

**Solutions for Fluid Technology**



**RS SERIES**

**FLOW MEASUREMENT TECHNOLOGY**

## RS FLOW METER

RS flow meters measure the flow rate based on the screw pump principle. A pair of rotors fitted precisely into the housing constitutes the measuring element. An integrated gear and non-contact signal pick-up system detects the rotations of the measuring element and converts them to 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 side.

The fluid volume put through within one main rotor rotation is the rotation volume, which is divided by the sensing gear and digitised, processed and output in the sensor module.

### ADVANTAGES

- High degree of precision that is mostly independent of viscosity
- 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 measurement

### SENSOR SYSTEM EXPLANATION

The non-contact pick-up system consists of two GMR-bridges (sin/cos), which are located in a sensor unit in cartridge design. It detects the movement of the sensing gear and routes the sin/cos-signals to the preamplifier electronics.

The preamplifier electronics digitise and amplify the sensor signals and multiply them by a high-resolution interpolator using adjustable settings. The square wave signals are bidirectional and can be utilised by any evaluating instrument as well as computers and PLC-controls. The resolution is selectable in steps from factor 1 to 128.

In case of an 1-channel evaluation, a separate directional signal is available.

An adjustable pulse filter can offset and suppress negative flows (e.g. generated by vibrations) while still in the device.

The frequency of the output signals is proportional to the flow (volume flow) and depends on the respective flow meter size. The frequency range is from 0 to 100 kHz. The preamplifier is protected against reverse polarity and incorrect connection. It is suitable for fluid temperatures of -30°C to +120°C (-22°F to +248°F) and is mounted directly on the RS flow meter.

### 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 designs, the technical data in the VSE catalogue are of a general nature.

Certain properties of the devices depend on type, size, and measurement 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.

Size	Measurement range (Q <sub>max.</sub> ) l/min.	RV ccm/rev	VE ccm/Imp.	K-Factor* Imp./l min.	K-Factor* Imp./l max.	P max. bar	Filtering my
RS 100	0.50 – 100 (120)	15.7	0.5815	1,720	220,000	450	250
RS 400	1.00 – 400 (525)	56.6	3.138	318	40,800	450	250
RS 800	4.00 – 800 (1,000)	180.0	10	100	12,800	450	500
RS 2500	10.00 – 2,500 (3,000)	666.0	37	27	3,459	40	500

\*adjustable

## FREQUENCY RANGE

0 ... 100 kHz, adjustable

## REPEATABILITY ACCURACY

± 0.05 % with same operating conditions

## MEASUREMENT ACCURACY

± 0.5 % (1 %) \*\* of measured value with viscosity of > 21 cSt.

\*\*RS 2500

## MATERIALS

### GRAY CAST IRON MODEL

EN-GJS-400-15 (EN 1563)/16 Mn Cr 5

### STAINLESS STEEL MODEL

Stainless steel 1.4305/1.4112, additional available upon request

### BEARING

Fluid-dependent as anti-friction bearing or SSIC/wolfram carbide friction bearing

### SEAL

FPM (standard) PTFE, NBR, EPDM upon request

### FLUID TEMPERATURE

-30°C ... +120°C; (-22°F to +248°F)

### VISCOSITY RANGE

1 ... 1.000.000 cSt.

