

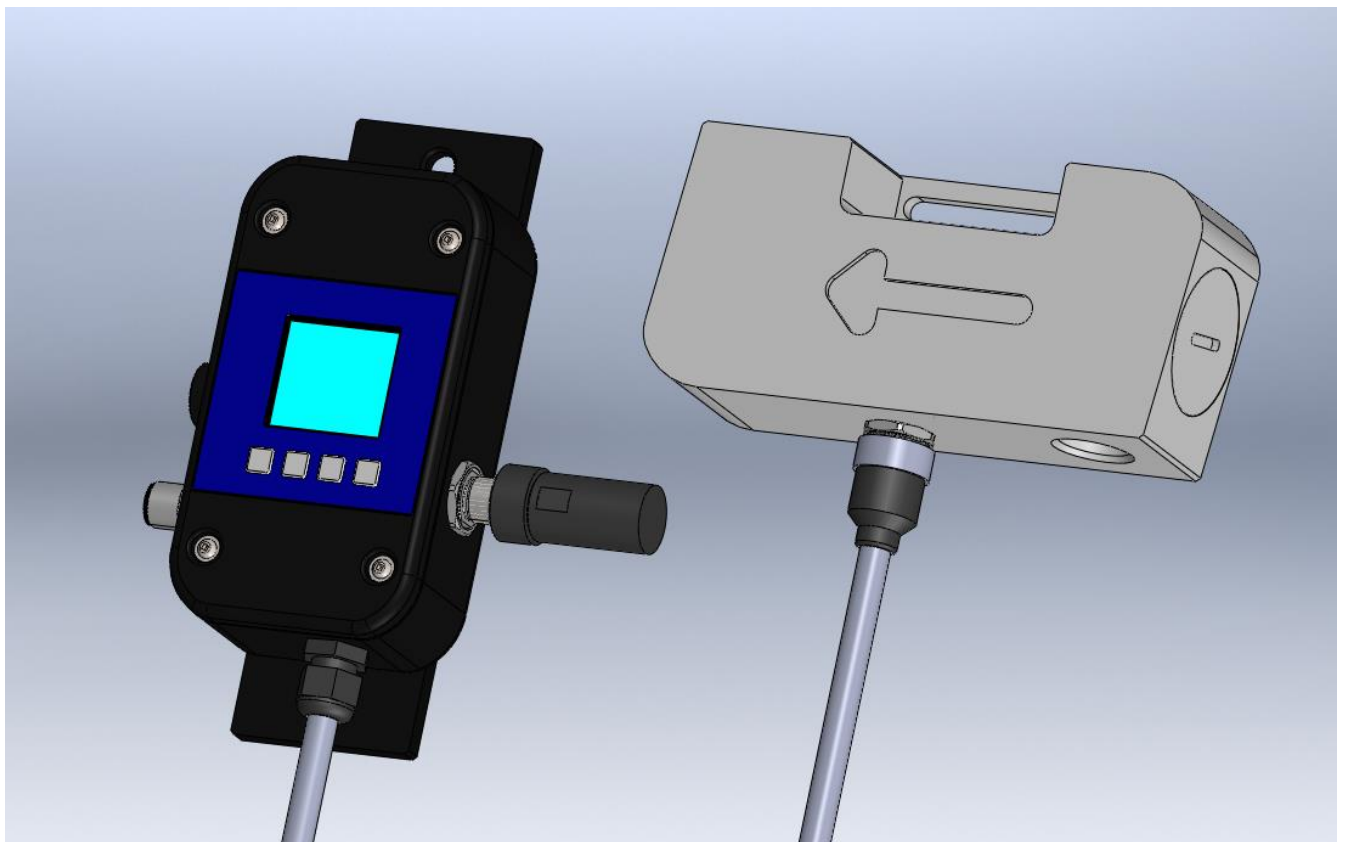
BA 007E/FM242i/02.18

Valid starting from
Hardware V 2.1
Software V 1.29

Flowmax[®] 242i

Ultrasonic flow metering / dosing device

Operating manual



General safety instructions

Please always observe the following safety instructions!

Please pay attention to the safety instructions with the following pictograms and signal words in these operating instructions:



IMPORTANT!

IMPORTANT! indicates situations or cases which, if not avoided, could result in damage or failure of the Flowmax 242i equipment.



WARNING!

WARNING! indicates general hazardous situations or cases which, if not avoided, could result in serious injury or death.

NOTICE!

NOTICE! is used to lead users to helpful information not related to personal injury.

Intended use

- The flow meter Flowmax 242i may only be used for measuring the flow of pure, homogeneous liquids.
- The volume flow meter Flowmax 242i is built operationally safe in accordance with the latest state of the art technologized developments and industry standard EN 61010 regulations (corresponds to VDE 0411 "Safety specifications for electrical measurement, control and laboratory devices").
- The manufacturer is not liable for any injury, damage or harm due to inappropriate or unintended use or modifications of the flow meter. Conversions and/or changes to the flow meter may only be made, if they are expressly performed in accordance with the operating instructions in this operating manual.

Personnel for installation, commissioning and operation

- **Assembly, electrical installation, commissioning and maintenance of the flow meter must be carried out by qualified, trained personnel. The qualified personnel must have read and understood the operating instructions in this operating manual and must follow the operating instructions in this manual.**
- **The installer has to ensure that the flow meter is correctly connected according to the electrical connection diagrams in this operating manual.**
- **Serious injury or death from electric shock may occur if wiring, installation, disassembly or remove of wires is performed while electrical power is energized**



WARNING!

Technological progress

The manufacturer reserves the right to revise, alter, or modify the flow meter to the most current technology without special prior notice. Further information about the latest updates and potential additions to these operating instructions are available from the manufacturer.

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1. Planning information

1.1 Areas of application

The flow measurement device in the Flowmax 242i designed to measure dynamic flow in pipes and tubes. This flow meter is suitable for liquids only. The Flowmax 242i is used in

- Bio-processing applications
- Chemicals supply for controlling, logistics, monitoring
- Cooling systems, logistics, monitoring
- Process equipment for control and monitoring of formulas
- Valve control for continuous release of liquid volumes
- Supply with de-ionized water
- Very dynamic liquid processes with dosing times of below 1 second

Flowmax 242i has the following features and benefits:

- No movable parts, therefore no wear
- High repeatability
- Easy to clean
- Safe operation
- Compact design
- Integrated detection of empty conduits
- Integrated dosing function with pre-set and adjustable amounts
- Chemical resistant
- Constant pipe cross-section over the entire measurement channel

1.2 Measuring principle

It usually takes more energy to swim against the flow than with the flow. The ultrasonic flow measurement is based on the phase-difference approach:

Two ultrasonic-sensors located opposite from each other alternatively transmitting and receiving ultrasonic signals. If there is no liquid flow both sensors receive the transmitted ultrasonic signals in the same phase, i.e. without phase difference. If liquid is flowing there is a phase shift. It differs when measured in direction of the flow than when measured against the direction of the flow. This phase difference is directly proportional to the flow rate.

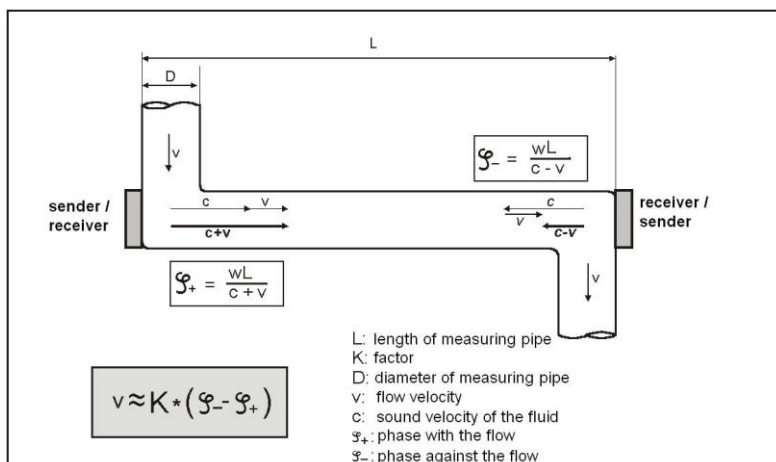


Figure 1: Presentation of the principle of ultrasonic flow measuring

1.3 Operational safety

Comprehensive self-tests ensure highest possible safety. Faults (process or system errors) are output on a digital output or displayed on the display menu.

