

# Inclined pressure reducing valves



01252/17 GB

replaces 01252/15 GB

## 533..H series



### Function

Pressure reducing valves are installed in residential water systems to reduce and stabilise inlet pressure from the water supply network which is generally too high and variable for domestic systems to work properly.

The 533..H series was designed for small systems, such as apartments, and to protect water storages, where size and lack of noise are important aspects.

This specific series of pressure reducing valves is certified according to the EN 1567 standard for operating with inlet water temperatures of up to 80°C.

Code

533241H	1/2"	1	20
533251H	3/4"	1	20



### Product range

5332..H series Inclined pressure reducing valve with pressure gauge

sizes DN 15 (1/2") and DN 20 (3/4")

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#### Materials

Body:	
- 5330..H, 5332..H, 5334..H series:	brass
	EN 12165 CW617N, chrome plated
- 5332..H LTC, 5334..H LTC, 5336..H, 5337..H, 5338..H series:	dezincification resistant alloy <b>CR</b>
	EN 12165 CW602N, chromeplated
- 5331..H series:	dezincification resistant alloy <b>CR</b>
	EN 12165 CW602N
Cover:	PA6G30
Control stem:	stainless steel EN 10088-3 (AISI 303)
Spring:	stainless steel EN 10270-1
Cartridge:	PPSG40
Internal component:	PSU
Obturator support:	dezincification resistant alloy <b>CR</b>
	EN 12164 CW724R
Diaphragm:	EPDM
Seals:	EPDM
Strainer:	stainless steel EN 10088-2 (AISI 304)

### Performance

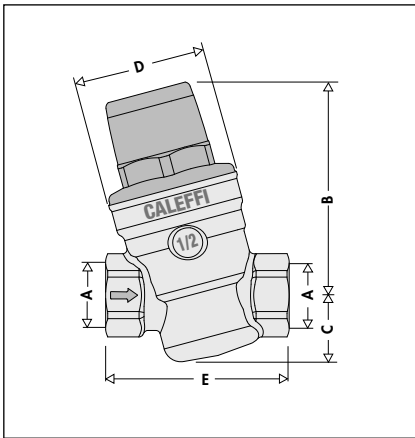
Maximum upstream pressure:	16 bar
Downstream pressure setting range:	1–5,5 bar
Factory setting:	3 bar
	(5331..H series) 3,5 bar
Maximum working temperature:	80°C
Pressure gauge scale:	0–10 bar
Medium:	water
Certification:	EN 1567
Acoustic group:	II (DN 15)

### Connections

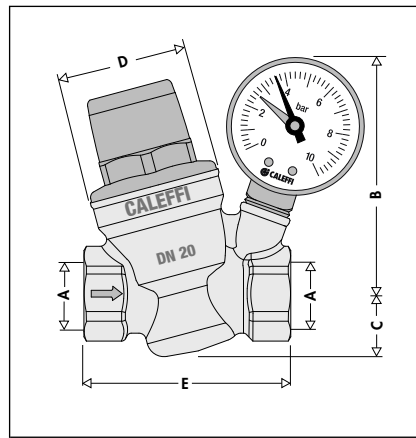
Main connections:	
- 5330..H:	1/2" - 3/4" F (ISO 228-1)
- 5331..H:	3/4" F (ISO 228-1) with nut x Ø 22 for copper pipe
- 5332..H:	1/2" - 3/4" F (ISO 228-1)
- 5332..H LTC:	1/2" - 3/4" F (ISO 228-1)
- 5334..H:	1/2" - 1" F (ISO 228-1)
- 5334..H LTC:	1/2" - 1" F (ISO 228-1)
- 5336..H:	Ø15 - Ø 22 for copper pipe
- 5337..H:	Ø15 - Ø 28 for copper pipe
- 5338..H:	Ø15 - Ø 28 for copper pipe

Pressure gauge connection: 1/4" F (ISO 228-1)

