

## FEATURES

The RD10 pressure reducer is a direct-acting and proportional pressure reducer. With a robust design, the RD10 pressure reducer is intended for industrial applications such as steam, air, water and all compatible fluid pressure-reducing stations. A balancing bellows and a large-section guided valve provide stable regulation under all operating conditions. The actuator must be connected to the downstream pressure via a condensation pot for steam.

## AVAILABLE MODELS

Cast iron body GS PN16

Diameters DN15 to DN100

PN16 flanged connections according to EN 1092-1

### Downstream adjustment ranges :

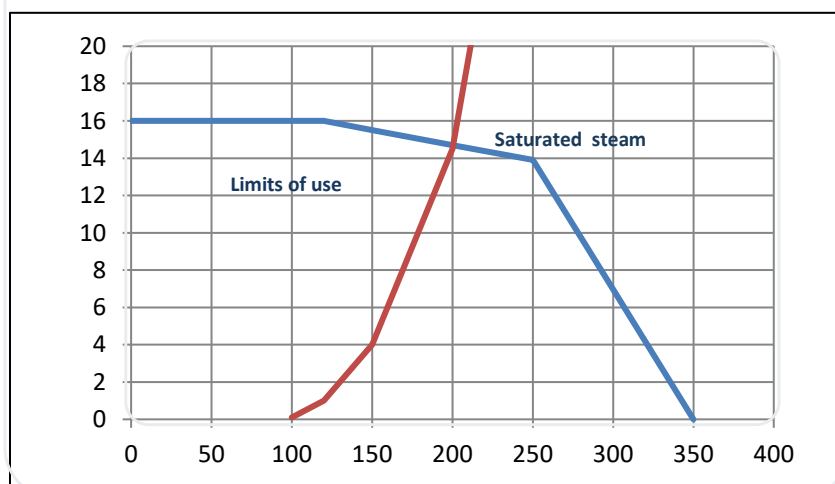
**DN15 to DN50:** 0.4-1 / 0.9-1.8 / 1.7-3 / 2.8-5 / 4.8-7 / 6.8-15 bar.

**DN65 to DN80:** 0.4-1 / 0.9-2 / 1.9-5 / 4.5-8.5 and 4.5-11.5 / 8-15 / 11-15 bar.

**DN100:** 0.4-1 / 0.9-2.6 / 2.5-8.5 / 8-15 bar.

## LIMITS OF USE

|                       |                                                                  |
|-----------------------|------------------------------------------------------------------|
| Fluid :               | Group 2 according to CE 14/68<br>Use prohibited on group I gases |
| Fluid pressure: PS    | 16 bar                                                           |
| Fluid temperature: TS | 300°C (with water seal)                                          |
| Use on steam          | 15 bar / 200°C                                                   |
| Actuator membrane     | +120°C                                                           |
| Rangeability          | 10:1                                                             |
| Explosive areas       | Areas 1, 2, 21 and 22 only                                       |



Information given as an indication only, and subject to possible modifications.

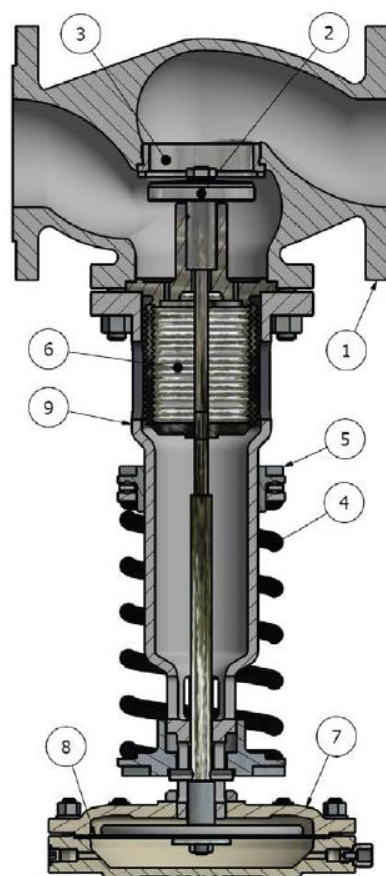


### CONSTRUCTION GUIDELINES AND STANDARDS

| OBJECT                      | Standard                  | OBJECT                  | Standard         |
|-----------------------------|---------------------------|-------------------------|------------------|
| EC Pressure Directive 14/68 | DN15 to DN50: art.4 § 3   | ATEX Directive CE 14/34 | EN 13465-1 and 5 |
|                             | DN65 to DN100: category 1 | Flange connection       | EN 1092-2        |
| Construction                | EN 12516-2                | Face-to-face dimension  | EN 558-1         |
| Material                    | EN 1503-3                 | SIL                     | IEC 61508        |

