Code 776 002

USER MANUAL

Remote monitor for BAMOFLONIC PFA	**DEB**
DISPLAY / PROGRAMMING UNIT	**776-03** /1
22-07-2021 M-776.03-EN-AB	

SUMMARY

1.   PRECAUTIONS

• Assembly, electrical connections, commissioning and maintenance must be carried out by qualified, trained personnel.
• The end-users must read and observe the operating instructions.
• The operation of the device must be in accordance with and strictly limited to the applications mentioned.
• The installer must ensure that the instrument is connected in accordance with the electrical diagrams.

2.   APPLICATIONS

The instrument is designed to visualize flow measurements and to program the operation of BAMOFLONIC flow-meters, allowing the following functions:
-   Set the Display and settings of the linked flow-meter
-   Real time display of parameters
-   Independent power supply
    BAMO Mesures cannot be held responsible for any damage caused by improper use or modification of the instrument.

3.   RELEVANT INFORMATION

This display unit is designed according the directive EN 61010 (VDE 0411 "Safety specifications for electrical measuring, control and laboratory equipment").
All tests comply with protection degree: IP 65. The display unit meets the requirements of current European Directves: CEM eN 50081-2 & eN 50082-2 & eN 60601-1 for low voltage applications.

4.   INSTALLATION

The installation and commissioning of both flowmeter and display unit must be carried out respecting instructions for each device, referring to their instructions manual.
Wall mounting is done with the bracket (2 holes, each Ø 8 mm; 145 mm apart).

4.1   Wiring

CAUTION

Serious injury or death from electric shock can occur if wiring is performed without first de-energizing any power source connected to the devices. Before any intervention, make sure that the power supply to the service panel is turned off by means of the switch or the circuit breaker and signal the intervention in order to exclude an accidental re-energization, during the intervention. Wiring, disassembly and removal of the indicator must be carried out by qualified and experienced technicians.
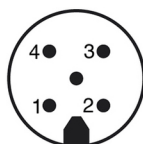
The connection between the indicator and the flow-meter, as well as the 24 V power supply, must be made using the T-connector provided (see Fig. 1a & 1b, next page). No other additional external power supply is required.

4.1.1 5-pin Connector configuration:
The outputs may be re-set for specific applications.

PIN Nr	Function	Description
1	L+	Power supply 18 ... 30 V DC
2	*(Not connected)*	
3	GND	0V
4	Communication	Communication interface
5	*(Not connected)*	

Built-on display unit   Removable connector

Fig. 1: 5-pin connector

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4.1.2 8-pin Connector configuration:

The outputs may be re-set for specific applications.

PIN Nr	Function	Description
1	L+	Power supply 18 ... 30 V DC
2	*(Not connected)*	
3	GND	0V
4	*(Not connected)*	
5	*(Not connected)*	
6	Communication	Communication interface
7	*(Not connected)*	
8	*(Not connected)*	
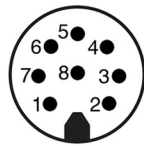
Built-on display unit   Removable connector
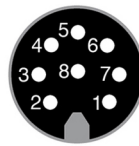
Fig. 2: 8-pin connector

4.2   Connections between Flow sensor and Display unit

Fig. 1b: Display unit to Bamoflonic PFA

Fig. 1a: Display unit to Bamoflonic (remote version)

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5.1 Operation

Displays and end-user menu:
The display indicates the measurements in real time and displays the parameters to set. 4 keys are used to navigate and to set up the parameters.

NOTE: If the indicator is operating without connection to a flow sensor, the display will show ''Searching SENSOR''. As soon as a flow sensor is correctly connected, the indicator displays measured values in real time.
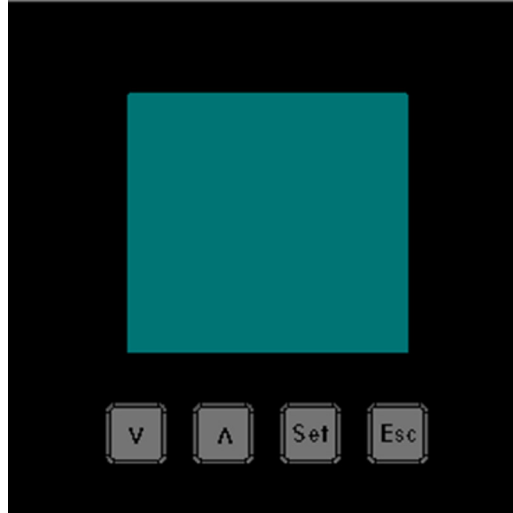
Fig. 3: Keyboard

Pressing the "Set" button opens the main menu. Press the arrow keys to access to setting options.

Example to set the highest value assigned to analogue output:
''max. value'' on analogue output, use the arrow keys to modify the value, then press the ''SET'' key to save the value.
To go back to previous menu, press the escape key ''Esc''.

The access to parameters modifications is protected by a keyword.

Default keyword is 41414

It can be modified through a software.
Configuration mode is available to end-user during 5 minutes after last key pressed. When no action occurs, the display goes back to normal screen after 3 min and 20 seconds, excepted for operating menus''Dosage'' and ''Diagnostic''.