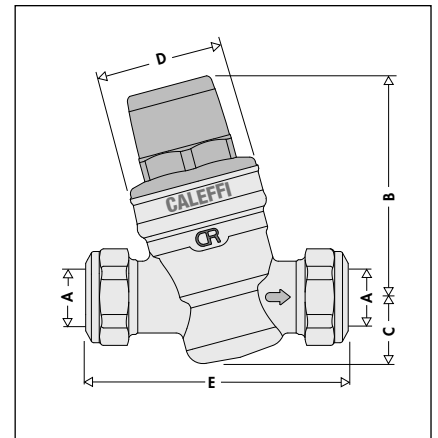
## Dimensions



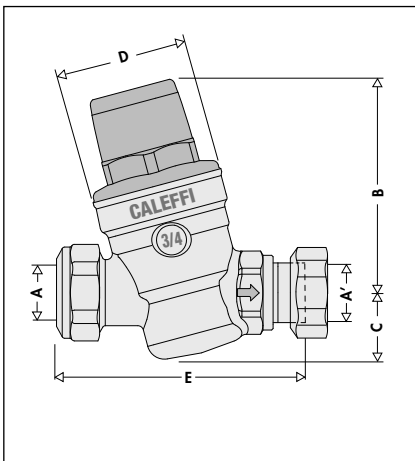
Code	DN	A	B	C	D	E	Mass (kg)
533041H	15	1/2"	74,5	23	∅ 46	64	0,39
533051H	20	3/4"	74,5	23	∅ 46	66	0,41



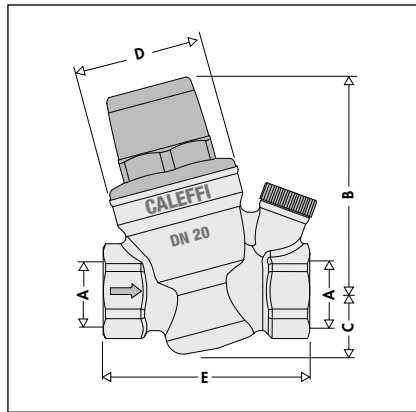
Code	DN	A	B	C	D	E	Mass (kg)
533241H LTC	15	1/2"	86	22	∅ 46	70	0,46
533251H LTC	20	3/4"	86	22	∅ 46	72	0,47



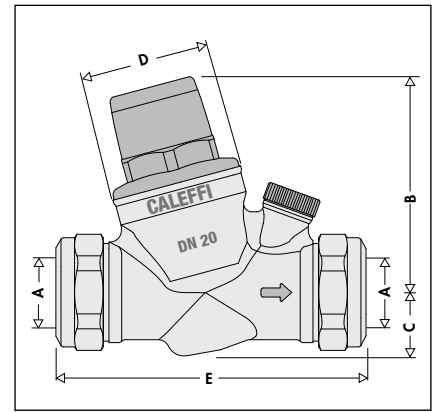
Code	DN	A	B	C	D	E	Mass (kg)
533641H	15	∅ 15	74,5	23	∅ 46	84	0,41
533651H	20	∅ 22	74,5	23	∅ 46	94	0,45



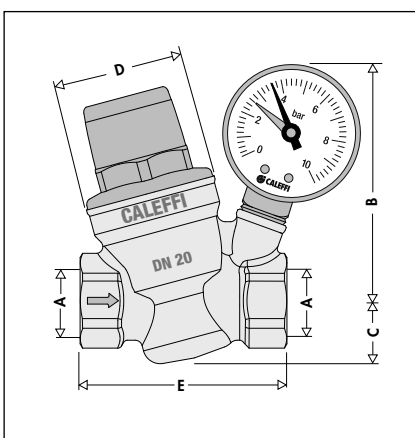
Code	DN	A	A'	B	C	D	E	Mass (kg)
533159H	20	∅ 22	∅ 22	74,5	23	∅ 46	84,5	0,46



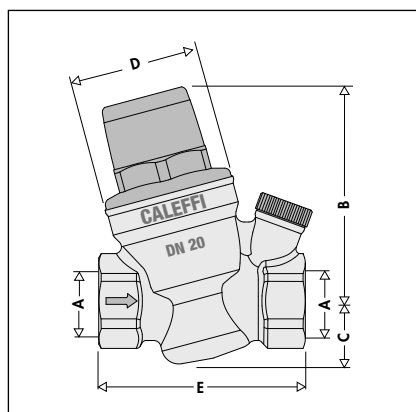
Code	DN	A	B	C	D	E	Mass (kg)
533441H	15	1/2"	74,5	22	∅ 46	70	0,40
533451H	20	3/4"	74,5	22	∅ 46	72	0,41
533461H	20	1"	74,5	22	∅ 46	87	0,56



