Pressure reducing valves

series 5360 - 5362 - 5365 - 5366

01026/17 GB
replaces dp
01026/05 GB

Function

Pressure reducing valves are devices which, when installed on a private plumbing system, reduce and stabilise the inlet pressure from the water mains. This inlet pressure, in general, is too high and variable for domestic systems to operate correctly.

The key requirement of a quality pressure reducing valve is that it must maintain a constant downstream pressure in the face of upstream pressure fluctuations.

WRAS APPROVED PRODUCT
CERTIFICATION MARK

ATTESTATION DE CONFORMITÉ SANITAIRE ACS

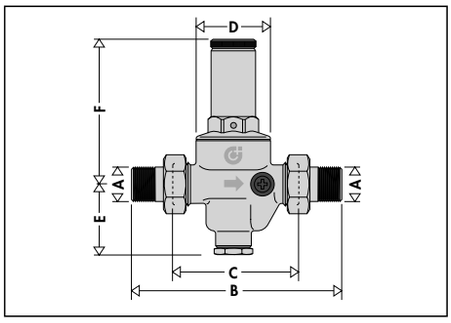
Product range

5360.1 series	Pressure reducing valve with male connections and pressure gauge	sizes DN 15 (1/2"), DN 20 (3/4"), DN 25 (1"), DN 32 (1 1/4"), DN 40 (1 1/2")
5360.0 series	Pressure reducing valve with male connections, without pressure gauge	sizes DN 15 (1/2"), DN 20 (3/4"), DN 25 (1"), DN 32 (1 1/4"), DN 40 (1 1/2")
5362.1 series	Pressure reducing valve with female connections and pressure gauge	sizes DN 15 (1/2"), DN 20 (3/4"), DN 25 (1")
5362.0 series	Pressure reducing valve with female connections, without pressure gauge	sizes DN 15 (1/2"), DN 20 (3/4"), DN 25 (1")
5365.1 series	Pressure reducing valve with male connections and double pressure gauge	sizes DN 40 (1/2"), DN 50 (2")
5365.0 series	Pressure reducing valve with male connections, without double pressure gauge	sizes DN 40 (1/2"), DN 50 (2")
Code 536660	Pressure reducing valve with flanged connections and double pressure gauge	size DN 65

Technical specifications

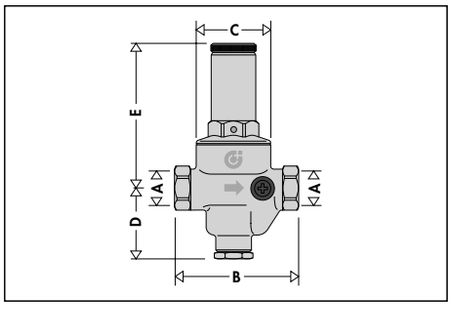
series	5360/5362	5365	5366
Materials:			
- Body:	dezincification resistant alloy CR EN 1982 CB752S	bronze EN 1982 CB499K	bronze EN 1982 CB499K
- Cover:	brass EN 12165 CW617N	brass EN 1982 CB753S	brass EN 1982 CB753S
- Diaphragm:	NBR	NBR	NBR
- Seals:	EPDM	EPDM	EPDM
- Seat and strainer:	stainless steel	stainless steel	stainless steel
Performance:			
- Max. upstream pressure:	25 bar	25 bar	16 bar
- Downstream pressure setting range:	0,5–6 bar	0,5–6 bar	0,5–6 bar
- Factory setting:	3 bar	3 bar	3 bar
- Max. working temperature:	80°C	80°C	80°C
- Pressure gauge scale:	0–10 bar	0–25 bar upstream 0 10 bar downstream	0–25 bar upstream 0–10 bar downstream
- Medium:	water	water	water
- Compliant with:	EN 1567	EN 1567	-
- Acoustic group:	I	-	-
Connections:	- 5360; 1/2"–1 1/2" (ISO 7-1) M with union - 5362 1/2"–1" (ISO 228-1) F	1 1/2"–2" (ISO 7-1) M with union	DN 65 flanged, PN 16 to be coupled with counterflange EN 1092-1
Pressure gauge connections:	one 1/4" (ISO 228-1) F	two 1/4" (ISO 228-1) F	two 3/8" (ISO 228-1) F