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6.　MENU: STEPS DIAGRAM
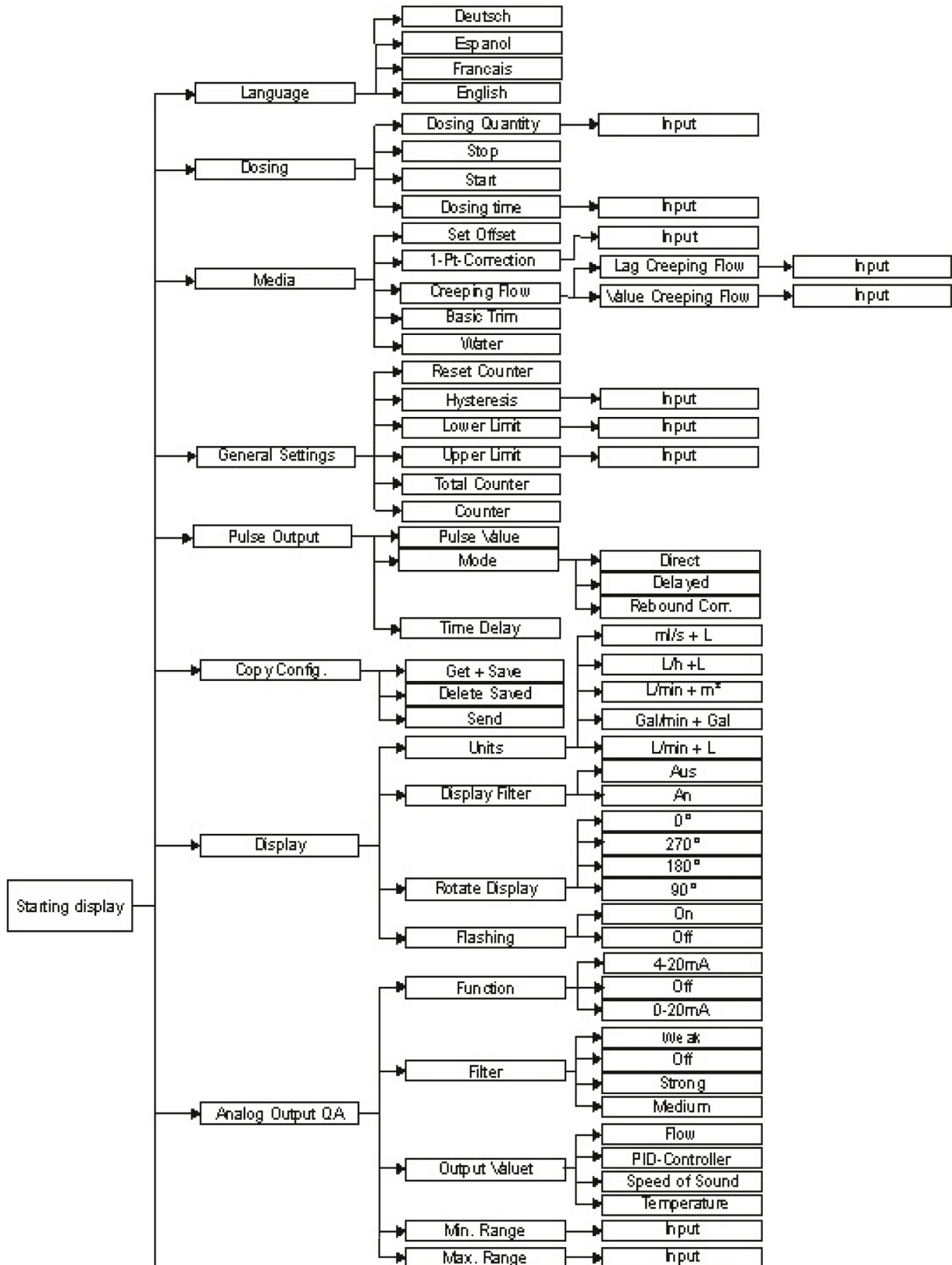

Menu steps diagram:

- **Language**
  - Deutsch
  - Espanol
  - Francais
  - English
- **Dosing**
  - Dosing Quantity → Input
  - Stop
  - Start
  - Dosing time → Input
- **Media**
  - Set Offset → Input
  - 1-Pt-Correction
  - Creeping Flow
    - Lag Creeping Flow → Input
    - Value Creeping Flow → Input
  - Basic Trim
  - Water
- **General Settings**
  - Reset Counter
  - Hysteresis → Input
  - Lower Limit → Input
  - Upper Limit → Input
  - Total Counter
  - Counter
- **Pulse Output**
  - Pulse Value
  - Mode
    - Direct
    - Delayed
    - Rebound Corr.
  - Time Delay
- **Copy Config.**
  - Get + Save
  - Delete Saved
  - Send
- **Display**
  - Units
    - ml/s + L
    - L/h +L
    - L/min + m²
    - Gal/min + Gal
    - L/min + L
  - Display Filter
    - Aus
    - An
  - Rotate Display
    - 0°
    - 270°
    - 180°
    - 90°
  - Flashing
    - On
    - Off
- **Analog Output O.A**
  - Function
    - 4-20mA
    - Off
    - 0-20mA
  - Filter
    - Weak
    - Off
    - Strong
    - Medium
  - Output Valuet
    - Flow
    - PID-Controller
    - Speed of Sound
    - Temperature
  - Min. Range → Input
  - Max. Range → Input

Starting display

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Digital Output Q1

Function
- Pulse Output
- Off
- Dosing
- Negative Flow
- Lower Limit
- Upper Limit
- Empty Pipe

Logic
- PNP Normal Open
- NPN Normal Closed
- NPN Normal Open
- PNP Normal Closed

Digital Output Q2

Function
- Empty Pipe
- Pulse Output
- Off
- Dosing
- Negative Flow
- Lower Limit
- Upper Limit

Logic
- PNP Normal Open
- NPN Normal Closed
- NPN Normal Open
- PNP Normal Closed

Digital Input I1
- Off
- Counter Reset
- Dosing
- Creeping Flow Off
- Set Offset

Diagnostic

S/N

Version
- SW-Ver
- DE-Ver
- HW-Ver

Testing Flow
- Set Flow
- Stop
- Start

Values
- VST
- PH-Window
- Amplitude
- TOF
- Rflow
- Temp.