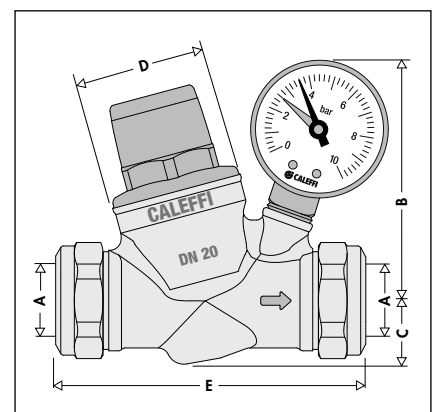
Code	DN	A	B	C	D	E	Mass (kg)
533741H	15	∅ 15	74,5	22	∅ 46	100	0,41
533751H	20	∅ 22	74,5	22	∅ 46	109	0,46
533761H	20	∅ 28	74,5	22	∅ 46	115	0,56



Code	DN	A	B	C	D	E	Mass (kg)
533241H	15	1/2"	86	22	∅ 46	70	0,46
533251H	20	3/4"	86	22	∅ 46	72	0,47



Code	DN	A	B	C	D	E	Mass (kg)
533441H LTC	15	1/2"	74,5	22	∅ 46	70	0,40
533451H LTC	20	3/4"	74,5	22	∅ 46	72	0,41
533461H LTC	20	1"	74,5	22	∅ 46	87	0,56

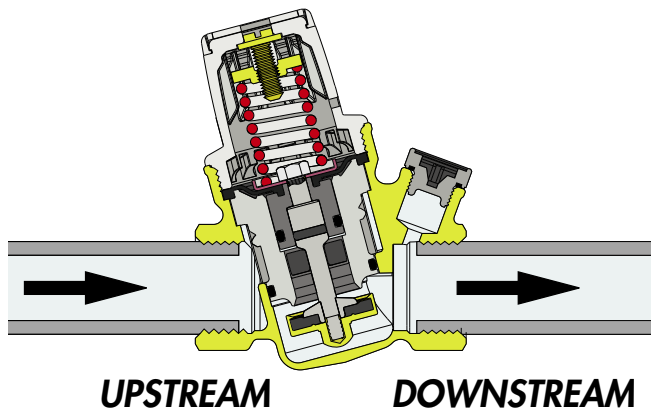


Code	DN	A	B	C	D	E	Mass (kg)
533841H	15	∅ 15	86	22	∅ 46	100	0,50
533851H	20	∅ 22	86	22	∅ 46	109	0,52
533861H	20	∅ 28	86	22	∅ 46	115	0,61

## Operating principle

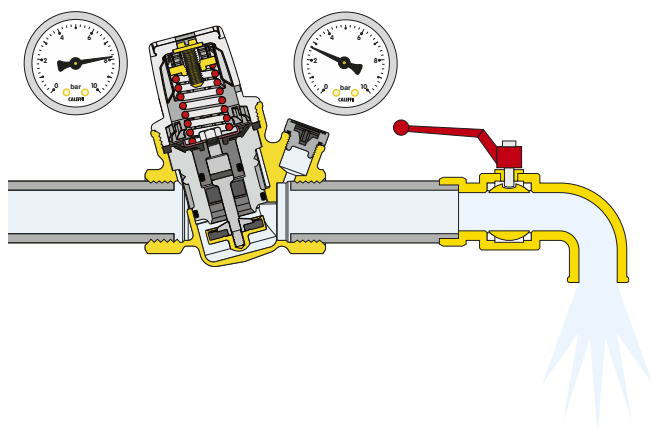
The operation of the pressure reducing valve is based on the balance between two opposing forces:

- 1 the thrust of the spring to open the flow passage cross section.
- 2 the thrust of the diaphragm to close the flow passage cross section.



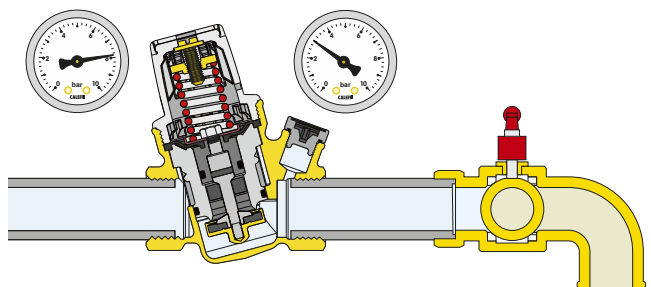
### Operation with water flow

When a draw-off outlet is opened, the force of the spring prevails over that of the diaphragm; the obturator moves downwards, thereby opening the valve to the flow of water. The greater the demand for water the lower the pressure under the diaphragm, resulting in a greater flow of water through the passage cross section..



