Alphanumeric and graphical displays
BAMOWIZ

USER MANUAL

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1. PRECAUTIONS

- Installation, commissioning and maintenance must be performed by qualified personnel.
- The power supply must comply with the values specified in the technical features.
- Disconnect all sources of power to the display unit during works and maintenance tasks.
- The operation of the device must be in accordance with and strictly limited to the applications as mentioned below.

2. DESCRIPTION

The instrument has a colour touch screen to navigate through an intuitive and multilingual menu. BAMOWIZ converts analogue input signals (4-20 mA) and delivers clear information on its large alphanumeric and graphic screens for an easy reading of measurements, thresholds and status of relays.

The programme is keyword protected allowing access to settings of thresholds, scaling of measurements, operating modes, etc.

BAMOWIZ has a flexibility of use for analysis of input data such as the display of level, volume or a specific parameter (pressure, temperature, turbidity, etc.). The keyboard on the touch screen allows you to set the measuring unit (Example: µS, Ohm, Ω, °C, K, °F, bar, etc.)

Indicator and totalizer for flow, with 1 frequency input
BAMOWIZ receive signals of sensors such as our BAMOFLU up to 10 kHz as well as signals from counters M series.

To resume, BAMOWIZ allows to :
- Change language
- Configure measurement ranges
- Choose the displayed units
- Calculate and display the volume inside square/ cylindrical tanks or specific tanks (Linearization with 20 steps)
- Calculate and display the differential between inputs 1 and 2
- Configure up to 8 alarm thresholds
- Assign freely each thresholds to any of the 3 relay contacts
- Display instant flow-rate and totalizing volume (with adequate sensor connected to pulse input)

From graphic display you can access to:
- For each input: Identification (Name/ TAG) - Values - Unit
- Synoptic of measurements (Bar Graph)
- Identification and status of each relay
- Display of minima and maxima values

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3. TECHNICAL FEATURES

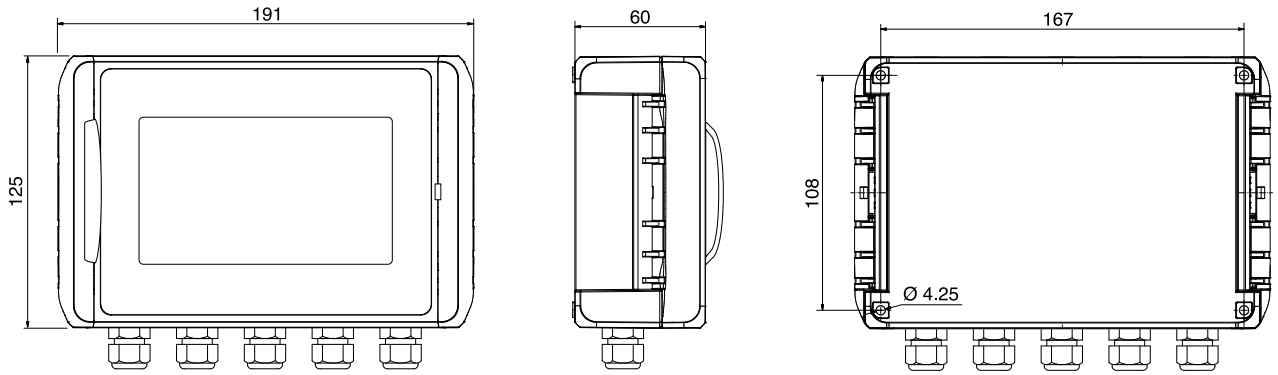
User interface	Graphic color touch screen, 4/3; Resolution of 480 x 272 pixels
Languages	English; French; German; Polish; Portuguese; Spanish
Alphanumeric touch keyboard	Dedicated for each language
Displayed measuring units	Selectable / customizable
Inputs:	
Analog	2 for sensors 4–20 mA, power to 2-wire sensors, 24 V DC; Max. 3 W; 120 mA (load: 50 Ω)
Frequency	1 Frequency input, range 0.04 Hz to 10 kHz
Outputs:	
Analog signal	1 output 4–20 mA (with or without linearization)
Relay outputs	3 N.O. contacts, potential free
Switching power	3A / 250 V AC
Hysteresis	Adjustable from 0 to 100%
Delay	Adjustable from 0 to 9999 seconds
Communication	Serial interface RS485, MODBUS
Other Features	
Adjustable alarms/thresholds	up to 8 thresholds which can be assigned to any of the 3 relays
Linearization	customizable 20-point curve
Differential	(input 1) - (input 2) : Available on display, thresholds, mA output
Flowmeter / Totalizer	via pulse input (from 0.04 Hz to 10 kHz)
Display	Bar-graph of each measured parameter Display of minima and maxima
Main power	100...240 V AC 50/60 Hz or 18...36 V DC
Consumption	Max. 10 W
Cable connections	Screw terminals
Cable glands	5 Cable glands (PG 9)
Mounting	Wall mount, IP 65 cabinet, in ABS
Operating temperature	-10 ... +50 °C

EC Conformity: The instrument meets the legal requirements of the current European Directives.