PCK
- PCK1
- PCK2
- PCK3
- PCK4
- PCK5
- PCK6

Status
- Flag0
- Flag1
- Flag2
- PuMo

Pump Mode
- On
- Off

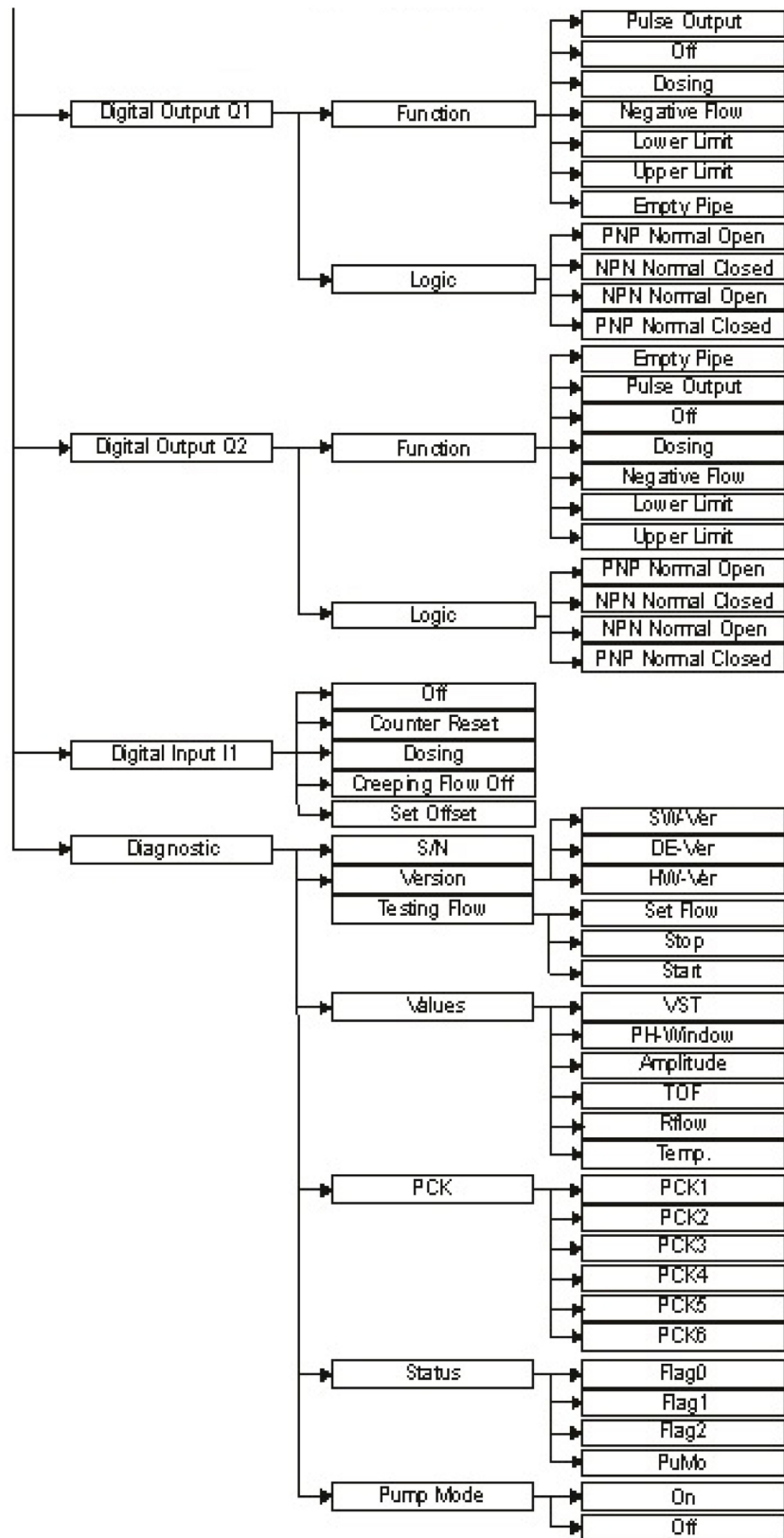**Remote monitor for BAMOFLONIC PFA**

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6.1 FUNCTIONS AND DEFAULT SETTINGS

6.1.1 Language
Choose your preference between English, French, German or Spanish.

6.1.2 Dosing function

"Dosing Quantity"	To set from 0 up to 3,500 litres (Default value: 0 litre)
"Dosing time"	To set from 0 up to 30,000 seconds (Default value: 3 s)

Caution !
To prevent disaster the user must have an emergency stop device, as well as an anti-overflow device. Both devices must be able to stop a safe shutdown of pump(s) and to close filling valve(s).