The protection class is IP 65.

Flowmax 242i meets the general EMC immunity requirements according to CE, EN 61000-6-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6.

Flowmax 242i meets the safety requirements concerning the Protective Extra Low Voltage directive according to EN 50178, SELV, PELV.

Flowmax 242iM has the USP Class VI approval and is resistant to gamma irradiation.

2. Assembly and installation

2.1 Installation instructions

The housing of the Flowmax 242i has an arrow, symbolizing the flow direction of measurement. The flow meter has to be installed in a way so that the flow-through is in the same direction as the arrow symbol.

NOTICE!

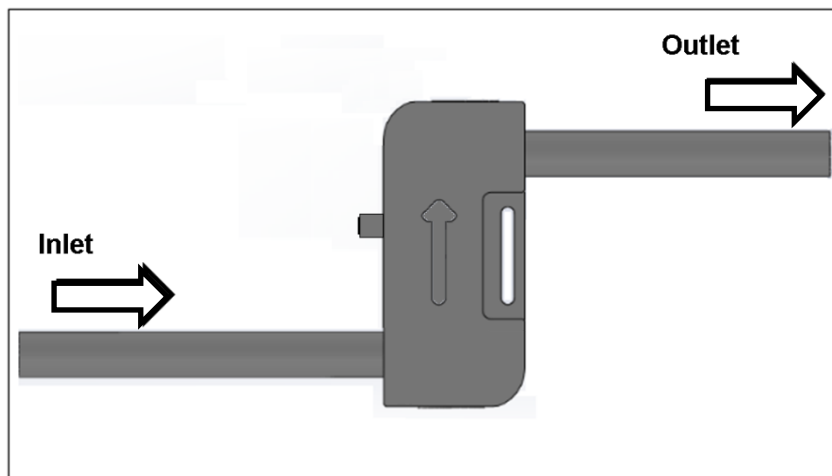


Figure 2: Installation position of Flowmax 242i

For fastest possible bubble detection it is important to keep the pipe distance from tank to Flowmax 242i as short as possible. Accurate measurement can only be assured, if the pipe is completely filled and the liquid does not outgas.

Notwithstanding it may be advantageous for dosing applications to install the Flowmax 242i as close as possible to the dosing valve, since soft pipes increase the cross-section depending on the system pressure. This may lead to repeatable differences.

Insure that no cavitations dissolve from the measured liquid. Depending on the measured liquid it can be helpful to have enough back pressure on the outlet of Flowmax 242i to avoid cavitations. Insure all mechanical connections are tight.

NOTICE!

Particles present in the flow stream may result in measuring errors.

When using pumps, Flowmax 242i must be installed in flow direction on the pressure side, on order to ensure sufficient pressure. The maximum pressure rating of Flowmax 242i has to be considered.

Do not exceed the maximum pressure allowance for of the Flowmax 242i (see section 5.2 Technical specifications). Exceed the maximum pressure can lead to destruction of the Flowmax 242i.

WARNING!

Flowmax 242i needs no inlet or outlet.

2.2 Assembly of the flow meter

The flow meter is mounted into a pipe system by using the mechanical connection. Flowmax 242i should be mounted vertically into the pipe for the best measuring performance. Do not install the flow meter after a dosing valve where the flow meter can run empty. Placing the flow meter after a dosing valve and allowing it to run empty will cause a measuring deviation at the next measurement. To avoid bubbles in the liquid, Flowmax 242i should be installed on the pressure side of the pump.

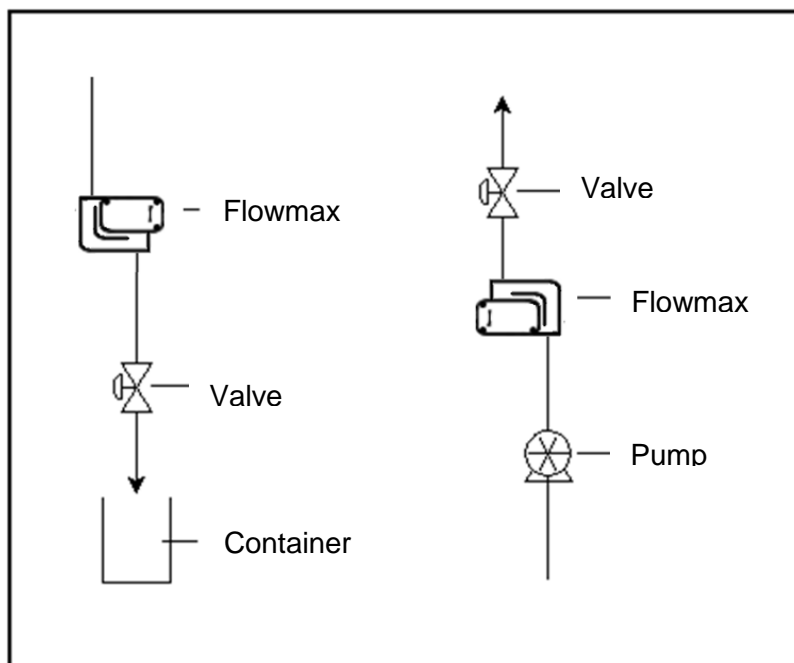
NOTICE!

Figure 3: Mounting examples for Flowmax 242i

If it is not possible to mount the flow meter vertically, then mount the instrument in a location where the pipe will be filled at all times. The best measuring result is achieved if bubbles do not pass through Flowmax 242i.

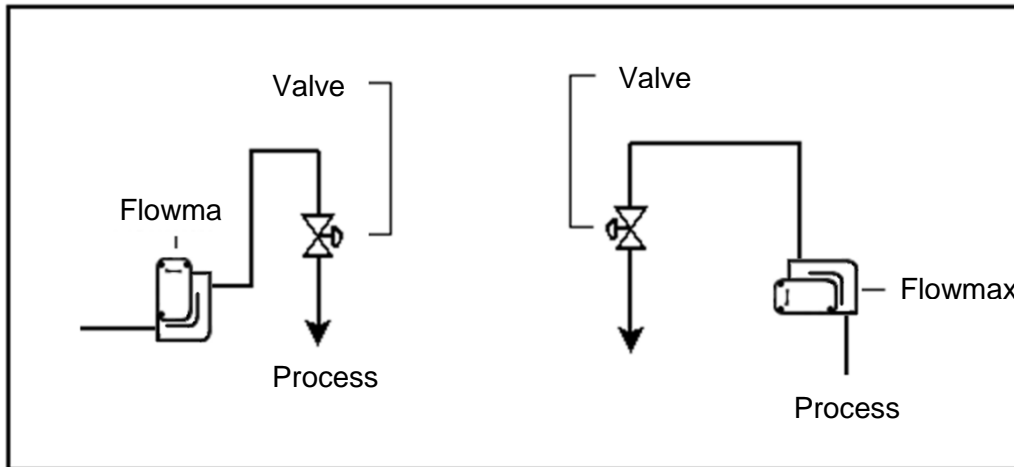


Figure 4: Mounting possibilities

For applications with a “clean design” for which it is necessary to completely drain the pipe system, we recommend mounting the flow meter in the vertical position. Residual liquid may remain inside the device if flow meter is mounted horizontally.

Vibrations or mechanical forces may decrease measuring accuracy. So if there is due to vibration or mechanical movements it is necessary to fix Flowmax 242i additionally, the instrument can be fixed on the lateral slot.

