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# USER MANUAL

## CEB09BV

## TRANSMITTER

## GUADARRAMA FLOW

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*Flowmeters and flow measurement technologies. Excellence in precision and repeatability. Made in Spain since 1972.*

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## 1. General information

The CEB09BV Transmitter is an electronic device that is used to display, locally or remotely, the flow and volume of liquid that passes through the Turbine or Oval Wheel flow meter.

This Transmitter transforms the received pulses and, using the specific pulse/liter factor of each flow meter, calculates and displays:

- The Total Volume of liters since the start of operation of the equipment, with a resolution of eight digits. It can be reseted by entering the Configuration Mode (see point 4.2).
- The Partial Volume of liters with easy zeroing.
- The Instantaneous Flow, with a resolution of five digits.

There are models of CEB09BVTransmitter that have:

- Signal outputs:
  - Pulses
  - Analog (4-20 mA.)
- Protective box for electronics:
  - Aluminum and glass.
- Positioning relative to the flowmeter:
  - Attached to the flowmeter.

## 2. CEB09BV Transmitters

There are different models of CEB09BV Transmitters to better adapt to the needs of each client and application. The following table details the different models of Transmitters that are manufactured and their main characteristics.

Model	Power supply	Output			Material	Description
		Indication	Pulses	4 – 20 mA		
CEB09BV	Internal	X			Aluminum	Local Indication, without outputs
CEB09BVSI	Internal	X	X		Aluminum	NPN – PNP transistor output and local indication
CEB09BVSI A	24 Vdc	X	X	X	Aluminum	NPN – PNP transistor and 4 – 20 mA output and local indication

### 3. Installation and connections of the CEB09BV transmitters

These transmitters are attached to the Turbine Flowmeter from which they receive the pulses, so they do not require specific mechanical installation. You only have to take into account the mechanical installation of the Flowmeter that is explained in the corresponding manual.

Models that have pulse and/or analog outputs require specific electrical connections.

**VERY IMPORTANT:** The external screw of the transmitter must be grounded using a cable with a minimum section of 4 mm.

#### 3.1. CEB09BV Transmitters

The CEB09BV transmitters have a protective aluminum casing, resistant to shocks and humidity. They do not have an electrical output, so they DO NOT require specific mechanical installation or electrical connection.

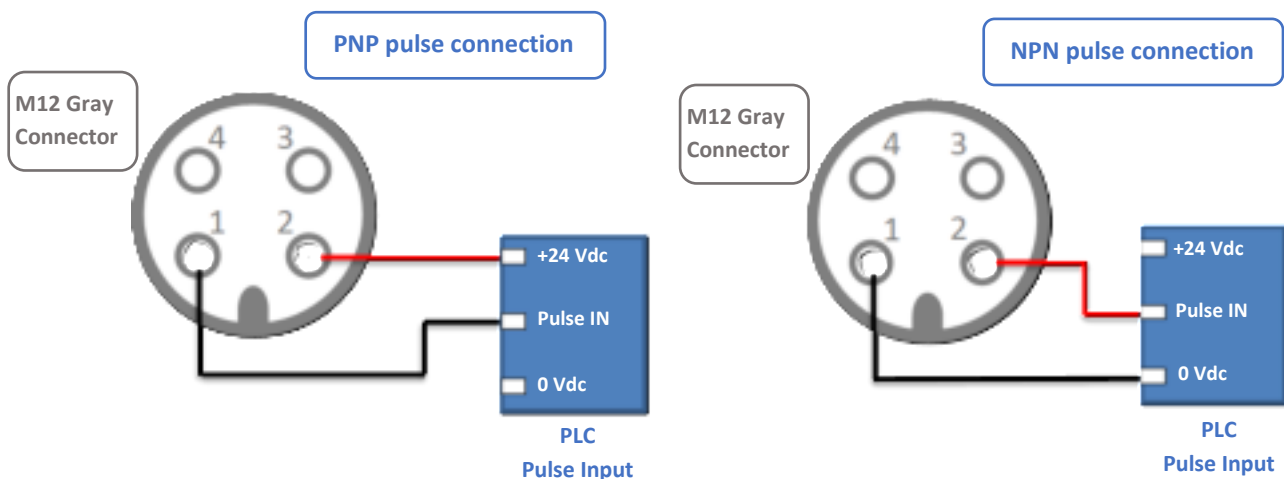


### 3.2. CEB09BVS I Transmitters

The CEB09BVS I transmitters have a protective aluminum casing and a pulse output through a 4-pin M12 connector as seen in the following image.



The pulse output can be connected PNP or NPN according to the following diagrams:



#### CONNECTION CABLES

- 1 Screened two wire hose.
- Ground only one end of the screen.
- Do not take the hoses through the power pipes.

#### PULSE OUTPUT

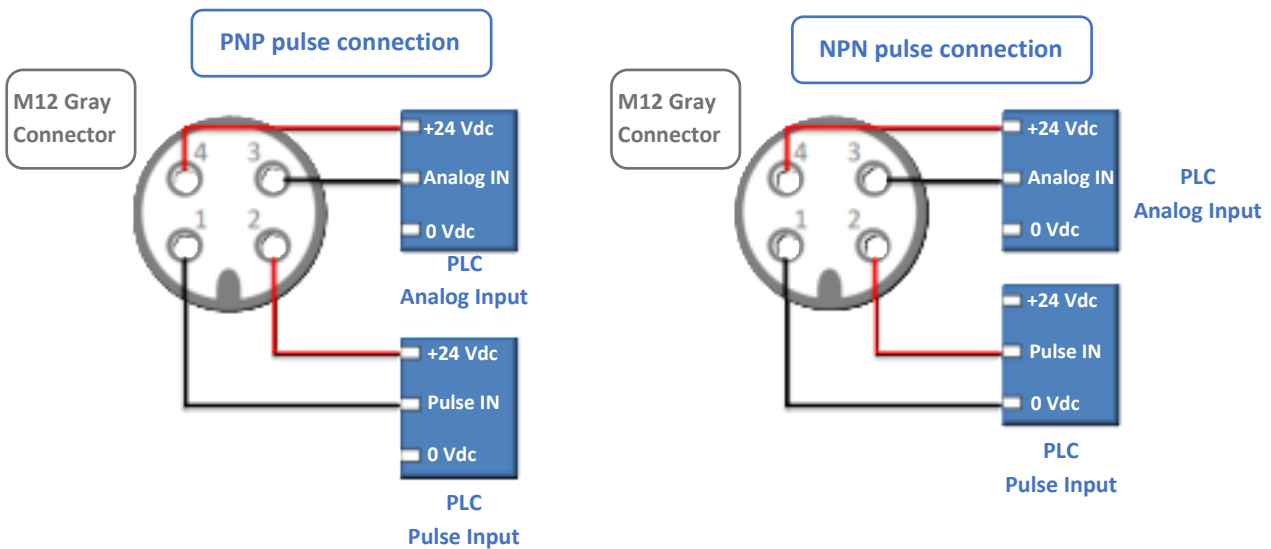
- Opto-coupled pulse output.
- 32ms configurable pulse width.
- Maximum voltage: 40 V
- Maximum current: 30 mA

### 3.3. CEB09BVSIA Transmitters

The CEB09BVSIA transmitters have a protective aluminum casing, it has a pulse and analog output through a 4-pin M12 connector as seen in the following image.



The connections of the pulse and analog outputs are detailed in the following diagrams:



#### CONNECTION CABLES

- 1 Screened two wire hose.
- Ground only one end of the screen.
- Do not take the hoses through the power pipes.

#### PULSE OUTPUT

- Opto-coupled pulse output.
- 32ms configurable pulse width.
- Maximum voltage: 40 V.
- Maximum current: 30 mA.

#### ANALOG OUTPUT

- By control loop.
- Maximum current: 30 mA.
- Voltage: 24 Vac
- Maximum load: 1.000 Ohm

Note: If you want to use the CEB09BVSIA transmitter without the analog output (such as if you want a transmitter with reading and pulse output without using a battery), the electrical connection is the same in both cases (PNP and NPN), only you must set **PIN 3** to **0 Vdc** instead of **IN Analog**.

## 4. CEB09BV Transmitter operating modes

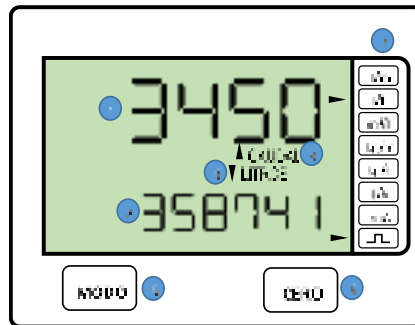
The CEB09BV Transmitter, like all the display flow meter transmitters that exist on the market, have 2 modes of operation:

- **MEASUREMENT MODE.** It is the normal operation mode of the instrument.
- **CONFIGURATION MODE.** It is the one used to modify the instrument's operating parameters.