### CONSTRUCTION

| No. | Name                 | Material                 |
|-----|----------------------|--------------------------|
| 1   | Body                 | Fonte EN-GJS-400-18 RT   |
| 2   | Disc                 | St. steel ASTM A182 F304 |
| 3   | Seat                 | St. steel ASTM A182 F304 |
| 4   | Spring               | Spring steel             |
| 5   | Adjustment ring      | St. steel ASTM A182 F304 |
| 6   | Compensating bellows | St. steel ASTM A182 F304 |
| 7   | Actuator             | Fonte EN-GJS-400-18 RT   |
| 8   | Diaphragm            | EPDM                     |
| 9   | Bonnet               | Fonte EN-GJS-400-18 RT   |



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**SIZING**

**Choice of diameter:** it is not necessary to choose a pressure reducer whose diameter is equal to that of the piping but to determine this diameter using the calculation formulas presented below.

**Flow coefficients Kv (m<sup>3</sup>/h) of RD10:**

| DN                     | 15  | 20  | 25 | 32   | 40 | 50 | 65 | 80 | 100 |
|------------------------|-----|-----|----|------|----|----|----|----|-----|
| Ø passage (mm)         | 20  | 20  | 25 | 25   | 45 | 45 | 64 | 76 | 100 |
| Kv (m <sup>3</sup> /h) | 5.0 | 6.5 | 11 | 14.5 | 30 | 40 | 58 | 78 | 128 |

**Calculation formula for a liquid :**

$$Kv = Q \times \sqrt{\frac{\rho}{\Delta P}}$$

*Kv: flow coefficient in m<sup>3</sup>/h.*

*Q: flow rate in m<sup>3</sup>/h*

*ΔP: upstream-downstream pressure difference in bar*

*ρ: density kg/dm<sup>3</sup>*

**Calculation formula for a gas :**

$$\text{If } P_2 > P_1/2 \quad Kv = \frac{Q}{445} \times \sqrt{\frac{d \times T}{\Delta P \times P_2}}$$

$$\text{If } P_2 < P_1/2 \quad Kv = \frac{Q}{240 \times P_1} \times \sqrt{d \times T}$$

*Kv flow rate coefficient*

*m<sup>3</sup>/h*

*Q flow in*

*Nm<sup>3</sup>/h*

*d density*

*Kg / m<sup>3</sup>*

*T Absolute temperature*

*°K (°C +273)*

*P1 Upstream pressure (abs)*

*bar*

*P2 Downstream pressure (abs)*

*bar*

*ΔP Upstream-downstream difference*

*bar*

**Minimum pressure difference:** The RD 10 pressure reducer has its own pressure loss, which results in a minimum difference between the upstream and downstream pressure. This difference is 15 to 20% of the upstream pressure.

**Double reduction:** a pressure reduction from a very high pressure to a very low pressure is theoretically possible. The PRV allows a maximum ΔP of 13 bar. However, noisy operation is to be expected. It is advisable to provide a 2-stage pressure reduction by installing two pressure reducers in series. The intermediate pressure is calculated as follows:

$$P_{\text{intermediate}} = \sqrt{P_{\text{amont}} \times P_{\text{aval}}}$$

**Upstream flow variation:** When the upstream flow varies over a range that is too wide, the downstream pressure may vary from the set point, or this set point pressure may take some time to recover.

**Upstream pressure variation:** when the upstream pressure varies, the downstream pressure varies in the same direction. If the flow rate also changes at the same time, the stability of the downstream pressure becomes even more difficult to ensure. If such a variation is not acceptable for the intended use, choosing a control valve controlled by a pressure transmitter installed downstream is preferable.

**Pumping phenomenon:** when the pressure reducer is too large for the flow rate to be ensured, unstable operation of the device is frequently observed (so-called "pumping" phenomenon). It is, therefore, essential to size a device that is neither too large nor too small.