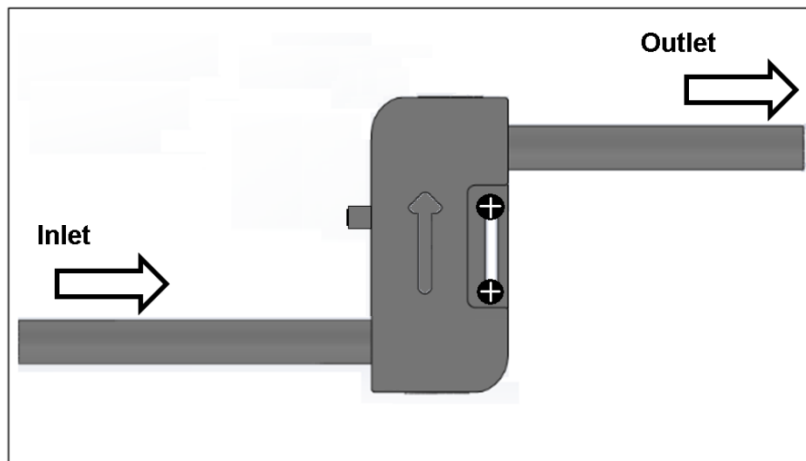


Figure 5: Fixing Flowmax 242i

Flowmax 242i must be installed without mechanical tensions on the existing pipe system. The flow meter may be damaged if there is tension on the existing pipe system.

Non-compliance of the installation instructions may result in tearing of the housing, liquid may leak out.



IMPORTANT!



WARNING!

2.3 Electrical wiring

The dongle must be connected before the Flowmax 242 is started. It must never be screwed under power.

The dongle-check is performed when the device is started:

- If no dongle is detected the display will show “No Dongle”
- If a dongle has been recognized but not a measuring pipe it shows “No Pipe”
- If dongle and measuring pipe were detected but do not match it shows “Wrong Dongle”

In all these messages, the device can not show the menu, can not measure any flow or empty pipe. Everything is blocked as long as Flowmax 242i starts with a valid measuring pipe and dongle.

If dongle and measuring pipe fit together the usual field with current flow and counter is displayed and the menu is normally accessible.



WARNING!

Serious injury or death from electric shock may occur if wiring, installation, disassembly or remove of wires is performed while electrical power is energized.

Always shut off or disconnect electrical power at service panel and lock switch or breaker and tag to prevent energizing electrical power during work or while Flowmax 242i is not assembled and installed.



WARNING!

Wiring installation, disassembly and removal must be performed by qualified persons experienced and knowledgeable about electrical work.



Figure 6: Pin code: Connection plug / socket for 5-pin version

Connector cable pin configuration defined by manufacturer.
The outputs may be re-programmed for specific applications.

Pin	Function	Description
1	L+	Voltage supply: 18...30 VDC
2	Pulse output Q1 alternative: 1. Empty-pipe output 2. Dosing output 3. Upper or Lower Limit-output 4. Negative flow	Digital Output Q1 Freely adjustable ranging from 0.1 to 3000 ml/pulse in 0.1 ml/pulse steps, npn-Transistor, max. load 30V/100mA. Max. Voltage must be less than the supply voltage Configurable output of 0V or 24V when pipe is empty. Configurable output of 0V or 24V Configurable output of 0V or 24V when reaching upper or lower limit Configurable output of 0V or 24V when liquid flows in negative direction
3	GND	Ground: 0 V
4	Communication	Communication interface A
5	Analog output QA	4...20mA; 0...20mA Example: 0l/min => 4mA 36l/min => 20mA Empty pipe Alert => 3.5mA (4-20mA, depending on the configured limits)

8-pin plug with 1-wire communication:



Figure 7: Pin code: Connection plug / socket for 8-pin version
Connector cable pin configuration defined by manufacturer.
 The outlets may be re-programmed for specific applications.

Pin	Function	Description
1	24 VDC	Voltage supply: 18...30 VDC
2	Digital output Q1 Functions 1. Pulse output 2. Empty pipe output 3. Dosing output 4. Upper or Lower Limit output 5. Negative flow	Digital output Q1 Configurable npn-or pnp transistor, max. load 100mA*. Max. voltage must be less than the supply voltage Freely adjustable ranging from 0.1 to 3000 ml/pulse in 0.1 ml/pulse steps, Configurable output of 0V or 24V when pipe is empty. Configurable output of 0V or 24V Configurable output of 0V or 24V when reaching upper or lower limit Configurable output of 0V or 24V when liquid flows in negative direction.
3	GND	Ground: 0 V
4	Digital output Q2 Functions: 1. Empty pipe output 2. Dosing output 3. Pulse output 4. Upper or Lower Limit output 5. Negative flow	Digital output Q2 Configurable npn- or pnp-transistor, max. load 100mA*. Max. voltage must be less than the supply voltage Configurable output of 0V or 24V when pipe is empty. Configurable output of 0V or 24V Freely adjustable ranging from 0.1 to 3000 ml/pulse in 0.1 ml/pulse steps. Configurable output of 0V or 24V when flow reaches upper or lower limit. Configurable output of 0V or 24V when liquid flows in negative direction.
5	Analog output QA	4....20mA; 0....20mA Example: 0l/min => 4mA 6l/min => 20mA (depending on diameter Empty pipe Alert => 3.5mA
6	Communication and Set offset	Communication interface The Offset is set by a signal of 0V for more than 2 seconds . All the other time it has to be high resistance.
7	No function	Not used.
8	Shielding	EMC safety

*it applies: for Q1 + Q2 ≤ 100mA



Attention: Only operate the flow meter Flowmax 242i within the operating limits stipulated on the product label and the operating manual / data sheet. Use of the Flowmax 242i outside these conditions will lead to overloads which cause permanent damage.



IMPORTANT!

3. Commissioning

NOTE: If Flowmax 242i is used for a fluid other than water the "basic trim" has to be carried out during commissioning. Therefore the device has absolutely be filled with medium.

The basic trim can be done on the device display. During the adjustment the medium may not flow as it affects the function.

NOTICE!

3.1 Operation

If Flowmax 242i is used as a volume flow meter for water or water-like liquids it will not require on-site calibration. Parameters for water are calibrated at the factory. The Flowmax 242i may also be ordered with customized settings, but customized settings must be requested when Flowmax 242i is ordered.

If necessary, e.g. if viscosity and/or speed of sound deviate significantly from water, the pre-set parameters can be adjusted via the display. It is always necessary to adjust the manufacturer pre-set parameters when using the Flowmax 242i as a dosing device according to section 3.2 (Dosing 1. Flowmax 242i as a dosing device). Adjusting the manufacturer pre-set parameters requires a display.

NOTICE!

The following parameters may be changed to settings suitable for the individual conditions:

- Digital output Q1, function and behavior
- Analog output QA, function and behavior
- Flow range, for which shall apply 4...20 mA
- Pulse value
- Creeping suppression

3.1.1 Display and user menu

Flowmax 242i is equipped with a display to visualize actual measurement values and to change parameters of the flow meter. Menu navigation and parameter changes are controlled by the four keys on the keypad.

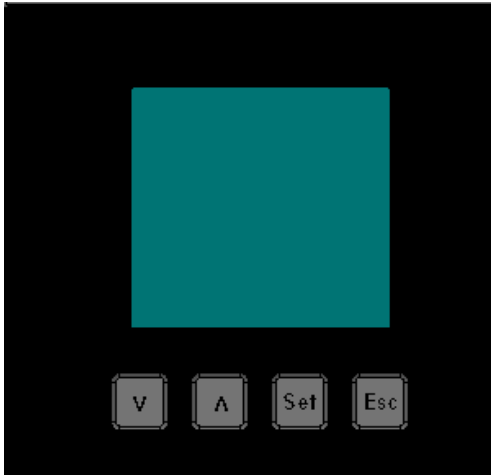


Figure 8: Operating with the key pad

Press the “Set” key to display the main menu. Different menu options can be selected by using the two arrow keys.

To enter e.g. analog limits “Analog output – Upper limit” use the arrow keys to change values and press “Set” to confirm. To switch back to the last menu level press the “Esc” key. As soon as the operator tries to change values the user will be prompted to enter a password. Password protection is used to ensure changes to values or configurations are done by authorized personnel. The default password for Flowmax 242i is **41414**. The user level will remain active for 5 minutes after the last press on any button.

The Password should only be shared with personnel authorized to make changes to setting.