### 4.1. Measurement mode

#### 4.1.1. Display description

The main elements of the CEB09BV transmitter display are shown below:



1. Top line. Depending on the "Display Mode", it can indicate Instantaneous Flow or Partial Volume (or Mass).
2. Lower Line. Depending on the "Display Mode", you can indicate the Total Volume (or Mass) or the Partial Volume (or Mass).
3. This label indicates that the top line shows Instantaneous Flow.
4. This label indicates that the Lower line (and sometimes the upper line) shows the Volume (Partial or Total) of liters. If, in the configuration of the equipment, a different density than 1000 gr/liter is selected, this label disappears.
5. MODE key. This key has several uses depending on the "Display Mode" and is activated with a magnetic key that is supplied with the equipment.
6. ZERO key. If the Partial Volume is displayed on the Upper or Lower line, this key sets it to zero using the magnetic key supplied with the equipment.
7. Arrows indicating:
  - Instantaneous Flow Units (l / m, l / h, m<sup>3</sup> / h, kg / m, kg / h, t / h).
  - If the data outputs (Pulse and Analog) are active.



### 4.1.2. Display modes

The CEB09BV transmitter display can show three types of data:

- **Instantaneous Volumetric Flow** (volume per unit of time)
- **Partial Volume** with reset
- **Total volume** without resetting

**NOTE:** If a liquid density other than 1,000 gr/liter is selected in the equipment configuration (see section 4.2), the CEB09BV transmitter would indicate the Flow, Partial or Total mass.

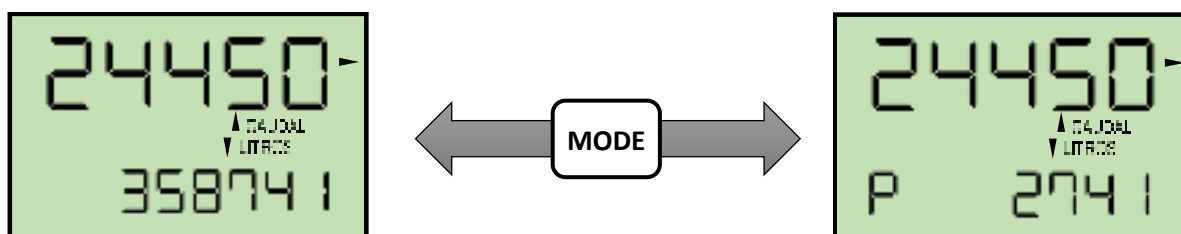
These 3 values can be displayed on the 2 lines of the screen, in different ways depending on the Display Mode. The CEB09BV transmitter has 3 different Display Modes:

DISPLAY MODES		
MODE	TOP LINE	LOWER LINE
MODE 1	FLOW	PARTIAL / TOTAL
MODE 2	FLOW	PARTIAL
MODE 3	FLOW / PARTIAL	TOTAL

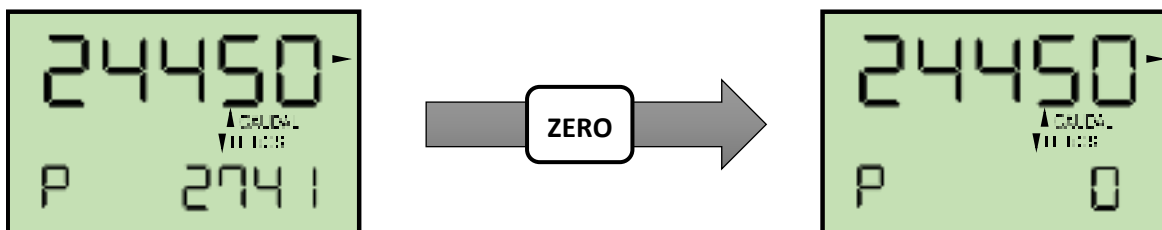
The user can select the "Display Mode" that best suits his needs, accessing the equipment configuration (see section 4.2). Modes 1 and 3 are typically used in fixed installations and Mode 2 in portable installations.

#### Display Mode 1

The "Display Mode 1" shows the Flow on the upper line, and the Partial or Total on the lower line. When the bottom line shows the Partial, a P appears on the left. To see alternately the Partial or the Total, simply position the magnetic key on the MODE key.

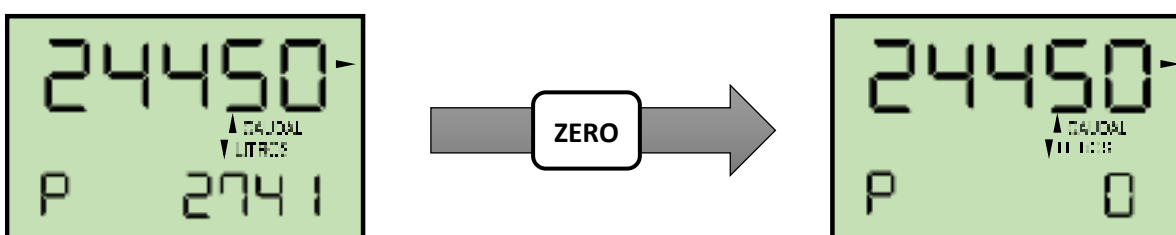


If you want to reset the Partial Volume (or Mass), just position the magnetic key on the ZERO key.



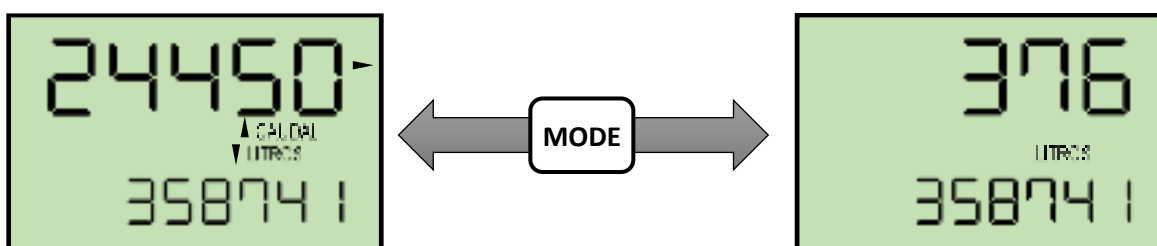
### Display Mode 2

The "Display Mode 2" shows the Flow in the Upper line and the Partial in the lower line. This Mode is widely used in installations where the flowmeter is portable and is installed between hoses. To reset the Partial Volume (or Mass), simply position the magnetic key on the ZERO key.

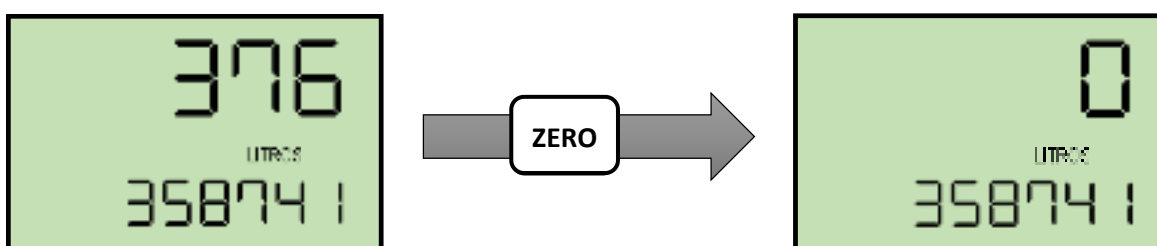


### Display Mode 3

The "Display Mode 3" shows the Flow or Partial on the top line, and Total on the bottom line. When the upper line shows Partial, the "FLOW" label and the arrow indicating the flow unit disappear. To see alternately the Partial or the Flow, simply position the magnetic key on the MODE key.



If you want to reset the Partial Volume (or Mass), just position the magnetic key on the ZERO key.



**Note:** If a liquid density other than 1,000 gr/liter is selected in the equipment configuration (see section 4.2), the CEB09BV Transmitter would indicate the Flow, Partial or Total mass.

## 4.2. Configuration mode

Access, navigation and modification of the equipment parameters is done from outside the CEB09BV transmitter. You don't need to physically access the electronics like you did in previous versions.



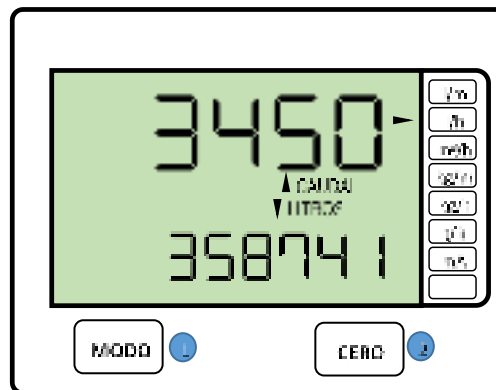
Access and modification of internal parameters must always be carried out by qualified personnel. Any incorrect alteration can cause the Transmitter to malfunction.

### 4.2.1. Access and Navigation in Configuration Mode. Modification of Parameters

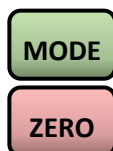
#### a. Keys and their meaning

The CEB09BV transmitter has only 2 keys:

1. **MODE** located in the lower left part of the Transmitter and
2. **ZERO** located lower right

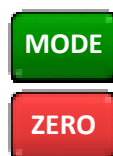


To activate each of these keys, just move the magnetic key supplied with each device. However, these two keys become 4 depending on how long we keep the magnetic key on each key:



#### SHORT KEY

Approach and quickly remove the magnetic key.