4. CODE NUMBERS AND REFERENCES

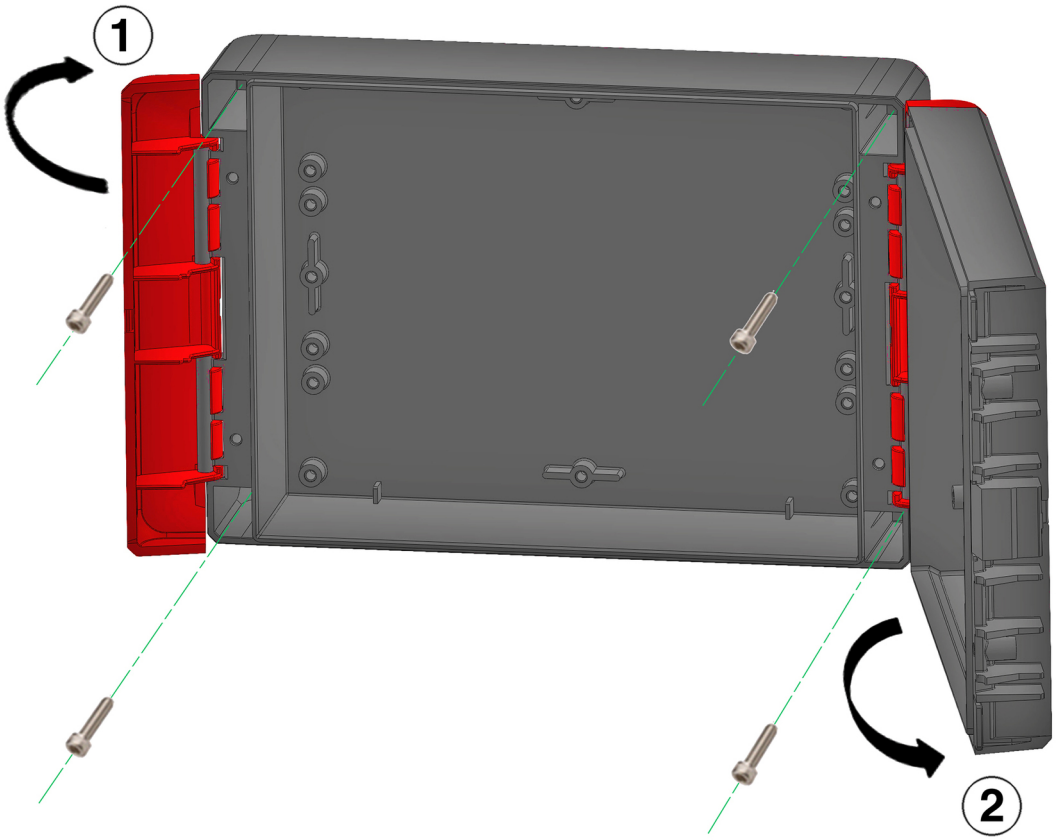
Code	Reference	Power supply
217 213	BAMOWIZ 213	100...240 V AC 50/60 Hz
217 214	BAMOWIZ 213/24	18...36 V DC

5. DIMENSIONS



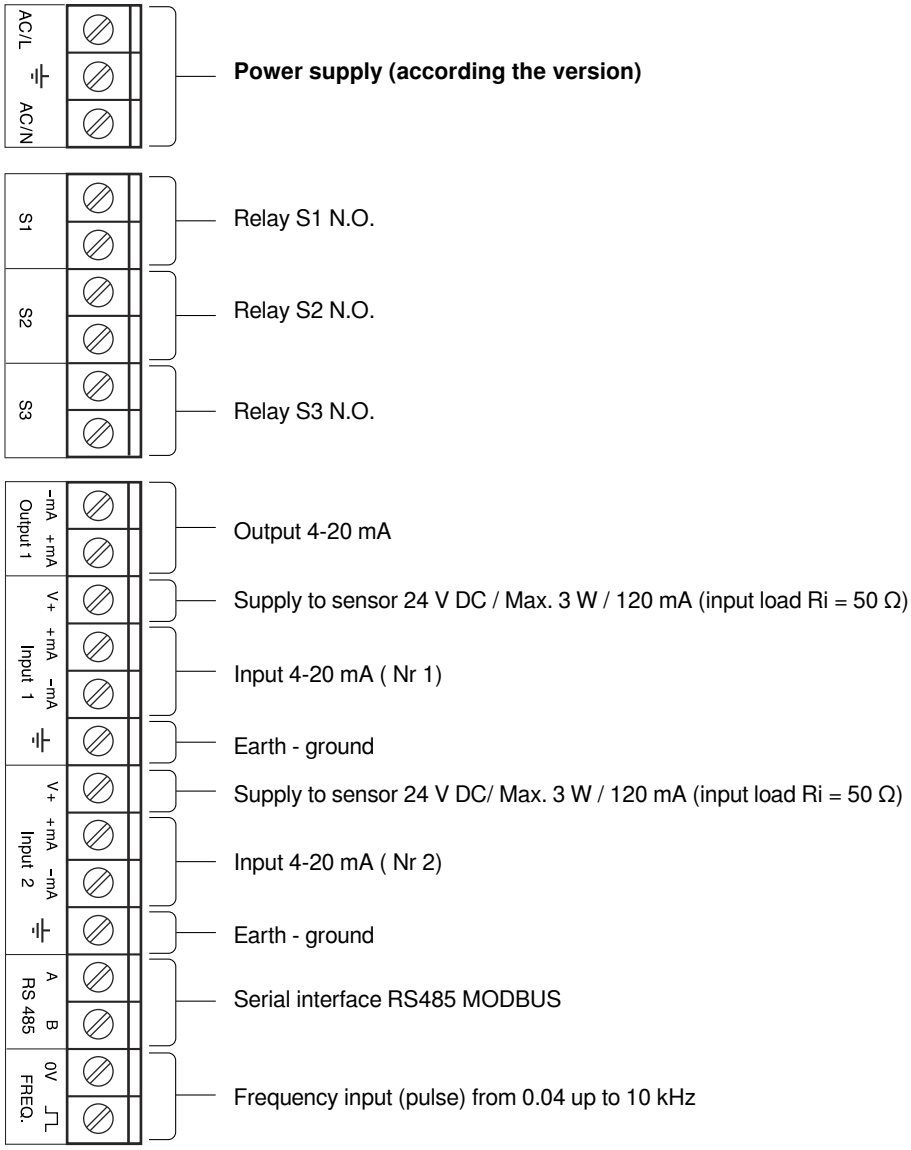
6. MOUNTING

The BAMOWIZ can be fixed directly to the wall with 4 screws (dia. 4 mm)



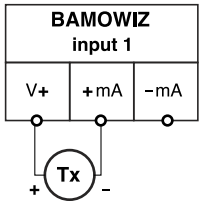
Caution: Do not drill the cabinet.