6.1.3 Liquid

"Set Offset"	Through the sub-menu "Set Offset" it is possible to adjust an offset of the flowmeter. This function is used when the pipe is full without flow.
"Correction"	Adjusting range from -50% up to +50% by step of 0.1% (default value: 0%) *This correction applies to correct the flow according the liquid properties (eg: concentration).*
"Creeping Flow"	On lowest flow-rate: Measurements around zero are excluded where accuracy is not appropriate. Default value is set at a standard value in relation to the cross-section of the flowmeter. *This creeping suppression works with an hysteresis of -25 %.*

Example : "Creeping flow" set at 0.6 l/min
Once the flow is less than 0.45 l/min, the pulse and analogue outputs become inactive.
Then, once flow-rate exceeds 0.6 l/min the pulse output (increasing the totalizer) and the analogue output are active again.

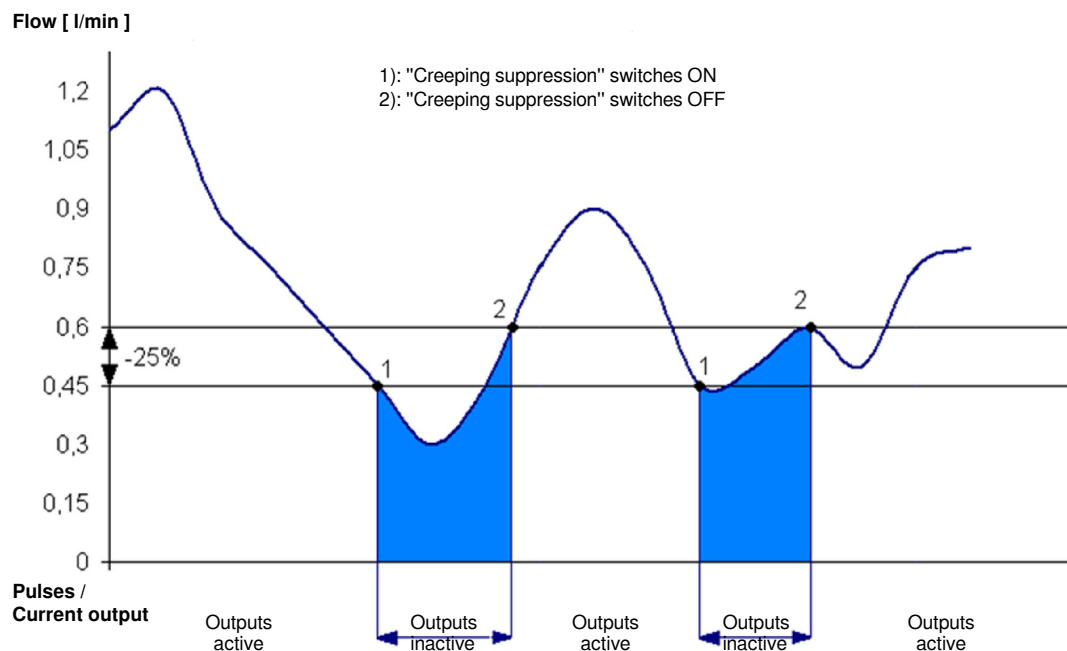Range settings: 0.0 ... 20 l/min, by step of 0.006 l/min

Fig. 4: Example of "creeping flow" set at 0.6 l/min

"Lag Creeping Flow"   To add a delay before switching ON the creeping flow suppression.

Example: Delay of 2 s
Setting range: 0... 99.9 s; by step of 0.1 s
(Default value: 0.5 s)
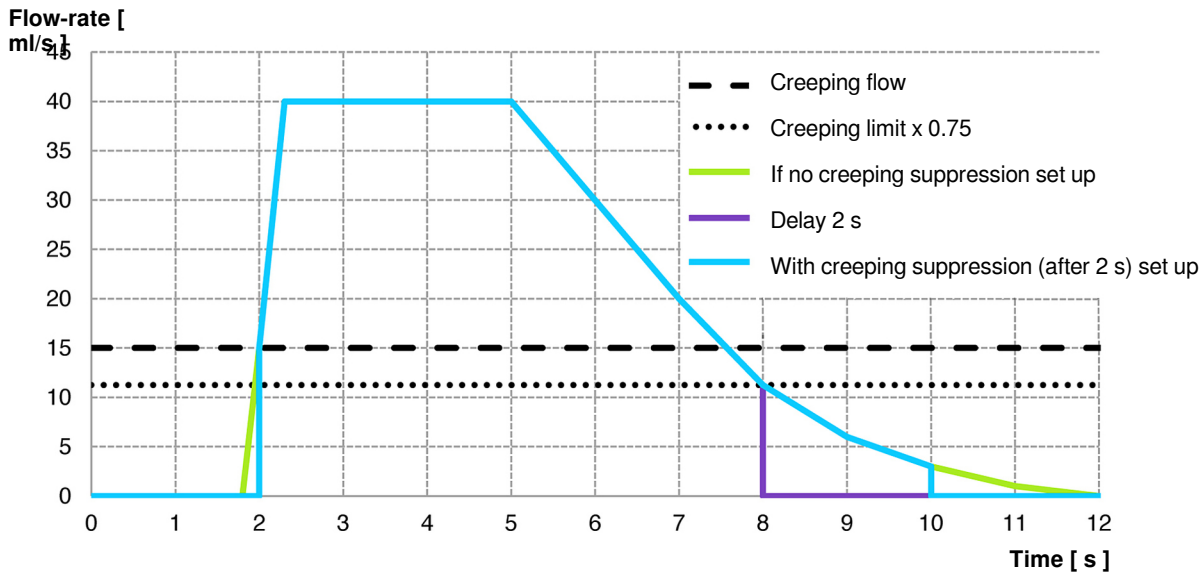
Flow-rate [ml/s]

Fig. 5: Example with delay on the "creeping flow"

"Basic Trim"   (Basic settings)
This function is a self-diagnostic for parameters optimization.
It takes about 1 minute.
The pipe must be full of liquid and no flow at all.
Ending the diagnostic, display "Done" appears; In case of an error, an error display appears.

