

DESCRIPTION

The RC 4000 BP Regulator with balanced obturator 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 RC 4010 BP versions include an optional SAV (Over-Pressure [OPSO] and/or Under-Pressure [UPSO]) Shut-Off facility, which takes the place of the lower body plug (3).

MODEL

There are 3 models in the range, depending on the required outlet pressures. Maximum inlet pressure 800 kPa (8 bar).

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

Model MP (Medium pressure version): For outlet pressures from 10 to 40 kPa (100 to 400 mbar).
(Please refer to technical data sheet RC 4000 MP)

Model AP (High pressure version): For pressures from 40 to 100 kPa (400 to 1000 mbar).
(Please refer to technical data sheet RC 4000 AP)

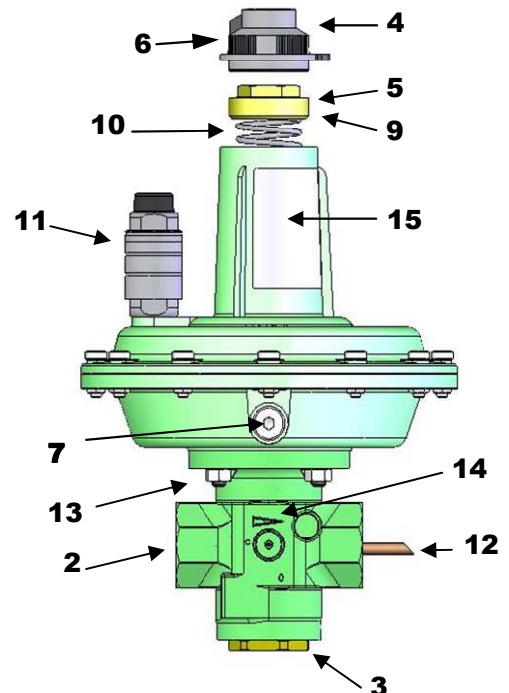
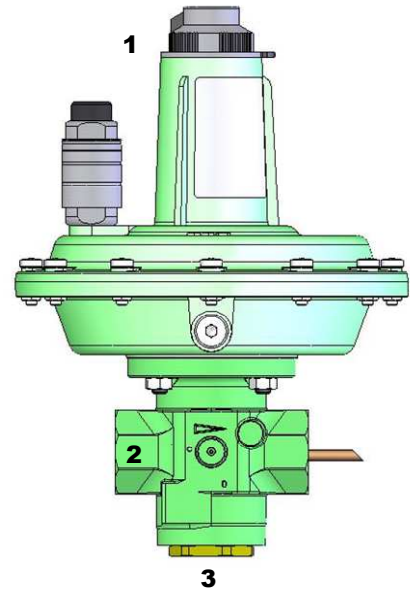
This regulator takes the signal internally (6), so do not need an outlet external signal. However, if you want increase the speed of response and flow, it should make the connection of external impulse (7) to the straight section of pipe out, that this turbulence-free (at least 5 times the pipe diameter out). The sense line tube should have a minimum diameter 10 mm and should be totally exempted of any type of obstruction, valves and diameter reductions.

