

DESCRIPTION

The RS 4001 AP Regulator is designed for use in distribution networks with low to medium inlet pressures.

They are direct acting regulator, where the spring housing/regulator head (1) is mounted directly to the screwed body (2).

The RS 4011 AP versions include an optional SAV (Over-Pressure [OPSO] and/or Under-Pressure [UPSO]) Shut-Off facility, which take the place of the lower body plug (3).

MODEL

There are four models in the range, depending on the required inlet/outlet pressures:

Model BP (Low pressure version): For outlet pressures from 2 to 10 kPa (20 to 100 mbar).

(Please refer to technical datasheet RS 4000 BP)

Model MP (Medium pressure version): For outlet pressures from 5 to 35 kPa (50 to 350 mbar).

(Please refer to technical datasheet RS 4000 MP)

Model AP1 (High pressure version): For outlet pressures from 30 to 150 kPa (300 to 1500 mbar)

(This technical sheet)

Model AP2 (High pressure version): For outlet pressures from 140 to 400 kPa (1400 to 2500 mbar)

(Please refer to technical datasheet RS 4002 AP)

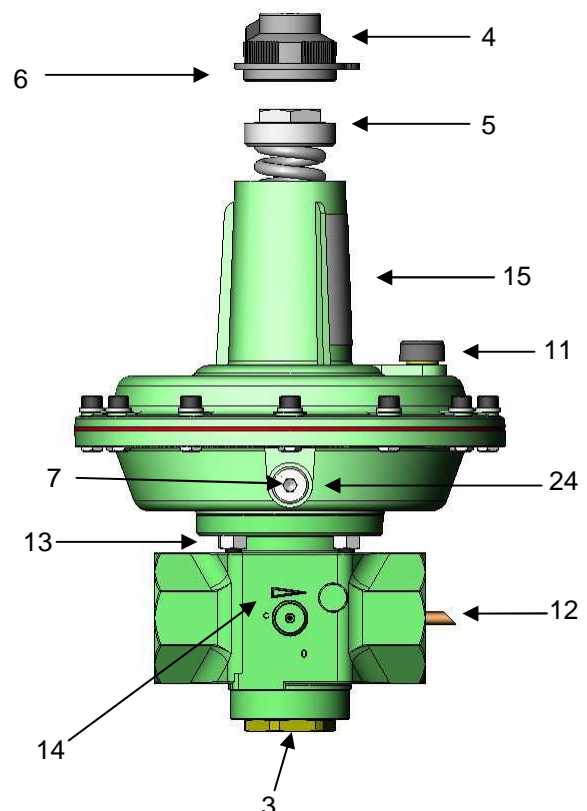
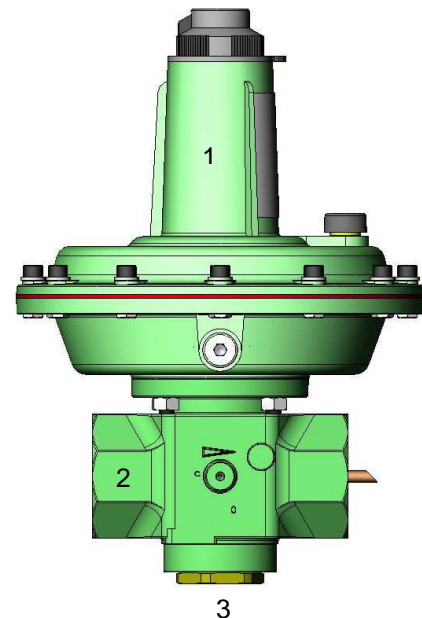
CONNECTIONS

