

UltraFlo® 1000 SERIES

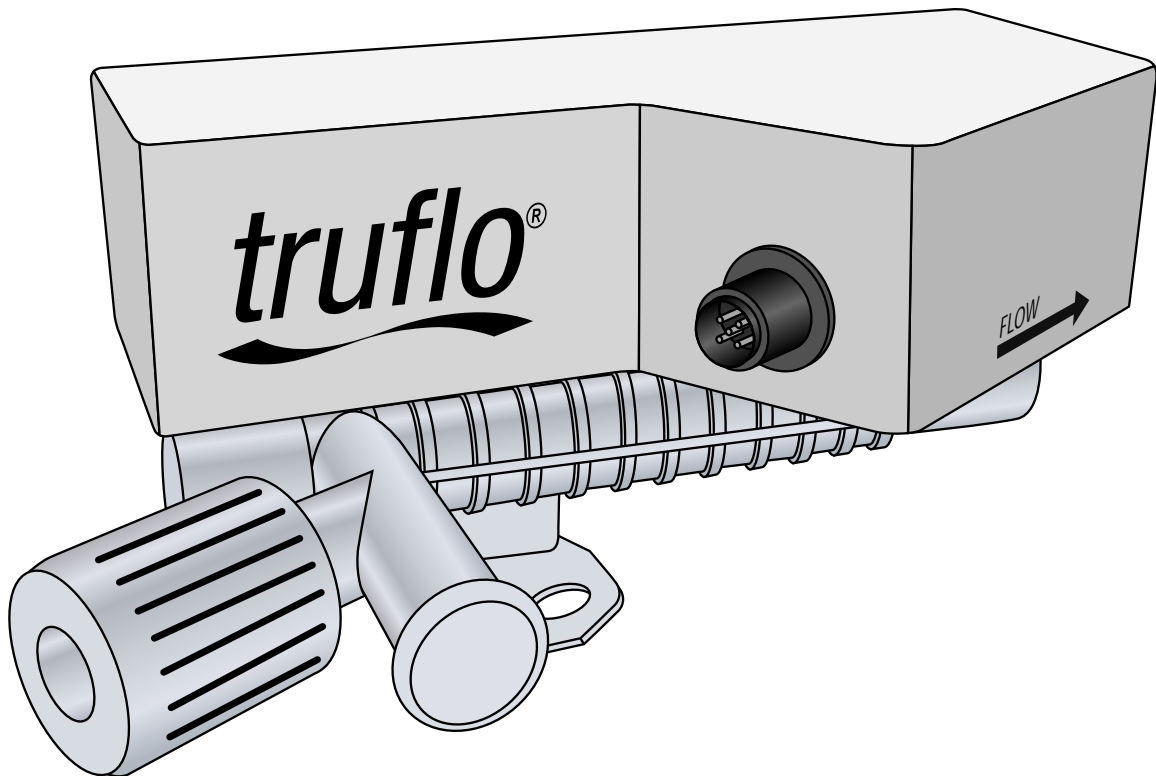
Ultra-Pure PFA Teflon Ultrasonic Flow Meter



UltraFlo® 1000 SERIES

Ultra-Pure PFA Teflon Ultrasonic Flow Meter

Operating Manual



Corrosion-Free
Instrumentation Equipment

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Corrosion-Free
Instrumentation Equipment

Safety Information

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 :



Warning | Caution | Danger

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



IMPORTANT!

indicates situations or cases which, if not avoided, could result in damage or failure of the **UltraFlo®** equipment.

Notice : Is used to lead users to helpful information not related to personal injury.

Intended Use

- ❑ The flow meter **UltraFlo®** should only be used for measuring the flow of pure, homogeneous liquids.
- ❑ The **UltraFlo®** is not intended for use in medical applications.
- ❑ The volume flow meter **UltraFlo®** is built in accordance with 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 removal of wires is performed while electrical power is energized

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 Truflo.

Planning Information

Areas of application

The manufacturer reserves the right to revise, alter, or modify the flowmeter 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.

- ❑ Chemicals supply for controlling, logistics, monitoring
- ❑ Filling machines in food industries
- ❑ 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

UltraFlo 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
- ❑ Integrated display with keypad

Measuring Principle

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.