7. ELECTRICAL CONNECTIONS



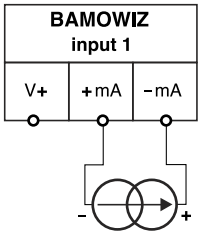
Sensor connections:

2-wire Transmitter

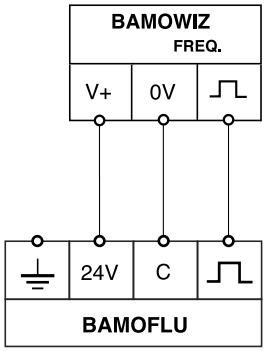


(Example for Input N° 1)

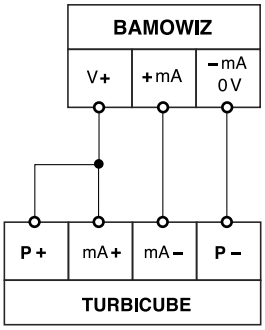
Transmitter active loop



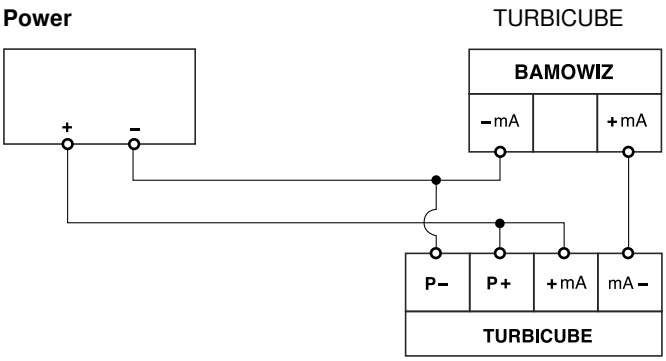
Frequency / Pulse



TURBICUBE

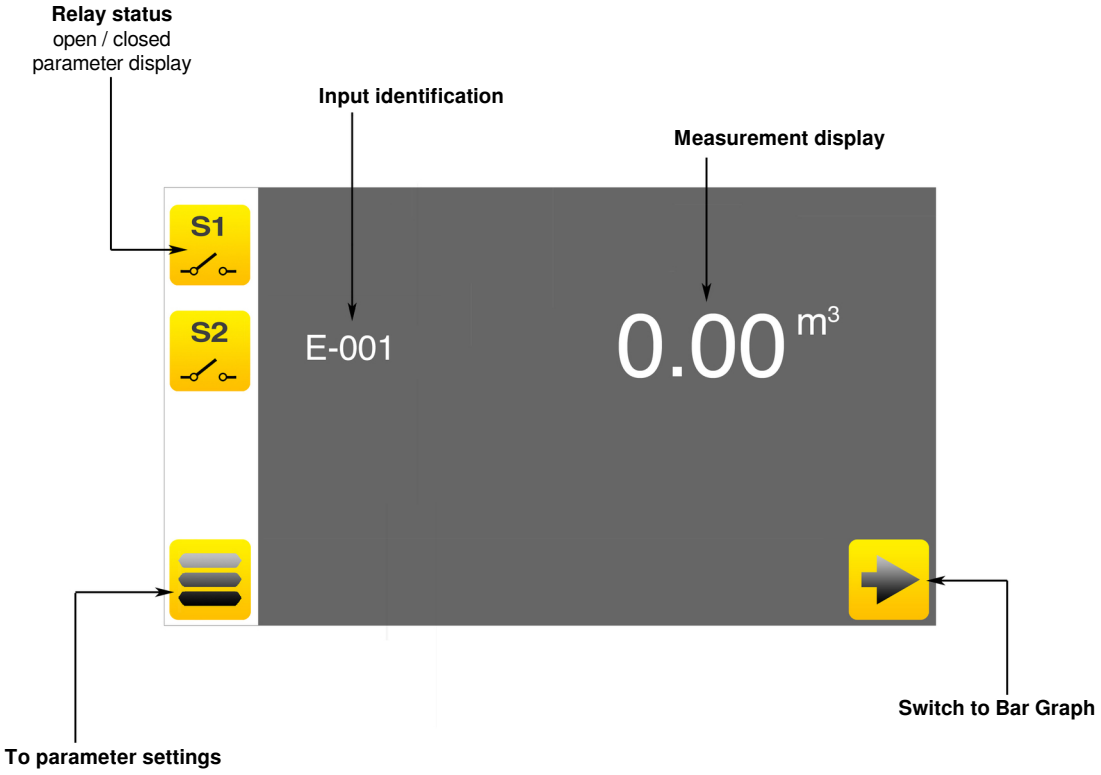


External supply

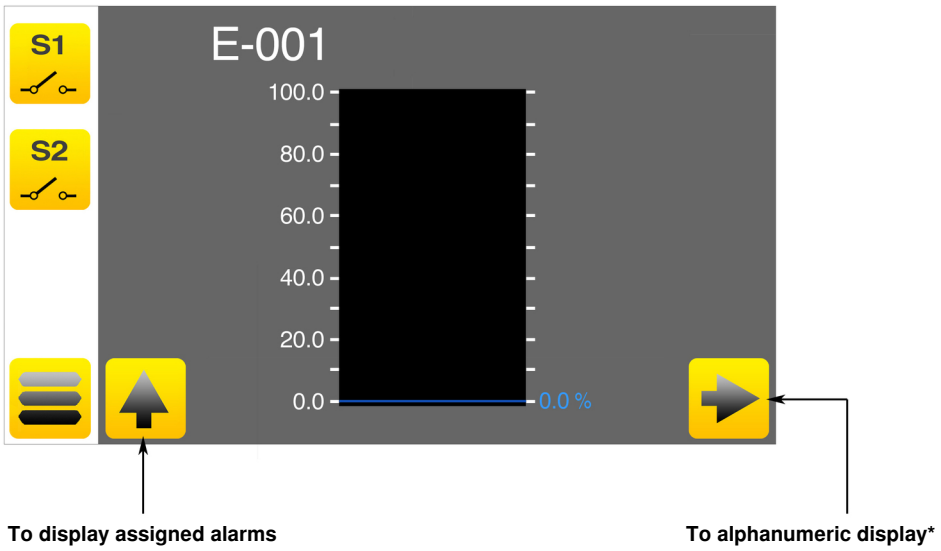


8. MAIN SCREENS

8.1 ALPHANUMERIC DISPLAY

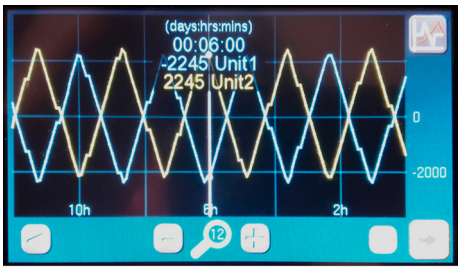


8.2 GRAPHICAL DISPLAY



* Each connected input has its own Bar Graph. Press on right arrow to see the next Bar Graph.

