536 Prescal

pressure reducing valves

WRAS APPROVED PRODUCT

altecnic
Caleffi group

536 Prescal pressure reducing valve

Application

Pressure reducing valves are installed in water systems to reduce and stabilise inlet pressures from mains water supplies or boosted water systems, which generally are too high and variable for domestic appliances to function correctly.

The 536 series is specially designed for hot and cold services in semi-commercial or public buildings to equalise either the hot or cold supplies or both and prevent excessive pressure at water outlets such as taps, basins, toilets, dishwashers and other appliances.

Design

The series 536 pressure reducing valves are factory set to maintain 3 bar downstream pressure. The pressure can be adjusted using a 10mm Allen key/screw driver, depending upon size.

The internal cartridge assembly can be easily removed for inspection, cleaning and maintenance operations.

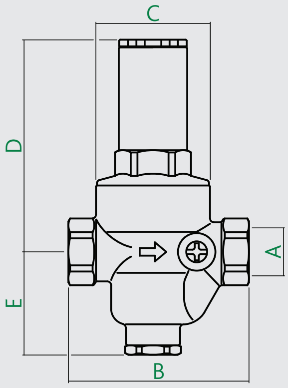
The compensated seat design means that the set downstream pressure remains independent of upstream pressure variations.

An integral filter prevents debris from entering the cartridge, which may affect its performance.

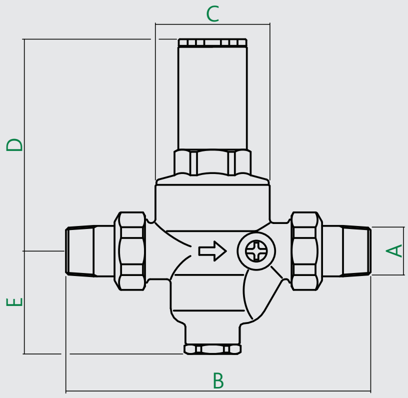
The hydraulic profile of the valve makes it possible to achieve low pressure losses, even when a large number of outlets are open.

Product Code	Size	Connections	Type
536040	½”	screwed iron	M x M - with gauge port
536050	¾”	screwed iron	M x M - with gauge port
536060	1”	screwed iron	M x M - with gauge port
536070	1¼”	screwed iron	M x M - with gauge port
536080	1½”	screwed iron	M x M - with gauge port
536041	½”	screwed iron	M x M - with pressure gauge
536051	¾”	screwed iron	M x M - with pressure gauge
536061	1”	screwed iron	M x M - with pressure gauge
536071	1¼”	screwed iron	M x M - with pressure gauge
536081	1½”	screwed iron	M x M - with pressure gauge
536240	½”	screwed iron	F x F - with gauge port
536250	¾”	screwed iron	F x F - with gauge port
536260	1”	screwed iron	F x F - with gauge port
536241	½”	screwed iron	F x F - with pressure gauge
536251	¾”	screwed iron	F x F - with pressure gauge
536261	1”	screwed iron	F x F - with pressure gauge
536580	1½”	screwed iron	M x M - with double gauges
536590	2”	screwed iron	M x M - with double gauges
536660	DN65	flanged	with double pressure gauges

Dimensions



Prod Code	A	B	C	D	E	kg
536240	G½	81	51	90	54	1.1
536241	G½	81	51	90	54	1.16
536250	G¾	95	60	112	54	1.57
536251	G¾	95	60	112	54	1.62
536260	G1	100	60	112	54	1.58
536261	G1	100	60	112	54	1.63



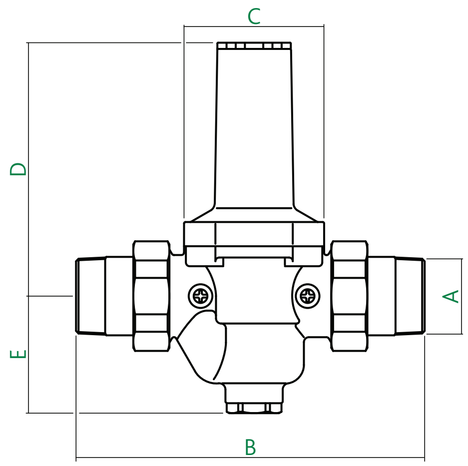
Prod Code	A	B	C	D	E	kg
536040	R½	140	51	90	54	1.25
536041	R½	140	51	90	54	1.30
536050	R¾	160	60	112	54	1.95
536051	R¾	160	60	112	54	2.00
536060	R1	180	60	112	54	1.9
536061	R1	180	60	112	54	1.95
536070	R1¼	200	72	126	63	3.14
536071	R1¼	200	72	126	63	3.20
536080	R1½	220	72	126	63	3.64
536081	R1½	220	72	126	63	3.74