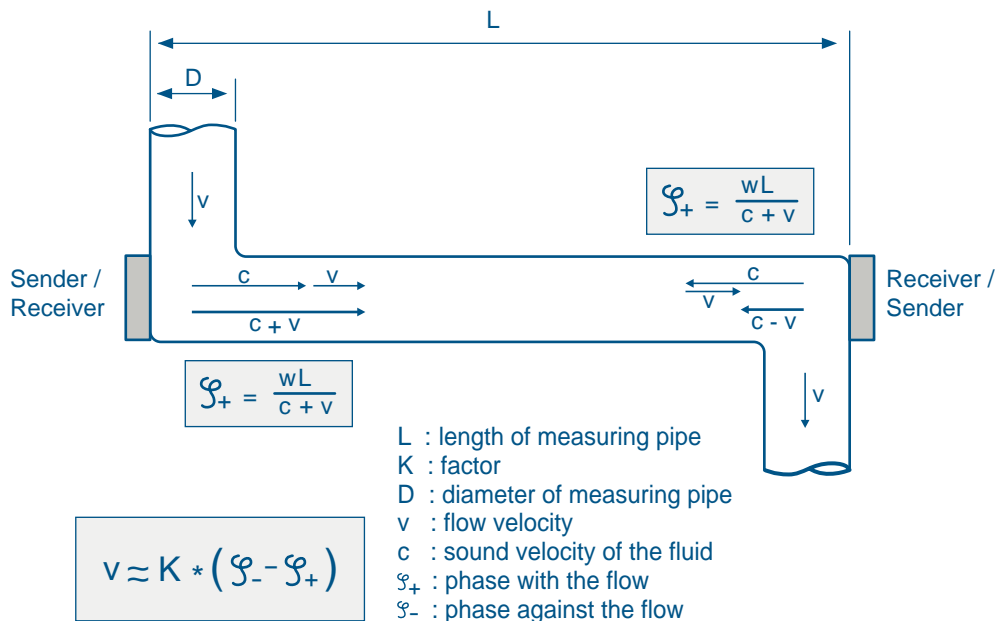


Fig. 1: Presentation of the principle of ultrasonic flow measuring

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.
- ❑ Flowmeter 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.
- ❑ Flowmeter meets the safety requirements concerning the Protective Extra Low Voltage directive according to EN 50178, SELV, PELV.

Technical Specifications

General					
Material	Pipe	PFA Teflon®			
	Electronics	PP			
	Nut	PFA NPT Adaption (Flare to NPT)			
Protection Class		IP67 NEMA 4X			
Medium Temperature		-40 - 248°F -40 - 120°C			
Measuring Range GPM LPM		0.005 - 1.6 0.02 - 9.0	0.08 - 6.3 0.3 - 24	0.24 - 15.8 0.9 - 60	0.32 - 31.7 1.2 - 120
Max. Pressure Non-Shock		100 psi 7 bar	100 psi 7 bar	100 psi 7 bar	100 psi 7 bar
Process Connection					
Sealless Tube Connection Flare		3/8"	1/2"	3/4"	1"
Dimensions Weight					
Dimensions L W H mm		209 120 79	209 120 79	209 120 82	209 120 92
Weight lbs		2.8	2.8	2.8	3.5
Electrical					
Power Supply		24VDC 3.6W			
Connection		plug 5 pins, plug 8 pins, 10-wire Teflon cable (5m)			
Output					
Output		4-20mA + Pulse Relay RS-485			
Ambient temperature		-20....+60°C			
Current output QA		0/4...20 mA Lower- and upper limit adjustable, Ground connected to supply ground Error Signal according to NAMUR NE43			
Digital output Q1 /2		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		± 2% of reading ± 3 mm/s Option: ± 1% of reading ± 3 mm/s Reference conditions (VDE/VDI 2642)			
Repeatability		0.5%			
Standards and Approvals					
CE FCC RoHS Compliant					

The measuring system Flowmeter 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.

*The flow range limits correspond to a flow speed of ~3m/s with Flowmeter of size 3/8", ~6m/s with Flowmeter of sizes 1/2", 3/4" und 1"

Installation Instructions

The housing of Flowmeter is labeled with an arrow symbolizing the direction of the flow. The flowmeter must be installed in direction of the flow.

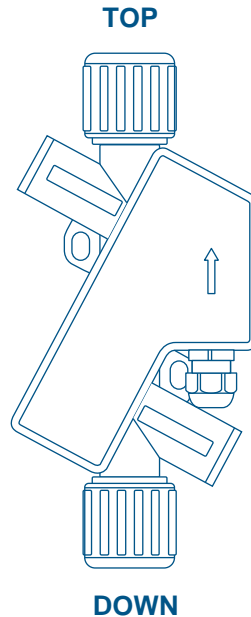


Fig. 2: Installation position of Flowmeter

Note : For fastest possible bubble detection it is important to keep the pipe distance from tank to Flowmeter 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 Flowmeter as close as possible to the dosing valve, since soft pipes increases 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 Flowmeter to avoid cavitations. Insure all mechanical connections are tight. Particles present in the flow stream may result in measuring errors.

When using pumps, Flowmeter must be installed in flow direction on the pressure side. The maximum pressure rating of Flowmeter has to be considered.

⚠ Do not exceed the maximum pressure allowance for of the Flowmeter (see Technical specifications - Page-5). Exceed the maximum pressure can lead to destruction of the Flowmeter.

