

Operating instructions

for flow meters of the product series "RS 5" and "RS 10"

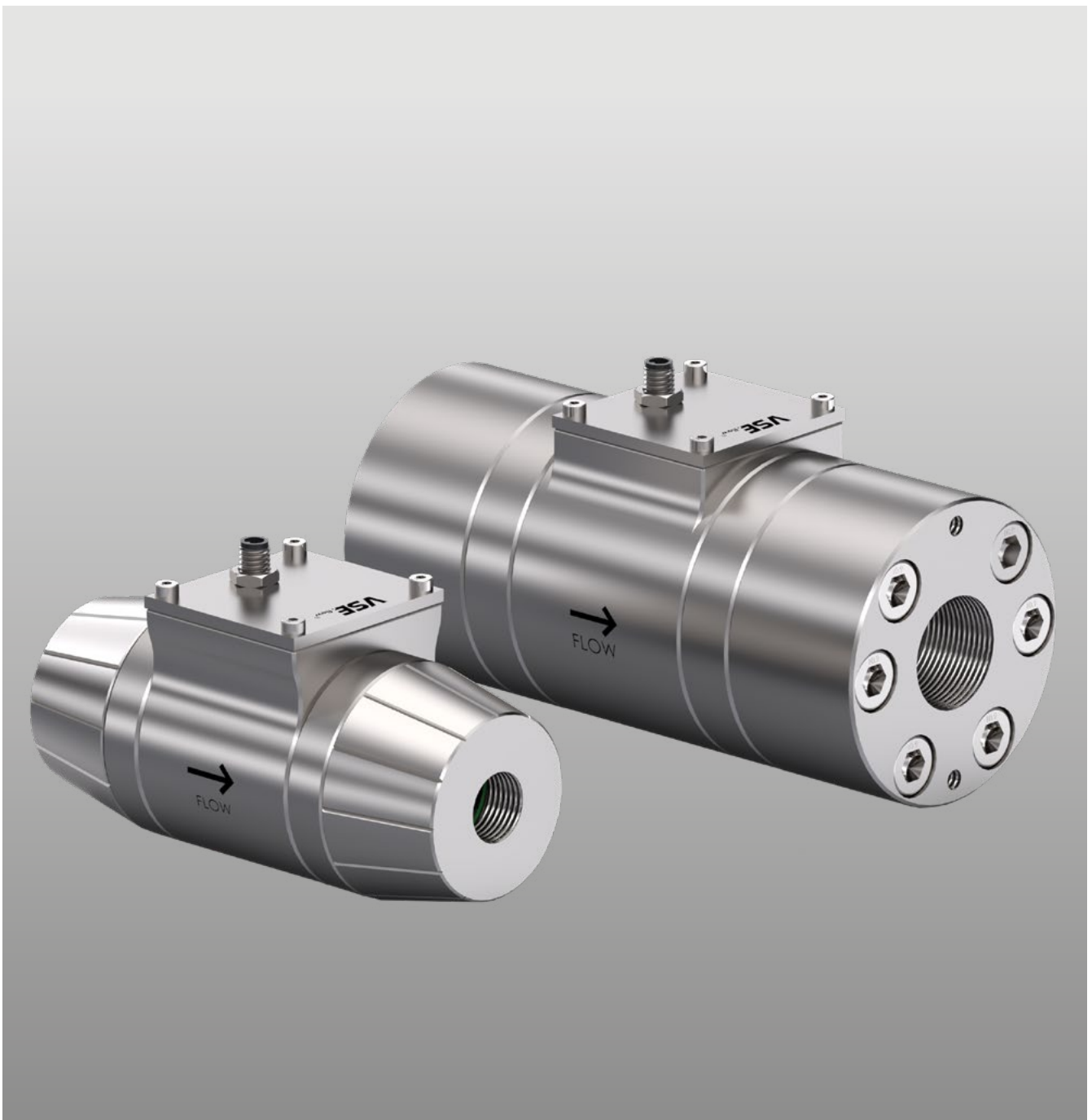


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1. IMPORTANT INFORMATION AND LEGAL NOTICES

Dear customer, dear user,

This operating instruction for flow meters of the **“RS 5 and RS 10”** series for microdosing by VSE Volumentchnik GmbH (VSE) contains information required to properly install and commission the flow meter for the intended purpose.

Any installation, commissioning, operation, maintenance and testing may only be carried out by trained and authorized personnel. The operating instructions must be read and followed carefully to ensure a trouble-free, proper and safe operation of the flow meter. In particular, the safety instructions are essential.

These operating instructions must be kept safe and accessible for the authorized personnel at all times. At no time should contents of the operating instructions be removed. A missing manual or missing pages must be replaced immediately if lost. The operating instructions can be requested at any time from VSE or downloaded from our website www.vse-flow.com. The operating instructions must be passed on to each subsequent user of the flow meter.

This operating instruction is not subject to any modification service by VSE. VSE reserves the right to make technical changes at any time without notice.

VSE makes no warranties, express or implied, with respect to commercial qualities and suitability for a particular purpose.

VSE accepts no liability for damage and malfunctions resulting from operating errors, failure to observe these operating instructions, improper installation, commissioning or maintenance as well as improper use of the flow meter.

The opening of the flow meter is absolutely not permitted. After an unauthorized opening or rebuilding as well as after a single, incorrect electrical connection of the flow meter, the warranty as well as the product liability by VSE will be void.

2. FUNCTION DESCRIPTION OF THE RS FLOW METERS

RS flow meters measure the flow rate based on the screw pump principle. The measuring mechanism consists of a pair of rotors that are precisely fitted into the housing. The rotation of the rotors is detected by a contactless signal pick-up system and converted into digital pulses.

Together with the housing walls, the rotor edges form closed measuring chambers in which the fluid is transported from the inlet to the outlet port.

The volume of fluid displaced within one secondary rotor revolution is called rotational volume. The rotation is recorded by the pickup system and output by the preamplifier as a pulse signal.

Advantages

- Pulsation-free measurement
- Lowest pressure losses
- Short response time due to innovative rotor profile and reduced mass
- Highest functionality due to intelligent sensor technology
- Gentle fluid measurements

3. GENERAL DESCRIPTION

Please follow all instructions in this manual to ensure the trouble-free operation of the RS flow meters. VSE is not liable or responsible for any damages resulting from noncompliance with these instructions.

