Bass Instruments

ELECTROMAGNETIC
FLOWMETER

EMDE

USER MANUAL

Bass Ölçme Enstrümanları A.Ş.
Esenşehir Mah. Füsun Sok. No:59 Ümraniye/İSTANBUL TR-34776
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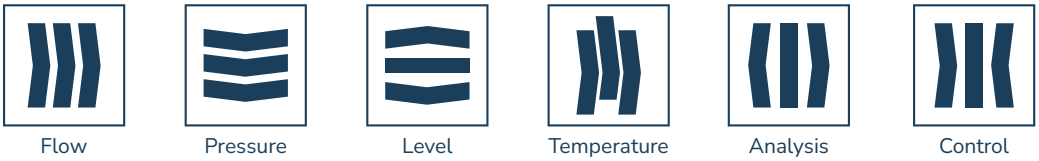

BASS INSTRUMENTS

Bass Olcme Enstrumanları A.Ş. was founded in Istanbul in 2006 to develop specialized solutions for measuring, monitoring, and controlling fluid parameters such as flow, pressure, level and temperature.

For nearly 20 years, Bass Olcme Enstrumanları A.Ş. has been making a significant impact in the industry and continues its operations in a 1,050 m² facility.

Our factory, spanning 10,000 m² of open space and 3,500 m² of enclosed area, is home to Turkey's most advanced and largest liquid and gas flow laboratory. Thanks to this state-of-the-art facility, all testing requirements of both the public and private sectors are met domestically, eliminating the need for international testing alternatives.

Our company exports to more than 40 countries and maintains a strong presence in the industry with its globally proven and reliable products.

Our company holds four patents, demonstrating our commitment to innovation and technological advancement in the industry.

Our company is a key supplier of products to leading firms in Turkiye and around the world across various industries, including Chemicals and Petrochemicals, Water and Wastewater, Textiles, Gas and Oil, Food and Beverage, Paper, Iron and Steel, Pharmaceuticals, Energy, Heating, Ventilation, and Air Conditioning.

Certificates

With its expert team, our company develops specialized solutions and operates in compliance with ISO 9001, ISO 14001, ISO 45001 standards and CE directives, and our calibration laboratory is accredited in accordance with ISO/IEC 17025.

We operate in relevant industries with our products certified for harsh conditions in compliance with ATEX directives and SIL (Safety Integrity Level) declaration, and with WRAS (Water Regulations Advisory Scheme) approved products for potable water applications.

With our EAC-certified products, we actively participate in numerous projects within the Eurasian Economic Union.

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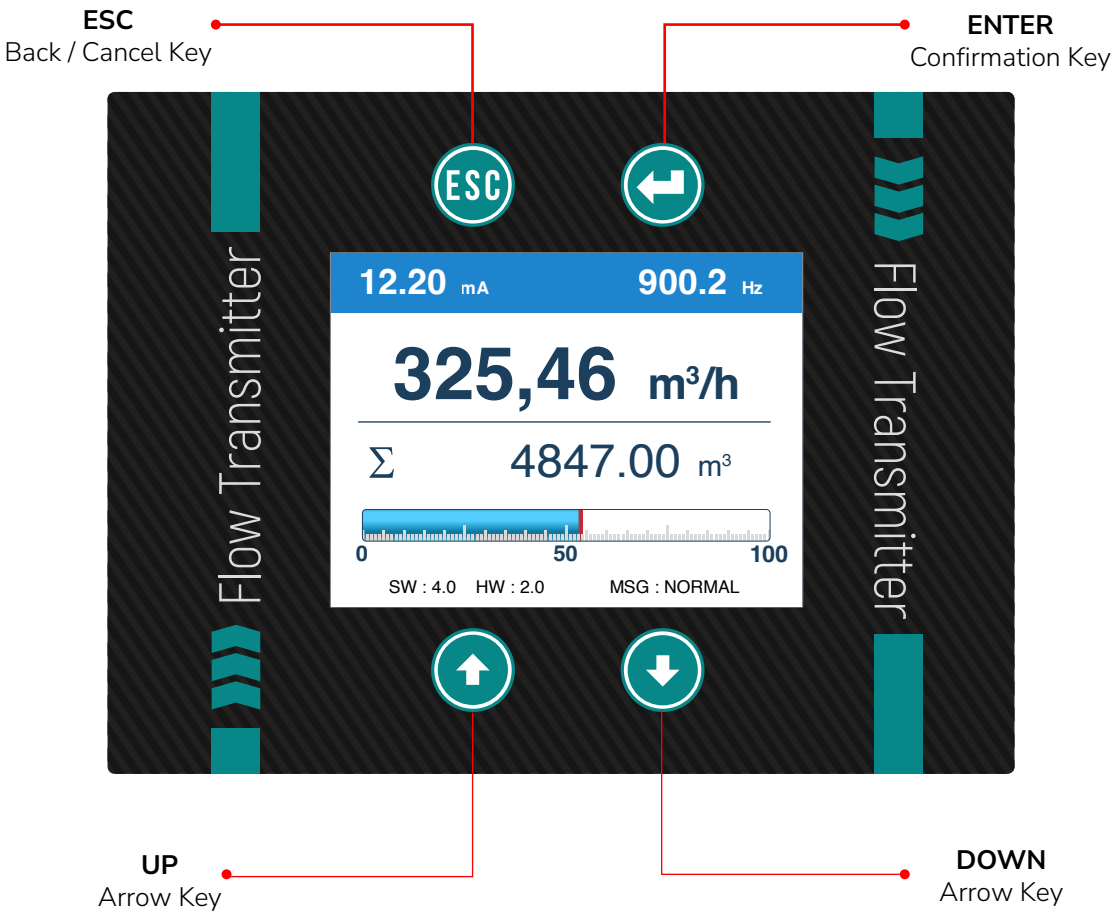
0 - KEYPAD



