User's Guide

Ultrasonic Flow Meter

Series SONIC-VIEW

Please keep this User's Guide for future reference.
If the device is resold, please provide the User's Guide along with it.

MASS-FLOW ONLINE BV
www.massflow-online.com

Table of contents page

0 About this User's Guide

- The User's Guide is aimed at specialists and semi-skilled personnel.
- Before each step, read through the relevant advice carefully and keep to the specified order.
- Thoroughly read and understand the information in the section “Safety instructions”.

If you have any problems or questions, please contact your supplier or contact us directly at:

MASS-FLOW ONLINE BV
www.massflow-online.com

Hazard signs and other symbols used:

WARNING! / CAUTION! Risk of injury!
This sign indicates dangers that cause personal injuries that can lead to health defects or cause considerable damage to property.

CAUTION! Electric current!
This sign indicates dangers which could arise from handling of electric current.

CAUTION! Risk of injury in the case of excessive pressure!
This sign indicates dangers which could arise from excessive pressure in a piece of equipment.

CAUTION! Material damage!
This sign indicates actions which could lead to possible damage to material or environmental damage.

ADHERE TO USER'S GUIDE!

NOTICE!
This symbol indicates important notices, tips or information.

NO HOUSEHOLD WASTE!
The device must not be disposed of together with household waste!

⚠ Pay attention to and comply with information that is marked with this symbol.

↳ Follow the specified instructions and steps. Adhere to the given order.

❑ Check the specified points or notices.

→ Reference to another section, document or source.

• Item.

1 Device description

The SONIC-VIEW series from MASS FLOW ONLINE B.V., is a non-contact flow meter. The measurement is performed using ultrasound and works without any moving parts.

The SONIC-VIEW is used for measuring or metering water and aqueous solutions. The compact design and independence from the intake and discharge sections allows the SONIC-VIEW to be used under a variety of conditions.

Components:

① Meter housing:
The meter housing consists of aluminium die casting and has the IP54 degree of protection.

② Electrical connection:
The electrical connection is made via 5-pin plug M12x1.

③ Switchpoint table (label):
The set point table shows the configurable set points of the alarm output.

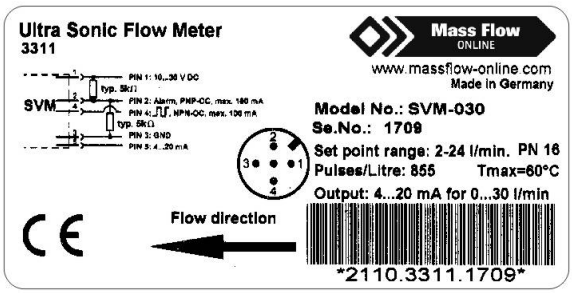
④ Process connection:
The process connections are available in different sizes.

⑤ Type plate with flow direction (label).

⑥ LED for flow/alarm indicator:
When flow is sufficient, the LED lights green. If there is a fault or the flow value falls below the switchpoint, the LED flashes resp. lights red.

⑦ Protective cap for rotary switch:
After removing the protective cap, the rotary switch can be adjusted to the desired switchpoint.

Example type plate:



Versions:

The SONIC-VIEW is available in nominal sizes DN10 and DN20.

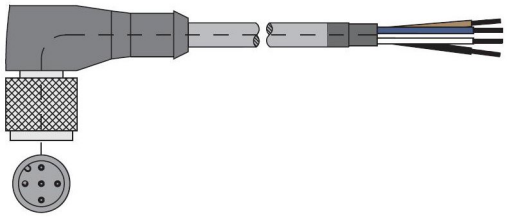
Both versions allow the frequency output, analog output as well as the process connection to be configured differently (→SONIC-VIEW Data sheet)

Scope of delivery:

- 1x Flow meter SONIC-VIEW with 3 protection caps (yellow).
- 1x User's Guide..
- 2x Flat gasket.
- 1x Packaging: Cardboard outer part, cardboard inner part with burl foam.

Accessories:

- Connection cable with moulded M12x1 coupling socket.



1.1 Intended use

The SONIC-VIEW ultrasound flow meter must only be used for measuring and metering water and aqueous solutions.

