Pre-adjustable pressure reducers

series 5350 - 5351

cert. n° 0003 ISO 9001

01085/03 GB

Replaces 01085/02 GB

Function

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

This series of pressure reducers has the special feature of being pre-adjustable. The reducer can thus be set at the required pressure value before installation, by means of an adjustment knob with a pressure setting indicator. After installation, the system pressure will automatically adjust to the set value.

The internal cartridge containing all the regulating components is pre-assembled as a “self-contained unit” to facilitate inspection and maintenance operations.

A version is also available with a high capacity inspectable filter sited in a suitable transparent container. This guarantees a high level of protection for the reducer and the water system from any impurities present in the supply water. The series 5350 and 5351 pressure reducers meet the requirements of the new European Standard EN 1567.

Patent application: **No. MI2001A001592**
No. 188928201

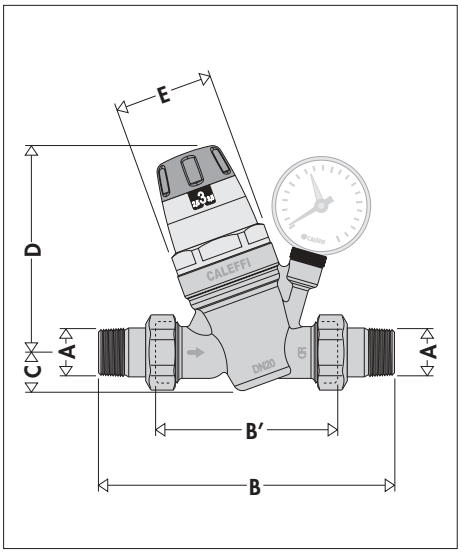
Product range

Series 5350	Pre-adjustable pressure reducer. With pressure gauge	Sizes 1/2” - 3/4” - 1” - 1 1/4” - 1 1/2” - 2” M with unions
Series 5350	Pre-adjustable pressure reducer. With pressure gauge connection	Sizes 1/2” - 3/4” - 1” - 1 1/4” - 1 1/2” - 2” M with unions
Series 5351	Pre-adjustable pressure reducer with inspectable filter. With pressure gauge	Sizes 1/2” - 3/4” - 1” M with unions
Series 5351	Pre-adjustable pressure reducer with inspectable filter. With pressure gauge connection	Sizes 1/2” - 3/4” - 1” M with unions

Technical specifications

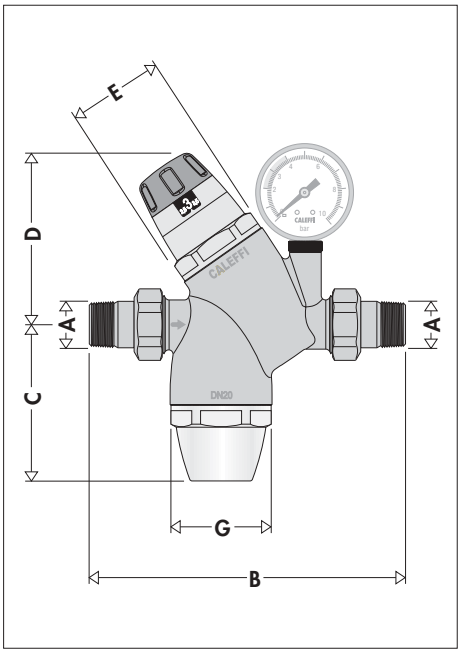
series ⇨	5350	5351
Materials		
Body:	Dezincification resistant alloy CR EN 12165 CW602N	Brass EN 12165 CW617N
Cover:	PA 66 G 30	PA 66 G 30
Control spindle:	Stainless steel	Stainless steel
Moving parts:	Dezincification resistant alloy CR EN 12164 CW602N	Dezincification resistant alloy CR EN 12164 CW602N
Diaphragm:	NBR	NBR
Seals:	NBR	NBR
Filter:	Stainless steel	Stainless steel
Filter container:	-	Transparent PA 12
Performance		
Max. pressure upstream:	25 bar	25 bar
Pressure setting range downstream:	1÷6 bar	1÷6 bar
Factory setting:	3 bar	3 bar
Max. working temperature:	60°C	40°C
Pressure gauge scale:	0÷10 bar	0÷10 bar
Filter mesh size:	0,51 mm	0,28 mm
Medium:	Water	Water
Complies with:	EN 1567	EN 1567
Connections:	1/2”÷2” M with union	1/2”÷1” M with union
Pressure gauge connections:	1/4” F	1/4” F