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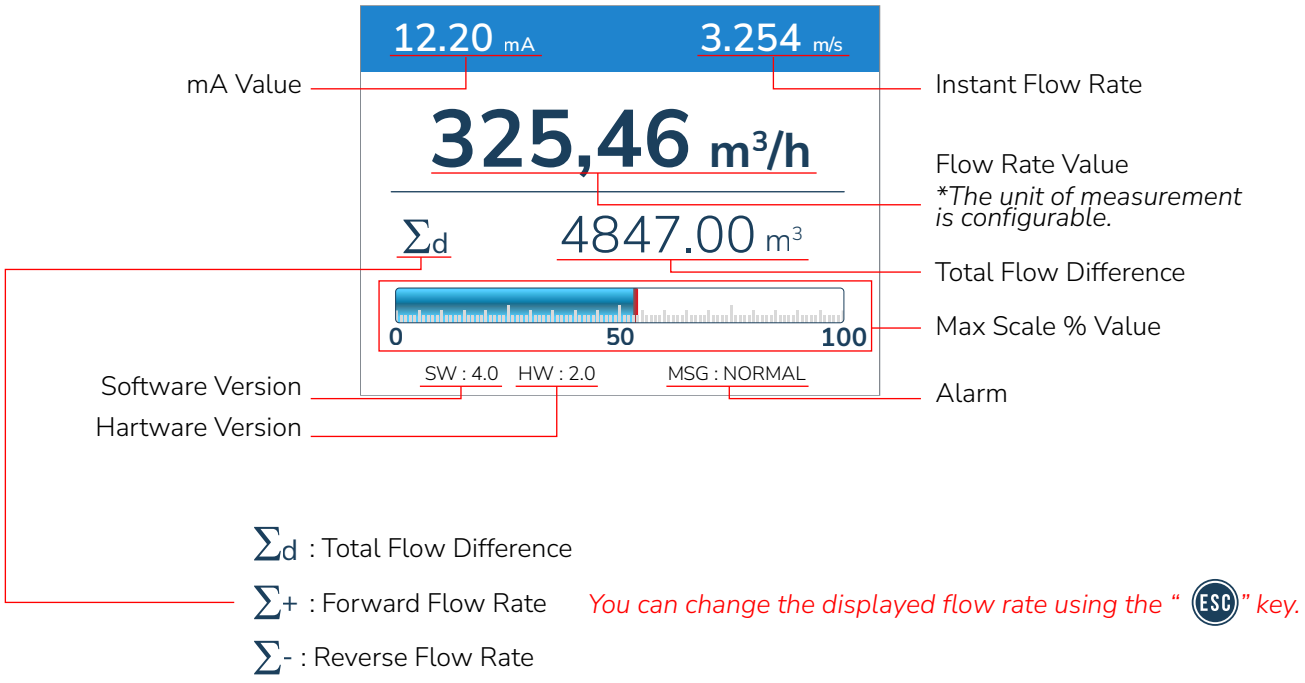
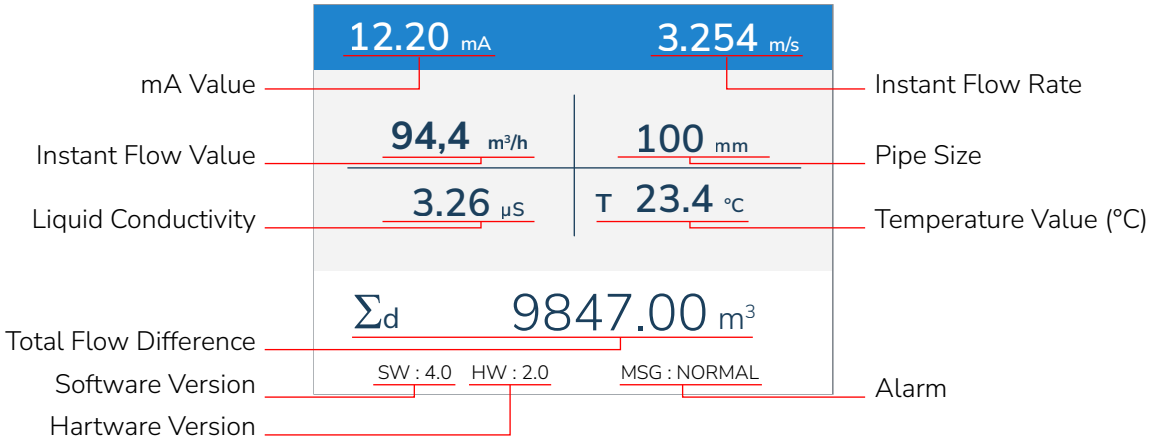
1 - MEASUREMENT SCREEN

There are 2 data reading screens.





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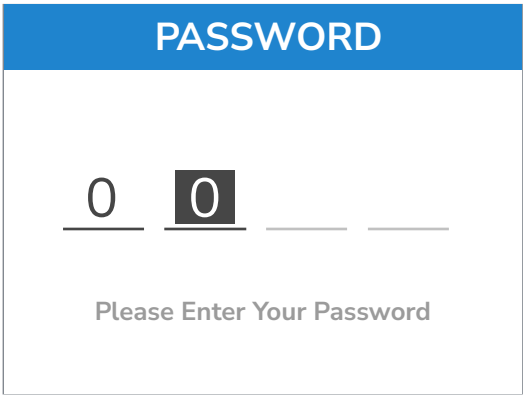
2 - PASSWORD

Press the " ↵ " key to enter the menu. The password screen will appear. After entering the set password, you can access the menu.



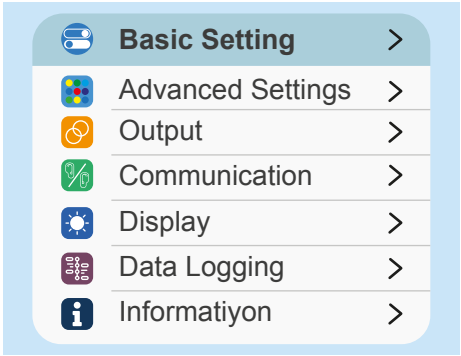
You can use the arrow keys while entering the password. The device's default password is "0000".

The entered password is valid for 2 minutes.

If the user password is forgotten, access to the device is possible using the master password "1863".

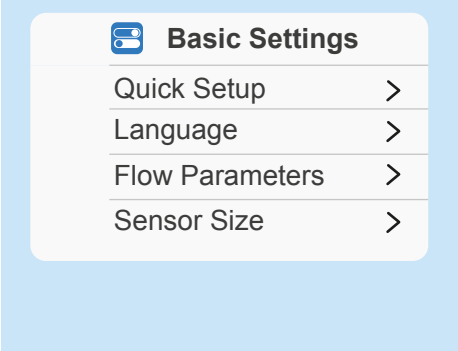
You can change your password in the menu and use your own personal password.

3 - MENU



In the main menu, you can navigate through the menu using the " ↑ ↓ " keys, make selections with the " ↵ " Enter key, and return to the previous menu with the "ESC" Esc key.

3.1 - BASIC SETTINGS



From the Basic Settings menu, you can perform the necessary configurations for operating the device; you can also select the interface language and the units to be displayed for the flow.

In the Sensor Size section, you can specify the diameter of the pipe to which the device is connected.

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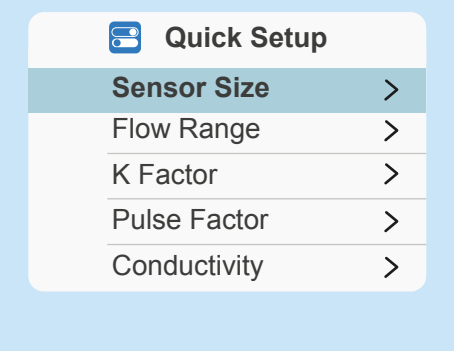
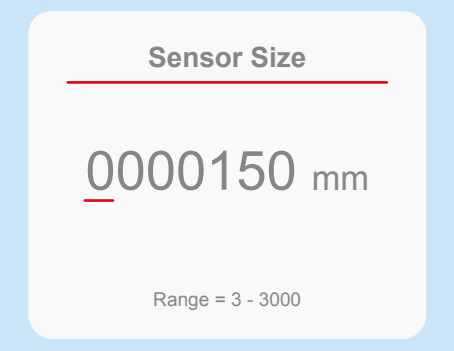
3.1.1 - Quick Setup



From the Quick Setup menu, you can configure the essential settings required to operate the device.

These settings are also available in other menus of the device, but for easier access, they are grouped under the Quick Setup menu.

