CTD+ during data transfer	DSM	XS
G	2013/09/24	Software evolution (DIM)	DSM	XS
A	2009/02/26	Creation – replace MM5014-EN-4	FM	DSM

CONTENTS

1 GENERAL PRESENTATION AND DESCRIPTION

The FLEXICOMPT AUTONOME+ is a measuring system intended to the gravity measurement of products other than water on various installations.

It can :

- ⇨ Measure products when they are delivered to the station,
- ⇨ Monitor the reception of products (lorry/wagon),
- ⇨ Split compartments,
- ⇨ Measure product returns,
- ⇨ And issue tank charts.

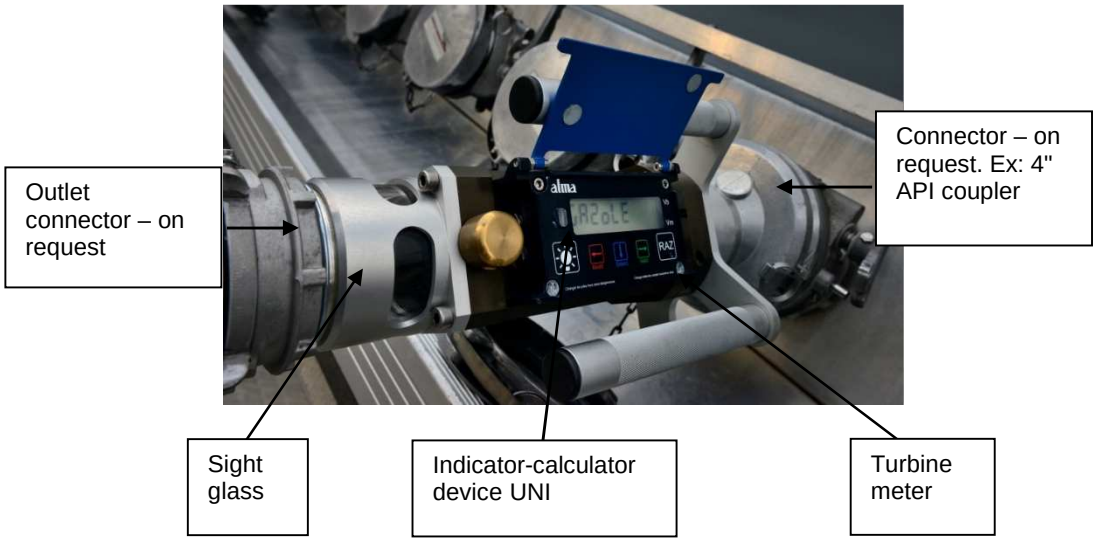
The FLEXICOMPT AUTONOME+ includes:

- ⇨ An intrinsic security indicator-calculator device, type UNI, powered by 2 lithium batteries (battery life 1 to 2 years) fastened to the hydraulic sleeve,
- ⇨ A hydraulic measuring sleeve composed of:
- ⇨ An ALMA turbine meter, type ADRIANE DN80-80,
- ⇨ A sight glass located downstream of the turbine meter,
- ⇨ A vacuum breaker valve,
- ⇨ An appropriate connector: a 4" coupler to connect onto the API adapter, a DN80 quick coupling to connect the unloading hose or any other connector (CAMLOCK, TODO, aviation…),
- ⇨ An appropriate unloading connector: a quick coupling to connect the unloading hose or any other connector (CAMLOCK, TODO, aviation,…).

The FLEXICOMPT AUTONOME+ may be connected to a temperature sensor.

The ‘Transfer Key CTD+’ option is used to transfer measurements results to a key thanks to an infrared communication between the FLEXICOMPT AUTONOME+ and the key. The data may be downloaded from the key to a PC through USB cable.

The metrological parameters file and the configuration file of the FLEXICOMPT AUTONOME+ may be uploaded separately in order to make an easier monitoring of the instrument (periodic inspection, identification and diagnosis).



The indicator-calculator device, type UNI guarantees the metering operations and manages the faults linked with the metering system.

The operating temperature for the UNI is between -25°C and +55°C.

On the front of the UNI, you can see five buttons:

BP5  Light the display during 10 seconds

BP4 

Normal mode: return to previous menu

Supervisor and Metrological mode: increment the flashing figure when imputing a value or return to previous menu

BP3 

Normal mode, metering off: select the menu

Normal mode, metering on: display the values (immediate flow, temperature)

Supervisor and Metrological mode: select the figure to be modified or select the menu

BP2 

Normal mode: validate the selected menu or value

Supervisor and Metrological mode: validate the displayed value or validate the selected menu

In case of default: acknowledge the default

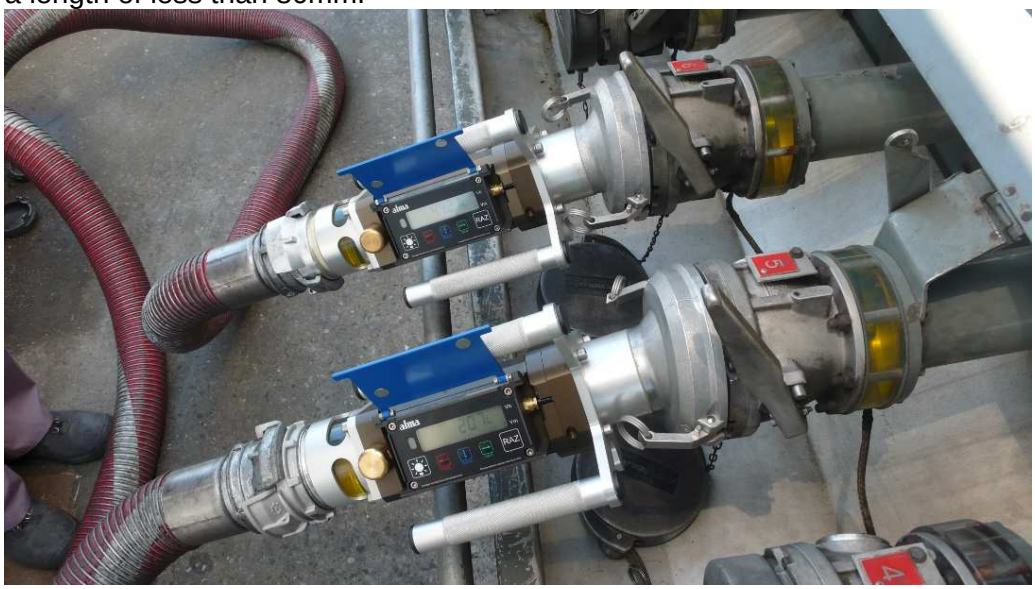
BP1 

Reset the volume to zero before a new measurement. The data of the last measurement are then recorded

2 USER RECOMMENDATIONS

2.1 Mobile installation

The vacuum between the connecting device and stripping valve on the FLEXICOMPT AUTONOME+ device must be rigid with a 15 degree angle, a 80mm minimum diameter and a length of less than 80mm.



2.2 Stationary installation

The FLEXICOMPT AUTONOME+ measuring system device must be placed within a vertical plan and with a 15 degree angle between his axis and the horizontal axis.

The connecting pipe to the discharge valve must have a 80mm minimum diameter and a length of less than 80mm.

If the length of the pipe exceeds 80mm, only complete discharges of the tank are guaranteed.

The operator must make sure that all of the following conditions are met:

- During the measurement, the FLEXICOMPT AUTONOME+ is placed according to a vertical plan on a horizontal discharge valve. This requirement has been considered as satisfactory when the FLEXICOMPT AUTONOME+ downstream connector is on the lowest position than the upstream connector;

- The flexible or rigid hose, placed between the FLEXICOMPT AUTONOME+ and the collecting tank must have an 80 mm minimum nominal diameter and a 8 m maximum lenght. It must allow an easy flow product when delivery.

The Alma FLEXICOMPT AUTONOME+ measuring system is a non-interruptible device, so direct sale to the public is prohibited.

NB: the FLEXICOMPT AUTONOME+ cannot be used for pumped applications.

3 IGNITION AND OPERATION

The FLEXICOMPT AUTONOME+ measuring system operates with an empty hose. The operator connects it to the API adaptor and then connects the hose to the FLEXICOMPT AUTONOME+ outlet.

The operating procedure is as follows:

⇨ After having reset the indicator to 0 (BP1 RAZ), the operator opens the tank valve. The metering starts as soon as the UNI indicator – calculator device records impulses coming from the turbine. The metered volume is continually displayed on the UNI indicator-calculator device.

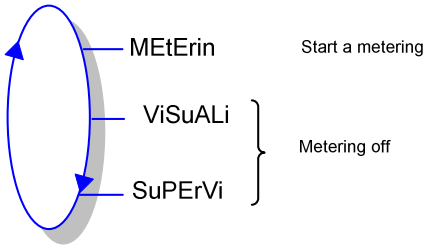
⇨ For partial emptying:

⇨ The operator stops metering by closing the tank valve. The metering stops when the UNI indicator-calculator device notes that the two gas detectors are wet and flow rate is to zero.

⇨ For complete emptying:

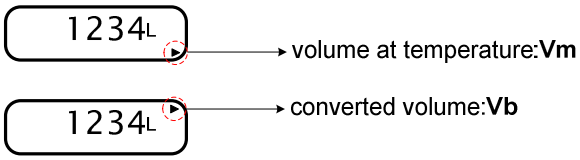
⇨ The operating procedure is identical to the partial emptying procedure but there is no voluntary action on the tank valve.

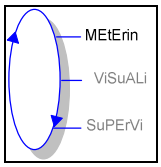
4 USER MODE



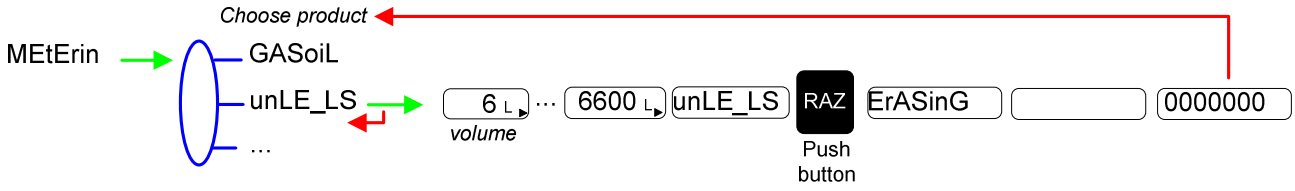
The UNI metering can be either ON or OFF. Metering is ON between the first command level after initialisation or resetting the current volume to zero, and resetting the current volume to zero.