For correct volume flow measurements straight and unobstructed inflow and outflow distances have to be observed. Starting from the connection thread these have to be at least:

Nominal Diameter	DN7 3/8"	DN10 1/2"	DN15 3/4"	DN20 1"
Inflow Distance	5 cm 2.0"	5 cm 2.0"	40 cm 15.8"	60 cm 23.6"
Outflow Distance	0 cm 0.0"	0 cm 0.0"	20 cm 7.9"	20 cm 7.9"

Assembly of the flowmeter

Flowmeter has two ears with 8 mm x 13 mm elongated holes (for dimensions see section 5. Technical specifications) for attachment to a fixed base. These elongated holes allow attachment to

Electrical Wiring

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 Flowmeter is not assembled and installed.

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

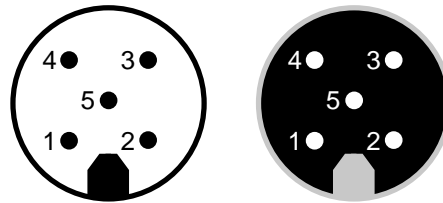


Fig. 7: Pin code: Connection plug / Socket for 5-pin version

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

Pin	Function	Description
1	L+	Power supply : 18...30 VDC
2	Pulse output O1 alternative:	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.
	1. Empty pipe output	Configurable output of 0V or 24V when pipe is empty.
	2. Dosing output	Configurable output of 0V or 24V
	3. Upper or Lower Limit output	Configurable output of 0V or 24V when reaching upper or lower limit
	4. Negative flow	Configurable output of 0V or 24V when liquid flows in negative direction
3	GND	Ground : 0 V
4	Communication	Communication interface
5	Analog output QA	4-20mA ; 0-20mA Example: 0L/min => 4mA 60L/min => 20mA Empty pipe Alert => 3.5mA (4-20mA depending on the configured limits)

Attention : Only operate the flowmeter Flowmeter within the operating limits stipulated on the product label and the operating manual / data sheet. Use outside these conditions lead to overloads which cause permanent damage.

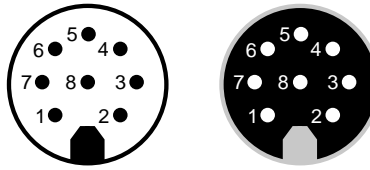


Fig. 8: Pin code: Connection plug / socket for 7-pin version

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

Pin	Function	Description
1	L+	Power supply : 18...30 VDC
2	Pulse output O1 alternative:	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.
	1. Empty pipe output	Configurable output of 0V or 24V when pipe is empty.
	2. Dosing output	Configurable output of 0V or 24V
	3. Upper or Lower Limit output	Freely adjustable ranging from 0.1 to 3000 ml/pulse in 0.1 ml/pulse steps.
	4. Negative flow	Configurable output of 0V or 24V when flow reaches upper or lower limit.
3	GND	Ground : 0 V
4	Digital output Q2 Functions:	Digital output Q2 Configurable npn- or pnp-Transistor, max. Load 30V/ 100mA. Max. Voltage must be less than the supply voltage.
	1. Empty pipe output	Configurable output of 0V or 24V when pipe is empty.
	2. Dosing output	Configurable output of 0V or 24V
	3. Pulse output	Freely adjustable ranging from 0.1 to 3000 ml/pulse in 0.1 ml/pulse steps.
	4. Upper or Lower Limit output	Configurable output of 0V or 24V when flow reaches upper or lower limit.
	5. Negative flow	Configurable output of 0V or 24V when liquid flows in negative direction.
5	Analog output QA	4-20mA ; 0-20mA Example: 0L/min => 4mA 60L/min => 20mA Empty pipe Alert => 3.5mA (4-20mA depending on the configured limits)
6	Communication	Communication Interface
7	Digital input I1	Digital input I1
	1. Dosing output	Starts the dosage by a rising edge of 24V.
	2. Set offset	The Offset is set by a rising edge of 24V.
	3. Reset counter	Reset of the counter by a rising edge of 24V.
	4. Creeping flow off	Creeping suppression is deactivated as long as there are 24V at the input.
8	Shielding	EMC safety

i Attention : Only operate the flowmeter Flowmeter within the operating limits stipulated on the product label and the operating manual / data sheet. Use outside these conditions lead to overloads which cause permanent damage.

Commissioning

NOTE : If Flowmeter 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 Programmtool). During the adjustment the medium may not flow as it affects the function

Operation

If Flowmeter is used as volume flowmeter for water or water-like liquids, it will not require on-site calibration. Parameters for water are calibrated at the factory. Notwithstanding the Flowmeter may also be supplied with customized settings. The coordination must be done at time of purchase order.

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

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

- Digital output Q1, function and behaviour
- Digital output Q2*, function and behaviour
- Pulse value
- Analog output QA
- Flow range, for which shall apply 4-20 mA
- Creeping suppression
- Dosing input I1*, function and behaviour
- Optimization of measurement curve with up to 8 interpolation values (media matrix)

Described functions that are marked with * are not available for the 5-pin version. The available functions of 5-pin version are described in the connection table on page 8. To change configurations at Flowmeter a Programmtool is needed.