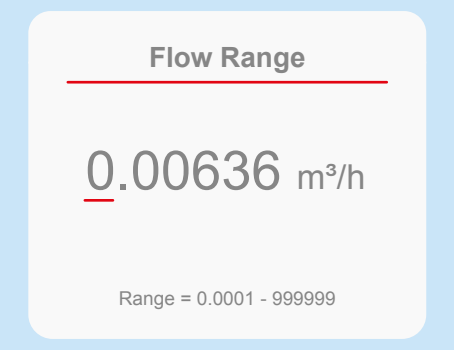
3.1.1.1 - Sensor Size



From this menu, you can enter the diameter of the pipe used in your line in millimeters (mm).

Accurate pipe diameter is important to ensure correct measurement.

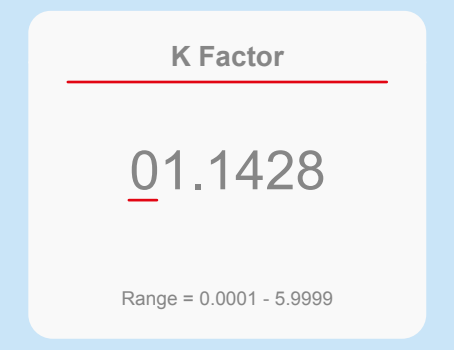
3.1.1.2 - Flow Range



The maximum expected flow rate through the line can be entered here.

All percentage-based scaling will be calculated relative to this value.

3.1.1.3 - K Factor



This is a correction factor entered to fix inaccurate measurements by the device.

For example, if 1.5 m³ of flow passes through the line but the device measures only 1 m³, setting the K-Factor to 1.5 will correct the reading.
The device multiplies the measured value by this factor, so the correct value will be displayed on the screen.

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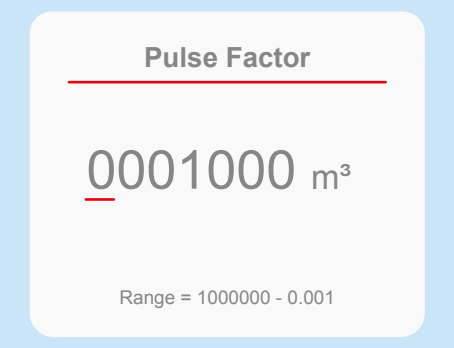
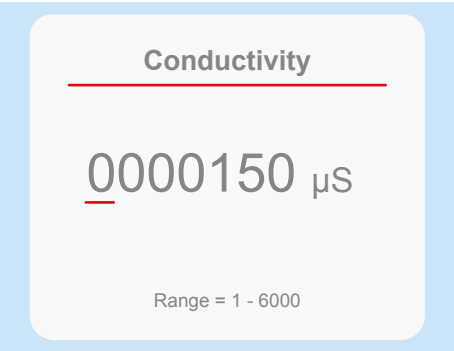
3.1.1.4 - Pulse Factor



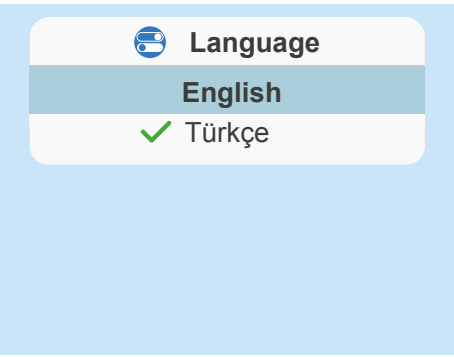
When configuring the pulse output, the unit in this section automatically changes when the total unit is modified.
You can set how many pulses will be generated per unit.
This unit is linked to the total unit, so it will update accordingly when the total unit is changed.

3.1.1.5 - Conductivity



The conductivity alarm screen is triggered when the conductivity of the measured fluid exceeds the specified threshold.
An alert will appear in the alarm section on the main screen.

3.1.2 - Language



The device language can be selected as Turkish or English.

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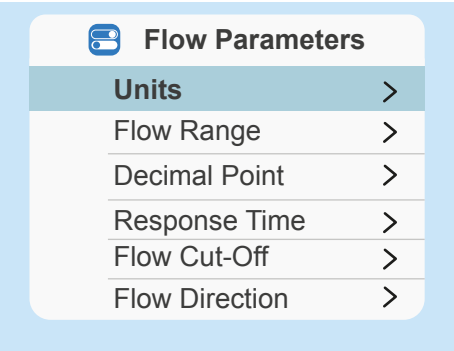
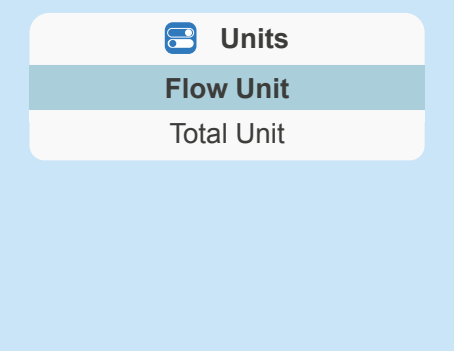
3.1.3 - Flow Parameters



While measuring, you can select the units for the values to be read, as well as configure options such as the maximum flow value through the line, the flow measurement duration, the cutoff flow amount, and the flow direction.

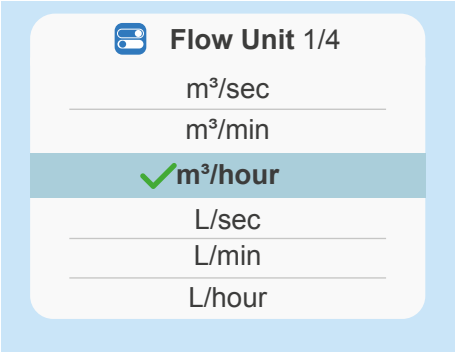
3.1.3.1 - Units

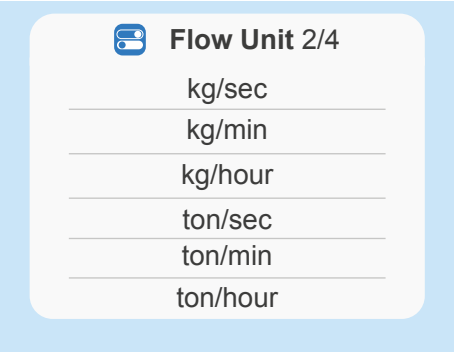


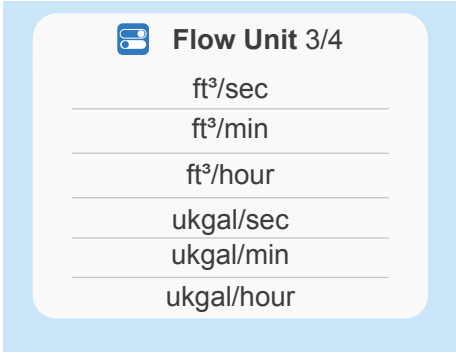
You can select the units for the Flow and Total Flow displayed on the main screen.