Important

For the self-diagnostic to be carried out perfectly, it is essential that the flowmeter is full of liquid and that the flow-rate is zero. If an error is detected during this operation, an error display appears, otherwise "Done" is displayed.

"Water"   This sequence allows a modification of standard features related by default to water.

6.2   Standard parameters

"Reset Counter"   The volume counter can be reset.

Caution
Accidentally reset counter values are permanently erased.

"Hysteresis"   Limit values may be configured with an hysteresis.
This is to avoid frequent switching of the outputs when the flow-rate fluctuates around the limit.
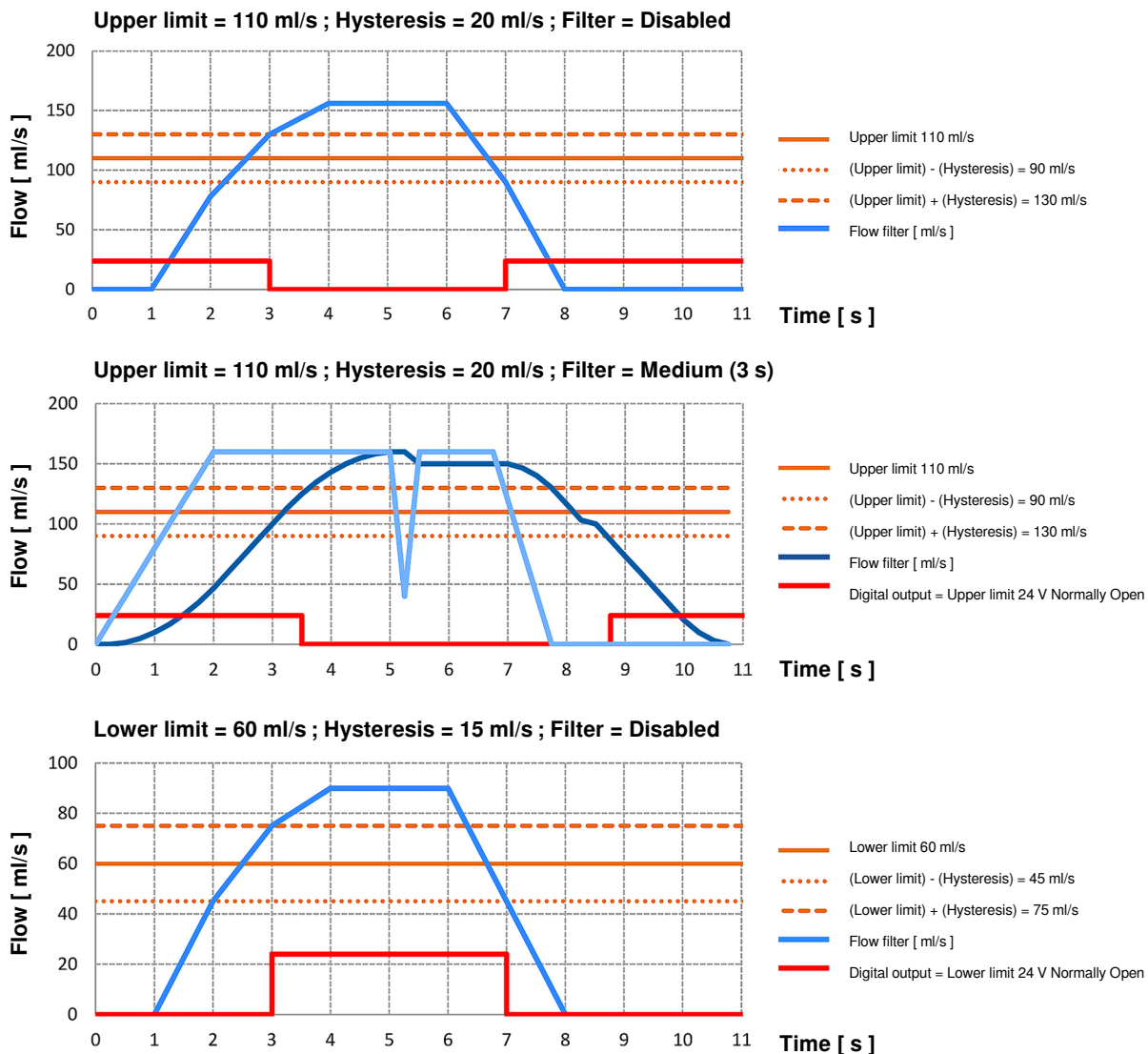
Upper limit = 110 ml/s ; Hysteresis = 20 ml/s ; Filter = Disabled

Upper limit = 110 ml/s ; Hysteresis = 20 ml/s ; Filter = Medium (3 s)

Lower limit = 60 ml/s ; Hysteresis = 15 ml/s ; Filter = Disabled

Fig. 6: Example of "Hysteresis"

Setting range: 0... 8 000 ml/s; by step of 0.01 ml/s
                                     (Default value: 0)

"Lower Limit"
This function is used to set the minimum flow rate acceptable.
Setting range: 0... 8,000 ml/s; by step of 0.01 ml/s
                                     (Default value = 0)

"Upper Limit"
This function allows you to adjust the maximum flow rate acceptable.
Setting range: 0... 8,000 ml/s; by step of 0.01 ml/s
                                     (Default value: Depends of the model in use)

"Total Counter"
The total counter can be displayed through the menu. The unit is [m^3]. This counter is unidirectional and therefore may differ from daily counters.
The total counter cannot be reset.

