

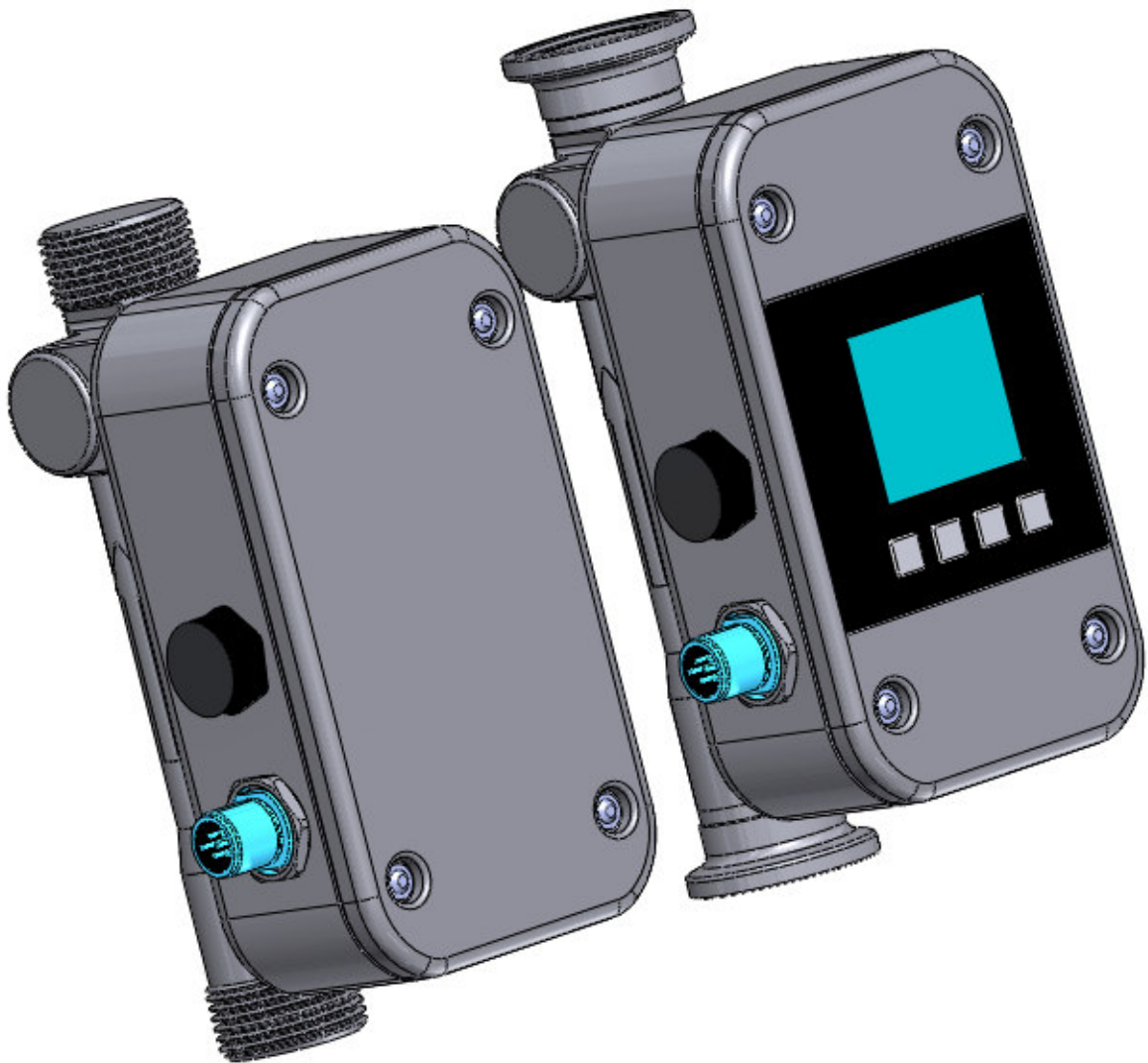
BA 018E/FM44i/10.25

Valid starting from  
Hardware V 2.1  
Software V 1.29

# Flowmax<sup>®</sup> 44i

## Ultrasonic flow metering / dosing device

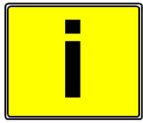
Operating manual



## 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 44i 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 flowmeter Flowmax 44i may only be used for measuring the flow of pure, homogeneous liquids.
- The Flowmax 44i is not intended for use in medical applications.
- The volume flowmeter Flowmax 44i 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 flowmeter. Conversions and/or changes to the flowmeter 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

- Mounting, electrical installation, commissioning and maintenance of the measuring device may only be carried out by trained specialist personnel who have been authorized to do such work by the system operator. The qualified personnel must have read and understood these operating instructions and follow them.
- The person carrying out the installation must ensure that the flow meter is connected correctly in accordance with the electrical connection diagrams.



**WARNING!**

### Disposal

In accordance with Directive 2002/96/EC of the European Parliament and of the Council of January 27, 2003 on waste electrical and electronic equipment and the national law on the marketing, return and environmentally friendly disposal of electrical and electronic equipment (Electrical and Electronic Equipment Act - ElektroG) of March 16, 2005, we commit ourselves to take back this device, which we placed on the market after August 13, 2005, free of charge at the end of its useful life and to dispose of it in accordance with the above-mentioned directives. As this appliance is used exclusively for commercial purposes (B2B), it may not be handed in to public waste disposal services.



### Technological progress

The manufacturer reserves the right to adapt technical data to technical development progress without prior notice. Please contact MIB for information on the current status and any updates of these operating manual.

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## 1. Planning information

### 1.1 Areas of application

The flow measurement device Flowmax 44i is designed to measure dynamic flow in pipes and tubes. This flowmeter is suitable for liquids only. The Flowmax 44i is used in

- 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 44i 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

### 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.

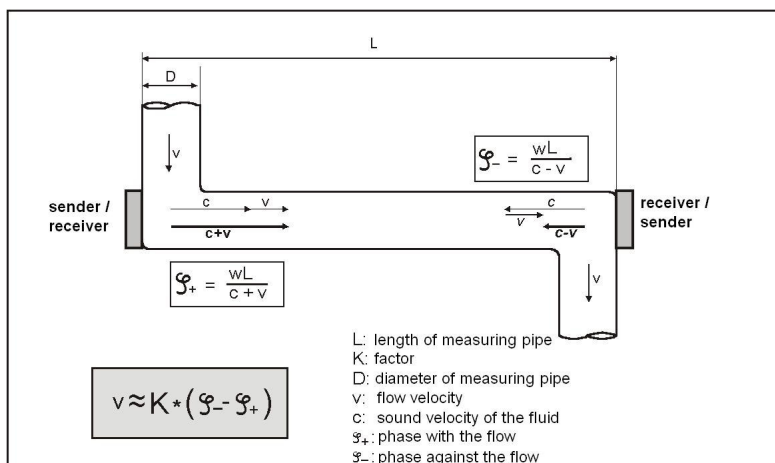


Figure 1: Presentation of the principle of ultrasonic flow measuring

### 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 67.

Flowmax 44i 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 44i meets the safety requirements concerning the Protective Extra Low Voltage directive according to EN 50178, SELV, PELV.

## 2. Assembly and installation

### 2.1 Installation instructions

The housing of Flowmax 44i is labeled with an arrow symbolizing the direction of the flow 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!**

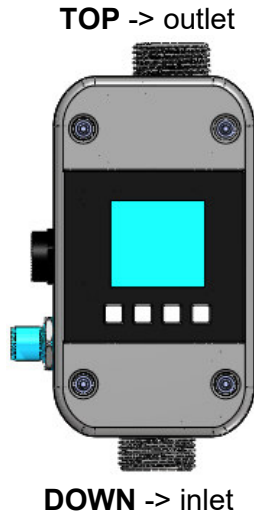


Figure 2: Installation position of Flowmax 44i

For fastest possible bubble detection it is important to keep the pipe distance from tank to Flowmax 44i 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 44i as close as possible to the dosing valve, as soft pipes change 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 44i to avoid cavitations. Insure all mechanical connections are tight. Absolutely do not use Teflon tape for sealing!

**NOTICE!**

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

When using pumps, Flowmax 44i must be installed behind the pump in the flow direction, on the pressure side, to ensure that sufficient pressure is available. The maximum pressure rating of the Flowmax 44i must be taken into account.

For correct volume flow measurement, straight and undisturbed inlet and outlet sections must be maintained for Flowmax 44i. Depending on the nominal diameter, these are at least:

Nominal diameter	DN 10	DN 15	DN 20	DN 25
Inflow distance	10cm 4"	30cm 12"	40cm 16"	40cm 16"
Outflow distance	0cm	5cm 2"	10cm 4"	20cm 8"

Always make sure that the maximum torque of the nuts for the hydraulic connections is not exceeded. Use the delivered seals and the maximum torque depending on the diameter:

Nominal diameter	DN10 3/8"	DN15 1/2"	DN20 3/4"	DN25 1"
Inch thread, torque:	2Nm 1.5 ft-lbs	3Nm 2.2 ft-lbs	4Nm 3.0 ft-lbs	6Nm 4.4 ft-lbs



**IMPORTANT!**

## 2.2 Assembly of the flowmeter

The flowmeter is mounted into a pipe system by using the mechanical connection. Flowmax 44i should be mounted vertically into the pipe for the best measuring performance. Do not install the flowmeter after a dosing valve where the flowmeter can run empty. Placing the flowmeter 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 44i should be installed on the pressure side of the pump.

**NOTICE!**

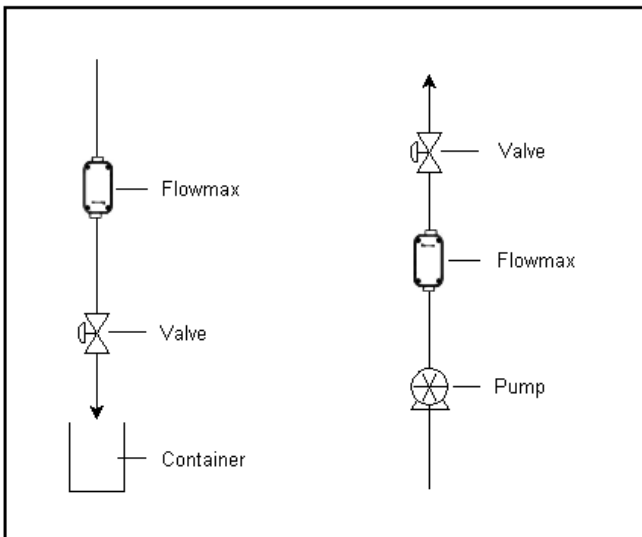


Figure 3: Mounting examples for Flowmax 44i

If it is not possible to mount the flowmeter 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 44i.

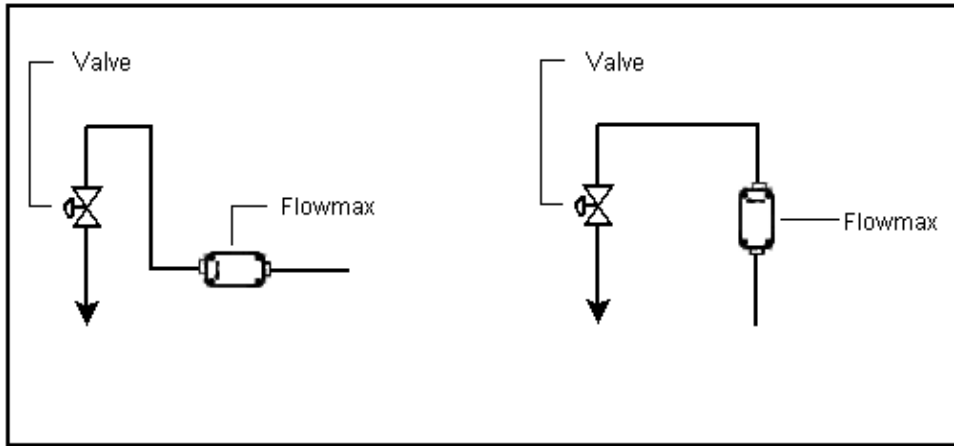


Figure 4: Mounting possibilities

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

Vibrations or mechanical forces may decrease measuring accuracy. Mounting the flowmeter using two clamps will reduce vibrations or movements. Use the clamps as seen in the figure below at the inlet and outlet connections of Flowmax 44i.