WARNING! No safety component!
The SONIC-VIEW are not safety components in accordance with Directive 2006-42-EG (Machine Directive).
↳ Never use the SONIC-VIEW as a safety component.

The operational safety of the device supplied is only guaranteed by intended use. The specified limits (→8 "Technical data") may under no circumstances be exceeded.

Before ordering and installation, check that the SONIC-VIEW materially suitable to the medium to be measured and your application.

The following components have contact with the medium:

Component	Material	Contact type
Meter housing	Aluminium die casting	indirectly
Process connections	Stainless steel 1.4404	permanently
Measuring pipe	Stainless steel 1.4404	permanently
Flat gasket	NBR	permanently

2 Safety instructions

Before you install the SONIC-VIEW, read through this User's Guide carefully. If the instructions contained within it are not followed, in particular the safety guidelines, this could result in danger for people, the environment, and the device and the system it is connected to.

The SONIC-VIEW correspond to the state-of-the-art technology. This concerns the accuracy, the operating mode and the safe operation of the device.

In order to guarantee that the device operates safely, the operator must act competently and be conscious of safety issues.

MASS FLOW ONLINE B.V. provides support for the use of its products through their website. The customer verifies that our product is fit for purpose based on our technical information and customer- and applicationspecific test to proof the products fitness for its purpose. With this verification all hazards and risks are transferred to our customers; our warranty is not valid.

Qualified personnel:

⚠ The personnel who are charged for the installation, operation and maintenance of the SONIC-VIEW must hold a relevant qualification. This can be based on training or relevant tuition.
The personnel must be aware of this User's Guide and have access to it at all times.

⚠ The electrical connection should only be carried out by a fully qualified electrician.

General safety instructions:

⚠ In all work, the existing national regulations for accident prevention and safety in the workplace must be complied with. Any internal regulations of the operator must also be complied with, even if these are not mentioned in this manual.

⚠ Degree of protection IP54:
Ensure that conditions at the place of use correspond to the IP54 degree of protection.

⚠ Only use the SONIC-VIEW if it is in perfect condition. Damaged or faulty devices must be checked without delay and, if necessary, replaced.

⚠ When fitting, connecting and removing the device use only suitable appropriate tools.

Special safety instructions:

Warnings that are specifically relevant to individual operating procedures or activities can be found at the beginning of the relevant sections of this User's Guide.

3 Construction and function

Construction:

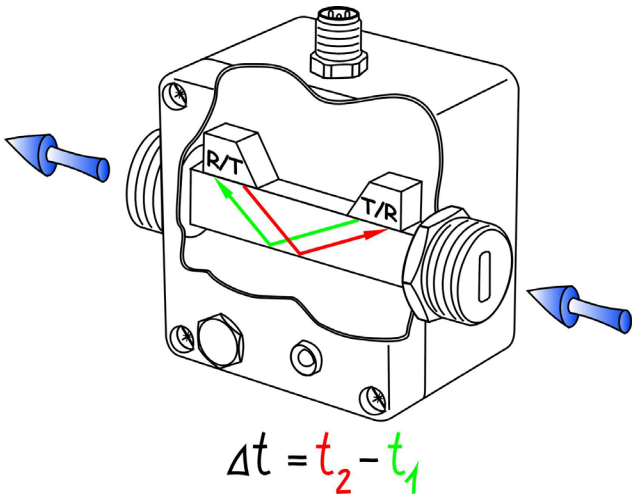
The measuring pipe runs through the housing of the meter and is welded to the exterior process connections of the SONIC-VIEW. The meter housing also contains the ultrasonic components as well as the measuring and processing electronics.

The two ultrasonic components are seated on the outside, on the measuring pipe. For this reason, the SONIC-VIEW does not require any moving parts. The inside of the measuring pipe is completely clear. The fluid can flow unobstructed through the measuring pipe.

Function:

In a flowing medium, the propagation speed of sound waves is greater in the direction of the flow and less when opposite the flow, respectively. A sonic signal requires less time when travelling with the flow between transmitter and receiver than it would if it were moving against the flow.