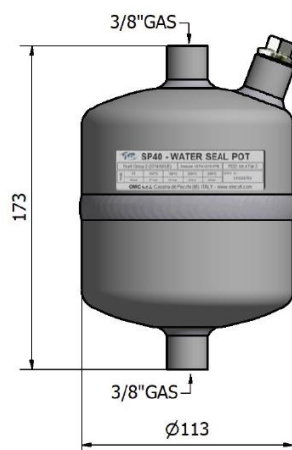
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**DIMENSIONS (mm) and WEIGHT (Kg)**

| DN  | A   | B   | Weight |
|-----|-----|-----|--------|
| 15  | 130 | 406 | 9.0    |
| 20  | 150 | 406 | 9.5    |
| 25  | 160 | 425 | 10.5   |
| 32  | 180 | 425 | 13.0   |
| 40  | 200 | 510 | 19.5   |
| 50  | 230 | 510 | 22.5   |
| 65  | 290 | 550 |        |
| 80  | 310 | 544 |        |
| 100 | 350 | 670 |        |

**Actuator diameter**

| Actuator | C   | Weight |
|----------|-----|--------|
| AR085    | 155 | 4.5    |
| AR100    | 170 | 5.0    |
| AR120    | 195 | 7.5    |
| AR150    | 220 | 8.5    |
| AR205    | 283 | 14.5   |
| AR 265   | 343 | 20.5   |


**Condensation pot**


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**INSTALLATION OF RD10 ON AIR OR WATER NETWORKS**

1. The RD10 regulator can be installed indoors or outdoors. However, if the fluid is likely to freeze, provide a suitable frost protection system.
2. The RD10 regulator must be installed on horizontal piping, either head up or head down.
3. Convergent and divergent: if the RD10 diameter is less than the diameter of the pipe (see § dimensioning), install a convergent upstream. For use on a neutral gas, it is necessary to provide a pipe at the outlet that is one diameter larger than that of the inlet and to connect it by a divergent, the expanded gas requiring a larger flow section downstream than upstream.
4. To ensure good downstream pressure stability and reduce outlet turbulence, provide a straight length of stilling equal to  $15 \times DN$  downstream of the reducer.
5. Respect the direction of passage indicated on the body.
6. Plan a protective filter in advance.
7. Provide shut-off valves upstream and downstream of the R10.
8. Also provide upstream and downstream pressure gauges with suitable scales. The downstream pressure gauge should be installed after the stilling length.
9. A safety valve must be provided downstream of the regulator to protect the downstream network (setting pressure = downstream pressure +10%, valve flow rate = regulator flow rate).