### INSTALLATION POSITION

Any, using selectable connection units, also customer specific

### SUPPLY VOLTAGE

10 ... 28 VDC

### CURRENT CONSUMPTION

65 mA at 24 VDC unloaded

### DELAY

≤ 8 µs

### PROTECTION CLASS

IP 65

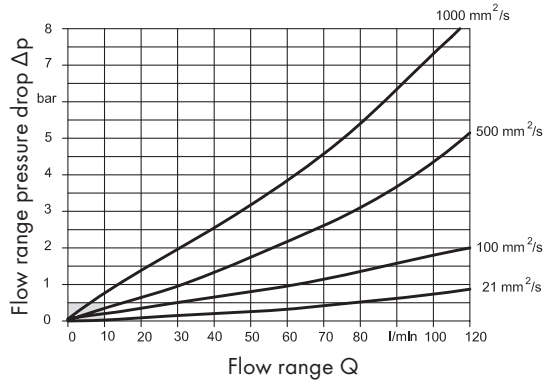
### EXPLOSION PROTECTION

Protection type: intrinsically safe, available soon

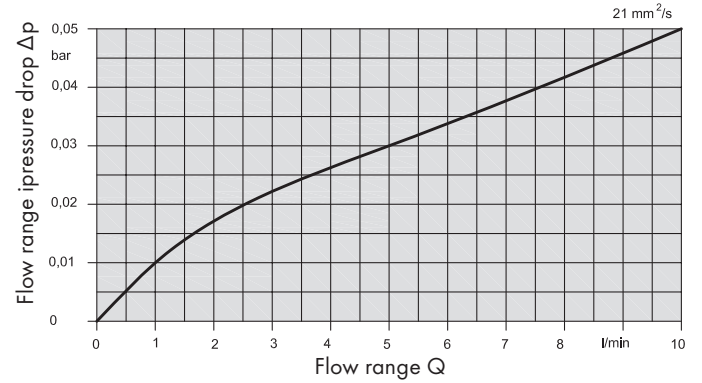
## FLOW RANGES

### Size 100

Flow range 0 up to 120 l/min

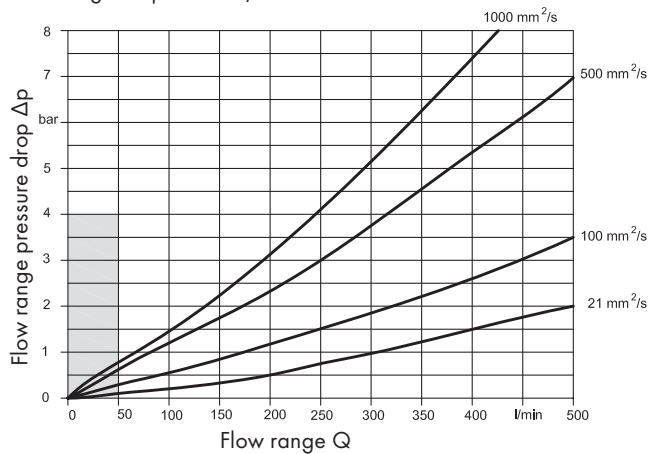


Flow range 0 up to 10 l/min

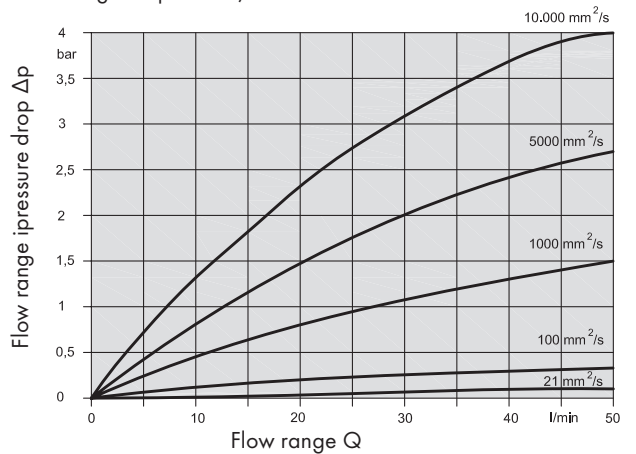


### Size 400

Flow range 0 up to 500 l/min

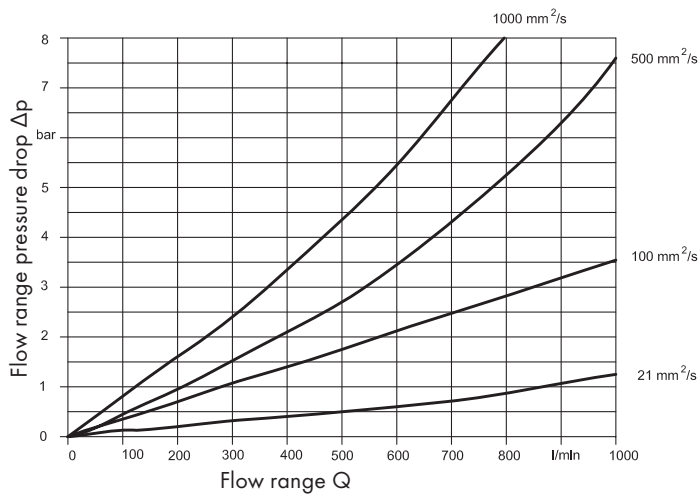


Flow range 0 up to 50 l/min