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"Counter"
This daily counter appears by default on the display. The unit varies according your choice.

a): Daily counter [l]			b): Daily counter [m³]			c): Daily counter US [Gal]		
from [l]	up to [l]	Resolution [l]	from [m³]	up to [m³]	Resolution [m³]	from [Gal]	up to [Gal]	Resolution [Gal]
0,000	14000	0,001	0,000	14000	0,001	0,000	14000	0,001
14000	28000	0,002	14000	28000	0,002	14000	28000	0,002
28000	56000	0,004	28000	56000	0,004	28000	58000	0,004
56000	112000	0,008	56000	112000	0,008	58000	112000	0,008
112000	225000	0,016	112000	225000	0,012	112000	225000	0,016
225000	445000	0,032	225000	461204	0,032	225000	460000	0,032
445000	1000000	0,064				445000	1000000	0,064

a): Once the counter reaches 1,000,000 litres it automatically starts again to count from zero.
b): Once the counter reaches 461,204 m³ it automatically starts again to count from zero.
c): Once the counter reaches 1,000,000 Gal it automatically starts again to count from zero.

The totalizer operates without possible reset (in any scale unit).

6.2.1 Display

"Units"
The device can display the flow + volumes in each following pair of units: ml/s + l ; Gal/min +Gal ; l/min + l ; l/min + m³.
First parameter is the unit for flow rates.
Second parameter is the unit for volumes.

"Display Filter"
Flow rate may be filtered for display.
This filter is an average on 16 seconds of instant values; it can be disabled. through the menu.

"Rotate Display"
Choose to rotate the screen view of: 90° or 180° or 270° - default value 0°

"Flashing"
The screen view will be flashing if an error occurs; May be disabled through the menu.

6.2.2 "Analogue output QA"
The output may be set as 4-20 mA or as 0-20 mA current output. Nominal current varies between 0 to 22.6 mA according the flow rate and measuring settings.

Default settings for signal output 4-20 mA:

20 mA	For the maximum flow rate of the device
4 mA	For the minimum flow rate of the device
3.5 mA	For an empty tube

On this analogue output the maximum load to respect is 500 Ohms
A higher load prevents the device from delivering the maximum current of 22 mA.

Analogue output features:
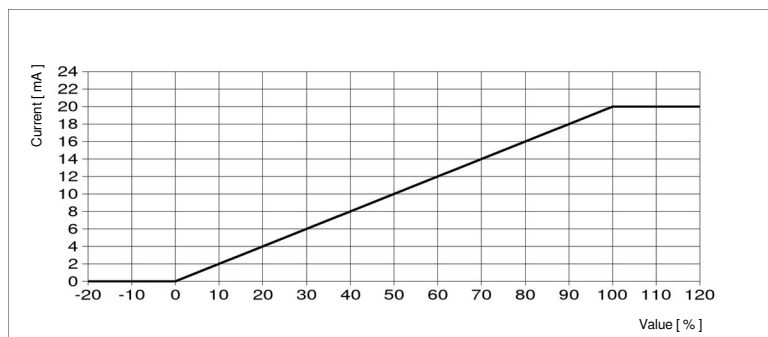On the following diagramm, the minimum of the scale corresponds to 0% and the maximum to 100%.

Fig. 7: Analogue output 0-20 mA

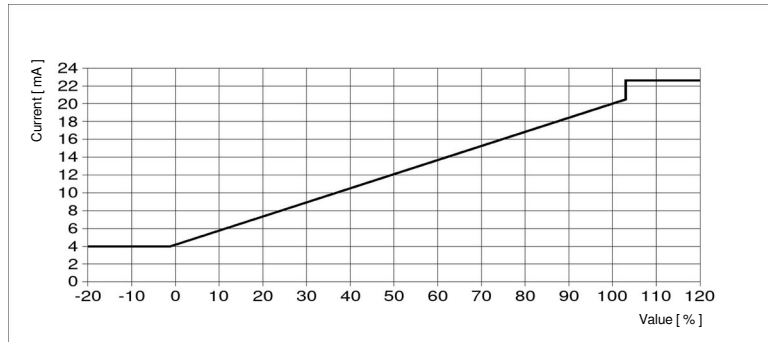| Flow values	Current [mA] setting: 0 ... 20 mA
lowest (< 0 %)	0
0% (minimum of the scale)	0
From 0 % up to 100 %	Linear interpolation from 0 to 20 mA
100 % (maximum of the scale)	20
Highest value (>100 %)	20