4. RS FLOW METER SELECTION

For the trouble-free, safe, and reliable operation of the flow meters, selecting the correct type and size is critical. Because of the wide variety of applications and flow meter types, the technical data in the VSE catalogue are kept general. Certain properties of the devices are

5. DECLARATION OF CONFORMITY

The flow meters of the "RS5 and RS10" series have been tested for electromagnetic compatibility and are in compliance with all applicable standards regarding electromagnetic compatibility (EMC).

They cannot be operated independently, are connected by cable to a power source, and provide digital electrical signals for electronic evaluation. All flow meters have a declaration of conformity, which can be requested if necessary.

Sensor system explanation

The pickup system directly detects the movement of the spindles and transmits the sine/cosine signals to the preamplifier electronics.

In the preamplifier electronics, these signals are processed, measured, and then converted into high-resolution quadrature signals. The resolution can be selected between the factors 256, 512, or 1024.

The frequency of the output signals is proportional to the flow rate (volume flow) and depends on the respective flow meter size. The frequency range depends of the filter setting and is limited to 80 or 200 kHz. The flow meter is suitable for media temperatures up to +80°C.

The device may only be opened within the warranty period after consultation and approval by VSE.

dependent on type, size and measuring range, as well as the liquid to be measured. Please contact VSE or one of our sales and service representatives for detailed information about the appropriate flow meter for your particular application.

Since the electromagnetic compatibility of the entire measuring system is also dependent on the installation of the cables, the correct connection of the shield, and each individual connected device, all components must comply with the EMC directive, and the electromagnetic compatibility of the entire system or machine must be ensured as well.

All flow meters are CE certified. The EC conformity marking is the CE mark affixed to the type-plate of all flow meters.

6. GENERAL OPERATING REQUIREMENTS

Before assembly or putting into operation (commissioning), check and verify the following properties and aspects of the respective circumstances of your system to ensure operation is trouble-free, safe, and reliable.

1. The fluid to be processed

- Is the flow meter suitable for the fluid?
- Is the fluid viscous or abrasive?
- Is the fluid dirty or does it contain contaminants/pollutants and solid particles?
- Which grain sizes do these solids have and could they block the measuring mechanism?
- Does the fluid have fillers or other additives?
- Is it necessary to install an upstream hydraulic filter?
- Are tubes and pipes clean and free of assembly residues such as chips or weld spatter?
- Is the tank clean and is it impossible for impurities or foreign substances to reach the pipeline or tubing system from the tank?
- Is a different fluid used frequently and is the system sufficiently flushed and rinsed in between?
- Are pipes/tubes and the entire system completely deaerated?
- Which cleaning agent is being used?
- Are fluid and cleaning agent compatible with the seals?
- Are the seals suitable for the fluid to be measured (compatibilities of seals)?

2. Hydraulic properties of the system

- Is the max. operating pressure of the system less than the max. permissible operating pressure of the flow meter?
- Is the max. pressure drop Δp (at flow meter) below the max. permissible pressure drop?
- Is the pressure drop Δp not excessive with max. flow (e.g. high viscosity)?
- Does the flow range of the flow meter (dependent on the viscosity) correspond with the present flow?
- Please note that the flow range is less with higher viscosity!
- Does the temperature range of the flow meter correspond with the present max. temperature of the fluid?
- Is the cross-section of the pipes/tubes large enough and are there no overly large pressure drops in the system?
- Is the hydraulic connection (inlet/outlet) correctly connected and sealed properly?
- Does the pump have enough power to operate the system?
- A blocked flow meter can stop the entire flow. Does the system feature an overpressure / bypass valve? This valve must be checked and maintained at regular intervals.

3. Electronic evaluation and electrical safety

- Have you selected the optimal flow meter?
- Is the flow meter voltage the same as the power supply voltage?
- Is the voltage of the power supply or the evaluating device sufficiently filtered?
- Does the output power of the supply voltage correspond with the required output power?
- Is the electrical connection established based on the enclosed wiring plan?
- Is the cable protected by a shield?
- Is there a connection between the cable shielding and the flow meter's M5 plug?
- Is there a potential difference between the PE on the flow meter and the PE at the evaluating device?
- Is a compensation line to eliminate the potential difference needed between the flow meter and the evaluating device?
- Is the flow meter permanently attached to the protective earth conductor (PE) (e.g. via the pipes)?
- Is the flow meter insulated to the protective earth conductor (PE) (e.g. connection via pipes/tubes)? If this applies, the protective earth conductor (PE) must be connected to the flow meter!
- Is the cable installed free of interference and is it impossible to couple interfering impulses?
- Is the round pin plug of the connection cable firmly attached to the plug of the flow meter?
- Are the wires at the evaluating device connected correctly?
- Does the entire system meet the legal rules and regulations concerning electromagnetic compatibility (EMC)?
- Is compliance with all local rule and regulations, applicable rules, guidelines and basic conditions of the EMC ensured?
- Systems where a malfunction or failure may lead to personal injuries must be equipped with suitable safety mechanisms. The function of these safety mechanisms must be checked at regular intervals.

7. MAXIMUM OPERATING PRESSURE

Before installing the flow meter, you must check whether the system's maximum operating pressure does not exceed the flow meter's maximum allowable operating pressure. Make sure to also consider the peak pressures that may occur during system operation.

Important:

Please contact VSE for all operating pressures > 80 bar for RS 5, > 250 bar for RS 10 and for special designs.



8. INFORMATION ON EU DIRECTIVE 2014/68/EU ON PRESSURE EQUIPMENT

VSE flow meters are classified as "piping" under Article 2, No. 3 of the aforementioned Directive and are therefore subject to this Directive. According to Article 4, paragraph (1c), VSE flow meters must comply with the technical requirements specified in Article 4 of the Directive. Only fluids of Group 2, according to Article 13, paragraph (1b) may be measured with the flow meters. If (hazardous) fluids of Group 1 are to be measured, VSE must be consulted.

The flow meters offered by VSE do not reach the limit values specified in Article 4, paragraph (1c) (ii). The technical requirements for VSE flow

meters are therefore limited to the criteria set out in Article 4, paragraph (3). This means that the devices must be designed and manufactured in accordance with good engineering practice in a Member State, which is hereby confirmed.

The paragraph also specifies that these units must not bear the CE marking referred to in Article 18. Therefore, a CE declaration of conformity is not issued in accordance with Directive 2014/68/EU.