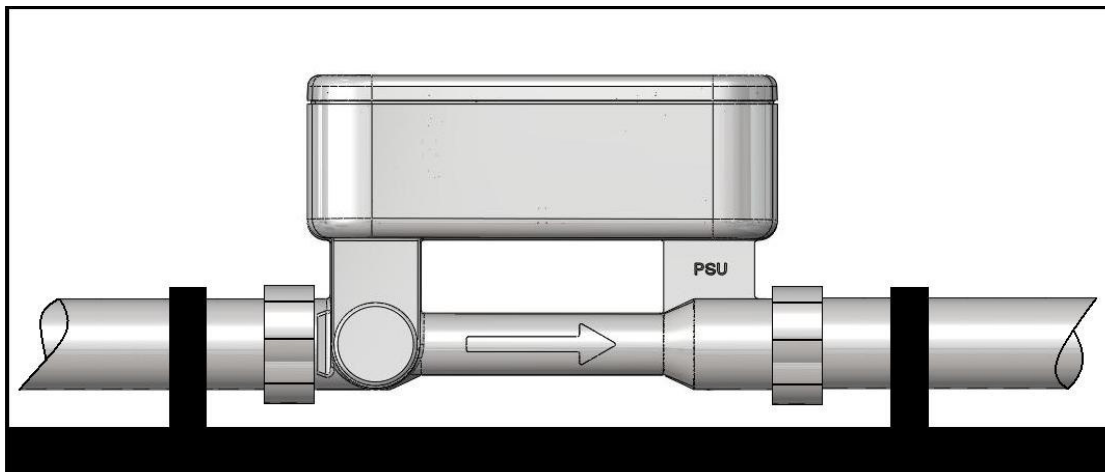


Figure 5: Fixing Flowmax 44i

**IMPORTANT!**

Flowmax 44i must be installed without mechanical tensions. The flowmeter may be damaged if there is tension on the existing pipe system. Set the axial channel offset to 5mm when mounting the flowmeter (For details see section 5.1 Dimensions and weight).



**Applications with hot liquids:**

For applications in which Flowmax 44i is exposed to temperatures above 60°C and is mounted horizontally, it is recommended that the measuring device is mounted with the electronics housing facing downwards. This allows the heat to be released upwards and reduces the load on the device electronics. In general, make sure that no additional external heat sources affect the measuring device.



**IMPORTANT!**

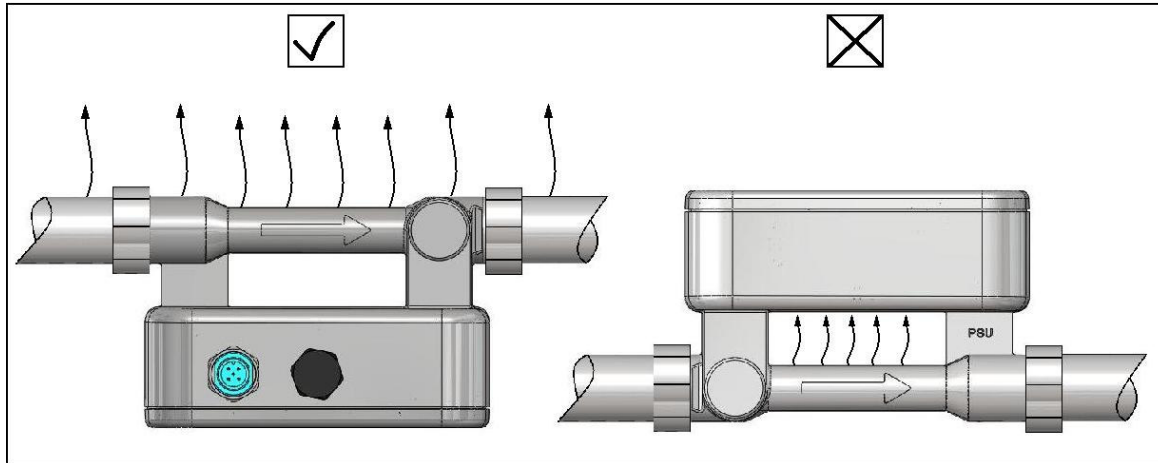


Figure 6: Flowmax 44i with hot liquids

**WARNING!**

**Installation with metal screw connections in combination with high medium temperatures**

Note that the metal tube, or the metal union nut and the plastic housing of the measuring device have a different expansion behavior! The resultant force acting on the meter forces can cause the plastic housing of Flowmax 44i warps and the process connection breaks off.

To ensure the mechanical stress-free mounting of Flowmax 44i, is on site to ensure by appropriate measures that no forces can act on the plastic housing, for example, a flexible metal hose or a strain curve.



**WARNING!**

## 2.3 Electrical wiring

Do not install, wire or dismantle the measuring device while it is under operating voltage. The supply voltage to the Flowmax 44i must be switched off during these procedures.



**WARNING!**



Figure 7: Pin code: Connection plug / socket for 5-pin version

### 5-pin plug assignment with factory-assigned outputs

The inputs and outputs can be parametrized for specific applications.

#### 5-pin plug with 1-wire communication:

Pin	Function	Description
1	24 VDC	Power supply: 18 ... 30 VDC
2	Digital Output Q1	Freely adjustable in the range from 0.1 to 3000 ml/pulse (or ml/s/Hz), in steps of 0.1. NPN or PNP transistor. Maximum load 100mA. Max. Voltage must be less than supply voltage.
	1. Pulse Output	Output in ml/pulse, depending on the pulse value setting.
	2. Increased tolerance for particle or gas inclusions (TPG)	Programmable output of 0V or 24V on detection of solid particles or air bubbles and change to "TPG" software mode.
	3. Frequency output	Output in Hz, depending on the pulse value setting.
	4. Dosing	Programmable output of 0V or 24V while dosing is running.
	5. Negative Flow	Programmable output of 0V or 24V in case of negative flow.
	6. Lower or upper limit (limit value monitoring)	Programmable output of 0V or 24V when an adjustable limit is undercut/exceeded.
7.	Empty Pipe	Programmable output of 0V or 24V when the measuring pipe is empty or too many bubbles/particles detected.
3	GND	Power supply ground: 0 V
4	Communication	Communication interface
5	Analog Output QA	4 ... 20mA; 0 ... 20mA
		For example: 0l/min → 4mA 36l/min → 20mA (depending on the nominal diameter) Empty pipe alarm → 3,5mA

**5-pin plug with RS485 communication and analog output:**

Pin	Function	Description
1	24 VDC	Power Supply: 18 ... 30 VDC
2	Communication	RS485B
3	GND	Power supply ground: 0 V
4	Communication	RS485A
5	Analog Output QA	4 ... 20mA; 0 ... 20mA For example: 0l/min → 4mA 36l/min → 20mA (depending on the nominal diameter) Empty pipe alarm → 3,5mA

**5-pin plug with RS 485 – communication and digital output Q1:**

Pin	Function	Description
1	24 VDC	Power Supply: 18 ... 30 VDC
2	Digital Output Q1	Freely adjustable in the range from 0.1 to 3000 ml/pulse (or ml/s/Hz), in steps of 0.1. NPN or PNP transistor. Maximum load 100mA. Max. Voltage must be less than supply voltage.
	1. Pulse Output	Output in ml/pulse, depending on the pulse value setting.
	2. Increased tolerance for particle or gas inclusions (TPG)	Programmable output of 0V or 24V on detection of solid particles or air bubbles and change to “TPG” software mode.
	3. Frequency output	Output in Hz, depending on the pulse value setting.
	4. Dosing	Programmable output of 0V or 24V while dosing is running.
	5. Negative Flow	Programmable output of 0V or 24V in case of negative flow.
	6. Lower or upper limit (limit value monitoring)	Programmable output of 0V or 24V when an adjustable limit is undercut/exceeded.
	7. Empty Pipe	Programmable output of 0V or 24V when the measuring pipe is empty or too many bubbles/particles detected.
3	GND	Power supply ground: 0 V
4	Communication	RS485A
5	Communication	RS485B

**8-pin plug with 1-wire communication:**

Figure 8: Pin code: Connection plug / socket for 8-pin version

**8-pin plug assignment with factory-assigned outputs**

Pin	Function	Description
1	24 VDC	Power Supply: 18 ... 30 VDC
2	Digital Output Q1	Freely adjustable in the range from 0.1 to 3000 ml/pulse (or ml/s/Hz), in steps of 0.1. NPN or PNP transistor. Maximum load 100mA*. Max. Voltage must be less than supply voltage.
	1. Pulse Output	Output in ml/pulse, depending on the pulse value setting.
	2. Increased tolerance for particle or gas inclusions (TPG)	Programmable output of 0V or 24V on detection of solid particles or air bubbles and change to "TPG" software mode.
	3. Frequency output	Output in Hz, depending on the pulse value setting.
	4. Dosing	Programmable output of 0V or 24V while dosing is running.
	5. Negative Flow	Programmable output of 0V or 24V in case of negative flow.
	6. Lower or upper limit (limit value monitoring)	Programmable output of 0V or 24V when an adjustable limit is undercut/exceeded.
	7. Empty Pipe	Programmable output of 0V or 24V when the measuring pipe is empty or too many bubbles/particles detected.
3	GND	Power supply ground: 0 V
4	Digital Output Q2	Freely adjustable in the range from 0.1 to 3000 ml/pulse (or ml/s/Hz), in steps of 0.1. NPN or PNP transistor. Maximum load 100mA*. Max. Voltage must be less than supply voltage.
	1. Pulse Output	Output in ml/pulse, depending on the pulse value setting.
	2. Increased tolerance for particle or gas inclusions (TPG)	Programmable output of 0V or 24V on detection of solid particles or air bubbles and change to "TPG" software mode.
	3. Frequency output	Output in Hz, depending on the pulse value setting.
	4. Dosing	Programmable output of 0V or 24V while dosing is running.
	5. Negative Flow	Programmable output of 0V or 24V in case of negative flow.
	6. Lower or upper limit (limit value monitoring)	Programmable output of 0V or 24V when an adjustable limit is undercut/exceeded.
	7. Empty Pipe	Programmable output of 0V or 24V when the measuring pipe is empty or too many bubbles/particles detected.
5	Analog Output QA	4 ... 20mA; 0 ... 20mA For example: 0l/min → 4mA 36l/min → 20mA (depending on the nominal diameter) Empty pipe alarm → 3,5mA
6	Communication	Communication interface
7	Digital input I1	
	1. Dosing	Starts the dosing process at 24V edge.
	2. Set Offset	Starts offset adjustment, at 24V edge.
	3. Reset Counter	Reset the counter on 24V edge
	4. Creeping Flow Off	Deactivates the creeping flow suppression while 24V is active.
8	Shield	EMC safety

\* Q1 + Q2 ≤ 100mA

**8-pin plug with RS 485 communication:**



Figure 9: Pin code: Connection plug / socket for 8-pin version

Pin	Function	Description
1	24 VDC	Power supply: 18 ... 30 VDC
2	Digital Output Q1	Freely adjustable in the range from 0.1 to 3000 ml/pulse (or ml/s/Hz), in steps of 0.1. NPN or PNP transistor. Maximum load 100mA. Max. Voltage must be less than supply voltage.
	1. Pulse Output	Output in ml/pulse, depending on the pulse value setting.
	2. Increased tolerance for particle or gas inclusions (TPG)	Programmable output of 0V or 24V on detection of solid particles or air bubbles and change to "TPG" software mode.
	3. Frequency output	Output in Hz, depending on the pulse value setting.
	4. Dosing	Programmable output of 0V or 24V while dosing is running.
	5. Negative Flow	Programmable output of 0V or 24V in case of negative flow.
	6. Lower or upper limit (limit value monitoring)	Programmable output of 0V or 24V when an adjustable limit is undercut/exceeded.
	7. Empty Pipe	Programmable output of 0V or 24V when the measuring pipe is empty or too many bubbles/particles detected.
3	GND	Power supply ground: 0 V
4	Digital input I1	
	1. Dosing	Starts the dosing process at 24V edge.
	2. Set Offset	Starts offset adjustment, at 24V edge.
	3. Reset Counter	Reset the counter on 24V edge
5	Analog Output QA	4 ... 20mA; 0 ... 20mA
		For example: 0l/min → 4mA 36l/min → 20mA (depending on the nominal diameter) Empty pipe alarm → 3,5mA
6	Communication	RS485A
7	Communication	RS485B
8	Shield	EMC safety

**ATTENTION:**

The Flowmax 44i measuring device may only be operated within the limits specified on the nameplate and in the operating manual/data sheet. Unauthorized operating conditions can lead to overloads, damage or defects.



**IMPORTANT!**

### 3. Commissioning

#### NOTE:

After starting up the electronics, the device is ready for use, but it reaches its optimum operating state after 30 minutes. It makes sense to carry out a basic trim or set offset adjustment only after this warm-up phase.