To measure flow, the SONIC-VIEW works according to the time difference method:
This entails transmitting an ultrasonic signal from the transmitter [T] through the fluid in the measuring pipe to the receiver [R]. This occurs once in both flow directions. The ultrasonic elements [T/R] and [R/T] alternate in their roles as transmitter and receiver.



When performing the measurement, the length of time t_1 in the direction of flow ➡ and then the length of time t_2 against the flow ⬅ is measured. The difference in time $\Delta t = t_2 - t_1$ is used to calculate the average flow speed inside the measuring pipe. A new measurement is then started.

The signals from the frequency output and the analog output are proportional to the flow that has been measured. The alarm output and LED are activated when the set flow value is reached. The output signals are updated with each measurement.

4 Installation and electrical connection

Before installing the SONIC-VIEW, check that

❒ the equipment is switched off and is in a safe and de-energised state.

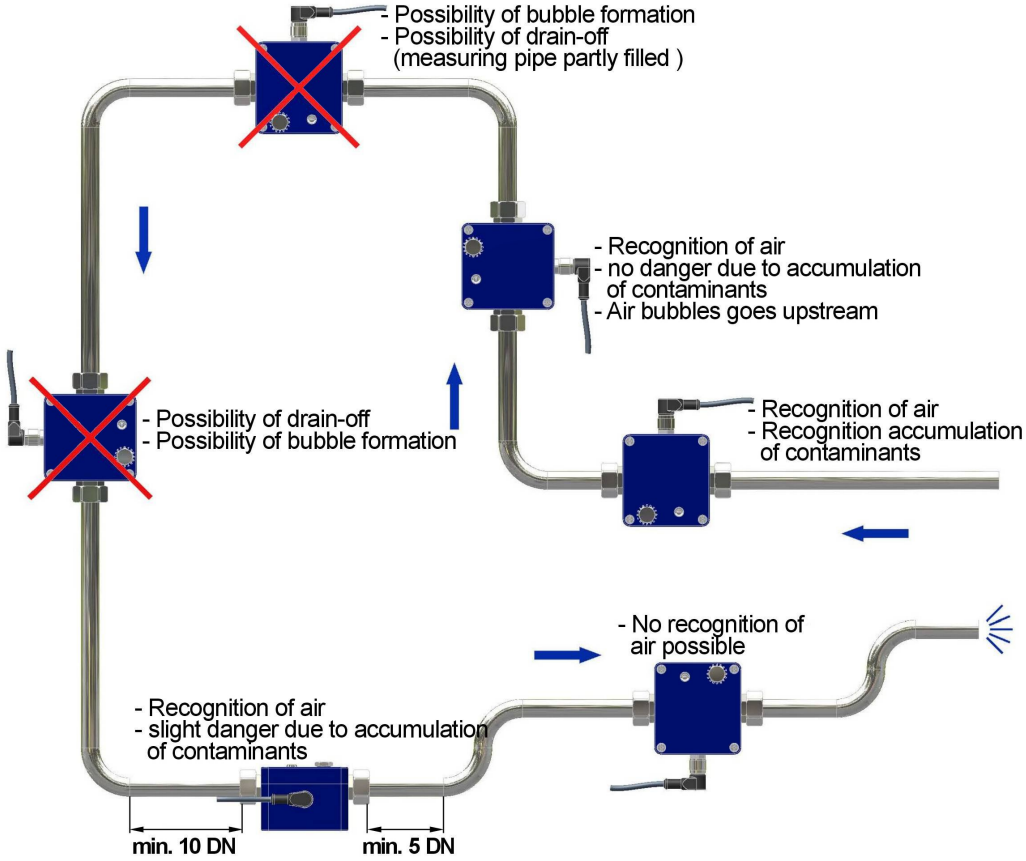
❒ the equipment is depressurised and has cooled down.

SUITABLE TOOLS:
Use only suitable tools of the correct size.

4.1 Installation of SONIC-VIEW

Installation of SONIC-VIEW:

- The SONIC-VIEW can always be installed anywhere along the pipeline. Straight sections of piping are preferable, however.

