Pressure reducing valves
series 5360 - 5362 - 5365 - 5366

Function
Pressure reducers are devices which, when installed on a water system, reduce and stabilise the pressure entering from the mains. This incoming pressure is generally too high and variable to be applied directly to domestic systems.

A basic characteristic of a good pressure reducer is that it makes it possible to maintain constant downstream pressure when the upstream pressure varies.

Product range

<table>
<thead>
<tr>
<th>Series</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>5360.1</td>
<td>Pressure reducing valve, male connections, with pressure gauge (Sizes 1/2&quot;, 3/4&quot;, 1&quot;, 1 1/4&quot;, 1 1/2&quot; M)</td>
</tr>
<tr>
<td>5360.0</td>
<td>Pressure reducing valve, male connections, with pressure gauge connection (Sizes 1/2&quot;, 3/4&quot;, 1&quot;, 1 1/4&quot;, 1 1/2&quot; M)</td>
</tr>
<tr>
<td>5362.1</td>
<td>Pressure reducing valve, female connections, with pressure gauge (Sizes 1/2&quot;, 3/4&quot;, 1&quot; F)</td>
</tr>
<tr>
<td>5362.0</td>
<td>Pressure reducing valve, female connections, with pressure gauge connection (Sizes 1/2&quot;, 3/4&quot;, 1&quot; F)</td>
</tr>
<tr>
<td>5365.1</td>
<td>Pressure reducing valve, male connections, with double pressure gauge (Sizes 1 1/2&quot;, 2&quot; M)</td>
</tr>
<tr>
<td>5365.0</td>
<td>Pressure reducing valve, male connections, with double pressure gauge connection (Sizes 1 1/2&quot;, 2&quot; M)</td>
</tr>
<tr>
<td>Code 536660</td>
<td>Pressure reducing valve, flanged connections, with double pressure gauge connection (Size DN 65)</td>
</tr>
</tbody>
</table>

Technical specification

<table>
<thead>
<tr>
<th>Materials:</th>
<th>5360/5362</th>
<th>5365</th>
<th>5366</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Body:</td>
<td>brass EN 1982 CB753S</td>
<td>bronze DIN 50930-6 RG5 PB3</td>
<td>bronze DIN 50930-6 RG5 PB3</td>
</tr>
<tr>
<td>- Cover:</td>
<td>brass EN 12165 CW617N NBR NBR NBR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Membrane:</td>
<td>NBR</td>
<td>NBR</td>
<td>NBR</td>
</tr>
<tr>
<td>- Seal:</td>
<td>NBR</td>
<td>NBR</td>
<td>NBR</td>
</tr>
<tr>
<td>- Seat and filter:</td>
<td>stainless steel</td>
<td>stainless steel</td>
<td>stainless steel</td>
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</table>

<table>
<thead>
<tr>
<th>Performance:</th>
<th>5360/5362</th>
<th>5365</th>
<th>5366</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Max pressure upstream:</td>
<td>25 bar</td>
<td>25 bar</td>
<td>16 bar</td>
</tr>
<tr>
<td>- Downstream pressure setting range:</td>
<td>0,5–6 bar</td>
<td>0,5–6 bar</td>
<td>0,5–6 bar</td>
</tr>
<tr>
<td>- Factory setting:</td>
<td>3 bar</td>
<td>3 bar</td>
<td>3 bar</td>
</tr>
<tr>
<td>- Max working temperature:</td>
<td>80°C</td>
<td>80°C</td>
<td>80°C</td>
</tr>
<tr>
<td>- Pressure gauge scale:</td>
<td>0–10 bar</td>
<td>0–25 bar upstream 0–10 bar downstream</td>
<td>0–25 bar upstream 0–10 bar downstream</td>
</tr>
<tr>
<td>- Medium:</td>
<td>water</td>
<td>water</td>
<td>water</td>
</tr>
<tr>
<td>- Certification:</td>
<td>EN1567</td>
<td>EN1567</td>
<td>-</td>
</tr>
<tr>
<td>- Acoustic group:</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connections:</th>
<th>5360: 1/2&quot;–1 1/2&quot; M with union connection</th>
<th>5362: 1/2&quot;–1&quot; F with union connection</th>
<th>Code 536660: DN 65 flanged, coupled with flat counterflanges EN 1092-1, PN 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure gauge connections:</td>
<td>one of 1/4&quot; F</td>
<td>two of 1/4&quot; F</td>
<td>two of 3/8&quot; F</td>
</tr>
</tbody>
</table>
Operating principle

The operation of the pressure reducing valve is based on the balancing of two opposing forces:

1. the thrust of the spring towards the opening of the obturator.
2. the thrust of the membrane towards the closing of the obturator.

Operating with flow

When a draw-off point is opened on the water main, the force of the spring prevails over the opposing pressure of the membrane; the obturator moves downwards, allowing water to pass. The greater the demand for water, the lower the pressure under the membrane, thus permitting more fluid to flow through the obturator.