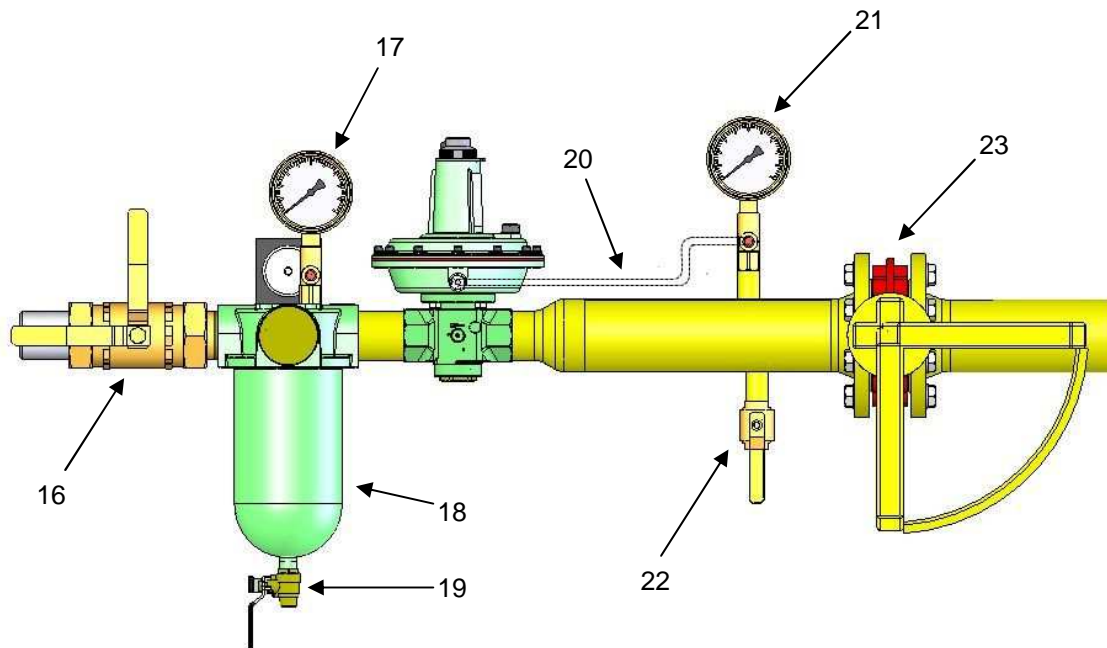
1.1/2" RP

1.1/2" NPT (optional)

ASSEMBLY

- Prior to installing the regulator, please verify the pressure and connection details required correspond with the information on the label (15).
- Assure that the fluid flows in the direction that the arrow (14) indicates.
- The sense line (12) for regulation is already assembled in the outlet of the regulator; this should be totally exempted of any type of obstruction or deformation.
- The location of the regulator at the installation should be adequate to allow maintenance labors and outlet pressure adjustments.
- The SAV (OPSO/UPSO Device) is mounted on the lower section of the regulator. It monitors the downstream pressure independently of the main section of the regulator. The SAV (OPSO/UPSO device) can be ordered with the regulator, or can be fitted separately, later if required.





STARTUP PROCEDURE

- Open the bleed valve (22) to provide a slight flow of gas when the inlet valve is turned on.
- Slightly and slowly, open the inlet valve (16), located immediately upstream of the regulator.
- Check that the inlet pressure (17) is correct.
- Verify that the outlet pressure (21) has stabilized.
- The main inlet valve (16), found at the inlet of the filter (18), can now be fully opened.
- Slowly open the outlet valve (23).
- If the regulator is fitted with a SAV (OPSO/UPSO), this should be kept in mind.

REGULATOR SETUP

Outlet Pressure Adjustment:

- Remove plastic cap (4), located on the top of the regulator.
- To increase outlet pressure, turn the main spring adjustment bolt (5) CLOCKWISE with a Tube Spanner 30mm.
- Turning this bolt anti-clockwise will decrease the outlet pressure.
- Place plastic cap (4) back onto the regulator top, make sure to put the O-ring (6).

The spring used in these regulators have been designed to provide specific outlet pressure ranges. For outlet pressures outside the specified range, a spring change will be required.