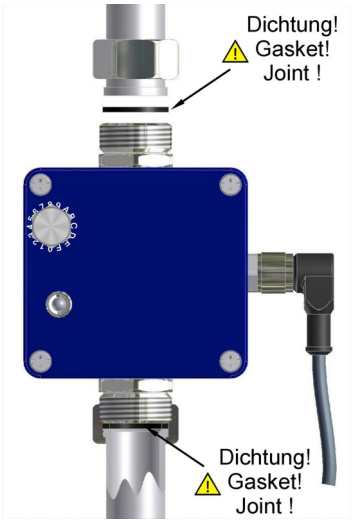


- The unit can be installed in both horizontal as well as vertical pipelines. The flow meter is only suitable for use in fully filled piping.
- Due to its operating principle, ultrasonic flow meters do not, for the most part, depend on the flow profile. A calming section is not absolutely necessary.
  However, to ensure the greatest possible degree of measuring accuracy, straight inlet and outlet pipe of the appropriate nominal diameter (DN) should be used. The inlet pipe should be at least 10 x DN, the outlet pipe 5 x DN, respectively.
- The degassing of the medium due to a temperature increase should be prevented by taking appropriate measures, e.g. increased system pressure.

Assembly:

The SONIC-VIEW is installed directly into the pipeline. The compact design and light weight of the unit make wall-mounting unnecessary.

IMPORTANT NOTICES:
- When installing the unit, use only the gasket that are provided.
- Observe the flow direction indicated on the type plate.
- Observe the mounting dimensions (→ dimensions).



↳ Select an appropriate location for installation (→ Installation instruction).
To ensure the best possible measuring accuracy, a horizontal installation position with increasing flow is preferable (no collecting of dirt deposits).

↳ Install the appropriate screwed connections at the installation location.

↳ Insert the SONIC-VIEW together with the gaskets.

↳ Screw the union nuts of the screwed connection onto the process connections of the SONIC-VIEW.

CAUTION! Material damage!
While tightening, counter the union nut on the hexagon of the process connection (A/F27 or A/F36)!
If you do not counter it, the SONIC-VIEW can be damaged.

↳ Tighten both union nuts.
When tightening, use a spanner (A/F27 or A/F36) to counter the process connection on the hexagon in place.

4.2 Electrical connection

The electrical connection of the SONIC-VIEW is a 5-pin plug M12x1 on the top side.

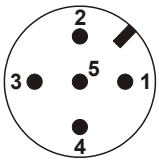
The corresponding connection cables with moulded coupling socket are available as an option.

CAUTION! Electric current!
The electrical connection should only be carried out by a fully qualified electrician.
↳ De-energize the electrical system before connecting the SONIC-VIEW.

Terminals and wiring:

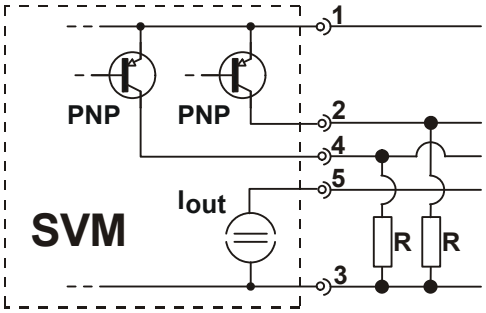
- ↳ Screw the coupling socket of the connection cable to the plug of the SONIC-VIEW.
- ↳ Tighten the knurled nut of the coupling socket with a maximum torque of 1 Nm.
- ↳ Connect the connection cables according to the following wiring diagrams.

Pin assignment:



Pin 1: $+U_B$
Pin 2: Alarm output PNP
Pin 3: GND
Pin 4: Frequenz output PNP
Pin 5: Analog output (4…20 mA)

Pin configuration with
PNP frequency output:



Pull-up- / pull-down-resistors (**R**).
We recommend using resistors of ~ 5 kΩ and 0.25 W for the pull-up / pull-down wiring.
Please note that the maximum signal current of 100 mA will not be exceeded.

5 Start-up and measuring mode

Before switching on the SONIC-VIEW for the first time, please follow the instructions in the following section.

5.1 Start-up

Before switching on the unit for the first time, check that

- ❒ the SONIC-VIEW has been installed correctly and that all screw connections are sealed.
- ❒ the electrical wiring has been connected properly.
- ❒ the measuring system is vented by flushing.

↳ Switch on the supply voltage.

