

Solutions for Fluid Technology



RS
HELICALSCREW SENSORS

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 with minimal shear

Lowest pressure losses

Short response time due to innovative rotor profile and reduced mass

Highest functionality due to intelligent sensor technology

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.

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 $+120^{\circ}\text{C}$ (-22°F to $+248^{\circ}\text{F}$) (with HT sensor for a range of -40°C ... $+210^{\circ}\text{C}$ (-40°F ... $+410^{\circ}\text{F}$)) and is mounted directly on the RS flow meter.

Size	Measurement range (Q _{max.}) l/min.	RV ccm/rev	VE ccm/Imp.	K-Factor* Imp./l min.	K-Factor* Imp./l max.	P max. bar	Filtering my
RS 40	0.04– 40 (50)	8.37	0.31	3,226	413,000	450	100
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

MEASUREMENT ACCURACY

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

REPEATABILITY ACCURACY

± 0.05 % with same operating conditions

**RS 2500

MATERIALS

GRAY CAST IRON MODEL

EN-GJS-400-15(EN 1563)/16 Mn Cr 5 or 1.4112 (depending on size)

STAINLESS STEEL MODEL

Stainless steel 1.4305/1.4112, additional available upon request

BEARING

Fluid-dependent as anti-friction bearing or SSIC/wolf-ram carbide friction bearing

SEAL

FPM (standard) PTFE, NBR, EPDM upon request

FLUID TEMPERATURE

-40°C...+210°C (HT design)