Dimensions



Code	A	B	B'	C	D	E	Weight (kg)
53504.	1/2"	140	76*	20,5	112	Ø 54	0,92
53505.	3/4"	160	90*	20,5	112	Ø 54	1,06
53506.	1"	180	95*	20,5	112	Ø 54	1,38
53507.	1 1/4"	200	110*	40	178	Ø 73	2,6
53508.	1 1/2"	220	120*	40	178	Ø 73	3,4
53509.	2"	250	130	40	178	Ø 73	4,3

* *Interchangeable with series 5360*



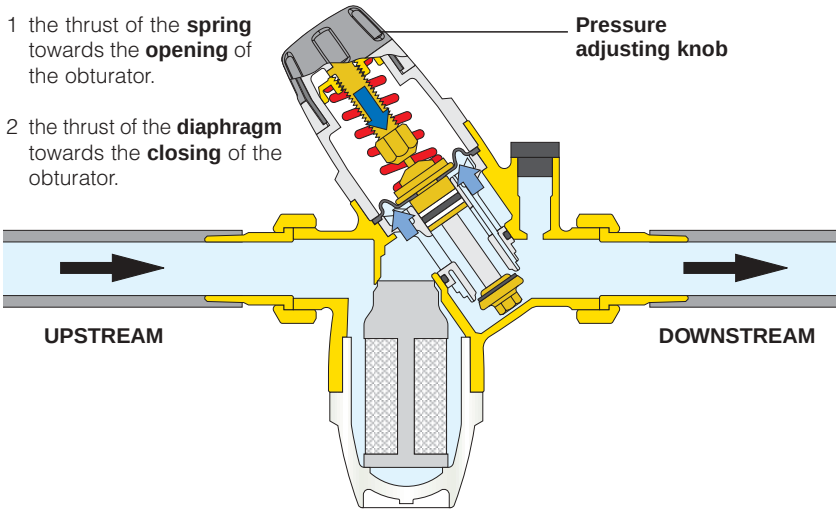
Code	A	B	C	D	E	G	Weight (kg)
53514.	1/2"	169	86,5	100,5	Ø 54	Ø 58	1,50
53515.	3/4"	180	89	98	Ø 54	Ø 58	1,57
53516.	1"	205	88,5	99,5	Ø 54	Ø 58	1,92

Operating principle

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

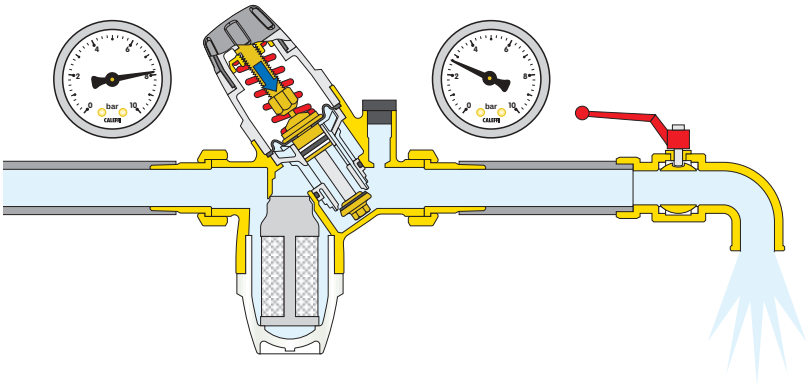
1 the thrust of the **spring** towards the **opening** of the obturator.

