

Pressure reducing valves

series 5360 - 5362 - 5365 - 5366



cert. n° 0003
ISO 9001

01026/01 GB

Replaces 01026/97 GB



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.



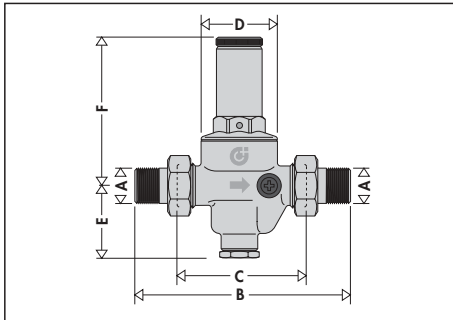
Product range

Series 5360.1	Pressure reducer - male union connection with pressure gauge	Sizes 1/2", 3/4", 1", 1 1/4", 1 1/2" M
Series 5360.0	Pressure reducer - male union connection without pressure gauge	Sizes 1/2", 3/4", 1", 1 1/4", 1 1/2" M
Series 5362.1	Pressure reducer - female connection with pressure gauge	Sizes 1/2", 3/4", 1" F
Series 5362.0	Pressure reducer - female connection without pressure gauge	Sizes 1/2", 3/4", 1" F
Series 5365.1	Pressure reducer - male union connection with double pressure gauge	Sizes 1 1/2", 2" M
Series 5365.0	Pressure reducer - male union connection without double pressure gauge	Sizes 1 1/2", 2" M
Code 536660	Pressure reducer - flanged connection with double pressure gauge	Sizes DN 65

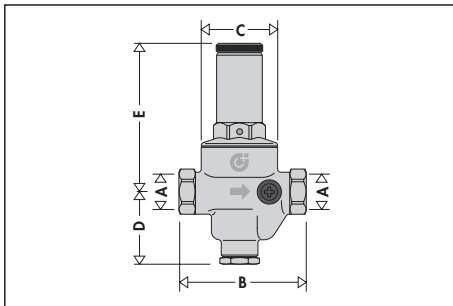
Technical specification

series ➔	5360/5362	5365	5366
Materials:			
- Body:	brass G-MS 59	bronze UNI 7013 G Cu Sn5 Zn5 Pb5	bronze UNI 7013 G Cu Sn5 Zn5 Pb5
- Cover:	brass UNI EN 12165 CW617N	brass G-MS 59	brass G-MS 59
- Membrane:	NBR	NBR	NBR
- Seal:	NBR	NBR	NBR
- Seat and strainer:	stainless steel	stainless steel	stainless steel
Performance:			
- Max pressure upstream:	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:	70°C	70°C	70°C
- Pressure gauge scale:	0÷10 bar	0÷25 bar upstream 0÷10 bar downstream	0÷25 bar upstream 0÷10 bar downstream
- Fluids suitable:	water, compressed air	water, compressed air	water, compressed air
Connections:	5360 male with union 5362 female	male with union	flanged UNI PN 16
Pressure gauge connections:	1/4" F	1/4" F	3/8" F

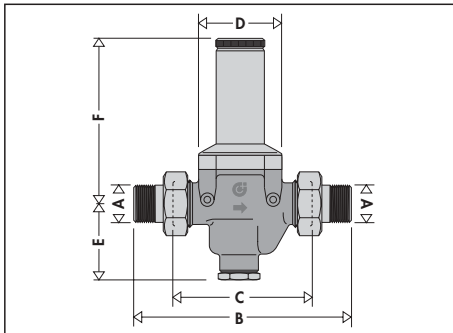
Dimensions



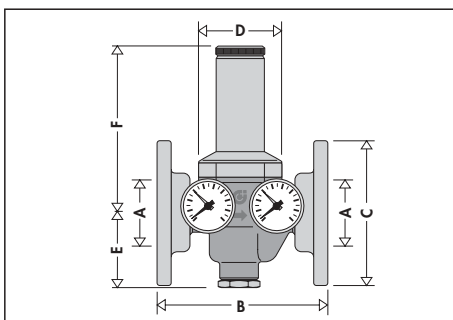
Code	A	B	C	D	E	F
536040/1	1/2"	140	76	Ø 51	53,5	89,5
536050/1	3/4"	160	90	Ø 60	54	111,5
536060/1	1"	180	95	Ø 60	54	111,5
536070/1	1 1/4"	200	110	Ø 72	63	126
536080/1	1 1/2"	220	120	Ø 72	63	126