The displayed quantity depends on the configuration set in METROLOGICAL mode. The arrow-pictogram located on the right hand of the display screen is used to point out Vm or Vb such as shown below:





4.1 Menu METERING



4.1.1 Visualisation of values during delivery

Use BP3 to display flow rate and temperature during measuring (flow>0). Press:

- One time for flow rate,
- Two times for temperature.

Display returns automatically to the current volume within 5 seconds.

4.1.2 Reset

At zero flow conditions, press BP1 RAZ to record the last measurement data and to reset the volume to zero.

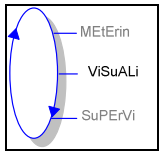
4.1.3 CTD+ option: Transfer measurement results to the key

The 'CTD+' option allows to transferring measurements results and parameters to the key.

Then, data can be used on a PC.

The transfer of the measurement results of the N last days is possible when flow rate is zero. N has to be set in SUPERVISOR menu

Refer to Maintenance sheet FM8012.



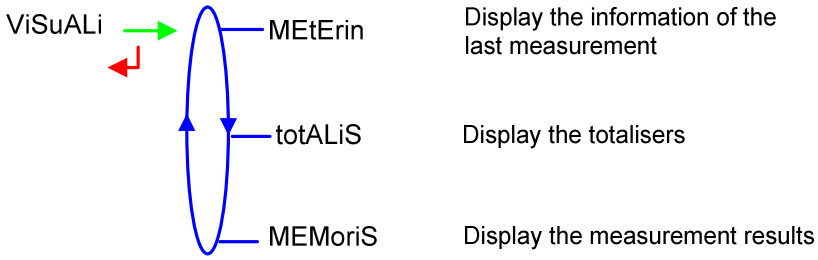
4.2 Menu VISUALISATION

The operator can access various menus and sub-menus by using:

BP3 select the menu,

BP2 validate the displayed menu or value

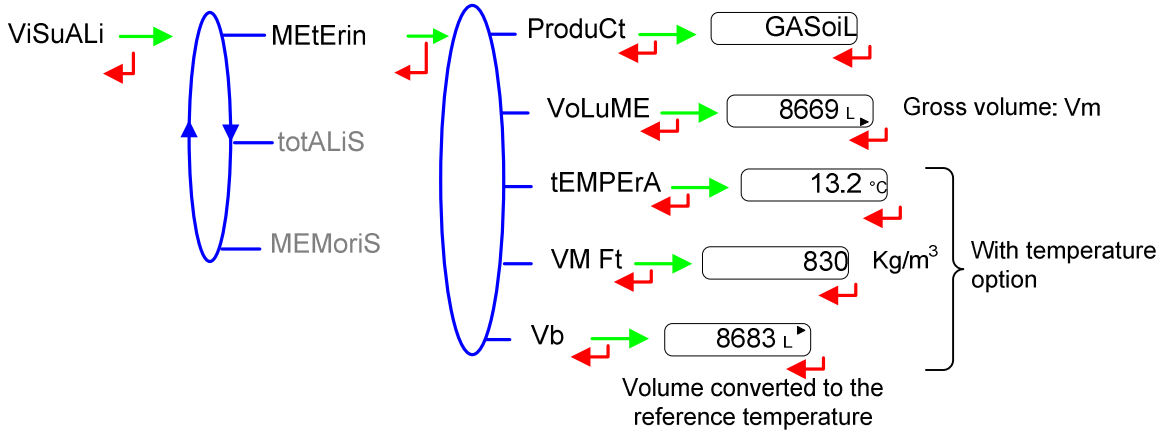
BP4 return to the previous menu.



If the values are preceded by this display '-------'; it means they are no longer guaranteed.

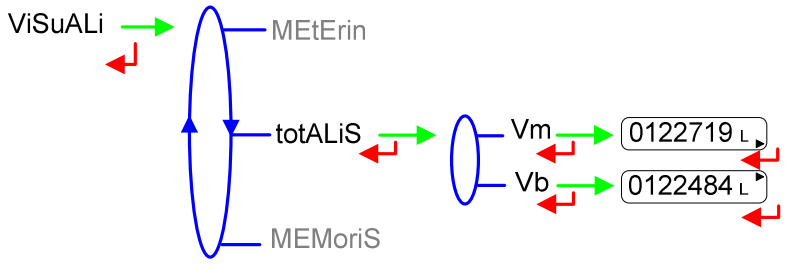
4.2.1 Sub-menu METERING

This menu displays the information of the last measurement.



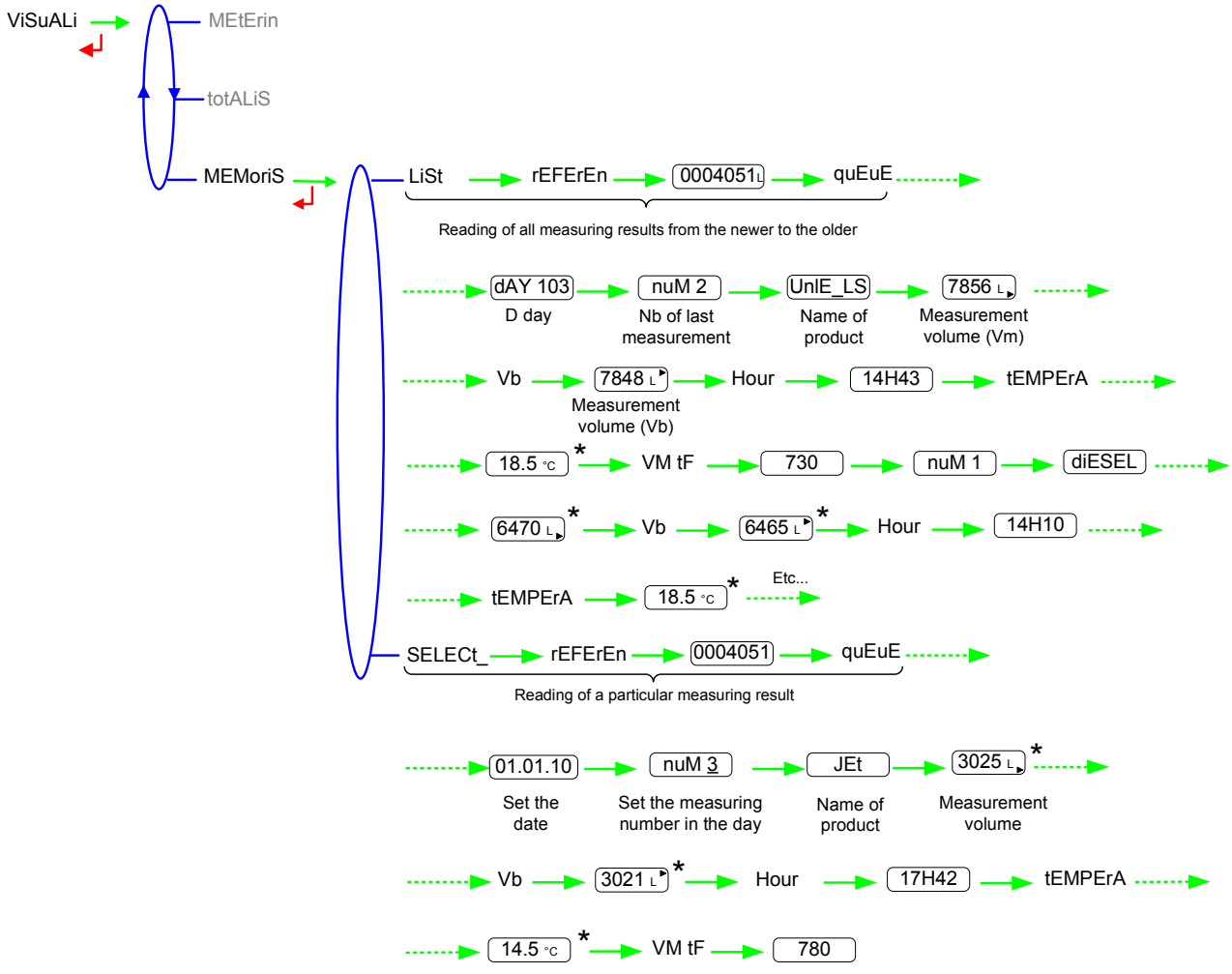
4.2.2 Sub-menu TOTALISER

This menu displays the totalisers.

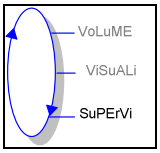


4.2.3 Sub-menu MEMORISATION

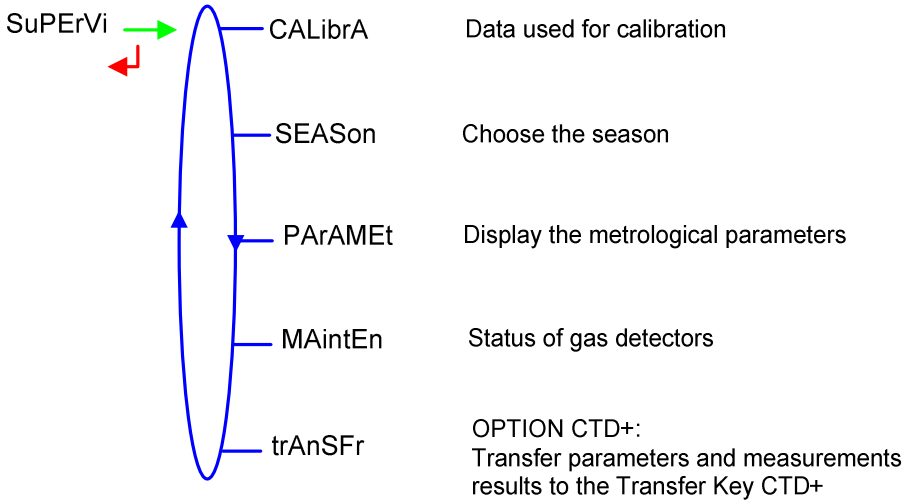
This menu displays the measurements results. The temperature, the converted volume and the density are only displayed if the temperature option is activated.