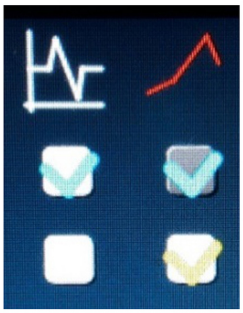
8.3 CHARTS DISPLAY



Pic. A

1) Features:

Backup capacity	96 Hours
RESET OF MEMORY	When main power switches off
Recording frequency	Each 5 min of the measurement average value
Number of charts displayed	2 Charts simultaneously
Number of data of charts	Max.: 300 points
Period scales	6 h / 12 h / 24 h
Time shift	Per hour
6-way recording:	Input I1 Display n° 1
	Input I1 Display n° 2
	Input I2 Display n° 1
	Input I2 Display n° 2
	Differential I1 - I2 Display n° 1
	Differential I1 - I2 Display n° 2



Pic. B

2) To choose the charts to display:

Press the key "CHARTS" (right top of screen) to display the selection (Pic. A).

Pic. B. First column: To choose the main chart; Second column: To choose the secundary chart.
Note that the scaling will be that of the main chart.

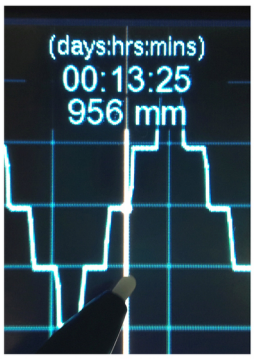
Pic. C

Pic. C: The selected charts are shown on the screen.

Pic. D

3) Setting the period scale:

Pic.D: Use the keys « - » et « + » to decrease or to increase the period (6 h ; 12 h ; 24 h).



Pic. E

4) Time shift:

Pic. E (example): Use the blue arrow keys to to shift the display area hour by hour.
Note that a long press (> 2 s) increases the shift speed.

Visualization of values on the charts:
It is possible to view the data of each point of the chart by pressing on it.
Use of a touch screen pen is highly recommended.

9. ICON DESCRIPTION

The touch screen allows you to navigate within the menus and set up parameters according your applications.

HOME
Return to alfanumeric display

SETTINGS
Access to serial number and version of your BAMOWIZ
Access to screen saver (set up available only in MODIFICATION MODE)

LANGUAGES
Language selection

MENU
Access to parameter settings of the monitor

PADLOCK
Open: means MODIFICATION mode
Closed: means CONSULTATION (review) mode

RETURN
Back to the previous screen

ARROWS
Cursors to navigate within the menus

ON / OFF
Enable / Disable a function

SAVE
To save the settings

ESCAPE
To cancel any modification on the input settings

RELAY STATUS S1, S2, S3
Display relays status and settings resume

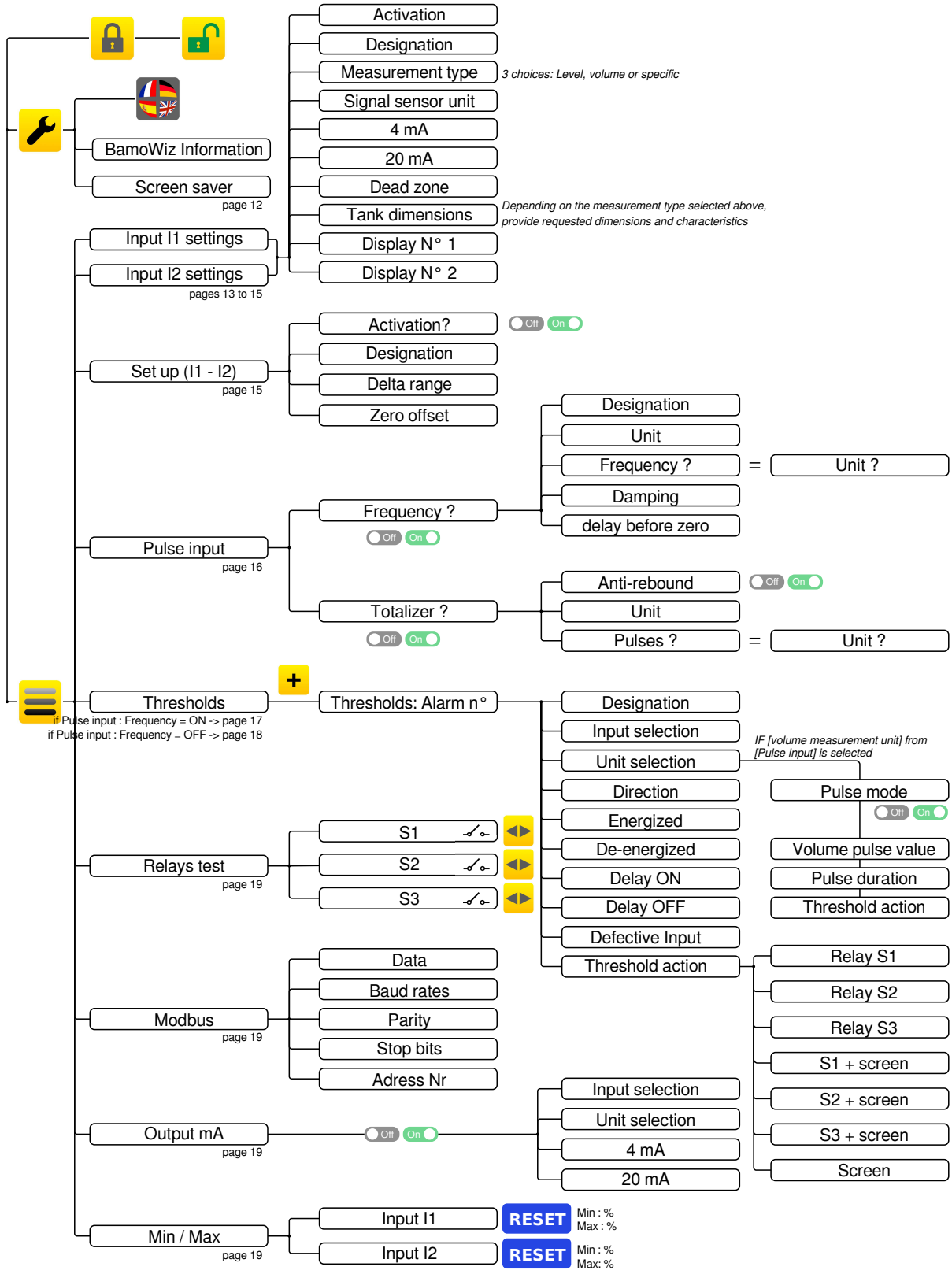
CURSOR
To navigate within the menus
Alternative display to Arrows in some menus