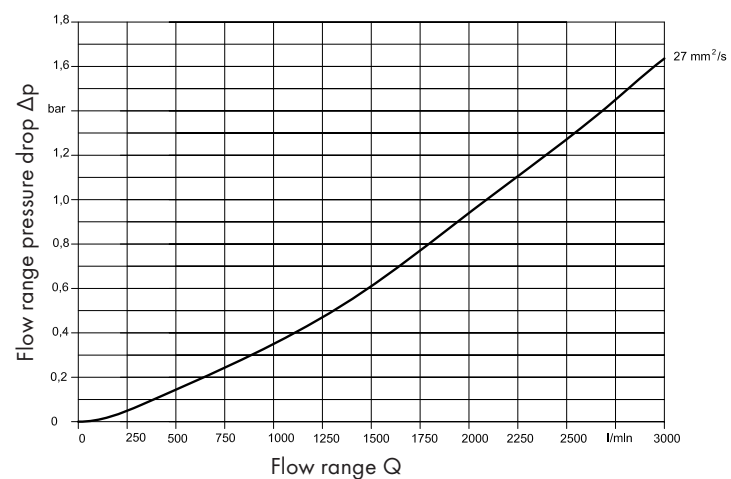
### Size 800

Flow range 0 up to 1,000 l/min

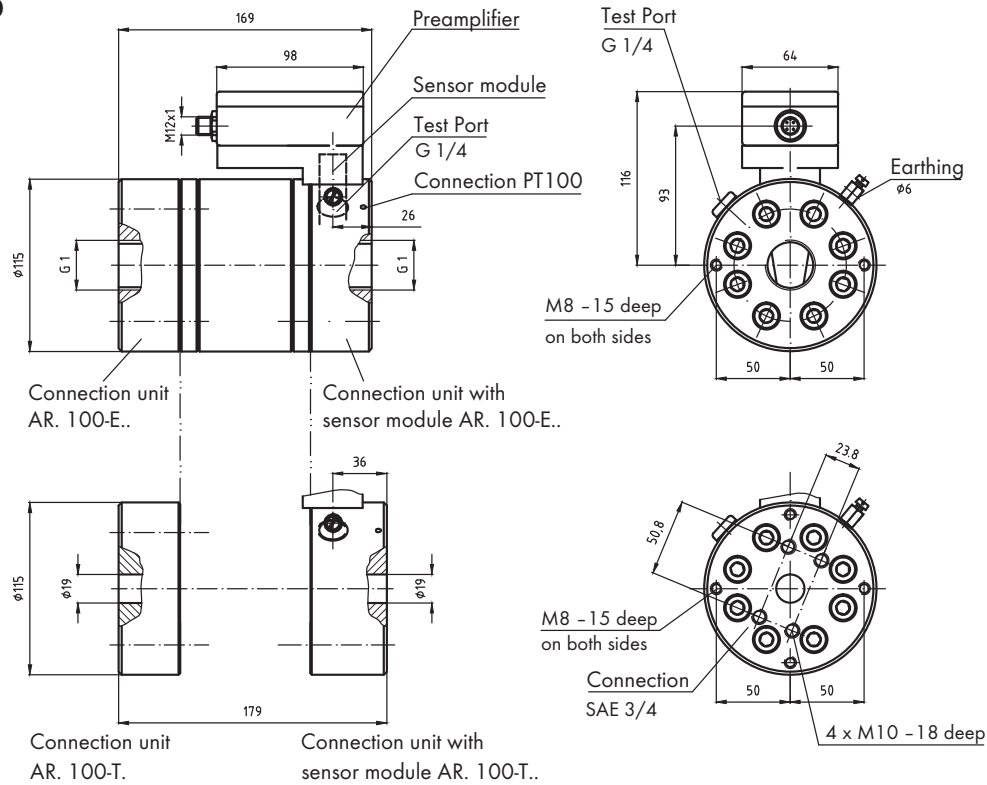


### Size 2500

Flow range 0 up to 3,000 l/min



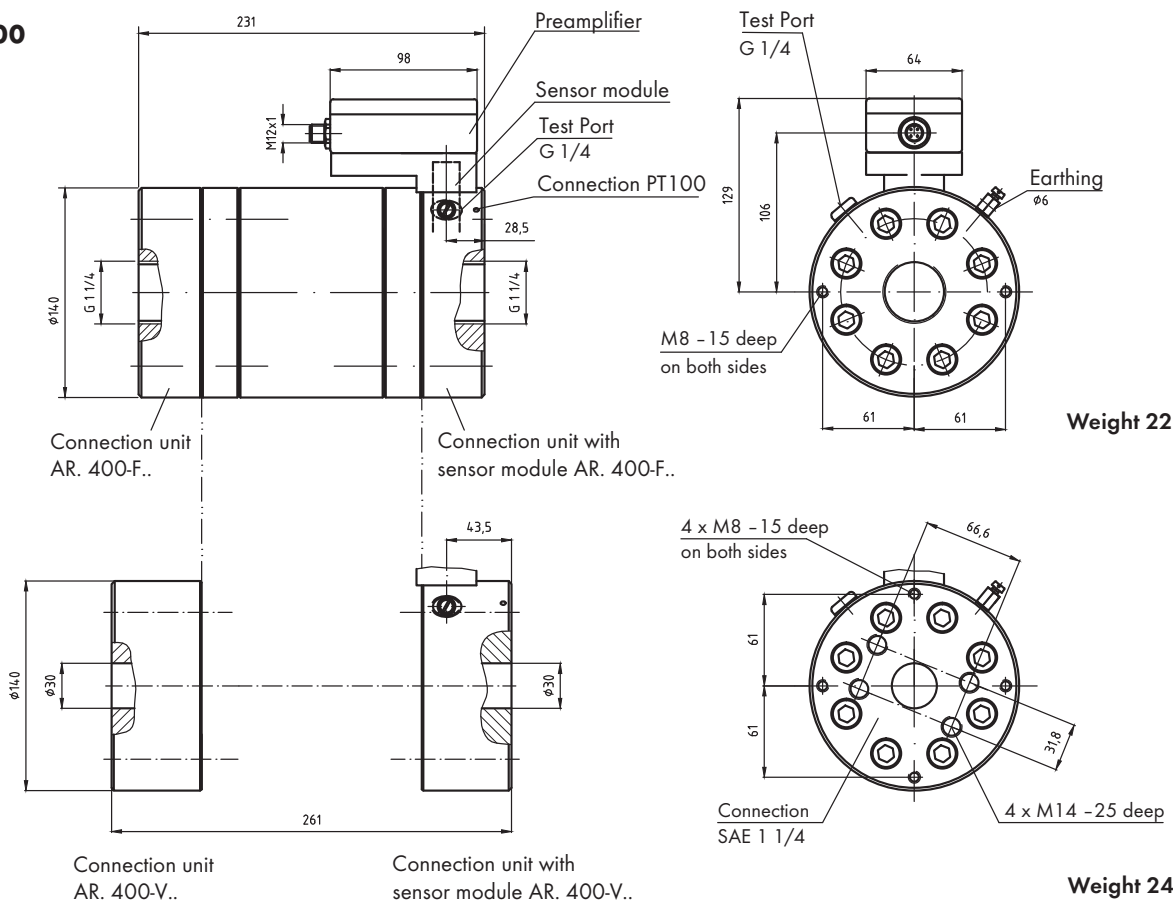
## RS 100



Weight 12 kg

Weight 12.7 kg

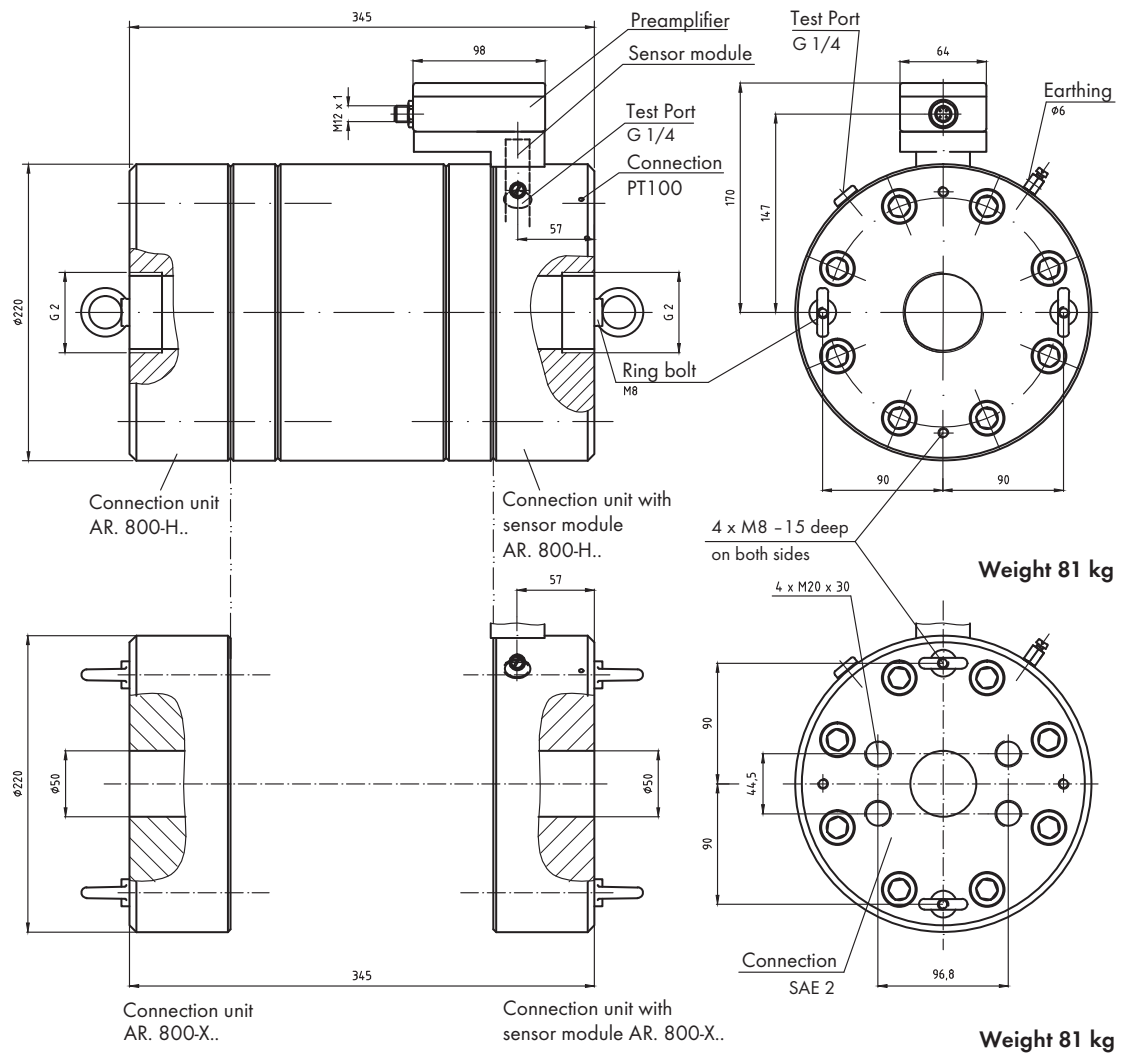
## RS 400



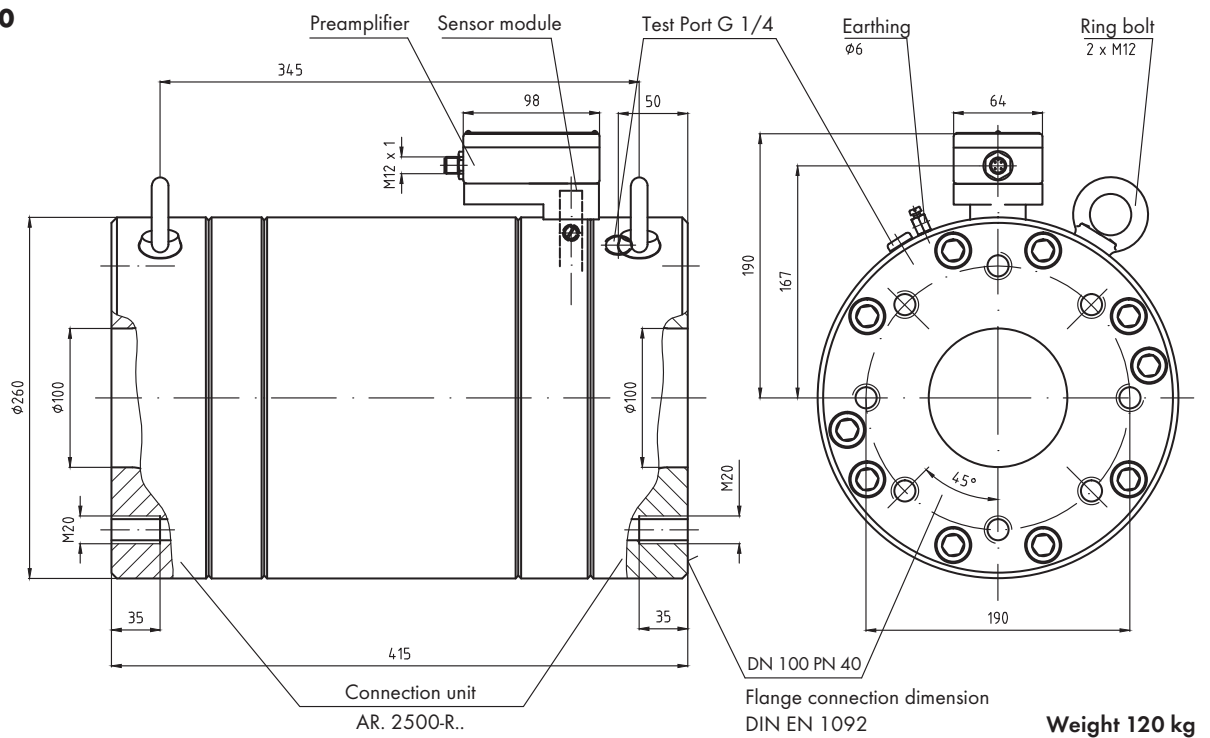
Weight 22 kg

Weight 24.8 kg

## RS 800



## RS 2500



### Example

**SENSOR ELECTRONICS DESCRIPTION**

A special sensor system detects any movement of the pair of rotors or of the liquid column. For this purpose, a precision gear connected to a shaft of the rotor pair is scanned by a special magnetoresistive