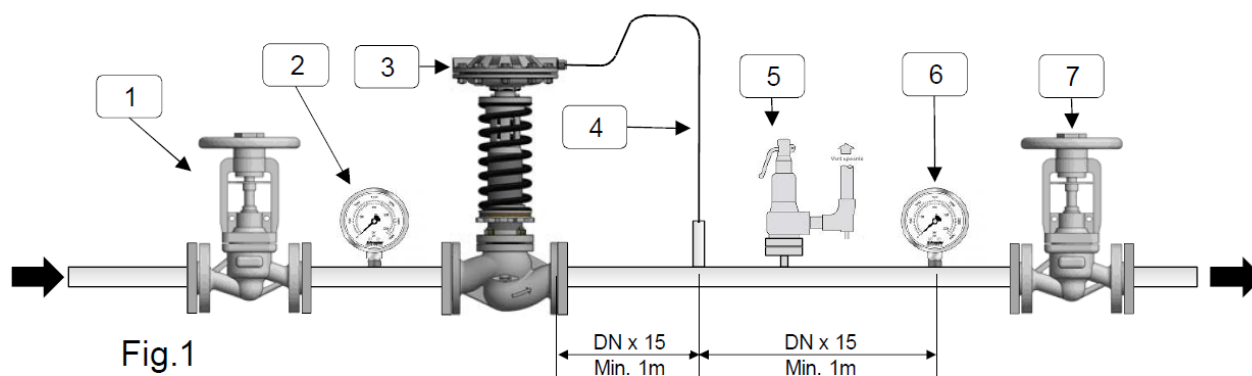


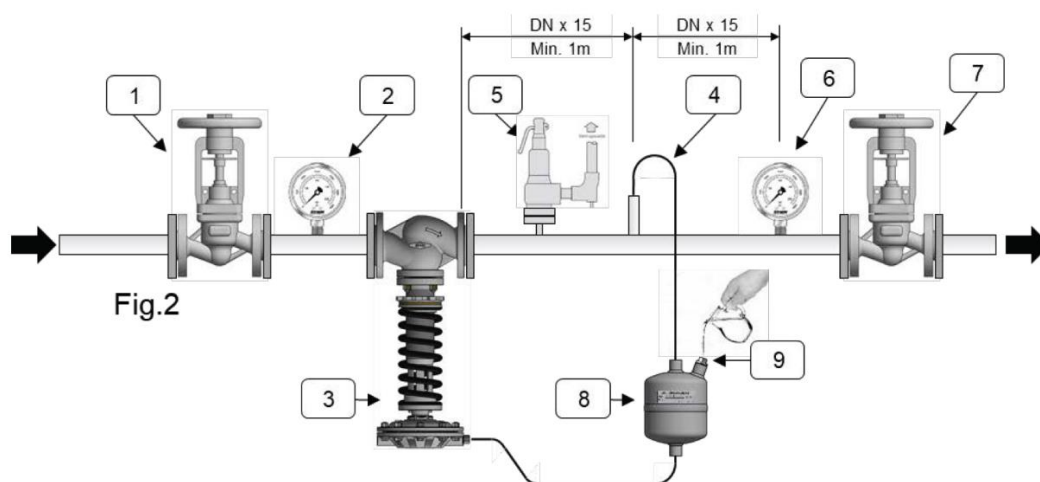
Fig.1

| No. | Name                    | No. | Name                      |
|-----|-------------------------|-----|---------------------------|
| 1   | Upstream valve          | 5   | Downstream safety valve   |
| 2   | Upstream pressure gauge | 6   | Downstream pressure gauge |
| 3   | RD10 pressure reducer   | 7   | Downstream valve          |
| 4   | Pressure port           |     |                           |

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**INSTALLATION ON STEAM NETWORKS WITH CONDENSATION POT**

1. The RD10 regulator can be installed indoors or outdoors. However, if the fluid is likely to freeze, provide a suitable frost protection system.
2. The RD10 regulator must be installed on horizontal piping with the head down.
3. Convergent and divergent: if the RD10 diameter is less than the diameter of the pipe (see § dimensioning), install a convergent upstream. Provide at the outlet of the PRV-S a pipe one diameter larger than that of the inlet and connect it by a divergent, the expanded gas requiring a larger flow section downstream than upstream.
4. Plan to install the condensation pot halfway up the low point as shown in the diagram below. The pressure port point must be located at the end of the stilling length. Connect with a steel or stainless steel tube diameter 10, resistant to the upstream pressure. Fill the condensation pot through the side hole. Close the cap.
5. To ensure good downstream pressure stability and reduce outlet turbulence, provide a straight length of stilling equal to  $15 \times DN$  downstream of the regulator.
6. Respect the direction of passage indicated on the body.
7. Plan a protective filter in advance.
8. Provide shut-off valves upstream and downstream of the R10.
9. Also provide upstream and downstream steam pressure gauges with suitable scales. The downstream pressure gauge should be installed after the stilling length.
10. A safety valve must be provided downstream of the regulator to protect the downstream network (setting pressure = downstream pressure +10%, valve flow rate = regulator flow rate).