**NOTICE!**

#### NOTE:

If Flowmax 44i 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 (alternatively FlowCon 200i). During the adjustment, the medium may not flow, as this can lead to a measurement deviation. If there is a possible flow, it will be stored as "zero point".

**NOTICE!**

#### 3.1 Operation

If Flowmax 44i is used as a flowmeter for water or water-like liquids, it generally requires no on-site operation, as the parameters listed below have a factory setting that ensures optimal function. However, Flowmax 44i can also be supplied with customer-specific settings.

**NOTE:** 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 or FlowCon 200i.

**NOTICE!**

The following parameters may be changed to settings suitable for the individual conditions: for 5-pin version

- Digital output Q1, function and behavior
- Analog output QA, function and behavior
- Flow range, for which shall apply 4 ... 20 mA resp. 0 ... 20mA
- Pulse value
- Creeping suppression
- RS485 Communication (option)
- Optimization of measurement curve with up to 8 interpolation values (Medium matrix requires FlowSoft\*)

The following parameters may be changed to settings suitable for the individual conditions: for 8-pin version

- Digital output Q1, function and behavior
- Digital output Q2, function and behavior
- Digital input I1, function and behavior
- Analog output QA, function and behavior
- Flow range, for which shall apply 4 ... 20 mA resp. 0 ... 20mA
- Pulse value
- Creeping suppression
- RS485 Communication (option)
- Optimization of measurement curve with up to 8 interpolation values (Medium matrix requires FlowSoft\*)

\*FlowSoft is the MIB programming software (option)

### 3.1.1 Display and user menu

Flowmax 44i is equipped with a display to visualize actual measurement values and to change parameters of the flowmeter. Menu navigation and parameter changes are controlled by the four keys on the foil keypad.

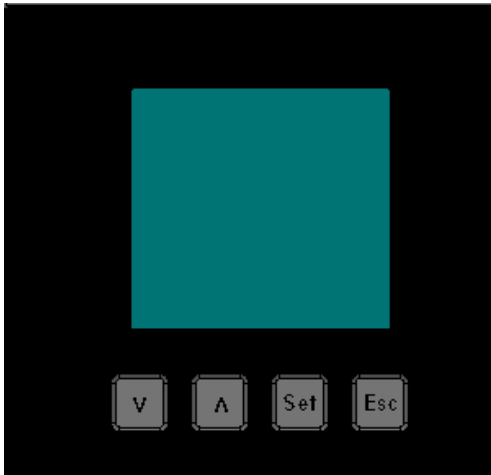


Figure 10: Operating with the key pad

Press the “Set” key to display the main menu. Different menu options can be selected by using the two arrow keys. To confirm a menu item, press the “Set” button again.

To enter e.g. analog limits “Analog output – max Range” 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 a parameter needs to be changed via the display menu, a password must be entered. Password protection is used to ensure changes to values or configurations are done by authorized personnel. The default password for Flowmax 44i is **41414**. The user level will remain active for 30 minutes after the last press on any button. 200 seconds after the last key press, the device skips the menu and returns to the display mode, which does not apply to the menu items diagnostic and dosing. Here, the device remains in the submenu until the operator exits the submenu again with the ESC key. Operating examples see appendix.

**NOTE:**

The display always shows the currently set activated parameter of the menu first. The activated parameter is inverted.

**NOTICE!**

**NOTE:**

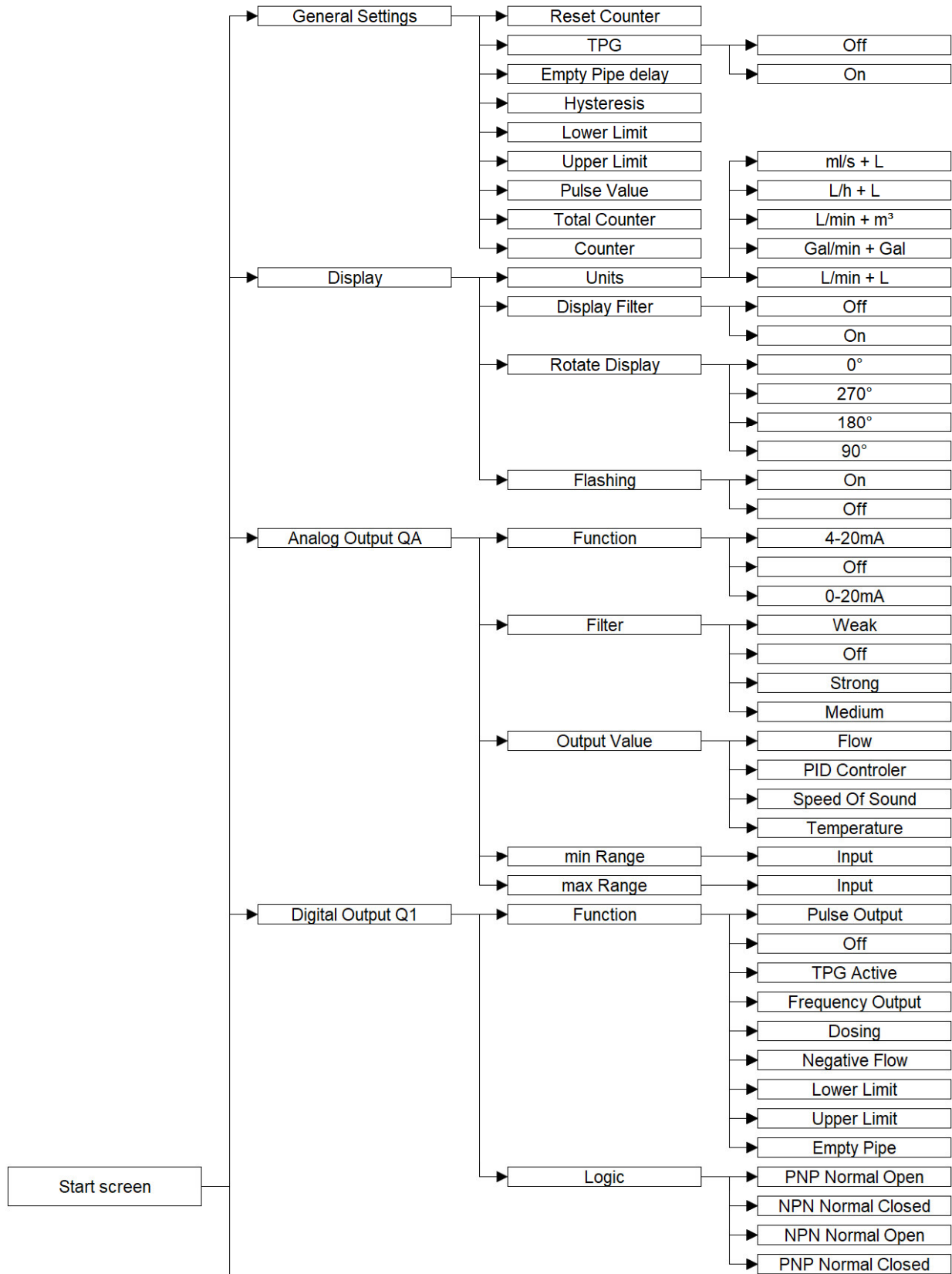
In the menu all possible functions of the device are visible.

**NOTICE!**

The functions of Digital Output Q2 and Digital Input I1 are only available on the Flowmax version with 8-pin plug.

The “PID controller” and “speed of sound” functions, displayed under the Analog output - Output value menu item, are only provided with functionality if they were selected when ordering (option).

Flowmax 44i without display has the same features as the display version, but you can change parameters only with the FlowCon 200i display and programming unit. (option)



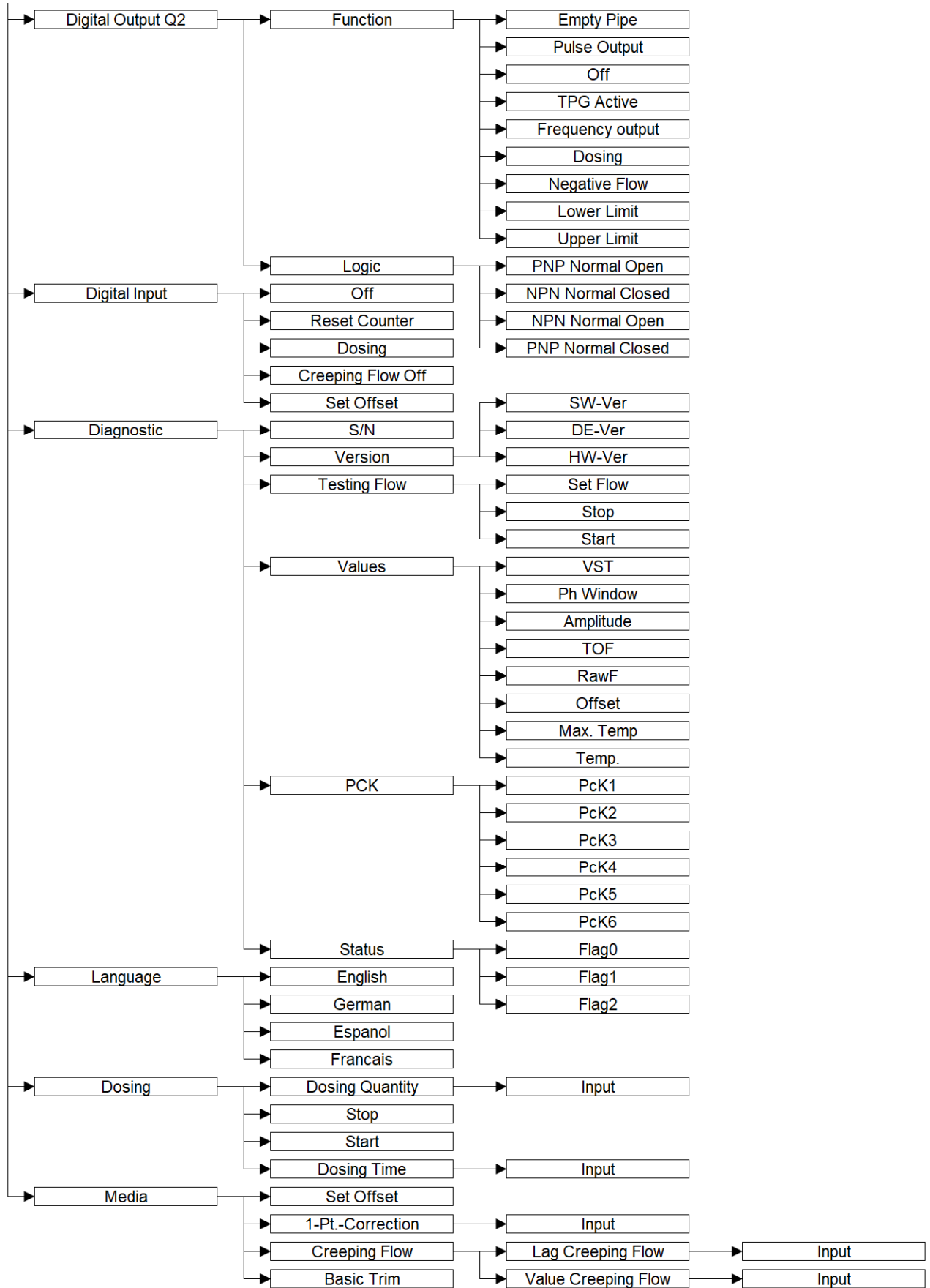


Figure 11: Menu structure Flowmax 44i

## 3.2 Functionalities of flowmeter and default settings

### 3.2.1 Language

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

### 3.2.2 Dosing

The Flowmax 44i can be configured for manually dosing by choosing the dosing function via the user display. The Volume “Dosing Quantity” and the “Dosing Time” are freely adjustable. The dosing time is intended as a safeguard against unintentional overspill. After the set time has passed, the output switches regardless of the measured quantity. When “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 Quantity”: 0 ... 3500 liters, in steps of 0.001 liters  
 Default setting “Dosing Quantity”: 0 liter

Setting range “Dosing Time” 0 ... 30000 Seconds, in steps of 1 sec,  
 having an accuracy of +0/-1 sec  
 Default setting “Dosing Time”: 3 Seconds

Example:

Dosing time = 3 seconds. That is Flowmax is sending the closing signal after 2.1 to 3.0 sec to the valve. The dosing time is intended as a safety function and should be selected insignificantly longer than the actual time required for dosing. This ensures that possible malfunctions/leakages in the structure/system are detected at an early stage. An exact dosage purely on the dosing time is not useful.

#### **IMPORTANT!**

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

To be able to activate dosing, a digital output must be parameterized for dosing. Dosing can be started both via the menu and via the digital input.