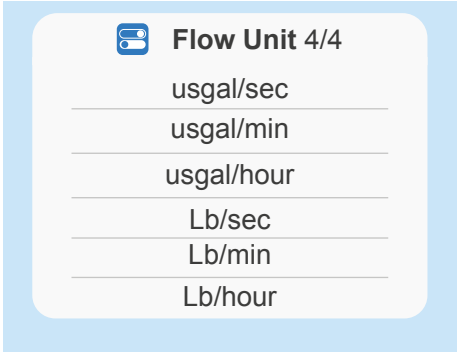
3.1.3.1.1 - Flow Unit

You can select the unit to be measured in the flow as m³, L, kg, ton, ft³, UK gal, US gal, or lb, and set the measurement time interval to seconds, minutes, or hours.









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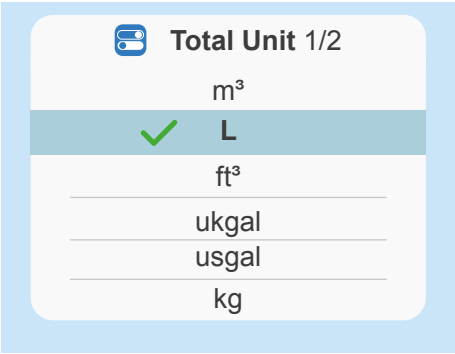
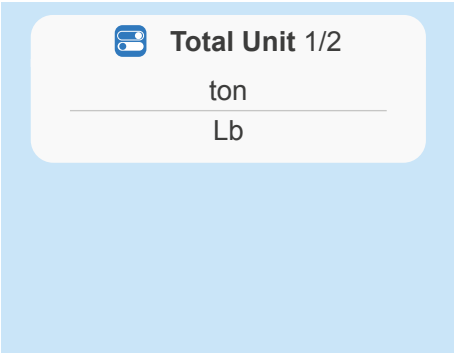
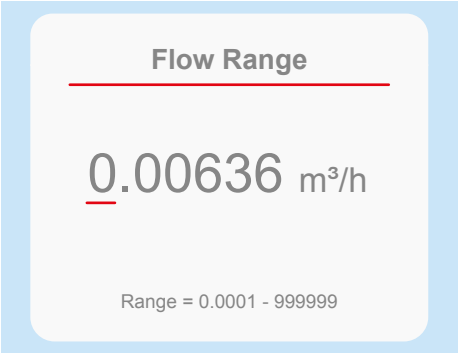
3.1.3.1.2 - Total Unit

You can select the unit for the total forward or reverse flow from m³, L, kg, ton, ft³, UK gal, US gal, or lb.



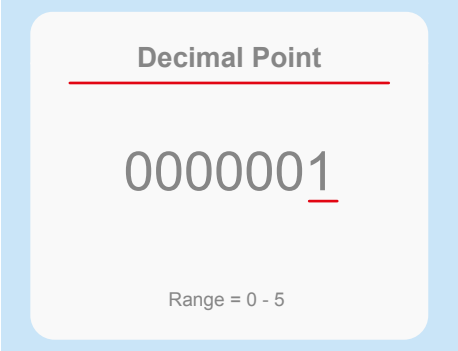


3.1.3.2 - Flow Range



You can enter the maximum flow value that will pass through the line. We can base the percentage calculations on this value.

3.1.3.3 - Decimal Point



You can select the decimal place value of the flow measurement on the display screen.

3.1.3.4 - Response Time

If the fluid is fluctuating, this is the set measurement duration to provide a more accurate result. The longer the duration, the slower the response will be.

For example, it measures the flow passing in 4 seconds and displays the average.

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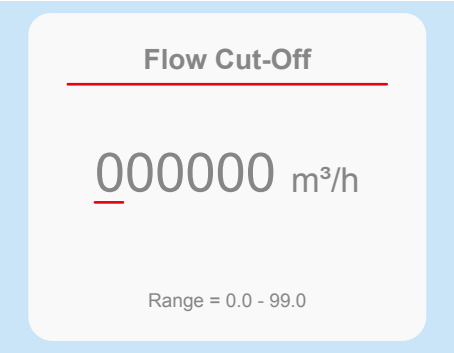
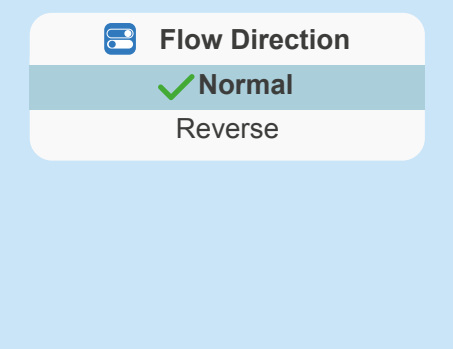
3.1.3.5 - Flow Cut-Off



If the flow value falls below the minimum flow value we have set, it is considered as "0".

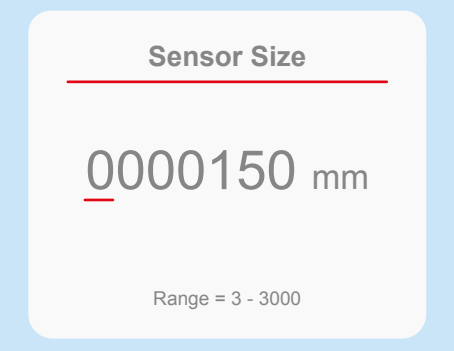
3.1.3.6 - Flow Direction



You can select the flow direction from here.

*It is used to avoid disassembling the device in case it is installed in reverse.

3.1.1.7 - Sensor Size



From this menu, you can enter the diameter of the pipe used in your line in millimeters (mm). The accuracy of the pipe diameter is important for precise measurement.

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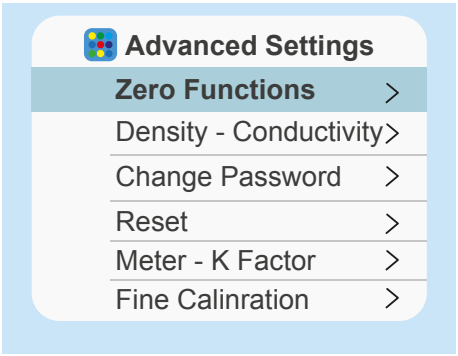
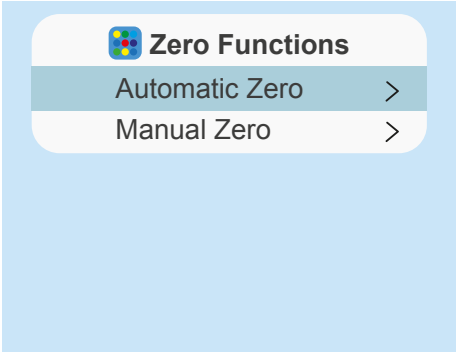
3.2 - ADVANCED SETTINGS



From the Advanced Settings menu, you can adjust the zero point, density, and conductivity settings, change the device password, restore the device to factory settings, reset the total recorded values, and perform precise calibration.

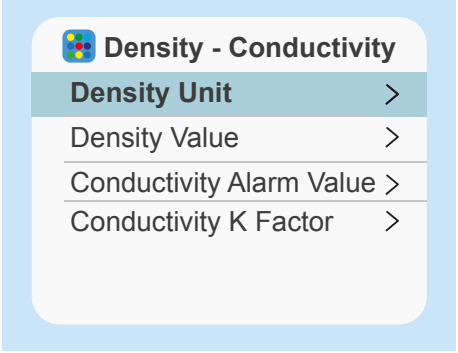
3.2.1 - Zero Functions



This setting is used to accept the flow value read by the device as “0.” When you perform Automatic Reset, the device automatically reads the current displayed value and accepts it as the zero point.