Operating without flow

When the draw-off point is fully closed, the downstream pressure rises and pushes the membrane upwards. The obturator therefore closes, preventing the fluid from passing through and holding the pressure constant at the calibrated value. A minimum difference in favour of the force exercised by the membrane in relation to that of the spring causes the device to close.
Construction details

Compensated seat

Caleffi pressure reducing valves are supplied with compensated seats. This means that the set pressure value downstream remains constant independently of the variations in value of the pressure upstream.

In the figure, the thrust towards opening is counterbalanced by the closing pressure acting on the compensating piston. As the latter has a surface equal to that of the obturator, the two forces cancel each other out.

Noiseless

The internal layout, designed to obtain the optimum fluid dynamic characteristics, has made it possible to achieve a noise level of less than 20 dB in all the tests carried out. Thanks to this quality, Caleffi reducing valves are approved to the I acoustic group, in compliance with the EN 1567 European standard.

Low pressure losses

The internal fluid-dynamic shape of the reducing valve makes it possible to attain low pressure losses even when a large number of draw-off points are open. This characteristic is important in relation to the high pressure losses caused by various devices present in modern systems, for example thermostatic mixers, which make it necessary to install reducers with minimum pressure losses.

High pressures

The zone exposed to the upstream pressure is constructed in such a way that it can operate at high pressure. Thanks to the PTFE anti-extrusion rings on the compensating piston, the valve can be used in continuous service with upstream pressures of up to 25 bar.

Seat seal

The fluid passage seat on which the obturator operates is made of stainless steel, which ensures the long-lasting operation of the device.

Sliding surfaces

The components most subject to wear due to the friction of moving parts are PTFE coated. This treatment considerably increases the life of the pressure reduction device.

Removable cartridge

The cartridge containing the membrane, filter, seat, obturator and adjusting piston can be removed for maintenance and strainer cleaning purposes.

Certification

Pressure reducing valves are certified in accordance with the requirements of the EN 1567 European standard.
Hydraulic characteristics

Reference conditions: Pressure upstream = 8 bar
Pressure downstream = 3 bar

Dimensioning

The typical flow rates of equipment commonly used in hot water systems are shown below to help in the selection of correct pipe sizes:

<table>
<thead>
<tr>
<th>Table of typical flow rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bathtub, kitchen sink, dishwasher</td>
</tr>
<tr>
<td>Shower</td>
</tr>
<tr>
<td>Washbasin, bidet, washing machine, WC</td>
</tr>
</tbody>
</table>

In order to prevent over-sizing of the pressure reducing valve and pipework, a simultaneous-use “correction factor” should be taken into account. In essence, the greater the number of users of the system, the lower the percentage of draw-off points opened at the same time.

Table showing simultaneous-use factors as %

<table>
<thead>
<tr>
<th>Number of devices</th>
<th>Private dwelling %</th>
<th>Public building %</th>
<th>Number of devices</th>
<th>Private dwelling %</th>
<th>Public building %</th>
<th>Number of devices</th>
<th>Private dwelling %</th>
<th>Public building %</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>54</td>
<td>64,5</td>
<td>36</td>
<td>23,2</td>
<td>30</td>
<td>80</td>
<td>16,5</td>
<td>22</td>
</tr>
<tr>
<td>10</td>
<td>41</td>
<td>49,5</td>
<td>40</td>
<td>21,5</td>
<td>28</td>
<td>90</td>
<td>16</td>
<td>21,5</td>
</tr>
<tr>
<td>15</td>
<td>35</td>
<td>43,5</td>
<td>45</td>
<td>20,5</td>
<td>27</td>
<td>100</td>
<td>15,5</td>
<td>20,5</td>
</tr>
<tr>
<td>20</td>
<td>29</td>
<td>37</td>
<td>50</td>
<td>19,5</td>
<td>26</td>
<td>150</td>
<td>14</td>
<td>18,5</td>
</tr>
<tr>
<td>25</td>
<td>27,5</td>
<td>34,5</td>
<td>60</td>
<td>18</td>
<td>24</td>
<td>200</td>
<td>13</td>
<td>17,5</td>
</tr>
<tr>
<td>30</td>
<td>24,5</td>
<td>32</td>
<td>70</td>
<td>17</td>
<td>23</td>
<td>300</td>
<td>12,5</td>
<td>16,5</td>
</tr>
</tbody>
</table>

The steps to be taken for correct dimensioning are as follows:

- Calculate the total flow on the basis of the number and types of appliance present in the system, adding up their individual typical flow rates.

Example:

For a single dwelling with 2 bathrooms:
- 2 bidets: \( G = 12 \text{ l/min} \)
- 1 shower: \( G = 9 \text{ l/min} \)
- 2 washbasins: \( G = 12 \text{ l/min} \)
- 2 WCs: \( G = 12 \text{ l/min} \)
- 1 bath: \( G = 12 \text{ l/min} \)
- 1 kitchen sink: \( G = 12 \text{ l/min} \)
- 1 dishwasher: \( G = 12 \text{ l/min} \)

\[ G_{\text{tot}} = 81 \text{ l/min} \]

- The design flow is calculated using the simultaneous-use factors table.