Dimensions

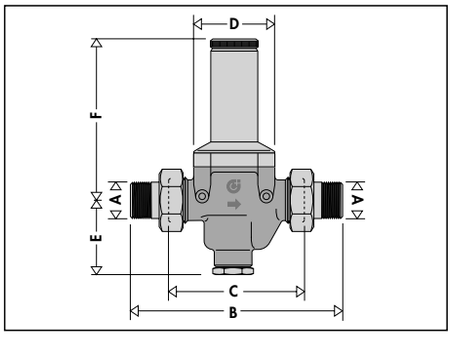


Code	DN*	A**	B	C	D	E	F	Mass (kg)
536040/1	15	1/2"	140	76®	Ø 51	53,5	89,5	1,25
536050/1	20	3/4"	160	90®	Ø 60	54	111,5	1,95
536060/1	25	1"	180	95®	Ø 60	54	111,5	1,82
536070/1	32	1 1/4"	200	110®	Ø 72	63	126	3,14
536080/1	40	1 1/2"	220	120®	Ø 72	63	126	3,64

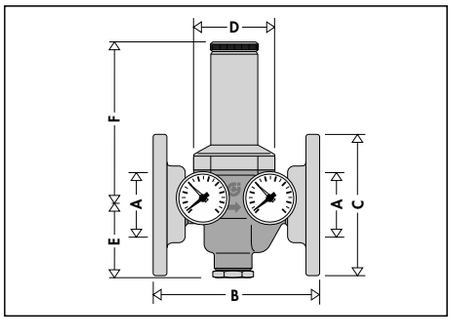
® Interchangeable with 5350 series.



Code	DN*	A**	B	C	D	E	Mass (kg)
536240/1	15	1/2"	81	Ø 51	53,5	89,5	1,10
536250/1	20	3/4"	95	Ø 60	54	111,5	1,57
536260/1	25	1"	100	Ø 60	54	111,5	1,58



Code	DN*	A**	B	C	D	E	F	Mass (kg)
536580/1	40	1 1/2"	260	160	110	97	201	9,2
536590/1	50	2"	280	160	110	94	204	10,4



Code	A	B	C	D	E	F	Mass (kg)
536660	DN 65	225	Ø185	110	94	204	14,9

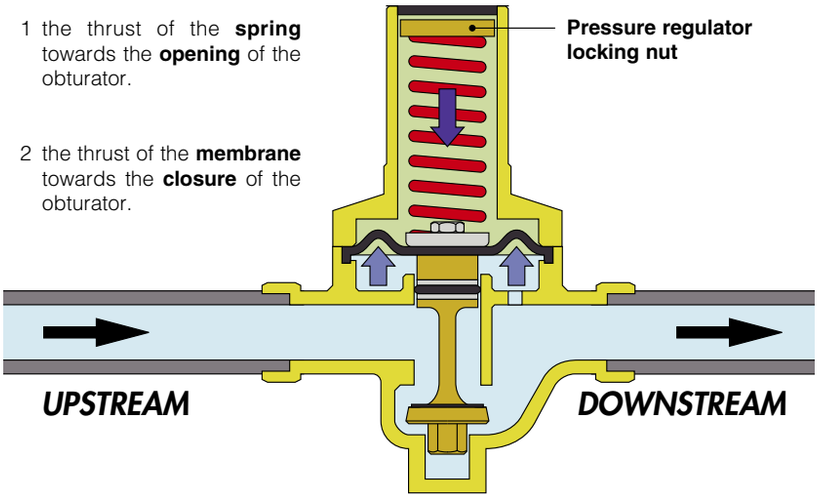
* Valve body ** Connections

Operating principle

Operation of the pressure reducing valve is based on the balance between two opposing forces:

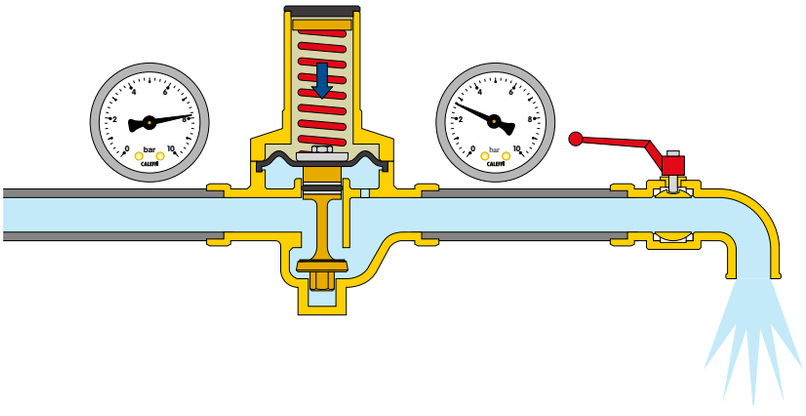
1 the thrust of the **spring** towards the **opening** of the obturator.

2 the thrust of the **membrane** towards the **closure** of the obturator.



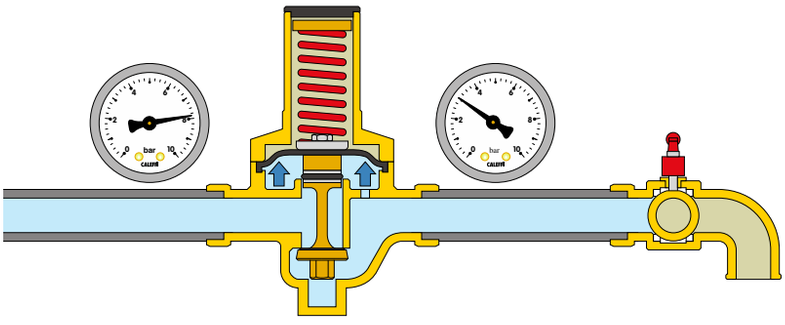
Operation with water flow

When a draw-off outlet is opened on the water system, the force of the spring becomes greater than that of the diaphragm; the obturator moves downwards opening the valve to the flow of water.
The greater the demand for water the lower the pressure under the membrane with a resulting greater flow of medium through the valve.



Operation without water flow

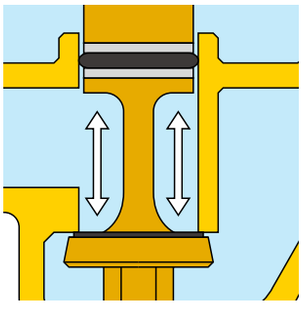
When the draw-off outlet is closed, the downstream pressure rises and pushes the diaphragm upwards.
As a result the obturator closes the valve to the passage of water and maintains the pressure constant at the calibrated pressure.
The slightest difference in favour of the force exercised by the diaphragm, in relation to that of the spring, causes the device to close.