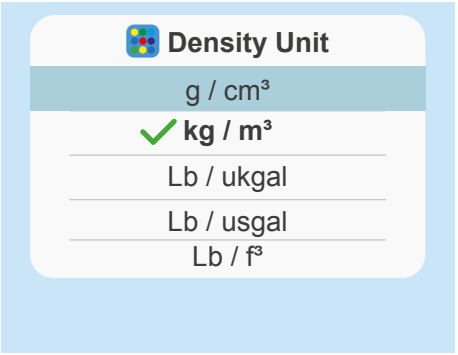
In Manual Reset, the value you enter on the screen is accepted as the zero point.

3.2.2 - Density - Conductivity



From this menu, you can select the density units and enter the values, as well as set the conductivity alarm and adjust the K factor.

3.2.2.1 - Density Unit



From this menu, you can select the density units and enter the values, as well as set the conductivity alarm and the K factor.

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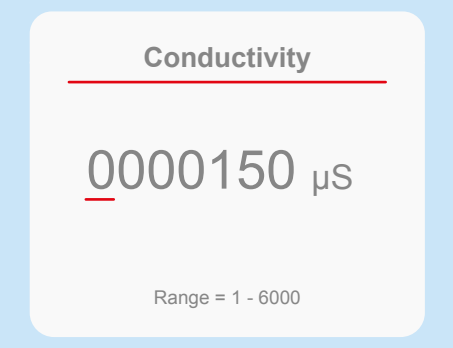
3.2.2.2 - Density Value

You can enter the value of the density you have selected. The adjustments made in these menus are used for more precise calibrations.

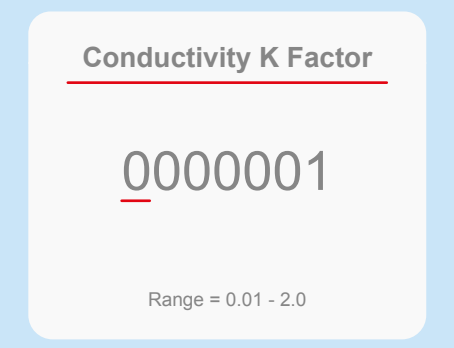
3.2.2.3 - Conductivity



The conductivity alarm screen gives a warning on the alarm section of the main screen when the conductivity value in the measured fluid exceeds the specified limit.

*This menu can be accessed from the quick setup menu.

3.2.2.4 - Conductivity K Factor



If our device is measuring conductivity incorrectly, this is a multiplier factor entered to correct it.

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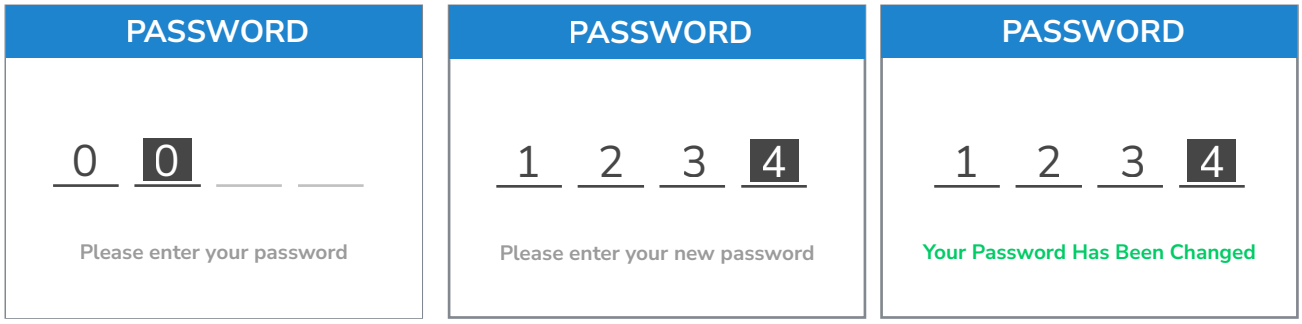
3.2.3 - Change Password

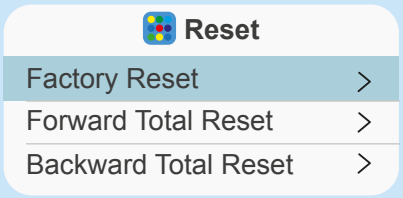


On the password change screen, enter your current password, then enter the new password you want to use and confirm it by pressing the Enter key. After seeing the message “Your password has been changed,” your password will have been successfully updated.

You can use the arrow keys while entering the password.

*If you forget your own user password, you can access the device using the master password “1863.”

3.2.4 - Reset



From this menu, you can reset your device:

- Factory Reset: You can restore many of your device’s settings to the factory defaults.
- Forward Flow Total Reset: $\sum+$ You can reset the total measured in the forward direction.
- Reverse Flow Total Reset: $\sum-$ You can reset the total measured in the reverse direction.

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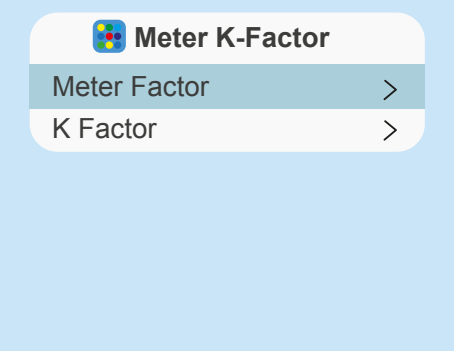
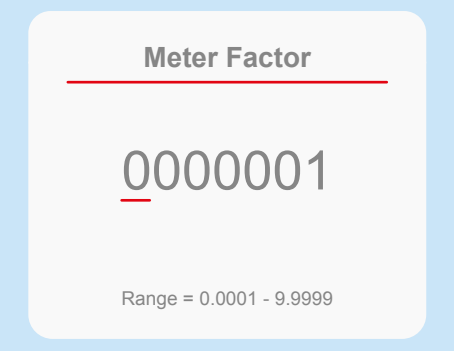
3.2.5 - Meter - K Factor



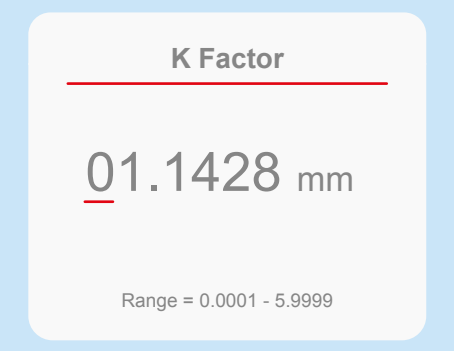
3.2.5.1 - Meter Factor



If our device is measuring incorrectly, this is a coefficient entered to correct it.

For example, if 1.5 m³ of flow passes through the line but the device measures only 1 m³, when you set the meter factor to 1.5, the device multiplies the measured value by this coefficient, allowing the correct value to be displayed on the screen.

3.2.5.2 - Conductivity K Factor



If our device is measuring incorrectly, this is a coefficient entered to correct it.