Code	A	B	C	D	E
536240/1	1/2"	81	Ø 51	53,5	89,5
536250/1	3/4"	95	Ø 60	54	111,5
536260/1	1"	100	Ø 60	54	111,5



Code	A	B	C	D	E	F
536580/1	1 1/2"	260	160	110	97	201
536590/1	2"	280	160	110	94	204

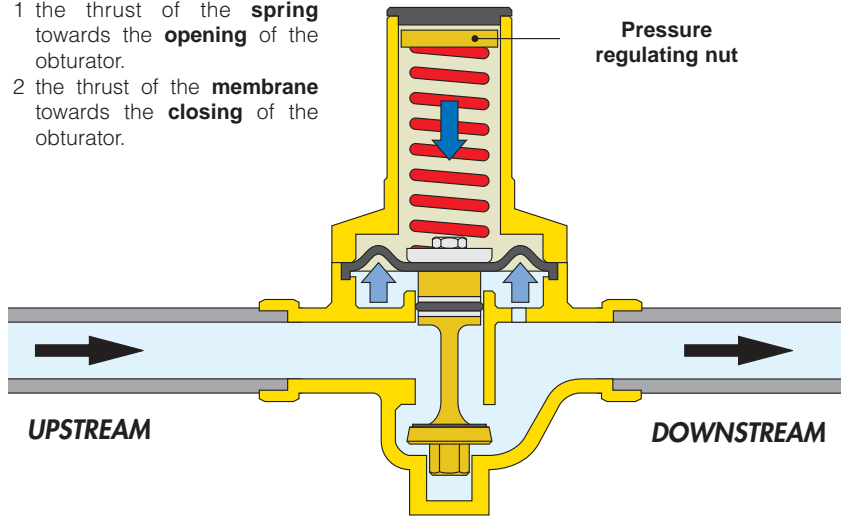


Code	A	B	C	D	E	F
536660	DN 65	225	Ø 185	110	94	204

Operating principle

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

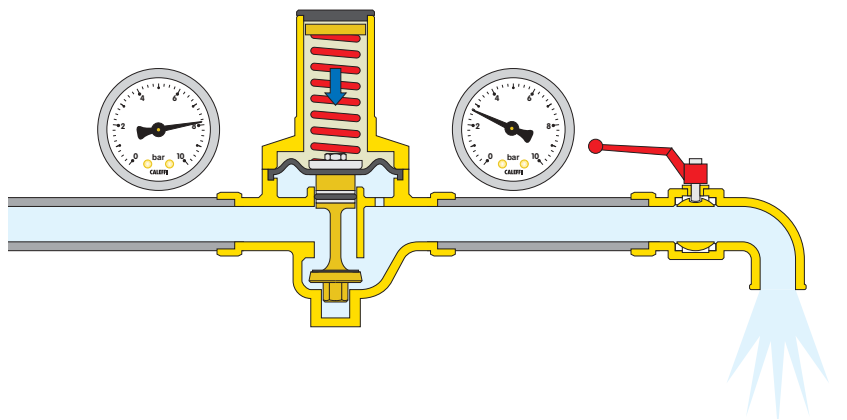
- 1 the thrust of the **spring** towards the **opening** of the obturator.
- 2 the thrust of the **membrane** towards the **closing** of the obturator.



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.

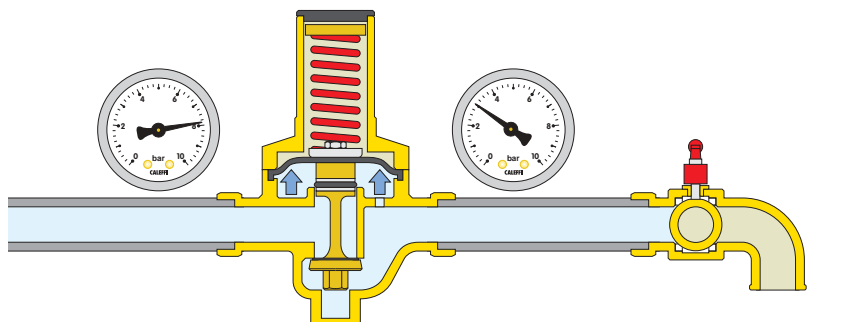


Operating without flow

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.

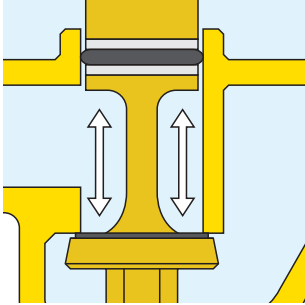
A minimum difference in favour of the force exercised by the membrane in relation to that of the spring causes the device to close.