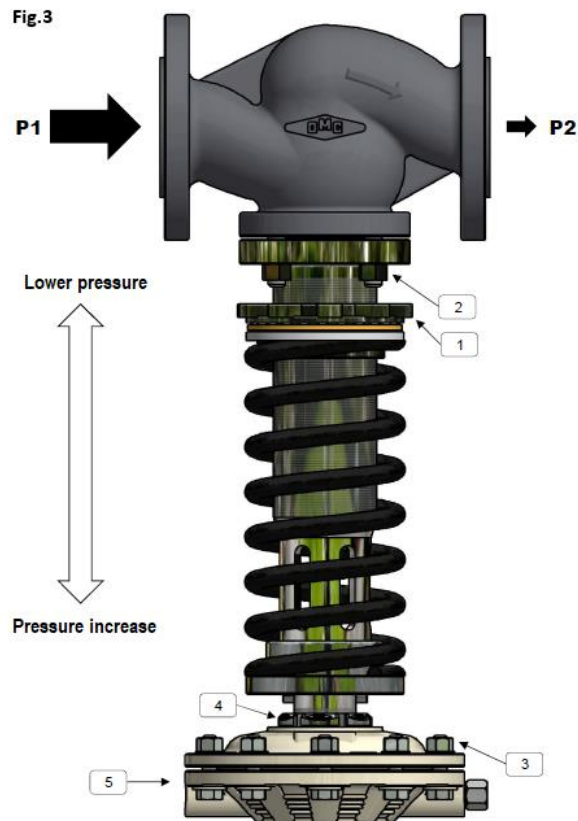


| No. | Name                    | No. | Name                      |
|-----|-------------------------|-----|---------------------------|
| 1   | Upstream valve          | 5   | Downstream safety valve   |
| 2   | Upstream pressure gauge | 6   | Downstream pressure gauge |
| 3   | RD10 regulator          | 7   | Downstream valve          |
| 4   | Pressure port           | 8   | Condensation pot          |
|     |                         | 9   | Filling hole              |

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**START-UP AND ADJUSTMENT**

1. The start-up can only be carried out by a qualified technician familiar with steam networks.
2. Wear appropriate clothing and protection.
3. Before any installation, insulate the upstream and downstream pipes, depressurize the pipeline and bring the installation to room temperature.
4. Check that the pressure range indicated on the body is adequate for the use.
5. Check the direction of fluid flow in relation to the arrow indicated on the body.
6. Thoroughly clean the piping of any particles or shavings by rinsing with water or blowing with air.
7. Install the RD 10 reducer respecting the direction of the arrow indicated on the body.
8. Open the drain pot cap and fill with water. Do not exceed the low level of the tapping on the downstream pipe. Use the drain plugs on the servomotor to remove air.
9. Slowly open the upstream and downstream isolation valves. (Item 3)
10. Use the adjustment screw (item 1) and the pressure indication on the pressure gauge to adjust the desired downstream pressure.

**MAINTENANCE**

The RD10 pressure regulator is a maintenance-free device. However, it is advisable to schedule a periodic inspection every 6 to 12 months to check the condition of the internal parts.

- 1 - Depressurize the system.
- 2 - Close the upstream shut-off valve (Figs. 1 and 2)
- 3 - Fully decompress the adjustment spring acting on the ring marked "item 1".
- 4 - Wait until the pressure reducer reaches room temperature.

The RD10 pressure regulation does not require regular maintenance, but it is recommended that it be dismantled every 12–18 months for a preventive inspection of its components. Parts showing signs of wear must be replaced. Before carrying out checks or assembling spare parts, ensure that the valve is closed and that the upstream and downstream pressure has been released to zero; turn the spring-loaded plate "rep.1" Fig.3 so as to completely release the spring.

The pipe "item 4" Fig. 1 and 2 of the downstream impulse connection must be disconnected from the actuator.

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**ATTENTION !!!** The balancing bellows located inside the pressure reducer (Fig. 8, Ref. 15) is designed to withstand 10,000 cycles. Any breakage would cause the fluid contained in the pipe to leak out. It is advisable to replace the bellows periodically, depending on the actual use of the pressure limiter. Do not install the reducer in areas where leakage of process fluid due to rupture of the bellows could cause damage to property and/or injury to persons and/or animals.



**ATTENTION !!!** The feedback membrane inside the pressure reducer (Fig. 8, Ref. 15) is designed to withstand 10,000 cycles. Any breakage would cause the fluid contained in the pipe to leak out. It is advisable to replace the membrane periodically, depending on the actual use of the pressure limiter. Do not install the reducer in areas where leakage of process fluid due to membrane rupture could cause damage to property and/or injury to persons and/or animals.