**IMPORTANT!**

#### **WARNING!**

**The customer has to provide a technical solution for overflow protection and an emergency stop switch. Both functions must lead to valve shutoff for safety reasons.**



**WARNING!**

### 3.2.3 Media

#### 3.2.3.1 Set Offset

In the sub menu “Set Offset” it is possible to set the actual offset of the flowmeter. Use this function only when Flowmax 44i is completely filled with liquid and there is no flow, as this condition is the new “zero” value.

Example of operation see appendix.

Flowmax 44i automatically does a small offset change, e.g. caused by variable temperatures. It is also possible to set the offset via the configurable digital input I1.

#### IMPORTANT!

In contrast to the basic trim, the Set Offset is not stored in the device. When the Flowmax 44i is restarted, the original, last stored value is active.



**IMPORTANT!**

#### 3.2.3.2 1-Pt.-Correction

Setting range: -50.0 ... 50.0 % in steps of 0.1%

Default setting: 0 %

Example of operation see appendix.

#### 3.2.3.3 Creeping suppression

Creeping flow suppression is used to exclude flows from the measurement that can occur within a narrow range around zero, even when the valve is closed, due to convection. The factory setting of the creeping flow suppression is set to a sensible standard value in relation to the cross-section of the measuring device.

There are higher tolerances below the standard default settings, see also section 5.2 → “measurement deviation”!

Creeping suppression works with a hysteresis of 0% to - 25%.

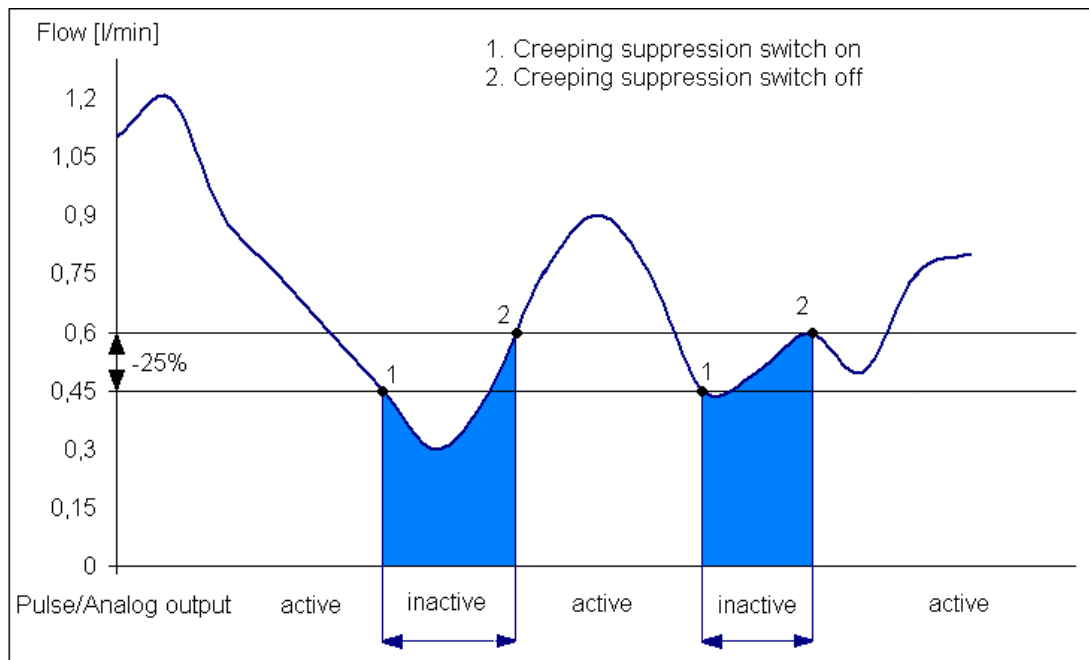


Figure 12: Function of creeping suppression illustrated with 0.6 l/min

Example: Creeping suppression = 0.6 l/min  
 If the flow rate falls below a value of 0.45 l/min, creeping flow suppression is activated. If the flow rate exceeds 0.6 l/min, the flow rate is again output as a pulse and added to the daily quantity counter. A value is also displayed to the analog output again.

Setting range: 0.0 ... 19.2 l/min, in 0.0006 l/min steps  
 Default settings: DN10: 0.3 l/min  
 DN15: 0.9 l/min  
 DN20: 3.5 l/min  
 DN25: 5.0 l/min

### Lag Creeping Flow

The activation of the creeping suppression can be delayed. The value is adjustable via menu.

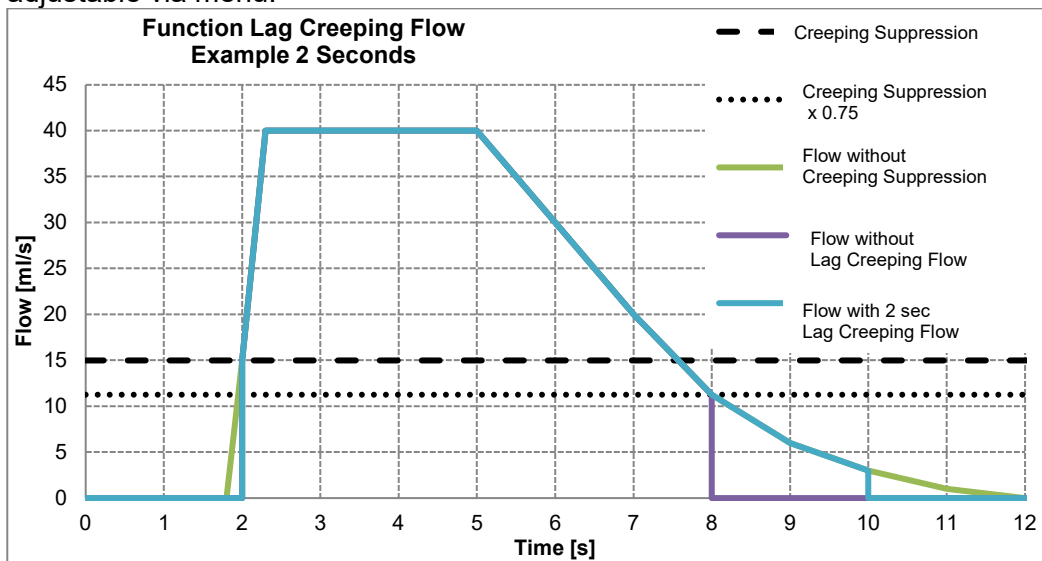


Figure 13: Function Lag Creeping Flow

Setting range: 0 ... 99.0 s in steps of 0.1 s  
 Default settings: 0.5 s

#### 3.2.3.4 Basic Trim

The “Basic trim” function enables optimum adjustments to the medium-specific characteristics. By executing this function, Flowmax 44i runs through an internal parameterization and saves relevant parameters automatically. This process can take up to approx. 1 minute.

#### IMPORTANT!

To ensure that the calibration can be carried out correctly, the device must be filled with liquid and there must be no flow.  
 If an error is detected during adjustment, e.g. because the device is not filled, “Error” appears on the display. If the calibration was performed successfully, the message “Completed” is displayed.

**NOTICE!**



**IMPORTANT!**

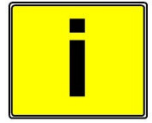
### 3.2.4 General Settings

#### 3.2.4.1 Reset Counter

The volume counter of Flowmax 44i can be reset.  
Example of operation see appendix.

#### IMPORTANT!

Accidentally deleted counter readings can't be restored. After the reset, the count starts again at the value 0.



**IMPORTANT!**

#### 3.2.4.2 TPG (tolerance against solid particles and gas inclusions) (option)

Ultrasonic flow measurement is a volume measurement. A precise measurement can only be guaranteed if the pipe is completely filled and the liquid is not outgassed or doesn't contain any solid particles. Gas bubbles and solid particles lead to measurement errors and can result in an alarm message if they occur more frequently. The TPG function can tolerate a significantly higher amount of gas bubbles or solid particles and therefore enables the flow measurement to be maintained for a longer period of time.

If the maximum possible amount of air bubbles or particles is exceeded, the Flowmax switches to the empty pipe alarm.

When the option is activated, the Flowmax automatically switches to "TPG" mode if the reception amplitude is insufficient. The active status is shown in the top line of the display and emitted at the digital output, provided this has been parameterized with the function.

Setting range:           Off, On  
Default settings:       Off

#### 3.2.4.3 Empty pipe delay

Small air bubbles or particles, which are carried with the liquid, disturb the sound transmission in the measuring pipe.

The last undisturbed flow value is output during the set time, but for a maximum of 3 seconds. After that, the behavior is similar to a non-existent flow rate. The measuring device only switches to alarm status after the configured delay time.

Setting range:           0.0 ... 3000.0 s  
Default settings:       0.5 s for all DN

### 3.2.4.4 Hysteresis

The limit values can be provided with a hysteresis. This is to prevent frequent switching of the outputs when the flow moves around a limit value.

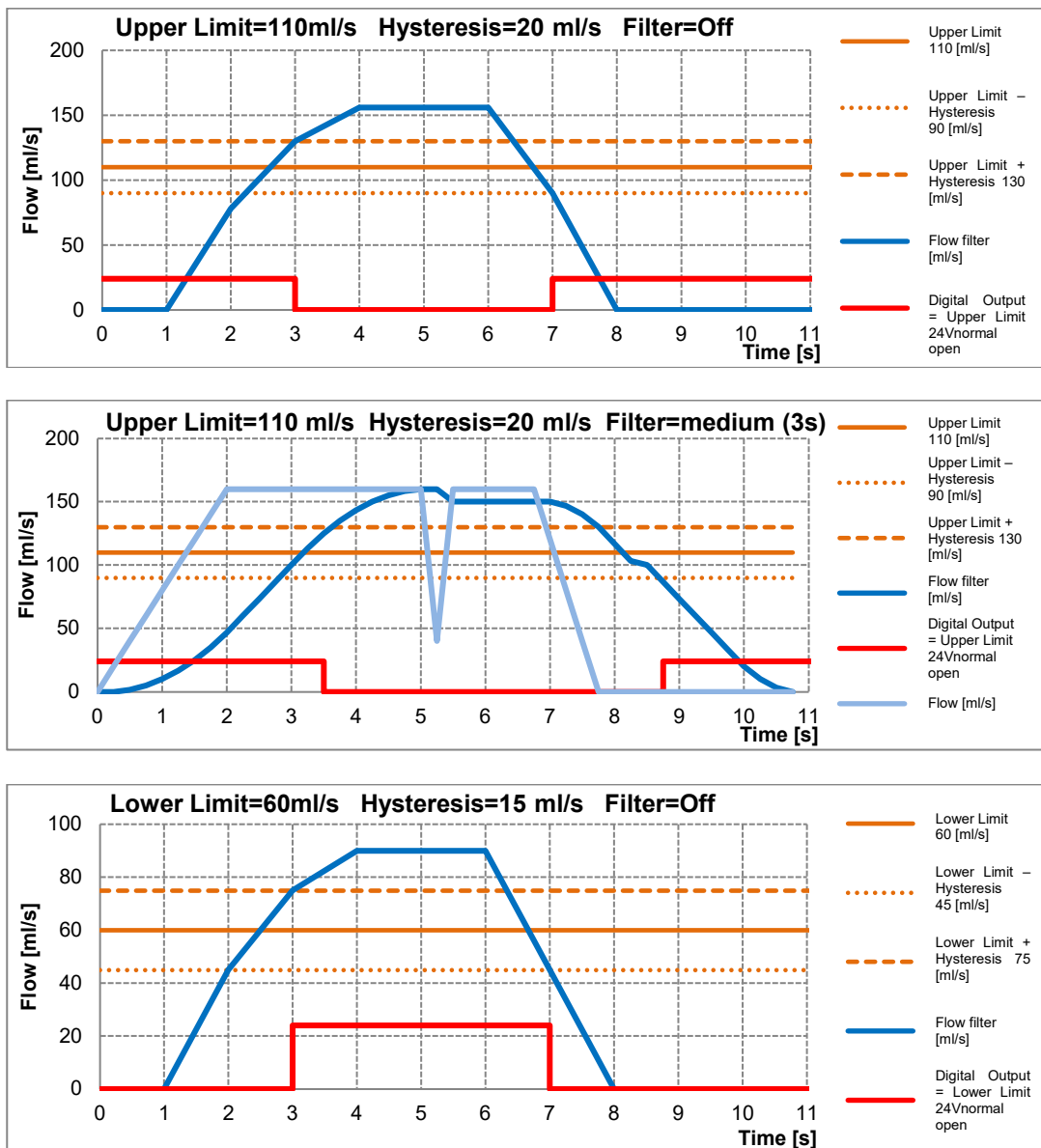


Figure 14: Function Hysteresis at limit

Setting range: 0 ... 8000 ml/s in steps of 0.01 ml/s.  
 Default settings: 0 for all DN

### 3.2.4.5 Lower Limit

The lower limit value for the digital output is set here.