The CE marking of our flow meters refers to Directive 2014/30/EU + Directive 2014/34/EU for our Ex-type flow meters.

9. FLOW RATE MEASURING RANGE

The flow range ($Q_{min} - Q_{max}$) specified in the data sheet for the flow meter refers to the test fluid "hydraulic oil" with a viscosity of approximately 1500 mPas at a temperature of 20°C. For this measurement range, VSE specifies an accuracy of up to 2 % of the measured value and a repeatability of 0.5 %.

For media with low viscosity (< 800 mPas), the measurement accuracy decreases, while it may increase for media with high viscosity (> 1500 mPas). Please note that the maximum flowrate (Q_{max}) is limited at higher viscosity (see "RS 5 and RS10 flow meter technical data").

Important:

Verify that the specified maximum permissible operating pressure of the flow meter can never be exceeded in any operating mode of the system. Also pay attention to the flow measuring range, which is dependent on the viscosity of the fluid to be measured.



10. MOUNTING THE FLOW METER

The flow meter should be mounted in an easily accessible location so that disassembly for cleaning the measuring elements is easily possible. Since flow meters operate in any orientation and flow direction, you can mount it anywhere in your system. When installing the flow meter, make sure that liquid remains in the flow meter even at standstill of the system and that the flow meter can never run dry. Please note that the outlet of the flow meter should have a certain amount of backpressure. This ensures that the measuring mechanism of the flow meter is firmly clamped in the fluid line and always filled with media, thus preventing it from emptying. In critical cases, or if the pipes can run empty in standstill or standby mode, it is always advisable to install an additional check valve in the outlet line.

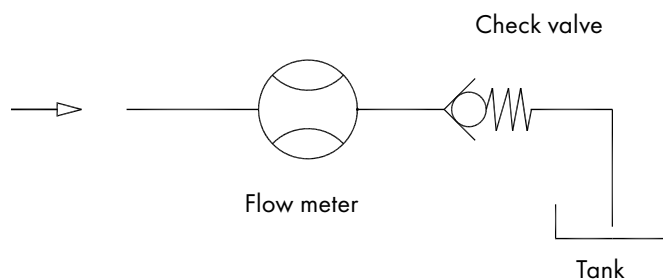


Fig. 1: Flow meter with backpressure

Important:

Make sure that the flow meter is always completely filled both at the inlet and outlet and that there is back pressure at the outlet. This prevents the measuring mechanism from being damaged by a sudden and steep increase of flow and at the same time improves measurement accuracy.



Flow meters of the "RS 5 and RS 10" series can be installed in a pipe system. It is recommended to use preferably large cross-sections at the inlet and outlet of the flow meter and also in the entire piping system. This reduces the pressure drop and thus also the influence on the flow rate in the entire system.

Installation notes

Installation position

The flow meter can be mounted in any orientation. If necessary, note the preferred flow direction (calibration arrow).

Try to orient the flow meter in a way that the preamplifier is facing away from any heat sources and heat build-up is avoided.

Straight pipe sections are **not** required before the inlet or after the outlet.

Connecting units

If the connecting units (mounting flanges) are installed on-site, ensure the specified tightening torques of the screws.

Attention: risk of damage!!! The RS 5 has a screw cap. Please do not tighten with a pipe wrench. Only tighten by hand and retighten if necessary.

Pipe thread

Please comply with the screw-in depths and sealing systems. Teflon tape, liquid sealants and adhesives are not permitted!

Fastening

The devices must be installed stress-free into the pipes. The RS10 features additional mounting threads on both the inlet and outlet port to relieve mechanical stress. If the installation is not stress-free, the maximum operating pressure may be limited! The connecting unit of the RS5 is designed as a M24x1.5 screw cap. Please only fasten hand-tight.

Table 1: Tightening torque of the connection units

Size	Torque
RS 5	1.8 Nm (Screws on the bearing carrier)
RS 10	14.0 Nm

11. CLEANING AND FLUSHING OF PIPELINE BEFORE INITIAL START-UP

Before initial start-up of the flow meter, you must flush and clean the whole system to prevent contaminants from reaching the measuring chamber during the assembly and installation. Solid particles or contaminants may block the flow meter or severely damage it so that the flow meter readings are no longer valid and the device must be returned for repairs. After completion of the installation or piping, you must first flush the entire pipeline system and carefully clean and flush the tank. This requires that the flow meter is removed from the fluid system to flush out all installation remains and contaminants (e.g. metal chips or sealing agents). Use a rinsing fluid that is compatible with the subsequently used fluid and will not cause chemical reactions. Such information can be obtained from the supplier or manufacturer of the fluid or from VSE. Flow meters are sensors manufactured with a high degree of precision. They have mechanical measuring elements consisting of two rotors fit-

ted into the housing with narrow gaps. Even the smallest damage to the rotors causes a measuring error. Always make sure that solid particles or contaminants cannot reach the measuring mechanism and that the fluid flowing through the flow meter is always free of pollutants and particles. Once the system is thoroughly flushed, you can mount the flow meter into the fluid system and start the actual initial startup process.

Before installing the flow meter, it should be rinsed with suitable agents, as residual fluids from testing may remain in the device and may cause the measurement mechanism to stick during prolonged storage or transport.

12. FLUID FILTERING

Heavily contaminated fluids or solid particles in the fluid can block, damage, and even destroy the flow meter. In these cases, always install a sufficiently small filter in front of the flow meter so that foreign particles

and solids are prevented from entering the measuring chamber, thus preventing damage to the flow meter. The required filter size depends on the flow meter size, bearing type, and design of the flow meter.

Table 2: Upstream filters

RS flow meter size	Filter size for ball and plain bearings
RS 5	5 µm
RS 10	5 µm

The filter size for flow meters with special designs, or with specially adapted tolerances can be obtained from VSE GmbH upon request.

Important:

**A blocked flow meter can cause the flow in the entire fluid system to stop!
An overpressure / bypass valve must be installed in the system side.**



13. OPERATING PRINCIPLE OF SENSOR ELECTRONICS

The liquid to be measured flows through the rotor chamber in axial direction, resulting in a uniform rotation of the rotors.

The profile geometry of the rotors, which was specifically designed for fluid measurement, allows the medium to be transported with minimal resistance and shearing. As a result, the measurement is almost leakage-free and causes no flow pulsation.