*These values may be preceded by this display: -------
Its means they are no longer guaranteed

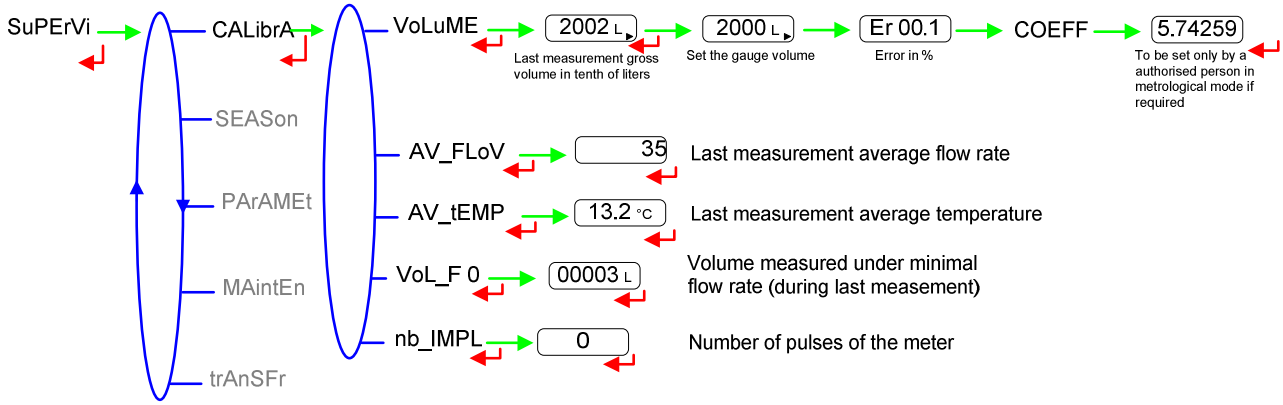


4.3 Menu SUPERVISOR



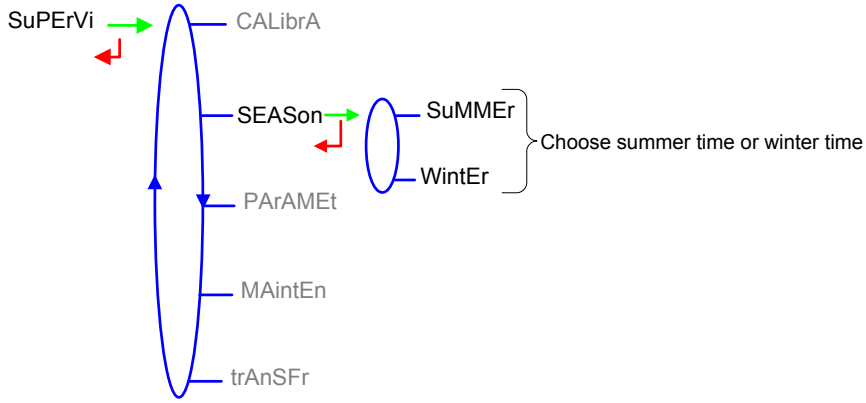
4.3.1 Sub-menu CALIBRATION

Check the measuring system accuracy during the calibration with a gauge. Data of the last measurement are available.



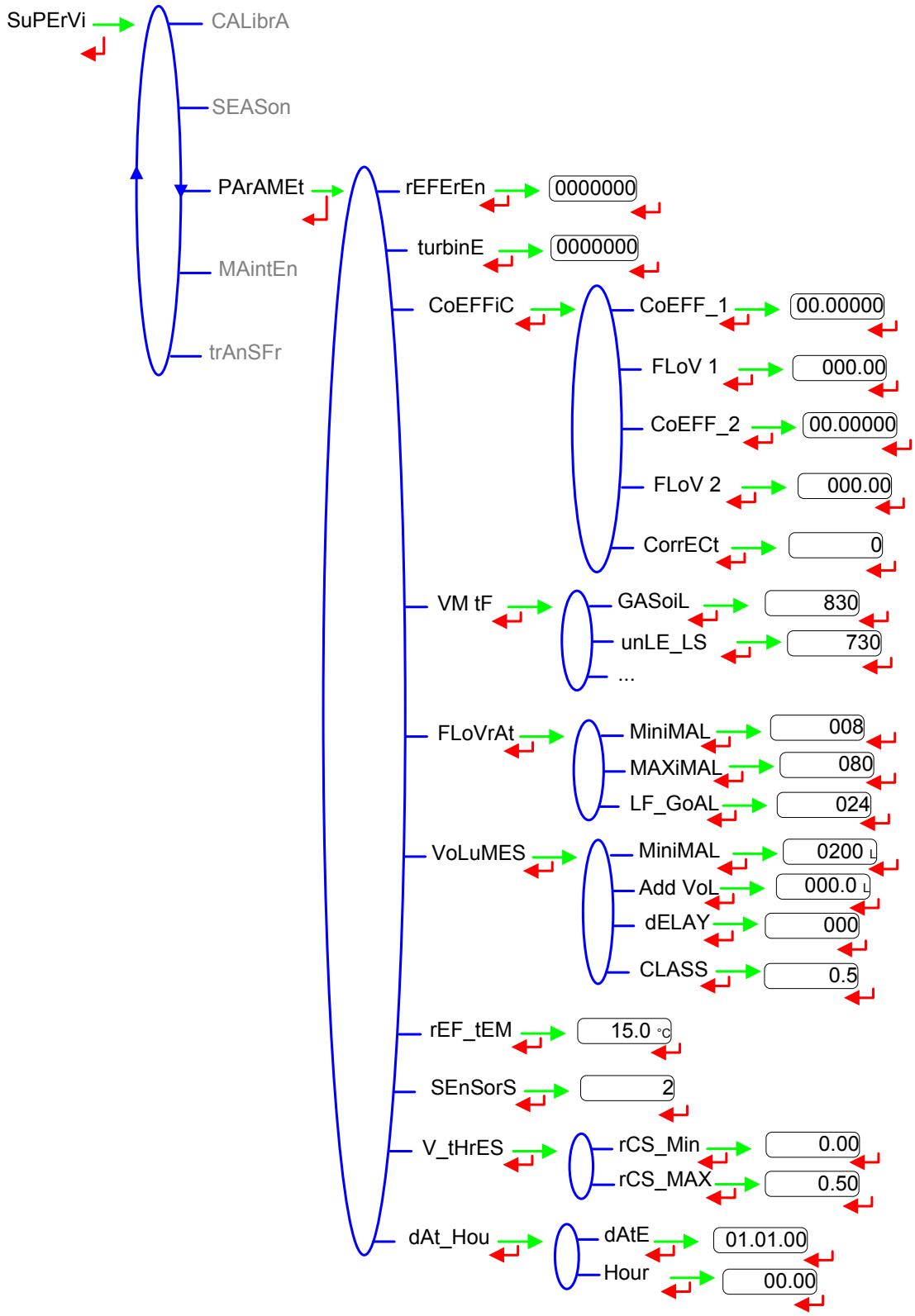
4.3.2 Sub-menu SEASON

Choose the season in order to change from summer to winter time (and back again).



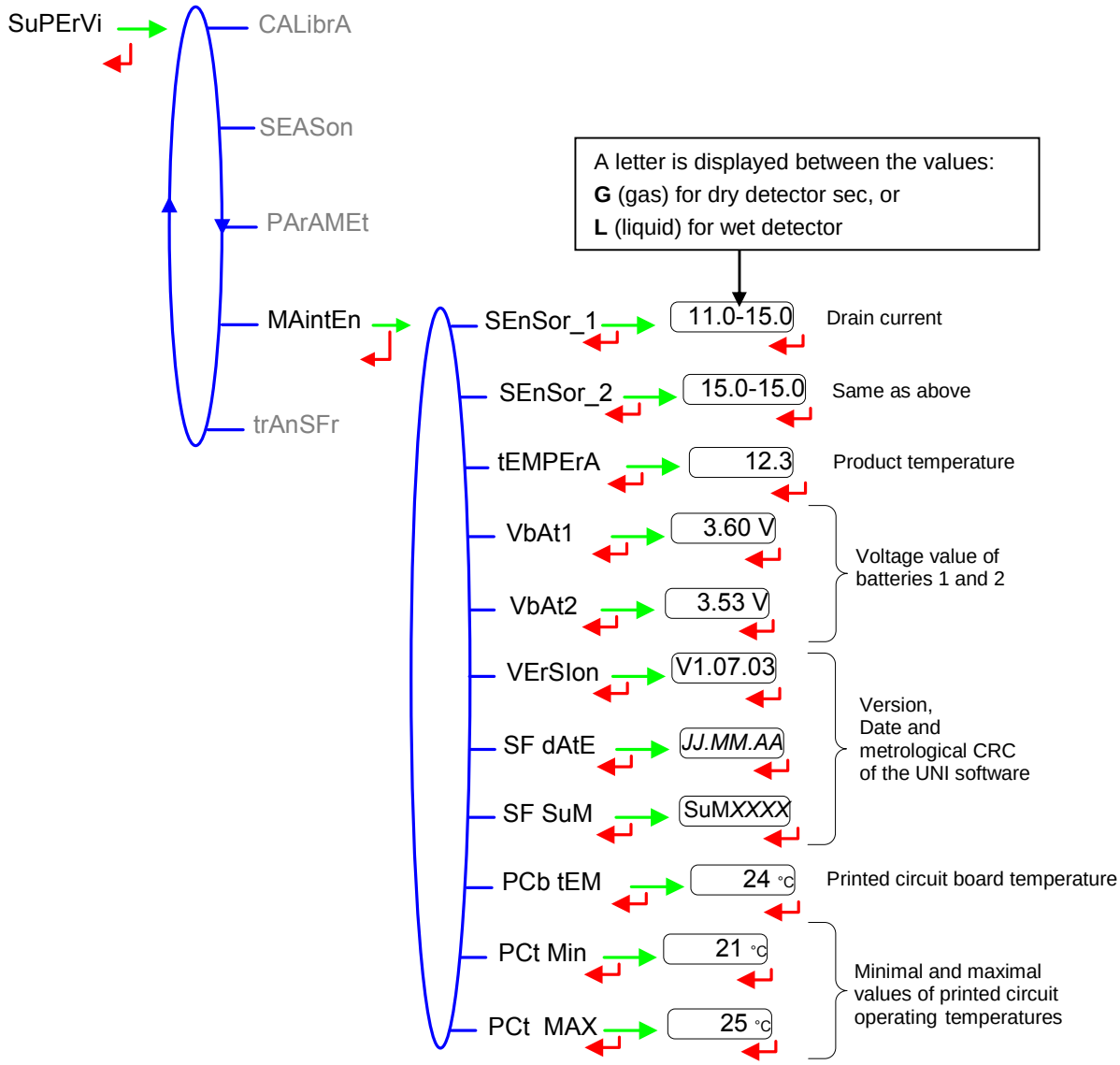
4.3.3 Sub-menu PARAMETERS

This menu displays the parameters set in METROLOGICAL mode.