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



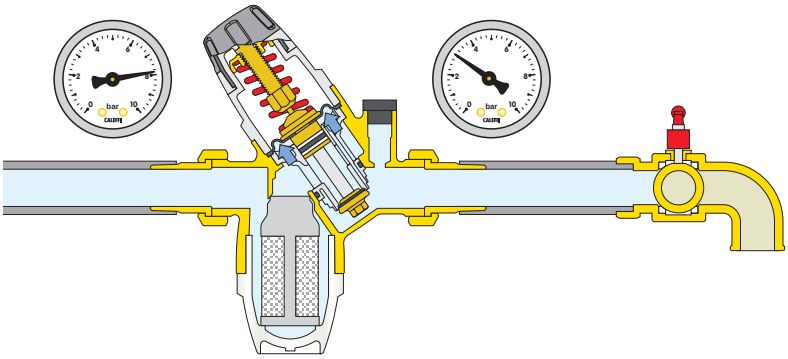
Operating with flow

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



Operating without flow

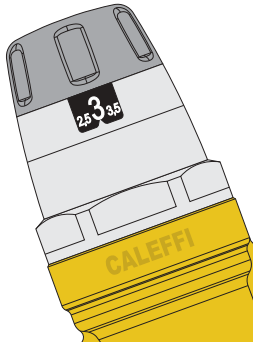
When the supply system is fully closed, the downstream pressure rises and pushes the diaphragm upwards.
The obturator therefore closes, preventing the fluid from passing through and holding the pressure constant at the calibrated value.
The slightest difference in favour of the force exercised by the diaphragm, in relation to that of the spring, causes the device to close.



Constructional details

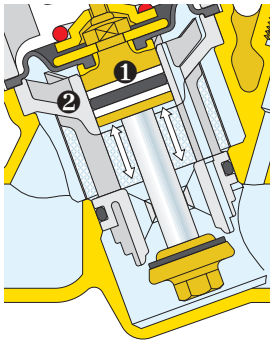
Pre-adjustment

Series 5350 and 5351 pressure reducers are provided with an adjustment knob and a calibration pressure indicator which is visible from both sides. This pressure indicator has an incremental movement, so that the pressure can be adjusted continuously, with the value being displayed at 0,5 bar increments.
The system pressure can thus be pre-set to the required value even before the reducer is installed.



Compensated seat

Caleffi pressure reducers are supplied with compensated seats. This means that the calibrated 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 area equal to that of the obturator, the two forces cancel each other out.



Low pressure loss

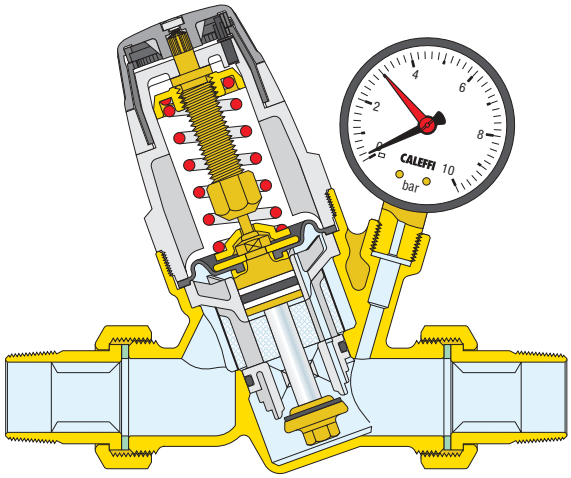
The internal fluid-dynamic shape of the reducers makes it possible to attain low pressure losses, even when a large number of draw-off outlets are open.

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 ❶ on the compensanting piston, the valve can be used in continuous service with upstream pressures of up to 25 bar.

Non-stick materials

The central support assembly ❷, containing the moving parts, is made of a plastic material with a low adhesion coefficient. This solution minimises the possibility of limescale formation, the main cause of eventual malfunctions.