The pick-up system directly detects every movement of the rotor and transmits the sin/cos signals to the preamplifier electronics. In the preamplifier electronics, these signals are processed, measured and then converted into high-resolution quadrature signals. These signals can be evaluated using compatible counter and frequency measurement cards in conjunction with a programmable logic controller (PLC), for example.

The measured volume is proportional to number of pulses/edges and the flow rate is proportional to the pulse frequency.

The flow meter is particularly suitable for the following applications:

- Measuring, controlling, and regulating high viscosity fluids
- Measuring, controlling, and regulating in low flow ranges
- Measuring, controlling, and regulating when passing through zero
- Measuring, controlling, and regulating in both flow directions
- Measuring, controlling, dosing, and filling of small volumes

The resolution of the quadrature signals is set to 512 by default. You can choose between the interpolation factors 256, 512 and 1024.

When selecting the resolution, the maximum output frequency must be considered. The preamplifier is suitable for media temperatures from -30°C to +80°C and is integrated into the RS flow meter.

The measuring volume is calculated by dividing the amount of fluid displaced by one tooth division by the resolution factor or interpolation factor IPF. It is specified in the unit [cm³/imp]. The calibration factor (K-Factor) is the reciprocal of the measuring volume in the unit [imp/l].

The frequency of the output signal can be calculated as follows:

Formula 1: Calculation of the output frequency

$$f \text{ [Hz]} = \frac{Q \left[\frac{l}{\text{min}} \right] \times K_{RS} \left[\frac{\text{pulses}}{l} \right]}{60}$$

Formula 2 can be used to determine the appropriate maximum IPF for the application.

Alternatively, the following tables can also be used.

Table 3: Measurement volumes and K-factors

RS 5				RS 10			
Interpolation factor (IPF)	Measurement volume V _m [cm ³ /Imp]	K-Factor [Imp/l]	K-Factor [Imp/gal. ¹]	Interpolation factor (IPF)	Measurement volume V _m [cm ³ /Imp]	K-Factor [Imp/l]	K-Factor [Imp/gal.]
1	0.70441	1420	5375	1	1.42624	701	2654
256	0.00275	363636	1376511	256	0.00557	179533	679606
512	0.00138	724637	2743048	512	0.00279	358423	1356778
1024	0.00069	1449275	5486100	1024	0.00139	719424	2723307

¹ US.liq.gal.

The values in the table are for reference only. To achieve maximum measurement accuracy, prior calibration is necessary.

Example

Flow meter: RS 5 → K_{RS,IPF1} = 1420 Imp/l
 Max. input frequency of the evaluation → f_{max} = 10 kHz (<80/200 kHz)
 Operating flow rate → Q_{max} = 0.5 l/min

Formula 2: Calculation of the max. possible IPF

$$IPF \leq \frac{f_{max} \times 60}{Q_{max} \times K_{RS,IPF1}} = \frac{10000 \text{ Hz} \times 60}{0.5 \text{ l/min} \times 1420 \text{ Imp/l}} = 845$$

IPF interpolation factor
 f_{max} max. input frequency of evaluation
 K_{RS,IPF1} calibration factor at IPF 1
 Q_{max} max. operating flow rate in l/min

This results in an IPF of 512 for this application, as this is the next smallest selectable interpolation factor.

14. CONFIGURATION OF THE PREAMPLIFIER

Changing the interpolation factor

To switch between interpolation factors, briefly press the button on the circuit board during operation. Depending on the number of green blinks, the IPF will switch to 256, 512, or 1024.

In order for this to work the preamp must be properly configured (→ cyan or purple LED is on).

Number of blinks	IPF
1x	256
2x	512
3x	1024

Frequency filter

The preamplifier also features frequency filtering. This filter smoothes out the frequency of the pulse output without affecting the total pulse count. The filter is enabled by default. For highly dynamic processes, such as dosing, you can disable this functionality by pressing the button until the LED lights up purple.

LED color	Filter mode
cyan	frequency filter enabled (default)
purple	no filter (dosing mode)

Reconfiguration procedure











In the event of a sensor replacement or malfunction, a new configuration of the sensor electronics can be initiated. Before attempting this, make sure, a constant high flow rate can be maintained for several seconds (~10-30 seconds).

Caution: If the reconfiguration procedure is initiated and the process cannot be completed, the flow meter will remain non-functional.

To initiate the procedure, press and hold the button on the circuit board for two seconds until the red LED quickly flashes three times, then release it. The LED should now light up yellow or blink red, and the reconfiguration will begin. The higher the flowrate, the faster the procedure will be finished. If successful, the LED will flash green twice.

Flow meter type	Recommended flow rate for config.
RS5	0.25 ml/min - 1.00 l/min
RS10	0.50 ml/min - 10.00 l/min

15. STATUS LEDS

Operating mode	LED	Meaning
Unconfigured / Configuration procedure	 2x	No flow / sensor board not connected
	 4x	Flow too low / too high
	 5x	Flow fluctuating too much
		Configuration in progress
Configuration complete		Signal output active (filter enabled)
		Signal output active (filter disabled)
At start-up / during IPF switch	 1x	Configuration ok / IPF 256
	 2x	Configuration ok / IPF 512
	 3x	Configuration ok / IPF 1024
	 1x	Hardware error

16. PREAMPLIFIER TECHNICAL DATA

Sensor technology	Magnetoresistive sensors
Resolution	256, 512, 1024
Max. frequency	80 kHz (filter enabled), 200 kHz (filter disabled)
Output signals	Channel A, Channel B
Channel A and B	Two-channel quadrature signal 90° phase offset (Ch. A/B) Low signal level: 0.7 ... 1 V High signal level: $V_b - 1$ V
Flow direction	The phase relationship (lead/lag) between channels A and B corresponds to the flow direction
Outputs	2 current-limited and short-circuit-proof push-pull output stages (channel A/B); max. driver current approx. 300 mA at supply of 24 V
Error messages	Electronics fault, sensor errors, configuration necessary
Operating voltage	$V_b = 6 \dots 26$ VDC
Current consumption	$I_{nom} = 50$ mA at 24 VDC unloaded

17. PIN CONFIGURATION OF PREAMPLIFIER

Fig. 6 shows the pin configuration of the preamplifier.