sensor. The scanning sensor includes two GMR-bridges (sin/cos) and is housed in a removable stainless steel cartridge case together with a signal conditioning and amplifier unit. The downstream electronics unit features a high-resolution

sin/cos-interpolator, which is adjustable with ten different resolution factors. Furthermore, a programmable signal filter is available as well, which can offset unwanted negative pulse sequences up to an adjustable degree. In addition, a signal for a separate direction detection, e.g. in case of a 1-channel evaluation, is provided by the electronics. Optionally, this output can be used for the detection of excess flows and temperatures.

**FEATURES**

Adjustable interpolation factors IPF:

1, 2, 5, 10, 25, 32, 50, 64, 100, 128

Adjustable pulse filtering: up to 22% of the rotation volume

Adjustable preferential direction for filtering processes

Generating frequencies up to 100,000 Hz

Output of a separate directional signal or error signal (selectable)

Automatic offset adjustment of the GMR-sensor-bridge (sinus, cosine)

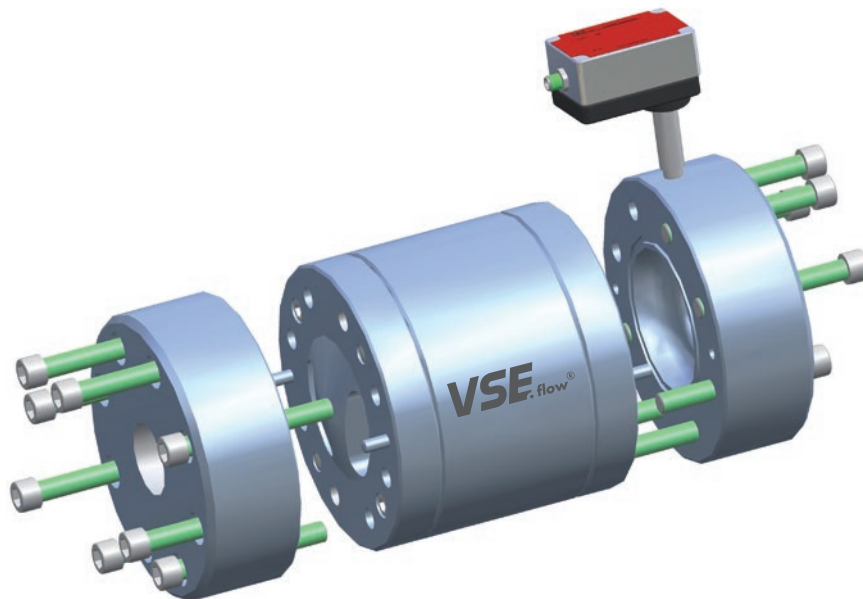
Detection of stalled sensor or sensor faults/  
magnet wheel damages

Flow overload detection with logging

Excess temperature detection with logging

Detection of exceeding the max. permissible highest frequency (> 100,000 Hz)