Construction Details

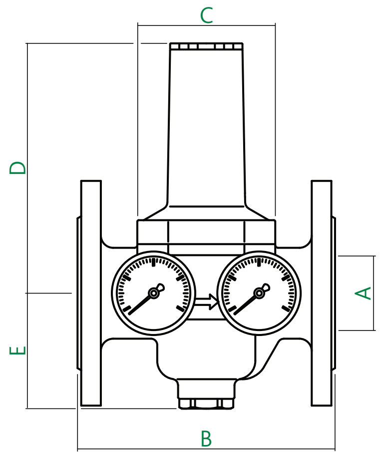
Component	Material	Grade
Body	DZR copper alloy	BS EN 1982 CB752S
Cover	DZR copper alloy	BS EN 12165 CW617N
Seat	Stainless steel	AISI 304
Diaphragm	Elastomer	NBR
Seals	Elastomer	EPDM
Strainer screen	Stainless steel	AISI 304

536 Prescal pressure reducing valve

Dimensions



Prod Code	A	B	C	D	E	kg
536580	R1½	260	110	201	97	9.2
536581	R1½	260	110	201	97	9.3
536590	R2	280	110	204	94	10.4
536591	R2	280	110	204	94	10.5



Prod Code	A	B	C	D	E	kg
536660	DN65	225	110	204	94	14.9
536661	DN65	225	110	204	94	14.9

Construction Details

Component	Material	Grade
Body	Bronze	BS EN 1982 CB499K
Cover	DZR copper alloy	BS EN 1982 CB753S
Seat	Stainless steel	AISI 304
Diaphragm	Elastomer	NBR
Seals	Elastomer	EPDM
Strainer screen	Stainless steel	AISI 304

Technical Data

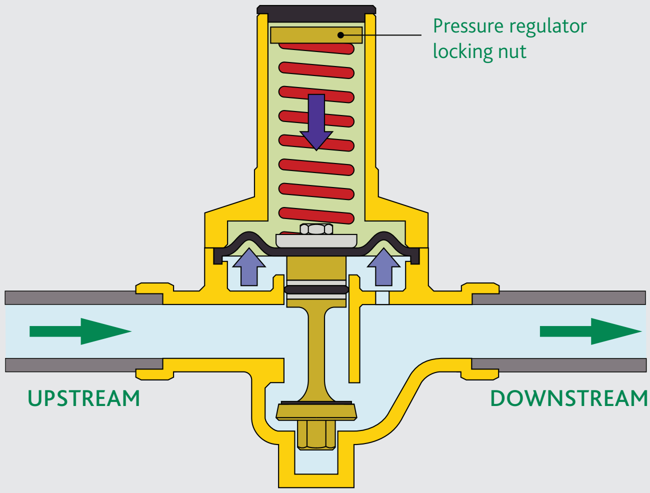
Max. inlet pressure:	25 bar
Outlet pressure setting range:	0.5 to 6 bar
Factory setting:	3 bar
Max. working temperature:	80°C
Pressure gauge range:	0 to 10 bar
Medium:	portable water
Complies with:	BS EN 1567
Acoustic group:	I