For example, if 1.5 m³ of flow passes through the line but the device measures only 1 m³, when you set the K factor to 1.5, the device multiplies the measured value by this coefficient, allowing the correct value to be displayed on the screen.

*This menu can be accessed from the quick setup menu.

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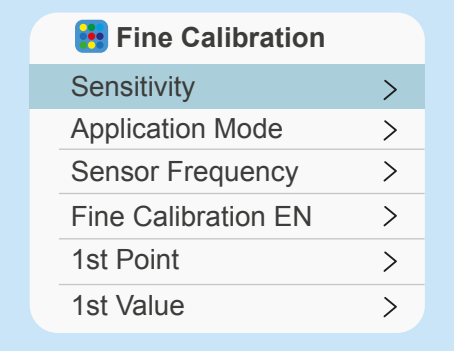
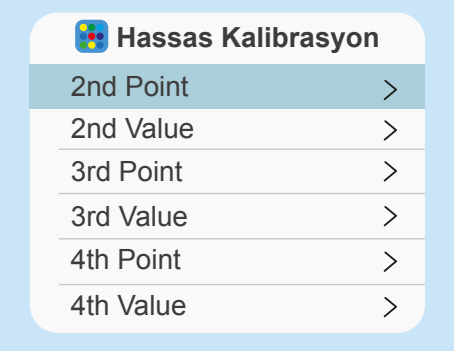
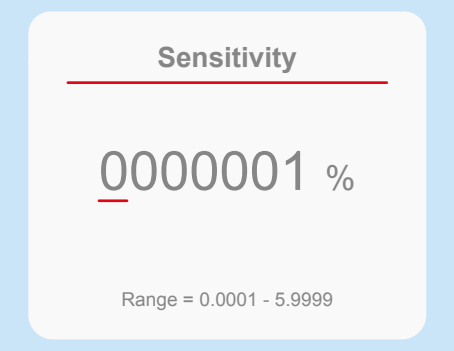
3.2.6 - Fine Calibration



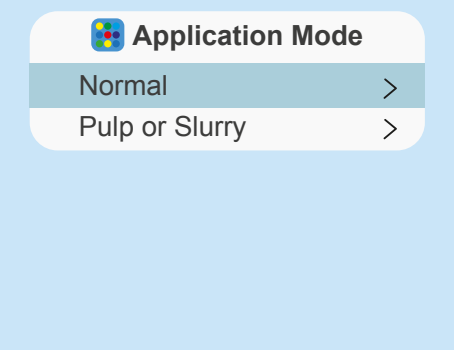


3.2.6.1 - Sensitivity



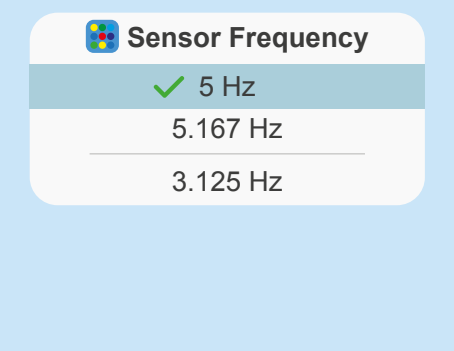
This is the value entered to suppress very fluctuating/noisy measurements; you can reduce the noise by trying a few different settings.

3.2.6.2 - Application Mode



The selection should be made according to the particle turbidity of the fluid being used. If a clean fluid is being measured, the "Normal" option can be selected.

3.2.6.3 - Sensor Frequency



You can select the frequency value of the sensor used in your system.

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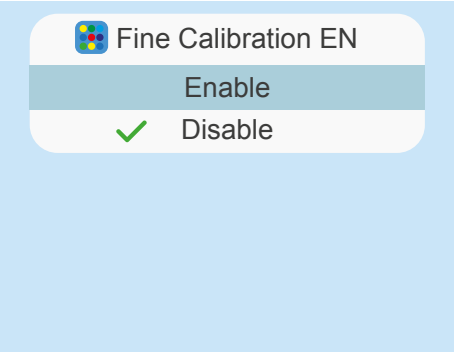
3.2.6.4 - Fine Calibration EN



You can activate or deactivate the 4-Point Calibration Setting. The values you enter will not take effect unless this setting is activated. It can be used to correct nonlinear measurements and improve measurement accuracy. After activating the setting, speed and multiplier values for all four points must be entered. A reference device should be used when entering the data.

- **Point 1, Point 2, Point 3, Point 4:** These are four correction (calibration) points.
- **Value 1, Value 2, Value 3, Value 4:** These are the coefficients corresponding to Correction Points 1, 2, 3, and 4, respectively.

This function is designed in four segments and includes four different flow rate points along with their corresponding correction coefficients.

The nonlinear correction coefficients work based on the original transducer calibration coefficient. Therefore, the precise calibration activation should initially be turned off during measurement.

The flow correction coefficient is calculated as follows:
Correction Coefficient = Reference Device Flow / Flow Measured by EMDE

Correction Coefficient > 1.0: Positive correction (measured flow is increased).

Correction Coefficient < 1.0: Negative correction (measured flow is decreased).

The correction points should follow this order:
15.0 m/s ≥ Correction Point 1 > Correction Point 2 > Correction Point 3 > Correction Point 4 > 0

The mutual relationship between nonlinear correction points (flow rates) and correction coefficients is shown in the table below.

Original Flow Rate	Coefficient
15.0 m/s ≥ Flow Rate ≥ Correction Point 1	Correction Coefficient 1
Correction Point 1 > Flow Rate ≥ Correction Point 2	Linear Interpolation Between Correction Coefficients 1 and 2
Correction Point 2 > Flow Rate ≥ Correction Point 3	Linear Interpolation Between Correction Coefficients 2 and 3
Correction Point 3 > Flow Rate ≥ Correction Point 4	Linear Interpolation Between Correction Coefficients 3 and 4
Correction Point 4 > Flow Rate ≥ 0.00 m/s	Correction Coefficient 4

Note: The 1st correction coefficient must be exactly 1.00!

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Application Example:
When the nonlinear correction function is turned off, the meter is tested at four low flow points. As shown in the table below, there is deviation (bias) in the flow rates at these four points:

Actual Flow (m/s)	Flow Measured by E4000 (m/s)
0.225	0.221
0.150	0.145
0.075	0.069

Four-point correction is selected, and the correction points and coefficients are calculated in the table below:

	Correction Point (m/s)	Corrected Flow Rate
1	0.300	1.0 (must be exactly 1.0!!!)
2	0.225	1.018 (0.225 / 0.221 = 1.018)
3	0.150	1.034 (0.150 / 0.145 = 1.034)
4	0.075	1.087 (0.075 / 0.069 = 1.087)

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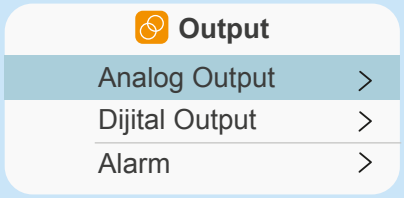
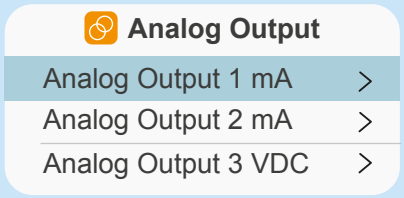
3.3 - OUTPUT



From this menu, you can configure the digital and analog output settings and adjust the device's alarm level.