SELECTION
Scroll of choices

CHARTS
To choose the charts to display

BLUE ARROWS
To shift the display area hour by hour.

10. BAMOWIZ MENU FLOWCHART



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11. SCREEN SETTINGS

11.1 LANGUAGE SELECTION

Direct access to the language of your choice.

- From the main screen, go to MENU.
- Press "SETTINGS" to view the icon LANGUAGES
- Select your language, pressing the corresponding flag.

11.2 CONSULTATION mode or MODIFICATION mode

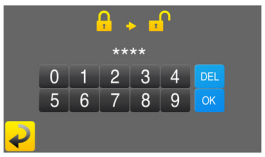
CONSULTATION mode allows the end-user to review all settings.
This mode corresponds to a closed padlock icon

To change settings, you have to use the MODIFICATION mode.
This mode is protected by a password: the last 4 numbers of the serial number.

Example : S/N : 20000-01
Password is: 0001

Note: Serial number of your BAMOWIZ is on the sticker on left side of the unit. You can find it as well through the menu SETTINGS.

- From the main screen, go to MENU.
- Press the padlock icon and type the last four number of S/N.
- Pressing "OK" the BAMOWIZ is set in MODIFICATION mode (Open padlock)



In case of mistyping, the display shows "ERROR".
After 30 minutes, the BAMOWIZ reset automatically in CONSULTATION mode.

11.3 SCREEN SAVER

Access from the menu SETTINGS (in MODIFICATION mode): allows to set the brightness of screen saver mode (it runs after 30 min of non activity)

12. INPUT 1 & INPUT 2 PARAMETER SETTINGS

3 types of measuring inputs are available on BAMOWIZ:
- Level
- Volume
- Specific, such as pressure, turbidity, temperature, etc.

12.1 SETTING A CHANNEL FOR LEVEL

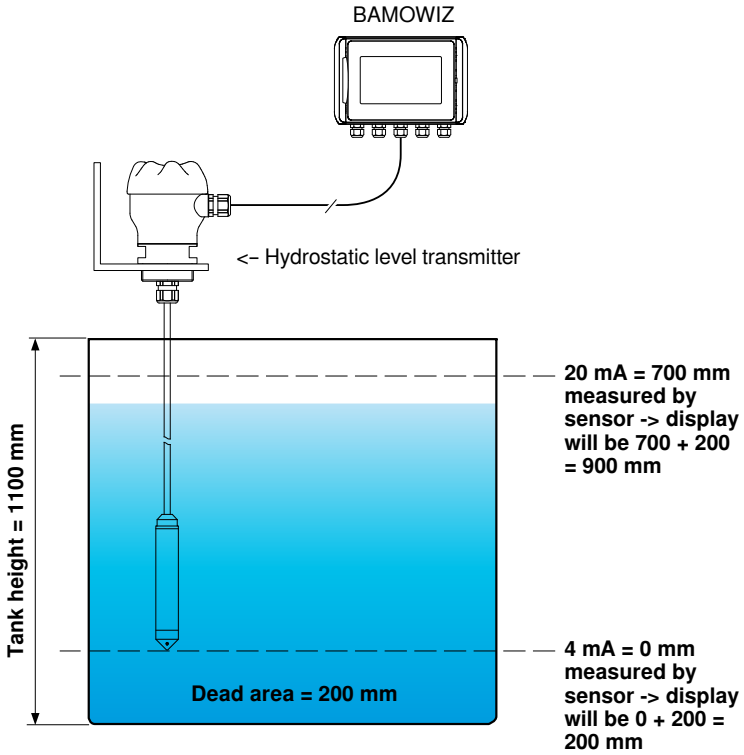
Below, set up of channel for LEVEL measurement:
Go to "Input I1/I2 settings" menu

Activation?	On
Designation	Enter the desired name for the measurement
Measurement type	Level
Signal sensor unit	Select the unit: mbar / mm / mmH2O (= water column in 'mm')
4 mA	Enter the value, expressed in unit above, corresponding to 4 mA input signal from sensor
20 mA	Enter the value, expressed in unit above, corresponding to 20 mA input signal from sensor
Dead zone	Zero level offset (in 'mm'): used to adjust the measurement start level corresponding to a 4 mA input signal, if different from zero.
Tank height	Height of the tank or container, including the dead zone above. This will correspond to the height of the bargraph displayed.
Display N° 1	Select the unit for the numeric display: m, cm, mm or %
Display N° 2	Select the unit for Bar Graphical display: m, cm, mm or , %

Press RETURN , then SAVE to record all settings.

Example:
Use of an hydrostatic level transmitter with 4-20mA output signal corresponding to 0 ... 1000 mm WC (water column). The tank is 1100 mm high, and the sensor is immersed 200 mm above the bottom. The digital display will be in 'mm' and graphic display in 'cm'.