Functionalities of Flowmeter and Default Settings

Digital Outputs

All outputs switch over to high resistance when the supply is smaller than 18V. 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	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

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	0V	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

i 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

□ Digital output Q1

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

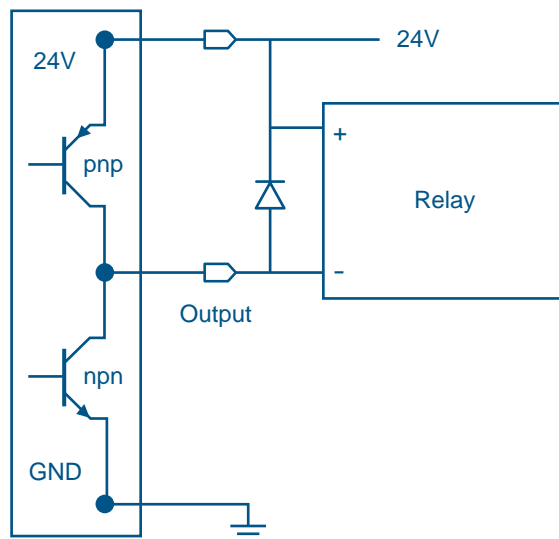


Fig. 5: Connecting Output Q1 to Relay

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

□ Digital output Q2*

Digital outputs 2 may be used as pulse output, empty pipe detection, for switching dosing valve, limit control or flow direction control. See Page- 7 **Electrical Wiring** table connection

The **npn** or **pnp** logic can be selected. When the output is connected to an inductive consumer a diode has to be installed parallel to the load.

Flowmeter via pnp, external counter e.g. PLC

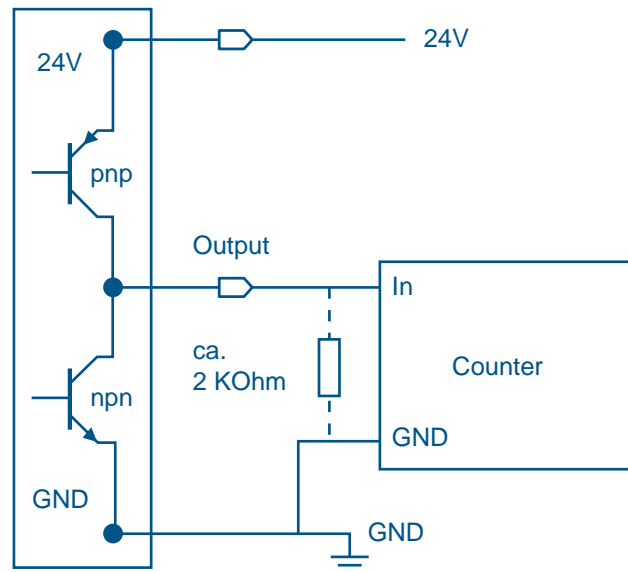


Fig. 6: Connecting Output Q2 to counter

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

i Important! Inductive load on the digital outputs without an installed diode may cause damage on the Flowmeter electronics. dosing batch.

Dosing Function

Dosing can be determined in different ways :

1. Flowmeter as dosing device (dosing control via Flowmeter)

Flowmeter controls the complete dosing function. The dosing quantity (e.g. 400 ml) is pre-set in the Flowmeter via Programmtool. Dosing starts, as soon as line start of dosing is wired to 24 V, e.g. via a pushbutton. Flowmeter will now open the dosing valve via the output configured for it. When the pre-set dosing quantity is reached, the dosing valve is closed via the above output. The second output can be used independently for signalling empty pipe, limit control, pulse output or signalling negative flow.

2. Flowmeter as flowmeter (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 now open the dosing valve. From now on Flowmeter will send a voltage pulse to the control for each volume unit that has flown through (e.g. per 1ml). When the pre-selected pulse quantity is reached, the control closes the dosing valve. In this case, output 1 is used to send out pulses, output 2 is independently usable for empty pipe detection, limit control or signalling negative flow.

⚠ 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 WARNING! closing of valves.

❑ Pulse value

This section determines the output settings for pulsed outputs.

Choose configuration such as to neither exceed the maximum output frequency of the Flowmeter (10kHz) nor the maximum input frequency of the control. If the maximum frequency is exceeded the Flowmeter 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	Pulse value	Frequency	Period	Duration of the Pulse	
ml/s	ml/Pulse	Hz	s	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	50

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

❑ Analog output QA

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


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

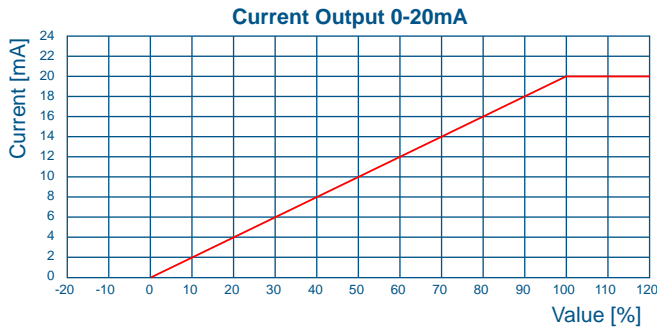
Setting range	0-20mA, 4-20mA, off
Output value	Flow, Temperature