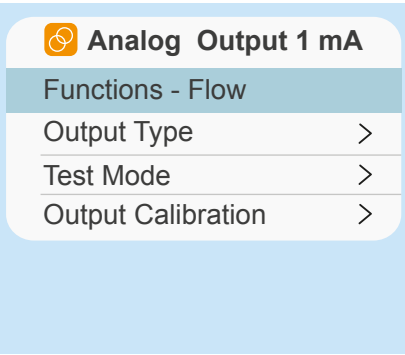
3.3.1 - Analog Output



There are 2 mA outputs and 1 voltage output available.

The precise output is this one, and it should be used primarily.

3.3.1.1 - Analog Output 1 mA



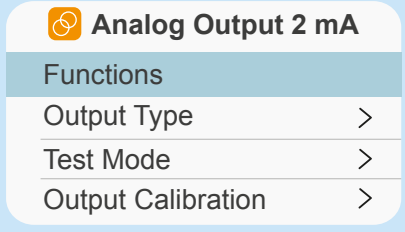
Functions - Flow: Output based on flow.

Output Type:
4 - 20 mA
4 - 12 - 20 mA
0 - 20 mA

Test Mode: You can check whether the outputs are working.

Output Calibration: By entering the value measured from the measuring device, it allows you to obtain more accurate results.

3.3.1.2 - Analog Output 2 mA



Functions: Can operate based on flow, temperature, or conductivity.

Output Type:
4 - 20 mA
4 - 12 - 20 mA

Test Mode: You can check whether the outputs are working.

Output Calibration: For example, if it shows 3.8 mA at 4 mA during measurement, you can increase the value here to calibrate it to 4 mA.

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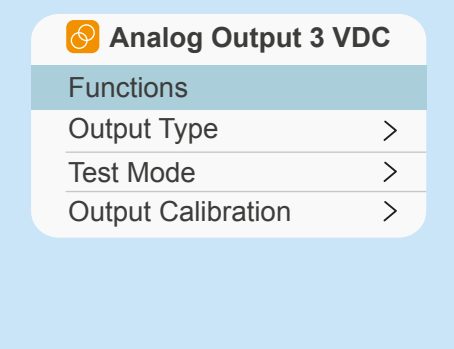
3.3.1.3 - Analog Output 3 VDC



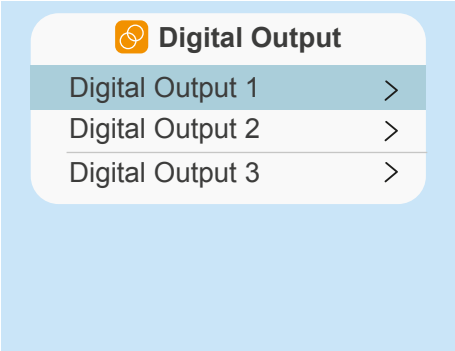
Functions: Can operate based on flow, temperature, or conductivity.

Output Type:
0 - 10 V
0 - 5 - 10 V

Test Mode: You can check whether the outputs are working.

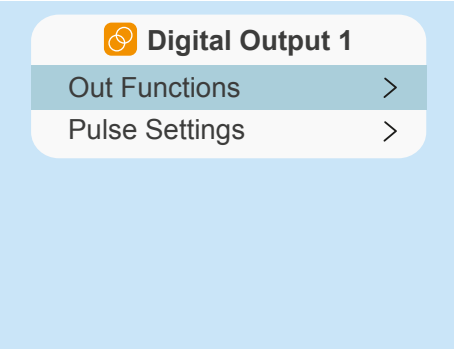
Output Calibration: For example, if it shows 9.8 V at 10 V during measurement, you can increase the value here to calibrate it to 10 V.

3.3.2 - Digital Output



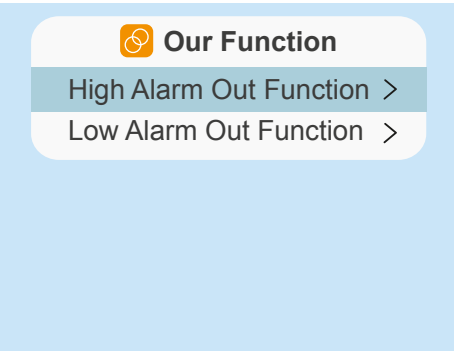
We have 3 digital outputs.

3.3.2.1 - Digital Output 1



You can configure your alarm and pulse settings.

3.3.2.1.1 - Our Function



You can select the units for the High and Low alarm outputs.

*These settings can be activated from the device's alarms menu.

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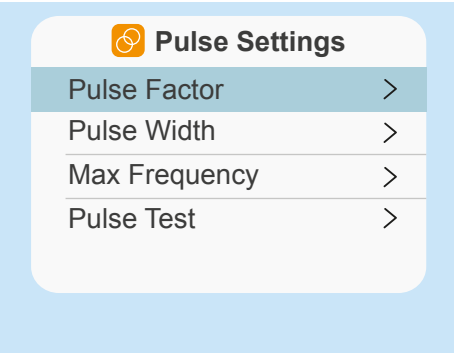
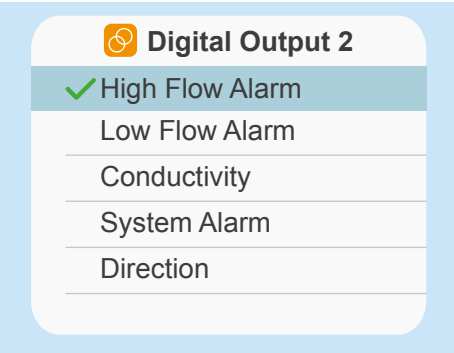
3.3.2.1.2 - Pulse Setting



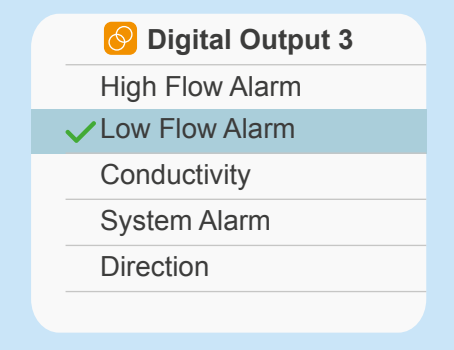
You can configure the pulse output settings from this menu.

3.3.2.2 - Digital Output 2



You can select alarm categories such as flow rate, conductivity, or flow direction.

3.3.2.3 - Digital Output 3



You can choose alarm categories such as flow rate, conductivity, or flow direction.