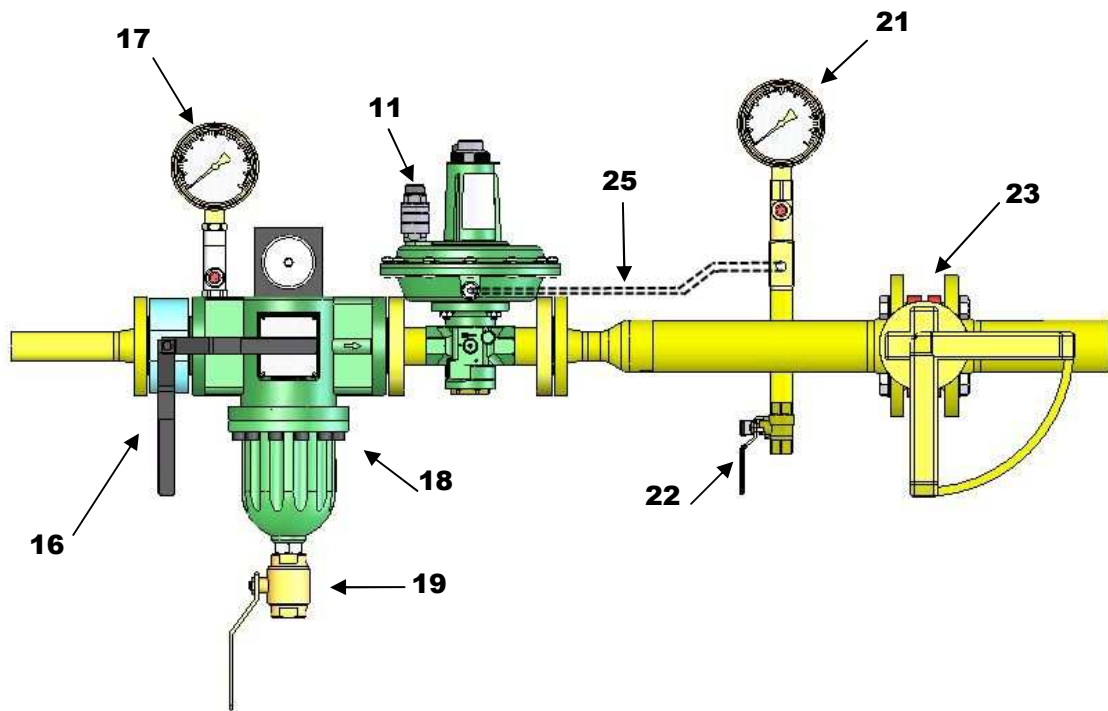
CONNECTIONS

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 area of installation of the regulator 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.
- Possibility to activate the internal valve to relief a small quantity of gas to the atmosphere.
- The tube for taking internal impulse (12), and is mounted. Verify that obstructs or is damaged.
- The tube making external impulse (24) (optional), you must connect the regulator replacing the cap (7).





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 (16), 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 the 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 24mm.
- Turning this bolt anti-clockwise will decrease the outlet pressure.
- Place the cap (4) back onto the regulator top, make sure to put the O-ring (6).

The spring used in these regulators (10) 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 (25) -optional- , not connected, blocked or leaking.
- Sense lines (25) -optional- may be of insufficient diameter, or connected at a location of turbulence in the pipeline.
- 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, or pitted Valve Seat Disc.
- Orifice may be worn.
- O-ring may be worn.
- Deterioration of the main diaphragm.

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 50 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.
- 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 RC 4000 BP REGULATORS

		
O-ring Extractor	Allen Key 3 - 4 - 5	Tube Spanner 13 - 26 - 30
		
Open-end Spanner 13 - 19 - 40	Screwdriver 10 x 1,6mm	Tweezers
		
		Hook-Spanner 60-90

OUTLET PRESSURE ADJUSTMENT SPRINGS FOR THE RC 4000 BP REGULATORS

Spring Code	Spring Color	Ø Wire (mm)	Length (mm)	Ø Outside (mm)	n° Turns	Spring Range in kPa (mbar)
ZM337134251	Red	2.5	134	37	12.0	2 ÷ 3.5 (20 ÷ 35)
ZM337134281	White	2.8	134	37	12.0	3 ÷ 5 (30 ÷ 50)
ZM337134301	Yellow	3.0	134	37	12.0	4 ÷ 7 (40 ÷ 70)
ZM337130321	Blue	3.2	130	37	11.5	5.5 ÷ 9 (55 ÷ 90)
ZM337130351	Black	3.5	130	37	10.0	8 ÷ 17 (80 ÷ 170)

FLOW

Table 1. Regulator flow in (n)m³/h natural gas, with internal signal (12).

Table 2. Regulator flow in (n)m³/h natural gas, with internal signal (12) + external signal (25).

The speed of the gas flowing through the outlet pipe where the pressure is taken to drive the regulator (25), (and Shut-off valve) must be less than 12 m/s.

The accuracy class is AC10 / SG20

RC 4000 BP Internal signal

Table 1

P _a bar	P _e (bar)															
	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
0.02	75	114	131	131	131	131	131	131	131	131	131	131	131	131	131	131
0.04	74	114	133	133	133	133	133	133	133	133	133	133	133	133	133	133
0.06	73	113	136	136	136	136	136	136	136	136	136	136	136	136	136	136
0.08	72	113	139	139	139	139	139	139	139	139	139	139	139	139	139	139
0.10	71	112	141	141	141	141	141	141	141	141	141	141	141	141	141	141