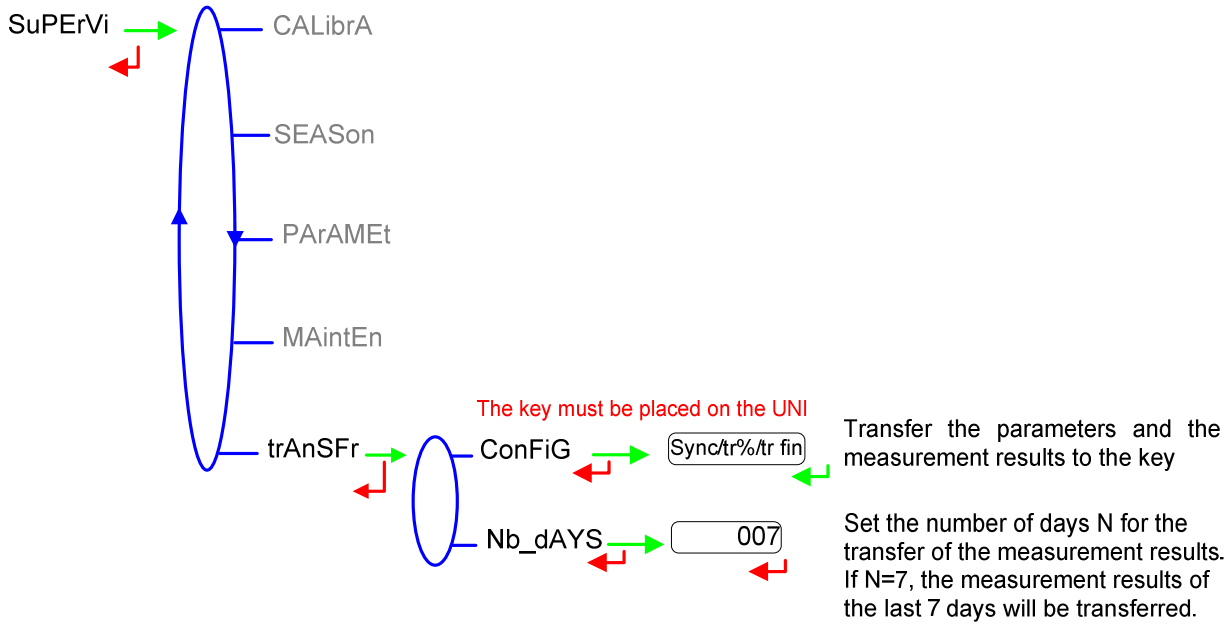
4.3.4 Sub-menu MAINTENANCE

This menu displays the drain current (mA) of the gas detectors and the reference current set in METROLOGICAL mode, as well as the product temperature.



4.3.5 Sub-menu TRANSFER – OPTION

This sub-menu is available with the 'Transfer Key CTD+' option. It is used to transfer to the key the parameters set in METROLOGICAL mode and the measurement results and to download it to a PC. The file format is '.csv'. Refer to the maintenance sheet FM 8012.



NOTE: Do not plug the USB cable during data transfer

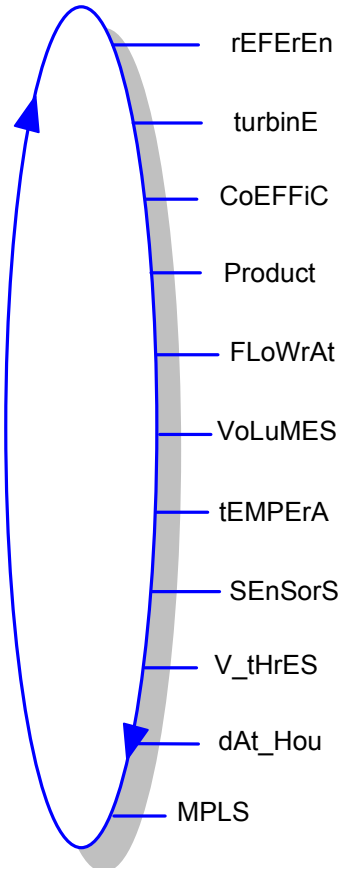
4.4 Faults list

Should a fault occur, the UNI displays the word "ALArM" and the fault title on the display (using some or all of the seven digits) followed by the displayed value. The operator acknowledges the fault by pressing down BP2 (even when pouring). Apart from battery related faults, persistent faults cannot be acknowledged.

Once the fault is acknowledged, the selected value is displayed alternately with "-------" to indicate that the measured values are no longer guaranteed.

	DISPLAY	MEANING	ACTION
USER	oVErFLo	Volume greater than 9 999 999 liters	Reset the device
	LoW_FLo	Flow rate less than the setting minimal flow rate	Check the hydraulic configuration and the flowing
	SEnSor1	High gas detector fault (GDh)	Use the maintenance menu to check the status of the detector
	SEnSor2	Low gas detector fault (GDl)	Use the maintenance menu to check the status of the detector
REPARATOR	FLoV_	Flow setting fault	Check the parameters
	FrEQ_	Frequency fault	Check the parameters
	COEFF_	Difference two coefficients is greater than 0,5%	Check the coefficients setup
	MEtEr	Problem of metering with the meter	Check the setup
	HiGH_FL	Flow rate greater than the setting maximal flowrate	Check the setup
	dAtE	Loss of date and time	Set date and time in metrological mode
	GAS	GDh is wet but GDl is dry	Check the hydraulic configuration / Check the detector status
	bobinE	Loss of pulse transmitter signal	Check the link with the pulse transmitter
	LF_HiGH	Flow rate greater than 20m^3/h when GDh is dry	Check the hydraulic configuration / Check the detector status
	tEMPErA	Temperature less than -20°C or greater than 50°C	Check the temperature sensor (measure and calibration)
	diSPLAY	LCD display fault	If steady alarm, substitution of the UNI
	doG	Fault with display card	If steady alarm, substitution of the UNI
	ProGrAM	Error on the cheksum of the metrological data	If steady alarm, substitution of the UNI
	rAM	Saved memory fault	If steady alarm, substitution of the UNI
	MEMoriS	Bad writing into the memory	Substitution of the backup battery
	FuLL	SIM memory full	If steady alarm, substitution of the UNI
	MEtro_	Configuration loss	If steady alarm, substitution of the UNI
	bAttErY	Low battery	Substitution of the batteries
	totAL_	Totaliser fault	If steady alarm, substitution of the UNI
	dEF_MEM	Loss of backup data concerning the last measurement	If steady alarm, substitution of the UNI
	dEF_CoM	Communication fault with IRDA link	Check the IRDA link

5 METROLOGICAL MODE



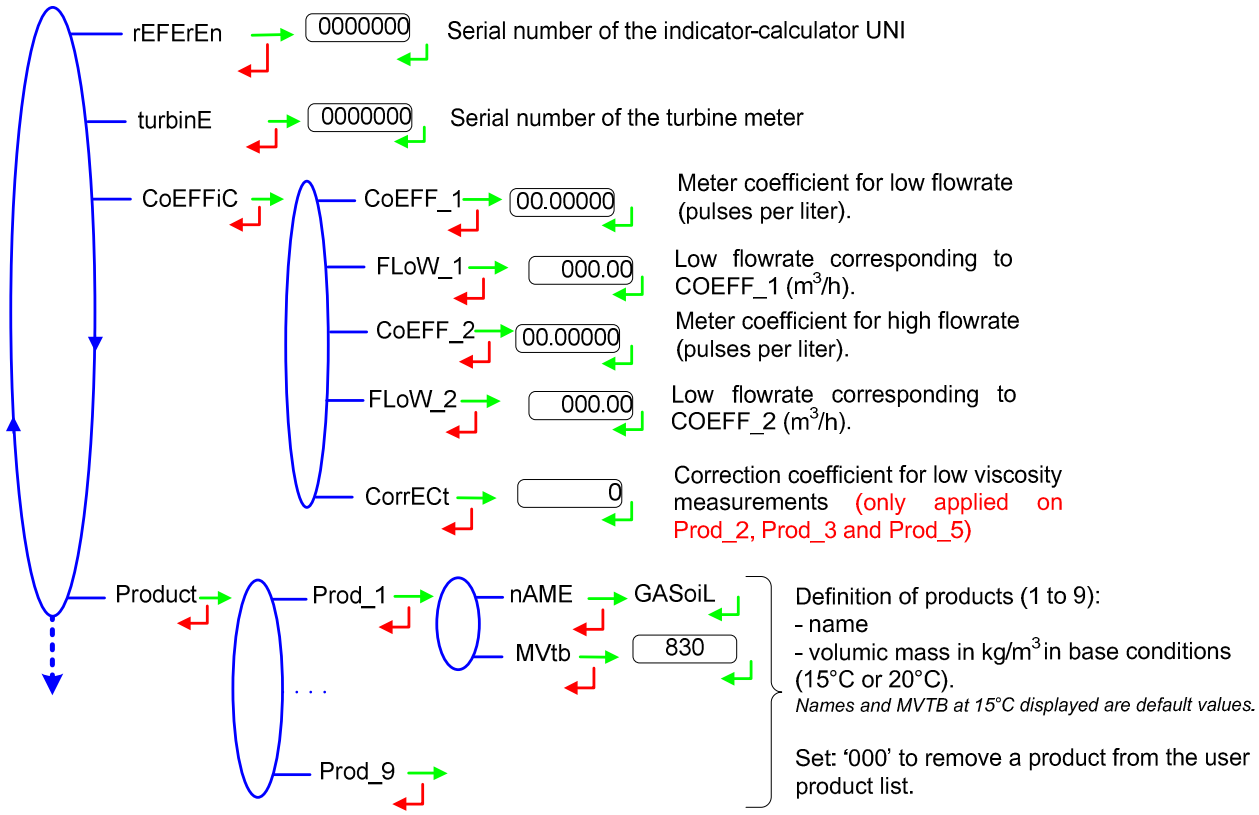
The configuration parameters can only be modified after the processor configuration switch on the electronic card has been switched over. Only authorized personnel can modify these parameters. All other interventions must be carried out by authorised personnel since the metrological character of the FLEXICOMPT AUTONOME+ may be modified. Exit the METROLOGICAL mode thanks to the switch; the device is then reset.