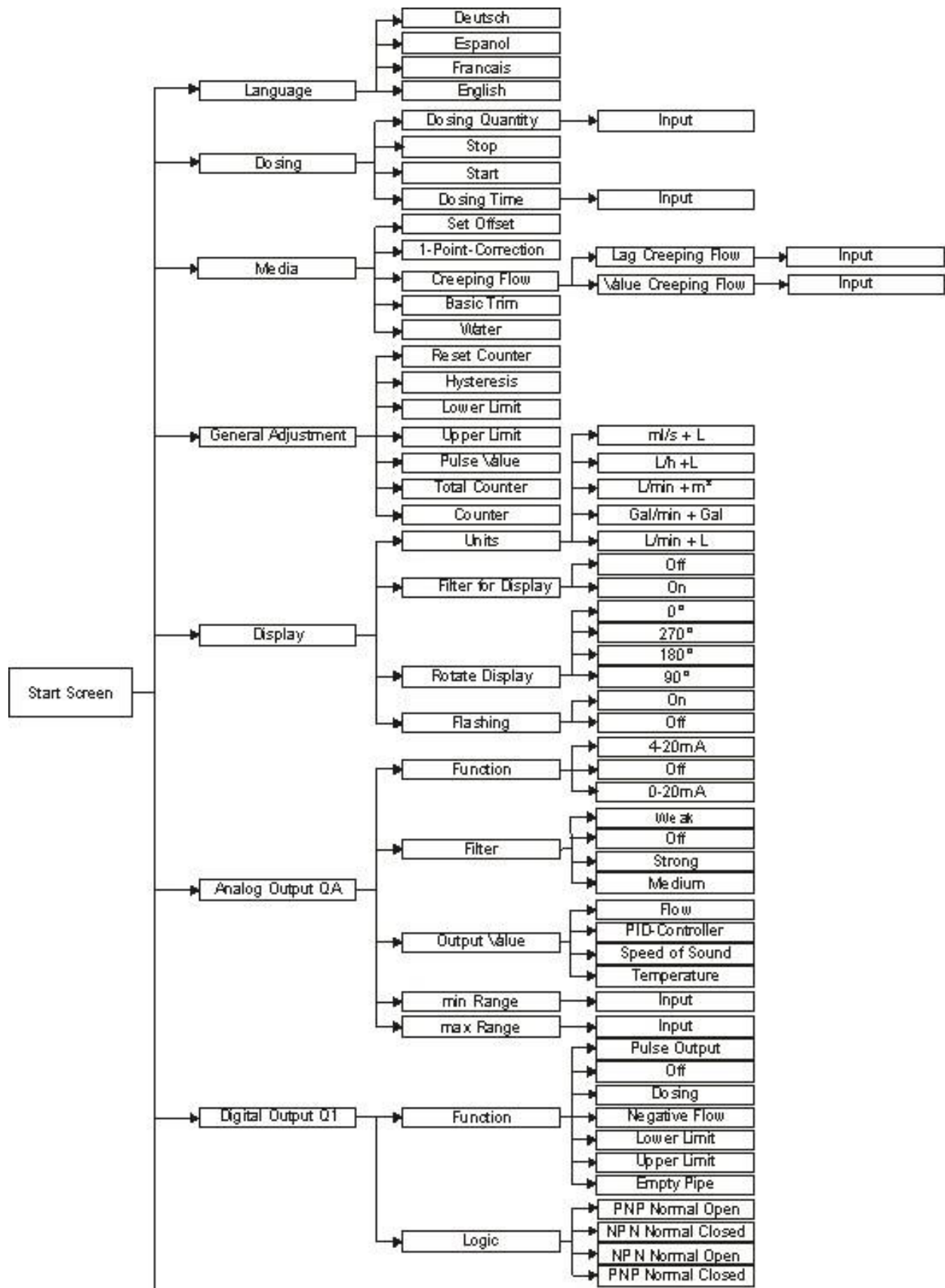
NOTE:

Always the first parameter of the menu appears in the display. This need not be the adjusted enabled parameter. The enabled parameter appears inverted and is possibly visible by scrolling.



IMPORTANT!

NOTICE!



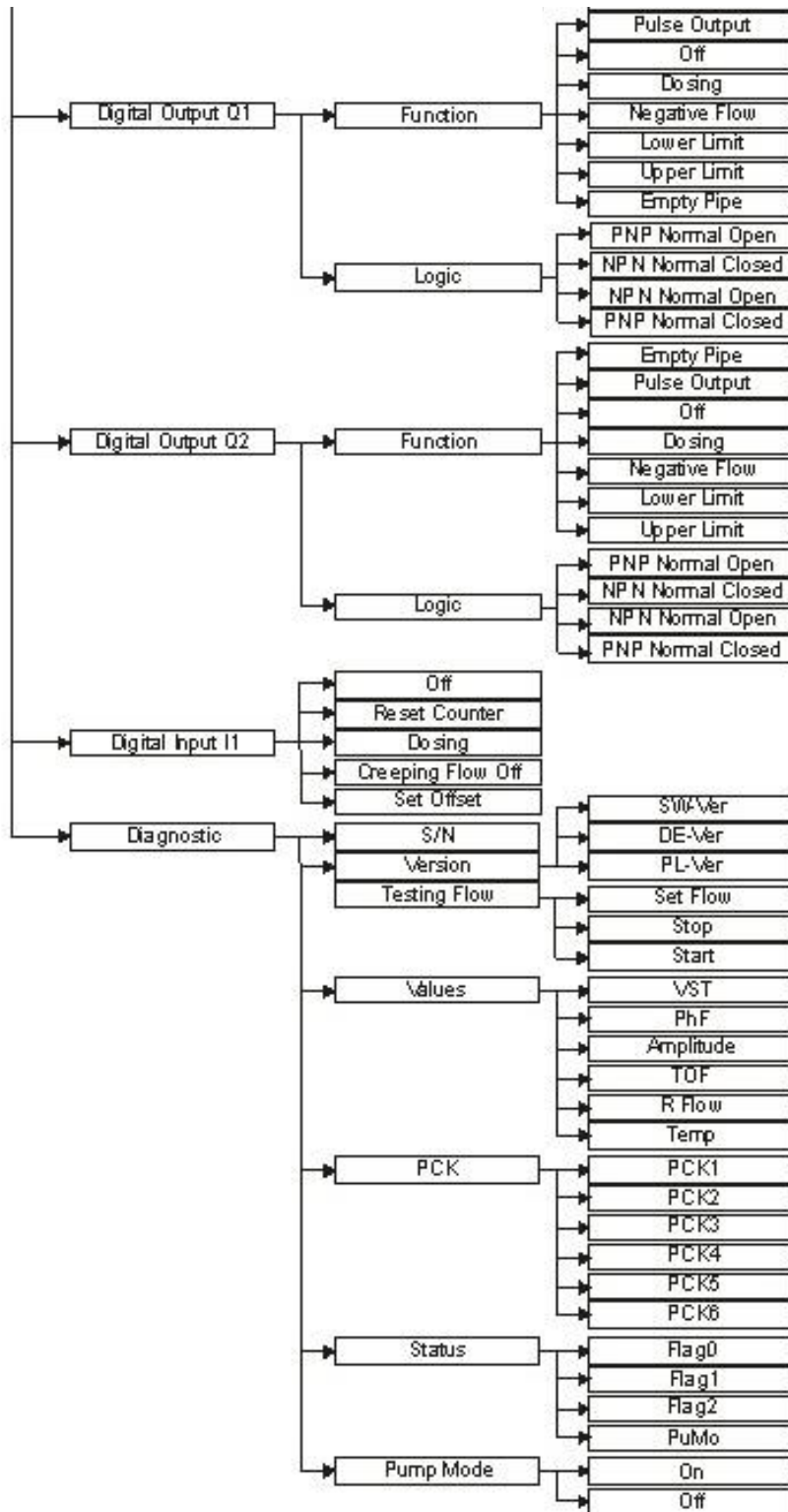


Figure 9: Menu structure

3.2 Functionalities of flow meter and default settings

3.2.1 Language

The language of the display can be changed. Available languages are English and German.