Causes of abnormal operation:

- Sense lines (12) blocked or turbulence in the zone.
- Pressure required is outside the range of the spring installed.
- Flow capacity requires exceeds regulator capacity.
- Atmospheric Vent (11) blocked or restricted.

If regulator does not close perfectly, this may be caused by:

- A worn, damaged, filth, or pitted Valve Seat Disc.
- Orifice may be worn.
- O-ring may be worn.
- Deterioration of the diaphragms.

If the SAV (OPSO/UPSO) does not close perfectly:

- Please refer to the Technical Data Sheet relevant to the SAV (OPSO/UPSO) device concerned.

To avoid particle damage of the internal working parts of the regulator, it is necessary to install a filter (18) of not less than 5 microns prior to the regulator.

CHANGING THE MAIN SPRING:

Removing the main spring:

- Close inlet valve (16) and the outlet valve (23).
- Depressurize the inlet and outlet side of the regulator via purge valves 19 and 22.
- Remove main regulator cap (4) to access the bolt (5).
- Wind the adjustment bolt (5) ANTI-CLOCKWISE, until all pressures is taken off the main spring, remove.
- Extract the spring.

Re-assembly:

- Insert the spring of appropriate outlet pressure range (view spring table).
- Re-assemble the main spring housing in reverse order to the above instructions.
- **Please ensure only spring of appropriate size are fitted and properly install the Teflon and brass washer (9) previously greased, as failure to do so may cause regulator damage or failure.**



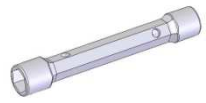




REMOVAL OF THE MOBILE DEVICE:

- Close inlet Valve (16) and outlet Valve (23).
- Depressurize the inlet and outlet side of the regulator via purge valves 19 and 22.
- Using a 13mm Open-end spanner, loosen and remove the four body bolts (13).
- The regulator head can now be safely removed.

Re-assembly

- Insert the seat disc with a little bit of pressure.
- To re-fit the regulator head, reverse the above procedure.

TOOLS REQUIRED FOR THE MAINTAINANCE OF THE RS 4001 AP REGULATORS

	O-ring Extractor		Allen Key 4 - 5 mm		Tube Spanner 13 - 24 mm
	Open-end Spanner 13 - 19 - 27 mm		Screwdriver 10 x 1,6 mm		Tweezers
			Hook-Spanner 60-90		

OUTLET PRESSURE ADJUSTMENT SPRINGS FOR THE R 4001 AP REGULATORS

Spring Code	Spring Color	Ø Wire (mm)	Length (mm)	Ø Outside (mm)	n° Turns	Spring Range in kPa (bar)
ZM.3.35.100451A	White	4.5	100	35	10	250 ÷ 450 (25 ÷ 45)
ZM.3.35.100501A	Yellow	5.0	100	35	10	400 ÷ 600 (40 ÷ 60)
ZM.3.35.100551A	Blue	5.5	100	35	10	500 ÷ 900 (50 ÷ 90)
ZM.3.35.100601A	Black	6.0	100	35	10	700 ÷ 1200 (70 ÷ 120)
ZM.3.35.100651A	Purple	6.5	100	35	10	1000 ÷ 1500 (100 ÷ 150)

RS 4001 AP Orifice Ø 14 mm

P _a (mbar)	P _e (barg)																
	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4	5	6	8	10	12	14	16	18	20
300	65	116	176	238	294	362	419	484									
500		98	149	183	241	284	310	401	573	689							
750		72	126	177	213	264	316	352	501	657	657	657					
1000			105	161	196	248	298	326	438	500	500	500	500				
1250			111	176	230	281	337	389	490	621	621	621	621	621	621		
1500				172	236	291	365	411	519	634	634	634	634	634	634	634	634

The flow is measured at nominal output pressure, with close accuracy ± 10% (AC10)

Example:

Regulator without consumption, flow 0, inlet pressure 4 bar, close to 1.65 bar, nominal output pressure 1.5 bar (AC10) and Ø 14 mm orifice, its maximum flow is 411 (n) m³/h.