Example:

For \( G_{\text{tot}} = 81 \text{ l/min} \), % = 41 %, \( G_{\text{des}} = 33 \text{ l/min} \)

When sizing pressure reducing valves, it is advisable to keep the velocity of flow in the pipes at between 1 and 2 m/s. This prevents both noise in the pipework and rapid wear in the point of use equipment.

- The size of the pressure reducing valve is determined by means of graph 1, starting with the design flow figure and remembering that the ideal velocity is between 1 and 2 m/s (blue band).

Example:

For \( G_{\text{des}} = 33 \text{ l/min} \), size 3/4" is selected (see graph 1)

Using graph 2, still starting with the design flow figure, identify the pressure drop, intersecting the curve relating to the size already selected (the downstream pressure falls by a value equal to the pressure drop in relation to the zero flow set pressure).

Example:

For \( G_{\text{des}} = 33 \text{ l/min} \), \( \Delta p = 0.55 \text{ bar} \)

Nominal flow rates

In accordance with the requirements of the EN 1567 European standard, these are the flow rates for each diameter, at an average speed of 2 m/s.

<table>
<thead>
<tr>
<th>Size</th>
<th>1/2&quot;</th>
<th>3/4&quot;</th>
<th>1&quot;</th>
<th>1 1/4&quot;</th>
<th>1 1/2&quot;</th>
<th>2&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow rate (m³/h)</td>
<td>1.27</td>
<td>2.27</td>
<td>3.6</td>
<td>5.8</td>
<td>9.1</td>
<td>14</td>
</tr>
<tr>
<td>Flow rate (l/min)</td>
<td>21.16</td>
<td>37.83</td>
<td>60.66</td>
<td>96.66</td>
<td>151.66</td>
<td>233.33</td>
</tr>
</tbody>
</table>
**Trouble-shooting**

Some faults, which are usually due to the lack of suitable system safeguards, are sometimes incorrectly attributed to pressure reducing valves. The most frequent cases are:

1. **Increased pressure downstream of the pressure reducing valve when a water heater is installed**
   This problem is due to the overheating of the water caused by the water heater. The pressure cannot "leak", as the reducing valve is properly closed. The solution is to install an expansion vessel (between the reducer and the water heater) to "absorb" the pressure increase.

**Installation**

1. Prior to installation, open all the draw-off taps to empty the system and expel any air remaining in the pipework.
2. Install shut-off valves upstream and downstream to assist in future maintenance operations.
3. Install the pressure reducing valve in any position except upside down.

4. **Close the downstream shut-off valve.**
5. Calibrate by means of the spring pressure regulating nut located under the head cover, turning with a 10 mm hexagonal Allen key clockwise to increase the set value or anticlockwise to reduce it.
6. Check the required pressure on the pressure gauge. (Caleffi reducers come factory set at 3 bar).

**Installation recommendations**

1. **Installation in pits**
   Installing pressure reducing valve inside pits is not recommended, for two reasons:
   - it is very difficult, if not impossible, to read the pressure gauge.
   - impurities may enter the device through the pressure relief outlet in the head cover.

2. **Water hammer**
   This is one of the main causes of failure of pressure reducing valves. During the installation of "at risk" systems, the use of specific devices designed to absorb water hammer should be provided for.

**Maintenance**

For cleaning, inspection or replacement of the entire cartridge:

1. Isolate the pressure reducing valve.
2. Unscrew the spring pressure regulating nut to release the spring tension.
3. Remove the head cover.
4. Extract the cartridge using two screwdrivers.
5. After inspection and cleaning if necessary, the complete cartridge can be refitted or replaced using a spare cartridge.
6. Recalibrate the pressure reducing valve.
**System application diagram**

- Shut-off valve
- BALLSTOP ball valve with built-in check valve
- Filter
- Water hammer arrester
- Solenoid valve
- Regulator

**Irrigation systems**

**Washing machines**

**Mixer taps**

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**SPECIFICATION SUMMARIES**

**Series 5360**
Pressure reducing valve with compensated seat to standard EN 1567. Threaded connections 1/2” M (from 1/2” to 1 1/2”) with union. Brass body. Stainless steel seat and filter. NBR seal and membrane. Maximum working temperature 80°C. Maximum upstream pressure 25 bar. Downstream pressure setting range from 0.5 to 6 bar. Sliding surface heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.

**Series 5362**
Pressure reducing valve with compensated seat. Threaded connections 1/2” F (from 1/2” to 1”). Brass body. Stainless steel seat and filter. NBR seal and membrane. Maximum working temperature 80°C. Maximum upstream pressure 25 bar. Downstream pressure setting range from 0.5 to 6 bar. Sliding surface heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.

**Series 5365**
Pressure reducing valve with compensated seat to standard EN 1567. Threaded connections 1 1/2” M (from 1 1/2” to 2”) with union. Bronze body. Stainless steel seat and filter. NBR seal and membrane. Maximum working temperature 80°C. Maximum upstream pressure 25 bar. Downstream pressure setting range from 0.5 to 6 bar. Sliding surface heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.

**Code 536660**

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