Even though the flow meters of the "RS5 and RS10" series are equipped with a male M5 connector, the pinout is still compatible with all VS(i) and RS preamplifier versions. Using the separately available "M5-to-M12" adapter cable, the common 4- or 5-wire M12 connection cables can be used to connect the flow meter.

Please note that the shielding of the cable on the connector side is connected to the metal housing of the connector.

It is crucial that the shielding of the cable remains uninterrupted and continuously conductive, with no interruptions in junction boxes or other components. If possible, use a single cable to connect the evaluating unit to the flow meter, since interruptions are always a potential source of error.

Either the shield or the flow meter itself should be connected to earth or balanced using equipotential bonding. In many cases the flow meter is already connected to earth through the pipe system. The RS10 model is additionally equipped with a screw terminal for a protective earth (PE) connection.

If there are differences in potential between the flow meter housing and the protective earth connection on the evaluation electronics, you must take measures to guarantee the same electrical potential on both devices.

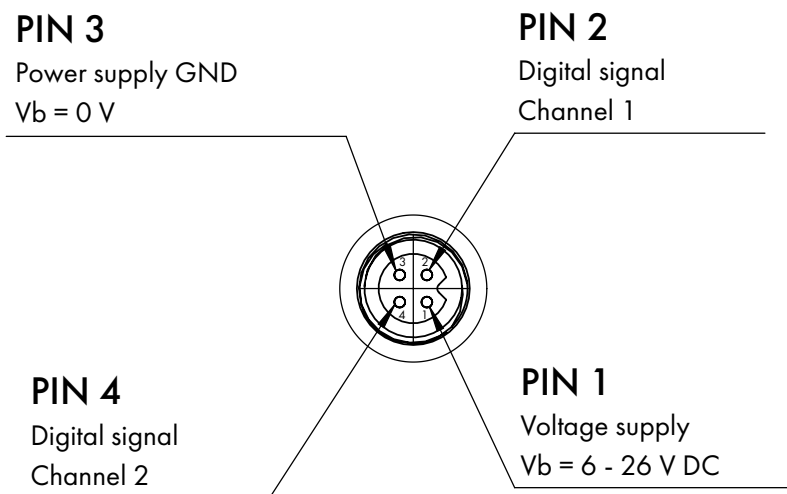


Fig. 6: Flange plug installed in the preamplifier housing of the flow meter

Important:

Only use shielded cables as connection cables, with a wire cross section of $\geq 4 \times 0.14\text{ mm}^2$. Please make sure that the housing of the round plug is metallic and that it has a connection to the shielding.

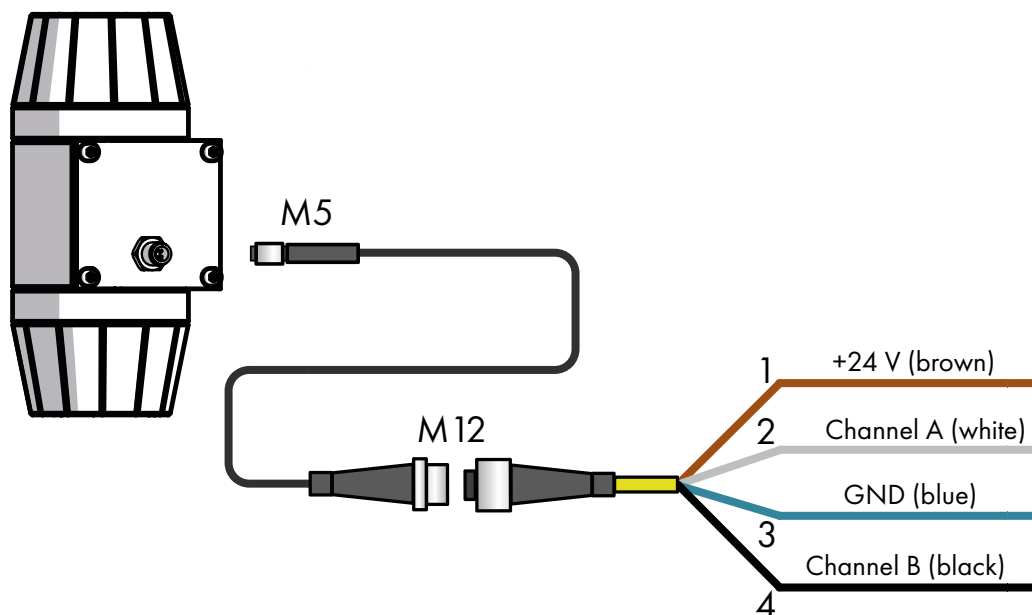


Important:

Please make sure that no extra inductive elements are connected to the power supply of the flow meter, such as contactors, relays, valves etc. These components are potential sources of interference which generate high interference pulses when switched, especially if the inductive elements are not provided with an adequate protective circuit. These can interfere with the functionality of the flow meter, even though it complies with the electromagnetic compatibility directives.



18. CONNECTION DIAGRAM



19. MAINTENANCE, SERVICE LIFE AND WARRANTY

Depending on the operating conditions, the service life and specific properties of the flow meter are limited by wear, corrosion, deposits, or ageing. The operator is responsible for regular inspection, maintenance, and recalibration. In case of detected malfunctions or damage, operation must be immediately stopped. On request, we can provide a

replacement flow meter for the duration of the repair. We recommend an annual inspection and recalibration. Under normal operating conditions, the service life is approximately 10,000 hours. The warranty period is 12 months.

Safety note:

Seals are not covered by the warranty, as they are parts that are subject to wear and tear. The properties of plastics, such as elastomer seals, can change over time in terms of flexibility, strength and toughness. Operating conditions have a significant influence on the durability and lifespan of seals. Therefore, they should be checked, and if necessary, replaced, at regular intervals.



20. STORAGE, RETURN AND DISPOSAL

Temporary storage

All VSE flow meters are delivered with sealing plugs and in suitable packaging for all destinations and transport types, ensuring optimal protection. The flow meters should always be stored in their original foam packaging or transport boxes. The flow meters must not be exposed to temperatures below -20°C or above $+40^{\circ}\text{C}$ and must be protected from direct sunlight and moisture or its effects. The maximum storage period is 48 months. If the maximum storage time is exceeded, the flow meter must be disassembled by the manufacturer VSE or an authorised service partner. This includes cleaning, replacing the seals, and recalibration.