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

Characteristic Curves Analog Output

0 - 20mA

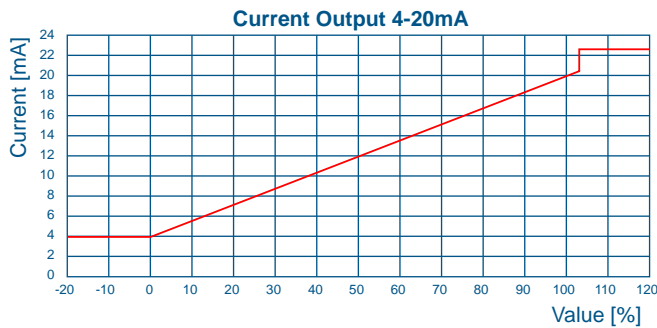
For the following graphic "min Range" is used for 0% and "max Range" is used for 100%.



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

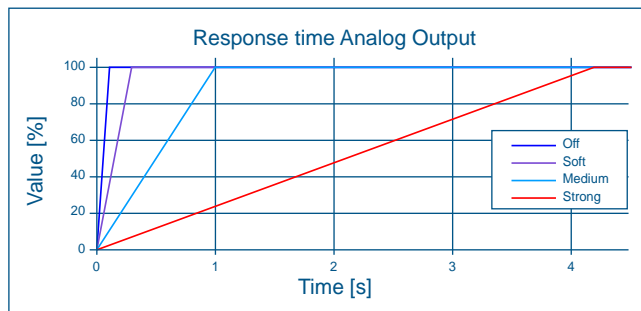
4 - 20mA

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

Filter options for Analog Output



Filter	100%
off	16ms
soft	0.3s
medium	1s
strong	4.2s

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 flowmeter.

There are higher tolerances below the Standard Default Settings.

- Setting range : 0.0...20 l/min, in 0.006 l/min steps
- Default settings : 0.09 l/min for DN7 / 3/8", LowFlow option 0.03l/min
- 0.3 l/min for DN10 / 1/2"
- 0.9 l/min for DN15 / 3/4"
- 1.2 l/min for DN20 / 1"

The Creeping Suppression Works with a Hysteresis of -25%.