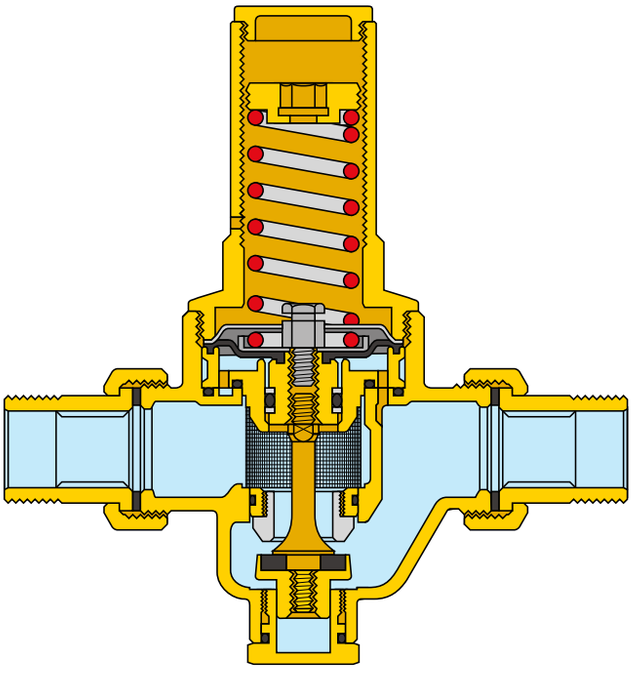
Construction details

Compensated seat

Caleffi pressure reducing valves are fitted with compensated seats. This means the downstream **setting pressure value** remains **constant**, regardless of variations in the upstream pressure value.



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



Silent operation

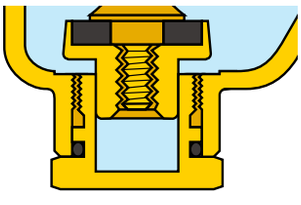
The internal structure is designed for optimum fluid-dynamic performance, and showed noise levels of less than 20 dB in tests. Thanks to this quality, Caleffi 5360 series reducing valves are classified in acoustic group I, under the provisions of EN 1567.

Low head losses

The internal fluid-dynamic structure of the reducing valve yields very low head losses, even if a large number of consumer outlets are opened.
This feature is important in relation to the high head losses caused by devices currently used in systems, such as thermostatic mixing valves, which require the installation of reducing valves that optimise head losses.

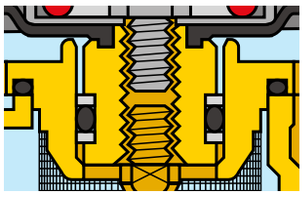
Sliding contact surfaces

The parts most subject to deterioration as a result of friction from moving parts are PTFE-coated.
This treatment significantly increases the service life of the reducing device.



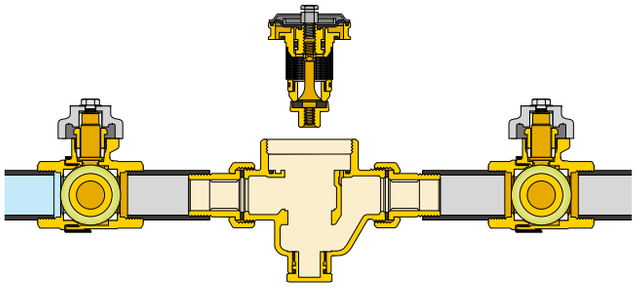
High pressure

The zone exposed to upstream pressure is constructed so that it can even operate at high pressure. The PTFE anti-extrusion rings on the compensating piston make it possible for the valve to be used continuously at upstream pressures up to 25 bar.



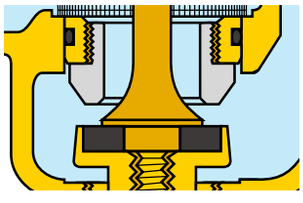
Extractable cartridge

The cartridge containing the membrane, strainer, seat, obturator and compensation piston can be removed to facilitate strainer cleaning and maintenance procedures.



Seal seat

The seat through which the medium flows and on which the obturator operates is made of stainless steel, which ensures that the device maintains its high performance over time.