#### LONG KEY

Approach and hold the magnetic key for **4 seconds** until the message ESPERE (wait) appears. A decreasing counter is displayed on the top line until the message SUELTE (release) is displayed.

**Note:** In the different diagrams of this manual these symbols are used so that the user knows at all times if he has to apply a **LONG KEY** (more alive symbol) or **SHORT** (dimmer symbol).

Screens that appear when the **LONG KEY** is activated:

When the key is held over each key, the **LONG KEY** is activated and the following screens appear to guide the user:

- **WAIT screen.** At the bottom appears the word ESPERE (wait) and at the top the number 4 that decreases until it reaches zero. The magnetic key must remain next to the key since, if it is separated from the key before reaching zero, the spindle returns to the previous screen without having performed any function.



- **RELEASE screen.** When the countdown reaches zero, the SUELTE (release) screen appears. This message tells the user that they can remove the magnetic key from the key. In this way, you will go to the next screen, which will be different depending on each situation.

**Note:** This operation has been developed so that the user knows at all times what he is doing and has been the result of communication with our clients.

### b. Access to Configuration Mode

To access the equipment configuration parameters, proceed as follows:

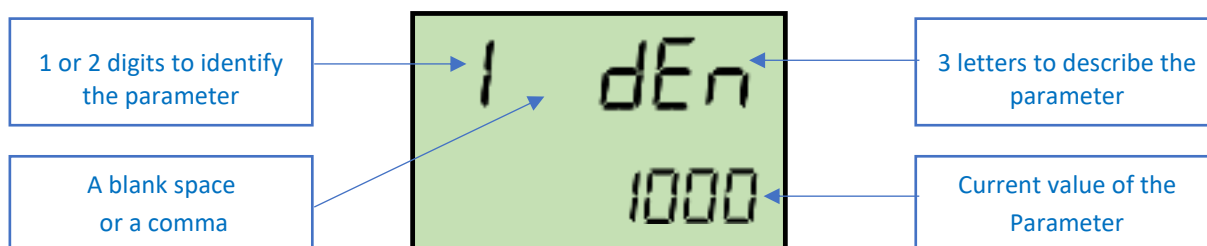
1. Position the magnetic key for 4 seconds on the key **MODE**. The screen to enter the PASSWORD will appear, in which the first digit from the left flashes:



2. Enter the password **0300** using the keys:
  - Key **MODE**: increases the flashing digit by one unit.
  - Key **ZERO**: Shifts the blinking digit to the right.
3. Confirm the KEY by positioning the magnetic key for 4 seconds on the Key **ZERO** and the first configuration parameter of the equipment is accessed (**0-ADJUSTMENT**)

### c. Navigating the Configuration Mode

- **Description of the parameter screens.** When positioned on a parameter, a screen appears in which:
  - The top line shows:
    - One or 2 digits to identify each parameter.
    - A blank space or a comma (in case of 2 digits)
    - 3 letters to describe each parameter
  - The bottom line shows the current value of that parameter.



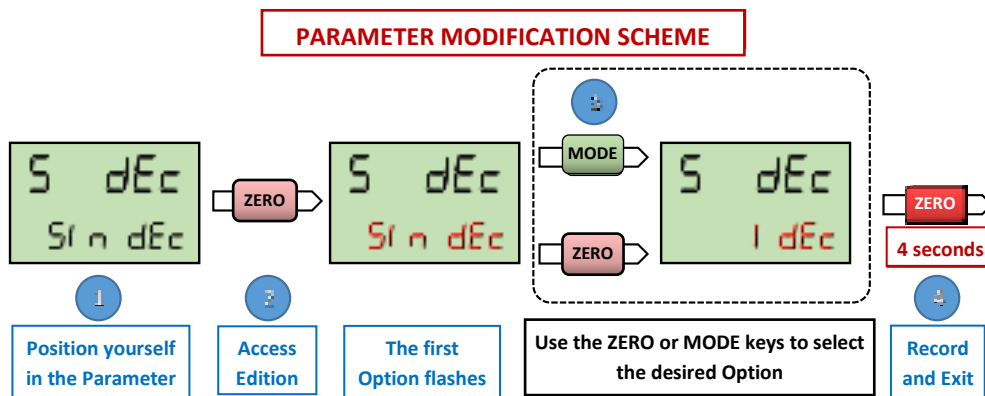
- **Navigation.** Once you have accessed the Configuration Mode, you have the following Navigation options:
  - Move to the next Parameter. Press the Key **MODE**. If the last parameter is reached and the key is pressed again **MODE**, returns to the first parameter.
  - Exit Configuration Mode. Press the Key **MODE** for 4 seconds.
  - Access Parameter Modification. Press the Key **ZERO**.

#### d. Modification of Parameters

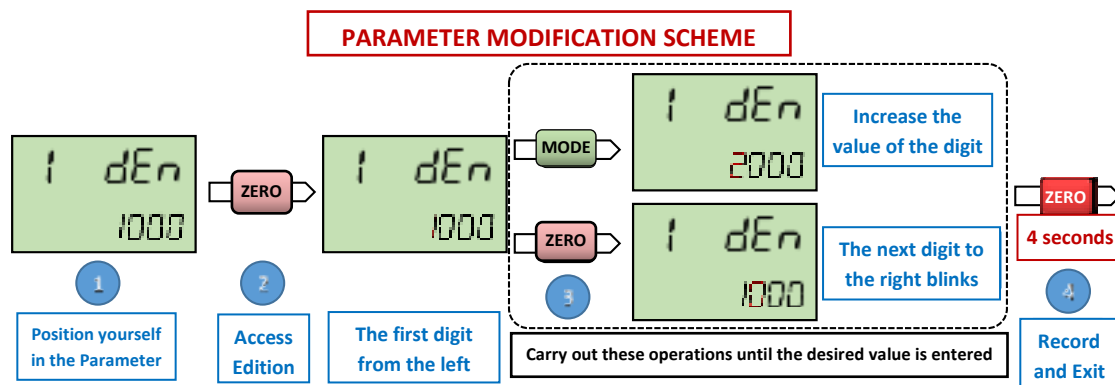
As explained in the previous section, once positioned on the parameter to be modified, press the Key **ZERO** and the edition of the Parameter is accessed.

There are two ways to modify a parameter, depending on the type of Parameter to enter:

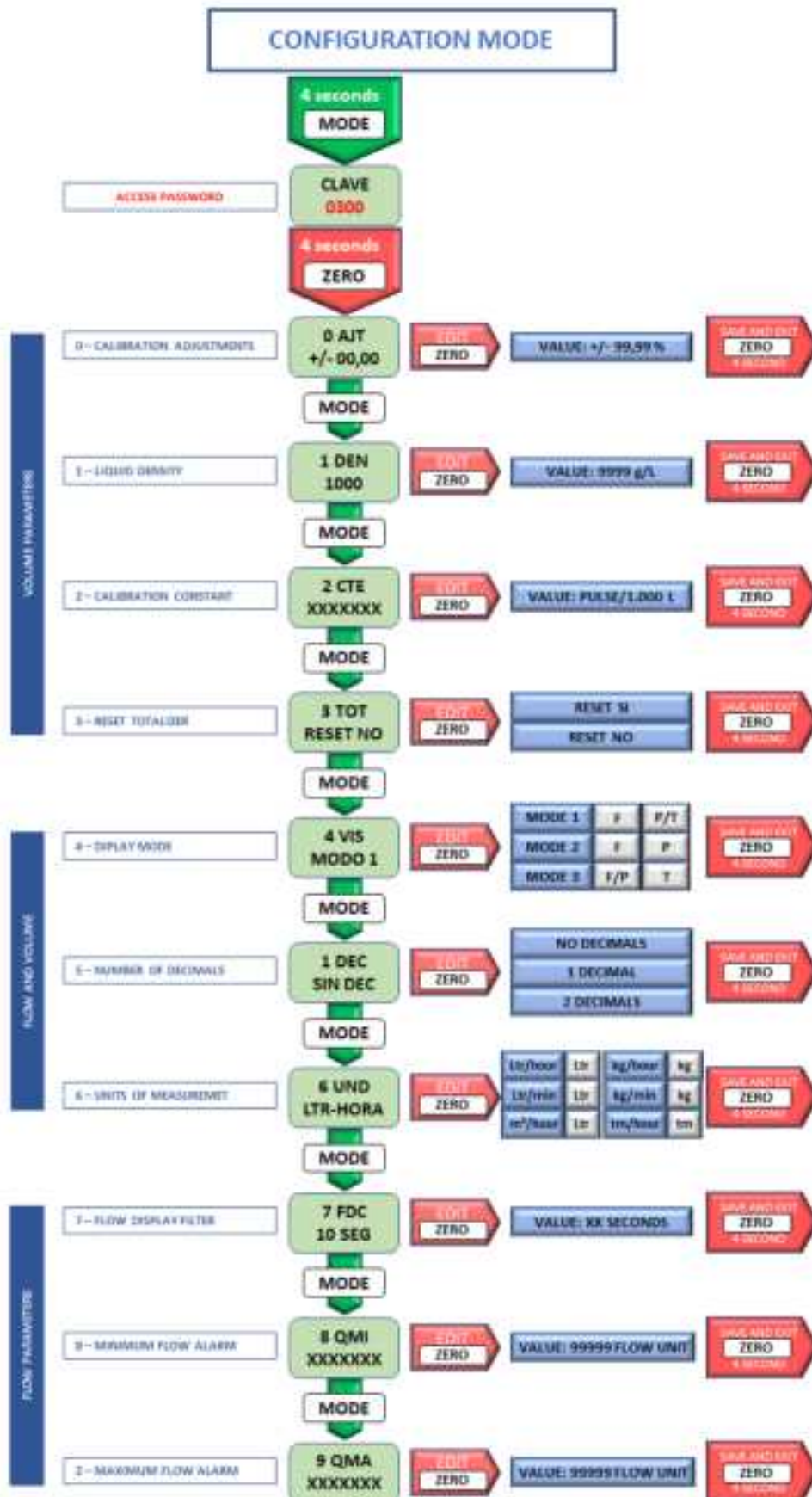
- **Options Parameter.** The value can only be chosen from several options. When editing a parameter with Options, the entire bottom line of the display flashes, and the following actions can be performed:
  - Select the next Option: Press the Key **MODE** or the Key **ZERO**.
  - Save changes and Exit Configuration Mode: Press the Key **ZERO** for 4 seconds.