Operating Principle

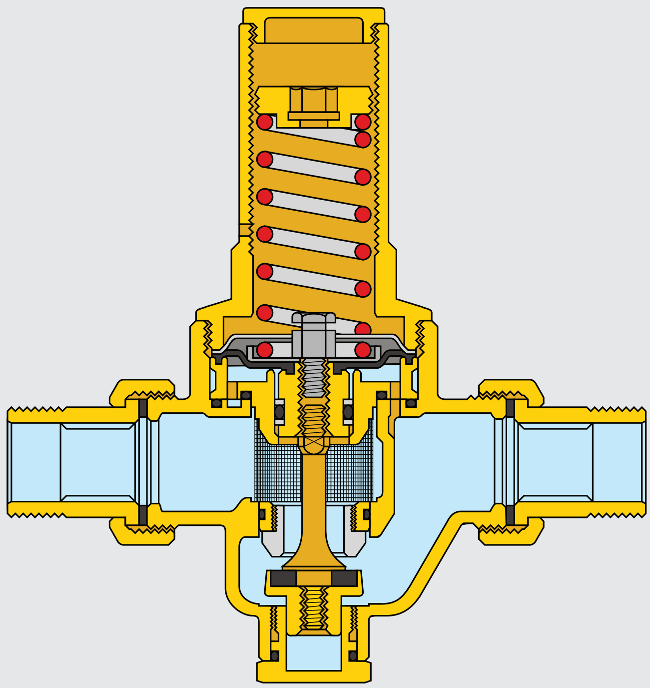
The operation of the pressure reducing valve is based on the balance between two opposing forces:

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

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



Cross Sectional View

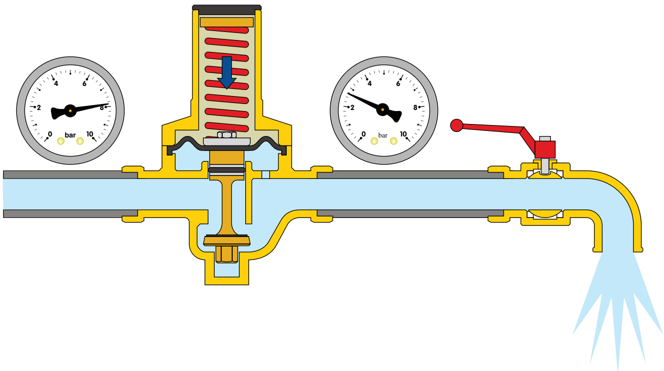


536 Prescal pressure reducing valve

Operation with water flow

When a tap or shower valve is opened, the force of the spring becomes greater than that of the diaphragm; the obturator moves downwards opening the pressure reducing valve to the flow of water.

The greater the demand for water the lower the pressure under the diaphragm with a resulting greater flow of water through the valve.

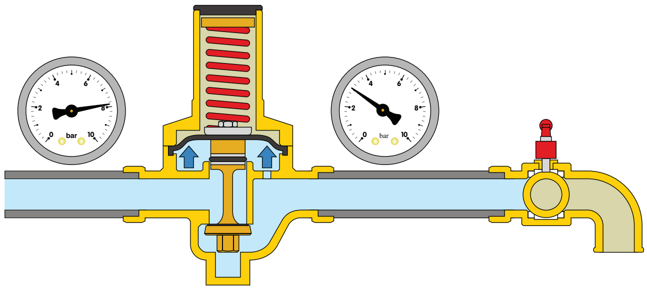


Operation without water flow

When the tap or shower valve 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.



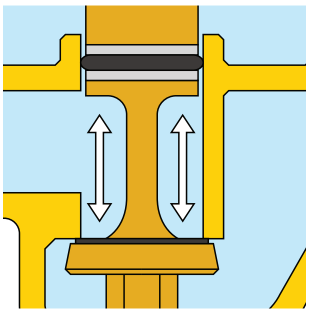
Construction Details

Compensated seat

Altecnic pressure reducing valves are fitted with compensated seats. This means the set pressure value remains constant, regardless of variations in the upstream pressure value.

In the illustration, 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 the obturator one, the two forces cancel each other out.



Silent Operation

The internal structure is designed for optimum fluid-dynamic performance, and achieved noise levels of less than 20 dB in tests. Altecnic 536 series reducing valves are classified in acoustic group I, under the provisions of EN 1567.

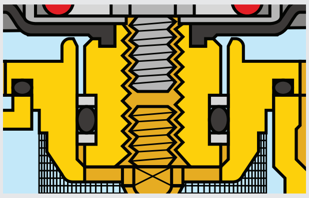
Low headloss

The internal fluid-dynamic shape of the pressure reducing valve allows it to achieve particularly low pressure losses, even if a large number of user outlets are opened.