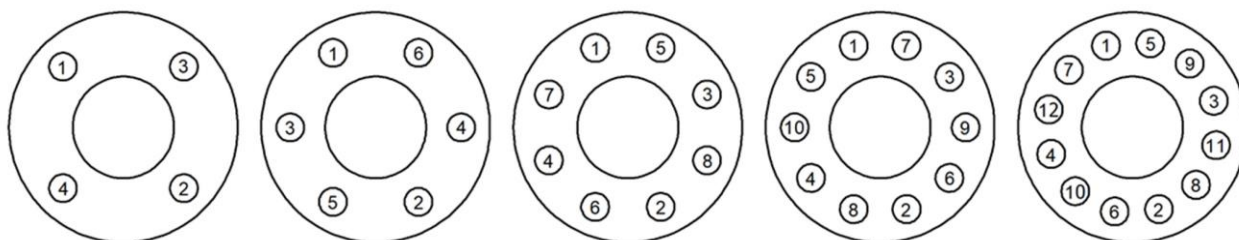
## TIGHTENING TORQUES

| Valve diameter |       | Seat<br>(Fig.8 rep.17)<br>Nm $\pm$ 10% | Nut<br>Body<br>(Fig. 8 rep. 2)<br>Nm $\pm$ 10 % | Actuator blocking<br>ring nut<br>(Fig.4 rep.4)<br>Nm $\pm$ 10% | Actuator<br>model | Nuts<br>(Fig.6 rep.8)<br>Nm $\pm$ 10% |
|----------------|-------|----------------------------------------|-------------------------------------------------|----------------------------------------------------------------|-------------------|---------------------------------------|
| DN15           | //    | 190                                    | 19                                              | 300                                                            | AR085             | 40                                    |
| //             | 1/2"  | 190                                    | 27                                              | 300                                                            | AR100             | 40                                    |
| DN20           | //    | 190                                    | 19                                              | 300                                                            | AR120             | 40                                    |
| //             | 3/4"  | 190                                    | 27                                              | 300                                                            | AR150             | 40                                    |
| DN25           | 1"    | 240                                    | 27                                              | 300                                                            | AR205             | 50                                    |
| DN32           | 1"1/4 | 350                                    | 27                                              | 300                                                            | AR265             | 50                                    |
| DN40           | 1"1/2 | 570                                    | 42                                              | 300                                                            |                   |                                       |
| DN50           | 2"    | 570                                    | 42                                              | 300                                                            |                   |                                       |
| DN65           | 2"1/2 | 700                                    | 86                                              | 300                                                            |                   |                                       |
| DN80           | 3"    | 700                                    | 100                                             | 300                                                            |                   |                                       |
| DN100          | 4"    | 850                                    | 118                                             | 300                                                            |                   |                                       |

## TIGHTENING SEQUENCE

To ensure uniform load and alignment, bolts should be tightened gradually and in a crisscross sequence, as shown in the example in Fig. E.

Avoid excessive tightening. Use the recommended tightening torques.



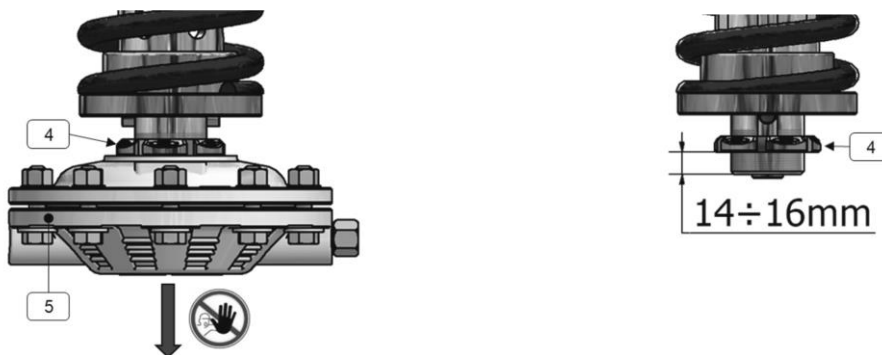
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**ACTUATOR REPLACEMENT**