Other gases flow

In the tables above the flow is in (n) m³ / h natural gas with density 0.61 and temperature of 15 °C.

To convert to other gas flow, using the following formula:

$$Q \text{ (n) m}^3/\text{h natural gas} \times F_c = Q \text{ (n) m}^3/\text{h n gas}$$

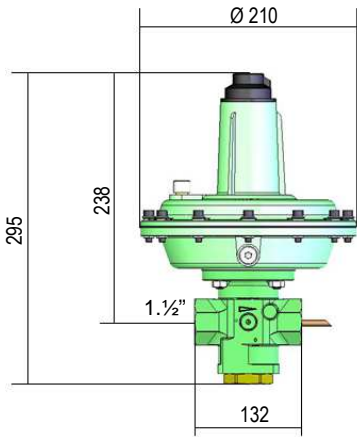
Example:

$$Q \text{ (n) m}^3/\text{h natural gas} \times 0.78 = Q \text{ (n) m}^3/\text{h air}$$

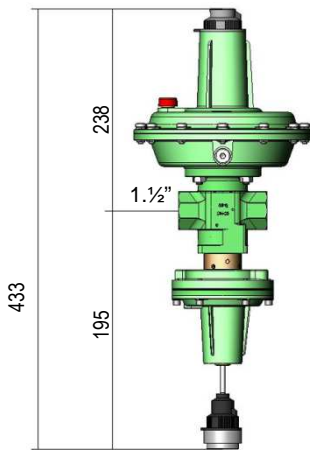
$$1 \text{ (n) m}^3/\text{h natural gas} = 0.78 \text{ (n) m}^3/\text{h air}$$

Conversión factor Fc	
Butane	0.55
Propane	0.64
Oxygen	0.76
Air	0.78
Nitrogen	0.81
Bio gas	0.85
Town gas	1.23
Hidrogen	3.04

DIMENSIONS AND WEIGHTS



RS 4001 AP1



RS 4011 AP1

Technical features of RS 4001 AP1

bpu	0.2 ÷ 25 bar	(inlet pressure range)
Ps	25 bar	(design pressure)
Pu	25 bar	(maximum inlet pressure)
Wd		(outlet pressure range)
RS 4001 AP1	300 ÷ 1500 mbar	
Wdo	500 ÷ 4000 mbar	(OPSO range)
Wdu	150 ÷ 2500 mbar	(UPSO range)
Wrv	+10 ÷ +20% Pd	(Relief valve range)
Ac	until 10 %	(accuracy class)
Sg	until 20 %	(accuracy class)
T	-20°C ÷ 60°C	(working temperature)

Inlet connection	1.1/2" RP
Outlet connection	1.1/2" RP
Connections position	Axial
Weight RS 4001 AP1	6.1 Kg
Weight RS 4011 AP1	7.6 Kg

BUILT-IN RELIEF VALVE

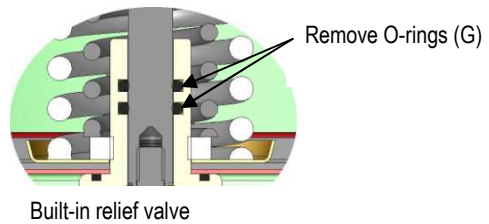
The regulator has an internal relief valve, which allows a certain quantity of free gas in case of abrupt changes of flow or by heating the tubes with no flow.

To activate the relief valve must be removed, the two O-rings (G) mounted on the fitting assembly of the membrane.

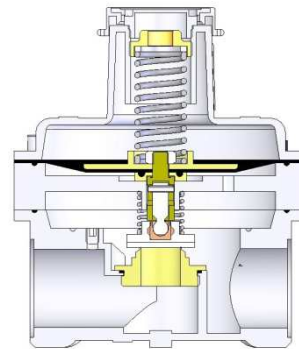
For installations ON-OFF, the output of the regulator should be sufficiently large lungs to absorb water hammer. It is recommended that lung mounted external relief valve capable of removing pressure peaks.