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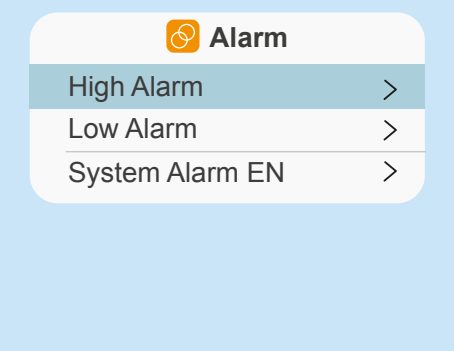
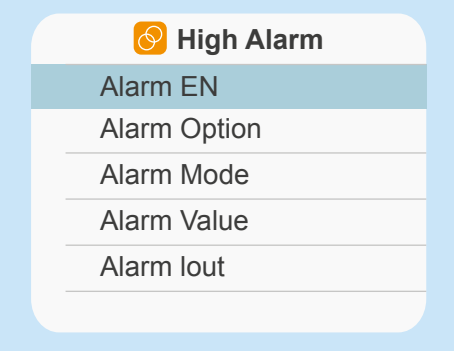
3.3.3 - Alarm



3.3.3.1 - High Alarm



You can activate or deactivate the alarms.

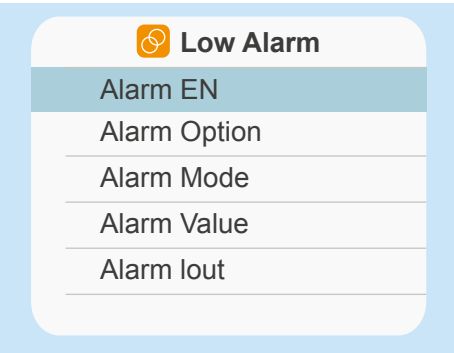
Alarm Settings: You can set alarms based on percentage, unit, or total value.

Alarm Mode: When active, you can choose between High or Low.

Alarm Value: You can enter the value at which the alarm will be triggered.

Alarm Output: You can activate the alarm output and select the mA level it will output when the alarm is triggered.

3.3.3.2 - Low Alarm



You can activate or deactivate the alarms.

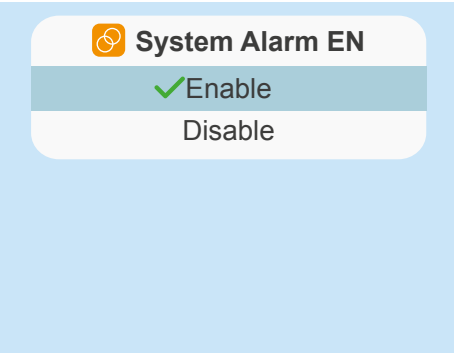
Alarm Settings: You can configure the alarm based on percentage, unit, or total value.

Alarm Mode: When active, you can select either High or Low.

Alarm Value: Enter the value at which the alarm will be triggered.

Alarm Output: You can enable the alarm output and select the mA level it will output when the alarm is triggered.

3.3.2.3 - System Alarm EN



You can activate or deactivate the system alarms.

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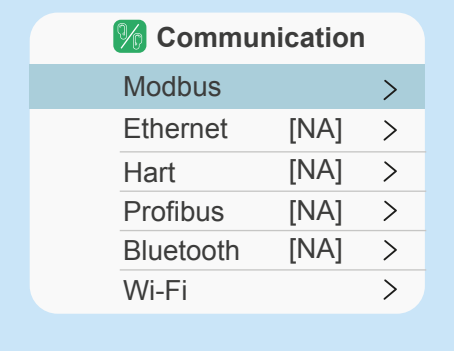
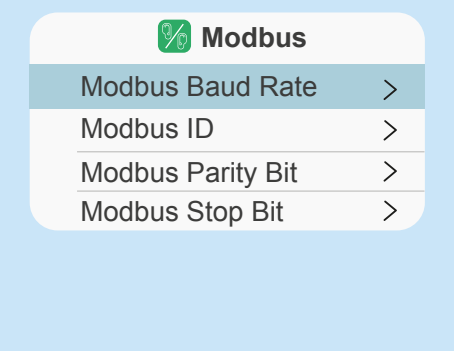
3.4 - COMMUNICATION



From this menu, you can configure the device's communication settings and firmware update options.

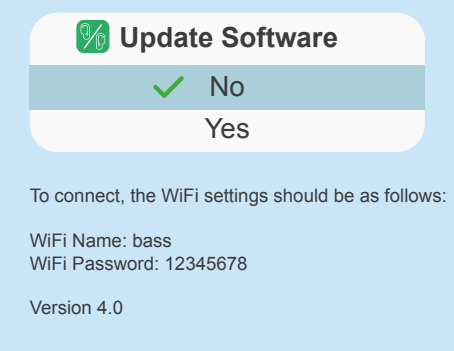
Options marked as [N/A] are currently inactive but can be enabled upon request.

3.4.1 - Modbus



From the Modbus menu, you can enter values suitable for your usage and configure your Modbus communication settings.

3.4.2 - Wi-Fi



From this menu, you can update your device's software.
To connect the EMDE to a modem or mobile device via WiFi, the WiFi settings should be as follows:

WiFi Name: bass
WiFi Password: 12345678

After selecting "Yes" on the screen, the device will automatically connect to the WiFi network and perform the software update.
You can check whether the update was successful by looking at the version number.

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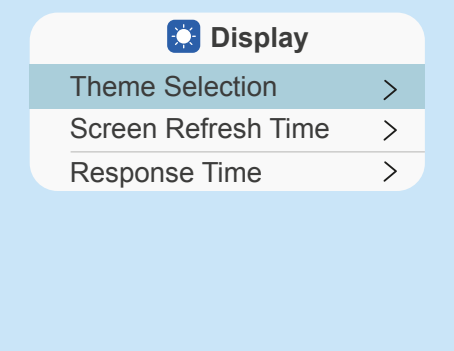
3.5 - DISPLAY



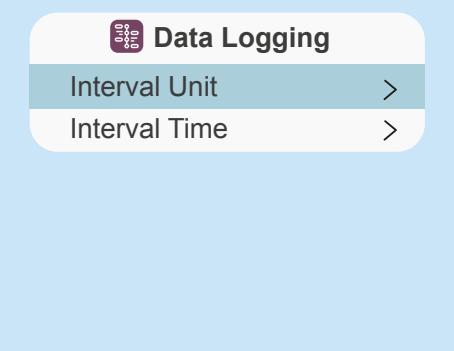
Theme Selection: From this menu, you can choose the device's theme in either dark or light tones, selecting one of two options according to your preference.

Screen Refresh Rate: You can set how often the displayed values refresh on the screen.

Response Time: The set measurement duration to provide a more accurate result if the fluid is fluctuating. The longer the duration, the slower the response will be.

For example, it measures the flow passing in 4 seconds and displays the average.

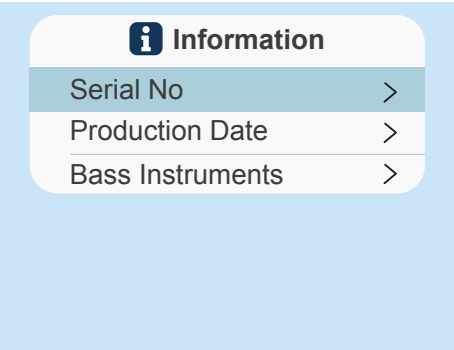
3.6 - DATA LOGGING



This is the area where the data read by your device is recorded. You can select the recording unit and the interval at which data will be recorded.

The data recording section is disabled by default and can be activated upon request.

3.7 - INFORMATION



The product serial number, production date, and our company's contact information related to the device you are using are provided here.

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