To show the height of liquid on BAR GRAPH, set tank height = 1100 'mm' and display N°2 in 'cm'.



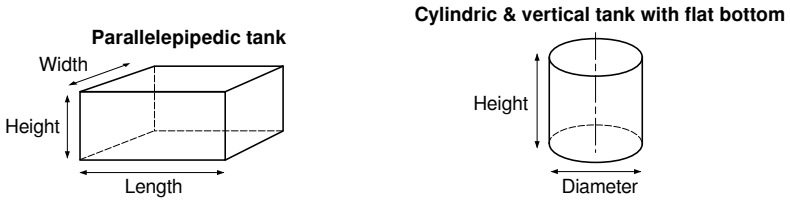
12.2 SETTING A CHANNEL FOR VOLUME

Below, set up of a channel for VOLUME monitoring:
Go to "Input I1/I2 settings" menu

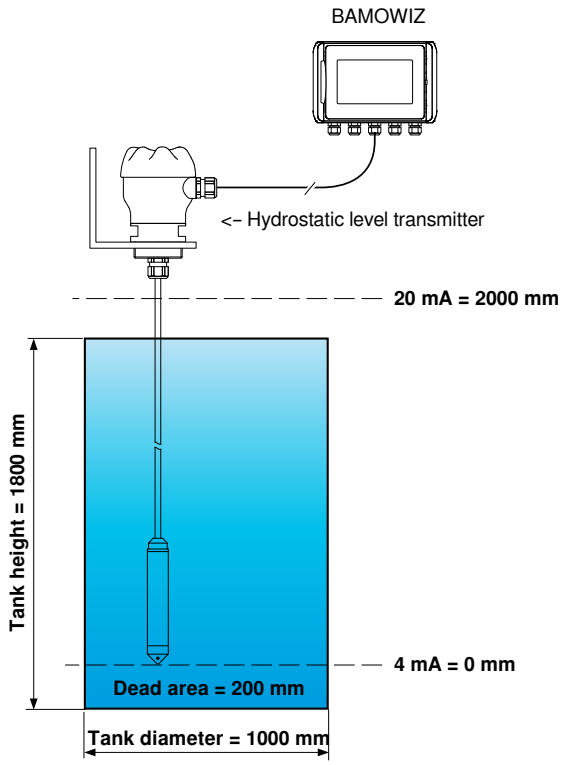
Activation?	On
Designation	Enter the desired name for the measurement
Measurement type	Volume
Signal sensor unit	Select the unit: mbar / mm / mmH2O (= water column in 'mm')
4 mA	Enter the value, expressed in unit above, corresponding to 4 mA input signal from sensor
20 mA	Enter the value, expressed in unit above, corresponding to 20 mA input signal from sensor
Dead area	Zero level offset (in 'mm'): used to adjust the measurement start level corresponding to a 4 mA input signal, if different from zero.
Tank type	Select the type: Parallelepiped / Horizontal cylindrical / Vertical cylindrical / Linearization (customized curve) *Dimensions will be requested depending on the selected tank shape.* *Linearization: gives access to a new menu ("Set points") to define a specific curve with up to 20 customizable points.* Complete all parameters according your tank
Display N° 1	Select the digital display unit: m^3 (cubic meter) or l (liter)
Display N° 2	Select the digital display (bargraph) unit: m^3 (cubic meter) or l (liter)

Press RETURN , then SAVE to record all settings.

Standard tank shapes:



Example:
A hydrostatic sensor with a 4-20 mA scale equivalent to 0 - 2000 mm water column (H2O) is connected. The sensor is positioned 200 mm from the bottom, in a vertical cylindrical tank, Ø 1000 mm and 1800 mm high. The unit of the digital display will be L (Litre) and the unit of the graphic display will be %.



12.3 SETTING A CHANNEL IN SPECIFIC MODE

Below, set up of a channel for a specific input:
Go to "Input I1/I2 settings" menu

Activation?	On
Designation	Enter the desired name for the measurement
Measurement type	Specific
Signal sensor unit	Enter the unit of your choice
4 mA	Enter the value, expressed in unit above, corresponding to 4 mA input signal from sensor
20 mA	Enter the value, expressed in unit above, corresponding to 20 mA input signal from sensor
Dead area	Zero offset (expressed in specific unit above): used to adjust the start of measurement corresponding to a 4 mA input signal, if different from zero.

Press RETURN , then SAVE to record all settings.
Note: Measuring unit and scale range are directly set on both displays, numeric and Bar Graph.

13. INPUT 1 - INPUT 2 : MEASUREMENT DIFFERENTIAL SETTINGS

Note: activation of this function requires that the measurements on both inputs are of the same type (level, volume or specific). Beforehand, set the parameters in the "Input I1 settings" and "Input I2 settings" menus.

The measurement difference between the two inputs I1 and I2 will be displayed on display 3 of the BAMOWIZ.

Below, details to set up the differential mode:
Go to menu "Set up (I1 - I2)"

Activation?	On
Designation	Enter the desired name for the measurement
Delta range	Enter measurement range for delta bar graph display
Zero Offset	Used to reset the delta to the current inputs values (even if different). Useful for equalizing two slightly different measurements, or for monitoring a variation from a given state of the process.

Press RETURN , then SAVE to record all settings.

