

### DESCRIPTION

The RS 2501 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 2511 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 2500 BP)

Model MP (Medium pressure version): For outlet pressures from 8 to 35 kPa (80 to 350 mbar).  
(Please refer to technical datasheet RS 2500 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 250 kPa (1400 to 2500 mbar)  
(Please refer to technical datasheet RS 2502 AP)

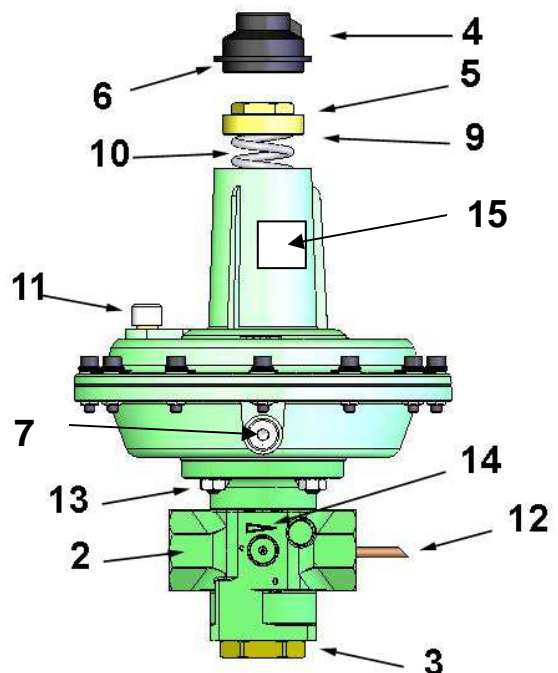
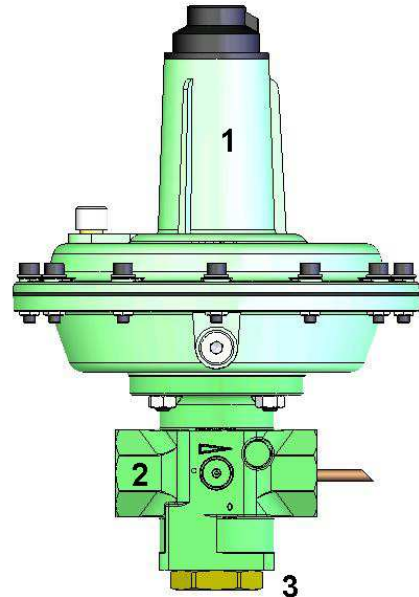
### CONNECTIONS