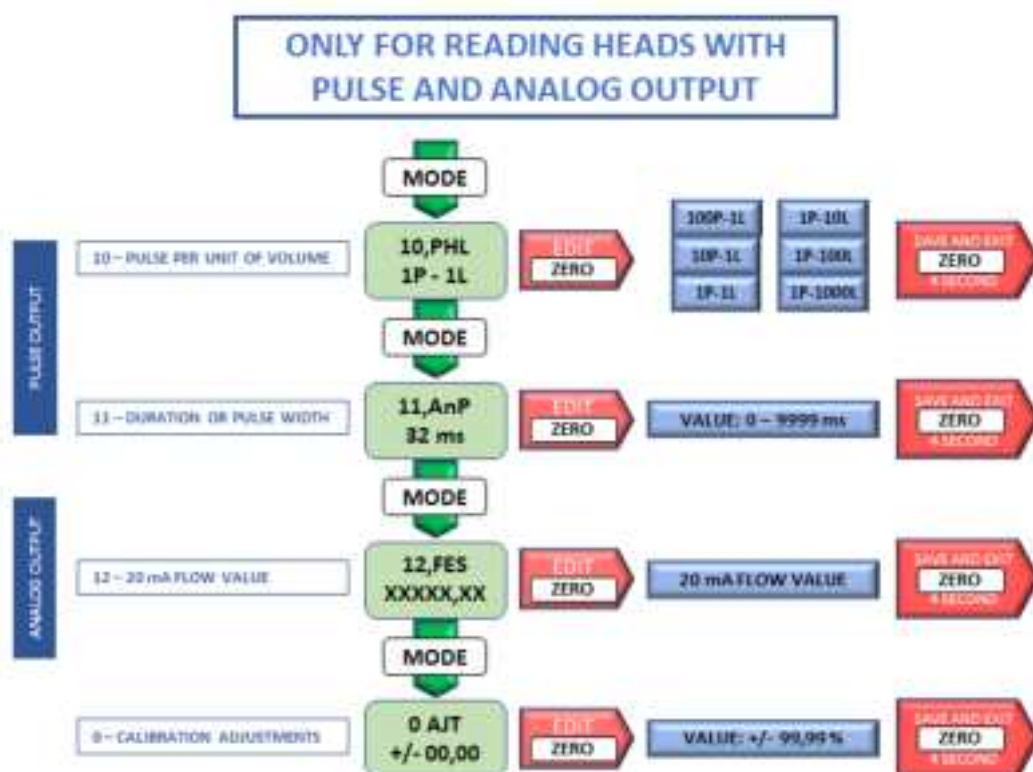


- **Numerical Parameter.** The value can be any number, between a minimum and a maximum. When this type of parameter is edited, the left digit flashes, indicating that it is the one that can be modified. The possible actions are:
  - Increase the value of the flashing digit: Press the Key **MODE**
  - Edit the next digit to the right of the current one: Press the Key **ZERO**.
  - Save changes and Exit Configuration Mode: Press the Key **ZERO** for 4 seconds.



**SUMMARY SCHEME:** On the next page you can see a summary diagram so that the user can navigate in an easier way through the Configuration Mode.







### 4.2.2. Description of Parameters

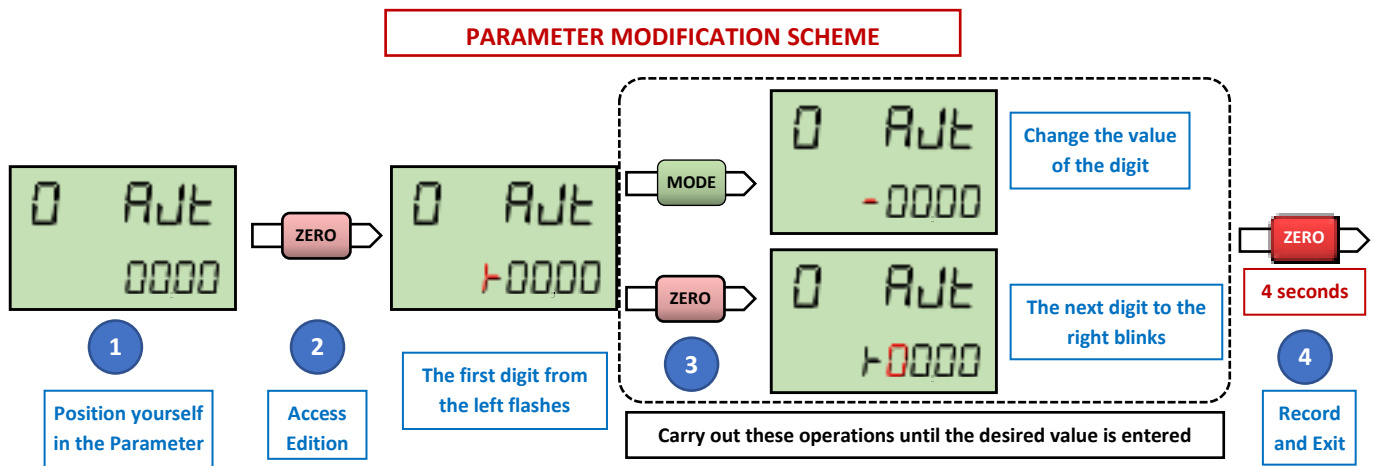
The characteristics of each of the CEB09BV Transmitter Configuration Parameters and how to edit and modify them are detailed below.

#### a. - Calibration Adjustment (0 AJT)

- This parameter is used to adjust the flowmeter measurement to the customer's installation. Flowmeters leave the factory calibrated in our Approved Laboratory so, in principle, this parameter should always be zero.

However, due to the characteristics of the installation and the type of flowmeter, it may be necessary to perform an Adjustment or Recalibration of the equipment on-site. To make an accurate adjustment you need a reliable and precise standard or reference (Volume or Weight) (Scale or Calibrated Vessel, etc.).

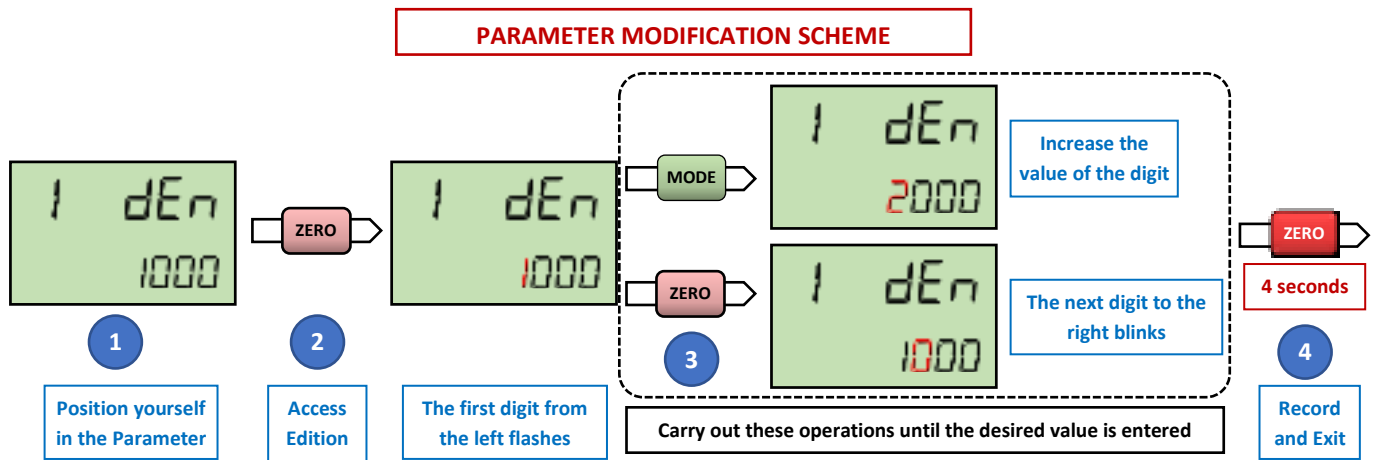
- The user can choose a value between + 99.99% and -99.99% to adjust the flowmeter value to the Standard or Reference.