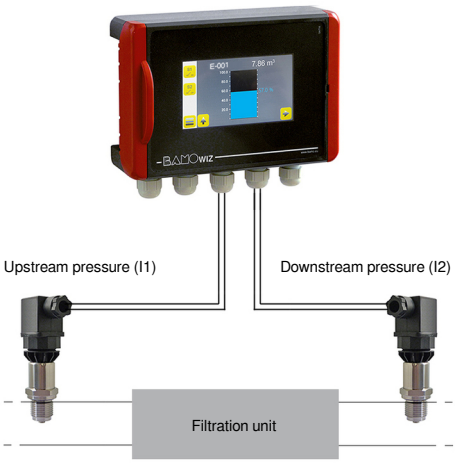
Example : Differential pressure to monitor the clogging of a filtration unit

- *Upstream: Pressure transmitter 0 ... 10 bar on Input I1*
- *Downstream: Pressure transmitter 0 ... 10 bar on Input I2*
- *Delta range: -10 ... +10 bar*

Settings will be:

Menu "Settings input"	Input I1 settings	Input I2 settings	Set up (I1-I2)
Start-up input?	*On*	*On*	*On*
Designation	*Upstream*	*Downstream*	*Differential*
Measurement type	*Specific*	*Specific*	-
Signal sensor unit	bar	*bar*	-
4 mA	*0*	*0*	-
20 mA	*10*	*10*	-
Dead area	*0*	*0*	-
Delta range	-	-	*20*

If the upstream pressure is 6.1 bar and the downstream pressure is 4.5 bar, the result displayed will be: +1.6 bar



14. PULSE INPUT : FLOWRATE AND CUMULATED VOLUME MEASUREMENT SETTINGS

Note: this function cannot be used while the differential measurement function is active.

-> Go to the menu "Pulse input"
"Frequency" is used to control a flow rate / "Totalizer" is used to control a cumulative volume.

Frequency ?	On
Designation	Enter the desired name for the measurement
Signal sensor unit	Enter the desired unit of measurement on the display (Example: m^3/h, l/s, l/min etc.)
Frequency ? = Unit ?	Enter a frequency value in Hertz (Hz) as well as the corresponding flow rate value
Damping	Select sliding measurement dampening time (0.5, 1, 2, 5, 10 or 20 seconds). Short dampening time = better responsiveness; Long dampening time = better display stabilization
Delay zero	Time until display returns to zero in absence of flow (2.5, 5, 10 or 25 seconds).
Totalizer	Default: "OFF" If ON, the steps below are added to the programming:
Anti-rebound	Default : OFF (if used with potential free contacts : select ON) Eliminates parasitic measurements due to the rebound effect of potential free contacts
Unit:	indicate the desired totalizing unit (e.g. m^3, liter etc.).
Pulses ? = Unit ?	Used to indicate the equivalence between the number of pulses and the chosen unit of volume.

BAMO after-sales support: Please do not hesitate to contact our teams, who will be able to carry out or confirm your calculations.

14.1 Example with a BAMOFLU turbine flowmeter:

The BAMOFLU is mounted on a DN 50 pipe with a maximum flow rate of 35 m^3/h.
The speed corresponding to this flow in the pipe is 4.954 m/s (v = flow/section).

According to the flowmeter's technical specifications, on a DN50 pipe, the frequency is estimated at 45 Hz for a velocity of 1 m/s. This gives the frequency (F) in Hz corresponding to the maximum flow rate, i.e. :

Freq = Speed in 'm/s' x Frequency per m/s
Freq = 4,954 m/s * 45 Hz/m/s
Freq = 222,9 Hz

To totalize, convert the frequency into pulses, i.e. Frequency / Max. flow (pay attention to the units) :

Tot = Frequency ÷ Max. flow
Tot = 222.9 Hz * 3600 ÷ (35 m^3/h * 1000)
Tot = 22.9 Impulses per liter

In the BAMOWIZ, you will need to enter the frequency (229.9 Hz), the display value (35) and the unit of measurement corresponding to the sensor (m^3/h). To totalize, enter 22.9 for 1 liter.

14.2 Example of a flowmeter with a BAMOMATIC pulse output:

The sensor produces 400 pulses per liter. The maximum flow is 65 liters per minute. We want to display liters per minute.
In this case, the number of pulses must be converted to frequency (F) (pay attention to units), i.e. :

Freq = Number of pulses x Flow rate
Freq = (400 Imp/liter x 65 l/min) ÷ 60
Freq = 433.33 Hz

In the BAMOWIZ, enter the frequency (433.33 Hz), the display value (65) and the unit of measurement corresponding to the sensor (liters/min).

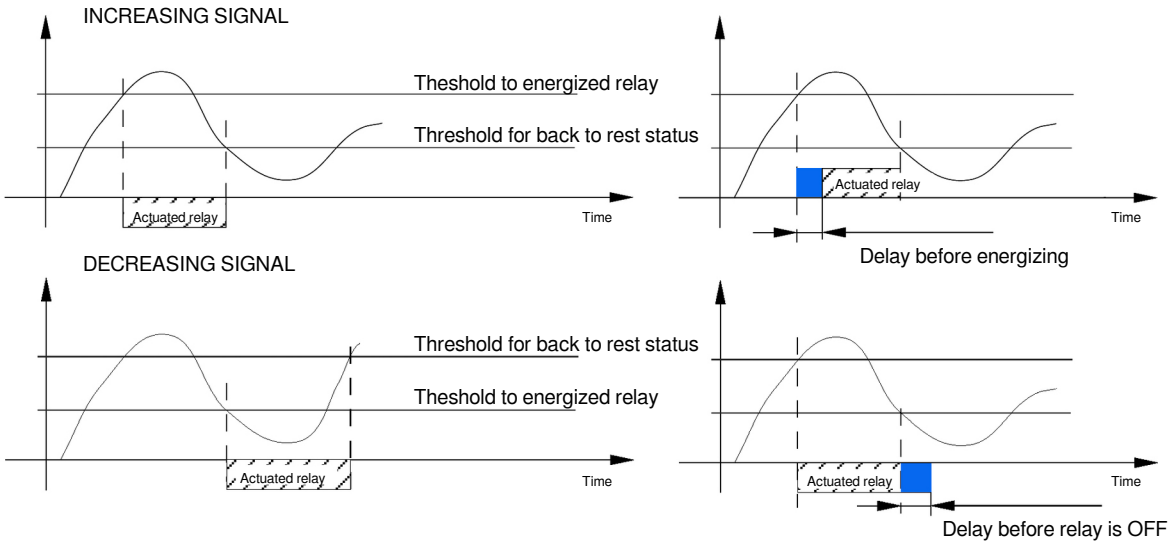
15. SETTING ALARM/CONTACT THRESHOLDS FOR I1 / I2 / (I1-I2) INPUTS

Alarm thresholds can be triggered on reaching specific values of measurements from Input 1 / Input 2 (section 12) or [Input 1 - Input 2] (section 13).
Go to the menu "Thresholds"

To add a threshold, click on the (+) symbol, then click on the threshold to be configured.