Fig. 8: Analogue output 4-20 mA

Values	Current [mA] setting: 4 ... 20 mA
Empty tube	3.5 mA
Lowest (<1,2 %)	3.8 mA
Intermediate -1.2% and 0%	Linear interpolation from 3.8 to 4 mA
0% (minimum scale)	4 mA
From 0 % to 100 %	Linear interpolation from 4 mA to 20 mA
100 % (maximum scale)	20 mA
From 100 % to 103 %	Linear interpolation from 20 mA to 20.5 mA
Highest value (>103 %)	22.6 mA

"Filter"
This function averages the analog output signal.
Available settings: Weak, Medium, Strong, Off; default value = Weak
The analog output signal reacts quickly to measurement changes when the setting is "low", while it reacts slower when the setting is "High".
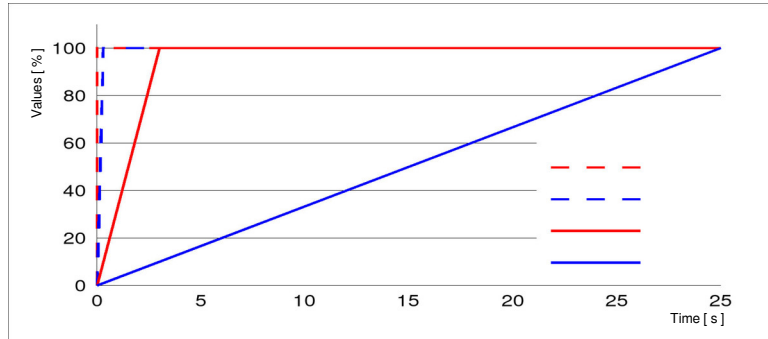

Fig. 9: Response time with filter

Filter	100 %
Disabled	16 ms
Weak	0.3 s
Medium	3 s
Strong	30 s

"Output value"
In the menu, all output values are visible. The optional functions are operational only if they have been requested on the purchase order.

Functions:
Flow
PID regulation (Option)
Sonic speed (Option)
Temperature
(default value = Flow)

"Flow"
The flow rate is measured via the analog output.

"PID regulation"
Available only in OPTION: On the current output, it is possible to control the flow rate. To adjust the parameters (target flow, proportional gain, integral gain and differential gain), the software interface on PC is required.

"Sonic speed"
Available only in OPTION

"Température"
The built-in thermocouple is not in direct contact with the liquid, it is used to calculate the thermal expansion of the housing.
Surrounding temperature significantly influences the actual temperature of the thermocouple.
The response time varies depending on the mounting position of the thermocouple inside the housing.

6.3 Digital outputs Q1 and Q2

The digital output Q2 is only available on the model with the 8-pin connector.

Each output is activated when the power supply is less than 16 V. In the event of an overload or short circuit, the output is deactivated within 100 µs, then becomes active again within 2 s.

Functions: Pulses/ Disabled/ Dosing/ Negative flow/ Lower limit/ Upper limit/ Empty tube
    (Default values Q1 = Pulses; Q2 = Empty Tube)

Select or a NPN, or a PNP logic function.

Functions: Opening PNP (N.C. contact); Closing NPN (N.O. contact); Opening NPN (N.C. contact); Closing PNP (N.O. contact)
    (Default values for Q1 and Q2 = Opening PNP)

Empty tube output	Empty tube	Full tube	
Opening NPN	High impedance	0V	
Closing NPN	0V	High impedance	
Opening PNP	High impedance	24 V	
Closing PNP	24 V	High impedance	

Pulse output	Empty tube	Full tube; No flow	Full tube; Existing flow
Opening NPN	0V	0V	High impedance
Closing NPN	0V	0V	High impedance
Opening PNP	High impedance	High impedance	24 V / Pulse
Closing PNP	High impedance	High impedance	24 V / Pulse

High Limit output	Below Low Limit	Between limits	Above High limit
Opening NPN	High impedance	High impedance	0V
Closing NPN	0V	0V	High impedance
Opening PNP	High impedance	High impedance	24 V
Closing PNP	24 V	24 V	High impedance

Low Limit output	Below Low Limit	Between limits	Above High limit
Opening NPN	0V	High impedance	High impedance
Closing NPN	High impedance	0V	0V
Opening PNP	24 V	High impedance	High impedance
Closing PNP	High impedance	24 V	24 V

Dosing output	Starting dosage	During dosage	Before/After dosing
Opening NPN	High impedance	High impedance	0V
Closing NPN	High impedance	0V	High impedance
Opening PNP	High impedance	High impedance	24 V
Closing PNP	High impedance	24 V	High impedance

Caution
When using the dosing function, the output must not be configured as "opening" (do not use "NPN opening" neither "PNP opening").
If the dosing output is set as Normally Closed (NPN opening or PNP opening) the valve will stay open after the dosing batch.