This feature is important in relation to the high head losses caused by devices such as thermostatic mixing valves, which require the installation of reducing valves to optimise head losses.

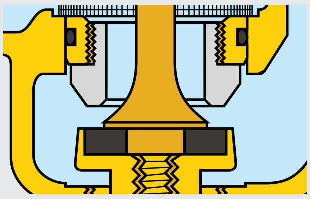
High Pressure

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.



Seat Material

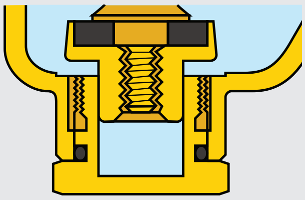
The seat through which the medium flows and on which the obturator operates is made of stainless steel, which ensures that the device maintains its high performance.



Sliding Contact Surfaces

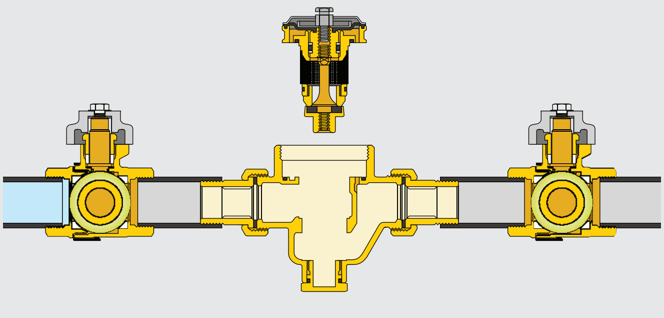
The parts most subject to deterioration as a result of friction from moving parts are PTFE-coated.

This treatment significantly increases the service life of the reducing device.



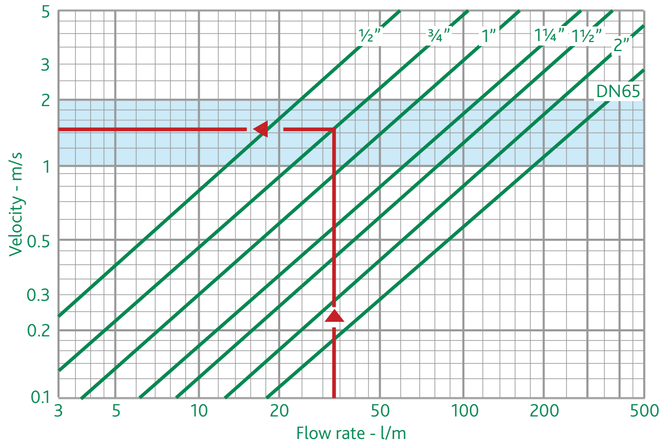
Extractable Cartridge

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

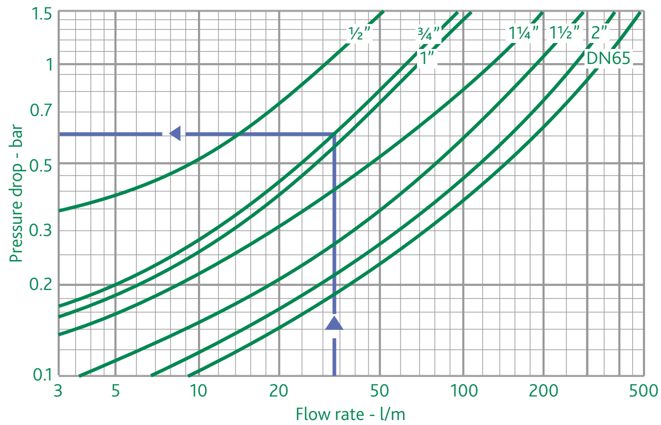


Hydraulic Characteristics

Graph 1 - Water Velocity



Graph 2 - Pressure drop



Reference values: Upstream pressure = 8 bar
Downstream pressure = 3 bar

Sizing

Typical flow rates of outlets commonly used in domestic water systems are shown below, to help in the selection of correct pipe diameters:

Table of typical flow rates

Bathtub, kitchen sink, dish washer	12 l/min
Shower	9 l/min
Wash basin, bidet, washing machine, WC	6 l/min

To prevent over sizing 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 (%)

No of devices	Private dwelling %	Public building %
5	54	64.5
10	41	49.5
15	35	43.5
20	29	37
25	27.5	34.5
30	24.5	32