3.2.2 Dosing

The Flowmax 242i can be configured for manually dosing by choosing the dosing function via the user display. The Volume “Dosing Batch” and the “Dosing Time” are freely adjustable. When the “Dosing Time” is set to zero, the timer control is inactive. A dosage can be started and stopped with the menu function keys “Start” and “Stop”.

Setting range “Dosing Batch”:	0 – 3500 Liters
Setting range “Dosing Time”	0 –30000 Seconds
Default setting “Dosing Batch”:	0 Liters
Default setting “Dosing Time”:	3 Seconds

3.2.3 Media

Flowmax 242i comes with a medium matrix with up to 8 interpolation values. Different media can be managed in the sub menu “Media”. By using the sub menu point “Correction” it is possible to correct the flow measurement in percent. Example of operation see appendix.

3.2.4 Set Offset

In the sub menu “Set Offset” it is possible to set the actual offset of the flow meter. Use this function only when Flowmax 242i is completely filled with liquid, and there is no flow. If the offset is set while flow is present or when the pipe is empty it will cause an offset drift what results in a faulty measurement. Example of operation see appendix.

A small offset change, e.g. caused by variable temperatures, is automatically done by the flow meter. It is also possible to set the offset via a signal of **0V for more than 2 seconds at PIN 6**. All the other time it has to be high resistance..

3.2.5 Creeping suppression

The creeping suppression excludes flow measurements that result from convection in a narrow band around zero, even with a closed valve. At the factory, the creeping suppression is set at a standard value in relation to the cross-section of the flow meter. Changes to a smaller value of the parameter may cause an offset drift what results in a faulty measurement.

There are higher tolerances below the standard default settings, see also section 5.2 measurement errors!

Setting range:	0.0...3 l/min, in 0.006 l/min steps
Default settings:	0.0025 l/min for DN 3
	0.024 l/min for DN 5
	0.09 l/min for DN 7

The creeping suppression works with a hysteresis of - 25%.

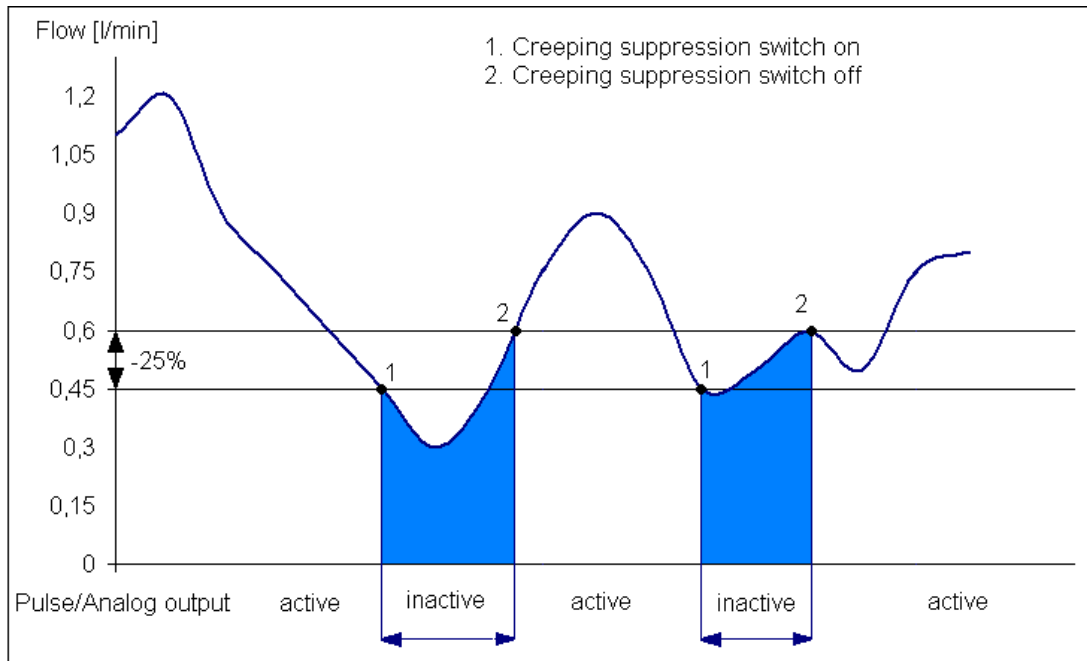


Figure 10: Function of the creeping suppression illustrated with 0.6 l/min

Example: Creeping suppression = 0.6 l/min

If the flow rate is lower than 0.45 l/min the pulse output/analog output becomes inactive. If the flow rate exceeds 0.6 l/min a pulse is output again and added to the totalizer. Similarly, a value is transmitted to the analog output again.

3.2.6 Basic Trim

The “Basic Trim” function insures that the flow meter is conforming to the media specific characteristics. To execute this function, Flowmax 242i runs a self-diagnostic function which optimizes all important parameters. This process lasts approximately 1 minute.

IMPORTANT!

To make sure the basic trim is correctly done, the flow meter has to be filled with liquid without a flow.

When there is an error detected while performing the basic trim function, the display shows “Error”. After successfully finishing the basic trim function, the display will show “Done”

NOTICE!

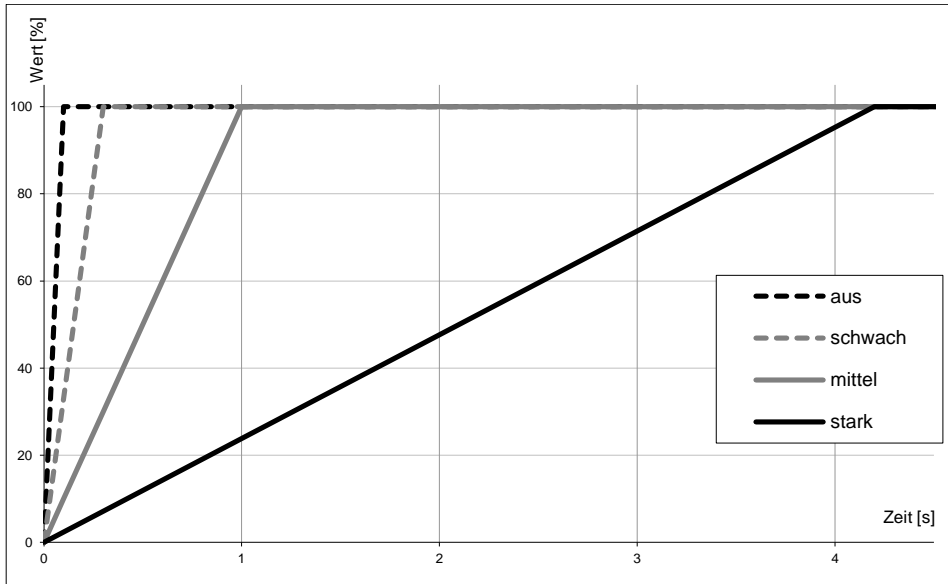


IMPORTANT!

3.2.7 Filter

The function “Filter“ averages the analog output signal. Possible settings: Soft, Medium, Strong, Off

The analog output signal reacts faster to signal changes when average determination is set to “soft”. Whereas the analog output signal reacts slower when average determination is set to “strong”.



Filter	100%
off	16ms
soft	0,3s
medium	1s
strong	4,2s

3.2.8 Units

Flowmax 242i is able to show actual flow or the volume in different units. Following units can be selected:
 ml/s + l , Gal/min +Gal , l/min + l , l/min + m³.

The first letters correspond to the unit of the flow value. The letters after the + correspond to the unit of the volume value.

3.2.9 Reset Counter

The volume counter of Flowmax 242i can be reset. Example of operation see appendix.

IMPORTANT!

Once reset, counter values cannot be restored. After a reset the counter works normally.

3.2.10 Diagnostic

The sub menu “Diagnostic“ shows the software/hardware version and other helpful values for analysis. Actual values and the instrument’s present status are important to analyze the measurement or failure by the manufacturer service.



3.2.11 Analog output QA

The analog output is available as current output 4-20mA or 0-20mA. This is selected with the purchase order. As a standard it comes with current output 4-20mA. It can also be switched off by the device menu.

The current output ranges from 0 to 22.6mA measuring the flow rate or the condition of the flow measurement.