**Note:** A variation of the value of this parameter alters the flowmeter measurement

b. - Liquid Density (1 DEN)

- This parameter is used to enter the density of the liquid that passes through the flowmeter.
- The user can choose a value between 0 and 2000 gr / liter.



**Note:** When this parameter has a value of 1000 gr / liter, the CEB09BV Transmitter displays all units in volume (Liters, m3) or volumetric flow (L / h, L / min, m3 / h). However, if this parameter is different from 1000 gr / liter, all units will be displayed in mass (Kg, Tm) or mass flow (Kg / h, K / min or Tm / h).

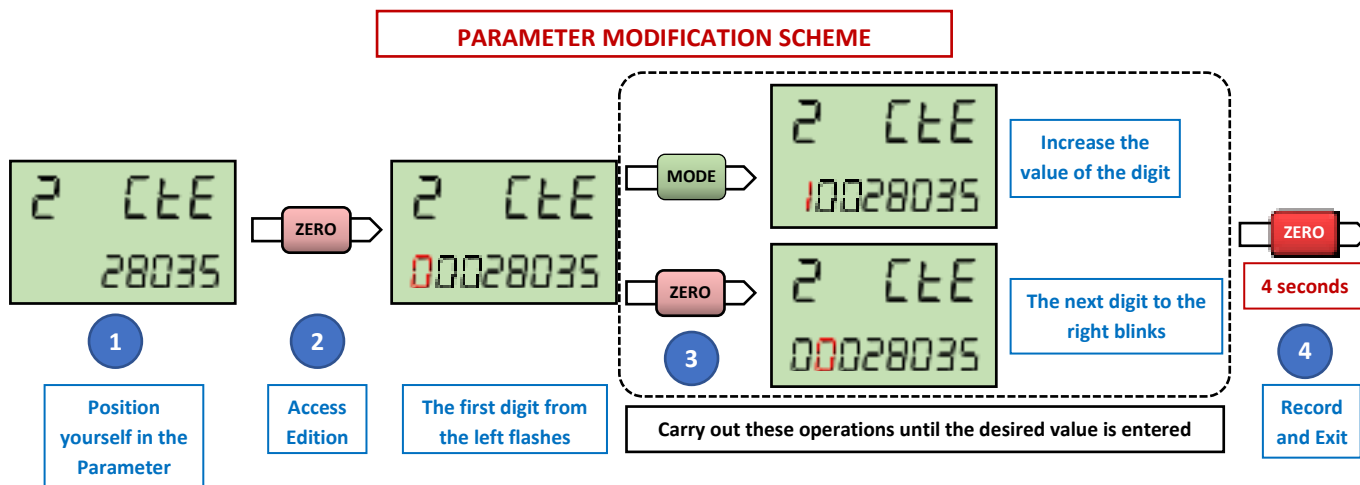
**Note:** This parameter can be interesting to use when the density of the liquid that passes through the flowmeter has a small variation.

### c. - Calibration Constant (2 CTE)

- This parameter shows the constant of the flow meter that has been obtained when calibrating the equipment in our Approved Laboratory. For this reason, it is important not to modify this parameter unless you do a Recalibration in a Laboratory.

If you need to adjust the flowmeter measurement, the above 2 parameters can be used.

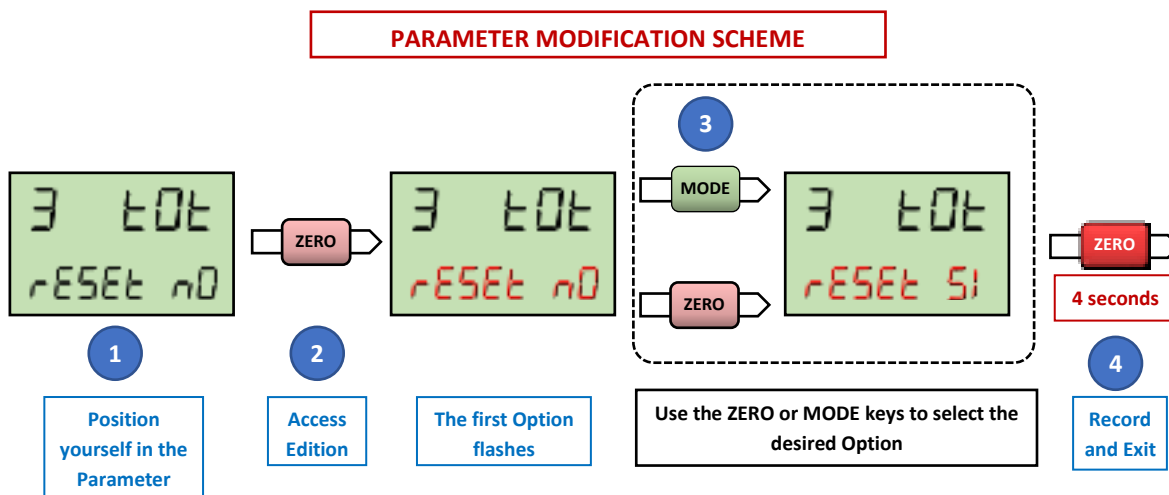
- The user can select a value between 1 and 99999999 (8 digits) pulses per 1,000 liters.



**Note:** A variation of the value of this parameter alters the flowmeter measurement

### d. - Reset Totalizer (3 TOT)

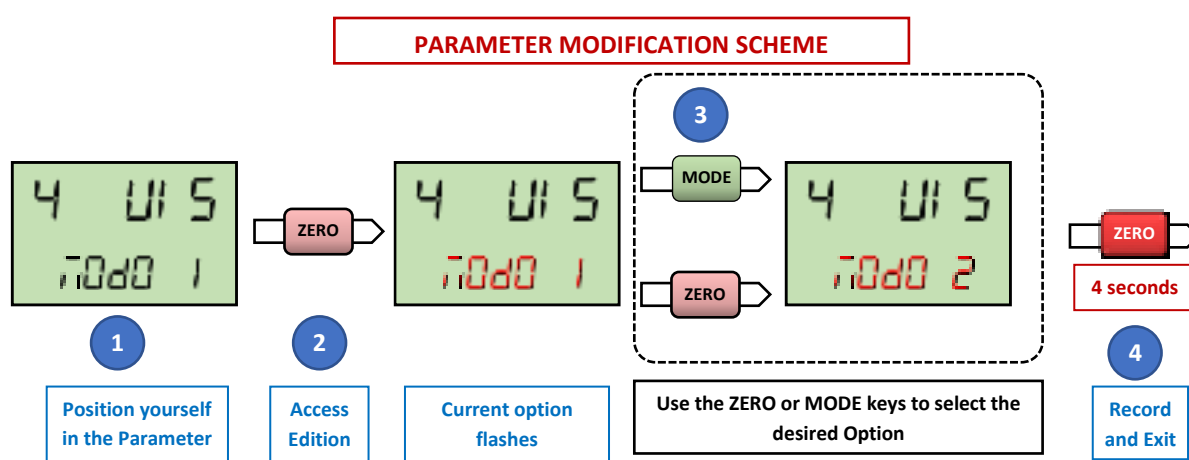
- This parameter is used to reset the General Totalizer that appears on the bottom line of the work mode screen.
- The user can choose between:
  - "Reset YES". Resets the totalizer
  - "Reset NO". Doesn't zero it



e. - Display Modes (4 VIS)

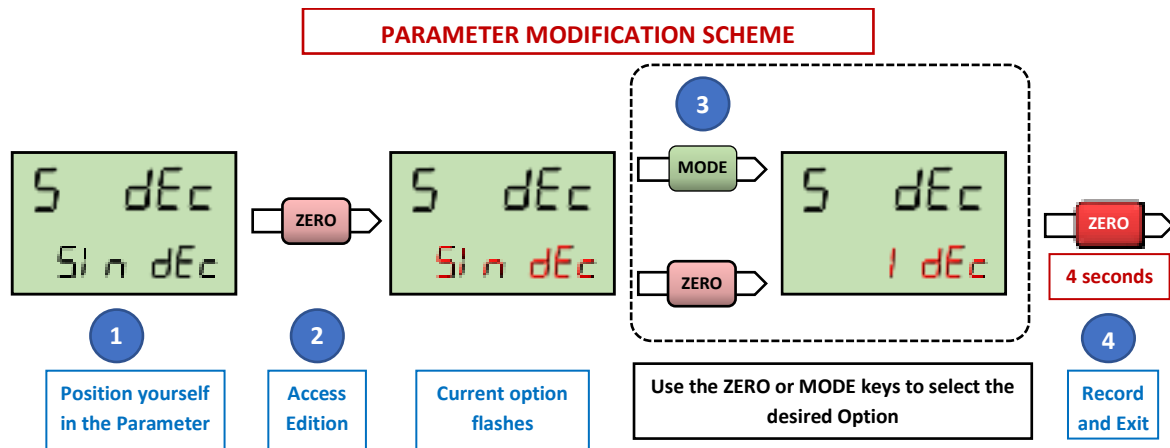
- This parameter is used to select the Mode in which you want the main quantities to be seen (Flow, Partial and Total) on the main screen of the Transmitter (Work mode).
- The user can choose between:

MODE	TOP LINE	LOWER LINE
MODE 1	FLOW	PARTIAL / TOTAL
MODE 2	FLOW	PARTIAL
MODE 3	FLOW / PARTIAL	TOTAL



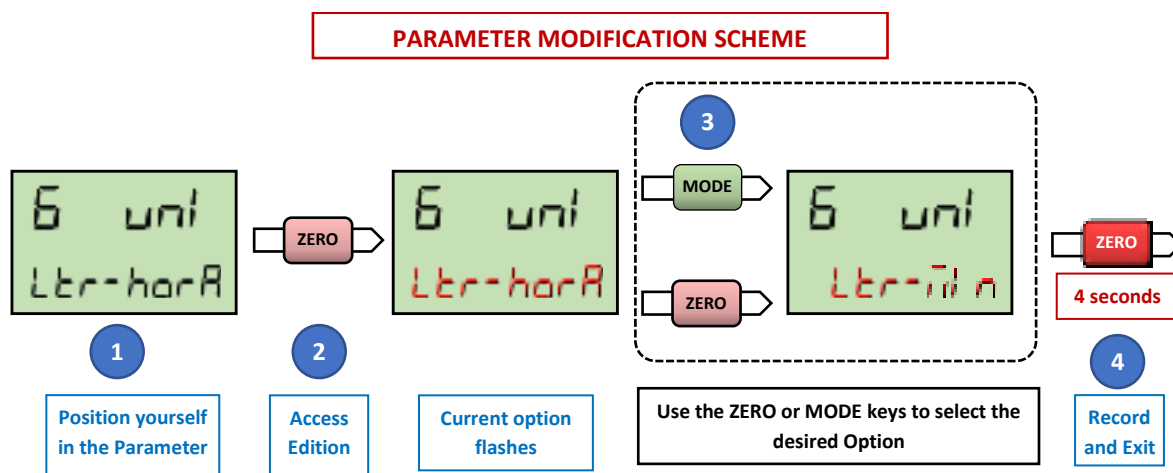
*f. - Number of Decimals (5 DEC)*

- This parameter is used to select the number of decimal places shown by the 2 totalizers (Partial and Total) and the Flow on the main screen.
- The user can select from the following options:
  - No decimals
  - 1 decimal
  - 2 decimals



### g. - Units of Measurement (6 UNL)

- This parameter is used to select the flow unit shown on the Transmitter display.
- The user can choose between the following options:
  - Liters / minute
  - Liters / hour
  - m3 / hour

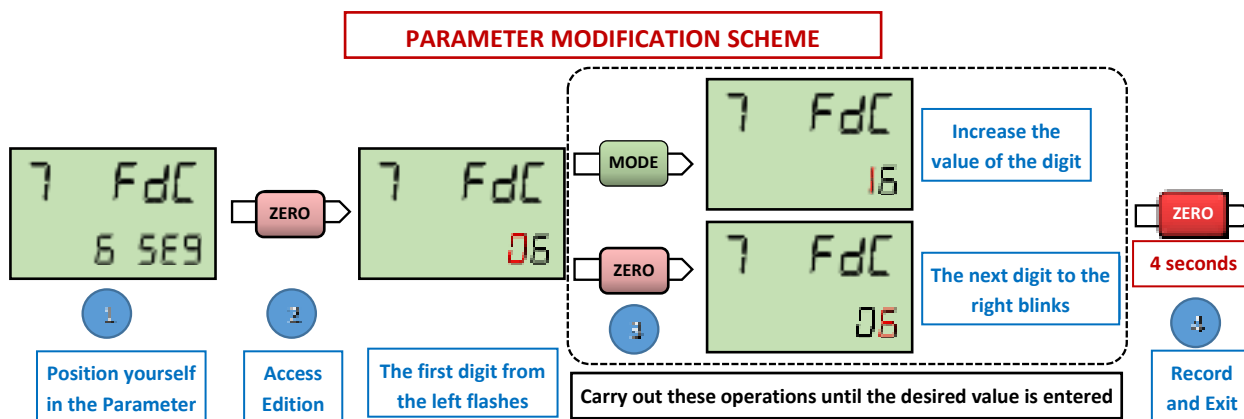


#### Notes:

- When the flow rate is displayed in Work Mode, a small arrow appears on the right side of the display indicating the selected flow unit.
- If m3 / hour is selected, Totalizers (Partial and Total) are shown in m3

### h. – Flow Display Filter (7 FDC)

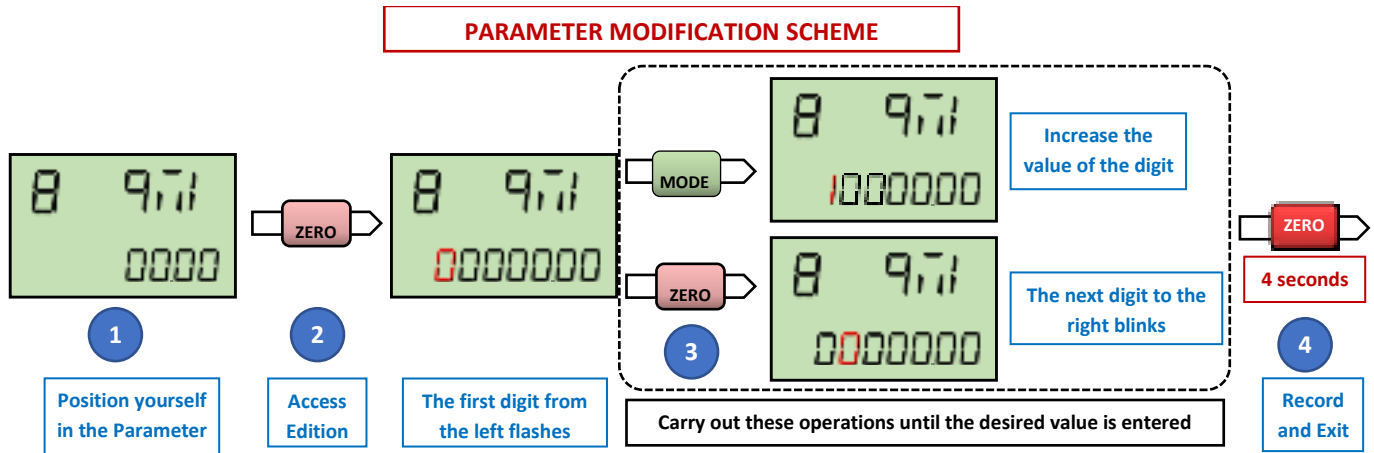
- This parameter is a time filter and serves to stabilize the flow reading. Sets a time interval in which it receives the pulses from the flowmeter and does the instantaneous flow calculations.
- User can enter a value between 1 and 60 seconds



**Note:** it is useful when the pulse frequency (Pulses / Second) is very low or not very stable due to, for example, the use of a pulsating pump

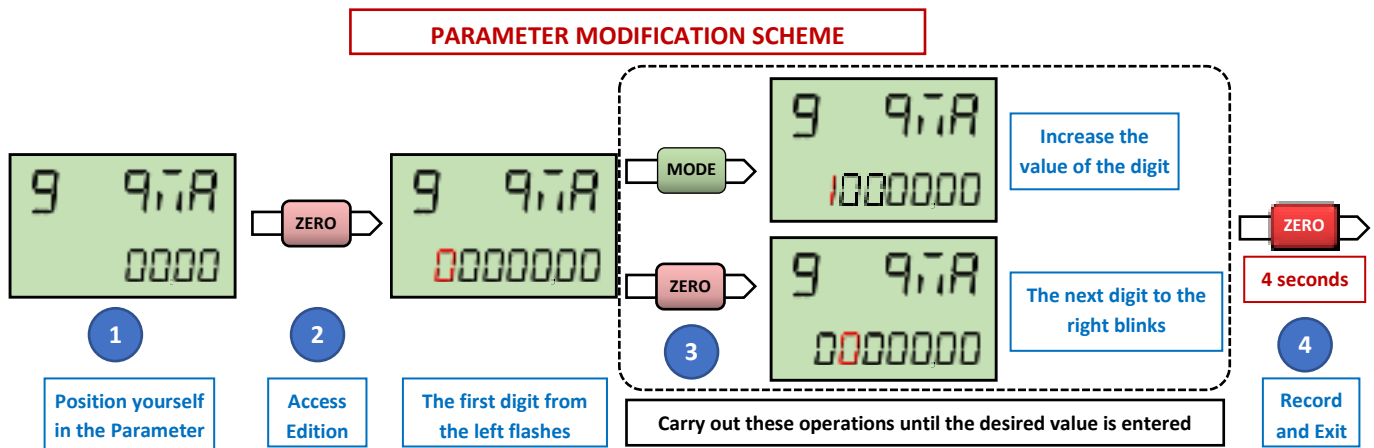
### i. - Minimum Flow Alarm (8 QMI)

- This parameter is used to indicate on the main screen that the flow rate at which the equipment works is lower than this value.
- The user can choose a value between 0 and 9999999. The flow units used are those defined in parameter 6.