The LED indicator illuminates and blinks briefly. The SONIC-VIEW is now ready for operation and goes into measuring mode.

5.2 Measuring mode

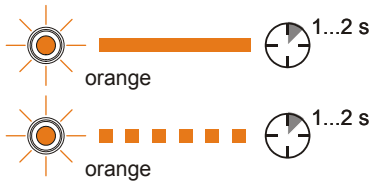
CAUTION! Maximum flow 33 l/min or 140 l/min!
Flows higher then the maximum for SVM-030 (33 l/min) or SVM-110 (140 l/min) will be displayed as considerably lower flow rates.
↳ Take proper measures to ensure the maximum flow is not exceeded.

Initialization:

The SONIC-VIEW is initialized when it is switched on.

At first, the LED will shine orange for 1…2 s. The LED then blinks for an additional 1...2 s.

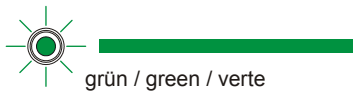
After ~ 2…5 s, the SONIC-VIEW will be in measuring mode and the flow will be measured continuously.



Depending on the switchpoint configuration and measured flow, either flow or alarm will be displayed.

Flow indicator:

The LED lights green. The measured flow is greater than the switchpoint for decreasing flow of the selected switch position (→ switchpoints alarm output).



Alarm indicator:

The LED lights red. The measured flow is below the switchpoint for decreasing flow.

The alarm output is activated.

Fault indicator:

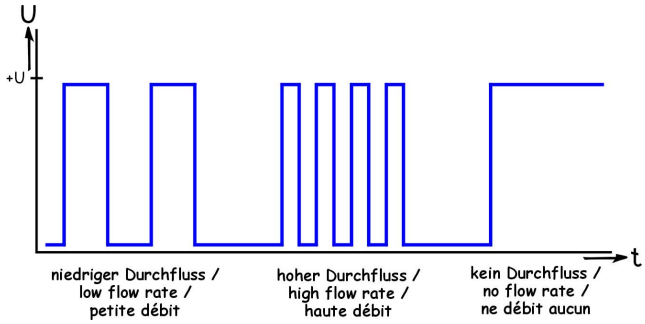
The LED blinks red. The SONIC-VIEW has air in the system, dirt in the measuring pipe or has found some other fault.

The alarm output is activated.

Frequency output:

The frequency output provides a flow-proportional PNP square wave signal.

There is no galvanic separation between the power supply and the output signal.



Analog output:

The analog output signal porvides a proportional signal current in accordance with NAMUR NE43.

Configuration	Type	Measuring range	Output signal
Flow	SVM-030	0…30 l/min	4…20 mA
Flow	SVM-110	0…110 l/min	4…20 mA

Alarm output:

The alarm output is constructed as a PNP open collector and can be connected accordingly (→ 4.2 "Electrical connection").

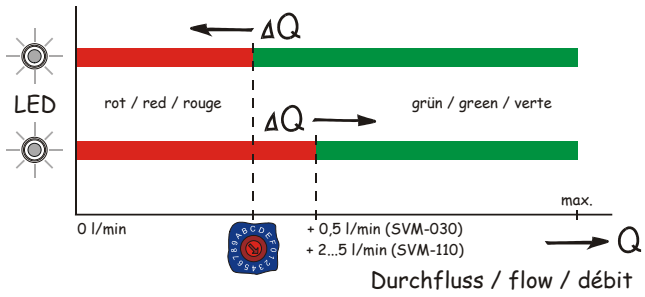
Please note that the maximum signal current of 100 mA will not be exceeded.

5.2.1 Switching characteristics

The LED and alarm output always switch simultaneously.

Decreasing flow ← **ΔQ**:
Is the value below the switchpoint, the alarm output switches and the LED lights red.

Increasing flow **ΔQ** →:
Only if the switchpoint is exceeded by more than 0,5 l/min (SVM-030) or 2…5 l/min (SVM-110), the alarm output switch back and the LED lights green.



The hysteresis of 0,5 l/min or 2…5 l/min prevents the LED and alarm output from oscillating during the switch operation.