IMPORTANT

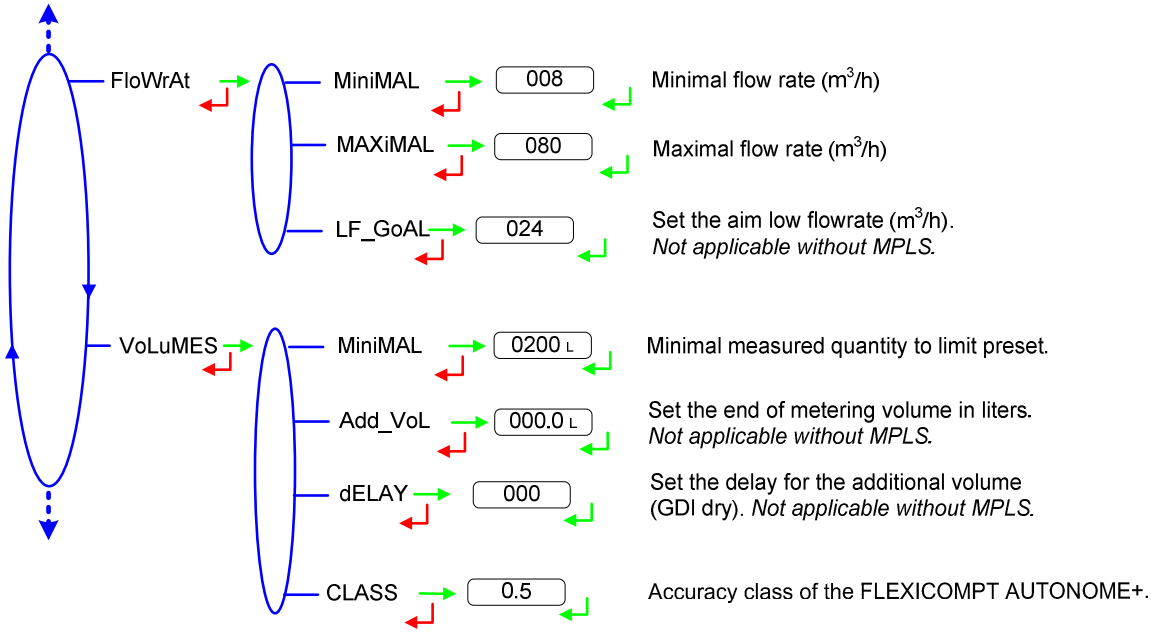
Setup should be done under cover, metering off, with dry gas detectors (see § 5.3).

5.1 Menus REFERENCE, TURBINE, COEFFICIENTS, VMFT

A correction can be applied for low viscosity measurements. The correction coefficient can be applied on three products: Prod_2, Prod_3, and Prod_5.



5.2 Menus FLOW RATES, VOLUMES



5.3 Menus TEMPERATURE, GAS DETECTORS, THRESHOLDS, DATE, MPLS

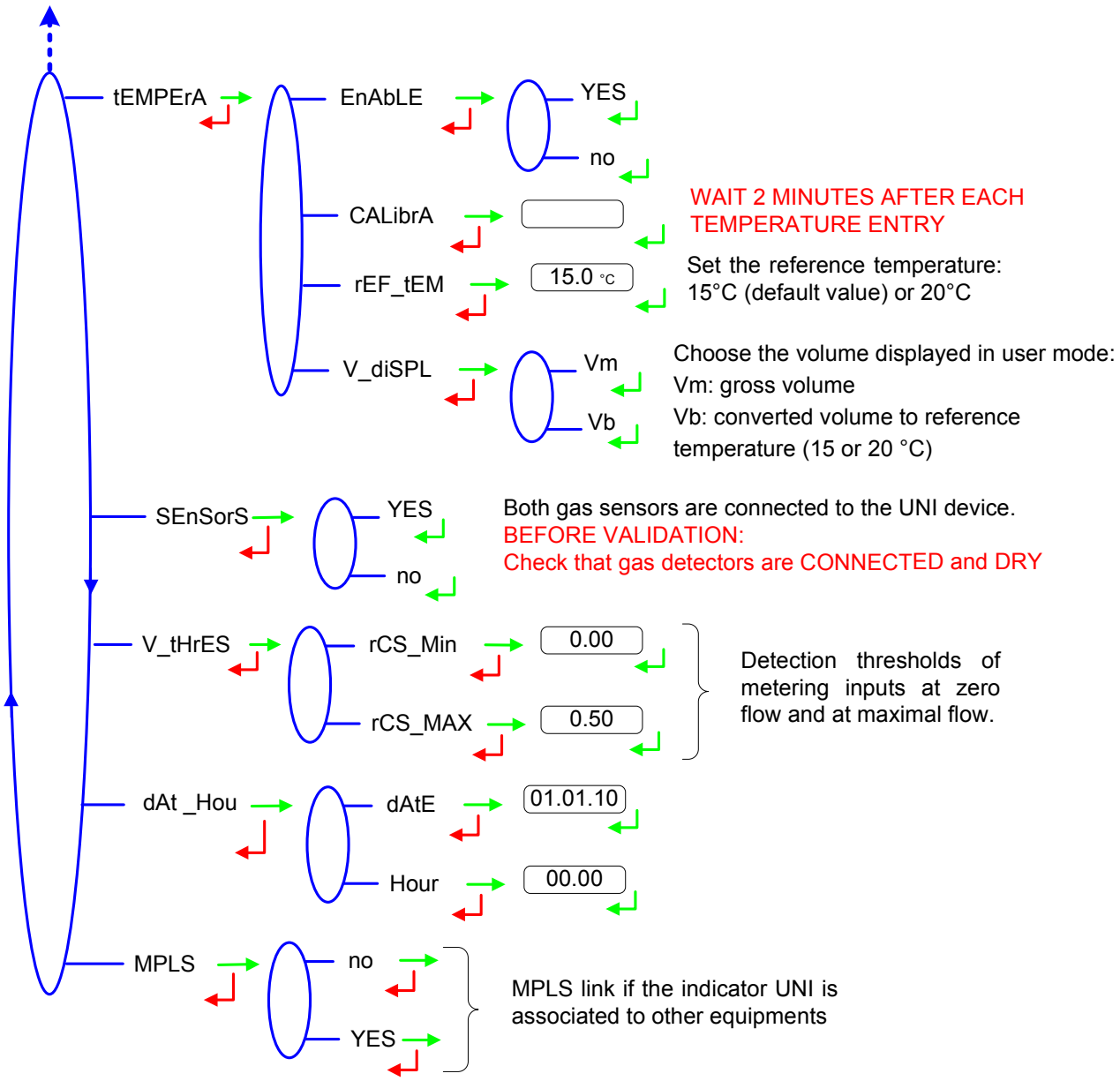
The temperature calibration can be done either on two measuring points or on a single measuring point (menu CALibrA).

- Two temperature measuring points:

  The measure must be done outside the range -20 to +50°C. Adjust the PT100 simulator to a value<-20°C, wait for 15 seconds before setting the temperature into the calculator. Then do the same for a value>+50°C.

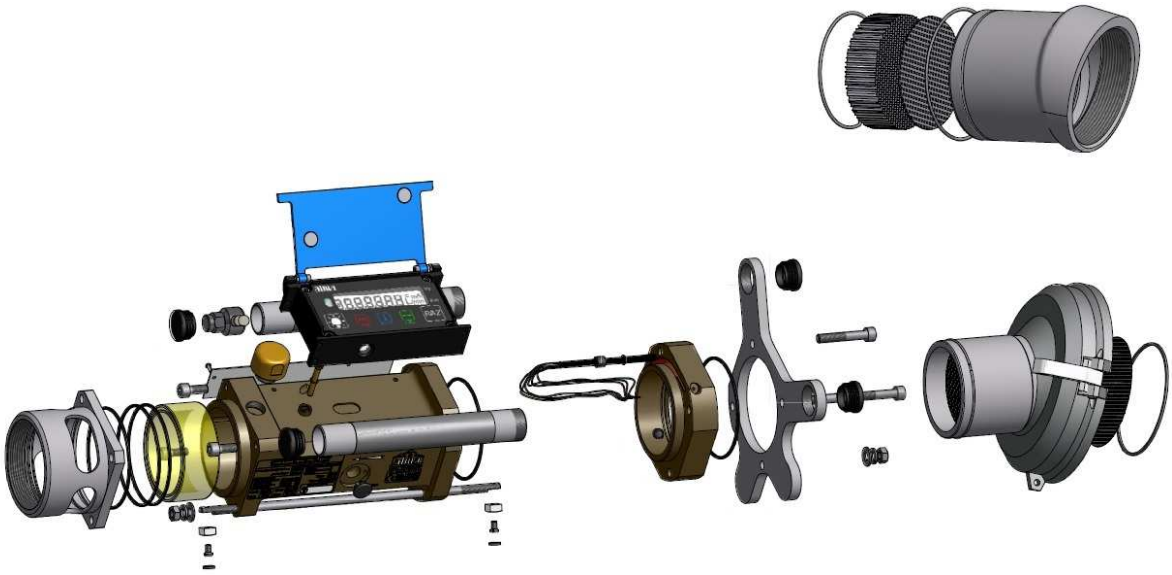
- Single temperature measuring point:

  The measure must be done in the range -20 to +50°C.



6 MAINTENANCE

Any intervention with broken seals must be carried out by authorised personnel and under the control of the competent authorities or of one of its representatives.



6.1 UNI indicator-calculator device

It is made of a box with an intrinsic safety electronic board set by 4 CHC screws (diameter of 4 mm) on the body of the turbine meter. An o-ring is the seal between the casing and the turbine meter. Make sure that it is in its groove and well lubricated before tightening the screws.

Apart from metering calibration operations, there is no adjustment or specific preventive maintenance.

6.1.1 Replacement of batteries

The UNI device is powered by 2 batteries that must be changed during each regulatory control or when voltage is under 3.2V. The display "Battery" indicates that they have to be changed. It must be done in a non-explosive area. The verification seals have to be broken by authorised personnel only. Refer to Maintenance sheet FM 8009.