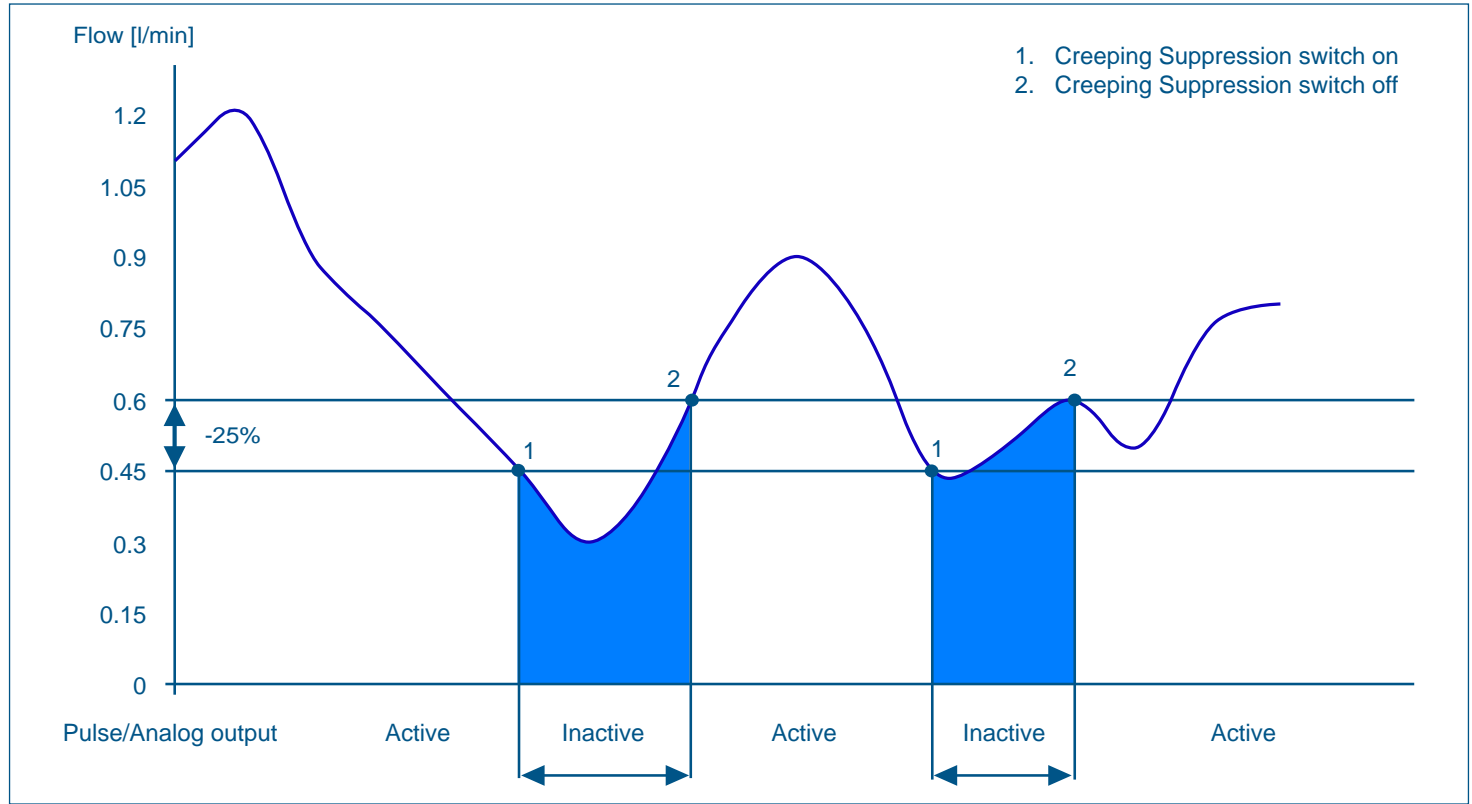


Fig. 7: Function of the creeping suppression illustrated with 0.6 l/min

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.

Digital input I1*

Flowmeter has a digital input that is programmable to following functions: dosing input, set offset, creeping suppression inactive and reset counter. In order to start a dosing process, 24V DC power is required. The status of the dosing parameters is modified with the Programmtool.

NOTE : The dosing input is locked so that a re-start is not possible during a running dosing process. After changing configurations via Programmtool a restart of the device is necessary to activate the doing input function.

Available Input Functions

	Set offset	Creeping flow off	Dosing	Reset Counter	off
0V	-	-	-	-	-
24V	Rising edge: 0->24V Set offset	State : deactivating creeping flow	Rising edge: 0->24V start dosing	Rising edge: 0->24 Vcounter is reset	-
Run only in stationary medium					

The input function "Set Offset" may only be used when there is no flow through the meter. If an offset trim is done while liquid flow is present an offset drift will cause measurement deviations. If the Flowmeter shows an offset drift caused by a wrong offset setting, run the function "Set Offset" or "Basic Trim" again with filled flow meter and no present flow.

Overview of Default Settings

Function	Default Settings
Digital output Q1	Pulse output as 24V normal open
Digital output Q2*	Empty pipe detection as 24V normal open
Digital input I1*	No function assigned
Analog output QA	Current output
Current output	4-20mA
Measuring range	20mA -> 6 l/min for 3/8" 24 l/min for 1/2" 60 l/min for 3/4" 120 l/min for 1"
Pulse value	1 ml/pulse
Creeping suppression	0.09 l/min for 3/8", 0.03l/min LowFlow 0.3 l/min for 1/2" 0.9 l/min for 3/4" 1.2 l/min for 1"

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. Are the direction of the arrow on the name plate and the actual flow direction in the pipe congruent?
- Is the measurement pipe completely filled with fluid?

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

Now, Flowmeter is operational!

Exchange of Measuring Device

- Switch off power before disconnecting the electrical connections!
- 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 flowmeter



- a) the programming of the previous flowmeter should be saved and copied on the new flowmeter
- b) when using the dosing function, set a quantity

If the device requires a configuration change, the display and programming unit Programmtool is required.

Repair, Hazardous Substances

Before sending the flowmeter 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.

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

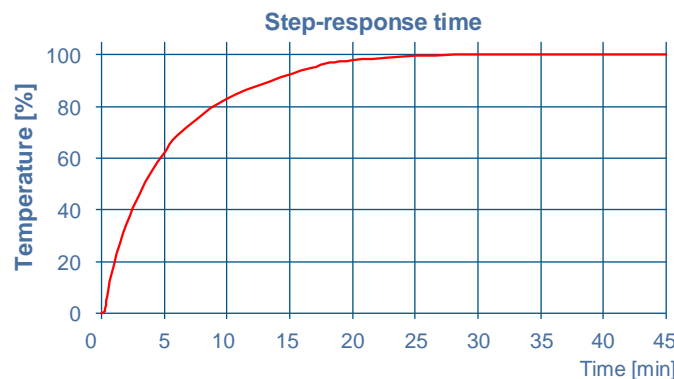
In order to be able to process your repair order quickly and smoothly it is important that you provide a technical contact person including phone and fax number as well as e-mail address.

Behavior of the Temperature Sensor

The integrated temperature sensor has no direct contact to the liquid and is used to calculate the expansion of the housing. The environment temperature greatly influences the actual temperature of the temperature sensor. The response time of temperature changes relates to the mounting position of the temperature sensor inside the housing.