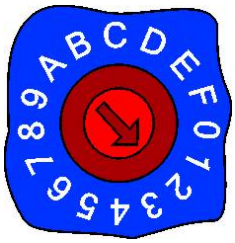
5.2.2 Set switchpoints

The rotary switch allows you to use 16 different switchpoints. The following table presents the standard flow values for the switch positions.

Switchpoints for alarm output																
SVM-030																
Switch position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Switchpoint decreasing flow [l/min]	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0
Switchpoint increasing flow (Hysterese)	0.5 l/min above the switchpoint of the switch position															
SVM-110																
Switch position	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Switchpoint decreasing flow [l/min]	3.0	5.0	6.0	8.0	10	12	15	18	20	25	30	35	40	50	70	100
Switchpoint increasing flow (Hysterese)	5.0	7.0	8.0	10	12	14	17	20	22	27	33	38	44	55	75	105

Switchpoint setting:

- Use a spanner (a/f 14) to loosen the protective cap.
- Screw off the protective cap.
- Use a narrow screwdriver to turn the rotary switch to the desired switchpoint.
- Screw the protective cap back into the housing. Look for damages and make sure that the O-ring is seated correctly.
- Use a spanner (a/f 14) to gently tighten the protective cap..



6 Maintenance, cleaning and faults

Maintenance:
The SONIC-VIEW is maintenance-free and cannot be repaired by the user. In case of a defect, the device must be sent back the manufacturer for repair.

CAUTION! Material damage!
Never open the SONIC-VIEW and / or perform any repair yourself.
When opening the device, critical parts or components can be damaged.

Cleaning:
Clean the SONIC-VIEW with a dry or slightly damp cloth. Do not use sharp objects or aggressive agents for cleaning.

Faults:

The following table lists faults and their remedies

Fault	Possible cause	Remedy
Not working	Supply voltage	Check the supply voltage connection.
LED red and blinking	Temperature outside the specified range	Check the temperature of the medium.
	Air in the system	Bleed the system.
	Dirt deposits.	Dismantle the SONIC-VIEW and clean the measuring pipe.

If you are unable to remedy a particular disturbance, please send in the device for repair and include a brief description of the problem, the environmental conditions and the length of time the device was operational before the fault occurred.

7 Disassembly and disposal

CAUTION! Risk of injury from over-pressurisation!

Never try to remove a flow meter from a pressurised installation.

↳ Make sure that the installation is fully depressurised before removing the flow meter.

Before disassembly:

Prior to disassembly, ensure that

❒ the equipment is switched off and is in a safe and de-energised state.

❒ the equipment is depressurised and has cooled down.

Disassembly:

↳ Remove the electrical connectors.

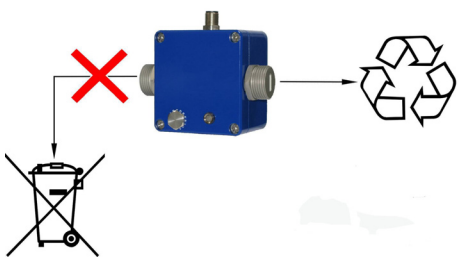
↳ Remove the flow meter using suitable tools.

Disposal:

No household waste!

The SONIC-VIEW consists of various different materials and must not be disposed of with household waste.