Return

1. The flow meter must be properly cleaned before being returned to prevent the risk of poisoning/contamination of humans and the environment from harmful, explosive, or otherwise hazardous media.
2. If media have been measured whose residues can cause corrosion or ignite on contact with oxygen, the flow meter must be additionally neutralised and thoroughly dried with anhydrous, inert gas.
3. The return of the flow meter must always include a fully completed declaration of non-objection (see page 17). All applied safety and decontamination measures must be specified.
4. When returning the flow meter, it must be packed according to applicable logistics standards and sealed with sealing plugs.

Disposal

VSE actively promotes environmental protection and is certified according to ISO 9001:2015 (Environmental Management). The environmental and human impact should be minimised during production, storage, transport, use and disposal of our products and solutions:

- Collect rinsing liquid as well as residual fluids and dispose them according to statutory provisions and regulations.
- Wear protective clothing and a protective mask/goggle if necessary.

Materials must be properly disposed of as follows:

- Metal
- Plastics
- Electronic components
- etc.

Disposal must comply with the waste-related regulations and requirements of the respective destination country!

21. RS FLOW METER TECHNICAL DATA

Size	Measuring range (Q_{max}) l/min.	Rotational volume $\text{cm}^3/\text{rev.}$	Measurement volume cm^3/Imp	K – Factor Imp./l min.	K – Factor Imp./l max.	P max. bar	Filtering μm
RS 5	0.00025 – 1 (5)	2.1	0.7	1,420	762,000	80	5
RS 10	0.0005 – 2 (10)	4.3	1.4	701	358,912	250	5

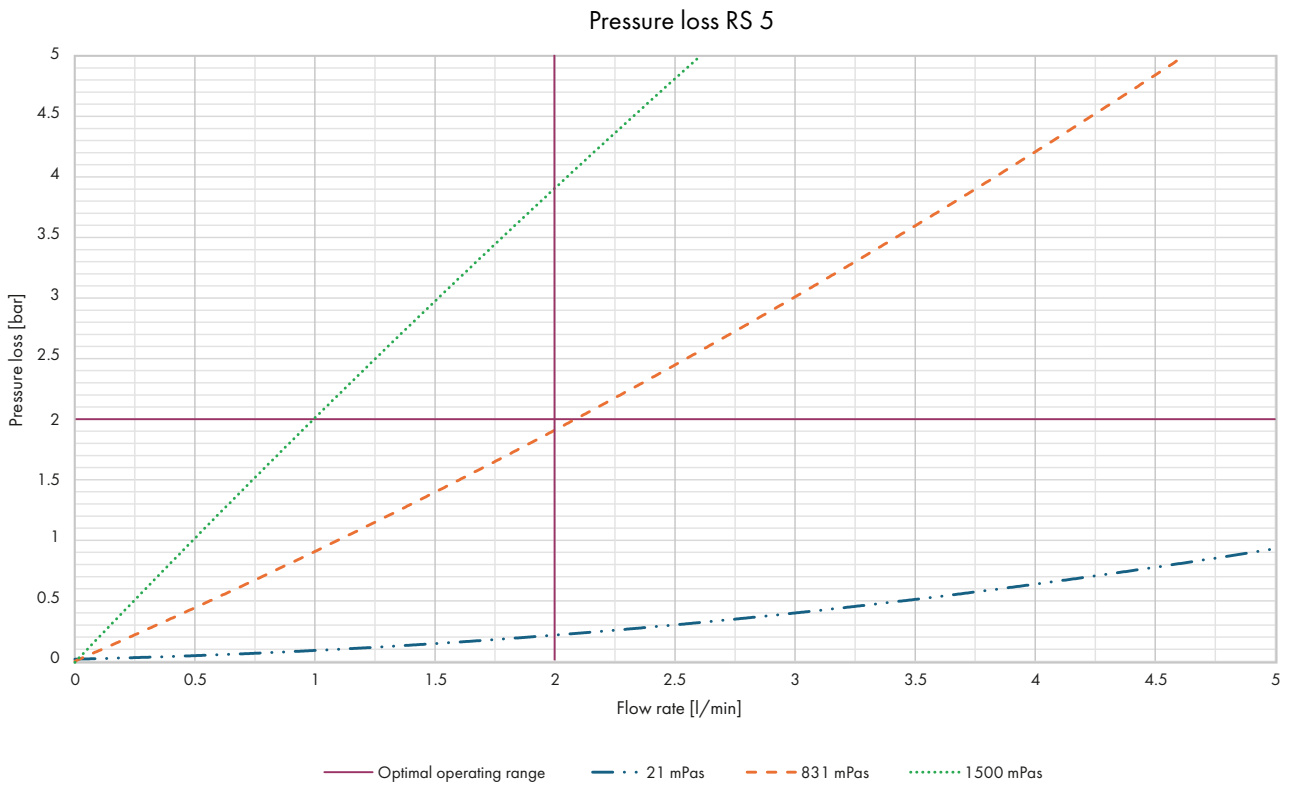
Measuring accuracy	$\pm 2\%$ relative to the measured value
Repeatability	$\pm 0.5\%$ under the same operating conditions