The values here signify for 4-20mA configuration:

- 20 mA the upper limit of the relevant measurement
- 4 mA the lower limit of the relevant measurement
- 3.5 mA empty pipe

Upper and lower limit parameters can be set within the type-specific measurement of the device. By default, zero flow is set at 4 mA and the maximum flow is set at 20 mA.

Set point ranges: 0-20mA, 4-20mA, off
 Output value: Flow, Temperature

When current output is used, the load must not be higher than 500Ohm. A higher load prevents the device from providing the maximum current of 22.6mA.

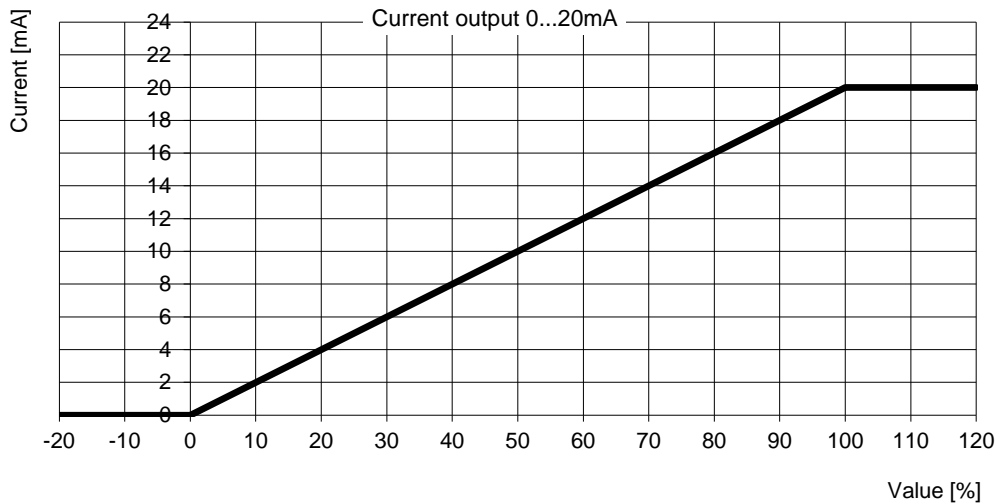


IMPORTANT!

Characteristic curves analog output

- 0 - 20mA

For the following graphic “min Range” is used for 0% and “max Range” is used for 100%.

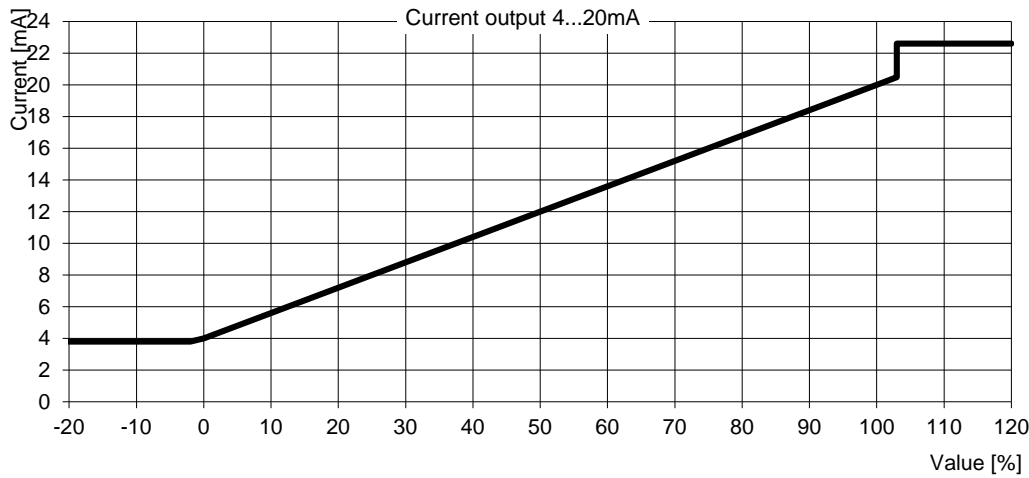


Value	Current [mA]
Smaller 0%	0
0% (min Range)	0
Between 0% and 100%	Linear interpolation from 0 to 20 mA
100% (max Range)	20
Bigger 100%	20

Figure 11: Characteristic curve 0 to 20mA

- **4 - 20mA**

For the following graphic “min Range” is used for 0% and “max Range” is used for 100%.



Value	Current [mA]
Empty pipe	3.5
Smaller -1.2%	3.8
Between -1.2% and 0%	Linear interpolation from 3.8 to 4mA
0% (min Range)	4
Between 0% and 100%	Linear interpolation from 4 to 20mA
100% (max Range)	20
Between 100% and 103%	Linear interpolation from 20 to 20.5mA
Bigger 103%	22.6

Figure 12: Characteristic curve 4 to 20mA

Min Range

Here, the value is set at the 0 or 4 mA to be output.

Setting range: 0 to 8000ml/s in steps of 0.01

Default setting: 0 ml/s

Max Range

Here, the value is set at the 20 mA to be output.

Setting range: 0 to 8000ml/s in steps of 0.01

Default setting: max Flow of the flowmeter (depending on diameter)

DN 3: 17 ml/s

DN 5: 50 ml/s

DN 7: 100 ml/s

3.2.12 Pulse value

The pulse value determines the flow volumes for which an output pulse will be emitted.

Choose a configuration which will neither exceed the maximum output frequency of the Flowmax 242i (10kHz) nor the maximum input frequency of the control. If the maximum frequency is exceeded the Flowmax 242i will not output pulses correctly.

Example: 2.0 ml/Pulse

This means: a pulse is emitted every 2.0 ml.

Setting range: 0.1...3000.0 ml/Pulse, in 0.1 ml/Pulse steps

Default setting: 1.0 ml/Pulse

Flow ml/s	Pulse value ml/Pulse	Frequency Hz	Period s	Duration of the pulse	
				s	ms
1	1	1	1	0,5	500
100	1	100	0,01	0,005	5
1000	0,1	10000	0,0001	0,00005	0,05
100	10	10	0,1	0,05	50
0,5	10	0,05	20	1	1000

In the last case every 20 seconds, a pulse of 1 second duration is put out.

IMPORTANT!

If Dosing Time =0 the time switch-off is inactive.



IMPORTANT!

3.2.13 Digital outputs

All outputs switch over to high resistance when the supply is smaller than 16V. When overload or short circuit is detected the digital outputs are switched off after 100µs for a period of 2s. When time is up the outputs get applied again.

Empty pipe output

	Empty pipe	Filled, no flow
0V normal closed	High resistant	0V
0V normal open	0V	High resistant
24V normal closed	High resistant	24V
24V normal open	24V	High resistant

Pulse output

	Empty pipe	Filled, no flow	Filled, flow
0V normal closed	0V	0V	High resistance
0V normal open	0V	0V	High resistance
24V normal closed	High resistance	High resistance	24V Pulses
24V normal open	High resistance	High resistance	24V Pulses

Upper limit output

	Below lower limit	Between the limits	Above upper limit
0V normal closed	High resistance	High resistance	0V
0V normal open	0V	0V	High resistance
24V normal closed	High resistance	High resistance	24V
24V normal open	24V	24V	High resistance

Lower limit output

	Below lower limit	Between the limits	Above upper limit
0V normal closed	0V	High resistance	High resistance
0V normal open	High resistance	0V	0V
24V normal closed	24V	High resistance	High resistance
24V normal open	High resistance	24V	24V

Dosing output

	Startup of device	While dosing	Before/after dosing
0V normal closed	High resistance	High resistance	0V
0V normal open	High resistance	0V	High resistance
24V normal closed	High resistance	High resistance	24V
24V normal open	High resistance	24V	High resistance

IMPORTANT!

When using the dosing function the output should not be configured as normal closed!
 If the dosing output is configured as normal closed the valve will stay open after the dosing batch.



IMPORTANT!

3.2.14 Digital output Q1

Digital output Q1 may be used as pulse output, empty pipe detection, for switching dosing valve or limit control. By using the Display the user can switch between npn and pnp-transistor logic. In case of inductive load a diode has to be connected antiparallel to the coil.