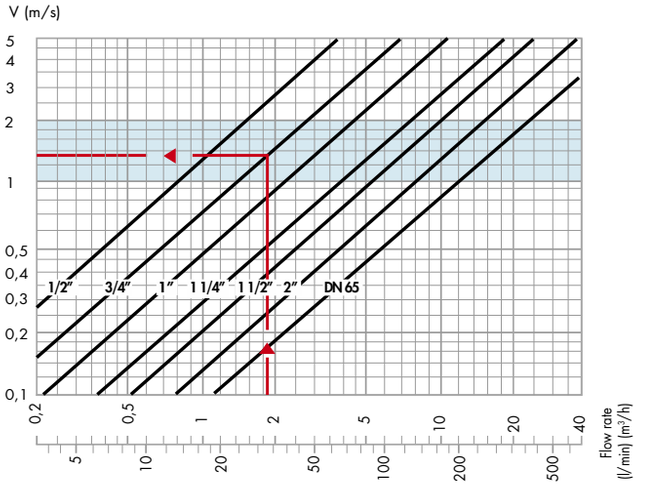


Reference standards

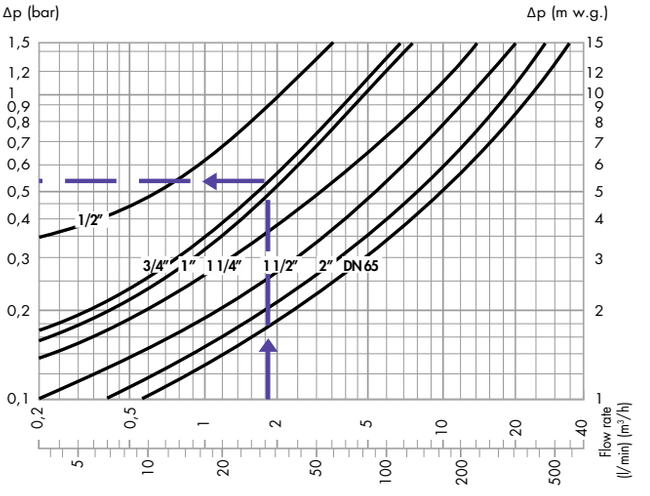
The pressure reducing valves meet the requirements of European standard EN 1567.

Hydraulic characteristics

Graph 1 (Circulation speed)



Graph 2 (Pressure drop)



Reference conditions: *Upstream pressure = 8 bar*
Downstream pressure = 3 bar

Sizing

To make selecting the correct valve diameter easier, below we have listed the typical flow rates of the most common appliances used within domestic plumbing systems:

Table of typical flow rates

Bathtub, kitchen sink, dishwasher	12 litres/min
Shower	9 litres/min
Washbasin, bidet, washing machine, WC with cistern	6 litres/min

To prevent oversizing of the pressure reducing valve and the pipes, the correct simultaneous use correction factor must be taken into account. Basically, the more outlets within the system, the lower the percentage of draw-off outlets opened simultaneously will be.

Table of simultaneous use factors (%)

Number of Devices	Private dwelling %	Public buildings %
5	54	64,5
10	41	49,5
15	35	43,5
20	29	37
25	27,5	34,5
30	24,5	32

Number of Devices	Private dwelling %	Public buildings %
35	23,2	30
40	21,5	28
45	20,5	27
50	19,5	26
60	18	24
70	17	23

Number of Devices	Private dwelling %	Public buildings %
80	16,5	22
90	16	21,5
100	15,5	20,5
150	14	18,5
200	13	17,5
300	12,5	16,5

Correct sizing should take place as follows:

- The total flow rate is calculated from the number and type of appliances present by taking the sum of the individual flow rates

  Example:

  Residence with 2 bathrooms

2 bidets	*G = 12 l/min*
1 shower	*G = 9 l/min*
2 washbasins	*G = 12 l/min*
2 WCs with cistern	*G = 12 l/min*
1 bathtub	*G = 12 l/min*
1 kitchen sink	*G = 12 l/min*
1 washing machine	*G = 12 l/min*

  G_{tot} = 81 l/min
  No. of appliances = 10

- The design flow rate is calculated from the table of simultaneous use factors.

  Example:

  $G_{pr} = G_{tot} \cdot \% = 81 \cdot 41\ \% = 33$ l/min

It is recommended that flow velocity is kept within 1 to 2 metres per second when calculating the correct reducing valve size. This will prevent noise in the pipes and rapid wear of appliances.

- The correct diameter of the reducing valve is taken from diagram 1 on the basis of the design flow rate taking into account an ideal flow velocity of between 1 and 2 m/s (blue band).

  Example:

  for G_{pr} = 33 l/min, select the 3/4" diameter
  (see indication on diagram 1)

- The pressure drop is taken from diagram 2 again on the basis of where the design flow rate intersects the curve for the relative diameter already selected (the downstream pressure falls by an amount equal to the pressure drop, with respect to the set pressure at no flow condition).