Readable error code LEDs



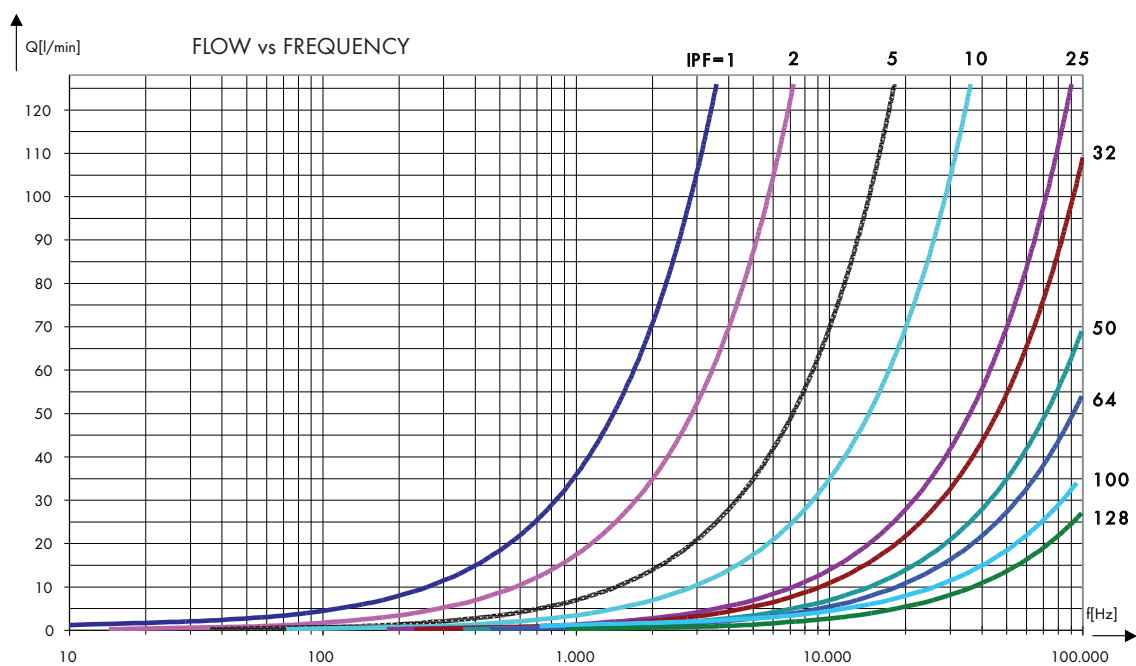


## TECHNICAL DATA

### RS 100

Max. permissible flow 126 l/min ( $n = 8025.2$  rev/min)

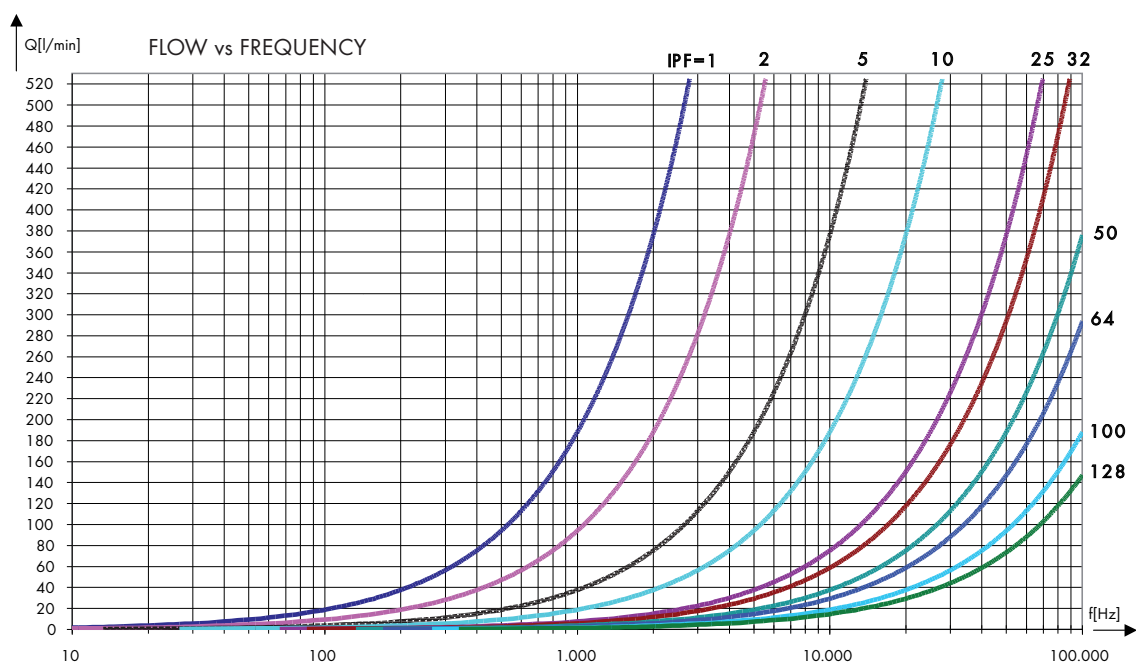
Min. permissible flow 0.25 l/min ( $n = 15.9$  rev/min)



### RS 400

Max. permissible flow 525 l/min ( $n = 6,196.4$  rev/min)