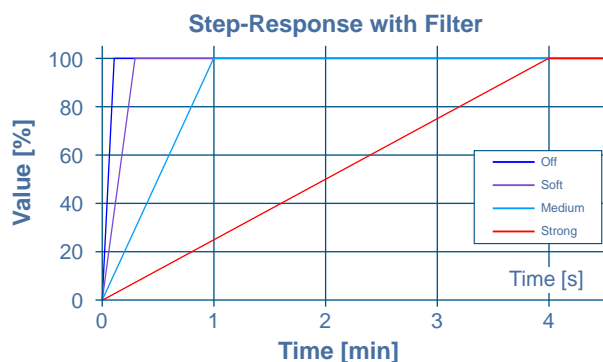
Step-Response Time

Step-response time after a significant temperature change. (Filter "Off")



Filter Configurations for Temperature Sensor

Filter	100%
Off	1s
Soft	16s
Medium	1min
Strong	4min



Influence of the environment temperature

In the table below some examples of the temperature influence are shown.

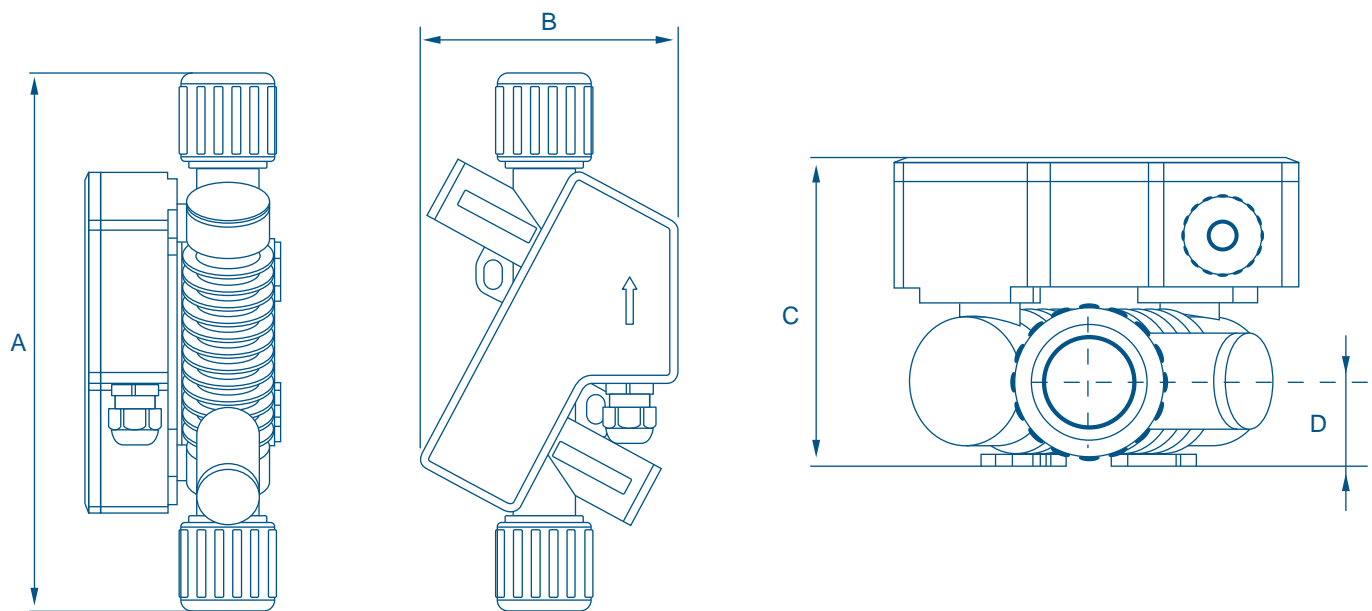
Liquid Temp	X	0.7	+	Environment temp.	X	0.3	=	Measured Temp.
40	X	0.7	+	20°C	X	0.3	=	34°C
40	X	0.7	+	20°C	X	0.3	=	37°C
40	X	0.7	+	20°C	X	0.3	=	40°C
60	X	0.7	+	20°C	X	0.3	=	48°C

In case of an error :

In case of a short circuit of the temperature sensor -50°C are shown.

In case of a cable brake between temperature sensor and electronic -30°C are shown.

Dimensions and Weight



Nominal width	Length A [mm]	Width B [mm]	Height C [mm]	Height of axis D [mm]	Weight [kg]
DN7 3/8"	218.0	120.0	79.0	16	1.1
DN10 1/2"	219.5	120.0	79.0	16	1.1
DN15 3/4"	227.0	120.0	82.0	19	1.1
DN20 1"	251.0	120.0	91.5	25	1.3

Warranty, Returns and Limitations

Warranty

Icon Process Controls Ltd warrants to the original purchaser of its products that such products will be free from defects in material and workmanship under normal use and service in accordance with instructions furnished by Icon Process Controls Ltd for a period of one year from the date of sale of such products. **Icon Process Controls Ltd** obligation under this warranty is solely and exclusively limited to the repair or replacement, at **Icon Process Controls Ltd** option, of the products or components, which **Icon Process Controls Ltd** examination determines to its satisfaction to be defective in material or workmanship within the warranty period. Icon Process Controls Ltd must be notified pursuant to the instructions below of any claim under this warranty within thirty (30) days of any claimed lack of conformity of the product. Any product repaired under this warranty will be warranted only for the remainder of the original warranty period. Any product provided as a replacement under this warranty will be warranted for the one year from the date of replacement.