Setting range: 0 ... 20000 ml/s in steps of 0.01 ml/s.  
 Default settings: 0 for all DN

### 3.2.4.6 Upper Limit

The upper limit value for the digital output is set here.

Setting range: 0 ... 20000 ml/s in steps of 0.01 ml/s.  
 Default settings: max. Flow of the flowmeter (depending on the diameter)  
 DN10 = 350 ml/s  
 DN15 = 600 ml/s  
 DN20 = 1000 ml/s  
 DN25 = 4000 ml/s

### 3.2.4.7 Pulse value

Here you can specify the flow rate, sonic speed (Speedmax option), or temperature at which an output pulse is displayed.

Choose a configuration which will neither exceed the maximum output frequency of the Flowmax 44i (10kHz) nor the maximum input frequency of the PLC. The pulse/pause ratio is 1:1. The pulse length is limited to 1s.

Example: 2.0 ml/pulse

This means: a pulse is emitted every 2.0 ml.

Setting range: 0.1 ... 3000.0 ml/pulse, in steps of 0.1 ml/pulse

Default setting: 1.0 ml/pulse for all DN

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.

### 3.2.4.8 Total Counter

The Total Counter can be displayed in the menu. The unit is fixed to m<sup>3</sup>. This counter is unidirectional and can therefore differ from the daily counter. The Total Counter can't be set to zero!

**NOTICE!**

### 3.2.4.9 Counter

The counter that appears on the standard screen is the daily quantity counter. The unit corresponds to the currently set one. The behavior of the daily quantity counter:

a) at daily amount in [ ]

from [ ]	to [ ]	resolution display [ ]
0.000	14000	0.001
14000	28000	0.002
28000	56000	0.004
56000	112000	0.008
112000	225000	0.016
225000	445000	0.032
445000	1000000	0.064

Once the counter has reached 1000000 liters, it automatically begins to count up from zero. The total counter continues to run without being reset.

b) at daily amount in [m<sup>3</sup>]

from [m <sup>3</sup> ]	to [m <sup>3</sup> ]	resolution display [m <sup>3</sup> ]	rounding error -0.05%
0.000	14000	0.001	
14000	28000	0.002	
28000	56000	0.004	
56000	112000	0.008	
112000	225000	0.016	
225000	461204	0.032	

Once the counter has reached 461204 m<sup>3</sup> it automatically begins to count up from zero. Total counter runs without resetting on.

c) at daily amount in [US-Gal]

from [Gal]	to [Gal]	resolution display [Gal]	rounding error +0.12%
0.000	14000	0.001	
14000	28000	0.002	
28000	58000	0.004	
58000	112000	0.008	
112000	225000	0.016	
225000	460000	0.032	
445000	1000000	0.064	

Once the counter has reached 1000000 Gal it automatically begins to count up from zero. Total counter runs without resetting on.

### 3.2.5 Display

#### 3.2.5.1 Units

Flowmax 44i is able to show actual flow or the volume in different units.

Setting range: ml/s + l, l/h + l, l/min + m<sup>3</sup>, Gal/min +Gal, l/min + l  
 Default setting: ml/s + l

Example: ml/s + l

Here, the flow appears in the unit "ml / s" (milliliters per second) and the daily amount in "l" (liters).

Gal are US Gal with 1 Gal = 3,785 l.

#### 3.2.5.2 Filter for Display

The indicated flow can additionally be filtered. This filter is an average over the last 16s. It can be activated and deactivated via the menu.

Setting range: Off, On  
 Default setting: Off

#### 3.2.5.3 Rotate Display

The display can be rotated in steps of 90°.

Setting range: 0°, 270°, 180°, 90°  
 Default setting: 0°

### 3.2.5.4 Flashing

The display flashes in case of an error. This can be switched off.

When activating the alarm flashing, the backlight first flashes after 150s. The time is extended by the set empty pipe delay time, when the empty pipe delay is active.

Setting range: On, Off

Default setting: On

The alarm flashing can be muted for 150 seconds by pressing the ESC key.

### 3.2.6 Analog Output QA

#### 3.2.6.1 Function

The Analog Output is an active current output with 0 ... 20mA or 4 ... 20mA. It can be adjusted via the display menu or FlowCon 200i.

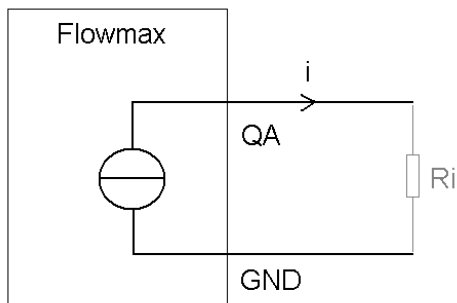


Figure 15: The analog output is active

Setting range: 0 ... 20mA, 4 ... 20mA, Off

Default setting: 4 ... 20mA

The analog 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 max range of the relevant measurement
- 4 mA the min range of the relevant measurement
- 3.5 mA empty pipe

Max range and min range parameters can be set within the type-specific measurement of the device. The value of the max range must be greater than the value of the min range, so that the values are stored. By default, the min range is 0 mA or 4 mA and the respective end of the measuring range is set to 20 mA.

#### **IMPORTANT!**

If the analog output is used, the maximum resistance  $R_i$  should not be more than 500 Ohm, otherwise it can't be guaranteed that the measuring device can deliver the maximum value.

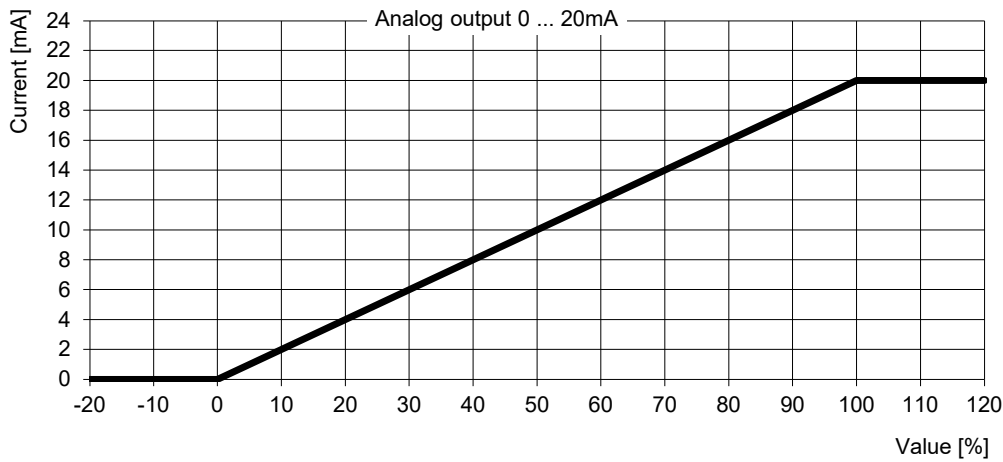


**IMPORTANT!**

**Characteristic curves analog output**

- **0 ... 20mA**

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

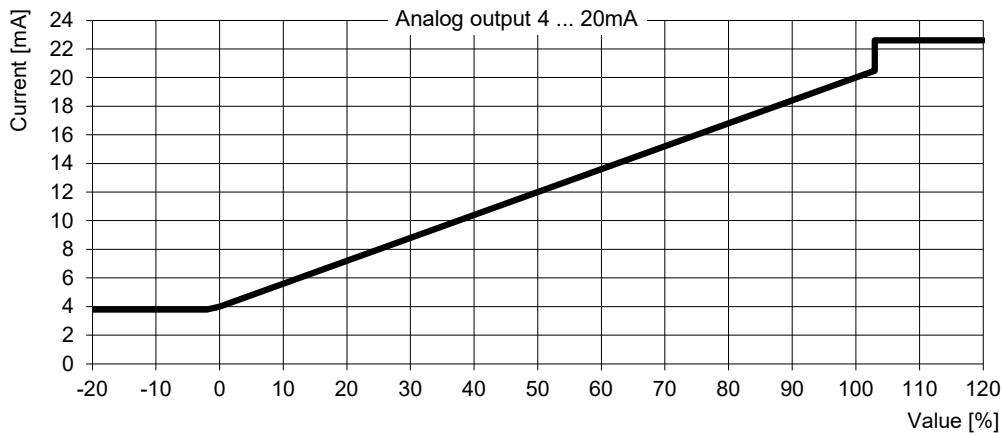


Value	Current [mA]
Smaller 0%	0
0% (min Range)	0
Between 0% and 100%	Linear interpolation from 0 ... 20 mA
100% (max Range)	20
Bigger 100%	20

Figure 16: Characteristic curve 0 ... 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 ... 4mA
0% (min Range)	4
Between 0% and 100%	Linear interpolation from 4 ... 20mA
100% (max Range)	20
Between 100% and 103%	Linear interpolation from 20 ... 20.5mA
Bigger 103%	22.6

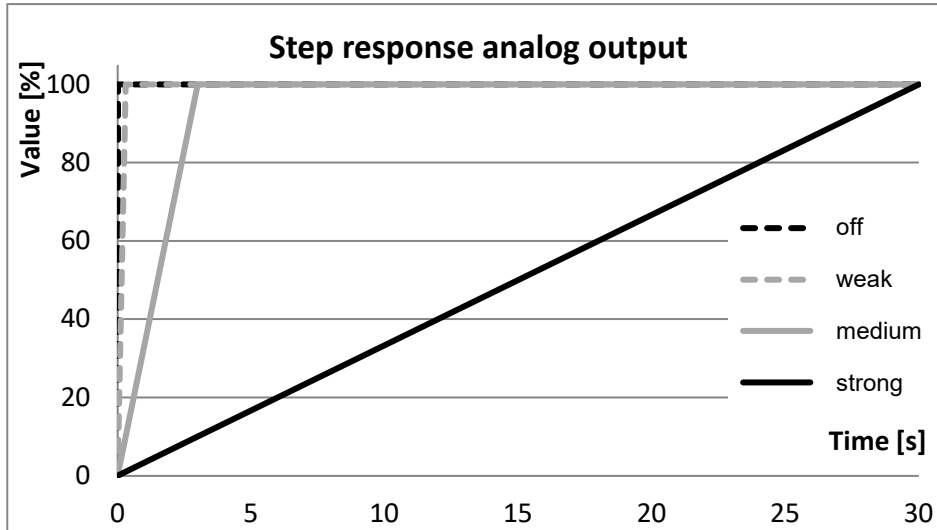
Figure 17: Characteristic curve 4 ... 20mA

### 3.2.6.2 Filter

The function "Filter" averages the analog output signal. Possible settings:

Setting range: Weak, Medium, Strong, Off  
 Default setting: Weak

With weak averaging, the analog output signal reacts more quickly. With strong averaging, the response of the analog value is slowly.



Filter	100%
off	16ms
weak	0,3s
medium	3s
strong	30s

Figure 18: Function Filter of analog output

### 3.2.6.3 Output Value

In the menu all output values are visible. The optional features are only available when they are ordered. If a not ordered function is selected, the output will be set on "Flow".

**NOTICE!**

Setting range: Flow, PID Controller, Speed of Sound, Temperature  
 Default setting: Flow

#### Flow measurement for the analog output

Via the analog output of the measured flow is output.

#### PID Controller for the analog output (Option)

It is possible to implement flow control on the analog output. FlowSoft\* is required to set the parameters (target flow, proportional factor, integral factor and differential factor).

If this function is selected via the menu (see point 3.1.1 Fig. 11. Menu structure Flowmax 44i in the section Analog Output QA - Output Value) and the function PID Controller has not been ordered, the output is set to "Flow".

\*FlowSoft is the MIB programming software (option)

#### Speed of Sound for the analog output (Option)

If this function is selected via the menu (see Section 3.1.1 Fig 11. Menu structure Flowmax 44i in the section Analog Output QA - Output Value) and the function Speed of sound has not been ordered, the output is set to "Flow".

**Temperature measurement for the analog output**

The measured temperature is displayed via the analog output.

The temperature sensor is not in contact with the medium. It is used to calculate the expansion of the measuring channel in the case of temperature fluctuations. The sensor is influenced by the ambient temperature. The temperature value reacts slowly because it measures the plastic temperature inside the sensor pocket.