RC 4000 BP Internal signal + External signal

Table 2

P _a bar	P _e (bar)															
	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
0.02	116	174	188	188	188	188	188	188	188	188	188	188	188	188	188	188
0.04	115	174	191	191	191	191	191	191	191	191	191	191	191	191	191	191
0.06	113	173	195	195	195	195	195	195	195	195	195	195	195	195	195	195
0.08	111	172	199	199	199	199	199	199	199	199	199	199	199	199	199	199
0.10	109	171	202	202	202	202	202	202	202	202	202	202	202	202	202	202

Flow in (n)m³/h natural gas

Flow with other gases

In the tables above, the flow is in (n)m³/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:

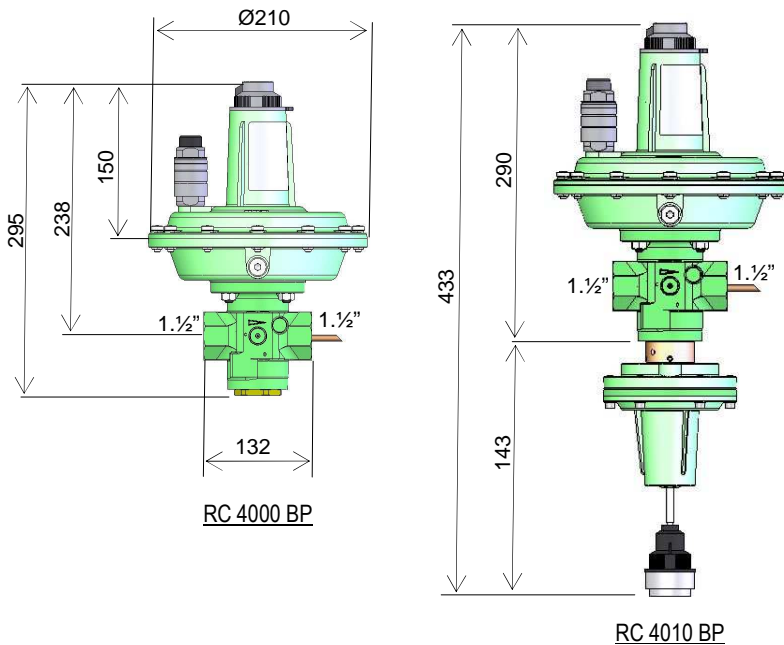
$$Q \text{ (n)m}^3/\text{h natural gas} \times 0.78 = Q \text{ (n)m}^3/\text{h air}$$

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

Correction factor F _c 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

ADJUSTING RC 4000 BP FORMED BY REGULATOR + RELIEF VALVE + OPSO AND UPSO			
Outlet pressure P _a	Setting relief valve	Setting OPSO	Setting UPSO
20 ÷ 100 mbar	> P _a x 1.5	> P _a x 2.0	< P _a x 0.6

DIMENSIONS AND WEIGHTS



Technical features of RC 4000 BP

bpu	1 ÷ 8 bar	(inlet pressure range)
Ps	8 bar	(design pressure)
Pu	8 bar	(maximum inlet pressure)
Wd		(outlet pressure range)
RC 4000 BP	20 ÷ 100 mbar	
Wdo	40 ÷ 240 mbar	(OPSO range)
Wdu	10 ÷ 115 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	1.½" (Screw female)
Outlet connection	1.½" (Screw female)
Connections position	Axial
Weight RC-4000 BP	5.2 Kg
Weight RC-4010 BP	6.0 Kg

BUILT-IN RELIEF VALVE

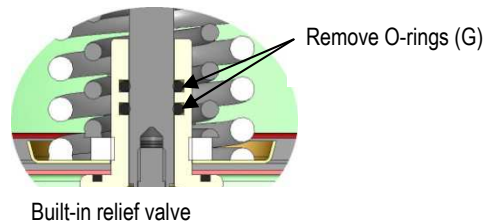
The regulator has an internal relief valve, which allows a certain quantity of free gas in case of abrupt changes of flow or by heating the tubes with no flow.

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

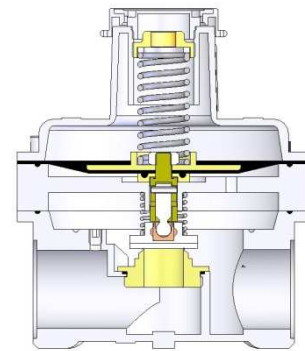
For installations ON-OFF, the output of the regulator should be sufficiently large lungs to absorb water hammer. It is recommended that lung mounted external relief valve capable of removing pressure peaks.