Construction details

Compensated seat

Caleffi pressure reducers 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 series 5360 and 5365 reducers are approved as Class 1 by the German DVGW, the Swiss SVGW and the Austrian ÖVGW.

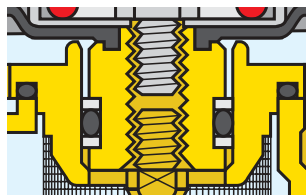
Low pressure loss

The internal fluid-dynamic shape of the reducers 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.

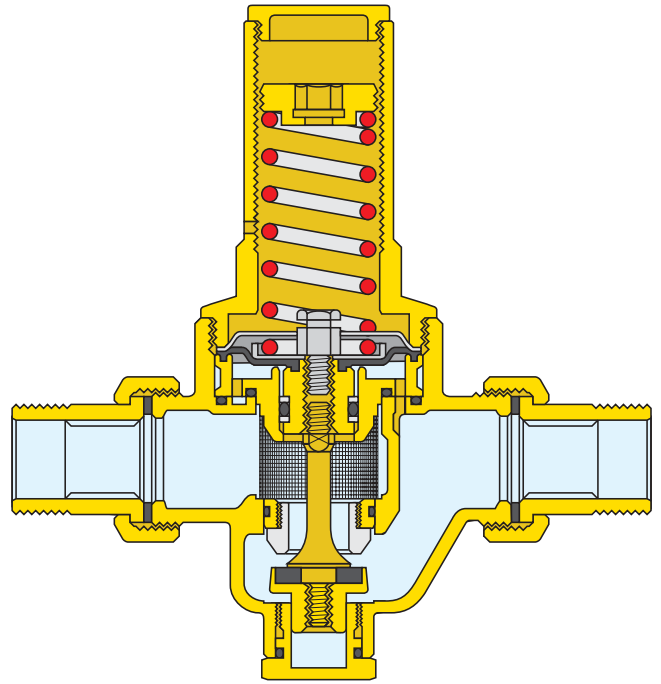
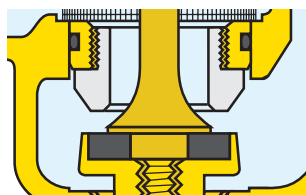
High pressures

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.



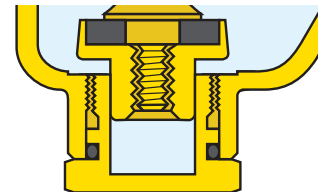
Seat seal

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



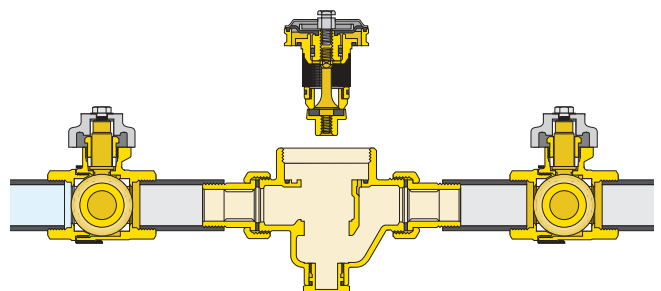
Sliding surfaces

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.