Step response time

Response of the temperature sensor after a temperature rise. (Filter set to "Off")

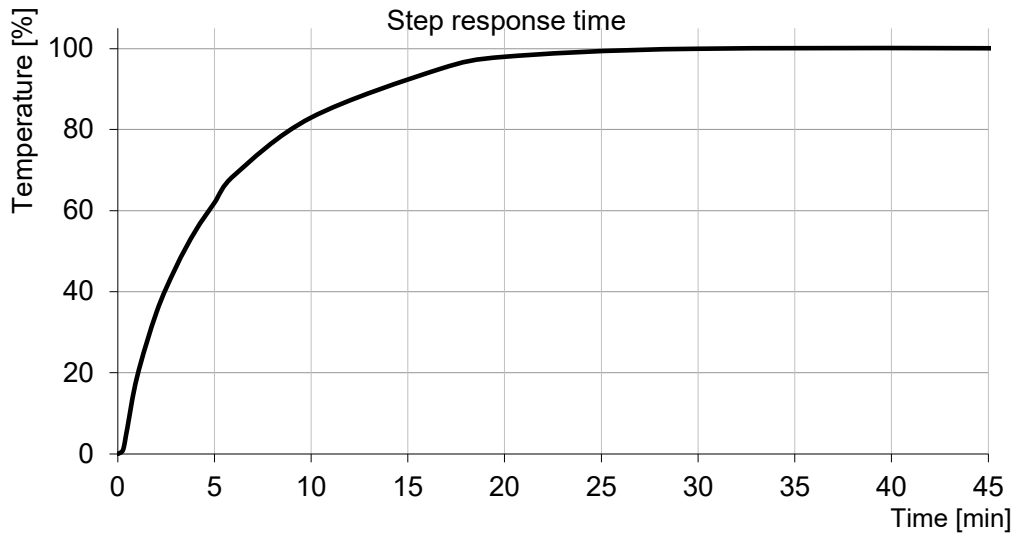


Figure 19: Step response time of the temperature measurement

Ambient temperature influence

Example of influences of the room temperature to the measured value.

Medium Temp.	x	0.7	+	ambient Temp.	x	0.3	=	measured Temp.
°C				°C				°C
40	x	0.7	+	20	x	0.3	=	34
40	x	0.7	+	30	x	0.3	=	37
40	x	0.7	+	40	x	0.3	=	40
60	x	0.7	+	20	x	0.3	=	48

**Min Range**

The value at which 0 or 4 mA is to be displayed is set here in the selected unit.

Setting range: 0.00 to 19999.99 in steps of 0.01

Default setting: 0 ml/s

**Max Range**

The value at which 20 mA is to be displayed is set here in the selected unit.

Setting range: 0.01 to 20000.00 in steps of 0.01

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

- DN10: 350
- DN15: 600
- DN20: 1000
- DN25: 4000

**NOTE!**

The value "Min Range" cannot be set bigger than or equal to the "Max Range".



### 3.2.7 Digital Outputs Q1 and Q2 (Q2 only available with 8-pin plug)

The digital outputs Q1 and Q2 can be used as pulse output, to display the “TPG” status, to signal the empty pipe message, to control a dosing valve or for limit value monitoring.

If “Pulse output” is selected on one of the two digital outputs, the “Frequency output” setting can't be selected on the other digital output.

In the case of a short circuit or overload, the digital outputs are set to high resistance for 2 s after approx. 100 µs. The output is then retried.

Setting range: Off, Pulse Output, TPG, Frequency output, Empty Pipe, Dosing, Lower Limit, Upper Limit, Negative Flow

Default setting Q1: Pulse Output

Default setting Q2: Empty Pipe

Depending on the application, NPN or PNP logic can be selected.

Setting range: PNP / NPN, normal closed / normal open

Default setting Q1: PNP normal open

Default setting Q2: PNP normal open

#### Pulse output / Frequency output

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

#### TPG output

	Empty pipe	Air/particles in the measuring pipe in TPG mode	Filled pipe
0V normal closed	0V	High resistance	0V
0V normal open	High resistance	0V	High resistance
24V normal closed	24V	High resistance	24V
24V normal open	High resistance	24V	High resistance

#### Empty pipe output

	Empty pipe	Air/particles in the measuring pipe in TPG mode	Filled pipe
0V normal closed	High resistance	0V	0V
0V normal open	0V	High resistance	High resistance
24V normal closed	High resistance	24V	24V
24V normal open	24V	High resistance	High resistance

#### 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 Pulses
24V normal open	High resistance	24V Pulses	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

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

**IMPORTANT!**

With an inductive load, e.g. relays, an additional freewheeling diode must be installed antiparallel to the load.



**IMPORTANT!**

Example 1: Flowmax 44i via NPN (0V), external relay

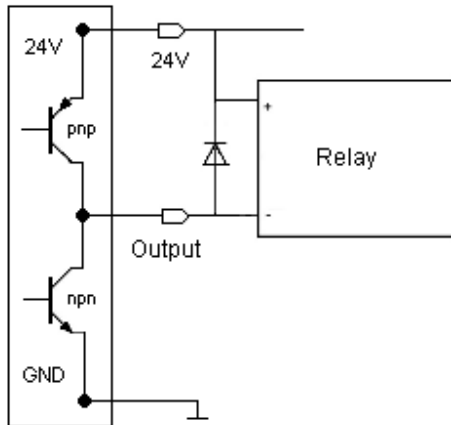


Figure 20: Connecting Digital output to relay

Example 2: Flowmax 44i via PNP (24V), external counter e.g. PLC

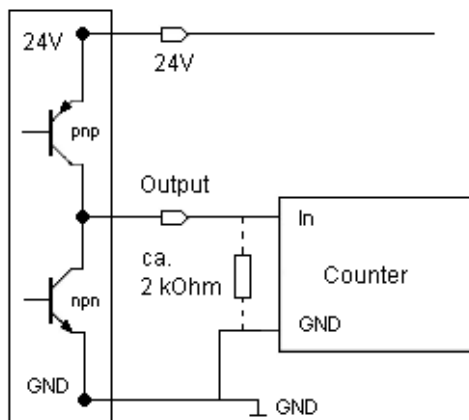


Figure 21: Connecting Digital output to counter

With high impedance input counters and highspeed counting, it may be necessary to include a resistor to have clean edges.

### 3.2.8 Digital Input I1 (only available with 8-pin plug)

Flowmax 44i has a digital input to which the functions can be assigned. For example, to start a dosing process, the line must be connected to 24V. The dosing parameters can be stored in the device either via the device display or FlowCon 200i.

Setting range: Off, Dosing, Set Offset, Reset Counter, Creeping Flow Off  
 Default setting: Off

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

Available input functions:

	Dosing	Set Offset	Reset Counter	Creeping Flow Off	Off
0V	-	-	-	-	-
24V	Rising edge: 0 → 24V Start dosing	Rising edge: 0 → 24V Set Offset	Rising edge: 0 → 24V Counter is reset	State: Deactivating creeping flow	-
		Only perform when the medium is standing still			

#### IMPORTANT!

The “Set Offset” input function may only be carried out when the medium is at a standstill. If a Set Offset is carried out when the flow is active, incorrect measurements may occur until the adjustment has been carried out correctly.



**IMPORTANT!**

### 3.2.9 Diagnostic

Current device parameters such as software versions etc. can be viewed under the “Diagnostics” menu item. This information is required for servicing.

#### NOTE!

Before contacting MIB, please note the values "Fab. no.", "Versions", "Values".

**NOTICE!**

#### 3.2.9.1 Testing Flow

A test flow can be set for checking the process system. In this case, the measuring device behaves as if the test flow is actually flowing, even if the measuring device is empty. To start the simulation, “Start” must be selected “Stop” ends the simulation.

When the device is restarted, the test flow is stopped and the value is deleted.

Setting range: 0 ... 3200.0 ml/s in steps of 0.1 ml/s

### 3.3 Overview of default settings

Function	Default settings
Pulse value	1 ml/pulse
Digital output Q1	Pulse output as PNP (24V) normal open
Digital output Q2 *	Empty pipe output as PNP (24V) normal open
Digital input I1 *	No function assigned
Analog output QA	Flow as 4 ... 20mA signal 20mA → 21 l/min at DN10 36 l/min at DN15 60 l/min at DN20 240 l/min at DN25
Creeping suppression	0.3 l/min at DN10 0.9 l/min at DN15 3.5 l/min at DN20 5.0 l/min at DN25

\* Option

### 3.4 General Information

Please check the following before powering the flowmeter for the first time:

- Check the electrical connections and cable allocations.
- Check the installation position of the flowmeter. Is the direction of the arrow on the housing/name plate and the actual flow direction in the pipe congruent?



**IMPORTANT!**

Once these checks have been carried out and the corresponding conditions have been checked, switch on the power supply. The device will reach optimum operating status after 30 minutes. See 3. Commissioning.

Flowmax 44i is operational!

## 4. Exchange of flowmeter

- **Switch off power before disconnecting the electrical connections!**
- **When removing the device, observe the safety instructions in chapter 2.3 Electrical wiring.**
- Please note that after replacing the flowmeter
  - a) Specific programming of the previous flowmeter should be noted and programmed to the new flowmeter
  - b) when using the dosing function, set a quantity

If the device requires a configuration change, the display and programming unit FlowCon 200i may be required (see section 6. Accessories).

### Repair, hazardous substances

Before sending the flowmeter Flowmax 44i 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 is health hazardous.**

**Measuring devices that are not or insufficiently cleaned will be returned to the sender for cleaning without testing!**

- **Always enclose a declaration of decontamination with the measuring device with as precise a description of the fault as possible, the application in which the measuring device was used and the chemical-physical properties of the measured medium.**

Costs resulting from insufficient cleaning of the measuring device for possible disposal or personal injury (chemical burns, etc.) will be charged to the sender of the measuring device.

To ensure that your repair order is processed quickly and efficiently, it is important that you provide us with a contact person with a phone number and e-mail address who can answer any technical questions our service staff may have.