↳ Take the SONIC-VIEW to your local recycling plant



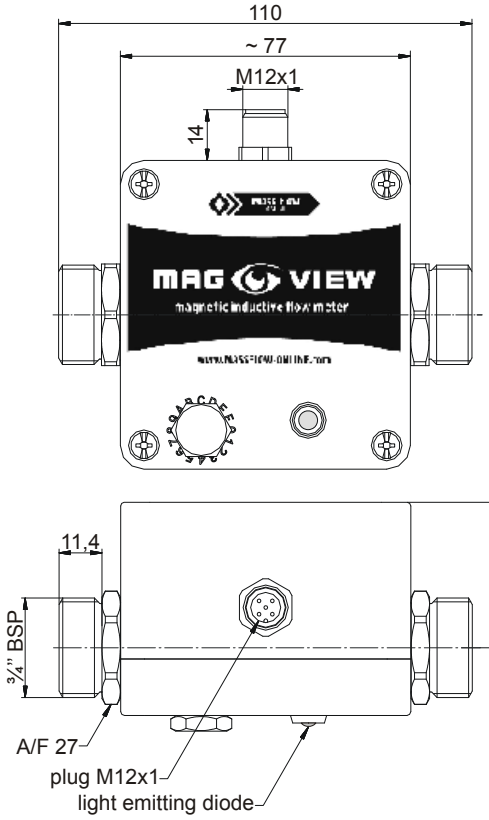
8 Technical data

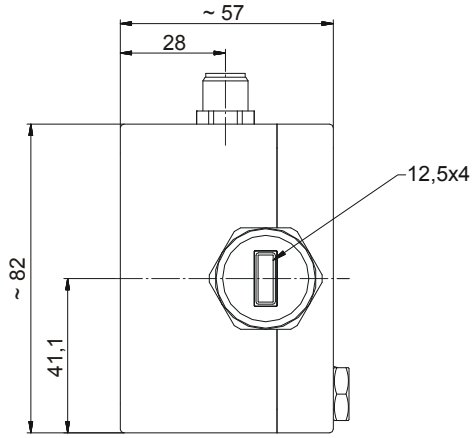
The technical data of customised versions may differ from the data in the instructions. Please observe the informations specified on the type plate.

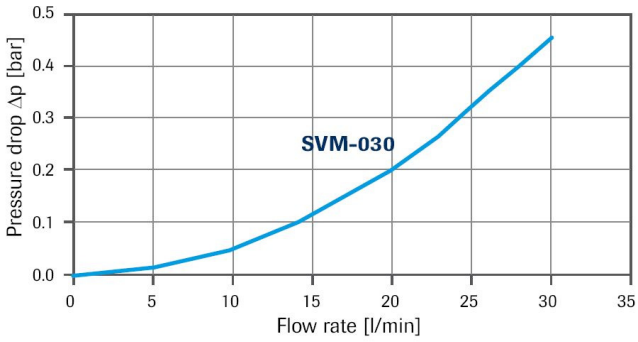
Type	SVM-030	SVM-110
Measurement device characteristics		
Measuring range	1.5…30 l/min	5…110
Accuracy *Test conditions:* *- Water 20…60 °C at* *- Adjustment 30 °C at*	±4% of reading (3.0…30 l/min). ±10% of reading (1.5…3.0 l/min). *5 l/min* *3 and 27 l/min*	±4% of reading (10…110 l/min). ±10% of reading (5…10 l/min). *10 l/min* *11 and 100 l/min*
Reproducibility	1%	1%
Output signal starting from	~ 1 l/min	~ 2 l/min
max. flow rate	33 l/min	140 l/min
Response time	< 500 ms	
Flow / alarm indication	LED green / red	
Output signal characteristics		
Frequency output:		
- Pulse rate / K-factor	855 pulses/l	200 pulses/l
- Resolution	1.2 ml/pulse	5 ml/pulse
- Signal shape	Square wave signal • duty cycle 50:50 PNP open collector	
- max. pull-up voltage	30 VDC	
Analog output:		
- Signal current: • Flow	4…20 mA acc. NAMUR NE43 equates 0…30 l/min	equates 0…110 l/min
- max. working resistance (R)	R = (+U - 10 V) / 23 mA	
Alarm output:		
- Switchpoints	16 switchpoints (rotary switch) as shown in switchpoint table	
- Alarm at	too little flow or faults	
- Wiring	PNP open collector	
- Signal current	max. 100 mA, short-circuit proof	
Electrical characteristics		
Supply voltage	10…30 VDC	
Current consumption	max. 80 mA	
Electrical connection	5-pin-plug M12x1	
Electrical protection measures	short-circuit proof (up to 30 V) protected against polarity reversal (up to -30 V)	
Degree of protection	IP 54	
Process variables		
Medium to measure	Water and aqueous solutions	
Medium temperature	5…60 °C	
Ambient temperature	5…60 °C	
Nominal diameter	DN 10	DN 20
Nominal pressure	PN 16	
Process connection	¾ " BSP male thread	1" BSP male thread

9 Dimensions, Pressure drop

SONIC-VIEW SVM-030







SONIC-VIEW SVM-110