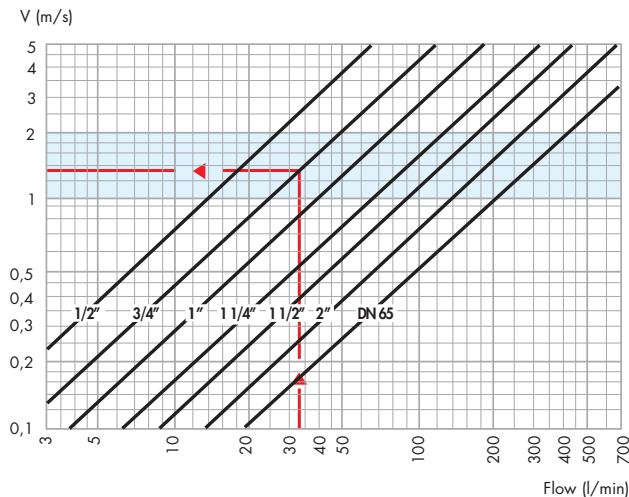
Removable cartridge

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

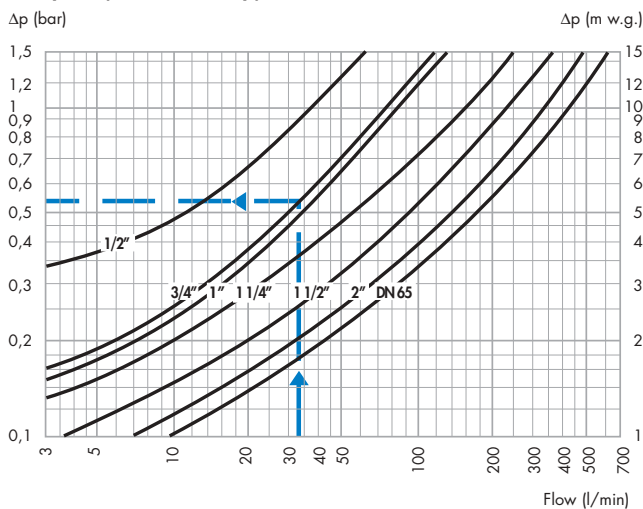


Hydraulic characteristics

Graph 1 (Circulation velocity)



Graph 2 (Pressure drop)



Reference conditions: Pressure upstream = 6 bar
Pressure downstream = 4 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 of typical flow rates

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

In order to prevent over-sizing of the pressure reducer 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 %

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

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:

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	$G = 12 \text{ l/min}$

$$G_{tot} = 81 \text{ l/min}$$

$$\text{No. of devices} = 10$$

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

Example:

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

When sizing pressure reducers, 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 reducer 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 $G_{des} = 33 \text{ l/min}$ 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 $G_{des} = 33 \text{ l/min}$ $\Delta p = 0,55 \text{ bar}$ (see graph 2)

Recommended flow rates

Water flow rates are shown below for each reducer size for a recommended average velocity of 1,5 m/s.

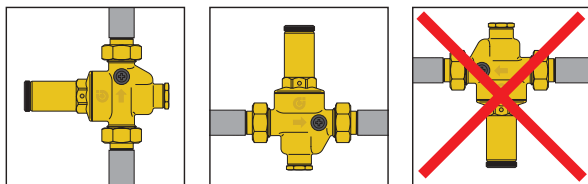
Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	DN 65
Flow (l/min)	20	35	60	90	120	200	300

Compressed air

If the system uses air as well as water, the recommended velocities are between 10 and 20 m/s and the consequent flow rates are around 10 times higher than those calculated for use with water.

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 reducer 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 exagonal 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 reducers 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 reducers.

During the installation of "at risk" systems, the use of specific devices designed to absorb water hammer should be provided for.

Trouble-shooting

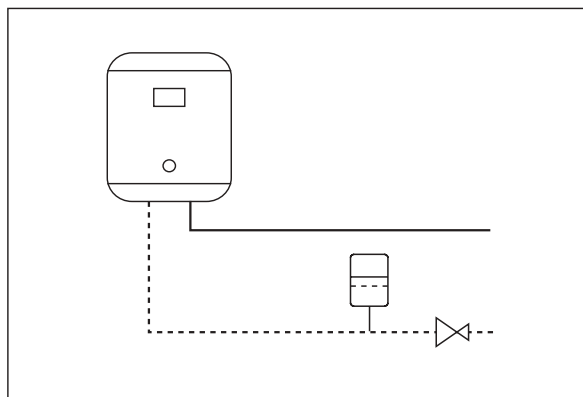
Some faults, which are usually due to the lack of suitable system safeguards, are sometimes incorrectly attributed to pressure reducers. The most frequent cases are:

1. Increased pressure downstream of the reducer 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 reducer is properly closed.

The solution is to install an expansion vessel (between the reducer and the water heater) to "absorb" the pressure increase.



2. The reducer does not maintain the set value

In the majority of cases, this problem arises from the presence of impurities on the seat seal causing leakage and consequent increases in the pressure downstream.

The solution consists of the preventive installation of a filter upstream of the reducer and subsequently of maintenance and cleaning of the removable cartridge (see maintenance).