6.1.2 Modification of the setting parameters

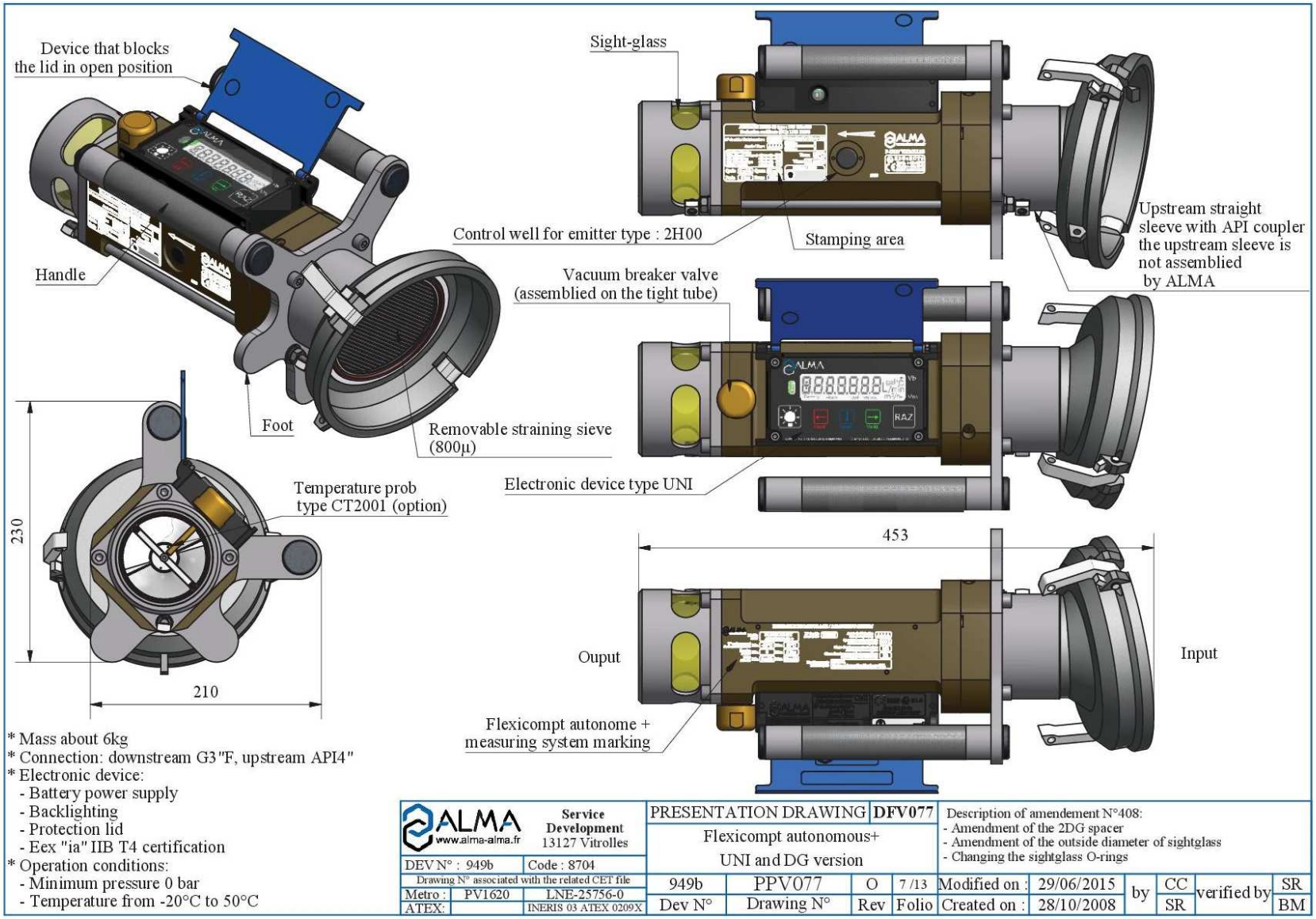
The modification of the setting parameters is made after entering the METROLOGICAL mode with the red switch on the electronic board.

Only authorized personnel can change the parameters.

Any other operation must be done by authorized personnel as it could affect the metrological nature of the FLEXICOMPT AUTONOME+.

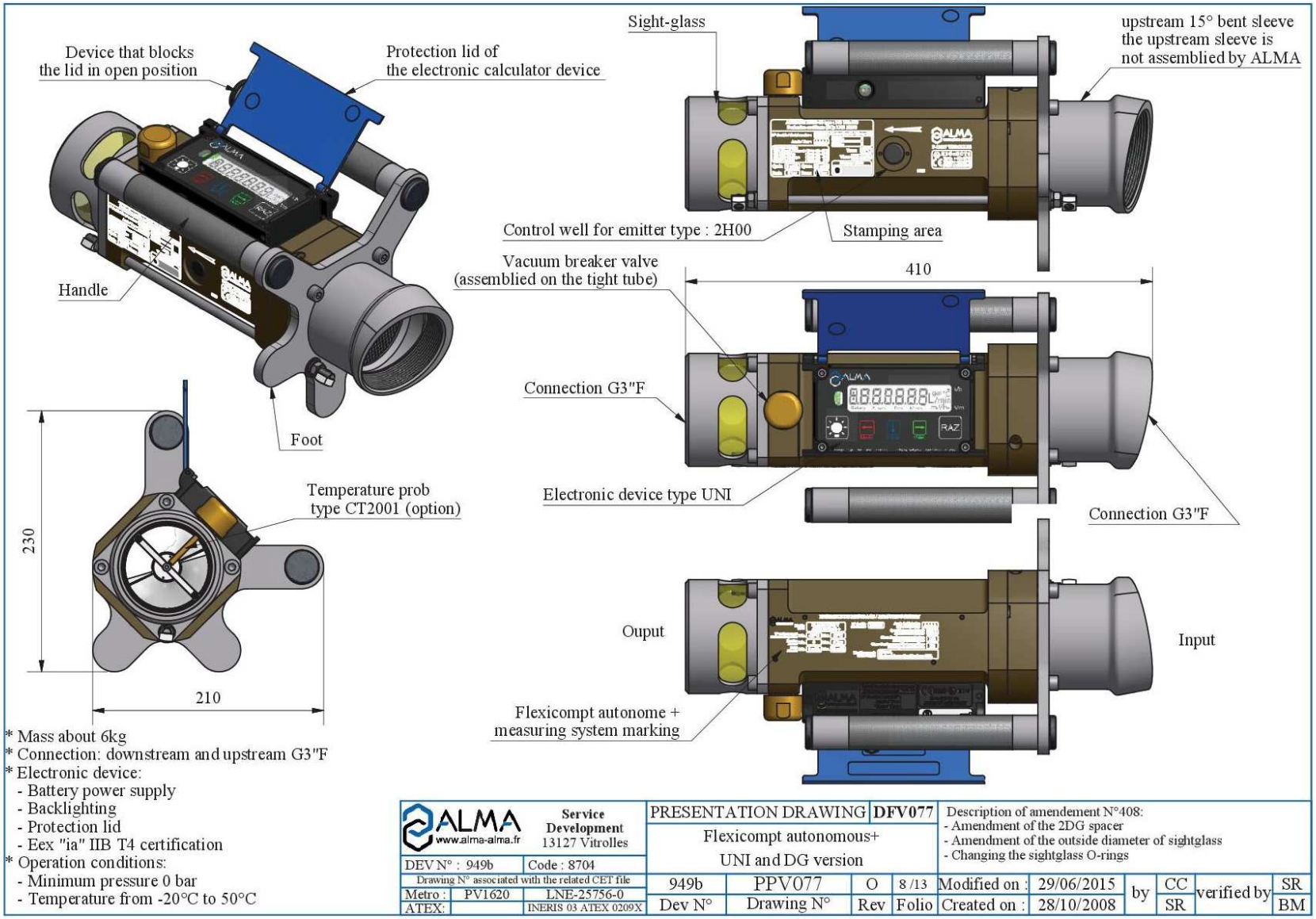
6.2 Hydraulic sleeve

The FLEXICOMPT AUTONOME + can be set with different hydraulic sleeves: upstream straight sleeve with API coupler or upstream 15° bent sleeve.



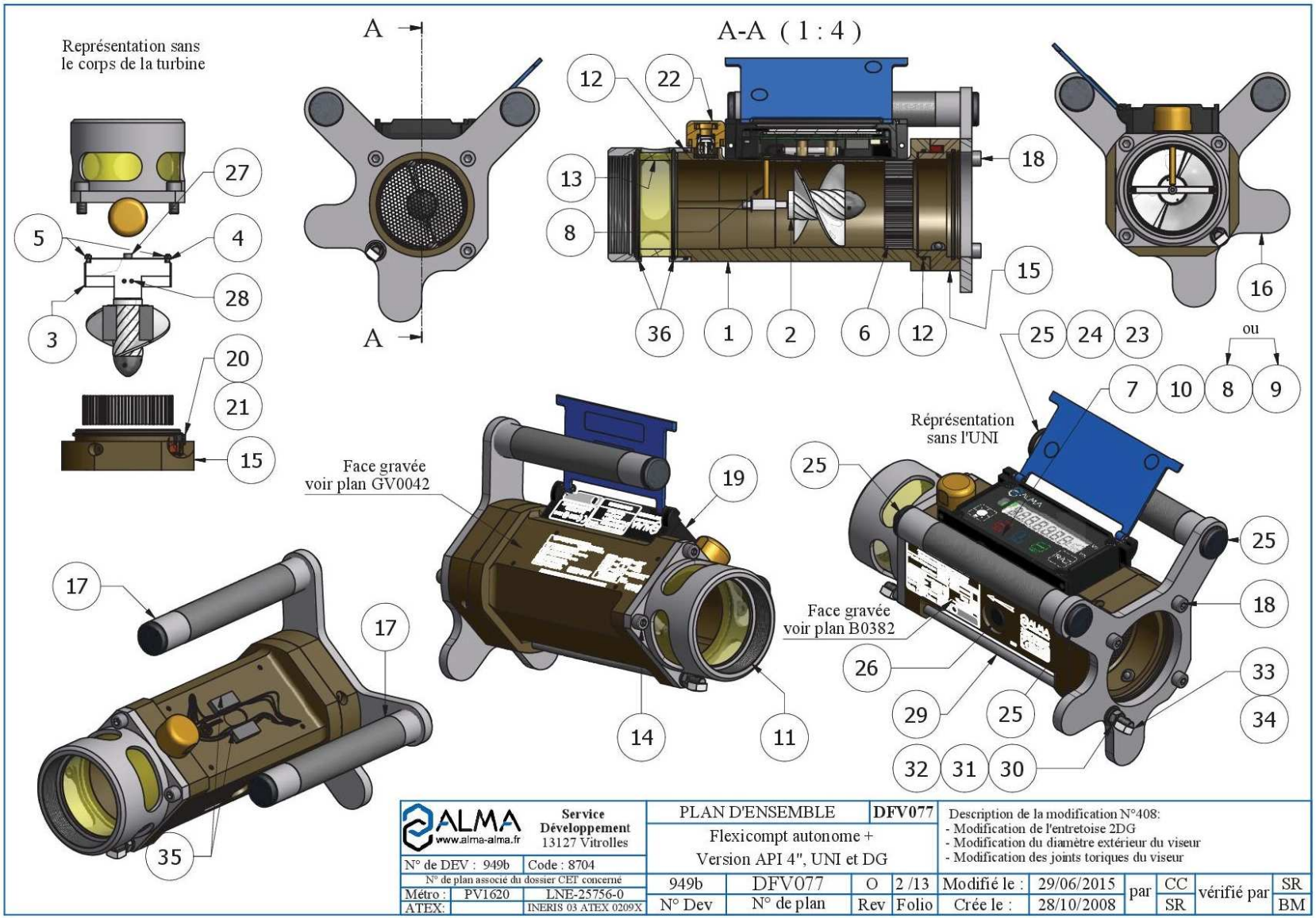
* Mass about 6kg
* Connection: downstream G3"F, upstream API4"
* Electronic device:
  - Battery power supply
  - Backlighting
  - Protection lid
  - Eex "ia" IIB T4 certification
* Operation conditions:
  - Minimum pressure 0 bar
  - Temperature from -20°C to 50°C

