535H

high performance pressure reducing valve

WRAS APPROVED PRODUCT

altecnic
Caleffi group

535H high performance pressure reducing valve

Application

Pressure reducing valves are installed in residential 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 535H series is specially designed for hot and cold services in houses or apartments to equalise the hot or cold water supplies or both and prevent excessive pressure at outlets such as taps and showers.

Design

535H pressure reducing valve benefits from a pre-adjustment feature.

The valve can be set to the desired outlet pressure before installation using the adjustment knob with pressure setting indicator.

After installation the outlet pressure will automatically adjust itself to the selected value.

The control stem housing of the cartridge is made from a plastic material with a low co-efficient of adhesion, which reduces the probability of scale deposits forming, the main cause of pressure reducing valve malfunction.

The cartridge and strainer screen are easily removed for periodic cleaning and maintenance.

The 535H series of pressure reducing valve is certified according to BS EN 1567 for operating with inlet water temperatures up to 80°C.

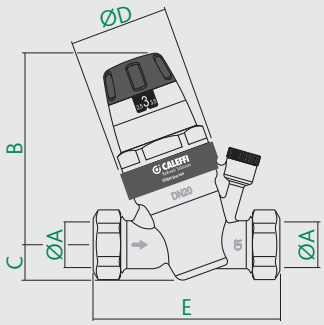
The 535H is specifically designed for higher flow rates with a low noise level when operating.

Supplied with tapered male union ends complying with BS EN 10226-1 or for use with copper tube have compression ends complying with BS EN 1254-2*.

Connection for pressure gauge ¼" female to BS EN ISO 228-1.

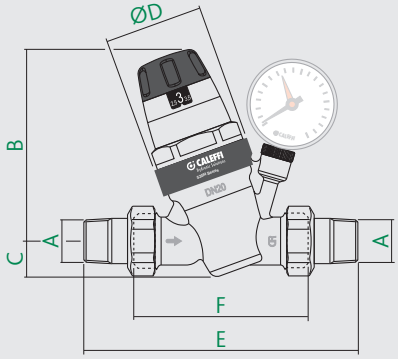
Product Code	Size	Connection	Type
535015H	15mm	compression	Cu x Cu with gauge port
535022H	22mm	compression	Cu x Cu with gauge port
535028H	28mm	compression	Cu x Cu with gauge port
535040H	½"	screwed iron	M x M - with gauge port
535041H	½"	screwed iron	M x M - with pressure gauge
535050H	¾"	screwed iron	M x M - with gauge port
535051H	¾"	screwed iron	M x M - with pressure gauge
535060H	1"	screwed iron	M x M - with gauge port
535061H	1"	screwed iron	M x M - with pressure gauge
535070H	1¼"	screwed iron	M x M - with gauge port
535071H	1¼"	screwed iron	M x M - with pressure gauge
535080H	1½"	screwed iron	M x M - with gauge port
535081H	1½"	screwed iron	M x M - with pressure gauge
535090H	2"	screwed iron	M x M - with gauge port
535091H	2"	screwed iron	M x M - with pressure gauge

Dimensions
Compression Ends



Prod Code	A	B	C	D	E	kg
535015H	Ø15	115	20.5	60	101	0.69
535022H	Ø22	115	20.5	60	109	0.74
535028H	Ø28	115	20.5	60	115	0.79

Dimensions
Threaded Ends



Prod Code	A	B	C	D	E	F	kg
535040H 535041H	R½	115	20.5	60	140	76	0.86 0.96
535050H 535051H	R¾	115	20.5	60	160	90	1.02 1.12
535060H 535061H	R1	115	20.5	60	180	95	1.31 1.41
535070H 535071H	R1¼	178	40	78	200	110	2.78 2.88
535080H 535081H	R1½	178	40	78	220	120	3.30 3.40
535090H 535091H	R2	178	40	78	250	130	4.41 4.51

* Use with R250 (half hard) copper tube

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Construction Details

Component	Material	Grade
Body	DZR chrome plated	BS EN 12165 CW724R
Cover	Nylon	PA 66M40/1
Control stem	Stainless steel	AISI 303
Cartridge	Polymer	PPSG40
Moving components	DZR	BS EN 12165 CW724R
Diaphragm	EPDM	
Seals	EPDM	
Strainer screen	Stainless steel	AISI 304