Materials

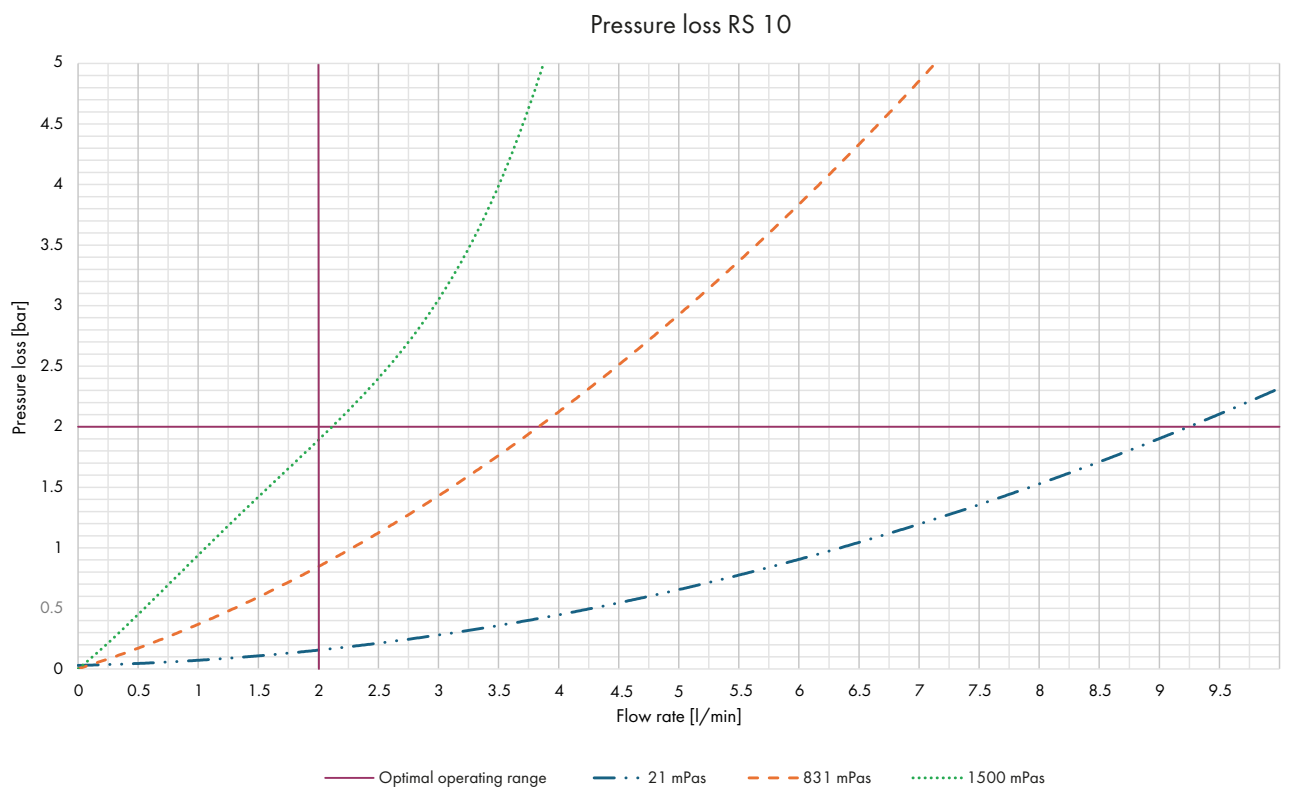
Aluminium version	On request
Stainless steel version	Stainless steel 1.4305/1.2379, additional available upon request
Bearing	Depending on the fluid, as ball bearings or sleeve bearings (ceramic)
Seals	FPM (standard), other seals on request
Fluid temperature	$-30^{\circ}\text{C} \dots +80^{\circ}\text{C}$
Viscosity range	500 ... 1,000,000 mPas
Installation orientation	Any
Supply voltage	6 ... 26 VDC
Current consumption	50 mA at 24 VDC unloaded
Protection type	IP 65
Channel offset	$90^{\circ} \pm 5^{\circ}$ max.
Duty cycle	1/1 $\pm 5\%$ max.