No of devices	Private dwelling %	Public building %
35	23.2	30
40	21.5	28
45	20.5	27
50	19.5	26
60	18	24
70	17	23

No of devices	Private dwelling %	Public building %
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

Sizing

Correct sizing should take 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	G = 12 l/min
1 bathtub	G = 12 l/min
1 kitchen sink	G = 12 l/min
1 washing machine	G = 12 l/min
No. of devices = 10	G_{tot} = 81 l/min

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

  Example:

  $G_{ds} = G_{tot}$ % = 41% * 81 l/min = 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 as this will prevent noise in the pipes and rapid wear of appliances.

- The correct diameter of the reducing valve is taken from Graph 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_{ds} = 33 l/min, select the 3/4" diameter - see Graph 1.

- The pressure drop is taken from Graph 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_{ds} = 33 l/min   Δp = 0.6 bar - see Graph 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 BS EN 1567.

Size	½"	¾"	1"	1¼"	1½"	2"	DN65
Flow - l/min	21.1	37.8	60	96.6	151.6	233.3	400
Flow - m^3/h	1.27	2.27	3.6	5.8	9.1	14	24

Valve sizing software

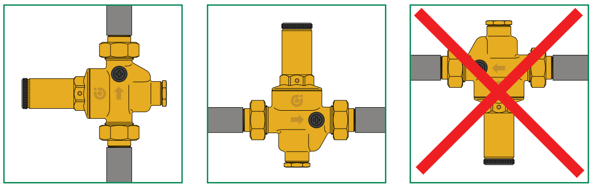
Valve sizing software is available, please contact Altecnic for details.

Installation

1 Install isolation valves upstream and downstream to facilitate future maintenance.

2 Open all the taps before installing the pressure reducing valve, to flush the system and expel any air remaining in the pipes.

3 The pressure reducing valve may be installed on either vertical or horizontal pipes, however, it must not be installed upside down.



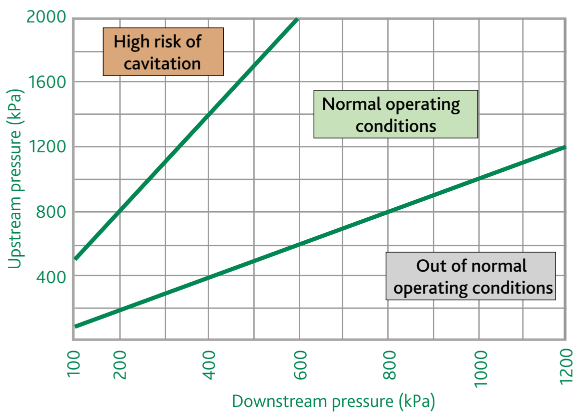
4 Close the downstream shut-off valve.

5 Set the valve 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 6 Read the desired value off the pressure gauge; valves are factory set to 3 bar.

Installation Recommendations

Cavitation diagram



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.

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 system during system 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.

example: first stage pressure reducing valve from 16 to 8 bar and second stage from 8 to 4 bar.

Installation recommendation

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 pipework.

1 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 is difficult
- reading the pressure gauge is difficult.
- impurities may enter the device through the holes designed for the release of the volumetric compression present in the valve.

2 Water hammer

This is one of the main causes of faults in pressure reducing valves.

It is recommended to fit special devices to absorb water hammer when installing in systems where this is likely to occur.

Resolving Problems

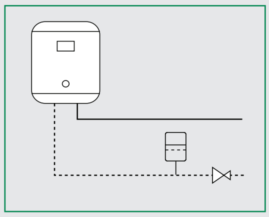
Certain types of fault, which are generally due to faulty design of the system, are often wrongly attributed to pressure reducing valves. The most frequent cases are as follows:

1 Increased downstream pressure in the presence of a water heater

This problem is due to heating of the water caused by the water heater.

There is no relief of the pressure due to the reducing valve being closed.

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



2 The pressure reducing valve does not maintain its calibrated value

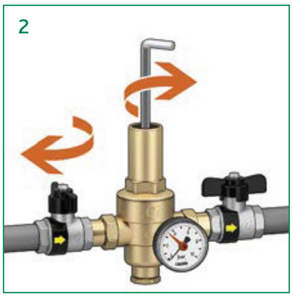
In most cases this is the result of impurities that deposit on the valve seat causing leakage with the resulting increase in pressure downstream.