  Example:

  for G_{pr} = 33 l/min *Δp = 0,55 bar*
  (see indication on diagram 2)

Nominal flow rates

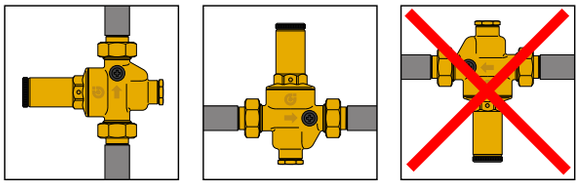
Water flow rates corresponding to each diameter are shown below, for an average velocity of 2 m/s, in accordance with the specifications of the standard EN 1567.

Diameter	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	DN 65
Flow rate (m³/h)	1,27	2,27	3,6	5,8	9,1	14	24
Flow rate (l/min)	21,16	37,83	60	96,66	151,66	233,33	400

Sizing software available at www.caleffi.it., Apple Store and Google play.

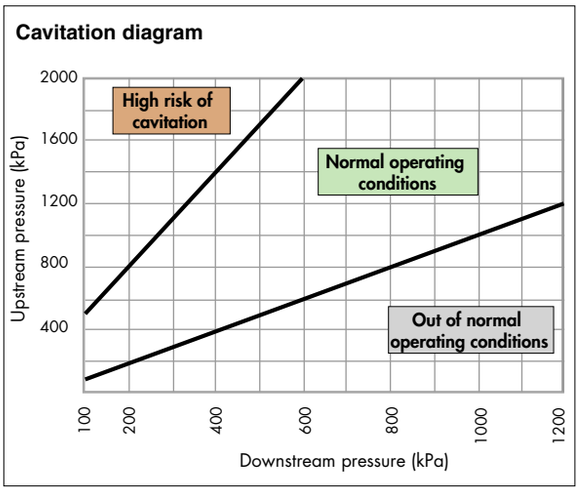
Installation

1) Turn all the taps on before installing the pressure reducing valve, to flush the system and expel any air remaining in the pipes.
2) Install shut-off valves upstream and downstream to facilitate maintenance operations.
3) The pressure reducing valve may be installed on either vertical or horizontal pipe.
   However, it must not be installed upside down



4 **Close the downstream shut-off valve**
5 Set the device by turning the spring locking nut under the bell cap with a 10 mm hex key or flat-blade screwdriver clockwise to increase the setting or anticlockwise to reduce it.
6 Read the desired value off the pressure gauge. (Caleffi pressure reducing valves are factory set to 3 bar).

Installation recommendations



In order to minimise the risk of cavitation in the reducing valve, which could cause malfunctions with the risk of erosion in the seal area, vibration and noise, you are strongly advised to refer to the operating conditions specified in the diagram.
Due to numerous factors and variable conditions, such as: system pressure, temperature, presence of air, flow rate and speed, which could affect the performance of the pressure reducing valve; it is advisable to keep the ratio between upstream and downstream pressure ideally at 2:1 and no more than 3:1 (for example, upstream pressure 10 bar, downstream pressure 5 bar, pressure ratio = 10/5 = 2:1) In these conditions, the risk of cavitation is minimised, but this does not preclude the possible effects of the many other factors in play in the system during operation. If the pressure ratio exceeds the specified limit, you should consider the design pressure of the system or the use of a first stage pressure reducing valve (e.g. first stage pressure reducing valve from 16 to 8 bar and second stage from 8 to 4 bar).
The upstream and downstream pipes of the pressure reducing valve must be secured with brackets in accordance with the manufacturer's instructions and local requirements, in order to avoid generating and transmitting noise and/or vibration in the installation.

Installation below ground

Installing pressure reducing valves below ground is not recommended, for four reasons:
- there is a risk of the reducing valve being damaged by frost
- inspection and maintenance operations are difficult
- reading the pressure gauge is difficult
- foreign bodies may enter the device through the volumetric compression vent holes in the bell-shaped cover.