22. RS FLOW METER FLOW CHARACTERISTICS

Size 5

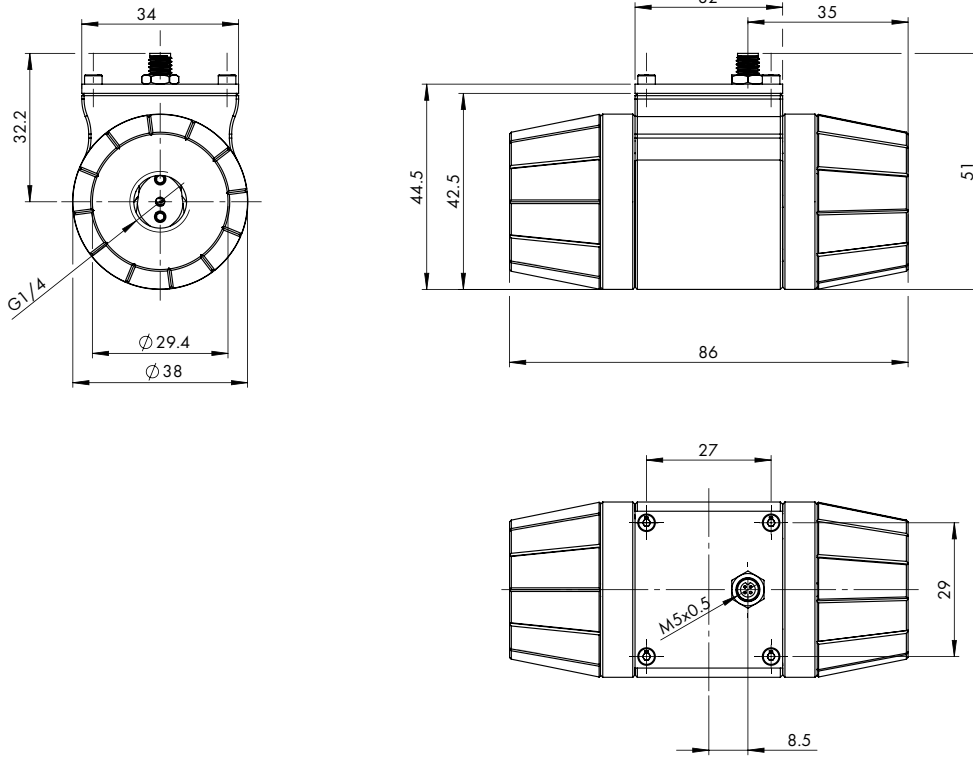


Size 10

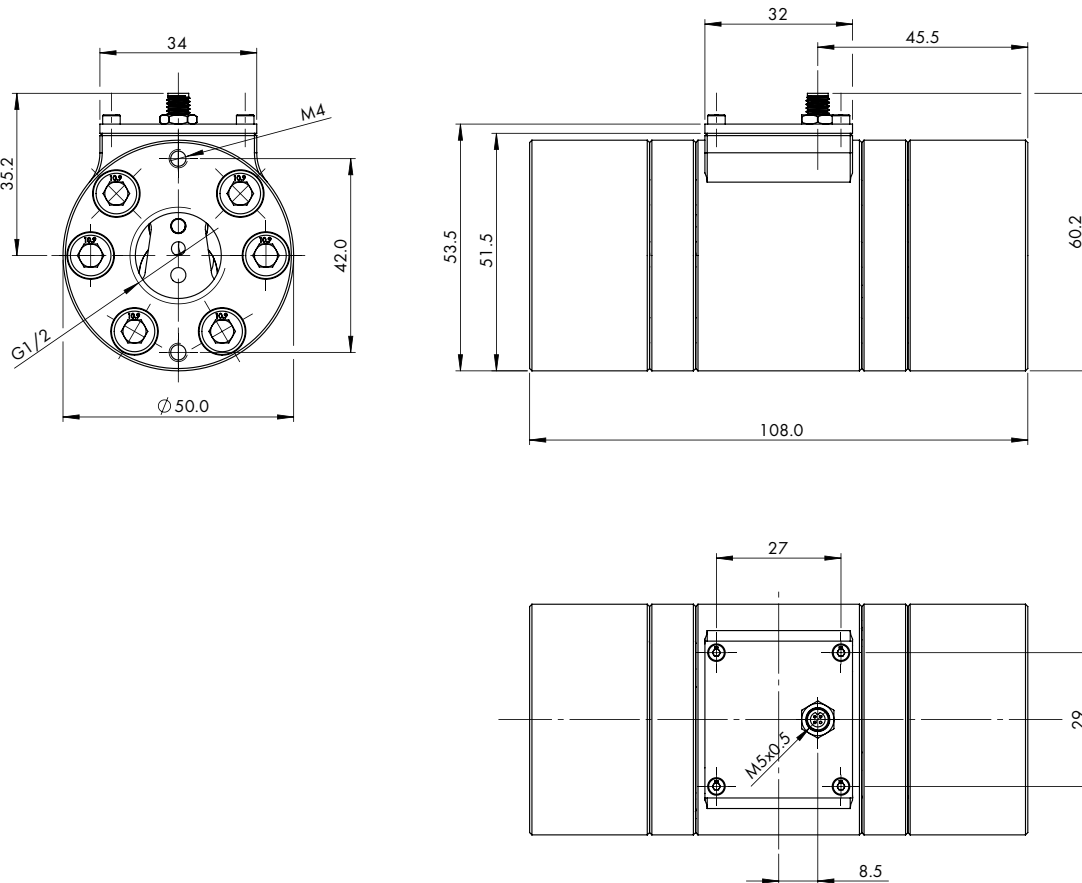


23. RS FLOW METER DIMENSIONS

RS 5



RS 10



24. RS 5/RS 10 FLOW METER TYPE CODE

RS 5 RS 10															
Size	256 512 1024		RS 5/RS 10 RS 5/RS 10 RS 5/RS 10												
	Interpolation factor		Material	A	Aluminium EN-AW 7075 (not available yet)										
				E	Stainless steel 1.4305 (V2A)										
			Connection type	R	Pipe connection										
				0	Standard										
			Factory-provided	Bearing	1	Ball bearing									
					K	Sleeve bearing (ceramic)									
			Backlash	2	Standard										
				Sealing type	V	FPM (Viton) Standard									
			T		PTFE										
Series			X	Modification figure/ Factory-provided											
RS 5 /		5	1	2	E	R	O	1	2	V	-	/	X	Flow meter	

S	.	.	.	Special design with consecutive no. factory-provided
	.	.		Consecutive no.



	.	.		Consecutive no.
S	.	.		Special design with serial no. factory-provided

AR		E	5	-	A	V	4	0	0	N	/	X	Connecting unit			
Connection unit	Material	Size	Connection		Sealing type	V	FPM (Viton) Standard									
						T	PTFE									
					Sensor module	A	G 1/4" (RS 5)									
						C	G 1/2" (RS 10)									
					Test port	5	RS 5									
						10	RS 10									
					Connection for temperature sensor	N	Standard									
						0	Without connection for PT 100									
					0	Without test port										
					4	Electronics										
V	FPM (Viton) Standard															
T	PTFE															
A	Aluminium EN-AW 7075															
E	Stainless steel 1.4305 (V2A)															

Declaration of non-objection (Decontamination declaration for return deliveries)

Last Revision: 03/2025

In order to ensure occupational health and safety and to protect our employees from harmful effects when handling hazardous substances, this decontamination declaration must be fully completed and enclosed with all VSE flow meters which are returned.

The declaration is binding and may only be completed and signed by authorised personnel. It must be visibly attached on the outside of the return packaging and sent in advance by email, including all safety data sheets. VSE and its sales partners will only conduct an inspection and failure analysis of the returned VSE flow meters if a fully completed and signed declaration is provided. Otherwise, we explicitly reserve the right to reject the shipment.

It is mandatory to obtain written approval before returning any VSE flow meters.

Approval was granted on by (contact person)











Type

Serial number Quantity

Reason for return

1. The VSE flow meter was last used with the following operating medium:
(Safety data sheet must be enclosed.)

Application-related contamination and effects:

 irritant	<input type="radio"/>	 harmful to health	<input type="radio"/>	 radioactive substances ¹	<input type="radio"/>
 toxic	<input type="radio"/>	 corrosive	<input type="radio"/>	 biologically hazardous substances ¹	<input type="radio"/>
 hazardous to the environment	<input type="radio"/>	 flammable	<input type="radio"/>		
 oxidising	<input type="radio"/>	 explosive	<input type="radio"/>		

¹ The return of VSE flow meters that have been contaminated by radioactive or biologically hazardous substances is expressly excluded.

2. The VSE flow meter has been carefully emptied, decontaminated and thoroughly cleaned both inside and outside, removing all residues.

The following cleaning agents were used:
(Safety data sheets must be enclosed).

Declaration of non-objection (Decontamination declaration for return deliveries)

3. No special safety measures or treatments are necessary.
- Special safety measures or treatments concerning employee protection, environmental protection, and/or disposal are required due to residual contamination, residual liquids, residual substances, solids, and/or used cleaning agents. (Safety data sheets must be enclosed.)

If yes, which:

4. Are there any other safety aspects to consider?

If yes, which:

We confirm that the information provided in this declaration is true and complete and that the shipment is carried out in accordance with legal regulations. We are aware that we are liable to VSE and its sales partners for any damages caused by incomplete and incorrect information. We commit to indemnify VSE and its sales partners against any claims for damages by third parties arising from incomplete or incorrect information, irrespective of the legal basis on which such claims may arise.

Company

Street/No.

Postal code/City

Phone

Email

Contact person

(In capitals)

Date

Signature

(Company stamp)

Enclosures

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