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

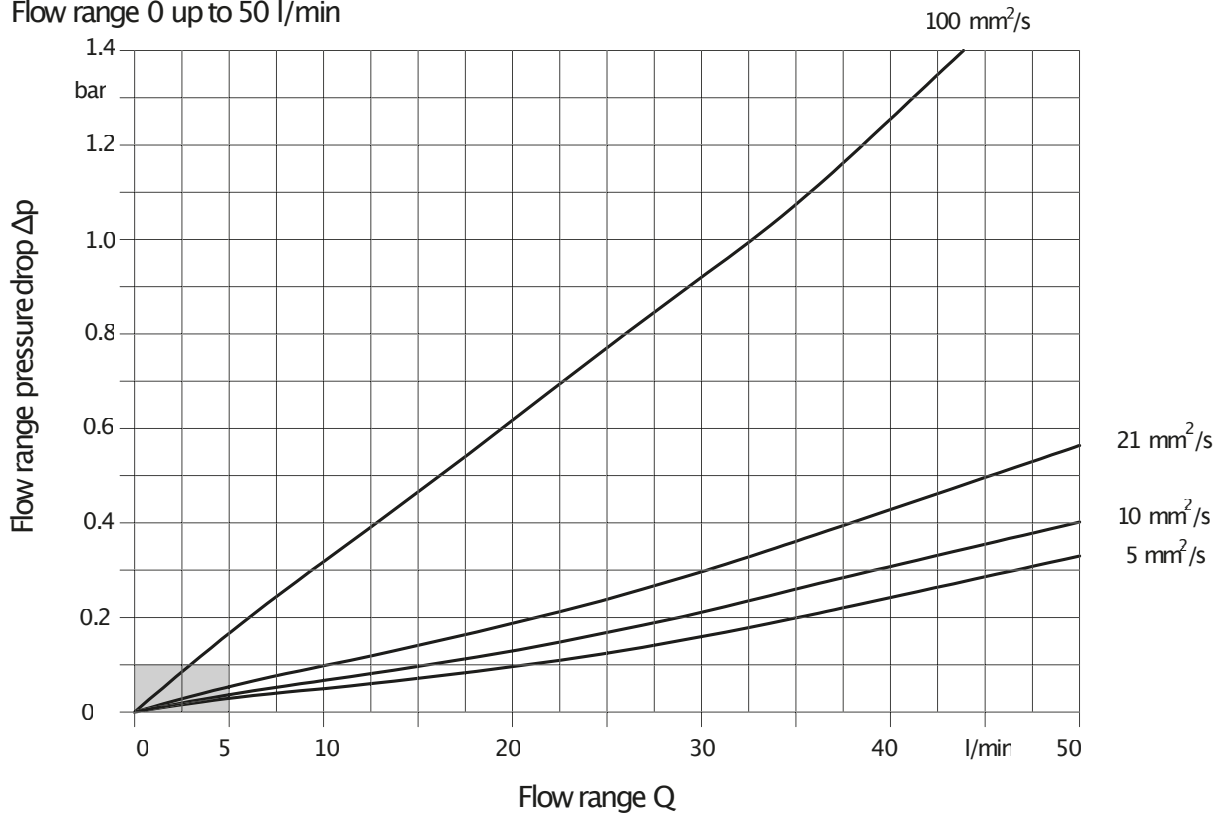
EXPLOSION PROTECTION

Protection type: intrinsically safe, available soon

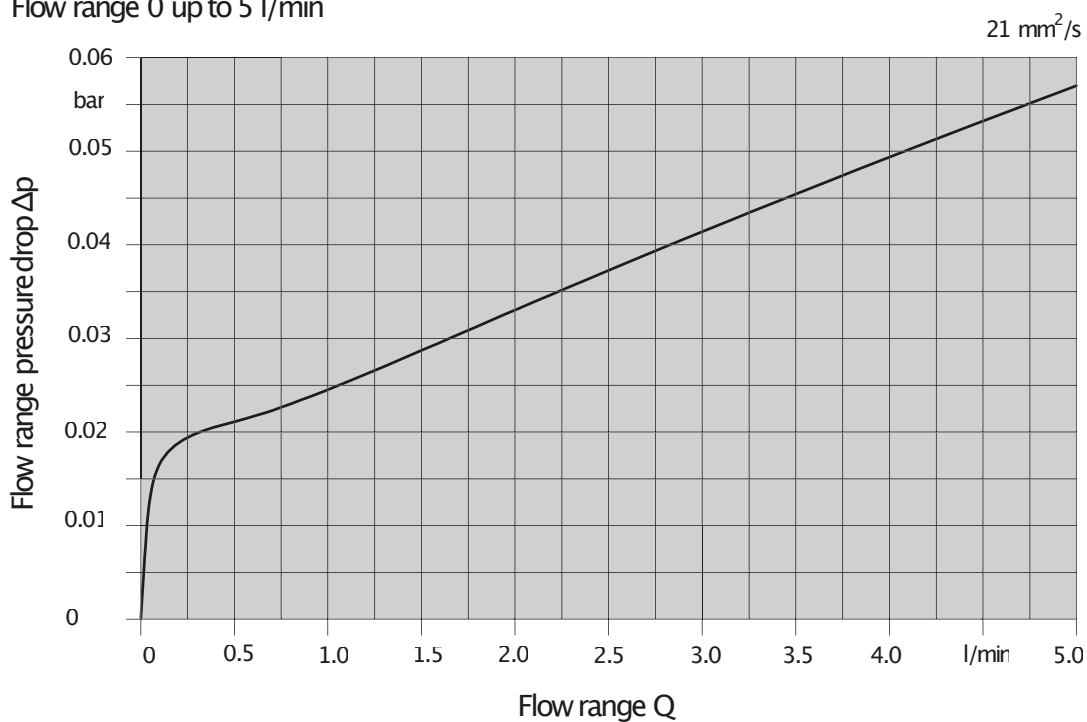
FLOW RANGES

SIZE 40

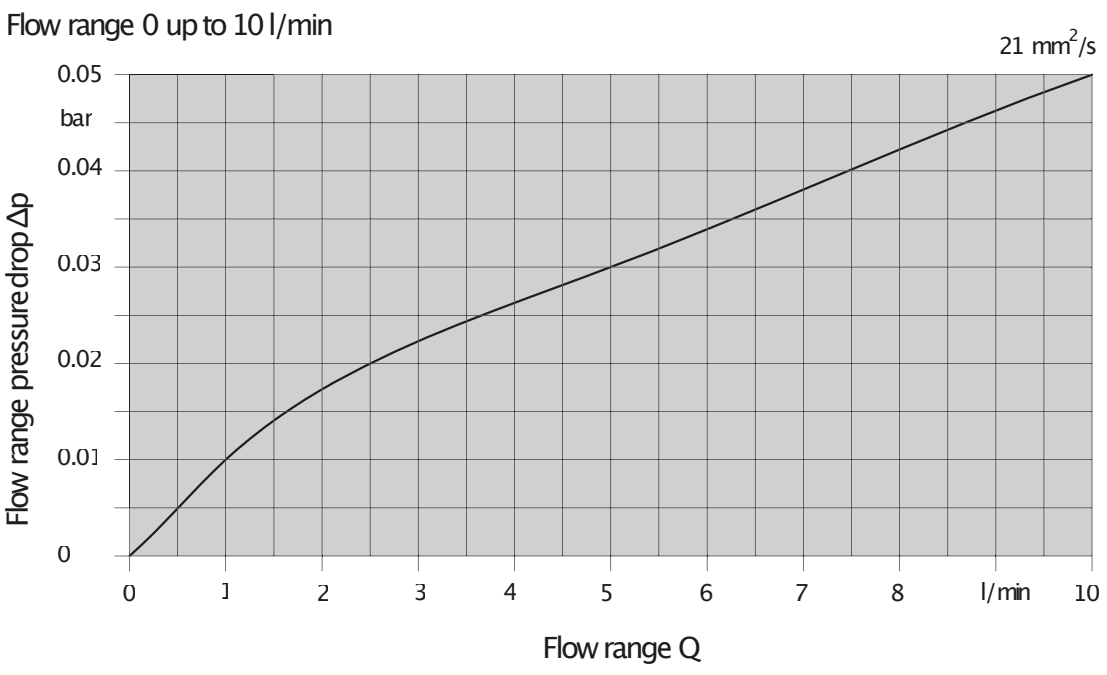
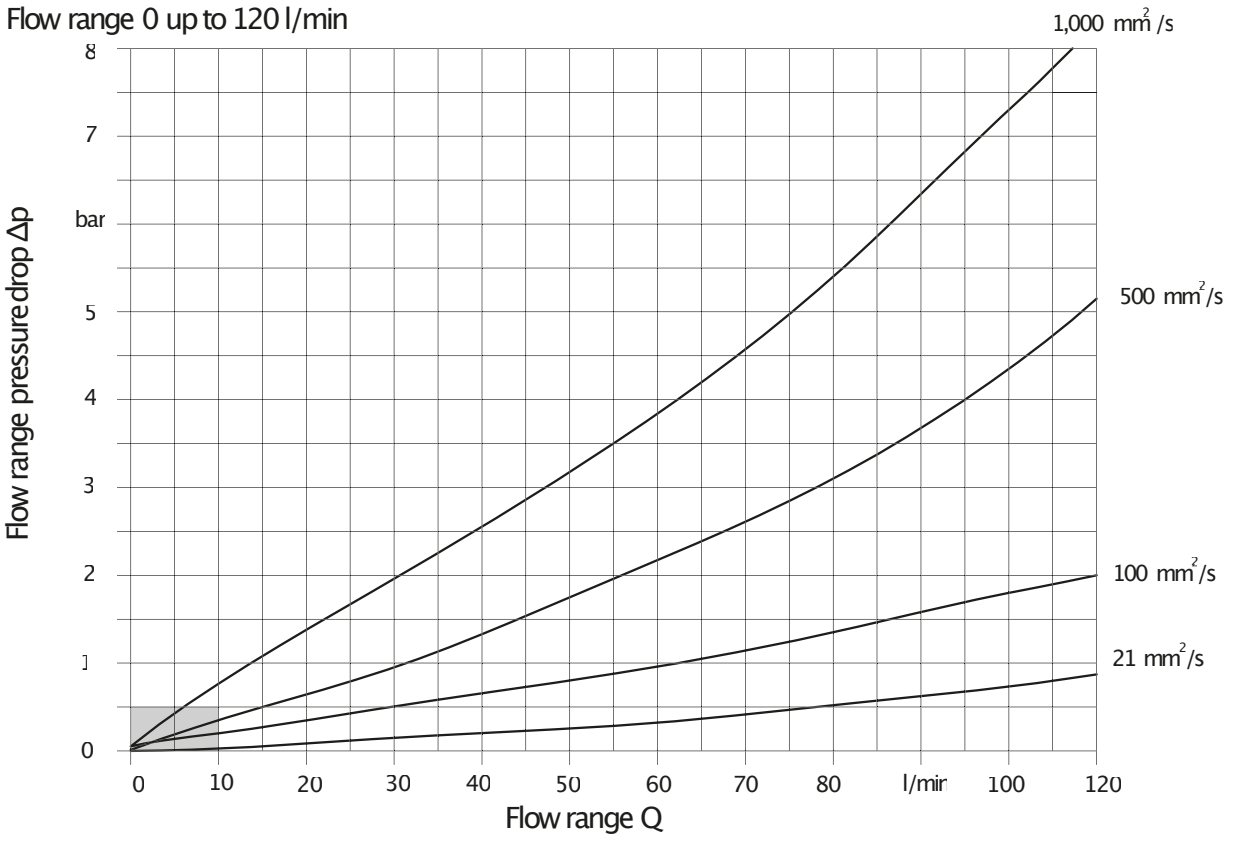
Flow range 0 up to 50 l/min