ALMA www.alma-alma.fr	Service Development 13127 Vitrolles	PRESENTATION DRAWING	DFV077				Description of amendement N°408: - Amendment of the 2DG spacer - Amendment of the outside diameter of sightglass - Changing the sightglass O-rings					
DEV N° : 949b	Code : 8704	Flexicompt autonomous+ UNI and DG version										
Drawing N° associated with the related CET file		949b	PPV077	O	7 /13	Modified on :	29/06/2015	by	CC	verified by	SR
Metro : PV1620	LNE-25756-0	Dev N°	Drawing N°	Rev	Folio	Created on :	28/10/2008		SR		BM
ATEX:	INERIS 03 ATEX 0209X										



* Mass about 6kg
* Connection: downstream and upstream G3"F
* Electronic device:
  - Battery power supply
  - Backlighting
  - Protection lid
  - Eex "ia" IIB T4 certification
* Operation conditions:
  - Minimum pressure 0 bar
  - Temperature from -20°C to 50°C

ALMA www.alma-alma.fr	Service Development 13127 Vitrolles	PRESENTATION DRAWING	DFV077	Description of amendement N°408: - Amendment of the 2DG spacer - Amendment of the outside diameter of sightglass - Changing the sightglass O-rings							
DEV N° : 949b	Code : 8704	Flexicompt autonomous+ UNI and DG version									
Drawing N° associated with the related CET file		949b	PPV077	O	8 /13	Modified on :	29/06/2015	by	CC	verified by	SR
Metro : PV1620	LNE-25756-0	Dev N°	Drawing N°	Rev	Folio	Created on :	28/10/2008		SR		BM
ATEX:	INERIS 03 ATEX 0209X										


Représentation sans
le corps de la turbine
A
A
A-A (1 : 4)
12
22
18
13
8
15
16
36
1
2
6
12
27
5
4
28
3
20
21
15
25
24
23
ou
7
10
8
9
Face gravée
voir plan GV0042
19
Réprésentation
sans l'UNI
25
25
18
Face gravée
voir plan B0382
26
33
29
25
34
32
31
30
17
17
14
11
35
ALMA
www.alma-alma.fr
Service
Développement
13127 Vitrolles
PLAN D'ENSEMBLE
DFV077
Flexicompt autonome +
Version API 4", UNI et DG
Description de la modification N°408:
- Modification de l'entretoise 2DG
- Modification du diamètre extérieur du viseur
- Modification des joints toriques du viseur
N° de DEV : 949b
Code : 8704
N° de plan associé du dossier CEI concerné
Métro : PV1620
LNE-25756-0
ATEX:
INERIS 03 ATEX 0209X
949b
N° Dev
DFV077
N° de plan
O
Rev
2 /13
Folio
Modifié le : 29/06/2015
Crée le : 28/10/2008
par
CC
SR
vérifié par
SR
BM

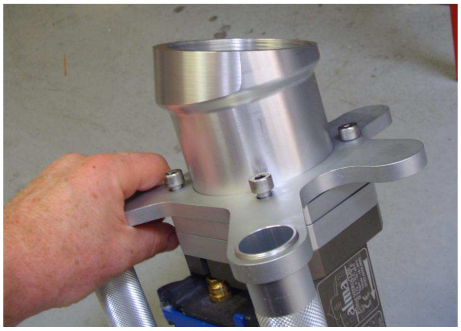
Rep.	Designation
1	FLEXICOMPT+ body : turbine meter ADRIANE DN80-80 machined, anodized and engraved
2	Propeller D=73 version SP, JET, GO, FOD
3	Light alloy axis seat for propeller D=73
4	Screw HCPL M3x12 (ISO 4026)
5	Nut H M3 (ISO 4032)
6	Flow straightener D=78.8, strip 158µ
7	O-ring 5.5x1.2
8	Temperature probe CT2001
9	Plug for temperature probe option D=8
10	Inner retaining ring D=8 steel
11	Downstream sleeve
12	O-ring 92x2.5
13	Plexiglass sight glass, Dext=92, Dint=78, L=37.5
14	Screw CHC M8x20 (ISO 4762)
15	2DG-wired-spacer
16	Handle seat
17	Knurled handle D=30, L=210,
18	Screw CHC M8x50 (ISO 4762)
19	Electronic device UNI in box without tap
20	Dext=10, Dint=6, h=8
21	Washer Dext=9, Dint=6, thickness=1
22	ALMA vacuum breaker G1/2"
23	Neodymium magnet N35 D=1, thickness=4
24	Magnet seal
25	Plug for tube D=30 black polyethylene
26	Closing plug D=14
27	Screw CHC M4x16 (ISO 4762)
28	Split spring thick pin 3x6 A (ISO 8752)
29	Sealing threaded rod
30	Nut H M8 (ISO 4032)
31	Washer W M8 (DIN 127)
32	Washer M M8 (NFE 25-514)
33	Brass square lead seal cup 12x12 for M5 pan head screw
34	Screw FS M 5X10 A4 70 for cylindric lead seal
35	Adhesive foam gasket 12x30 thickness =2.4
36	O-ring 91x3

The downstream and upstream sleeves allow the setting of suitable fittings (4” coupler, ½ snap coupling, etc.).

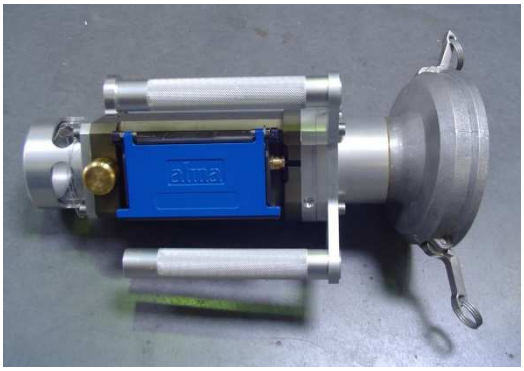
These sleeves are fastened with 4 screws on the turbine meter and can be removed to check the status of the turbine.

- Position the upstream coupling so that in use the downstream coupling is in the lowest position than the upstream coupling
- Position the upstream coupling as laid down the drawing pages 6, 7 and the pictures below
- Ensure a good sealing
- Check that the straining sieve and honeycombs are clean (at the entrance of the turbine and after the sieve)
- To ensure electrical continuity, the upstream and downstream couplings of the FLEXICOMPT AUTONOME+ must be sealed with conductor such as Loctite 577.

Positioning upstream bent sleeve



Positioning the API coupler

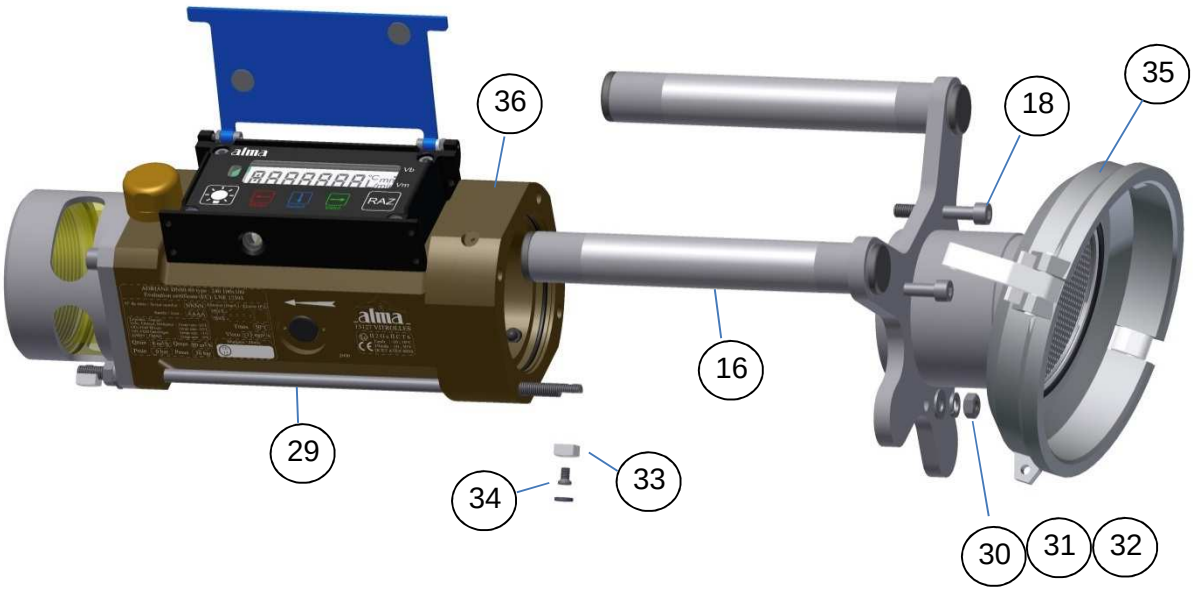


Any other operation must be done by authorized personnel as it could affect the metrological nature of the FLEXICOMPT AUTONOME+.