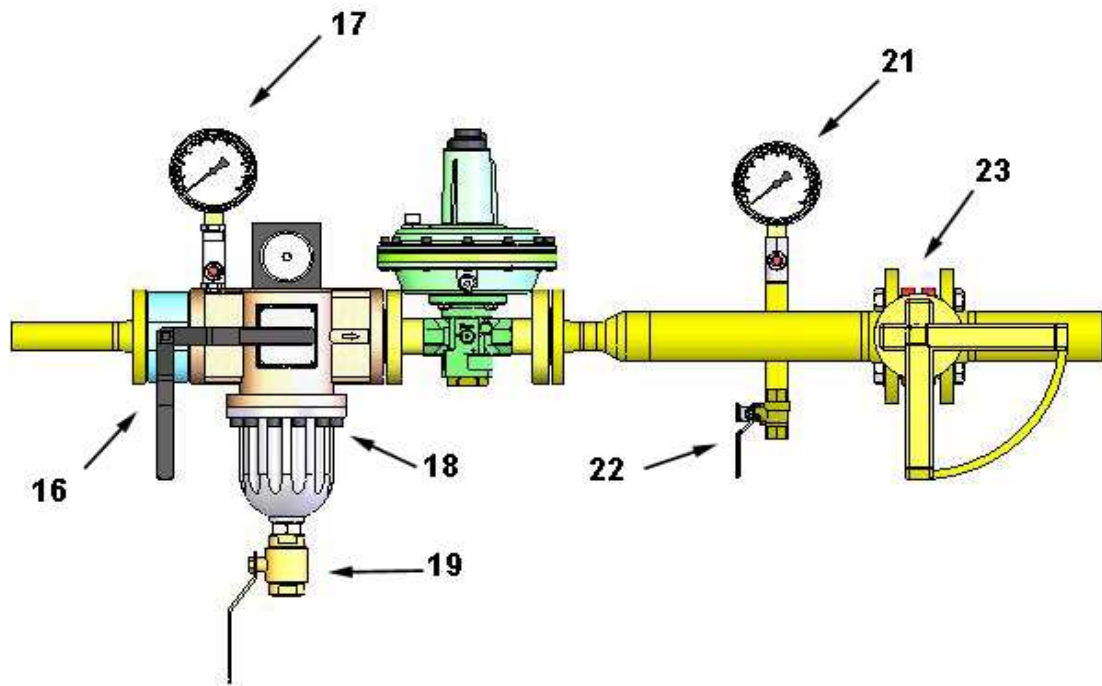
1" RP

1" 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 Optional 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 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 R 2501 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 RS 2501 AP REGULATORS

Spring Code	Spring Color	Ø Wire (mm)	Length (mm)	Ø Outside (mm)	n° Turns	Spring Range in kPa (bar)
ZM335100451A	White	4.5	100	35	10	25 ÷ 45 (0.25 ÷ 0.45)
ZM335100501A	Yellow	5.0	100	35	10	40 ÷ 60 (0.40 ÷ 0.60)
ZM335100551A	Blue	5.5	100	35	10	50 ÷ 90 (0.50 ÷ 0.90)
ZM335100601A	Black	6.0	100	35	10	70 ÷ 120 (0.70 ÷ 1.20)
ZM335100651A	Purple	6.5	100	35	10	100 ÷ 160 (1.00 ÷ 1.60)

**FLOW**Flow regulator (n)m<sup>3</sup>/h N.G. with different holes

The gas regulator should work within the range indicated in the tables, with the maximum inlet pressure of the resulting variable output pressure and the orifice mounted, whichever does not exceed the limits described in the table.

Accuracy class AC 20

**RS 2501 AP Orifice Ø 4 mm**

P <sub>a</sub> (mbar)	P <sub>e</sub> (bar)												
	0.5	1	1.5	2	2.5	3	3.5	4	5	6	8	10	12
300	10	15	21	26	29	32	37	41	49	57	57	57	57
500		14	20	25	29	32	37	41	49	57	57	57	57
750		14	20	25	29	32	37	40	49	57	57	57	57
1000			19	24	29	32	37	40	49	57	57	57	57
1500				21	27	32	37	40	49	57	57	57	57

**RS 2501 AP Orifice Ø 6 mm**

P <sub>a</sub> (mbar)	P <sub>e</sub> (bar)												
	0.5	1	1.5	2	2.5	3	3.5	4	5	6	8	10	12
300	19	36	48	60	71	81	91	101	121	140	140	140	140
500		37	50	59	69	82	92	100	119	140	140	140	140
750		23	38	51	65	74	86	97	120	143	143	143	143
1000			37	52	67	78	92	100	120	141	141	141	141
1500				49	65	82	93	106	114	136	136	136	136

**RS 2501 AP Orifice Ø 8 mm**

P <sub>a</sub> (mbar)	P <sub>e</sub> (bar)												
	0.5	1	1.5	2	2.5	3	3.5	4	5	6	8	10	12
300	32	57	80	98	119	137	155	173	208	244	244	244	244
500		49	71	92	111	126	144	165	202	238	238	238	238
750		36	66	88	108	128	148	167	204	238	238	238	238
1000			59	77	98	117	141	166	191	235	235	235	235
1500				79	106	133	155	176	209	245	245	245	245

**RS 2501 AP Orifice Ø 10 mm**

P <sub>a</sub> (mbar)	P <sub>e</sub> (bar)												
	0.5	1	1.5	2	2.5	3	3.5	4	5	6	8	10	12
300	43	74	105	121	163	193	231	263	328	389			
500		62	94	117	133	162	184	211	277	339	339	339	339
750		46	82	116	141	166	196	223	280	341	341	341	341
1000			65	82	133	141	176	202	281	349	349	349	349
1500				98	147	185	218	247	318	381	381	381	381