Flow range 0 up to 5 l/min



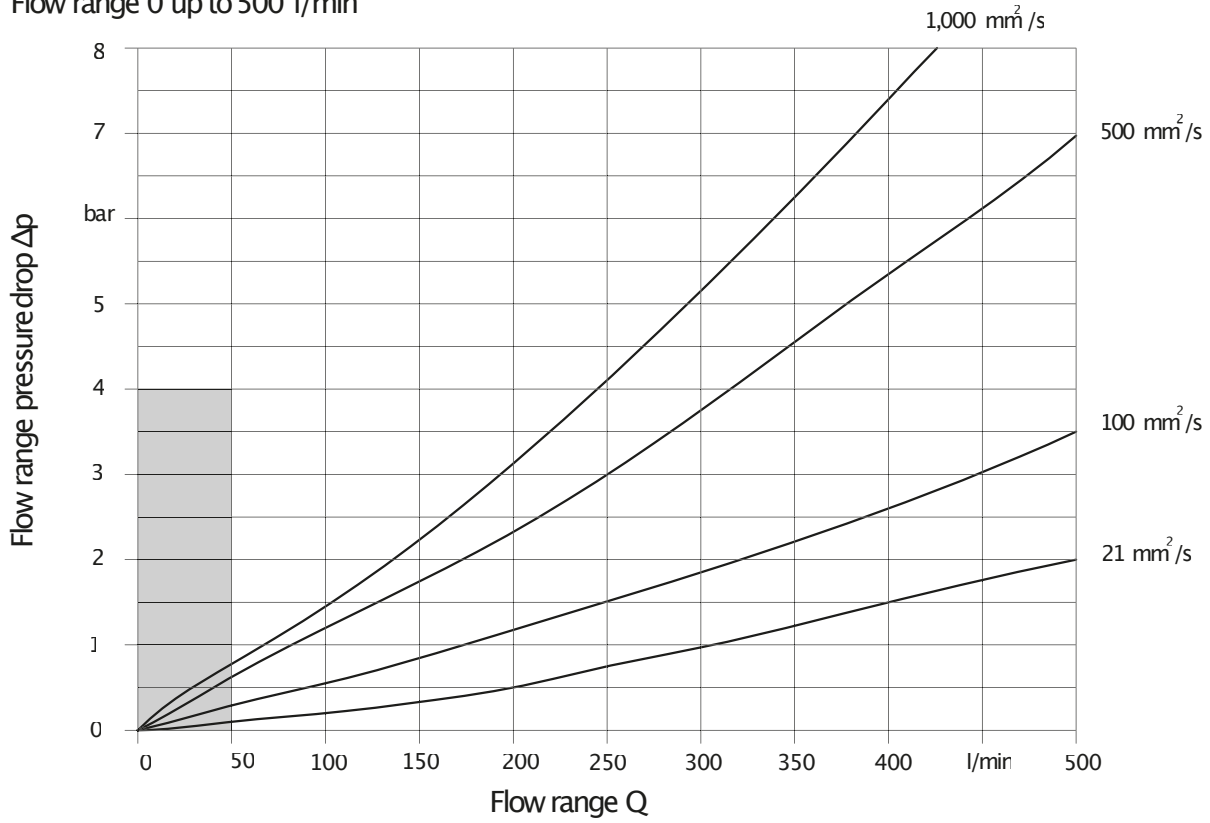
SIZE 100



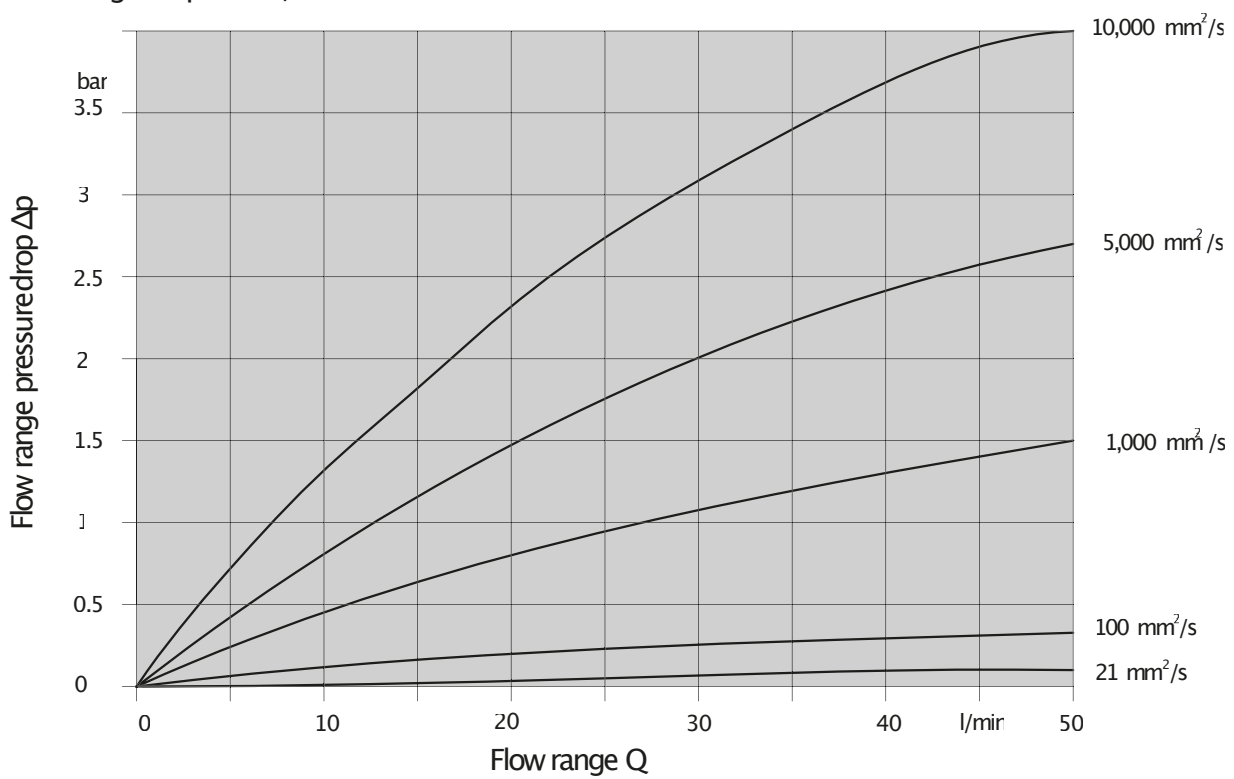
FLOW RANGES

SIZE 400

Flow range 0 up to 500 l/min

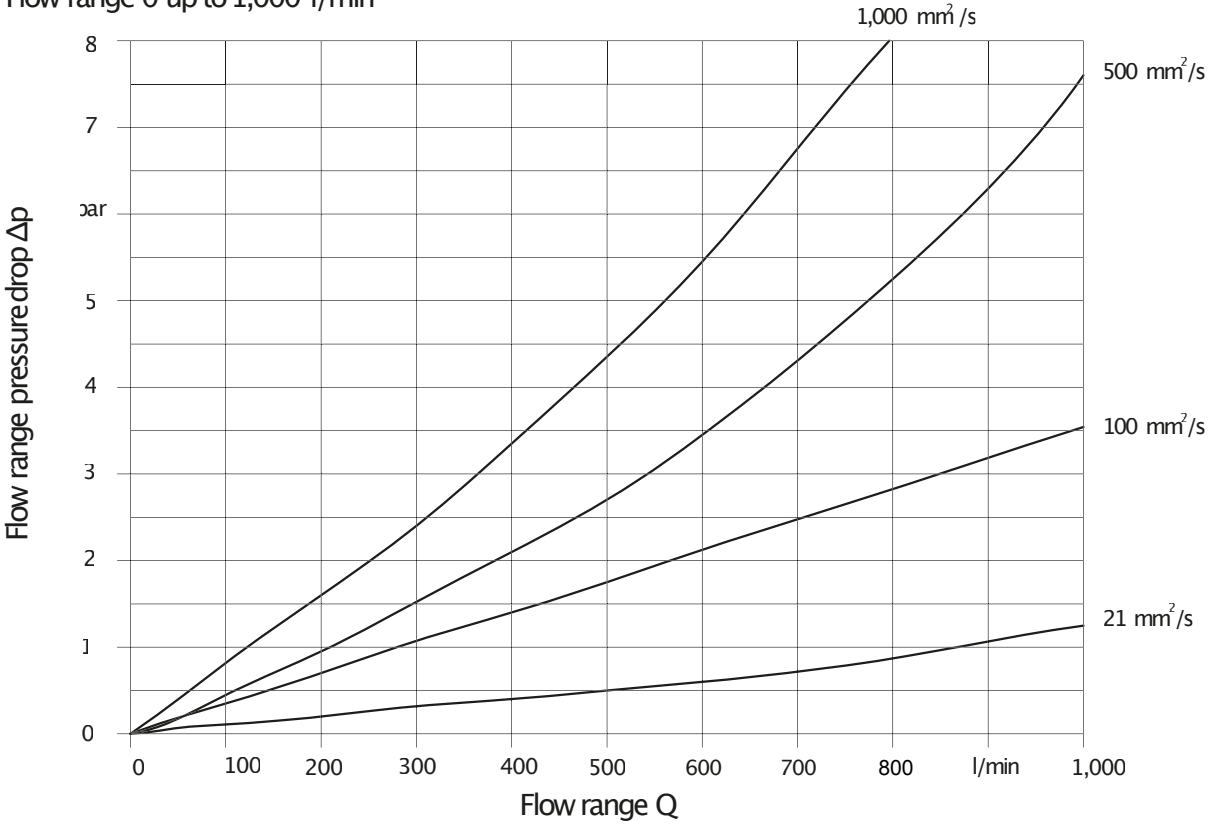


Flow range 0 up to 50 l/min



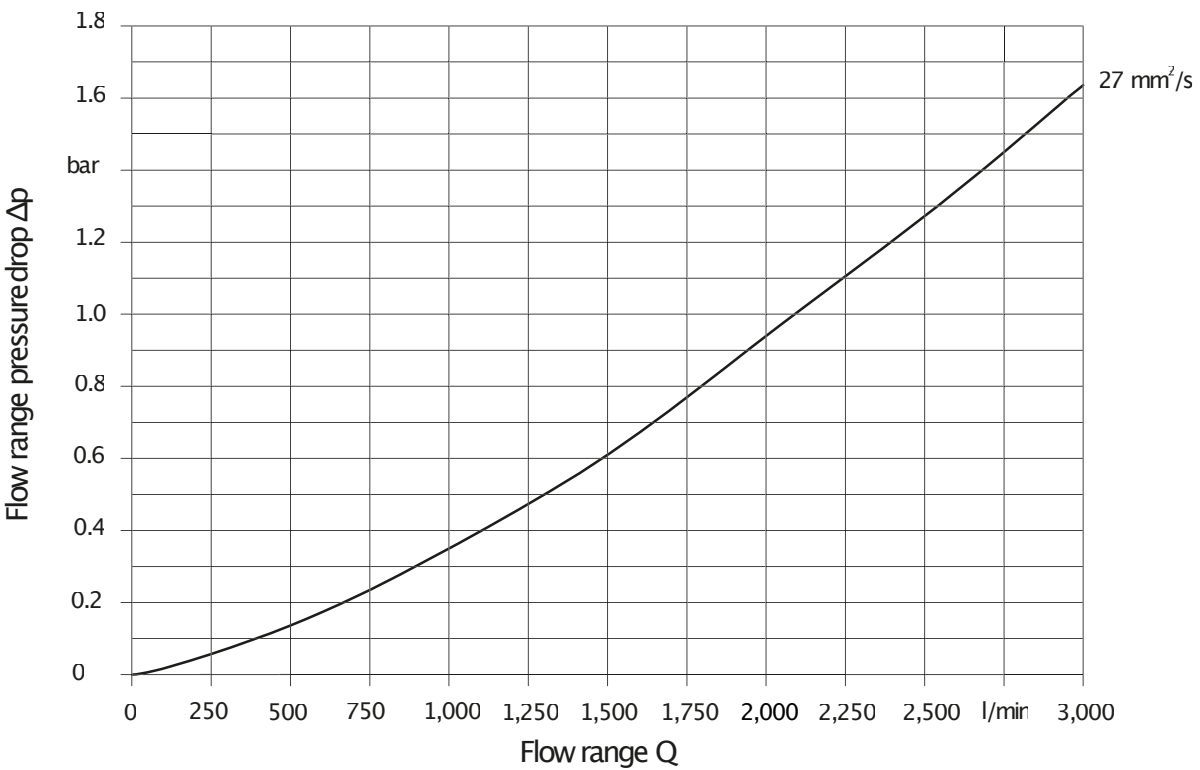
SIZE 800