**WARNING!**



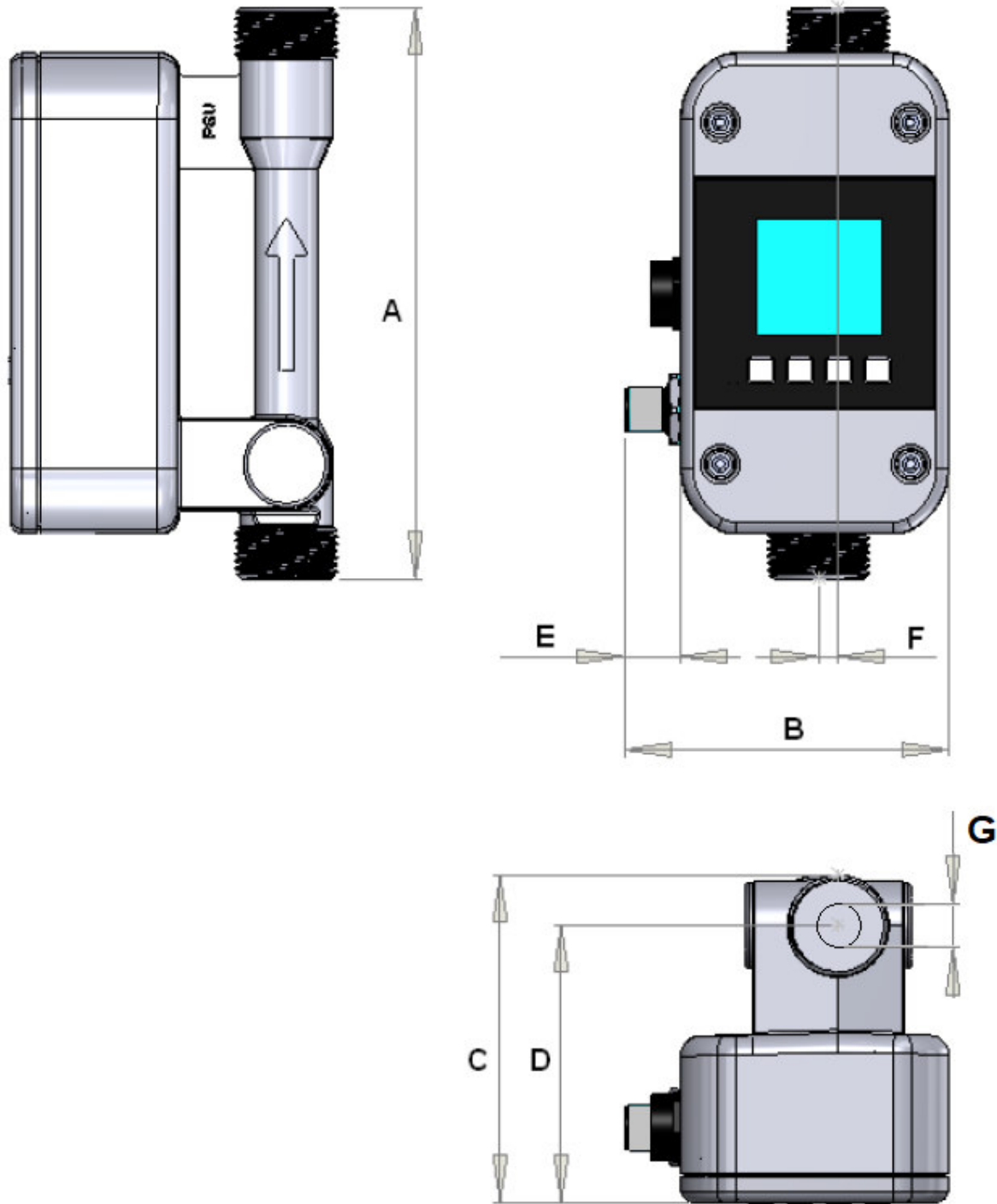
**WARNING!**



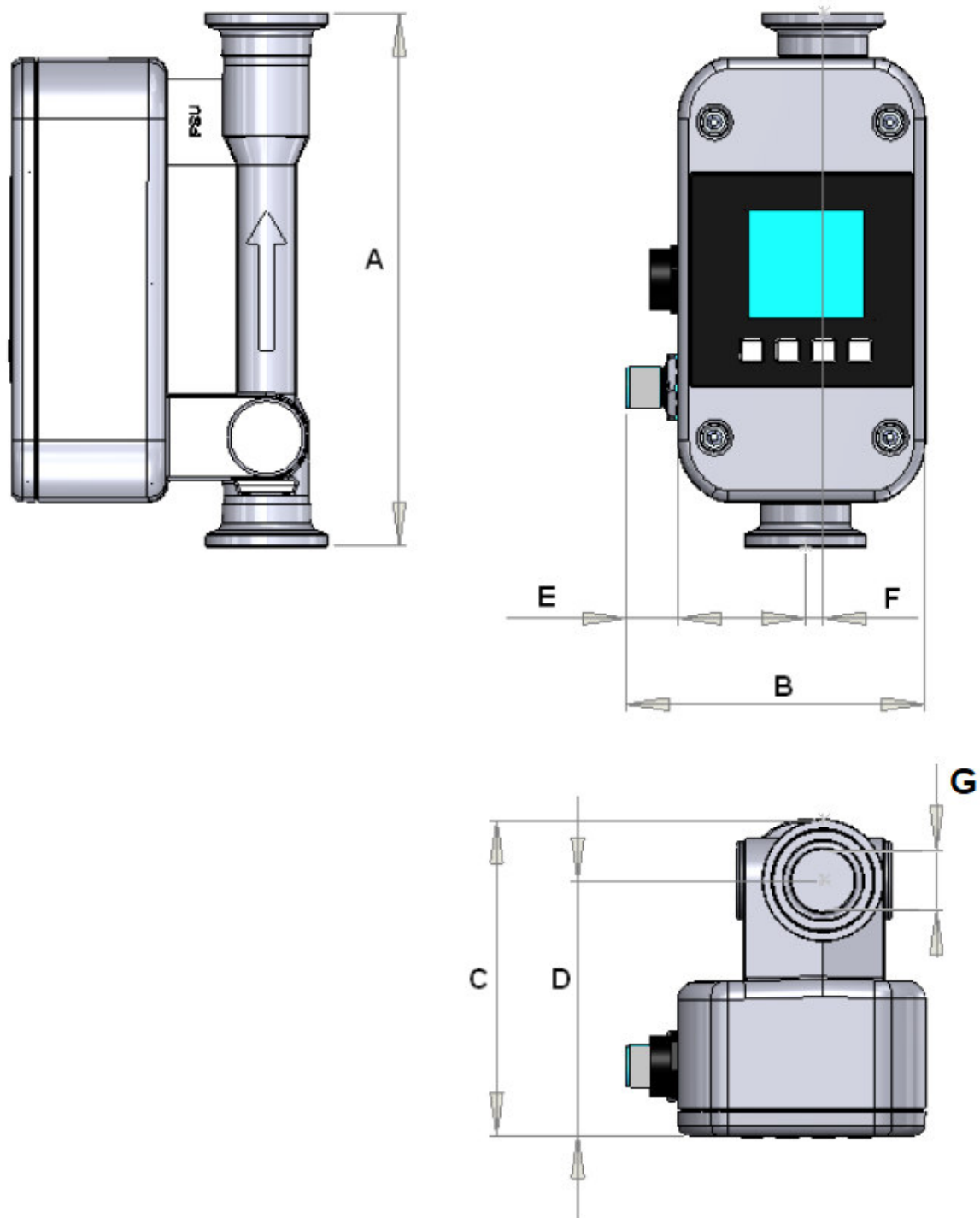
**WARNING!**

### 5. Technical specifications

#### 5.1 Dimensions and weight



Nominal diameter	Connection	Length A [mm] [in]	Width B [mm] [in]	Height C [mm] [in]	Height axis D [mm] [in]	Plug E [mm] [in]	Channel offset F [mm] [in]	Ø G [mm] [in]	Weight [g] [lbs]
DN10	½ G, NPT	147.0 5.79	84.0 3.31	83.0 3.27	70.5 2.78	15.0 0.59	5.0 0.2	10 0.4	332 0.73
DN15	¾ G, NPT	147.0 5.79	84.0 3.31	84.5 3.33	71.1 2.8	15.0 0.59	5.0 0.2	16 0.64	344 0.76
DN20	1 G, NPT	160.0 6.61	84.0 3.31	94.2 3.71	77.6 3.06	15.0 0.59	5.0 0.2	20 0.79	414 0.91
DN25	1 ¼ G, NPT	168.0 6.61	84.0 3.31	98.5 3.88	77.6 3.06	15.0 0.59	5.0 0.2	26 1.02	454 1.0



Nominal diameter	Connection	Length A [mm] [in]	Width B [mm] [in]	Height C [mm] [in]	Height axis D [mm] [in]	Plug E [mm] [in]	Channel offset F [mm] [in]	Ø G [mm] [in]	Weight [g] [lbs]
DN10	DIN 11864-3 BKS-Clamp Form A	149 5.87	84.0 3.31	83.0 3.27	70.5 2.78	15.0 0.59	5.0 0.2	10 0.4	339 0.75
DN15		149 5.87	84.0 3.31	84.5 3.33	71.1 2.8	15.0 0.59	5.0 0.2	16 0.64	347 0.77
DN20		162 6.38	84.0 3.31	94.2 3.71	77.6 3.06	15.0 0.59	5.0 0.2	20 0.79	429 0.95
DN25		170 6.69	84.0 3.31	98.5 3.88	77.6 3.06	15.0 0.59	5.0 0.2	26 1.02	469 1.03

## 5.2 Technical specifications

### Housing

Nominal diameters	DN10, DN15, DN20, DN25
Connection inner thread	inch thread G, inch thread NPT, clamp connection DIN11864-3 BKS-Clamp Form A
Medium temperature	0 ... +80°C (Option up to 90°C, resp. up to 140°C)
Protection class	IP 67
Nominal pressure	PN16 for DN10 and DN15 PN10 for DN20 and DN25
Material	all wetted parts made of PPSU (Polyphenylsulfone) Electronics housing made of PPSU (Polyphenylsulfone)