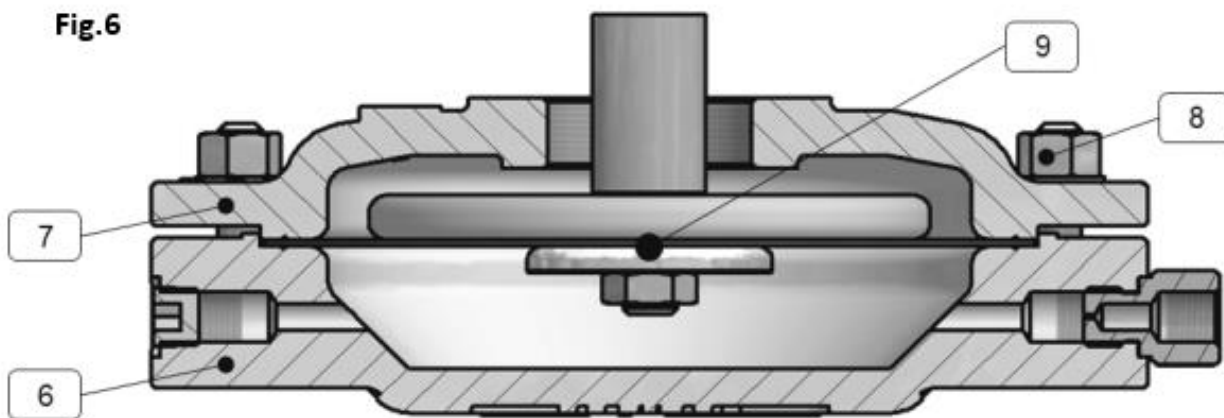
- 1 - Depressurize the installation.
- 2 - Close the upstream shut-off valve. (Fig.1 and 2 item 1)
- 3 - Fully decompress the calibration spring acting on ring "item 1" Fig. 3.
- 4 - Close the downstream shut-off valve. (Fig. 1 and 2, item 7)
- 5 - Wait until the entire pressure reducer reaches ambient temperature.
- 6 - Loosen the ring "item 4" (Fig. 4).
- 7 - Grasp actuator "item 5" (Fig. 4) and turn it anticlockwise until it is completely unscrewed.

**ATTENTION !!!! ACTUATOR WEIGHT**

- 1 - Turn ring "item 4" to the position shown in Fig.5..
- 2 - Screw the new actuator into place, bringing it into contact with the ring "item 4".
- 3 - Tighten ring "item 4".

**REPLACEMENT OF THE DIAPHRAGM UNIT**

- 1 - Separate the actuator from the gearbox as described above.
- 2 - Separate cover "item 6" from cover "item 7" by unscrewing nuts "item 8" (Fig. 6).
- 3 - Replace the membrane assembly "item 9" with the new membrane assembly.
- 4 - Reassemble the parts following the instructions described above (torque and tightening sequence).
- 5 - Reinstall the actuator on the gearbox as described above (replacing the actuator).

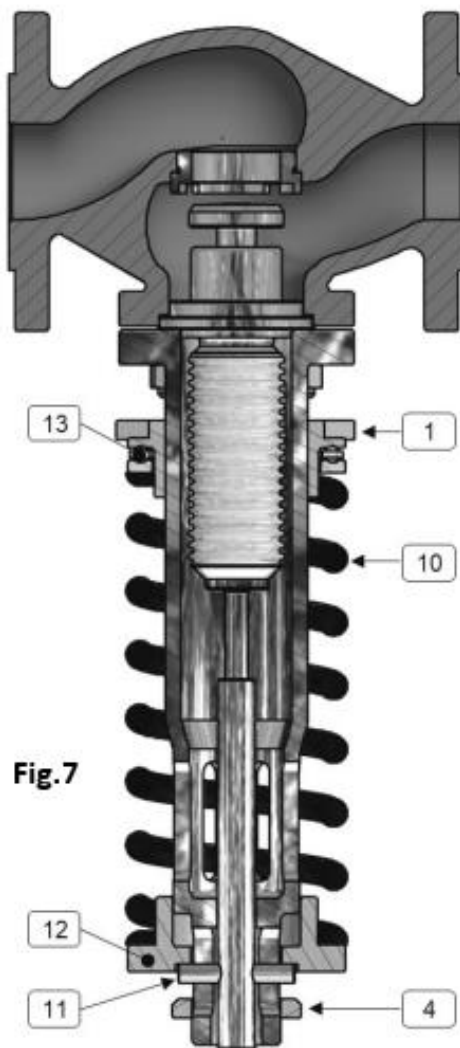
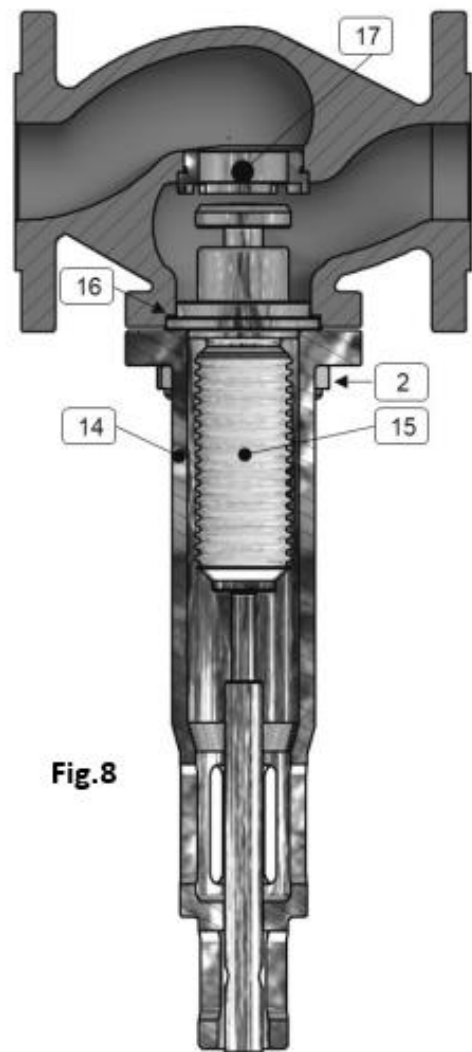
**Fig.6**