Flow range 0 up to 1,000 l/min



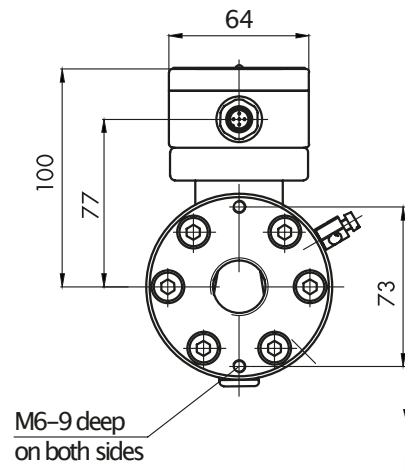
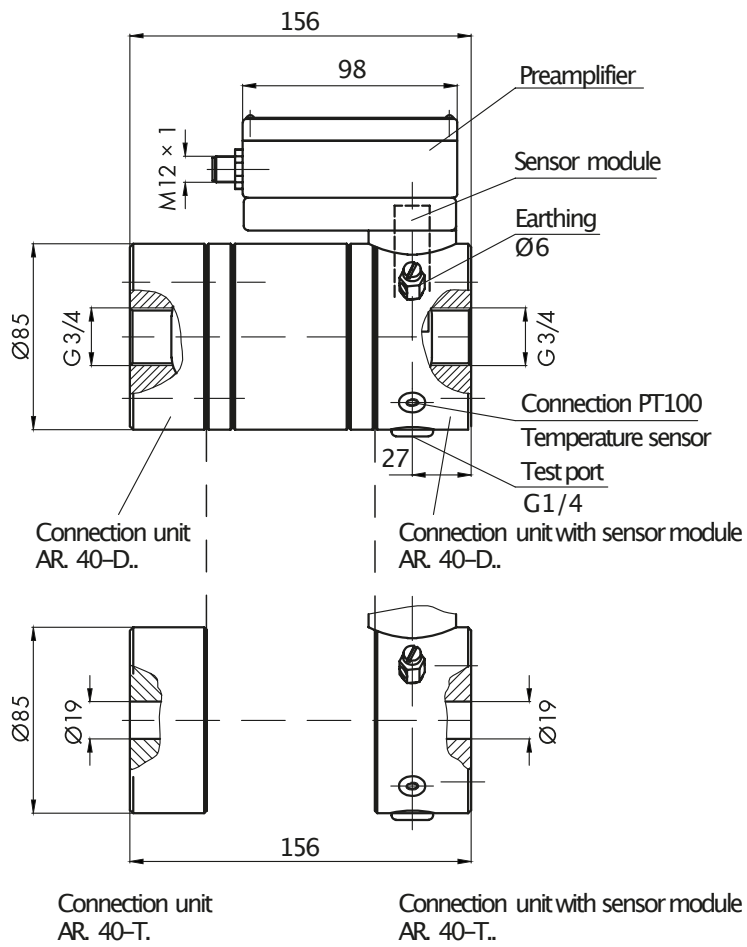
SIZE 2500

Flow range 0 up to 3,000 l/min



DIMENSIONS

RS 40



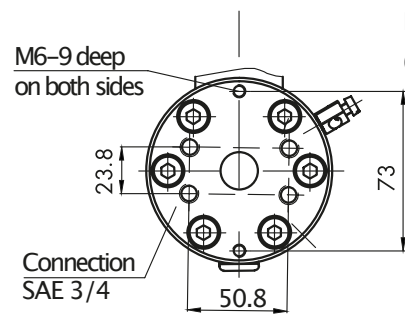
Weight:

Design "G"

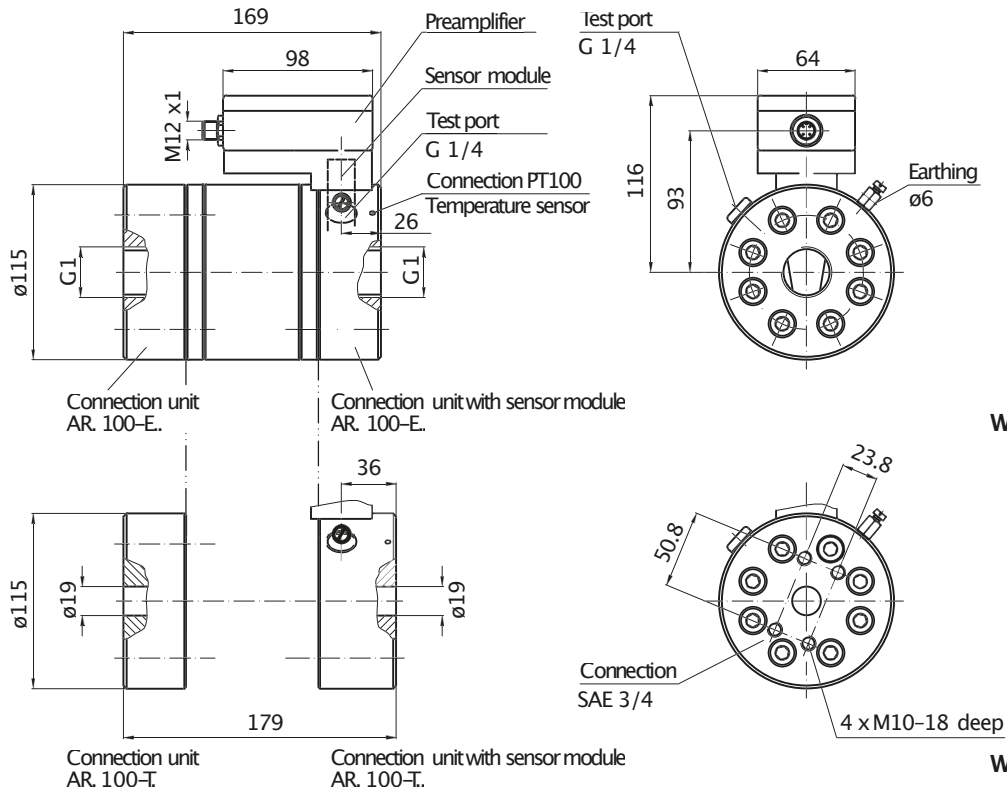
6.0 kg

Design "E + X"