Essential

To connect to an inductive load, such as an external relay, an additional diode must be installed in parallel with the load to prevent damages.
With a high impedance input counter and high speed counting, it is necessary to include a resistor to have clean edges.
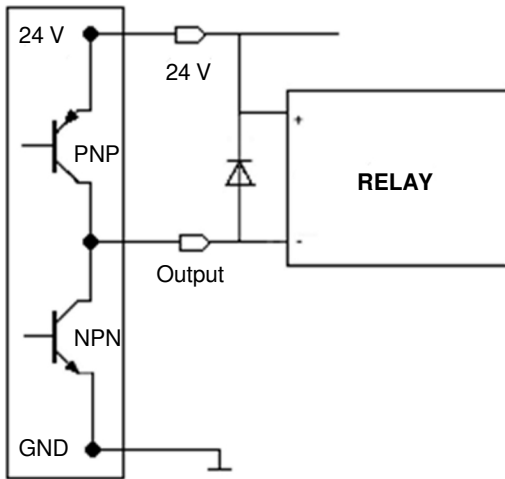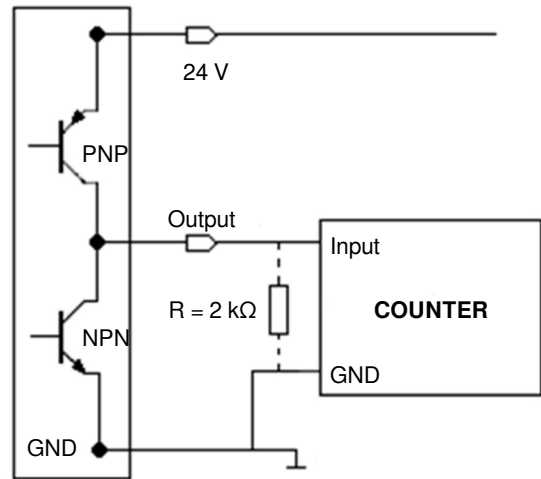

Fig. 10: Connections to a relay

Fig. 11: Connections to an external counter

6.4   Digital input I1

Digital input I1 is available only on version supplied with a 8-pin connector.
The instrument has a digital input for setting the following functions:

Counter reset; Starting dosage; Creeping Flow disabled; Offset setting.
To start a dosing process, a 24 V DC power supply is necessary.
The status of the dosing parameters or modifications, can be done via user display keyboard or through the interface software on PC.

Functions: Disabled
                                     Reset Counter
                                     Start dosage
                                     Creeping Flow disabled
                                     Offset setting
                                     (Default value = Disabled)

The dosing input is locked so that a re-start is not possible during a running dosing process.

Available input functions:

	Set Offset	Creeping flow disabled	Start dosage	Reset Counter	Off
0V	–	–	–	–	–
24 V	Rising edge: 0-> 24 V Set offset (*)	Status: Deactivating the creeping flow	Rising edge: 0-> 24 V Start dosage	Rising edge: 0-> 24 V Counter reset	–

(*) Offset settings function can only be operated when there is no flow in the meter. If offset is performed while the liquid is flowing, an offset drift will cause measurement deviations.

6.5   Diagnostic

"Testing Flow"
For commissioning or to test dosing procedure, a test flow-rate van be set between 0 and 3200 ml/s, by step of 0.1 ml/s. In that case the flowmeter will behave as if the liquid is really flowing (even with empty pipe), then the outputs and display are operating. To start the flow-test choose"Start"; Choose "Stop" to end the simulation or restart the device.

"Pump mode"
This mode can be switched on and off through the menu.
In this mode, with pulsating flow (e.g. peristaltic or diaphagm pumps) the flowmeter adapts itself automatically. The flowmeter sets the display and analogue filters on "Strong". If the pulsating stops, the device behaves again as its previous set.

6.6   General information

Caution, before powering the flowmeter for the first time:

- **Check the electrical connections, cable allocations and installation position of the flow sensor.**
- **Be sure that the pipe is completely filled with liquid and check the pressure.**
  (Direction of flow must correspond to the arrow direction engraved on the body)

When everything has been checked and satisfying, switch on the power.

7.   REPLACEMENT OF AN EXISTING DISPLAY UNIT

- **Switch off the power before to disconnect the instrument.**
  Please note that after replacing the unit:
  a) Specific programming of the previous flowmeter should entered into the new unit.
  b) When using the dosing function, set first a quantity.

Repairs, hazardous substances

– IMPORTANT –
Proceed with adequate cleaning of the device (indicator or / and flowmeter) before shipping it back, in particular when it has been in an environment with presence of substances dangerous to health (liquids, vapors, gases).

Contact our technical department to obtain the "documents for return" to be sent together in the parcel for any requested support of our after-sales services ("descriptive report" and "certificate of decontamination").

These documents may be downloaded from our Web sites.

8.   ERROR MESSAGES

Error message	Comments	On the display
Empty tube	No liquid in measuring tube	Message & Display, flashing
Low voltage	Supply voltage < 16 V; outputs are disabled	Message & Display, flashing
Looking for sensor	No sensor detected; check all connexions	Message only
Sonic speed	Sonic speed < to minimum acceptable Run the function "Basic trim"	Message only
Short circuit	Load of digital output is over 100 mA; Outputs are disabled.	Message only
Lower limit	Flow-rate is below the set value for limit control function Min.	Message only
Upper limit	Flow-rate is above the set value for limit control function Max.	Message only
Saving	Appears when leaving the menu when saving modifications.	Message only
Slave mode	Slave mode assigned to display unit	Message only
Out of range	Occurs if flow exceeds the measuring range, when starting or in presence of bubbles of gas	Message only (30 s)

9. TECHNICAL FEATURES

Housing	IP 65, PSU (Polysulfone), Wall mount bracket: anodized aluminum
Power supply	18 ... 30 V DC, 3.6 W
Connector	M12, 5-pin or 8-pin connector versions
Ambient temperature	+5 ... +60 °C
Storage temperature	0... +70 °C
Interface	For settings
Display	Back lighted LCD display
Key board	4 keys

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

10. DIMENSIONS [mm]

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