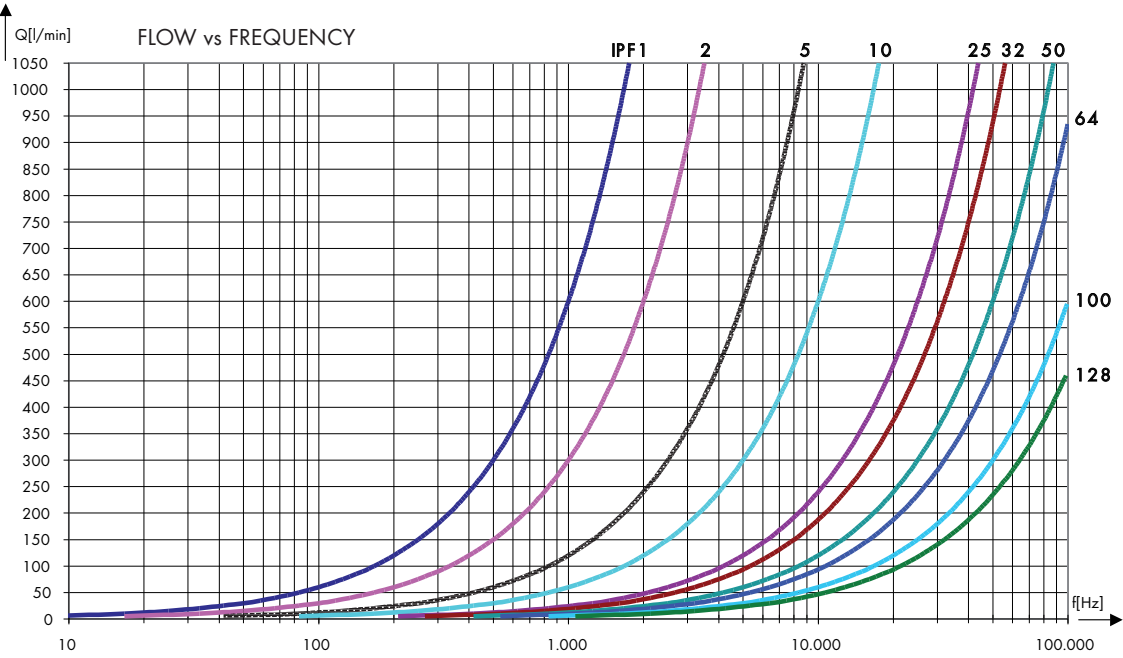
Min. permissible flow 0.5 l/min ( $n = 5.9$  rev/min)



**RS 800**

Max. permissible flow 1,050 l/min ( $n = 3,888.9 \text{ rev/min}$ )

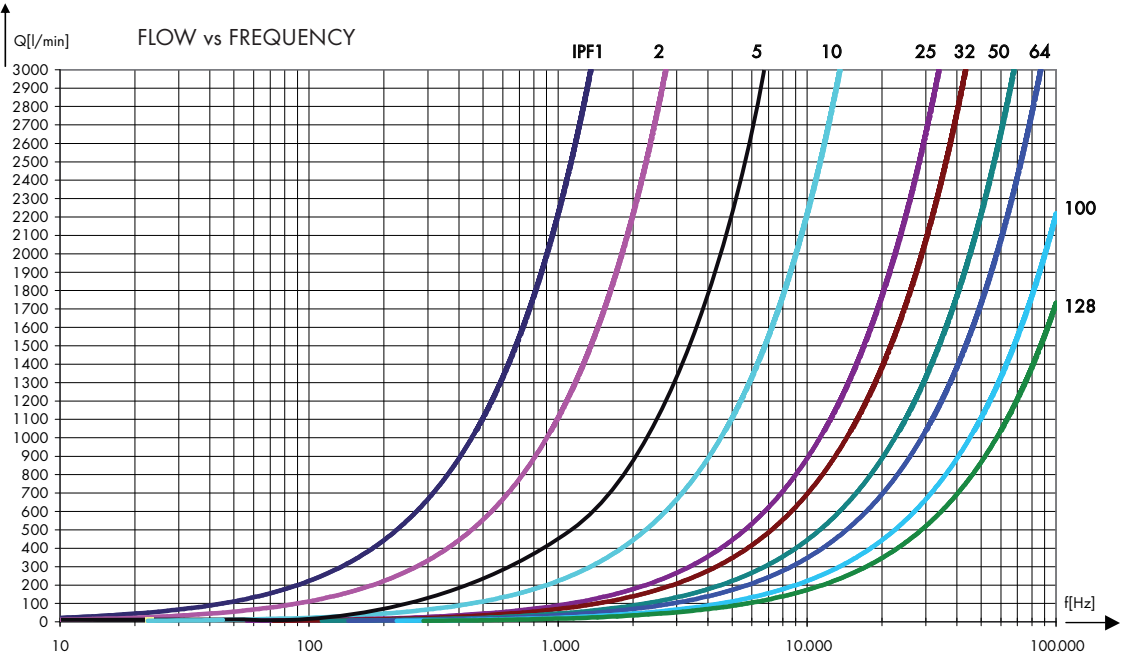
Min. permissible flow 5 l/min ( $n = 18.5 \text{ rev/min}$ )



**RS 2500**

Max. permissible flow 3,000 l/min ( $n = 3,003 \text{ rev/min}$ )

Min. permissible flow 10 l/min ( $n = 10 \text{ rev/min}$ )