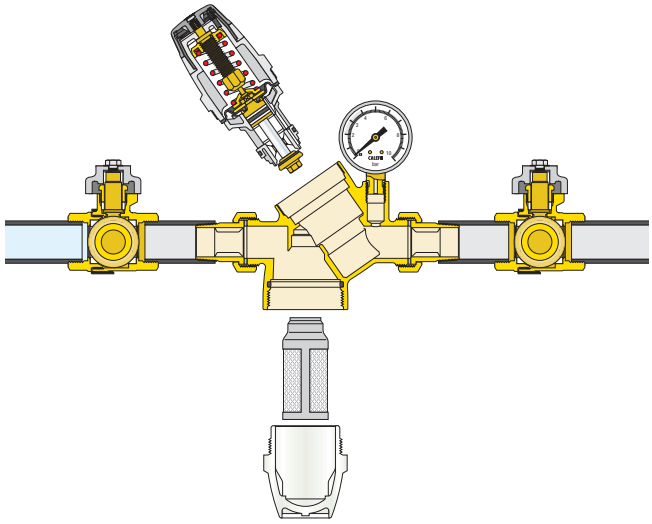


Removable self-contained cartridge

The cartridge, which includes the diaphragm, filter, seat, obturator and compensating piston, is pre-assembled as a “self-contained unit” with the cover, and can easily be removed for inspection and maintenance purposes.

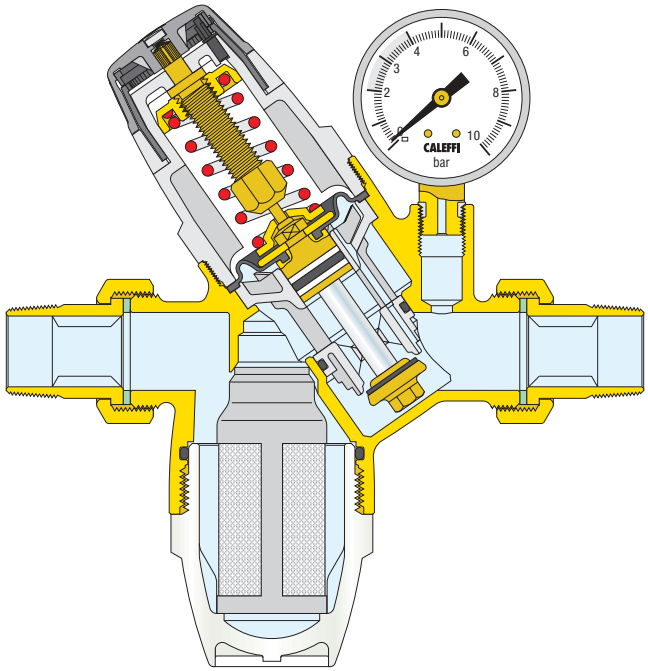
Inspectable filter

The series 5351 pressure reducers have inspectable high capacity filters, sited in a suitable transparent container. This makes it possible to visually check the filter status and, if necessary, carry out inspection and maintenance work.



Pressure gauge

The pressure gauge used with the series 5351 has a stainless steel casing and a connection provided with a PTFE ring, which guarantees the hydraulic seal without the need for any further sealing.