### j. - Maximum Flow Alarm (9 QMA)

- This parameter is used to indicate on the main screen that the flow rate at which the equipment works exceeds this value.
- The user can choose a value between 0 and 9999999. The flow units used are those defined in parameter 6.

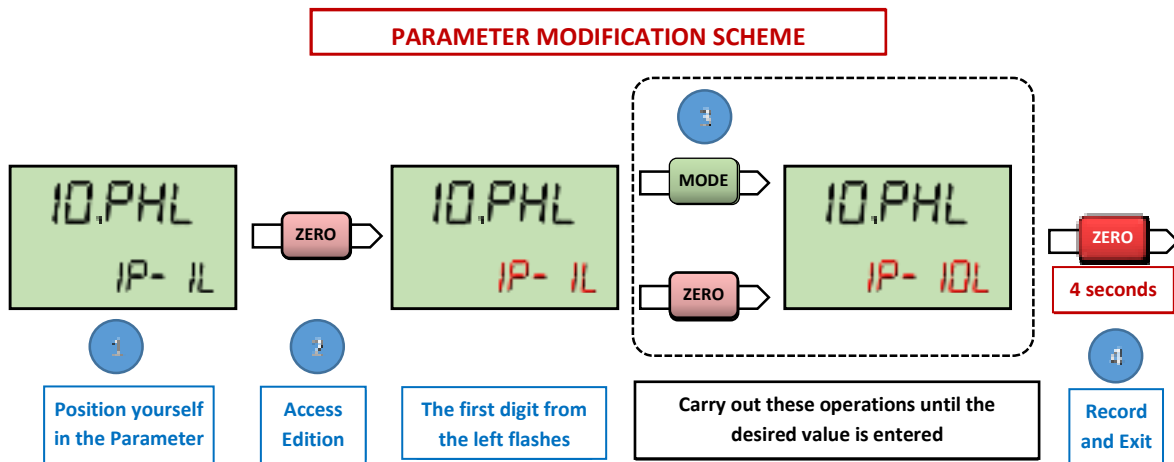


The following parameters will only be active for versions of the Transmitter with:

- Pulse Output "**SI**" (Parameters 10 and 11), or
- Pulse and Analog Output "**SIA**" (Parameters 10, 11 and 12)

*k. - Pulses per unit of Volume (10 PHL)*

- This parameter is used to adjust the number of pulses per unit volume that the Transmitter pulse output generates.
- The user can choose between the following values:
  - 100 Pulses / Liter
  - 10 Pulses / Liter
  - 1 Pulse / Liter
  - 1 Pulse / 10 Liters
  - 1 Pulse / 100 Liters
  - 1 Pulse / 1000 Liters

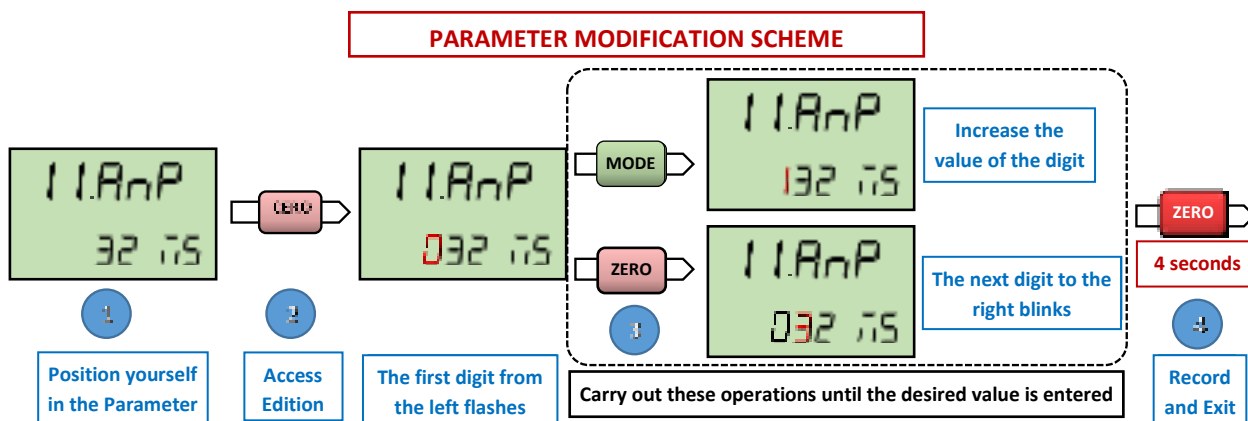


**Note:** The electronics of the Transmitter is a pulse divider, therefore, the selected value cannot be higher than that supplied by the Turbine or Oval Wheel flowmeter.



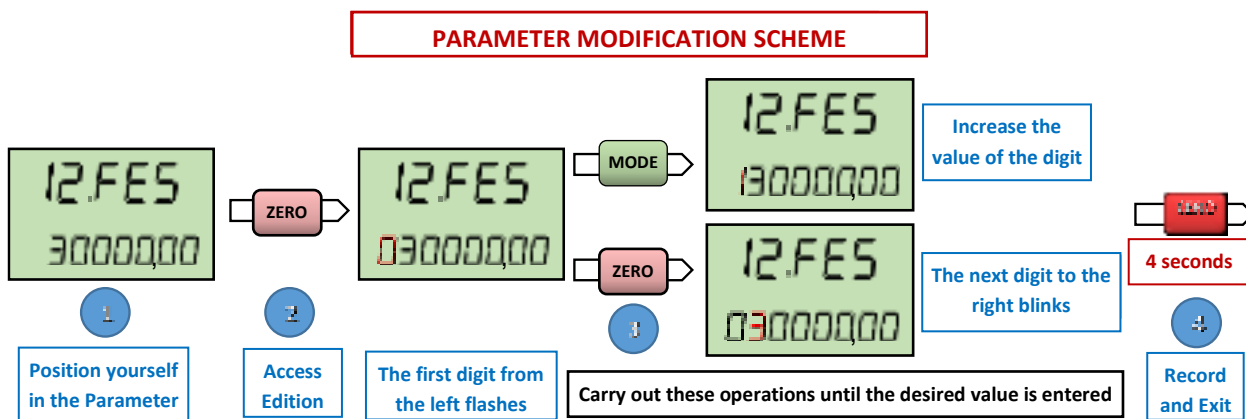
1. - Duration or pulse width (11 ANP)

- This parameter is used to adjust the width value of each spindle output pulse.
- The user can choose a value between 1 and 999 milliseconds.



*m. -20 mA Flow value - Full Scale (12 FES)*

- This parameter is used to adjust the full-scale value of the Analog Output, that is, the flow rate produced by a 20-mA output.
- The user can choose a value between 0.01 and 999999.99 Liters / hour.



## 5. Basic maintenance operations

### 5.1. Battery change.

The CEB09BV and CEB09BVSI models are self-powered by a 3.6V Lithium AA format battery. The duration of this battery varies depending on the use that is given to the equipment, but normally they have a work life of 4 to 7 years.

A few weeks before the battery is completely discharged, a flashing battery symbol appears on the screen.



This can also occur due to a shock, vibration, rough jolt, etc., which causes the battery to be removed in place and causes a small loss of voltage.