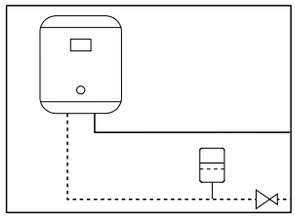
Water hammer

This is one of the main causes of faults in pressure reducing valves. It is best to fit special devices to absorb water hammer when installing pressure reducers in at-risk systems.

Troubleshooting

Certain types of fault, which are generally due to faulty design of the system, are often wrongly attributed to pressure reducing valves. The most frequent cases are as follows:

1. **Pressure rise downstream of the reducing valve in the presence of a water heater**
   This problem is due to overheating of the water by the water heater. There is no pressure relief because the reducing valve is rightly closed. The solution consists of installing an expansion vessel (between the pressure reducing valve and the water heater) to "absorb" the pressure increase.



2. **The reducing valve does not maintain its setting value**
   In the majority of cases, this problem is due to impurities being deposited on the seat seal and causing seepage, thereby increasing the downstream pressure. The preventive solution is to install a strainer upstream of the reducing valve and then to ensure that the removable cartridge is properly cleaned and maintained (see maintenance section).

Maintenance

The following steps are necessary for the cleaning, inspection and replacement of the entire cartridge:

1 Shut off the reducer.

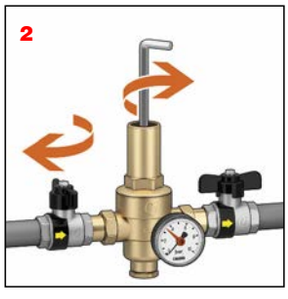
2 Unscrew the spring locking nut until there is no tension on the spring.

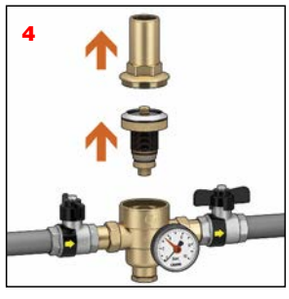
3 Remove the bell-shaped cover.

4 Remove the cartridge with the aid of two screwdrivers.

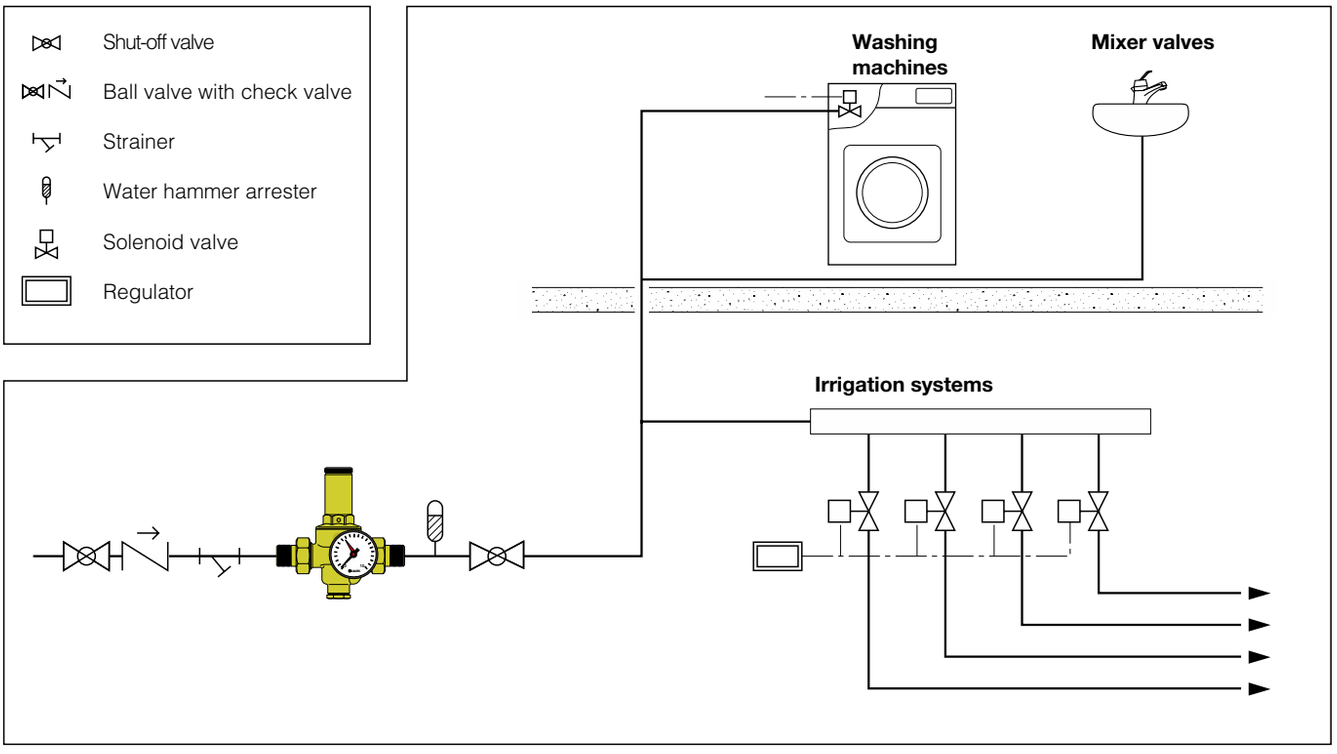
5 After inspection and cleaning, if appropriate, the entire cartridge can be re-fitted; alternatively, a replacement cartridge can be installed.