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.

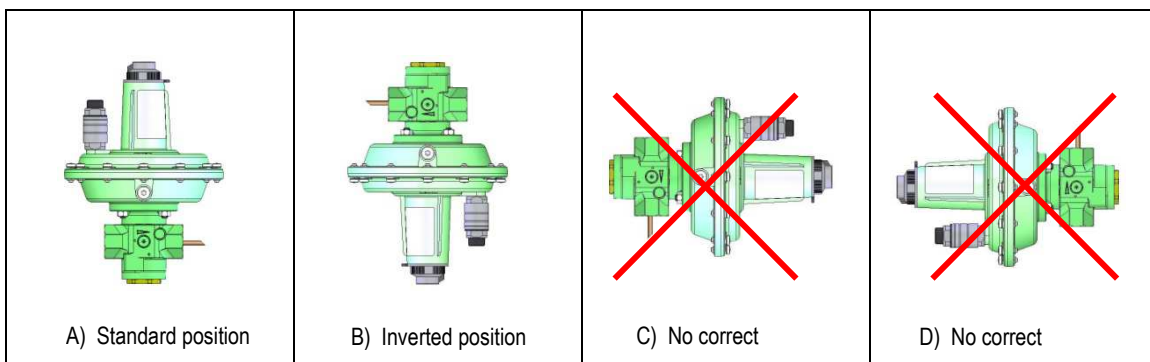


Built-in relief valve

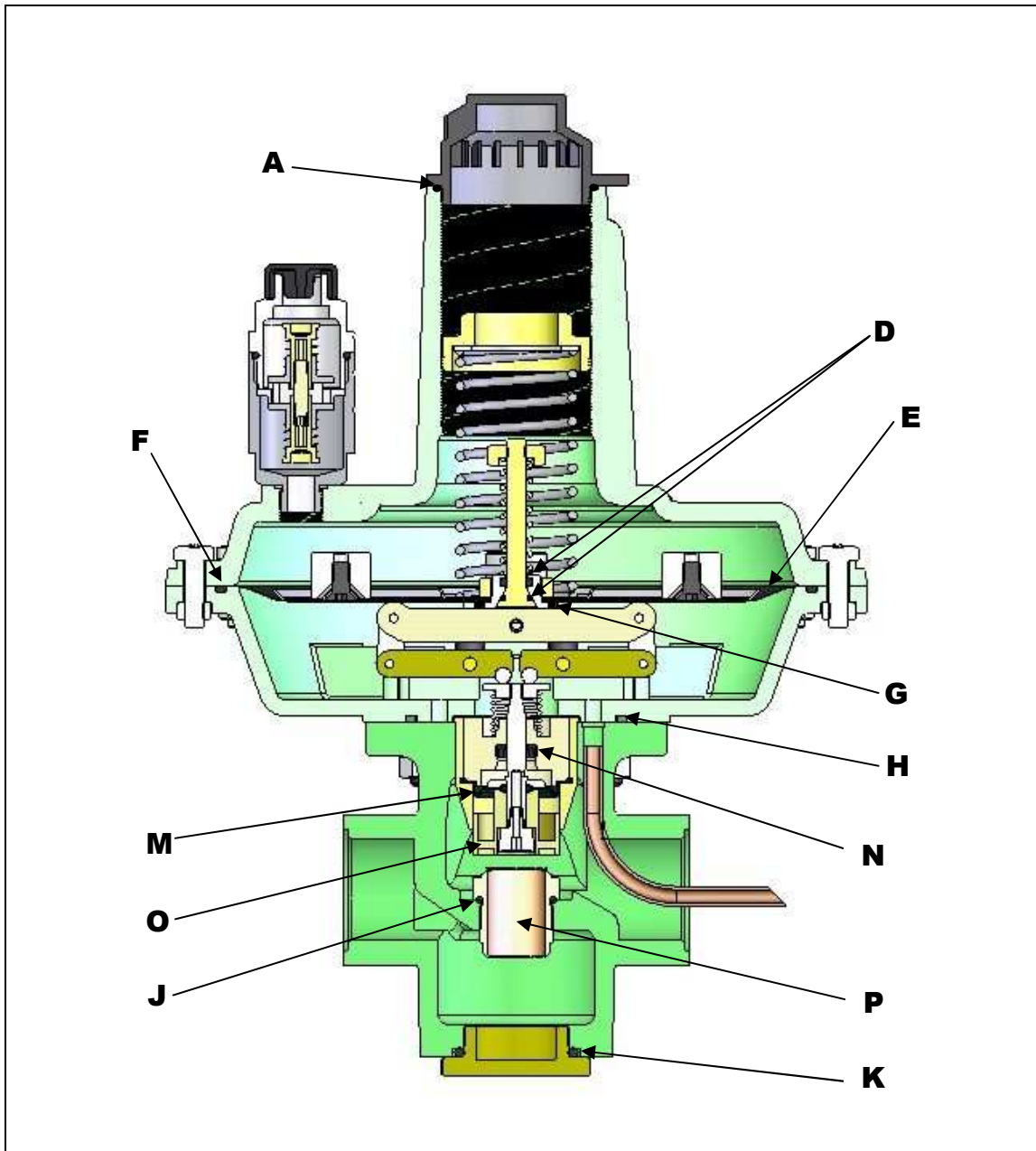


External relief valve VS-25



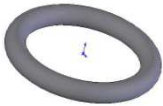


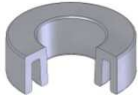
MOUNTING POSITION



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 ORDINARY MAINTENANCE OF THE RC 4000 BP

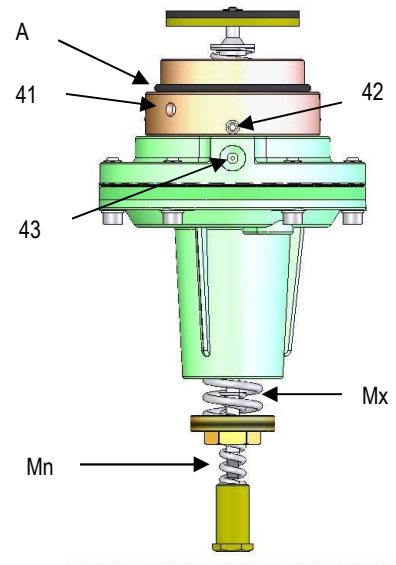
 <p>Obturator (O) Code ZM.1.00.0541A</p>	 <p>Orifice (P) Code ZM.1.00.0543</p>		 <p>O-rings</p> <table border="1"> <thead> <tr> <th>Position</th> <th>Code</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ZM1.00.1440</td> </tr> <tr> <td>D</td> <td>ZM1.00.0140</td> </tr> <tr> <td>F</td> <td>ZM1.00.0508</td> </tr> <tr> <td>G</td> <td>ZM1.00.0047</td> </tr> <tr> <td>H</td> <td>ZM1.00.0509</td> </tr> <tr> <td>J</td> <td>ZM1.00.0047</td> </tr> <tr> <td>K</td> <td>ZM1.00.3488</td> </tr> </tbody> </table>	Position	Code	A	ZM1.00.1440	D	ZM1.00.0140	F	ZM1.00.0508	G	ZM1.00.0047	H	ZM1.00.0509	J	ZM1.00.0047	K	ZM1.00.3488