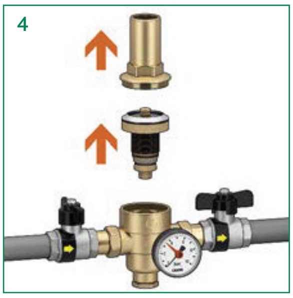
It is advised to carry-out maintenance and clean the removable cartridge (see Maintenance).

Maintenance

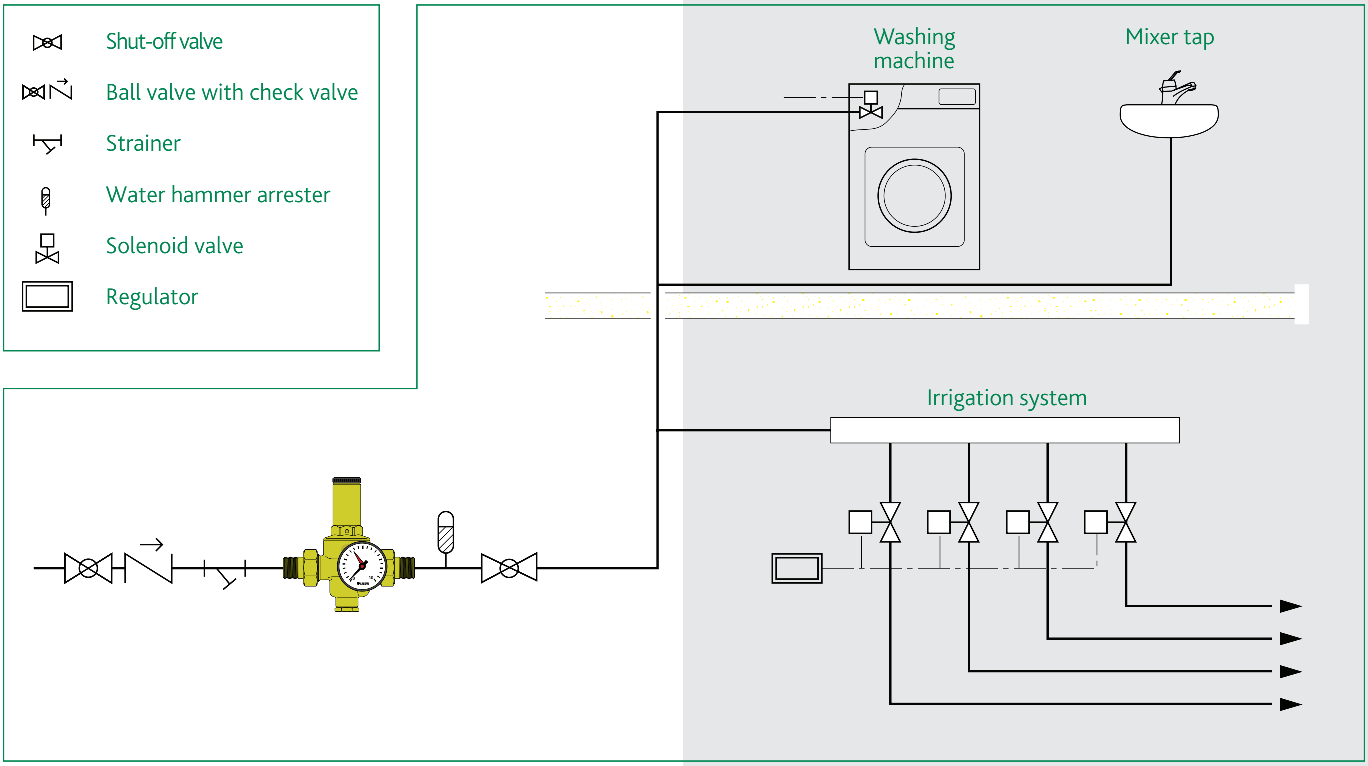
The following steps are necessary for the cleaning, inspection and replacement of the entire cartridge:

1. Isolate the pressure reducing valve.
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-calibrate the reducing valve.





Typical Application



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