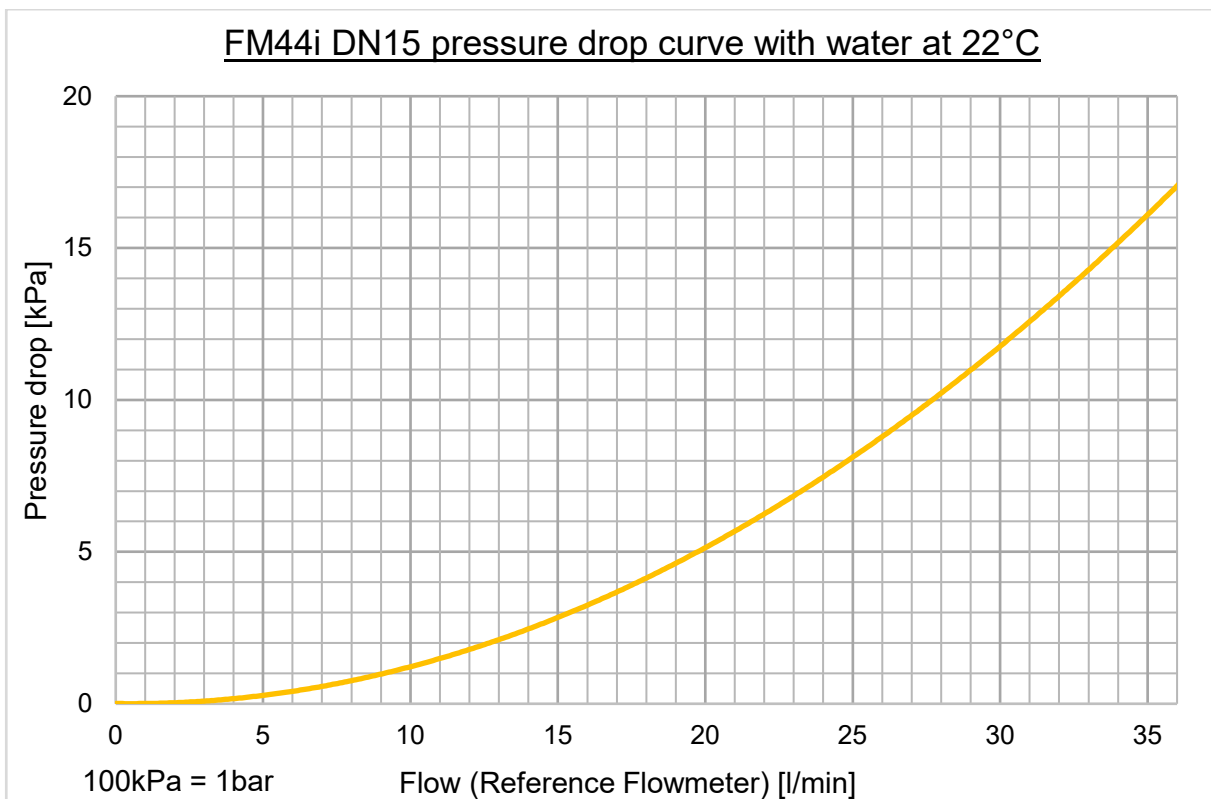
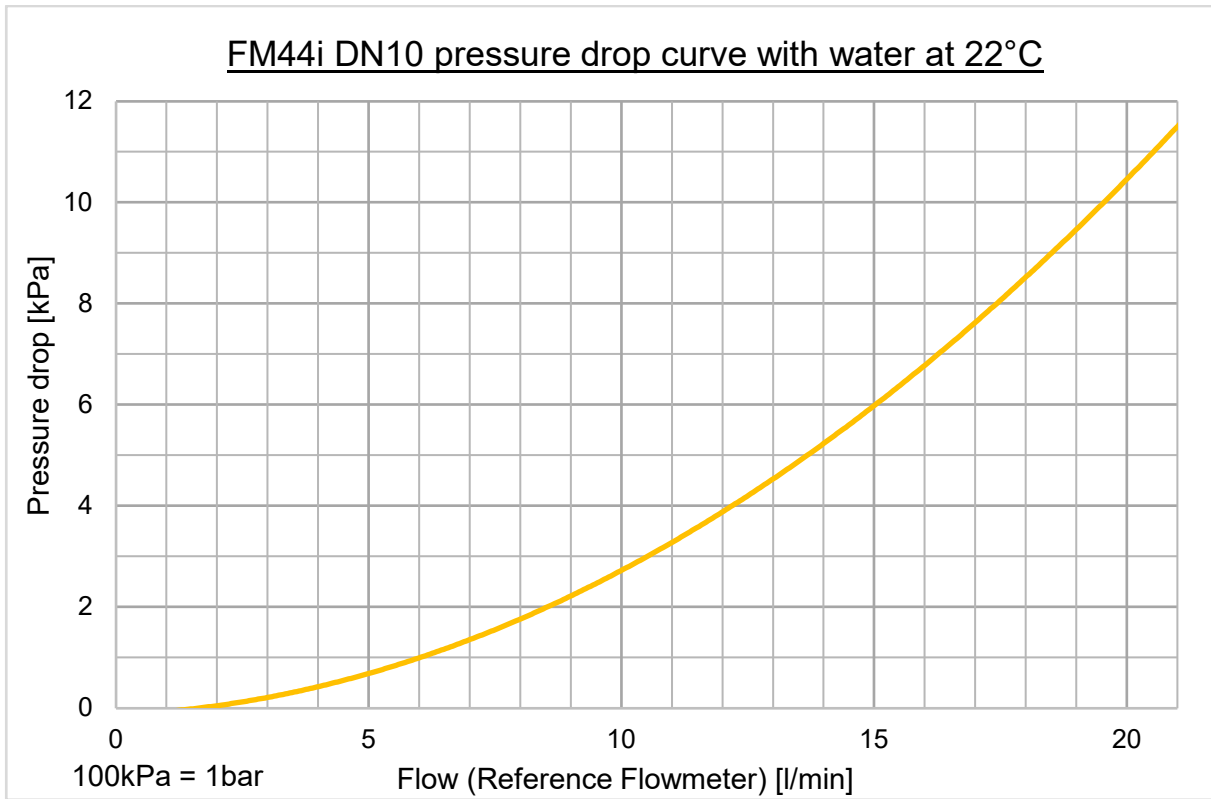
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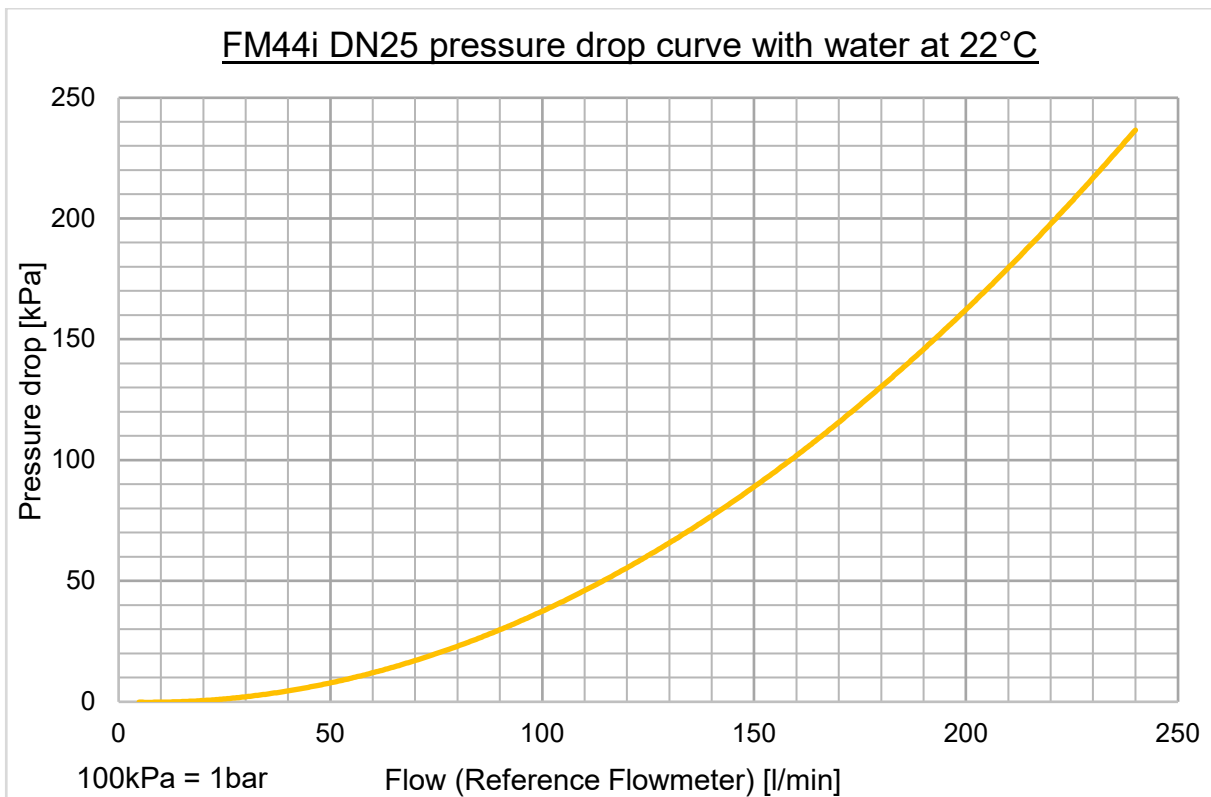
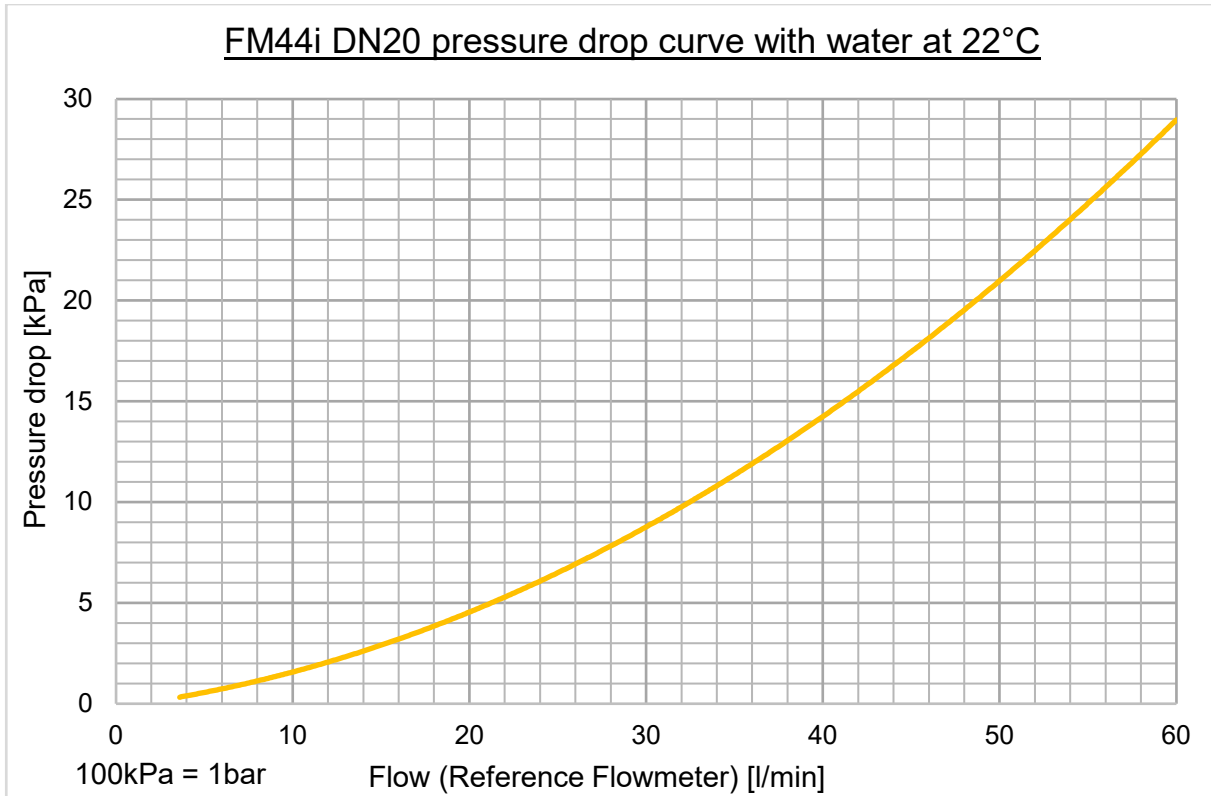
### Electronics

Power supply	18 ... 30 VDC
Power input	at 24 VDC = 3.6 W
Connection	Plug 5-pin, option plug 8-pin
Ambient temperature	0 ... +60°C
Storage temperature	0 ... +70°C
Analog output QA	0/4 ... 20 mA, 0 ... 10 V (option) Min Range and max Range adjustable, Ground connected to supply ground Error signal according to NAMUR NE43 at 4 ... 20 mA
Digital output Q1/2	via transistor NPN- and PNP -logic, max. 100 mA output voltage according to DIN 19240: ≤5 V means LOW ≥12 V means HIGH Short cut resistant Frequency 0 ... 10 kHz
Data interface	Communication interface RS485 (option); MODBUS (option)
Measuring deviation	± 2% o.r. ± 0.15% f.s. (o.r. = of reading, f.s. = full scale), option ± 1% o.r. ± 0.15% f.s. Reference conditions (VDE/VDI 2642) Different in TPG mode
Measuring range	DN10: 0.3 ... 21 l/min DN15: 0.9 ... 36 l/min DN20: 3.5 ... 60 l/min DN25: 5.0 ... 240 l/min
Repeatability:	0.5%

The measuring system Flowmax 44i 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.

**Pressure drop**





**Possible error text Flowmax 44i**

Display text	Description	Behavior
Empty Pipe	Message appears if empty pipe or too many bubbles/particles detected, no flow measurement possible.	Display flashing + text
Low Voltage	Message appears if power supply voltage is below 16V, outputs are deactivated.	Display flashing + text
Short Circuit	Message appears if the digital outputs are overloaded (>100mA), outputs are deactivated.	only text
Lower Limit	If the flow falls below a set flow limit and if limit values are configured as an output. The configured output switches at the same time.	only text
Upper limit	If a set flow limit is exceeded and if limit values are configured as an output. The configured output switches at the same time.	only text
Sonic Speed	The measured speed of sound is not outside the range of the window. May occur with media with speed of sound outside the measuring window or with very small air bubbles.	only text
Overflow	Message appears if the measuring range is exceeded. This may also occur during start-up or when there are air bubbles. The message is 30 seconds visible even when the flow is within the allowable range. However, the measurement still works.	only text, message is displayed 30 sec

## 6. Accessories

### Flowmax connection socket

Flowmax connection socket is used to power and connect Flowmax 44i to an external control unit.

Ordercode 507321 (Socket 5 pins)

Ordercode 507084 (Socket 8 pins)

### FlowCon 200i

External display and programming unit for use in combination with ultrasonic flow measuring devices Flowmax. FlowCon 200i can also be installed as separate display for Flowmax.

Ordercode 908873 (FlowCon 200i for 5-pin Flowmax)

Ordercode 908891 (FlowCon 200i for 8-pin Flowmax)

## 7. Shipment

- Flowmax 44i
- 2x EPDM O-Ring (only for inch thread G)

## Appendix

Examples of operation:

### Enter Password

Key	Display picture
<b>Set</b>	Password
4 x <b>Λ</b>	40000
<b>Set</b>	X0000
<b>Λ</b>	X1000
<b>Set</b>	XX000
4 x <b>Λ</b>	XX400
<b>Set</b>	XXX00
<b>Λ</b>	XXX10
<b>Set</b>	XXXX0
4 x <b>Λ</b>	XXXX4
<b>Set</b>	

### Reset Counter

<b>Set</b>	Dosing Media <b>General Settings</b> Display Analog Output QA
<b>Set</b>	<b>General Settings</b> Reset Counter
<b>Set</b>	<b>General Settings</b> <b>Reset Counter</b> Start?
<b>Set</b>	<b>General Settings</b> <b>Reset Counter</b> Done

**Set Offset**

The device must be filled with liquid and there must be no flow so that the calibration can be carried out correctly.

<b>Set</b>	Dosing Media <b>General Settings</b> Display Analog Output QA
<b>∧</b>	Language Dosing <b>Media</b> General Settings Display
<b>Set</b>	<b>Media</b> Set Offset
<b>Set</b>	<b>Media</b> <b>Set Offset</b> Start?
<b>Set</b>	<b>Media</b> <b>Set Offset</b> Done

**1-point correction**

The 1-point correction is used to adjust the measuring device to one operating point.

For this purpose, a typical volume for the application is filled into a container and the weight is determined using a scale. Caution: Subtract the weight of the container.

Including the density of the medium results in the volume (volume = mass/density). This is compared with the display of the measuring device.

If, for example, the measuring device shows 2% more than determined with the scale, a value of -02.0% must be entered for the 1-point correction.

<b>Set</b>	Dosing Media <b>General Settings</b> Display Analog Output QA
<b>∧</b>	Language Dosing <b>Media</b> General Settings Display
<b>Set</b>	<b>Media</b> Set Offset
<b>V</b>	<b>Media</b> 1-Pt.-Correction
<b>Set</b>	<b>Media</b> <b>1-Pt.-Correction</b> -00.0%

Setting the sign  
Setting the value

**Set**      **Media**  
              **1-Pt.-Correction**  
              Done

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

### **Display rotate 90°**

**Set**      Dosing  
              Media  
              **General Settings**  
              Display  
              Analog Output QA

**V**      Media  
              General Settings  
              **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 setting, choose Rotate Display 0°.

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