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**REPLACEMENT OF THE BELLOWS GROUP/PLUG**

- 1 - Separate the actuator from the gearbox as described above.
- 2 - Fully decompress the spring "item 10" acting on the ring "item 1" (Fig. 7).
- 3 - Remove the ring "item 4" and remove the pin "item 11".
- 4 - Remove the ring nut "item 12", the spring "item 10" and the bearing "item 13" in that order.
- 5 - Unscrew the nuts "item 2" (Fig. 8) and remove the cap "item 14".
- 6 - Remove the bellows group/plug "item 15".
- 7 - If necessary, replace seat "item 17" and tighten as described above (tightening torque).
- 8 - Replace seal "item 16".
- 9 - Fit the new bellows group/plug by performing the operations in reverse order.

For tightening, follow the instructions above (torque and tightening sequence).



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### TROUBLESHOOTING

| Symptom                                                                                           | Possible cause                                            | Repair                                               |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------|
| Downstream pressure too high                                                                      | Incorrectly sized actuator                                | Review the sizing                                    |
|                                                                                                   | Clogged pressure test pipe                                | Disassemble and check the tube                       |
|                                                                                                   | Damaged actuator membrane                                 | Replace it                                           |
|                                                                                                   | Damaged valve or seat                                     | Replace it                                           |
|                                                                                                   | Damaged stem-bellows assembly                             | Replace it                                           |
| At full flow the downstream pressure is lower than the setting pressure                           | Undersized actuator                                       | Review the sizing and possibly replace the actuator  |
| The actuator pressure range is correct but the regulator is not providing the requested flow rate | The regulator is not sized correctly                      | Review the sizing and possibly replace the regulator |
| Downstream pressure is not stable                                                                 | The downstream pressure tap is too close to the regulator | Move the pressure tap further downstream             |
|                                                                                                   | The reduction ratio is too high                           | Plan to install two regulators in a series           |
|                                                                                                   | The pressure gauge is too sensitive                       | Reduce the diameter of the tube.                     |
|                                                                                                   | The regulator is oversized                                | Review the sizing                                    |

### SPARE PARTS

| Item | Description          | Codes      |         |    |        |    |        |    |        |     |        |
|------|----------------------|------------|---------|----|--------|----|--------|----|--------|-----|--------|
| 7    | Complete actuator    | 0,4-1      | 0,9-1,8 |    | 1,7-3  |    | 2,8-5  |    | 4,8-7  |     | 6,8-15 |
|      | Code                 | AR265      | AR205   |    | AR150  |    | AR120  |    | AR100  |     | AR85   |
| 8    | Diaphragm            | 984065     | 984064  |    | 984063 |    | 984062 |    | 984061 |     | 984060 |
| 6    | Rod-bellows assembly | -          |         |    |        |    |        |    |        |     |        |
| 3    | Seat                 | -          |         |    |        |    |        |    |        |     |        |
|      | Body seal            | 15         | 20      | 25 | 32     | 40 | 50     | 65 | 80     | 100 |        |
|      | Code                 | -          |         |    |        |    |        |    |        |     |        |
| 4    | Spring               | contact us |         |    |        |    |        |    |        |     |        |
| 5    | Adjustment ring      | -          |         |    |        |    |        |    |        |     |        |

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