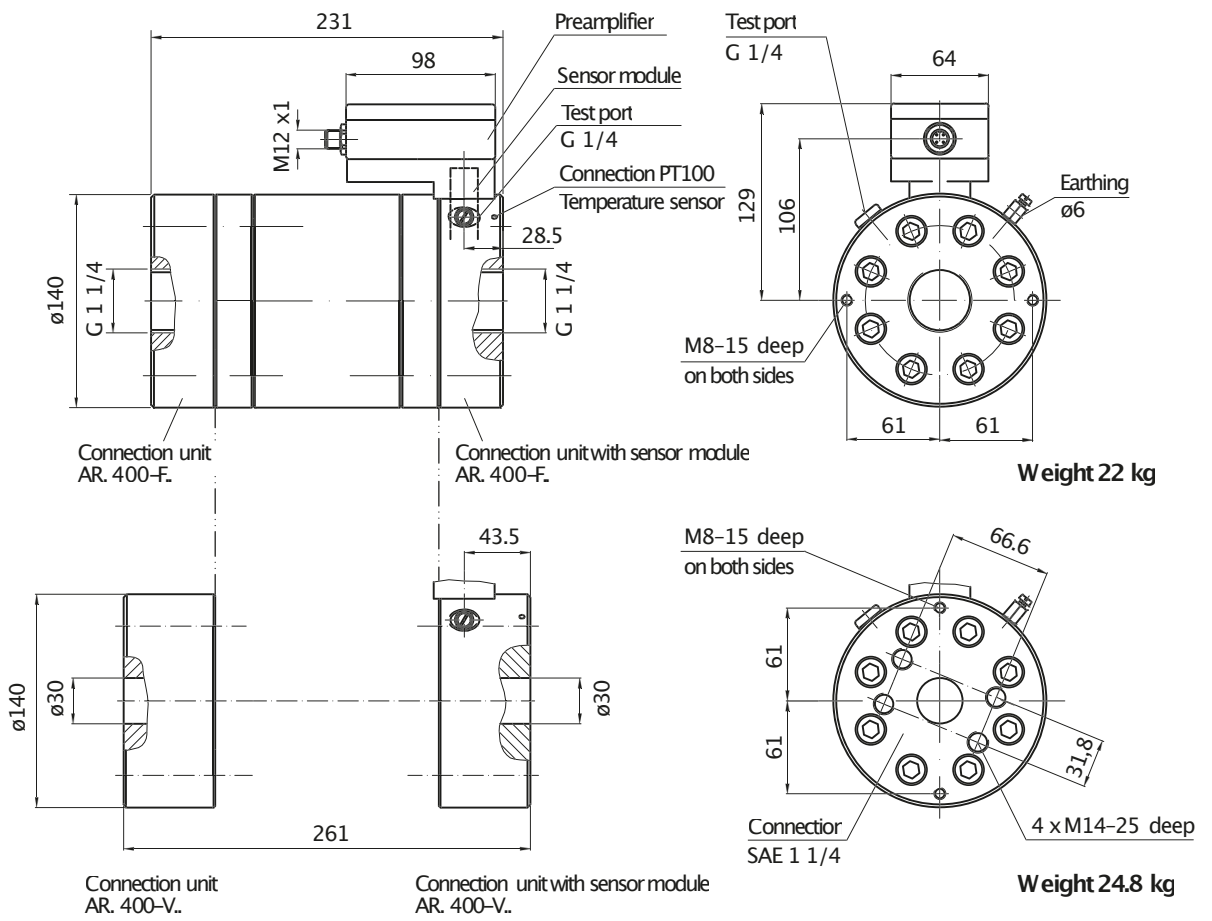
6.5 kg



RS 100

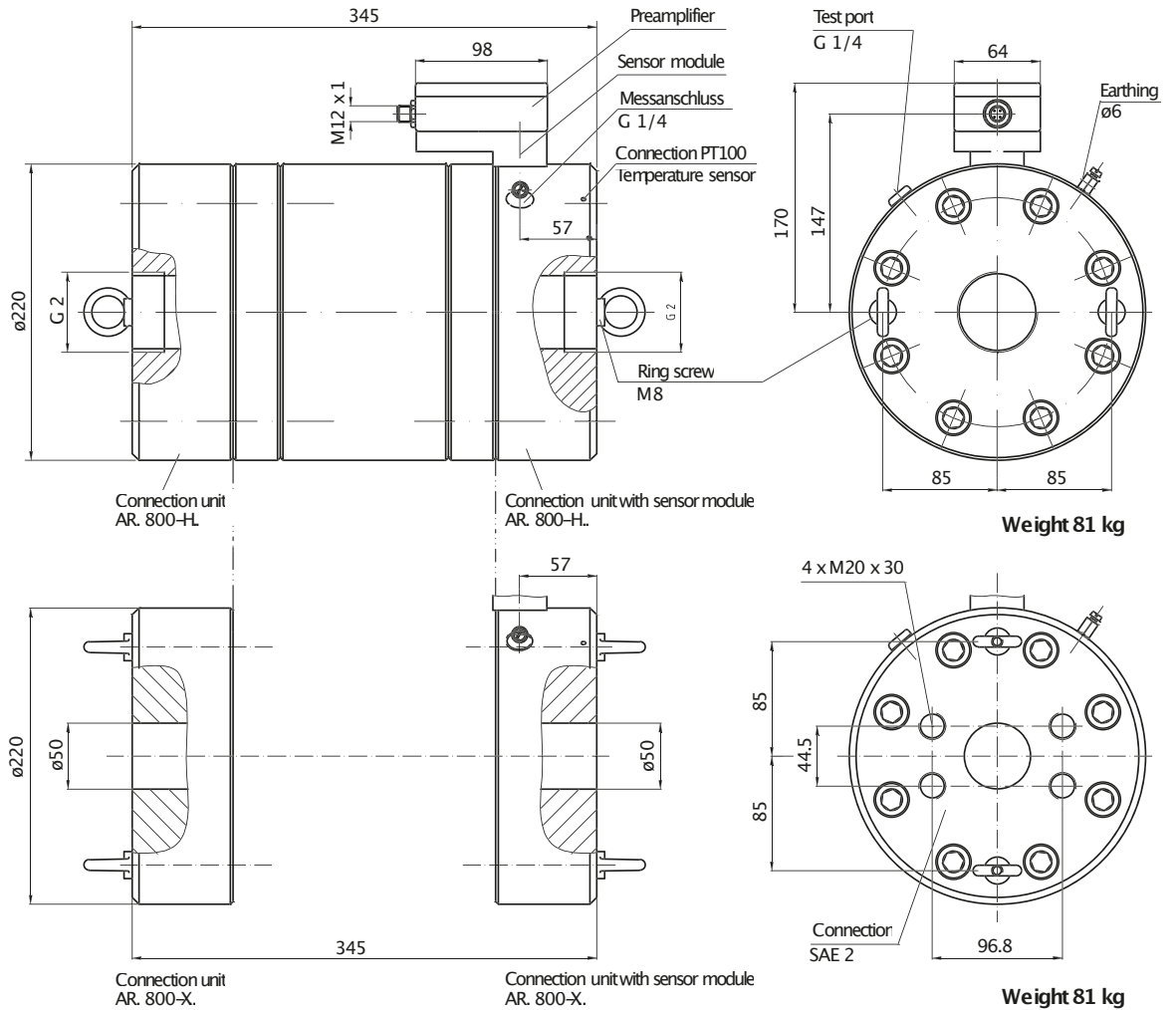


RS 400

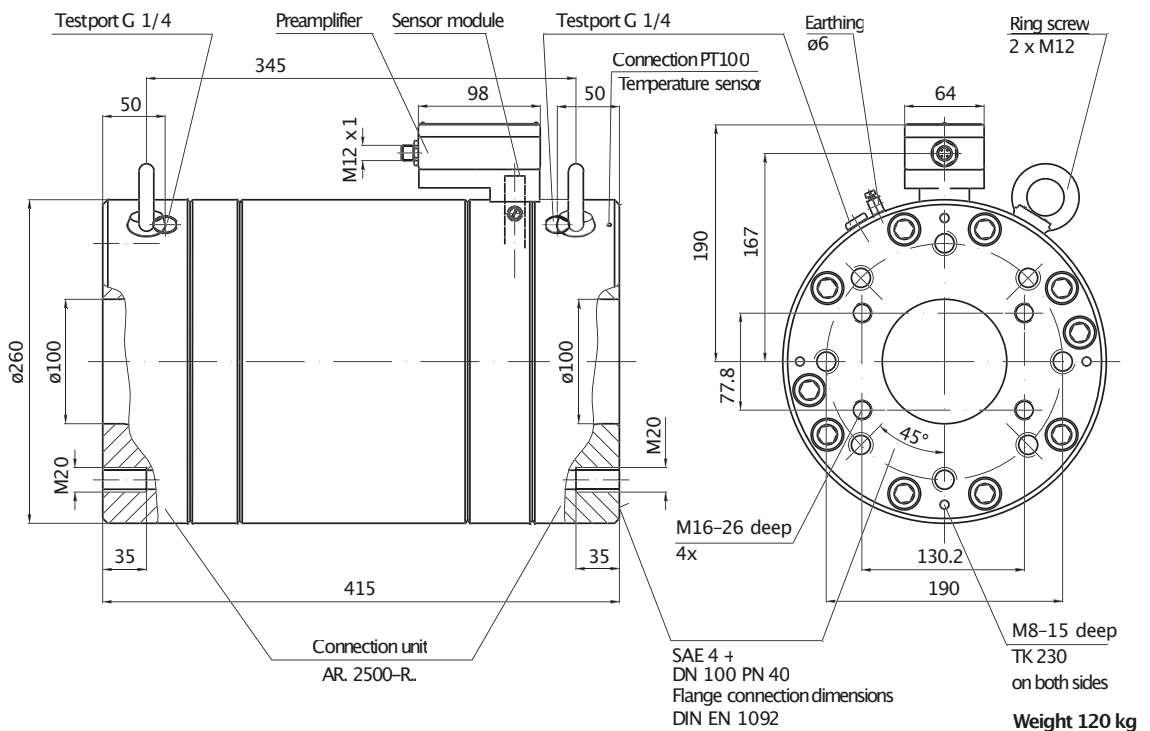


DIMENSIONS

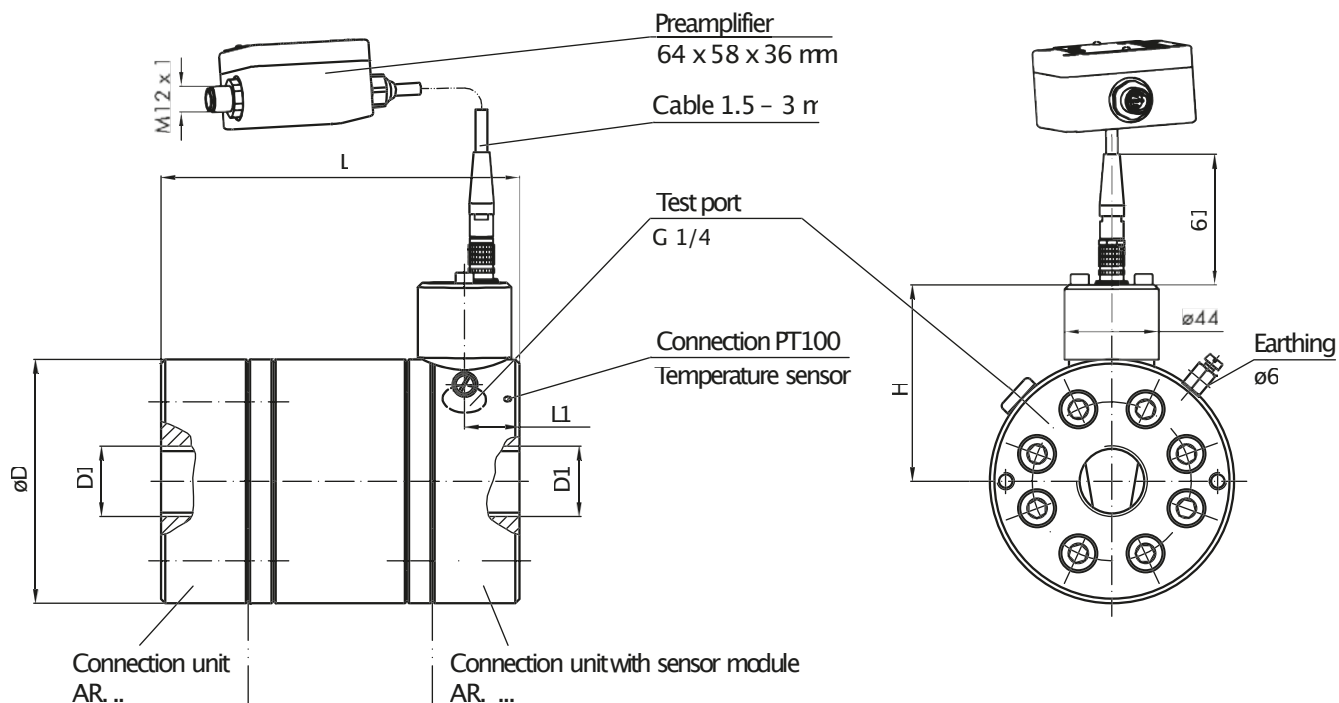
RS 800



RS 2500

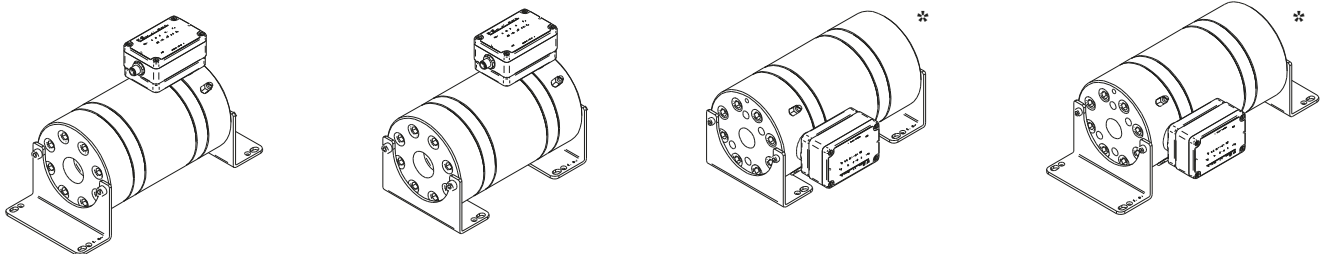
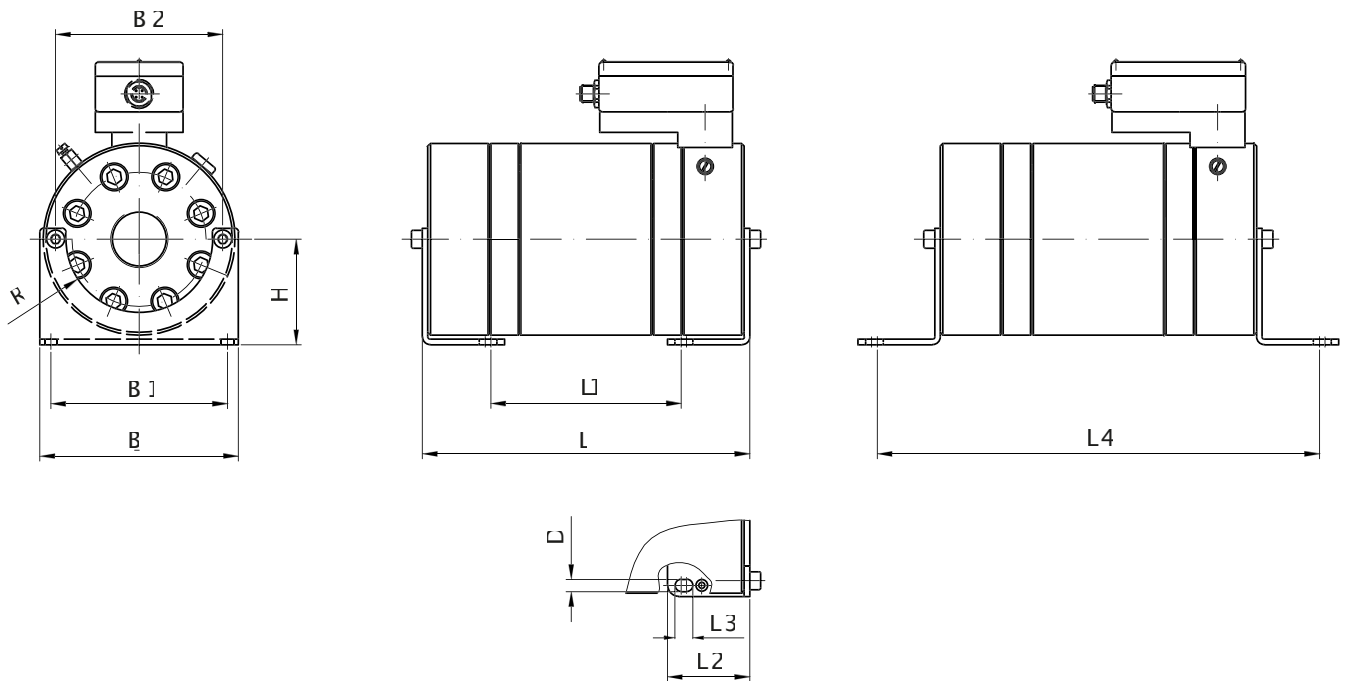


RS High temperature



Size	Ø D	D 1	L	L 1	H
RS 40	85	G 3/4 SAE 3/4	156	27	78.5
RS 100	115	G 1	169	26	93.5
		SAE 3/4	179	36	
RS 400	140	G 1 1/4	231	28.5	106
		SAE 1 1/4	261	43.5	
RS 800	220	G 2	345	57	147
		SAE 2			
RS 2500	260	SAE 4 + DN100 PN40	415	84	167.5

BRACKET CONNECTIONS RS



*Alternative bracket connections not available for all connection sizes

Size	Connection	B	B 1	B 2	R	H	L	L 1	L 2	L 3	L 4	D
RS 40	G 3/4	85	73	73	30.5	49	164	107-113	35	9.5	207-213	6.5
	SAE 3/4											
RS 100	G 1	120	104	100	41	64	177	97-105	50	13	241-249	9
	SAE 3/4						187	107-115			251-259	
RS 400	G 1 1/4	145	129	122	53.5	77	239	139-147	60	13	323-331	9
	SAE 1 1/4						269	169-177			353-361	
RS 800	G 2	225	209	180	76	117	353	193-201	90	13	497-505	9
	SAE 2											
RS 2500	SAE 4 + DN100 PN40	265	240	230	100	142	425	235-245	110	16	595-605	11

SENSOR MODULE

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

POWER SUPPLY

Supply voltage

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

Current consumption

$I_0 = 65$ mA (at 24 VDC); unloaded

Delay

$t_V = 8$ μ s max. (between scanning and measured value)

SIGNAL OUTPUTS

Output signal shape

Quadrature signals
(A, B with 90° 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)
 $V_{SS} = 9 \dots 27$ VDC