### Operation without water flow

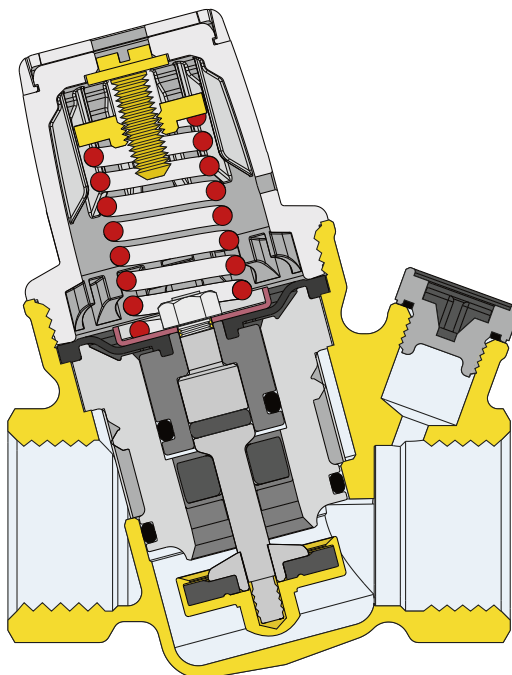
When the draw-off outlet is closed, the downstream pressure rises and pushes the diaphragm upwards. As a result, the obturator closes the passage cross section to the flow of water and keeps the pressure constant at the setting value. The slightest difference in favour of the force exercised by the diaphragm over that of the spring causes the device to close.



## Construction details

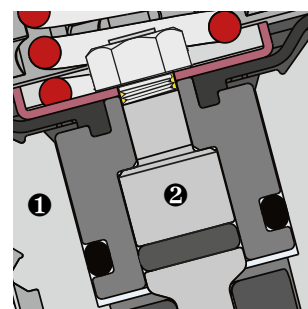
### Contoured diaphragm

The diaphragm was designed with a special shape to allow for accurate regulation in relation to changes in the downstream pressure. This design feature also extends the valve life as the



### Non-stick materials

The central support ❶, which contains the moving parts is made of a plastic material with a low coefficient of adhesion. This solution reduces the potential build-up of scale deposits, the main cause of malfunctions.

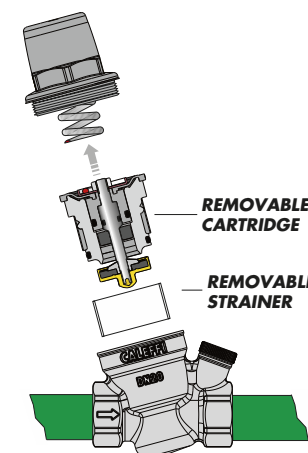


### Stainless steel stem

The stainless steel stem ❷ helps to minimise the typical problems linked to the use of hard and aggressive water.

### Removable cartridge

The cartridges mounted on 533...H series pressure reducing valves can be removed for periodic cleaning and maintenance.



### Compact dimensions

The "inclined" design guarantees compact dimensions making the 533...H series reducing valves easy to fit, especially in domestic systems.

## Certifications

The pressure reducing valves are certified according to the EN 1567 standard, making them suitable for use with hot water up to 80°C. Moreover, depending on the model, they comply with WRAS specifications (United Kingdom) and ACS specifications (France).

## Hydraulic characteristics

Diagram 1 (Water velocity)