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 <p>Main Diaphragm (E) Code ZM.1.00.052601</p>	 <p>Compensation Diaphragm (M) Code ZM.1.00.0538</p>	 <p>Seal (N) Code ZM.1.00.0353</p>																	

SAFETY SHUT-OFF DEVICE (SAV)

The RC 4000 BP 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.0401 and instead on the cap (3)

SAV installation

- With the Open-end spanner, loosen and remove the cap (3)
- Insert the RI.ORG.0401, 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.3.10.060.121	White	1.2	60	10	1.0 ÷ 3.2 (10 ÷ 32)
ZM.3.13.055.151	Yellow	1.5	55	13	2.4 ÷ 3.7 (24 ÷ 40)
ZM.3.13.055.201	Blue	2.0	55	13	3.0 ÷ 11.5 (30 ÷ 115)

OPSO ADJUSTMENT SPRINGS

Spring code	Spring color	Ø Wire (mm)	Length (mm)	Ø Outside (mm)	Spring Range in kPa (mbar)
ZM.3.30.060.221	Silver	2.2	60	30	4.0 ÷ 13.0 (40 ÷ 130)
ZM.3.30.060.251	Green	2.5	60	30	6.0 ÷ 19.0 (60 ÷ 190)
ZM.3.30.060.271	Reed	2.7	60	30	9.0 ÷ 24.0 (90 ÷ 240)

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.