Designation	Enter the desired name for the alarm threshold
Input selection	Select the input channel to be assigned to this alarm threshold
Unit selection	Select the threshold value unit *If measurement type on the input was set to "specific", the specific unit configured will be automatically selected.*
Direction	Increasing = the alarm is triggered when the measurement exceeds the threshold value Note : "De-energized" value must be lower than "Energized" value (see diagram below) Decreasing = the alarm is triggered when the measurement falls below the threshold value Note : "De-energized" value must be higher than "Energized" value (see diagram below)
Energized	Enter the value at which the alarm should be triggered
De-energized	Enter the value at which the alarm should be switched back off
Delay ON	Alarm delay time (ON/OFF)
Time (ON)	Alarm delay time (in seconds), when the “Energized” condition is met
Delay OFF	Alarm stop time delay (ON/OFF)
Time (OFF)	Alarm stop delay (in seconds), when “De-energized” condition is met
Defective Input	Select alarm behavior in case of sensor fault (signal input <3.8mA or >20.5mA) - De-energized - Energized - Hold current status
Threshold action	Selects the action to be taken when an alarm is triggered : - Relay S1 / S2 / S3 = activate (close) contact S1 / S2 / S3 - Relay S1 / S2 / S3 + Screen = activate (close) contact S1 / S2 / S3 + blinking display - Screen = blinking display

Saving threshold settings :
When thresholds are set, press RETURN , then SAVE to record all settings
NOTE : In the graphical display, threshold settings can be displayed on demand.



16. SETTING ALARM/CONTACT THRESHOLDS FOR PULSE INPUT

Alarm thresholds can be programmed to be triggered according to the values of measurements made via the Pulse input.
Go to the menu "Thresholds"

To add a threshold, click on the (+) symbol, then click on the threshold to be configured.

Extra function : using BAMOWIZ as a pulse emitter
As a reminder, Pulse input can be programmed with either or both functions : "Frequency" (instant flowrate control) and/or "Totalizer" (cumulative volume control).
The "Pulse mode" is automatically proposed when the totalizer function unit is selected in the "Unit selection" settings below.
In this mode, a contact can be programmed to send a pulse per volume quantity. Pulse duration & volume quantity are user-defined (e.g.: 1 pulse of 15 milliseconds every 100 liters).

Follow the setup steps below:

Designation	Enter the desired name for the alarm threshold
Input selection	Select the measurement made via Pulse Input
Unit selection	Select unit of measurement for instantaneous flow rate or cumulative volume *Note: the suggested units will depend on the functions activated in "Pulse Input" settings (section 14).*

16.1 Setting threshold according to instant flowrate values

Direction	Increasing = the alarm is triggered when the measurement exceeds the threshold value Decreasing = the alarm is triggered when the measurement falls below the threshold value
Energized	Enter the value at which the alarm should be triggered
De-energized	Enter the value at which the alarm should be switched back of
Delay ON	Alarm delay time (ON/OFF)
Time (ON)	Alarm delay time (in seconds), when the “Energized” condition is met
Delay OFF	Alarm stop time delay (ON/OFF)
Time (OFF)	Alarm stop delay (in seconds), when “De-energized” condition is met
Threshold action	Selects the action to be taken when an alarm is triggered : - Relay S1 / S2 / S3 = activate (close) contact S1 / S2 / S3 - Relay S1 / S2 / S3 + Screen = activate (close) contact S1 / S2 / S3 + blinking display - Screen = blinking display

16.2 Setting threshold according to cumulated volume values

When this unit is selected, "Pulse mode" is automatically proposed

16.2.1 Pulse mode OFF :

The threshold is set as above.

16.2.2 Pulse mode ON :

Energized	Enter the desired volume value of 1 pulse
Time (ON)	Enter pulse duration (contact closure time in milliseconds)
Threshold action	Select the desired contact for pulses

Important notice
The volume entered must not be less than the total volume over a 10-second period at maximum flow.
If higher pulse frequency is set, contact service life will be greatly reduced.

Make sure that the excitation time is shorter than the time between two pulses !

17. RELAYS TEST

Only accessible when BAMOWIZ is set in MODIFICATION mode (section 9), this menu allows testing of the 3 contacts. By default, each contact is set to "de-energized". Pressing the icon next to each contact will set it to the "energized" state.

18. MODBUS OUTPUT CONFIGURATION

Below are the detailed settings for the MODBUS output:
Go to the menu "MODBUS"

Data	8 bits
Baud rates	Choose between: 2400, 4800, 9600, 19200 bauds
Parity	Select between: None, even, odd
Stop bits	Select or 1 or 2
Address Nr	Enter station number

19. OUTPUT mA: ANALOG OUTPUT SETTINGS

4-20mA output can be used to replicate all or part of the measurement made via Input 1, Input 2 or (Input1-Input2)
Go to the menu "Output mA".

Start-up input	On
Input selection	select pre-programmed input to be copied to the 4-20mA output
Unit selection	Select the measurement unit (automatic choice between units pre-programmed on the selected input)
4 mA	Specify which measurement value the 4 mA output value should correspond to
20 mA	Specify which measurement value the 20 mA output value should correspond to

20. MIN. / MAX. VALUES MEMORISATION

The minimum and maximum measurement values of each input are stored into the BAMOWIZ memory
Press RESET to reset these values for the desired input.
NOTE: the user can choose whether or not to show these values on the bar graph display, by directly ticking the box next to the bar graph.

21. COLORS

Colors in charts display can be customized.

1) From the main display, go to "MENU"
2) Go to the menu "Colors"
3) Select an input to modify its color

- Confirm your choice by pressing the "SAVE" key.
- proceed the same way for other inputs if necessary, then press the "RETURN" key to exit the meu "COLOUR".
- Press the SAVE key to save your settings.