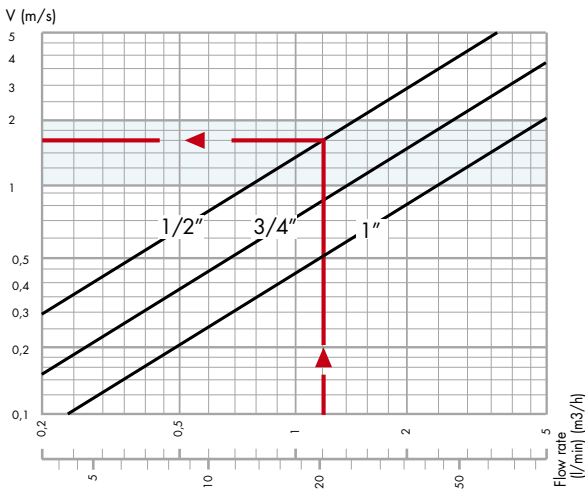
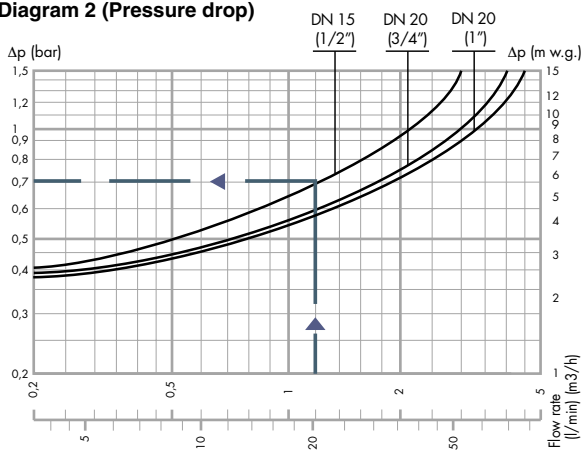


Diagram 2 (Pressure drop)



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

### Sizing the valve

NOTE: the following criterion makes it possible to size the pressure reducing valves by using a fast method of calculating the design flow rate. For a detailed sizing of the domestic water network with design flow rate calculation, please refer to applicable national regulations.

The flow rates of commonly used appliances in hydraulic and domestic water systems are indicated below to facilitate selection of the correct valve diameter:

Table of typical flow rates

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

The simultaneous-use factor must be taken into account to avoid selecting a valve or pipes that are too large. Basically, the fewer people using the system, the lower the percentage of appliances being used at the same time.

Table of simultaneous-use factor values (%)

No. of appliances	Residential %	Community %	No. of appliances	Residential %	Community %	No. of appliances	Residential %	Community %
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 following steps are necessary for selecting the correct dimensions:

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

Example:

One household with 1 bathroom

1 bidet	G = 6 l/min
1 shower	G = 9 l/min
1 wash basin	G = 6 l/min
1 wc with cistern	G = 6 l/min
1 kitchen sink	G = 12 l/min
1 washing machine	G = 12 l/min

$G_{tot} = 51 \text{ l/min}$   
No. of appliances = 6

- The design flow rate is calculated from the table of coefficients of simultaneity (using that for 10 appliances).

Example:

$$G_{pr} = G_{tot} \cdot \% = 51 \cdot 41 \% = 21 \text{ l/min}$$

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

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

Example:

for  $G_{ds} = 21 \text{ l/min}$  select diameter 1/2"

(see indications 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  $G_{pr} = 21 \text{ l/min}$  1/2"  $\Delta p = 0,7 \text{ bar}$

(see indications on diagram 2)

### Recommended flow rates

For an average flow velocity of 2 m/s, the maximum flow rates for each diameter, according to EN 1567, are as follows:

Ø	DN 15 (1/2" - Ø 15)	DN 20 (3/4" - 1" - Ø 22 - Ø 28)
G (m³/h)	1,27	2,27
G (l/min)	21,16	37,83

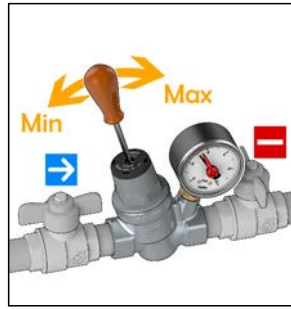


Sizing software is available on  
[www.caleffi.com](http://www.caleffi.com)  
Apple Store and Google play.

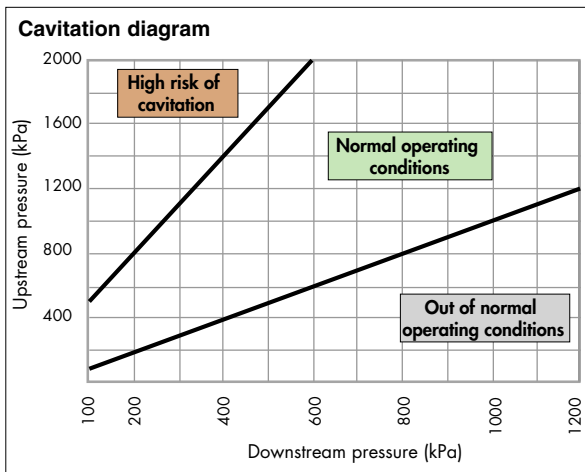
## Setting

The device can be set by acting on the screw on top of the plastic cover. Turn it clockwise to increase the pressure and anticlockwise to decrease it.