The quantity of gas released by pressure relief valve is related to the difference of inlet pressure and his calibrated. In the attached image is shown as an example, the relief valve VS 25 model. In which its operation is based on the confrontation of forces on both sides of the membrane.

On one side of the membrane, the gas pressure acts, on the opposite side and the spring force adjustment.

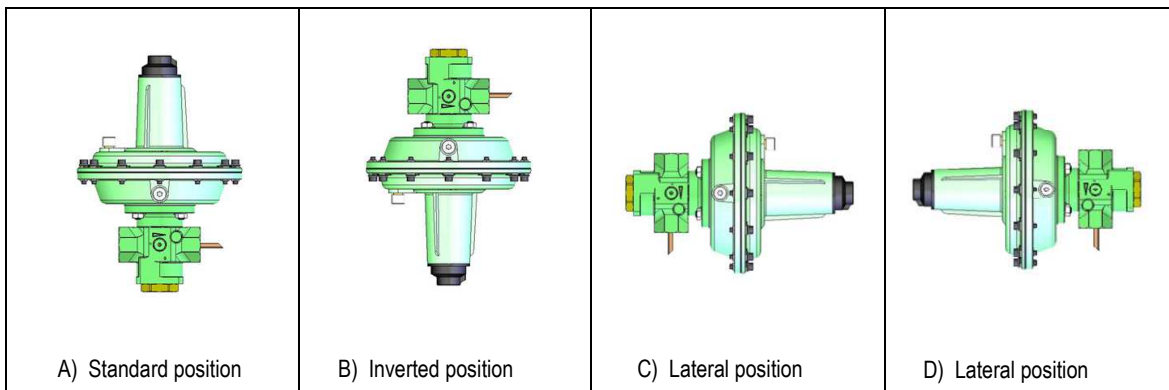


Built-in relief valve

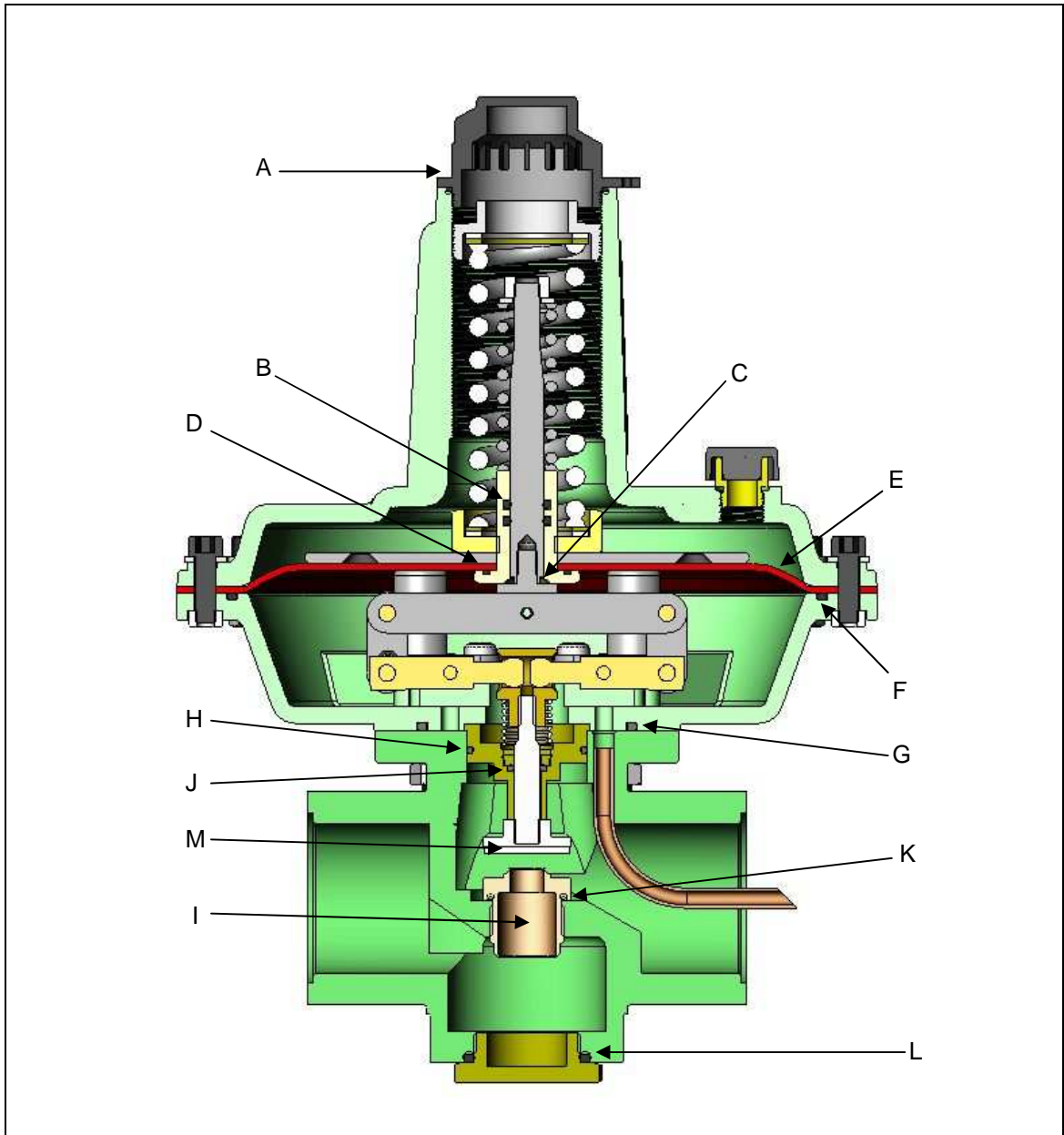


External relief valve VS-25



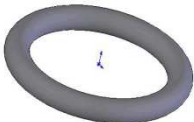
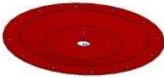
MOUNTING POSITION



For correct operation, the regulator must be mounted according to the above figures; the first image (A) is the usual position of mounting. There should be enough space for the maintenance work.