Signal output current

(channel 1, channel 2)
 $I_{OUT} = 300$ 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

PULSE FILTERING PRINCIPLE

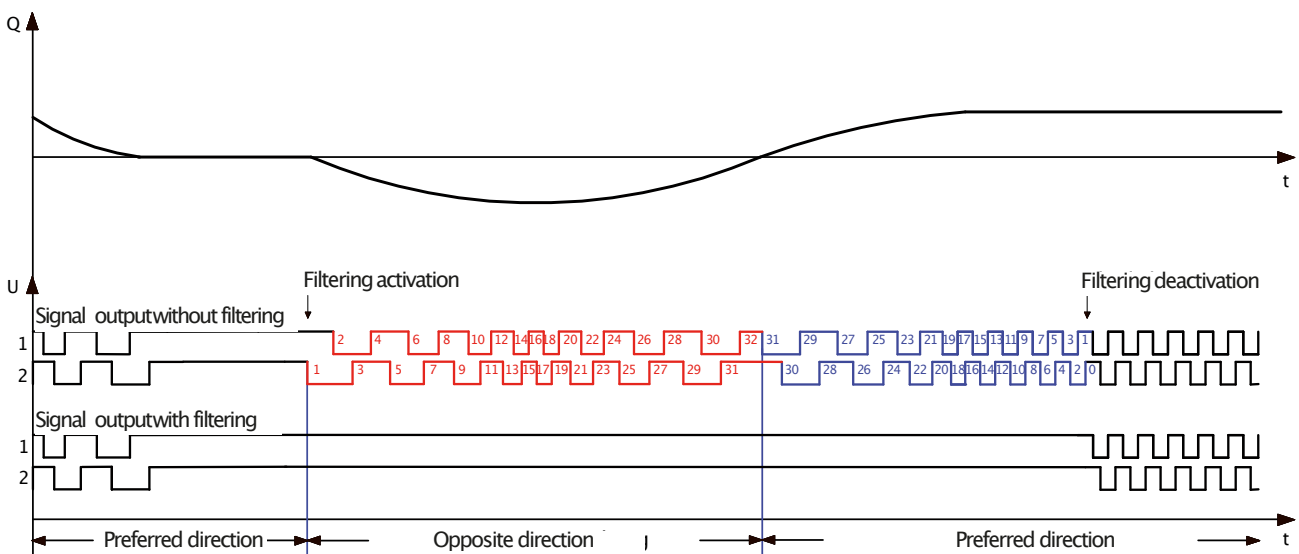
Oscillations in fluid systems manifest themselves through constant forward and backward movements of the liquid column, which is also detected by the rotor sensors and converted into proportional electronic pulses or edge sequences. These generated pulses can be incorrectly interpreted by the downstream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

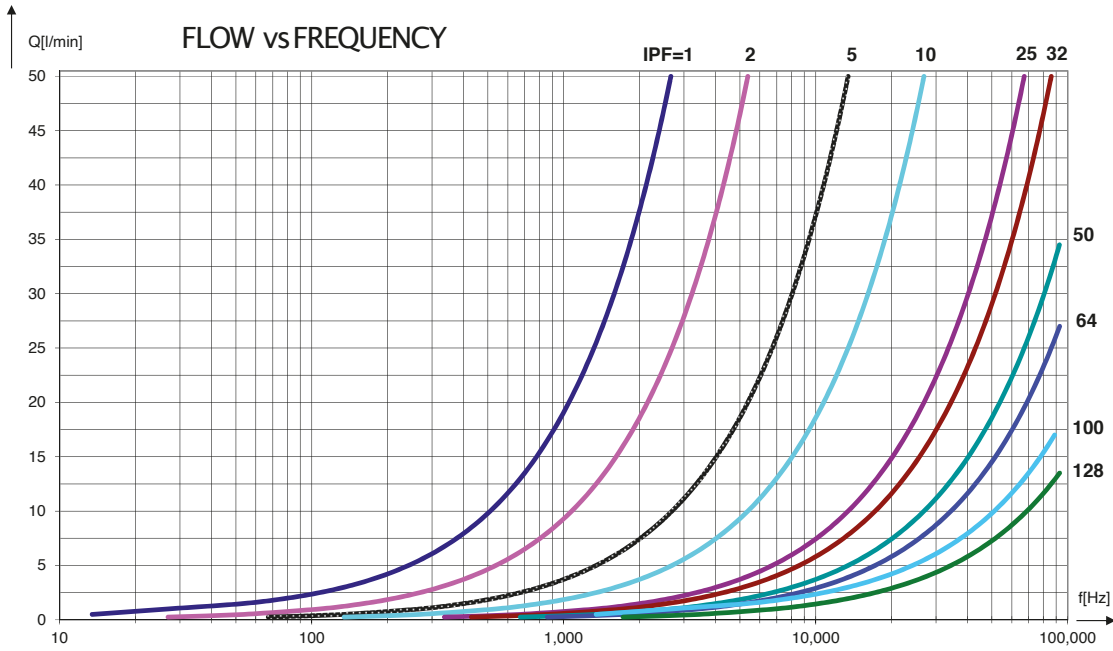
Filter position	RS 40X	RS 100X	RS 400X	RS 800X	RS 2500X
0	0	0	0	0	0
1	0.0775	0.145375	0.7845	2.5	9.25
2	0.155	0.29075	1.569	5.0	18.50
3	0.2325	0.436125	2.3535	7.5	27.75
4	0.31	0.5815	3.138	10.0	37.00
5	0.3875	0.726875	3.9225	12.5	46.25
6	0.465	0.87225	4.707	15.0	55.50
7	0.5425	1.017625	5.4915	17.5	64.75
8	0.62	1.163	6.276	20.0	74.00
9	0.6975	1.308375	7.0605	22.5	83.25
10	0.775	1.45375	7.845	25.0	92.50
11	0.8525	1.599125	8.6295	27.5	101.75
12	0.93	1.7445	9.414	30.0	111.00
13	1.0075	1.889875	10.1985	32.5	120.25
14	1.085	2.03525	10.983	35.0	129.50
15	1.1625	2.180625	11.7675	37.5	138.75