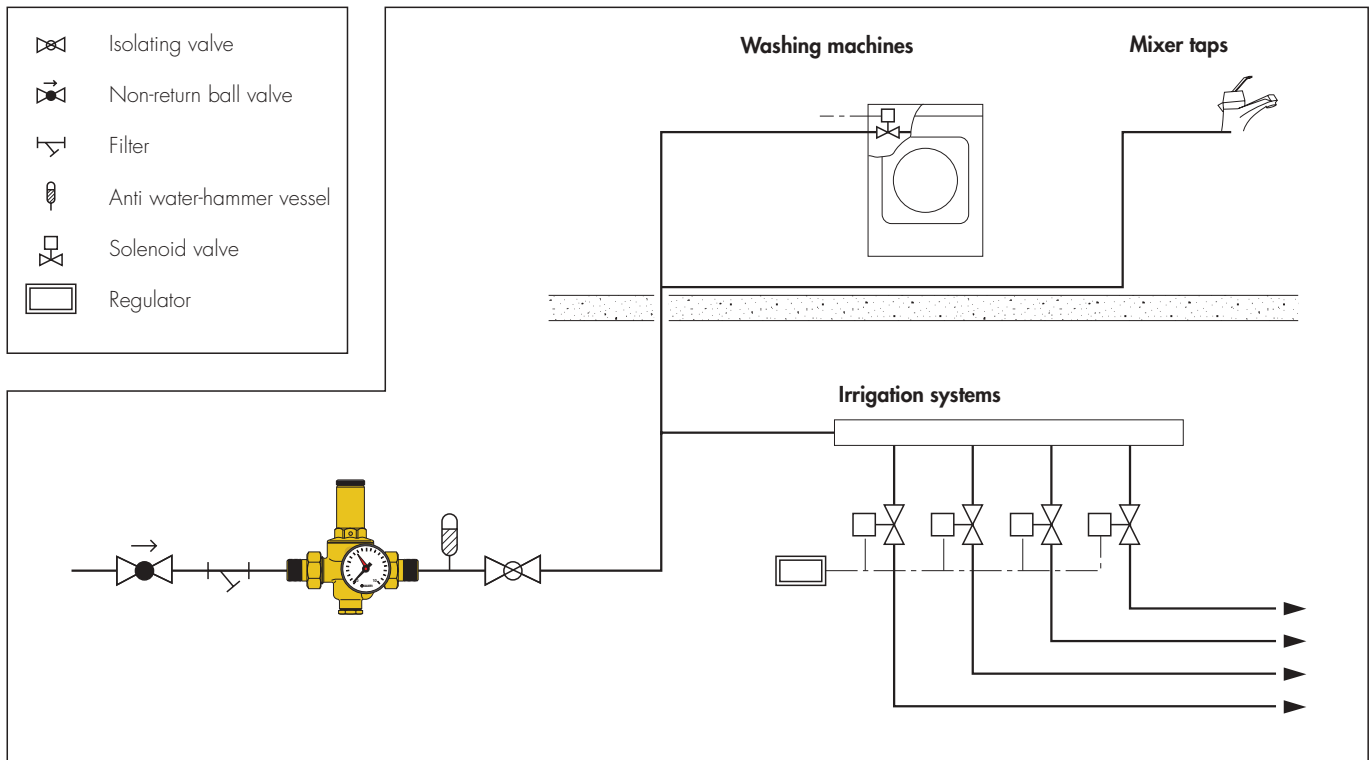
Maintenance

For cleaning, inspection or replacement of the entire cartridge:

- 1 Isolate the reducer.
- 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 reducer.



System application diagram



SPECIFICATION SUMMARIES

Series 5360

Pressure reducer with compensated seat. 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. Max working temperature 70°C. Max pressure upstream 25 bar. Range of pressure setting downstream from 0,5 to 6 bar. Sliding surfaces heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.

Series 5362

Pressure reducer with compensated seat. Threaded connections 1/2" F (from 1/2" to 1"). Brass body. Stainless steel seat and filter. NBR seal and membrane. Max working temperature 70°C. Max pressure upstream 25 bar. Range of pressure setting downstream from 0,5 to 6 bar. Sliding surfaces heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.

Series 5365

Pressure reducer with compensated seat. Threaded connections 1 1/2" M (from 1 1/2" to 2") with union. Brass body. Stainless steel seat and filter. NBR seal and membrane. Max working temperature 70°C. Max pressure upstream 25 bar. Range of pressure setting downstream from 0,5 to 6 bar. Sliding surfaces heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.

Series 5366

Pressure reducer with compensated seat. Flanged connections UNI PN 16 DN 65. Bronze body. Stainless steel seat and filter. NBR seal and membrane. Max working temperature 70°C. Max pressure upstream 16 bar. Range of pressure setting downstream from 0,5 to 6 bar. Supplied with double pressure gauge 0÷25 bar upstream and 0÷10 bar downstream. Sliding surfaces heat-coated with PTFE. Cartridge with membrane, filter and obturator, removable for maintenance operations.