Example 1: Flowmax 242i via npn, external relay

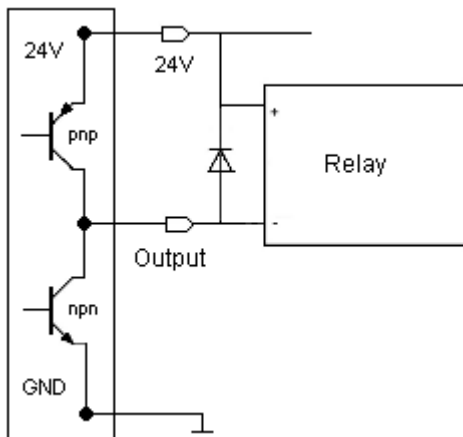


Figure 13: Connecting Output Q1 to relay

Setting area: off, pulse output, empty pipe, dosing output, lower limit, upper limit, negative flow

Example 2: Flowmax 242i via pnp, external counter e.g. PLC

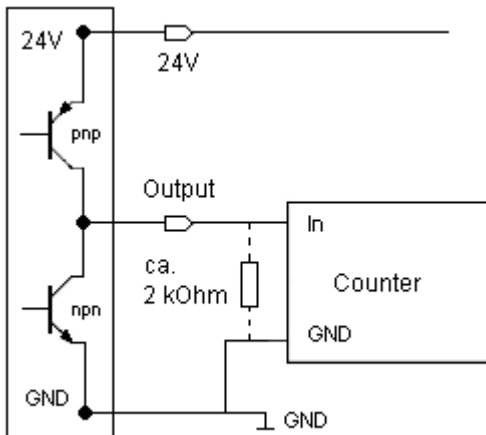


Figure 14: Connecting output Q1 to counter

Setting area: off, pulse output, empty pipe, dosing output, lower limit, upper limit, negative flow

IMPORTANT!

Inductive load on the digital outputs without an installed diode may cause damage on the Flowmax 242i electronics.



IMPORTANT!

3.2.15 Dosing function

Dosing controlled in different ways:

1. Flowmax 242i as dosing device (dosing control via Flowmax 242i)

Flowmax 242i controls the complete dosing function. The dosing quantity (e.g. 400 ml) is pre-set in the Flowmax 242i via the display. Dosing starts, as soon as the digital input is wired to 24V, e.g. via a pushbutton. Flowmax 242i will open the dosing valve via the output configured for it. When the pre-set dosing quantity is released, the dosing valve is closed via the above output. The dosing procedure can also be started and stopped by using the dosing user menu. The second output can be used independently for signaling empty pipe, limit control or flow direction.

2. Flowmax 242i as flow meter (dosing control via dosing equipment)

The dosing equipment controls the entire dosing function. The dosing quantity is fixed in the dosing equipment control during commissioning by pre-selecting the meter pulses. Dosing starts, when the relevant pushbutton of the dosing equipment is pushed. The control will open the dosing valve. Once the button is pushed Flowmax 242i will send a voltage pulse to release the metered volume (e.g. per 1ml). Once the pre-selected metered volume is released, the control closes the dosing valve. In this case, output 1 is used to send out pulses.

The customer has to provide an emergency stop and an overfilling stop to prevent hazardous situations. Both functions must perform safety shut down of pumps and closing of valves.



WARNING!

3.3 Overview of default settings

Function	Default settings
Digital output Q1	Pulse output as 24V normal open
Current output QA	Flow as 4-20mA signal 20mA -> 1 l/min at DN 3 3 l/min at DN 5 6 l/min at DN 7
Pulse value	1 ml/Pulse
Creeping suppression	0.0025 l/min at DN 3 0.024 l/min at DN 5 0.09 l/min at DN 7

3.4 General Information

Please check the following before powering the flow meter for the first time:

- Check the electrical connections and cable allocations.
- Check whether the belonging to the measuring pipe dongle is plugged in
- Check the installation position of the flow meter. Is the direction of the arrow on the housing/name plate and the actual flow direction in the pipe congruent?
- Is the measurement pipe completely filled with fluid?
- Check the back pressure in the system.
- Is the green cable from the electronic being connected to the measuring channel?



IMPORTANT!

When everything has been checked, switch on power. After 30 minutes with power running the measuring device reaches the maximum accuracy.

Flowmax 242i is operational!

3.5 Function of Dongle

- a) If no dongle and no measuring pipe is connected in the display appears "No dongle"
 - ⇒ Connect the measuring pipe and the belonging to the measuring pipe dongle to the electronics
- b) If no measuring pipe is connected in the display appears "No pipe"
 - ⇒ Connect the measuring pipe to the electronics
- c) If dongle and measuring pipe don't belong to each other in the display appears "Wrong dongle"
 - ⇒ Connect the belonging to the measuring pipe dongle to the electronics

4. Exchange of flow meter

- **Switch off power before disconnecting the electrical connections or screw the dongle!**
- **Wiring installation, disassembly and removal must be performed by qualified persons experienced and knowledgeable about electrical work.**
- **Serious injury or death from electric shock may occur if wiring, installation, disassembly or remove of wires is performed while electrical power is energized**

- Please note that after replacing the flow meter
 - a) Specific programming of the previous flow meter should be noted and programmed to the new flow meter
 - b) when using the dosing function, set a quantity



WARNING!

Repair, hazardous substances

Before sending the flow meter Flowmax 242i for repair, the following precautions must be taken:

- **Clean all process chemicals from the device. Fully rinse the flow path. Please pay close attention to the process fittings. All media must be removed before returning. This is particularly important, if the medium to be measured is health hazardous.**



WARNING!

Devices judged to be insufficiently cleaned will be returned to sender. No inspection of device will be done until proper cleaning is completed by user.

Costs due to inadequate cleaning of the instrument for possible disposal or injury (burns, etc.) will be charged to the sender of the meter into account.

- **With the flow meter send a detailed report describing the failure, the application and the physical-chemical properties of the medium parameters. (e.g. a decontamination declaration).**



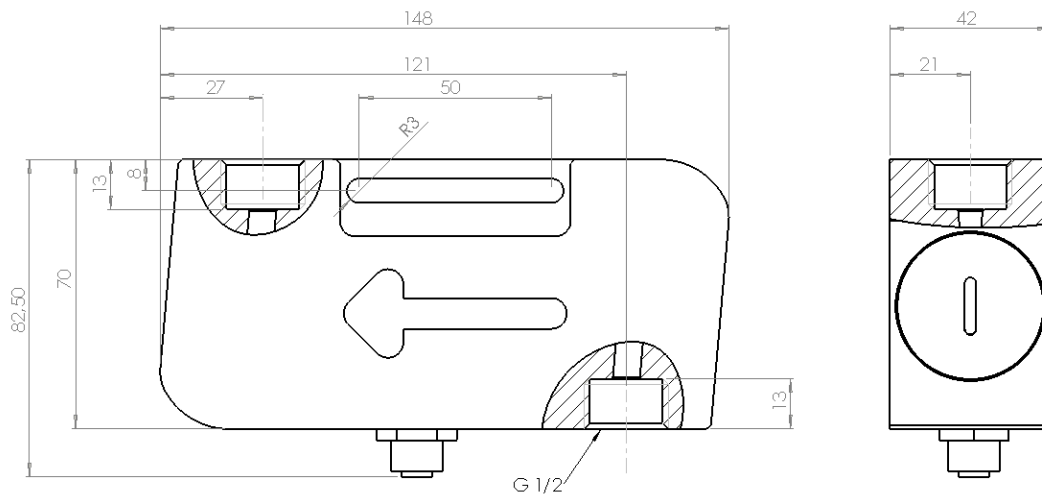
WARNING!

In order to be able to process your repair order quickly and smoothly it is important that you provide a technical contact person including phone and fax number as well as e-mail address.