6 Re-set the reducing valve.





Application diagram



SPECIFICATION SUMMARY

5360 series

Pressure reducing valve with compensated seat to EN 1567. Size DN 15 (from DN 15 to DN 40). 1/2" (from 1/2" to 1 1/2") M (ISO 71) threaded connections with union. Dezincification resistant alloy body and brass cover. Stainless steel seat and strainer. NBR diaphragm. EPDM sealing gasket. Medium: water. Maximum working temperature 80°C. Maximum upstream pressure 25 bar. Downstream pressure setting range from 0,5 to 6 bar. Sliding contact surfaces hot-coated with PTFE. Cartridge with membrane, strainer, seat and obturator removable for maintenance purposes.

5362 series

Pressure reducing valve with compensated seat. Size DN 15 (from DN 15 to DN 25). 1/2" (from 1/2" to 1") F (ISO 228-1) threaded connections. Dezincification resistant alloy body and brass cover. Stainless steel seat and strainer. NBR diaphragm. EPDM sealing gasket. Medium: water. Maximum working temperature 80°C. Maximum upstream pressure 25 bar. Downstream pressure setting range from 0,5 to 6 bar. Sliding contact surfaces hot-coated with PTFE. Cartridge with diaphragm, strainer, seat and obturator removable for maintenance purposes.

5365 series

Pressure reducing valve with compensated seat to EN 1567. Sizes DN 40 (DN 40 and DN 50). 1 1/2" (1 1/2" and 2") M (ISO 71) threaded connections with union. Bronze body and brass cover. Stainless steel seat and strainer. NBR diaphragm. EPDM sealing gasket. Medium: water. Maximum working temperature 80°C. Maximum upstream pressure 25 bar. Downstream pressure setting range from 0,5 to 6 bar. Sliding contact surfaces hot-coated with PTFE. Cartridge with diaphragm, strainer, seat and obturator removable for maintenance purposes.

5366 series

Pressure reducing valve with compensated seat. Size DN 65. Flanged PN 16 connections. Bronze body and brass cover. Stainless steel seat and strainer. NBR diaphragm. EPDM sealing gasket. Medium: water Maximum working temperature 80°C. Maximum upstream pressure 16 bar. Downstream pressure setting range from 0,5 to 6 bar. Supplied with double pressure gauge 0–25 bar upstream and 0–10 bar downstream. Sliding contact surfaces hot-coated with PTFE. Cartridge with diaphragm, strainer, seat and obturator removable for maintenance purposes.

We reserve the right to make changes and improvements to the products and related data in this publication, at any time and without prior notice.

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