Returns

Products cannot be returned to **Icon Process Controls Ltd** without prior authorization. To return a product that is thought to be defective, go to www.iconprocon.com, and submit a customer return (MRA) request form and follow the instructions therein. All warranty and non-warranty product returns to **Icon Process Controls Ltd** must be shipped prepaid and insured. **Icon Process Controls Ltd** will not be responsible for any products lost or damaged in shipment.

Limitations

This warranty does not apply to products which: 1) are beyond the warranty period or are products for which the original purchaser does not follow the warranty procedures outlined above; 2) have been subjected to electrical, mechanical or chemical damage due to improper, accidental or negligent use; 3) have been modified or altered; 4) anyone other than service personnel authorized by Icon Process Controls Ltd have attempted to repair; 5) have been involved in accidents or natural disasters; or 6) are damaged during return shipment to **Icon Process Controls Ltd** reserves the right to unilaterally waive this warranty and dispose of any product returned to **Icon Process Controls Ltd** where: 1) there is evidence of a potentially hazardous material present with the product; or 2) the product has remained unclaimed at Icon Process Controls Ltd for more than 30 days after Icon Process Controls Ltd has dutifully requested disposition. This warranty contains the sole express warranty made by **Icon Process Controls Ltd** in connection with its products. **ALL IMPLIED WARRANTIES, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE EXPRESSLY DISCLAIMED.** The remedies of repair or replacement as stated above are the exclusive remedies for the breach of this warranty. **IN NO EVENT SHALL Icon Process Controls Ltd BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY KIND INCLUDING PERSONAL OR REAL PROPERTY OR FOR INJURY TO ANY PERSON. THIS WARRANTY CONSTITUTES THE FINAL, COMPLETE AND EXCLUSIVE STATEMENT OF WARRANTY TERMS AND NO PERSON IS AUTHORIZED TO MAKE ANY OTHER WARRANTIES OR REPRESENTATIONS ON BEHALF OF Icon Process Controls Ltd.** This warranty will be interpreted pursuant to the laws of the province of Ontario, Canada.

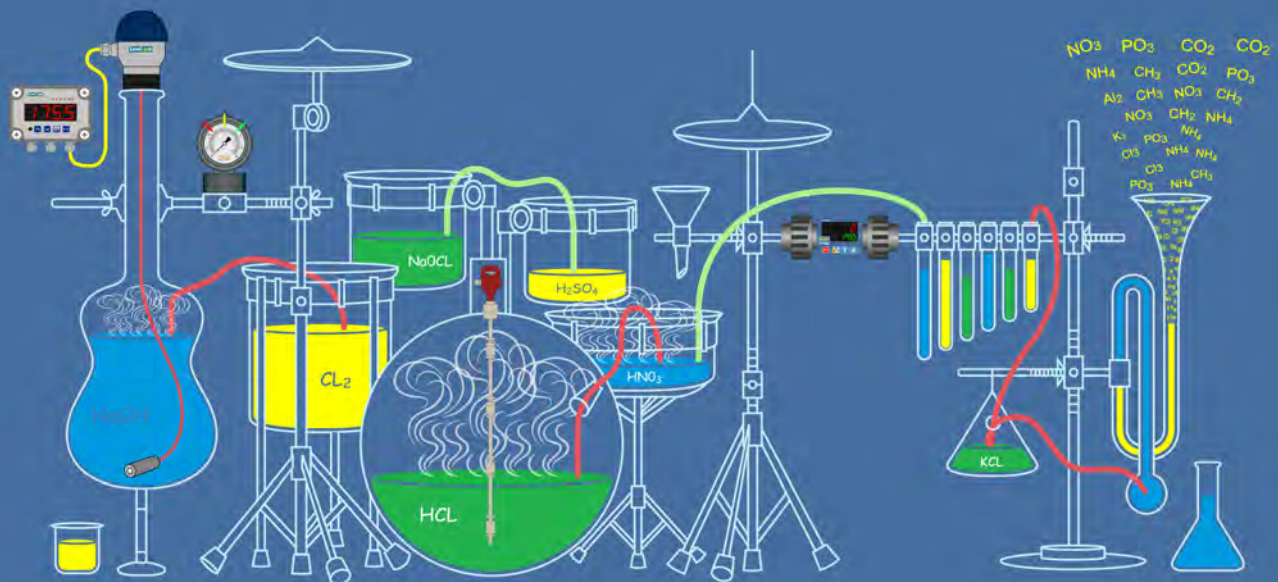
If any portion of this warranty is held to be invalid or unenforceable for any reason, such finding will not invalidate any other provision of this warranty

For additional product documentation and technical support visit www.iconprocon.com | e-mail: sales@iconprocon.com support@iconprocon.com | Ph: 905.469.9283



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