To change the battery, follow these steps:

**Steps**

**Description**

Remove the screw cap from the Transmitter

1



Remove the 4 screws that hold the Transmitter cover and remove the Transmitter cover

2



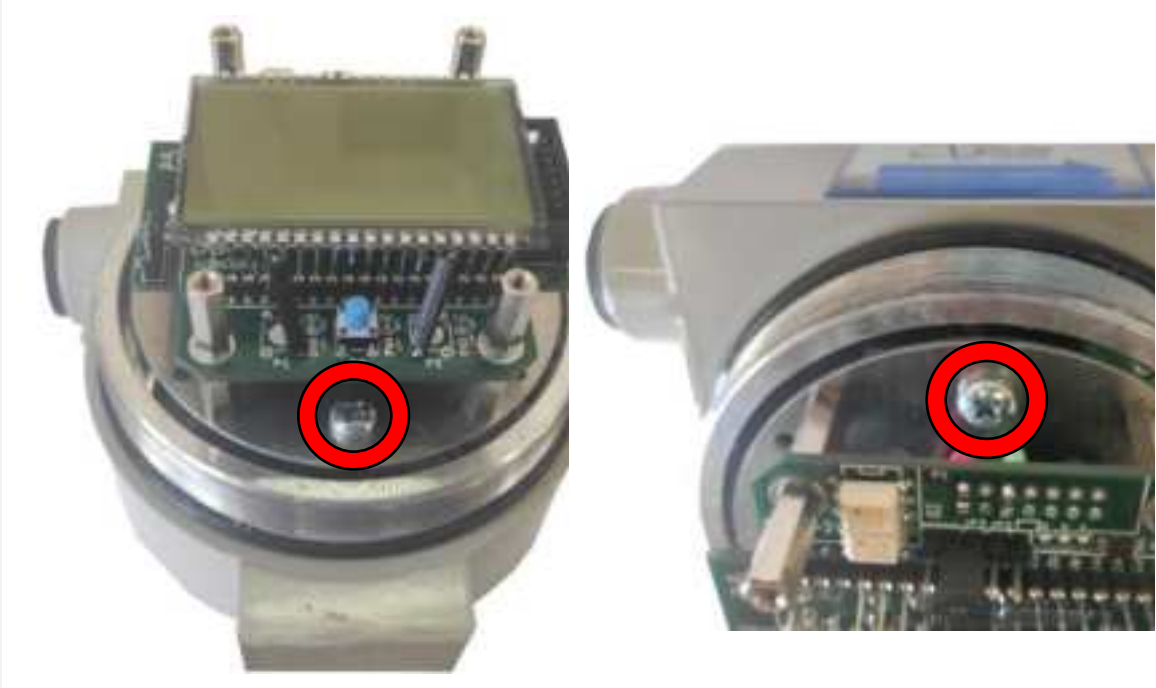
3

Raise the electric bridge. Wait 5 seconds and put it back on, if the battery icon persists, follow the procedure, if it disappears, go to step 10.



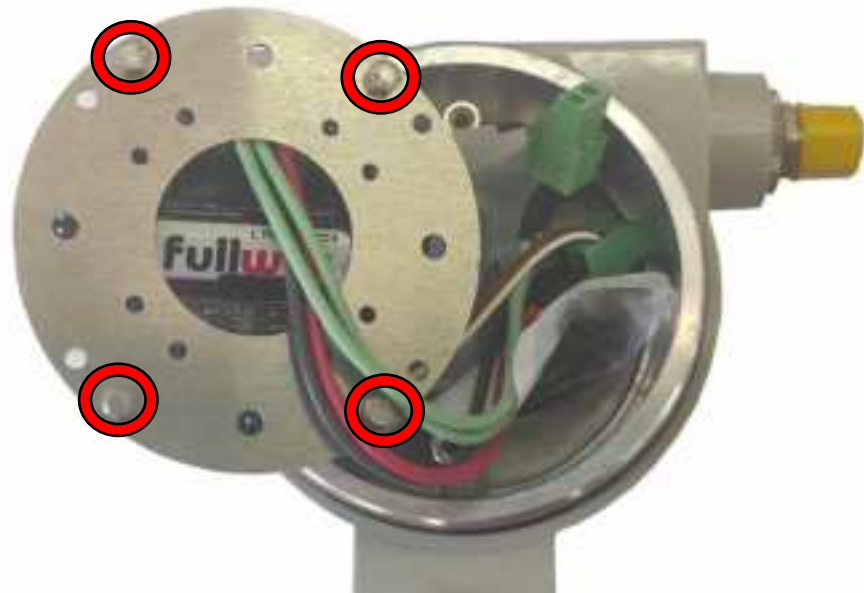
Remove the 2 screws that hold the aluminum bracket to the Transmitter body

4



5

Remove the 4 screws that hold the plate to the aluminum bracket



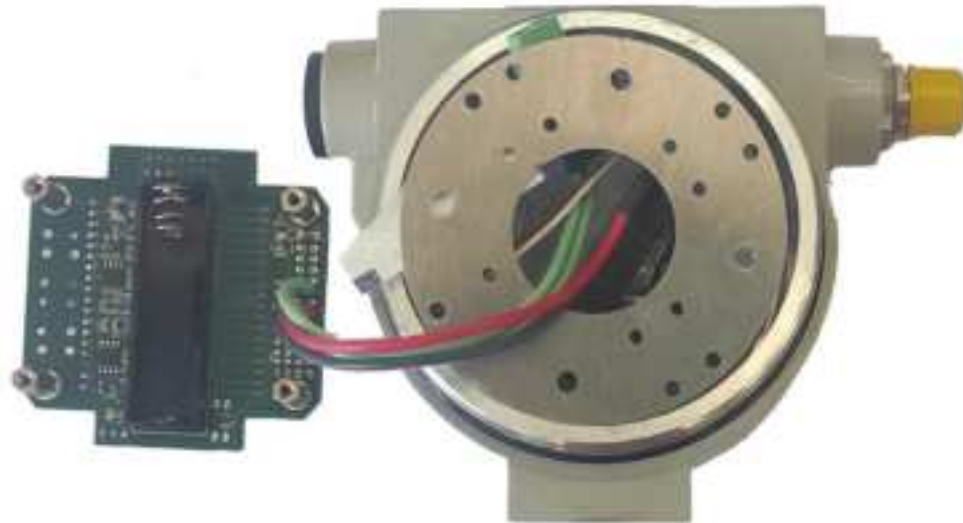
Remove the depleted 3.6V Lithium battery

6



7

Put a new 3.6V Lithium battery



Screw in the 4 screws. Accommodate wiring and silica bags inside Transmitter body

8



9

Screw in the 2 screws of the aluminum bracket.



Put the electric jumper on the top two pins

10



eleven

Put the Transmitter cover and screw the 4 screws





Put the screw cap on the Transmitter



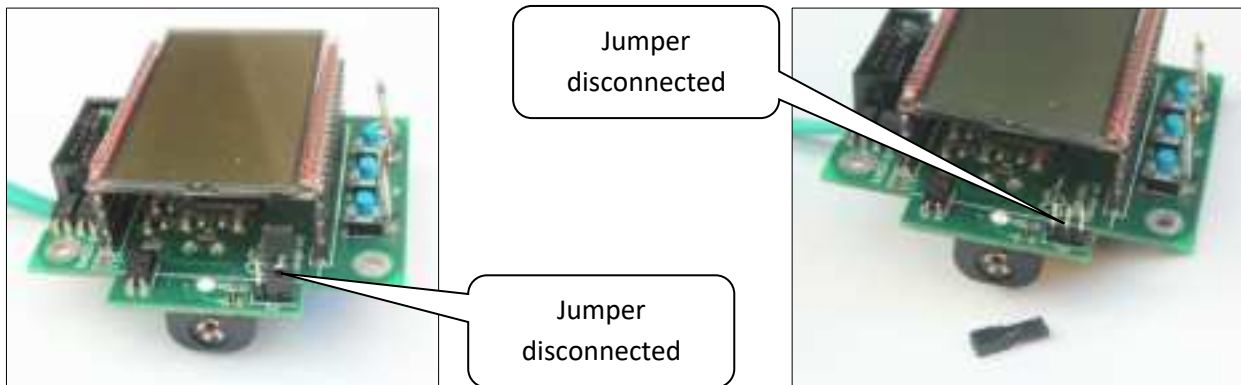


## 5.2. Electronic board change

The customer can replace, by himself, the electronics of the CEB09BV Transmitters, in those cases that it is necessary, following the following steps:

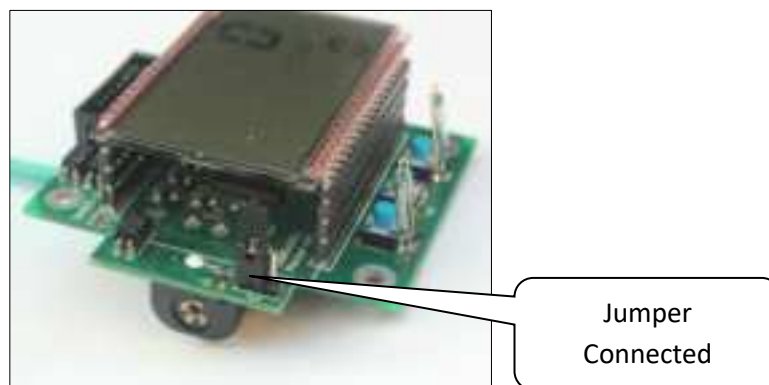
### 1. Remove from damaged electronics.

- Open the front cover
- Disconnect the connection bridge if the board is live.
- Loosen the 4 screws that hold the electronics
- Loosen the terminal block and loosen the cables. This terminal block connects the electronics with the pulse sensor.



### 2. Fit the new electronics. The electronics are shipped with the supply voltage disconnected and must remain so until installed.

- Connect the terminal block to the cables coming from the pulse sensor. It does not matter the order in which the cables are placed, since they do not have polarity.
- Put the board in its place and put the screws that hold it.
- Give voltage to the board by placing the jumper between the top 2 pins as seen in the image.
- Place the front cover of the Transmitter.



### 3. Adjust the flow meter constant. Check that the constant (Pulses / Liter) on the plate coincides with that of the flow meter, for which the procedure is as indicated in section 4.2.

## 6. Contact

For any problem you may encounter or service, you need, do not hesitate to contact the G - Flow offices.

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