6.3 2DG-spacer

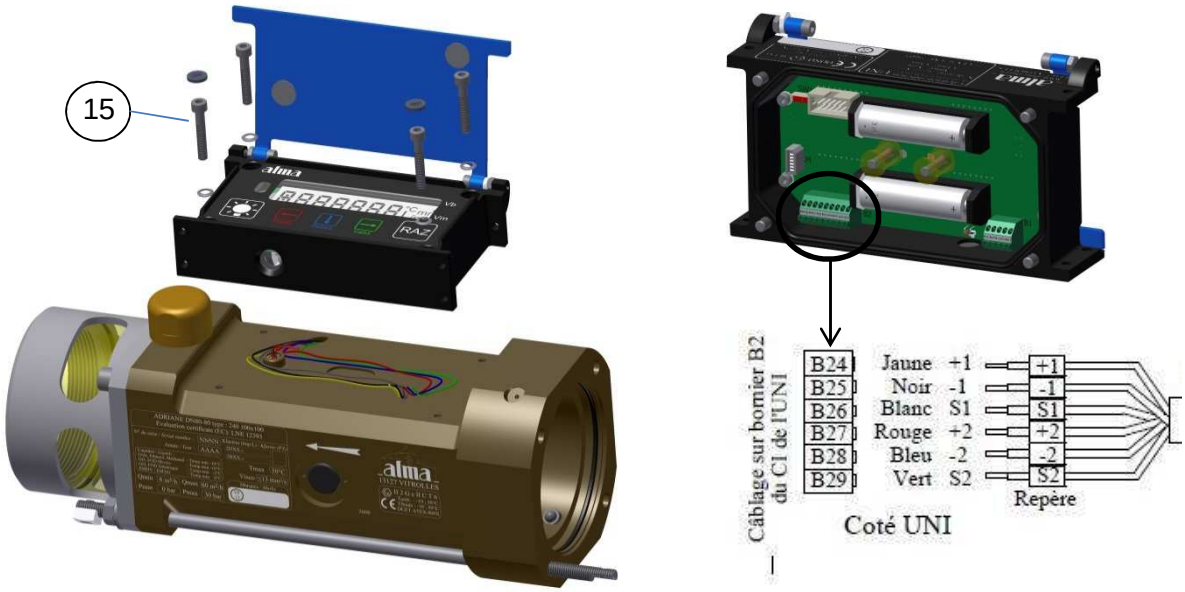
6.3.1 Removing the upstream coupling

- Remove the seal* from the upstream end of the threaded rod (29)
- Unscrew the screw (34) and remove the lead seal cup (33)
- Unscrew the nut (30) from the threaded rod (29) and remove the washers (31) and (32)
- Unscrew the 3 screws (18)
- Remove from the 2DG-spacer (36) the API coupler set (35) with handle seat and handles (16)



6.3.2 Removing the 2DG-spacer from the UNI

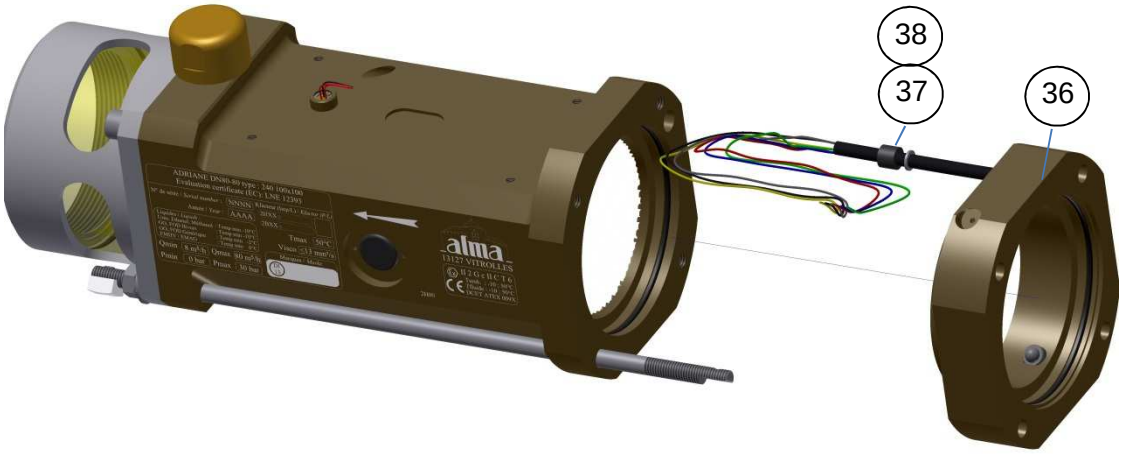
- Remove the 2 seals* from the screws of the calculator-indicating device UNI
- Unscrew the 4 CHC screws of the UNI
- Carefully lift up the UNI to find the terminal block B2. Wires are long enough to put the UNI near the FLEXICOMPT AUTONOME+
- Remove both batteries
- Unplug the 6 wires of the 2DG-spacer from the terminal block B2 (see *Picture A*)



Picture A

6.3.3 Removing the 2DG-spacer from the turbine

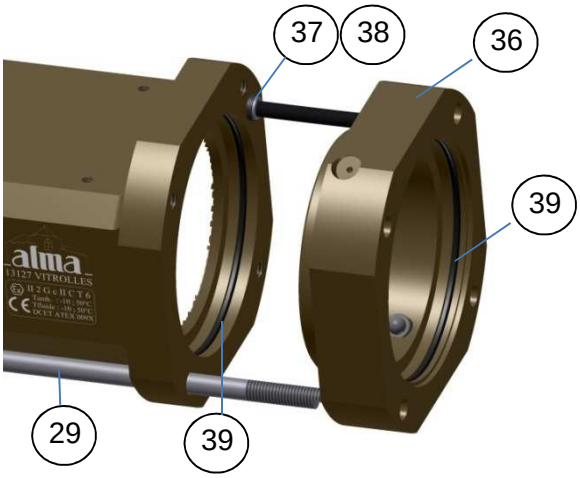
- Remove the 2DG-spacer (36) from the turbine body
- Keep by your side the ring (37) and the washer (38) of the 2DG-spacer cable



6.3.4 Setting of the new 2DG-spacer

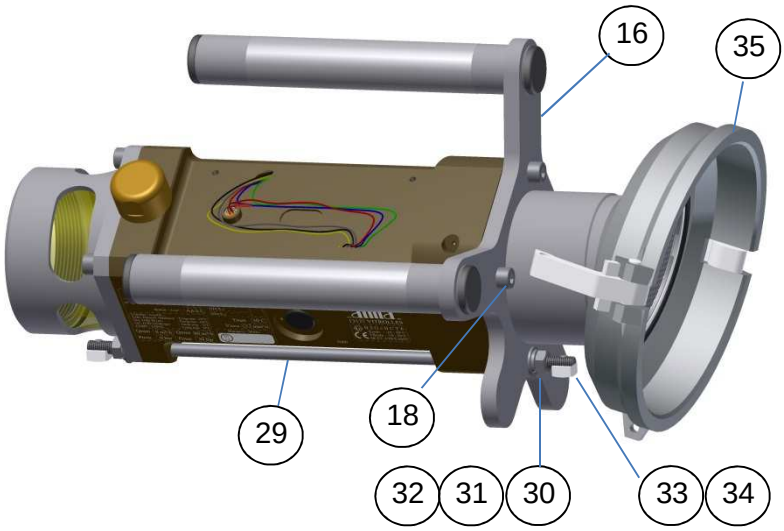
- Grease the rings (39) of the turbine body and the 2DG-spacer (translucent grease for food contact)
- Put back the washer (38) and the ring (37) on the cable of the new 2DG-spacer
- Pass the 6 wires and then the cable through the wires pass through of the turbine body
- Put the grain (37) in its place on the turbine body and press the washer (38) against the ring (37)

- Put the spacer on the input of the turbine body so that the cable faces the wires pass through and that the threaded rod (29) goes through the 2DG-spacer



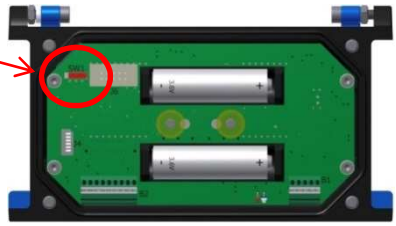
6.3.5 Assembling the upstream coupling

- Put the upstream coupling (35) with the handle seat (16) on the 2DG-spacer
- Position the upstream coupling (35) so that in use the downstream coupling is in the lowest position than the upstream coupling
- Screw the 3 screws (18). They must be lubricated with Molybdene grease
- Put the washers (31) and (32) on the threaded rod (29) and screw the nut (30)
- Put the lead seal cup (33) and the screw (34) on the threaded rod (29)
- Seal the lead seal cup* (if necessary)



6.3.6 Wiring and operational chek of the DG in the UNI

- Check there's no battery
- Plug on the UNI the 6 wires of the 2DG-spacer according to *Picture A*
- Put the batteries (respect polarization)
- Put the UNI red switch SW1 in METROLOGICAL mode position
- Enter the menu SENSORS/ON (See operating manual MU7033)
- Make sure both sensors are dry before validation
- Switch back SW1 to exit METROLOGICAL mode



6.3.7 Assembling the UNI on the FLEXICOMPT AUTONOME+

- Check the O-ring is properly positioned in its groove, grease it if necessary (translucent grease for food contact)
- Put the UNI (with the silica gel dehydrating packet) on the FLEXICOMPT AUTONOME+ body
- Make sure there's no wire between the UNI box and the FLEXICOMPT AUTONOME+ body
- Screw the 4 CHC screws of the UNI (15) equipped with SCHNORR washers. Screws must be lubricated with Molybdene grease
- Seal* both screws of the calculator-indicating device UNI (if necessary)

All these operations must be carried out by authorised personnel and under the control of the competent authorities. Refer to the certificate of the measuring instrument and the regulations in force.

6.4 Transfer key CTD+

Remove the battery in a non-explosive area. The key must not be plugged.

The level of the key battery is indicated in the parameters file (file P0000123). It can be read out, even if the battery is worn, by following the procedure of transfer of the data on a PC described in see Maintenance sheet FM 8012.

6.4.1 Removing the top cover (on the cable plug side)

- Unplug the cable if necessary
- Unscrew and remove the 4 screws from the top cover
- Remove the holder and the cover
- Remove the sheet on the battery
- If necessary slightly unscrew the screws of the base plate to make the removal of the sheet easier

6.4.2 Replacement of the battery

- Proceed to the substitution of the battery and respect polarization (3.6V type SAFT Lithium battery SAFT LS 14500 C or Lithium battery SONNENSCHEIN SL-760)

6.4.3 Assembling the cover

- Put the sheet back on the battery and make sure it‘s well-positioned in the base holder
- Put back the holder and the top cover
- Screw the 4 screws

RELATED DOCUMENTS

GU 7033	Operating guide
FM 8009	Replacement of the batteries of the UNI indicator device
FM 8012	Transfer the measurement results of the UNI indicator device to a computer
FM 8505	Adjustment of an ALMA measuring system equipped with a UNI indicator device
FM 8509	Adjustment of temperature in the UNI indicator device
DI 009	Installation guide (FR)
	Operating manual for printer