**RS 2501 AP Orifice Ø 12 mm**

P <sub>a</sub> (mbar)	P <sub>e</sub> (bar)												
	0.5	1	1.5	2	2.5	3	3.5	4	5	6	8	10	12
300	47	95	131	163	238	267	342						
500		89	122	158	201	247	281	321					
750		61	118	152	194	229	255	299	384	474	474		
1000			96	148	187	221	257	287	363	452	452	452	452
1500				147	199	256	293	342	427	517	517	517	517

Flow in (n)m<sup>3</sup>/h natural gas

### Flow with other gases

In the tables above, the flow is in (n)m<sup>3</sup>/h natural gas with a density 0.61 and temperature 15° C

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

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

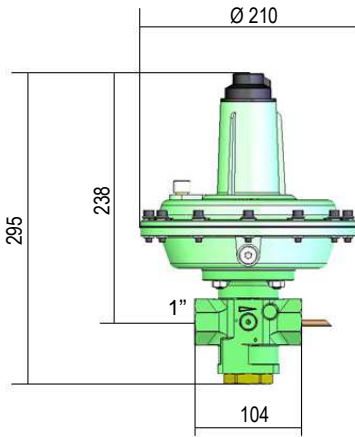
Example:

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

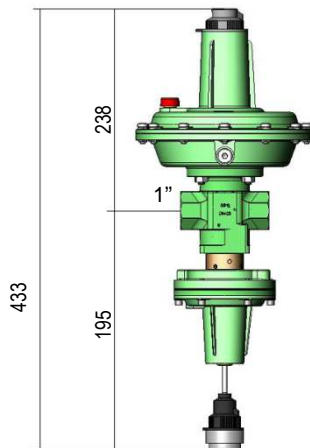
$$1 \text{ (n)m}^3/\text{h natural gas} = 0.78 \text{ (n)m}^3/\text{h air}$$

Correction factor Fc at 15°C	
Butane	0.55
Propane	0.64
Oxygen	0.76
Air	0.78
Nitrogen	0.81
Biogas	0.85
Town gas	1.23
Hydrogen	3.04

## DIMENSIONS AND WEIGHTS



RS 2501 AP1



RS 2511 AP1

### Technical features of RS 2501 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 2501 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" RP
Outlet connection	1" RP
Connections position	Axial
Weight RS 2501 AP1	5.0 Kg
Weight RS 2511 AP1	6.2 Kg

### BUILT-IN RELIEF VALVE

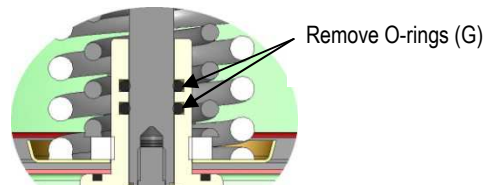
The regulator has an internal relief valve, which allows a certain quantity of free gas in case of abrupt changes of flow or by heating the tubes with no flow.

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

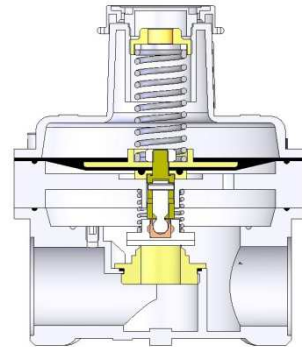
For installations ON-OFF, the output of the regulator should be sufficiently large lungs to absorb water hammer. It is recommended that lung mounted external relief valve capable of removing pressure peaks.

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.