5. Technical specifications

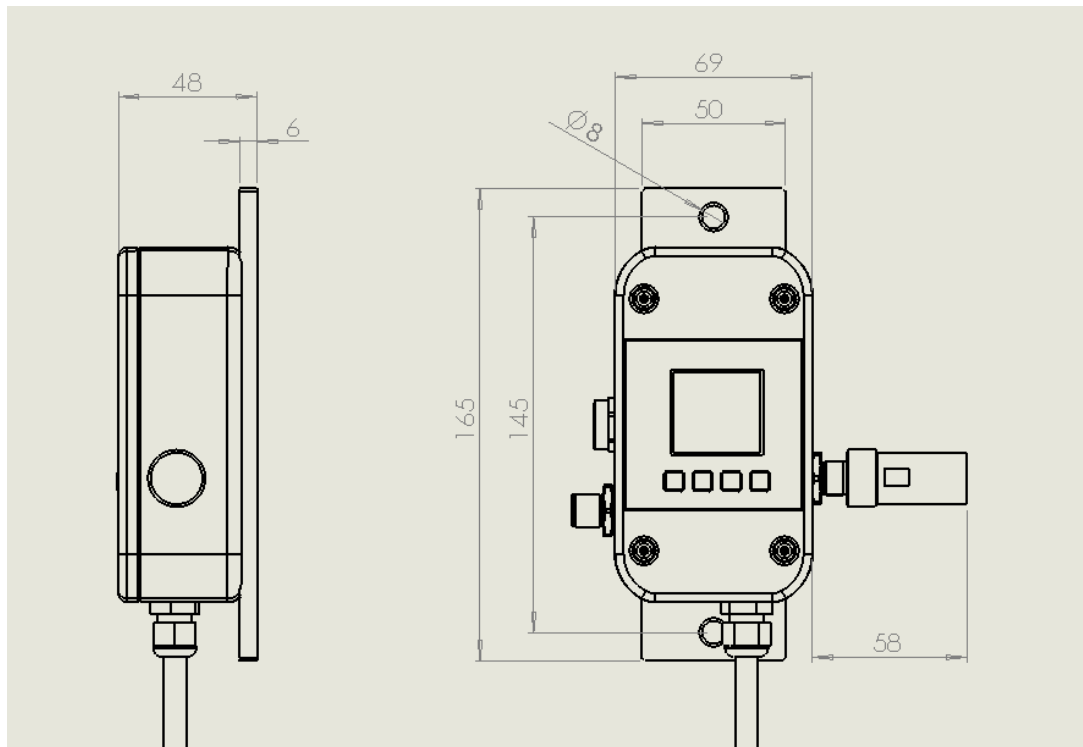
5.1 Dimensions and weight

Dimension Flowmax 242iM (Measuring Channel)



Nominal diameter	Height [mm]	Depth [mm]	Width [mm]	Weight [g] PE-HD
DN 3 / 5 / 7	148	82,5	42	390

Dimension Flowmax 242iE (Electronics)



Height [mm]	Depth [mm]	Width [mm]	Weight [g] PSU
165	48	42	340

5.2 Technical specifications

Measuring Pipe Housing (Flowmax 242iM)

Nominal diameters	DN 3, 5, 7
Mechanical Connection inner thread	G1/2
Medium temperature	0...+50°C
Protection class	IP 65
Pressure nominal	7 Bar
Material	PE-HD (Polyethylene)

Flowmax 242iM has the USP Class VI approval and is resistant to gamma irradiation.

Dongle (Flowmax 242iD)

Connection	Plug 5 pins
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Electronics (Flowmax 242iE)

Power supply	18...30VDC
Power input	at 24VDC = 3.6W
Connection	Plug 5 pins, option plug 8 pins
Ambient temperature	0...+50°C
Storage temperature	0...+50°C
Current output QA	0/4...20 mA, Lower- and upper limit adjustable, Ground connected to supply ground Error Signal according to NAMUR NE43 with 4...20mA
Digital output Q1	via transistor npn- and pnp-logic max. 30V/100mA output voltage according to DIN 19240: ≤5V means LOW ≥12V means HIGH Short cut resistant Frequency 0...10kHz
Data interface and Set offset	Data interface for parameterize The Offset is set by a signal of 0V for more than 2 seconds . All the other time it has to be high resistance
Measuring deviation	± 2% of reading ± 3mm/s, option ± 1% of reading ± 3mm/s Reference conditions (VDE/VDI 2642)
Measuring range	0.0025 – 1 l/min DN 3 0.024 – 3 l/min DN 5 0.09 – 6 l/min DN 7
Repeatability:	0.5%

Connection to the measuring pipe via a green cable, length 0,5, 1,5 or 2,0m.

The measuring system Flowmax 242i meets the general EMC immunity requirements according to CE, EN 61000-6-3, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6. It is in conformity with the requirements of the EC directives and has the CE label.

Possible error text Flowmax 242i

Display text	Description	Behavior
No Dongle	No dongle is detected	Connect dongle
No Pipe	A dongle has been recognized but no measuring pipe	Connect measuring pipe
Wrong Dongle	Dongle and measuring pipe were detected but do not match	Connect measuring pipe and dongle that match
Empty Pipe	When "Empty Pipe" is detected, no flow measurement.	Display flashing + text
Low Voltage	When power supply is less than 16V the outputs are inactiv.	Display flashing + text
Short Circuit	When over load of the digital outputs is detected (>100mA), outputs are inactive.	only text
Lower Limit	When the flow is less than an adjustable limit and the output is configured for limit control. At the same time the configured output is switched.	only text
Upper limit	When the flow is more than an adjustable limit and the output is configured for limit control. At the same time the configured output is switched.	only text
Sonic Speed	Actual sonic speed out of specified value. Run basic trim!	only text

6. Accessories**Flowmax connection socket**

Flowmax connection socket is used to power and connect Flowmax 242i to an external control unit.

Ordercode 507321 (Socket 5 pins)

Ordercode 800845 (Socket 8 pins)

Flat sealing EPDM (11 x 19 x 2) USP ClassVI: 801383

Nozzle for hose (all USP ClassVI):

DN3 PEHD 908998

6mm PVDF 908976

8mm PVDF 908978

7. Shipment

- Flowmax 242iE (Electronic)
- Flowmax 242iM (Measuring Pipe)
- Flowmax 242iD (Dongel)

Appendix

Examples of operation:

Enter Password

Key	Display picture
Set	Password
4 x ^	40000
Set	X0000
^	X1000
Set	XX000
4 x ^	XX400
Set	XXX00
^	XXX10
Set	XXXX0
4 x ^	XXXX4
Set	

Set Offset

Use this function only when Flowmax 242iM is completely filled with liquid, and there is no flow. If the offset is set while flow is present or when the pipe is empty it will cause an offset drift what results in a faulty measurement.

Set	Dosing Media General Adjustment Display Analog Output QA
^	Language Dosing Media General Adjustment Display
Set	Media Set Offset
Set	Media Set Offset Start ?
Set	Media Set Offset Start ? Done

1-point correction

With the 1-point correction, the meter is calibrated to an operating point. Given an arbitrary amount of volume is filled into a container and measured with a weight. Attention: subtract the weight of the container.

With inclusion of the density of the medium, the volume (volume = mass / density) is obtained. This has to be compared with the meter display.

Shows the meter for instance 2% more than determined by the scale a value of -02.0% must entered for the 1-point correction.

Set Dosing
Media
General Adjustment
Display
Analog Output QA

Λ Language
Dosing
Media
General Adjustment
Display

Set **Media**
Set Offset

V **Media**
1-Point-Correction

Set **Media**
1-Point-Correction
-00.0%

Setting the sign
Setting the value

Set **Media**
1-Point-Correction
Done

To enable the correction back to delivery, a correction of 00.0% is to be entered.

Display rotate 90°

Set	Dosing Media General Adjustment Display Analog Output QA
V	Media General Adjustment Display Analog Output QA Digital Output Q1
Set	Display Units
2 x V	Display Rotate Display
Set	Display Rotate Display 0°
3 x V	Display Rotate Display 90°
Set	Display Rotate Display 90° Done

To return your display to its delivery, choose Rotate Display 0°.

Reset Counter

Set	Dosing Media General Adjustment Display Analog Output QA
Set	General Adjustment Reset Counter
Set	General Adjustment Reset Counter Start?
Set	General Adjustment Reset Counter Done

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