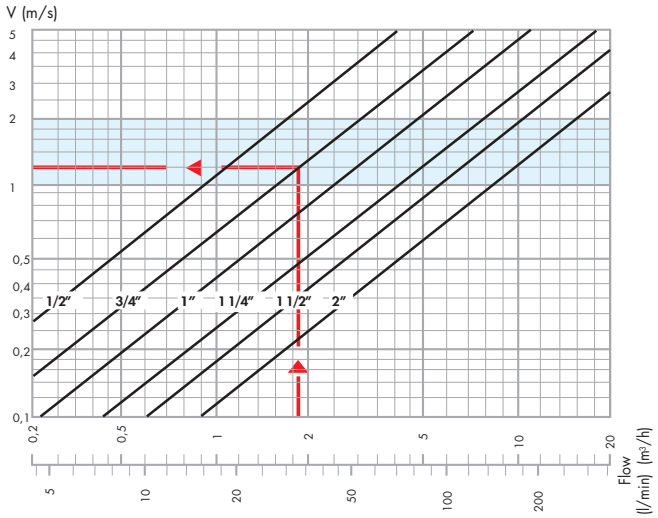


Approval

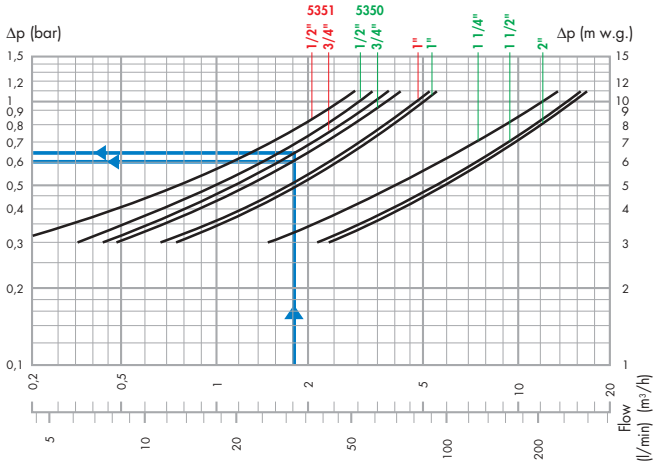
The series 5350 and 5351 pressure reducers meet the requirements of the new European Standard EN 1567, approved by SVGW and DVGW.

Hydraulic characteristics

Graph 1 (Water velocity)



Graph 2 (Pressure drop)



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

Sizing

The typical flow rates of equipment commonly used in domestic 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 outlets in the system, the lower the percentage of draw-off outlets opened at the same time.

Table showing simultaneous-use factors as %

Number 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
35	23,2	30
40	21,5	28
45	20,5	27
50	19,5	26
60	18	24
70	17	23
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

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

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

Example:

Single dwelling 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 bath	*G = 12 l/min*
1 kitchen sink	*G = 12 l/min*
1 dishwasher	*G = 12 l/min*

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

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

Example:

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

When sizing pressure reducers, it is advisable to keep the velocity of flow in the pipes to between 1 and 2 metre/sec. This prevents both noise in the pipework and rapid wear in the point-of-use equipment.

- The size of the reducer is determined by means of graph 1, starting with the design flow figure and bearing in mind that the ideal velocity is between 1 and 2 m/s (blue band).

Example:

for G_{ds} = 33 l/min the 3/4" size 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 calibration pressure).

Example:

for G_{ds} = 33 l/min *for 5350 Δp = 0,60 bar*
for 5351 Δp = 0,65 bar
(see graph 2)

Nominal flow rates

Water flow rates are shown below for each reducer size for a recommended average velocity of 2 m/s to Standard EN 1567.

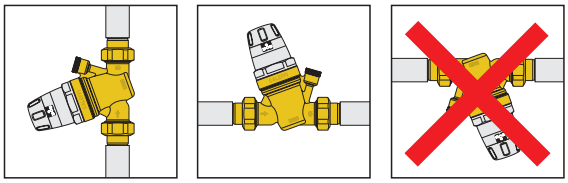
Size	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
Flow rate (m³/h)	1,27	2,27	3,6	5,8	9,1	14
Flow rate (l/min)	21,16	37,83	60,00	96,66	151,66	233,33

Installation

1) Before installing the pressure reducer, open all the draw-off taps to flush the system and expel any air remaining in the pipework.

2) Install shut-off valves upstream and downstream to facilitate future maintenance operations.

3) The pressure reducer can be installed with the pipework either vertical or horizontal.
However, it must not be installed upside down.



4) Close the downstream shut-off valve.

5) This mechanical pre-setting system, with the adjustment knob and pressure indicator visible from both sides, allows the reducer to be calibrated to the required value in the system prior to installation. The pressure indicator has an incremental movement, so that the pressure can be adjusted continuously, with the value being displayed at 0,5 bar increments.