Pulse filtering chart

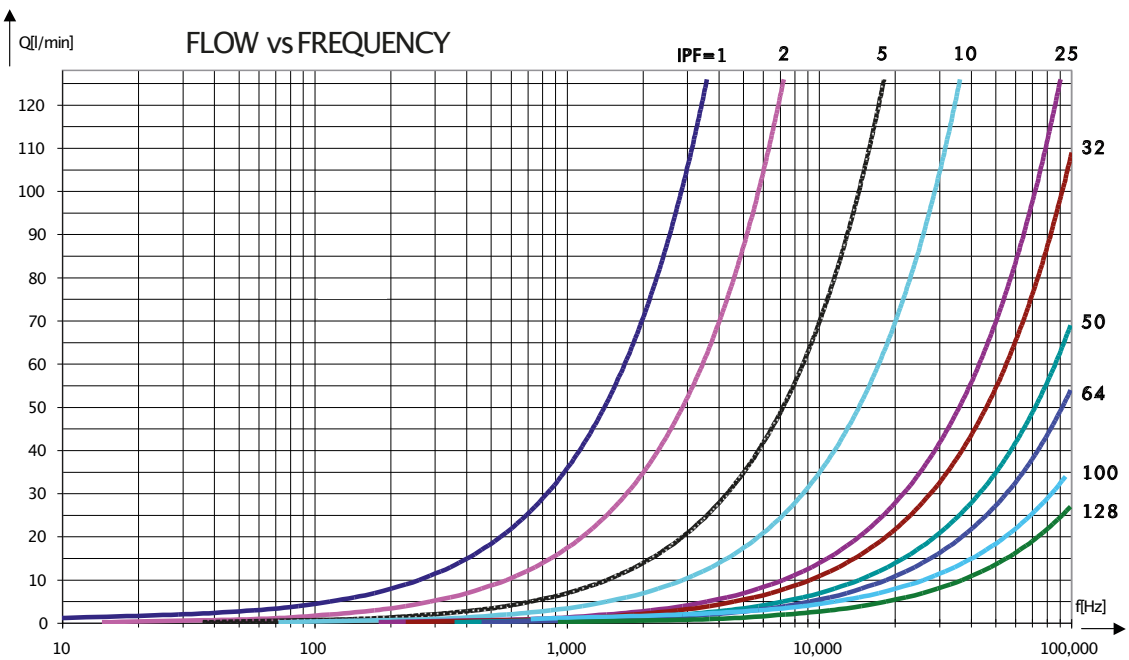
RS 40

Max. permissible flow 48 l/min
 Min. permissible flow 0.04 l/min



RS 100

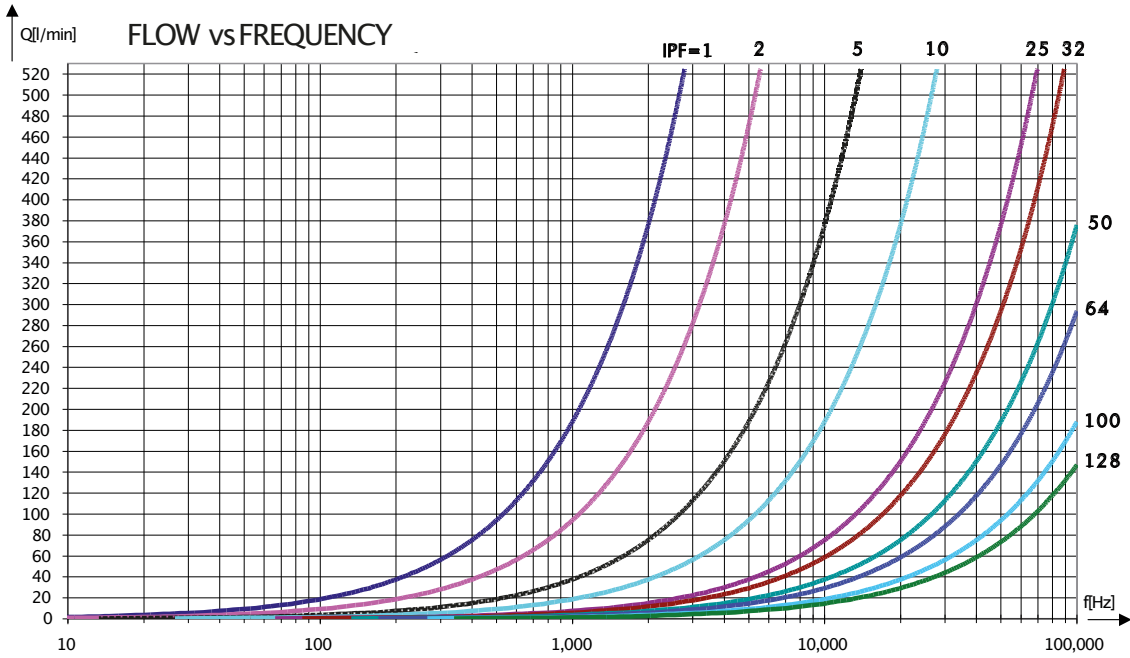
Max. permissible flow 126 l/min
 Min. permissible flow 0.25 l/min



RS 400

Max. permissible flow 525 l/min

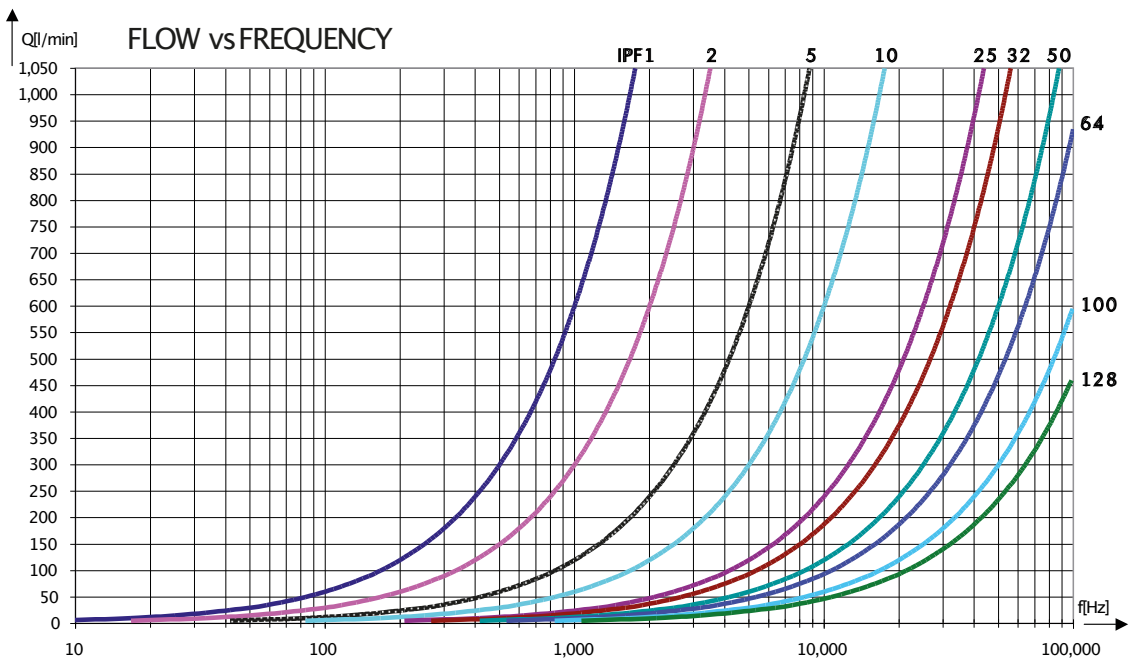
Min. permissible flow 0.5 l/min



RS 800

Max. permissible flow 1,050 l/min

Min. permissible flow 5 l/min



TYPE CODE

Example

RS 800		/	50	G	R	0	1	2	V	-	HT	/	X	Flow meter	+
Size	Interpolation	1 2 5 10 25 32 50 64 100 128	Material	Connection type											
				Factory provided											
				Bearing											
				Backlash											
				Sealing type											
				Design											
				Construction range											
				Modification figure Factory provided											
				High temperature design											
				Standard											
Ball bearing															
Ball bearing - Low temperature															
Hard metal sleeve bearing															
Angular contact ball bearing															
Standard															
Pipeline connection															
EN-GJS-400-15 (DIN EN 1563))															
Stainless steel 1.4305 (V2A)															
Stainless steel 1.4571 (V4A)															
Selectable interpolation factor															
RS 40															
RS 100															
RS 400															
RS 800															
RS 2500															

Connection unit

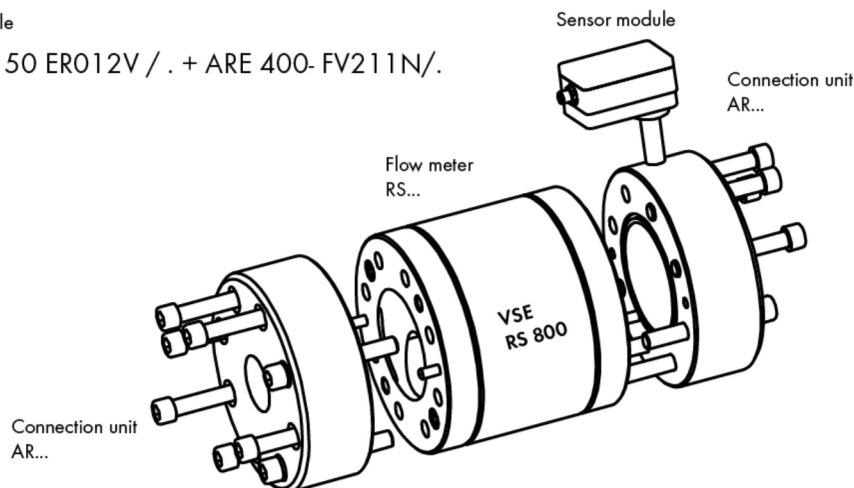
Example

AR	G	800	-	G	V	2	0	0	N	/	X								
Connection unit	Material	Size	Material	Connection	Sealing type	Sensor module	Test port	Connection for temperature sensor	Special design	Construction range	Modification figure Factory provided								
												V	FPM (Viton) Standard						
												P	NBR (Perbunan)						
												T	PTFE						
												E	EPDM						
												B	EPDM - 41B8						
												S	Silicone						
												D	G 3/4	H	G 2	T	SAE 3/4	Z	SAE 4
												E	G 1	I	DN 100 P16	V	SAE 1 1/4	Q	DN 50 PN40
												F	G 1 1/4	R	DN 100 PN40	X	SAE 2	Q1	DN 80 PN40
G	G 1 1/2			Y	DN 20 PN10	Q2	DN 100 PN10												
	40	RS 40																	
	100	RS 100																	
	400	RS 400																	
	800	RS 800																	
	2500	RS 2500																	
	G	EN-GJS-400-15 (DIN EN 1563)																	
	E	Stainless steel 1.4305 (V2A)																	
	X	Stainless steel 1.4571 (V4A)																	

RS 2500

Order example

RS 400 / 50 ER012V / . + ARE 400- FV211N/.



VSE.flow®

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