Adjust until the correct pressure appears on the 533...H series pressure reducing valves are factory set to 3 bar. (3,5 bar for 5331H series).



## 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.

### 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 casing.

### 2. Water hammer

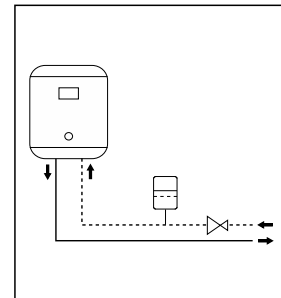
This is one of the main causes of faults in pressure reducing valves. It is advisable to fit special devices to absorb water hammer effects when installing pressure reducing valves in systems at risk.

## Troubleshooting

Certain types of faults, which are generally due to improper design of the system, are often wrongly attributed to the pressure reducing valve. The most frequent cases are the following:

### 1. Increased downstream pressure in the presence of a water heater

This problem is due to overheating of the water caused by the water heater. The pressure is not relieved because the pressure reducing valve is rightly closed. The solution is to install an expansion vessel (between the water heater and the reducing valve) to "absorb" the pressure increase.

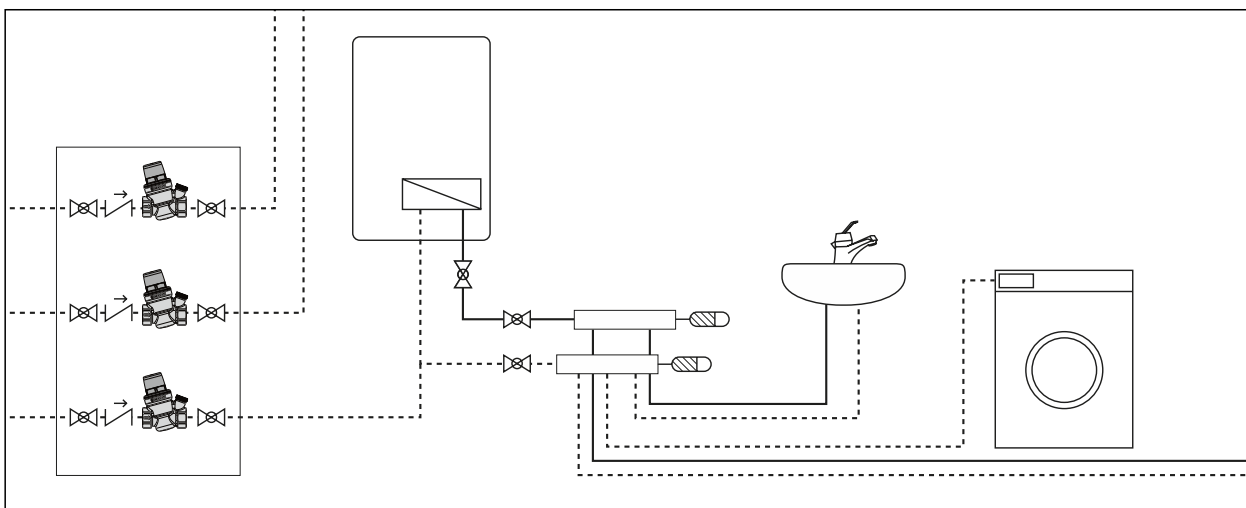


### 2. The pressure reducing valve does not maintain its setting value

In most cases this is caused by impurities that deposit on the valve's seal seats causing leakage and a resulting increase in downstream pressure.

The preventive solution is to mount a strainer upstream of the reducing valve and, subsequently, to maintain and clean the removable cartridge.

## Application diagram



## SPECIFICATION SUMMARY

### **5332..H series**

Inclined pressure reducing valve with pressure gauge. Size DN 15 (DN 15 and DN 20). Threaded connections 1/2" (from 1/2" and 3/4") F (ISO 228-1). Pressure gauge connection 1/4" F. Brass body. Chrome plated. Stainless steel control stem. PA6G30 cover. EPDM diaphragm and seals. Maximum working temperature 80°C. Maximum upstream pressure 16 bar. Downstream pressure setting range from 1 to 5,5 bar. Extractable cartridge and strainer for maintenance operations.

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