6) Calibrate by means of the adjustment knob on the upper part of the device. The reducers are pre-set at the factory to a pressure of 3 bar.

7) In view of the pre-setting function, the installation of a pressure gauge downstream of the reducer is not essential.

8) After installation, the internal mechanism will automatically adjust the pressure until it reaches the set value.

9) Re-open the downstream shut-off valve slowly.

Installation tips

1. Installation below ground
Installing pressure reducers below ground is not recommended, for three reasons:
- there is a risk of the reducer being damaged by frost;
- inspection and maintenance operations are difficult;
- it is difficult to read the pressure gauge.

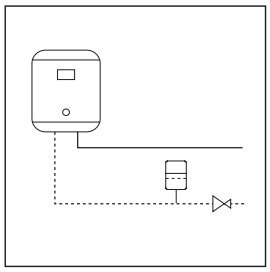
2. Water hammer
This is one of the main causes of failure of pressure reducers.
During the installation of “at risk” systems, the use of specific devices designed to absorb water hammer should be provided for.

Trouble-shooting

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

1. Increased pressure downstream of the reducer when a water heater is installed
This problem is due to the heating of the water caused by the water heater. There is no relief of the pressure, as the reducer is securely 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 calibrated value
In the majority of cases, this problem arises from the presence of impurities on the valve seat causing leakage and consequent increase in the downstream pressure.
It is advised to carry-out maintenance and cleaning of the removable cartridges (see Maintenance).



Maintenance

For inspection, cleaning or replacement of the complete regulating cartridge:

1) Isolate the reducer.

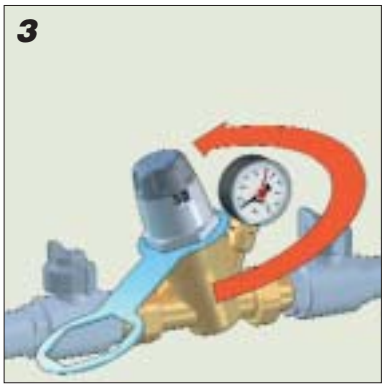
2) The special construction of the regulating unit requires no adjustment of the calibrated pressure, which can be left at the set value.

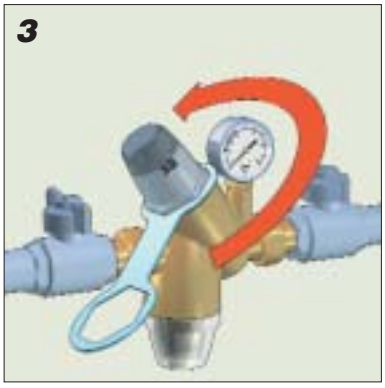
3) Remove the upper cover, using a suitable spanner. The upper cover is integral with the internal regulating cartridge.

4) On series 5350 devices only, carry out the essential operations of checking and cleaning the filter.

5) The whole self-contained cartridge can be refitted or replaced with a spare. When the cartridge is screwed back into the valve body the pressure indication windows will return to the original position.

6) Reopen the shut-off valves. The pressure will return to the original set valve.





Cleaning filter for series 5351

To clean the filter cartridge:

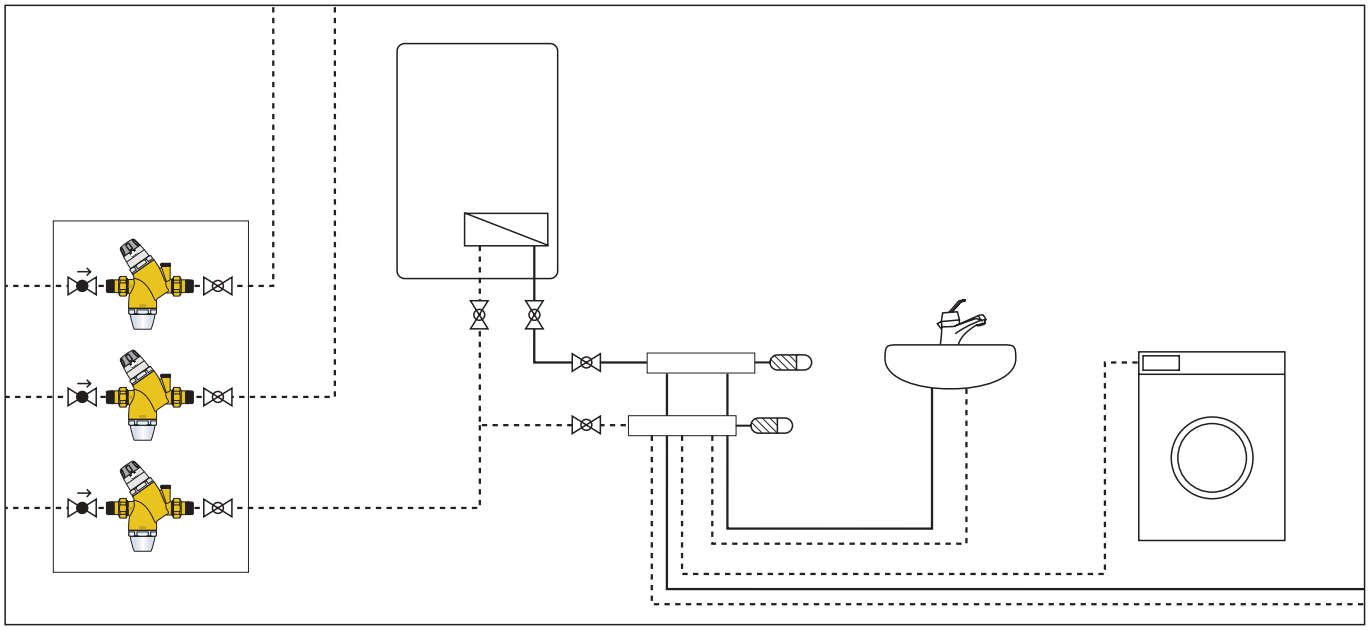
1) Isolate the reducer.

2) Unscrew the transparent container holding the filter cartridge, using the spanner provided.

3) After cleaning, the whole filter cartridge can be refitted or replaced with a spare.

4) Screw the container back on again using the spanner provided, and re-open the shut-off valves.

Application diagram



SPECIFICATION SUMMARIES

Series 5350

Pre-adjustable pressure reducer with compensated seat and self-contained cartridge, to Standard EN 1567. Connections 1/2" M (from 1/2" to 2") with unions. Body and internal moving parts in dezincification-resistant alloy. Cover in PA 66 G 30. Stainless steel filter, mesh size 0,51 mm. Diaphragm and seals NBR. Maximum working temperature 60°C. Maximum upstream pressure 25 bar. Downstream pressure calibration range 1 to 6 bar. Self-contained cartridge removable for maintenance purposes. Complete with: adjustment knob with downstream pressure regulating scale for manual calibration. Pressure gauge with scale 0÷10 bar (version with pressure gauge). Pressure gauge connection 1/4" F (version without pressure gauge).

Series 5351

Pre-adjustable pressure reducer with compensated seat, self-contained cartridge and inspectable filter, to Standard EN 1567. Connections 1/2" M (from 1/2" to 2") with unions. Brass body. Internal moving parts in dezincification-resistant alloy. Cover in PA 66 G 30. Stainless steel filter, mesh size 0,28 mm. Filter container in transparent PA 12. Diaphragm and seals NBR. Maximum working temperature 40°C. Maximum upstream pressure 25 bar. Downstream pressure calibration range 1 to 6 bar. Self-contained cartridge removable for maintenance purposes. Complete with: adjustment knob with downstream pressure regulating scale for manual calibration. Pressure gauge with scale 0÷10 bar (version with pressure gauge). Pressure gauge connection 1/4" F (version without pressure gauge).

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