## PULSE FILTERING PRINCIPLE

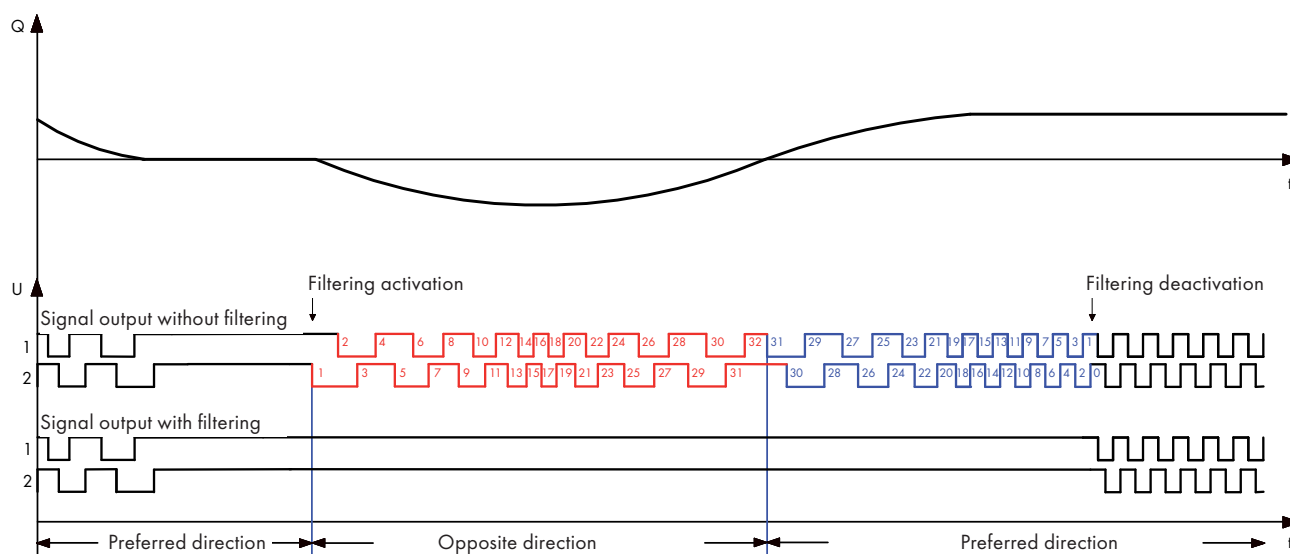
Oscillations in fluid systems manifest themselves through constant forward and backward movements of the liquid column, which is also detected by the rotor sensors and converted into proportional electronic pulses or edge sequences. These generated pulses can be incorrectly interpreted by the downstream evaluating unit or controller, which can be very distracting for the respective operating process.

The signal filtering function of the internal electronics continuously offsets these generated edges during the rapid forward and backward movements of the rotor measuring element. The signals at the channel outputs are also suppressed until the internal offset is equalized or the initial position of the rotor measuring element has been reached again.

The user is able to set the degree of filtering in the form of partial volumes using rotary coding switches.

## SUPPRESSED VOLUME WITH PULSE FILTERING ACTIVATION [ml]

Filter position	RS 100X	RS 400X	RS 800X	RS 2500X
0	0	0	0	0
1	0.145375	0.7845	2.5	9.25
2	0.29075	1.569	5.0	18.50
3	0.436125	2.3535	7.5	27.75
4	0.5815	3.138	10.0	37.00
5	0.726875	3.9225	12.5	46.25
6	0.87225	4.707	15.0	55.50
7	1.017625	5.4915	17.5	64.75
8	1.163	6.276	20.0	74.00
9	1.308375	7.0605	22.5	83.25
10	1.45375	7.845	25.0	92.50
11	1.599125	8.6295	27.5	101.75
12	1.7445	9.414	30.0	111.00
13	1.889875	10.1985	32.5	120.25
14	2.03525	10.983	35.0	129.50
15	2.180625	11.7675	37.5	138.75



Pulse filtering chart

**POWER SUPPLY****Supply voltage**

$U = 10 \dots 28 \text{ VDC}$ ; reverse pole protection

**Current consumption**

$I_0 = 65 \text{ mA}$  (at 24 VDC); unloaded

**Delay**

$t_V = 8 \text{ }\mu\text{s}$  max. (between scanning and measured value)

**SIGNAL OUTPUTS****Output signal shape**

Quadrature signals

(A, B with  $90^\circ$  phase shift)

**Directional output**

Positive high (24 V); negative low (0.8 – 1 V)

**Error output**

Active high (24 V); inactive low (0.8 – 1 V)

**Max. output frequency**

100 kHz

**Signal voltage output**

(channel 1, channel 2, direc/err)

$V_{SS} = 9 \dots 27 \text{ VDC}$

**Signal output current**

(channel 1, channel 2)

$I_{OUT} = 300 \text{ mA}$  max. at 24 VDC

**Output final stages**

Push-pull-final stages, current-limited, short-circuit proof, internal cable adjustment, small saturation voltage, thermal shutdown with hysteresis, high-impedance outputs in case of error

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Customer specific solutions can be realised at competitive prices in the shortest time. We develop your solutions in all current materials such as steel, stainless steel, titanium and aluminium as well as bronze materials.

### PROCESS CONTROL



Dyes, paints, (hot-) adhesives or epoxy or PUR-materials also with fillers can be reliably measured. Pressures up to 700 bar and temperatures up to 210°C (410°F) are included in our standard product range.

### AUTOMOBILE INDUSTRY



Whether for installation in vehicles or in climatic exposure test cabinets; we have a solution for almost every measuring application. High reliability, low space requirements and highest measurement accuracy, also for difficult media or aggressive atmospheres distinguish our products.

### ACCESSORIES



Connection blocks also heatable, sandwich plates with integrated ball valves and heating jackets for all current flow meters. Additional measuring connections for pressure and temperature. **MCS** Mini Control Systems can be supplied from stock.

### REPAIR AND CALIBRATION SERVICE

Inhouse calibrations from 0.002 l/min ... 600 l/min, traceable to a DKD normal. We are pleased to provide you with loan units for the time of repair or calibration. Repair and calibration also of external brands as well as electronic displays.



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