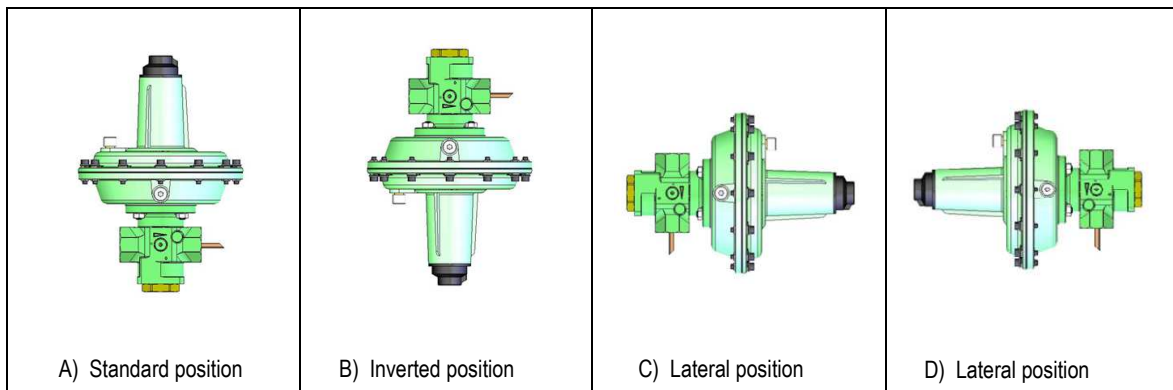


Built-in relief valve



External relief valve VS-25

### MOUNTING POSITION



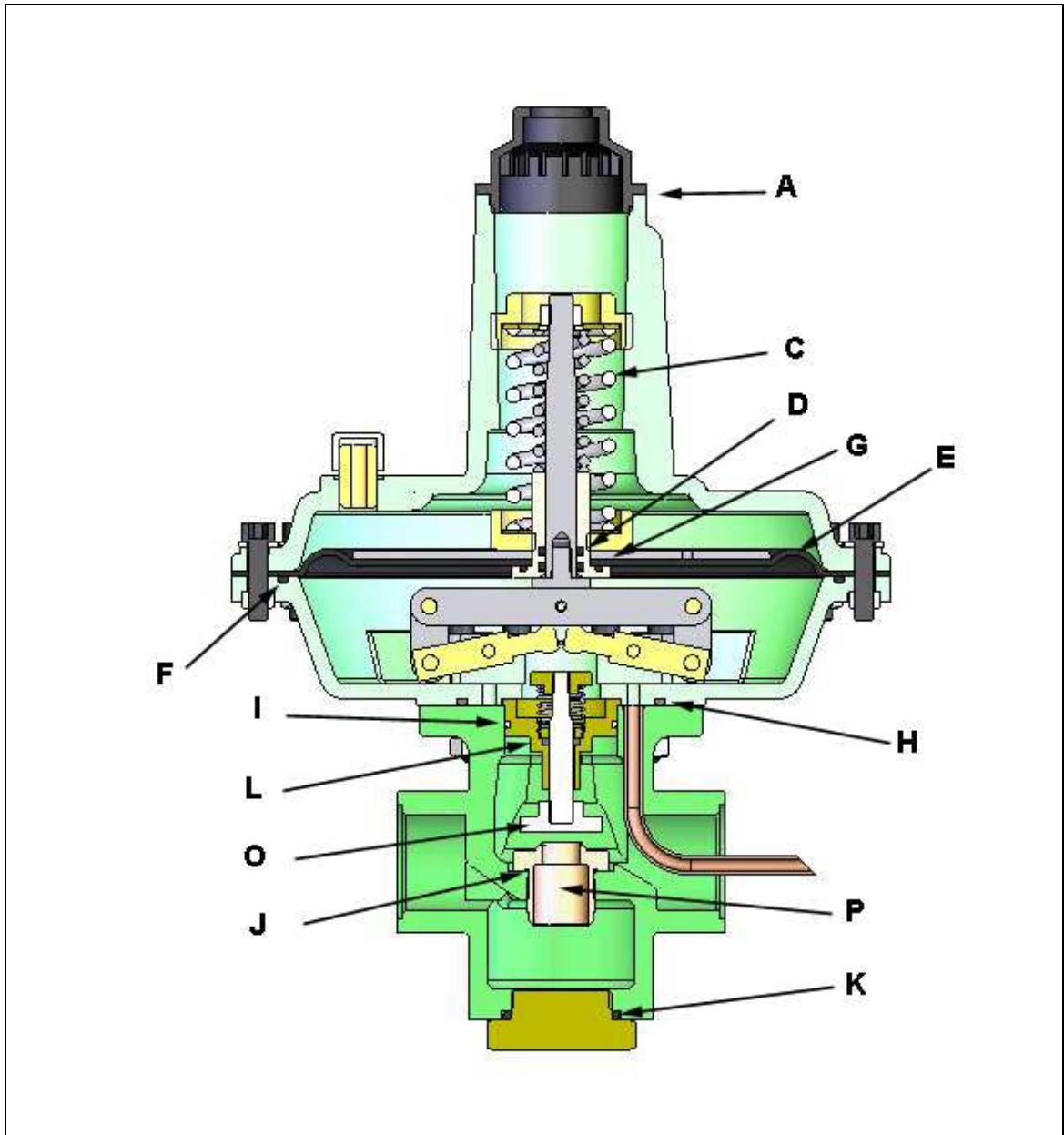
A) Standard position

B) Inverted position



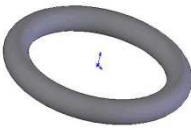

C) Lateral position

D) Lateral 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 2501 AP**

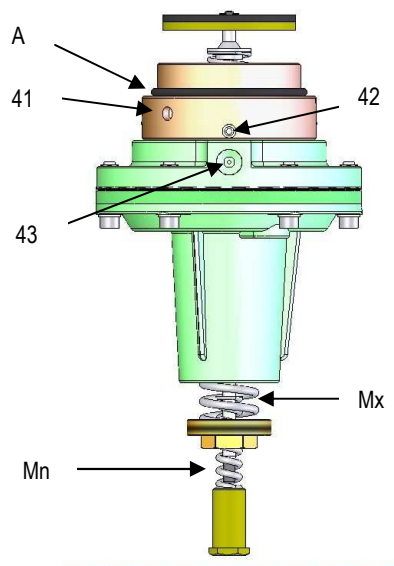
 <p>Seat Disc (O) Code ZM.1.00.070615</p>	 <p>Orifice (P)</p>	 <p>Construction O-rings</p>																																
 <p>Diaphragm (E) Code ZM.1.00.11591</p>	<table border="1"> <thead> <tr> <th>Ø Orifice (mm)</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>4</td> <td>ZM.1.00.0657</td> </tr> <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> </tbody> </table>	Ø Orifice (mm)	Code	4	ZM.1.00.0657	6	ZM.1.00.0659	8	ZM.1.00.0660	10	ZM.1.00.0661	12	ZM.1.00.0620	<table