SPARE PARTS FOR RS 4001 AP

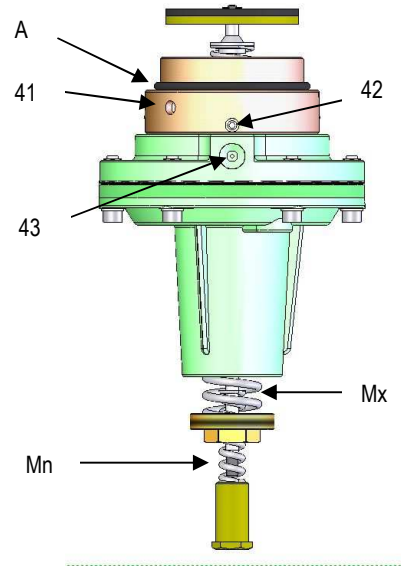
 <p>Seat Disc (O) Code ZM.1.00.070615</p>	 <p>Orifice (P)</p>	 <p>Construction O-rings</p>																																		
 <p>Diaphragm (E) Code ZM.1.00.0529</p>	<table border="1"> <thead> <tr> <th>Ø Orifice (mm)</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>ZM.1.00.0659</td> </tr> <tr> <td>8</td> <td>ZM.1.00.0660</td> </tr> <tr> <td>10</td> <td>ZM.1.00.0661</td> </tr> <tr> <td>12</td> <td>ZM.1.00.0620</td> </tr> <tr> <td>14</td> <td>ZM.1.00.0546</td> </tr> </tbody> </table>	Ø Orifice (mm)	Code	6	ZM.1.00.0659	8	ZM.1.00.0660	10	ZM.1.00.0661	12	ZM.1.00.0620	14	ZM.1.00.0546	<table border="1"> <thead> <tr> <th>Item</th> <th>Dimensions</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ZM.1.00.1440</td> </tr> <tr> <td>B</td> <td>ZM.1.00.0974V</td> </tr> <tr> <td>C</td> <td>ZM.1.00.0285</td> </tr> <tr> <td>D</td> <td>ZM.1.00.0893</td> </tr> <tr> <td>E</td> <td>ZM.1.00.0508</td> </tr> <tr> <td>F</td> <td>ZM.1.00.0509</td> </tr> <tr> <td>G</td> <td>ZM.1.00.0048</td> </tr> <tr> <td>H</td> <td>ZM.1.00.2325</td> </tr> <tr> <td>J</td> <td>ZM.1.00.0047</td> </tr> <tr> <td>K</td> <td>ZM.1.00.3488</td> </tr> </tbody> </table>	Item	Dimensions	A	ZM.1.00.1440	B	ZM.1.00.0974V	C	ZM.1.00.0285	D	ZM.1.00.0893	E	ZM.1.00.0508	F	ZM.1.00.0509	G	ZM.1.00.0048	H	ZM.1.00.2325	J	ZM.1.00.0047	K	ZM.1.00.3488
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SAFETY SHUT-OFF DEVICE (SAV)

The RS 4001 AP1 regulator, is available with built-in safety valve (SAV), or can also be mounted in the future if the installation conditions vary. In the future if you want to mount the SAV, request the set RI.ORG.0403 and instead on the cap (3).

SAV installation

- With the Open-end spanner, loosen and remove the cap (3)
- Insert the RI.ORG.0403, threading clockwise, taking care to reassemble the O-ring (A). Tighten the neck of the SAV with the spanner hook inserted into the holes (41)
- Loosen the screws (42) with a 2.5 mm Allen key and turn the SAV to connect the pressure tubing between the fitting (43) and exit the lung.
- Tighten the screws (42) with 2.5 mm Allen key.
- Connect with 10 mm diameter tube, the fitting (43) and the lung that are located at the exit, a distance at least 5 times the diameter of the lung output, taking care not to ride in this tube, gas valves that can break up the gas.



UPS0 ADJUSTMENT SPRINGS

Spring code	Spring color	Ø Wire (mm)	Length (mm)	Ø Outside (mm)	Spring Range in kPa (mbar)
ZM.3.12.055251	Purple	2.5	55	12.3	15 ÷ 50 (150 ÷ 500)
ZM.3.12.055281	Orange	2.8	55	12.3	30 ÷ 100 (300 ÷ 1000)
ZM.3.12.055301	Pink	3.0	55	12.5	80 ÷ 250 (800 ÷ 2500)

OPSO ADJUSTMENT SPRINGS

Spring code	Spring color	Ø Wire (mm)	Length (mm)	Ø Outside (mm)	Spring Range in kPa (mbar)
ZM.3.30.060351	Blue	3.5	60	30	50 ÷ 100 (500 ÷ 1000)
ZM.3.30.060371	Black	3.7	60	30	70 ÷ 130 (700 ÷ 1300)
ZM.3.30.060401	Purple	4.0	60	30	100 ÷ 180 (1000 ÷ 1800)
ZM.3.30.060451	Orange	4.5	60	30	130 ÷ 250 (1300 ÷ 2500)
ZM.3.30.060481	Pink	4.8	60	30	180 ÷ 400 (1800 ÷ 4000)

WARNING! It is potentially dangerous to manipulate a gas installation and its components. Therefore all start-up, adjustments and maintenance of the regulator must be carried out by duly authorized people with sufficient technical knowledge.