border="1"> <thead> <tr> <th>Item</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ZM.1.00.1440</td> </tr> <tr> <td>D</td> <td>ZM.1.00.0974V</td> </tr> <tr> <td>F</td> <td>ZM.1.00.0508</td> </tr> <tr> <td>G</td> <td>ZM.1.00.0893</td> </tr> <tr> <td>H</td> <td>ZM.1.00.0509</td> </tr> <tr> <td>I</td> <td>ZM.1.00.0048</td> </tr> <tr> <td>J</td> <td>ZM.1.00.0047</td> </tr> <tr> <td>K</td> <td>ZM.1.00.1467</td> </tr> <tr> <td>L</td> <td>ZM.1.00.2325V</td> </tr> </tbody> </table>	Item	Code	A	ZM.1.00.1440	D	ZM.1.00.0974V	F	ZM.1.00.0508	G	ZM.1.00.0893	H	ZM.1.00.0509	I	ZM.1.00.0048	J	ZM.1.00.0047	K	ZM.1.00.1467	L	ZM.1.00.2325V
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L	ZM.1.00.2325V																																	

## SAFETY SHUT-OFF DEVICE (SAV)

The RS 2501 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.0253 and instead on the cap (3)

### SAV installation

- With the Open-end spanner, loosen and remove the cap (3)
- Insert the RI.ORG.0253, 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.



### UPSO 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.