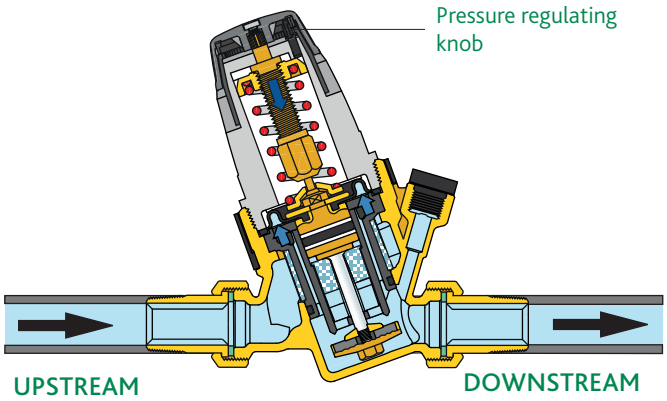
Technical Data

Max inlet pressure:		16 bar
Outlet pressure setting range:		1 to 6 bar
Factory setting:		3 bar
Max working temperature:		80˚C
Pressure gauge scale:		0 to 10 bar
Pressure gauge connection:		G1/4
Strainer mesh size:	½”&15 to 1” & 28	0.51 mm
	1¼” to 2”	0.65 mm
Medium:		potable water
Certification:		BS EN 1567
Acoustic group:	½”&15 to 1” & 28	II
WRAS approved product:		Yes

Operating Principles

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

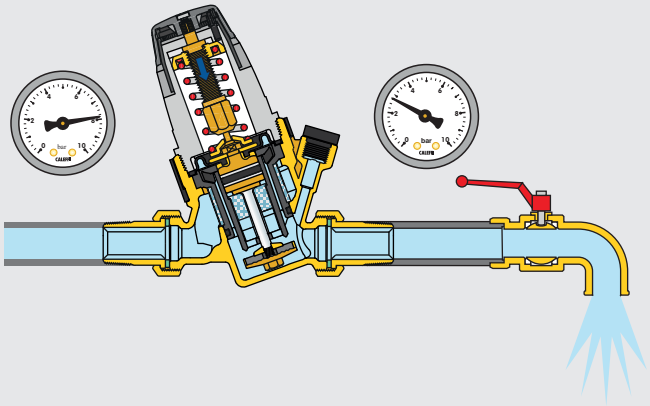
1. The thrust of the spring to open the flow passage by moving the obturator away from its seat.
2. The thrust of the diaphragm to close the flow passage to reseat the obturator.



Operation with water flow

When a draw-off outlet is opened, the force of the spring becomes greater than 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 valve.

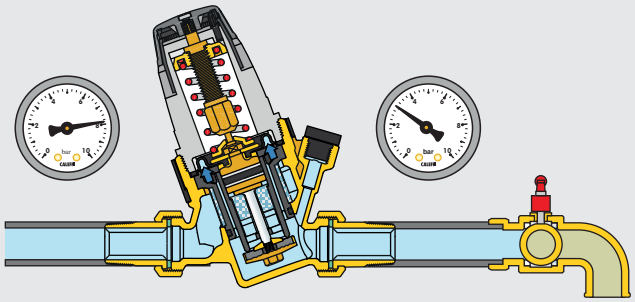


Operation without water flow

When the draw-off outlet is closed, the downstream pressure rises and pushes the diaphragm upwards.

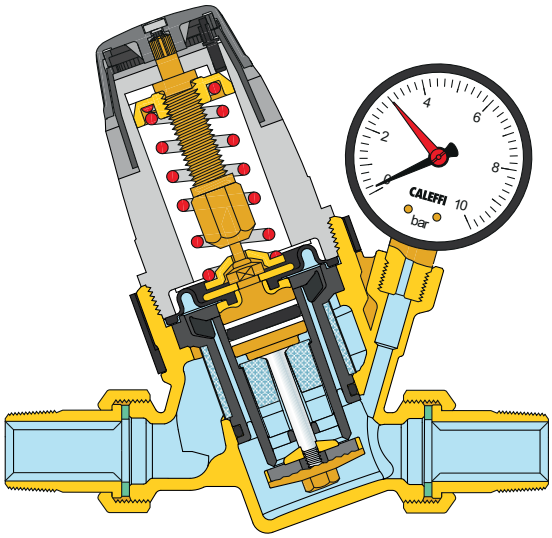
As a result, the obturator closes the valve to the flow of water and keeps the pressure constant at the setting value.

The slightest difference in favour of the force exercised by the diaphragm over that of the spring causes the valve to close.



535H high performance pressure reducing valve

Construction Details



Pre-adjustment

Pressure reducing valves in the 535H series are fitted with an operating knob and a pressure setting indicator which is visible on both sides.

This pressure indicator features incremental step operation, therefore the pressure can be adjusted continuously with the value displayed at 0.5 bar increments.

The system pressure can therefore be pre-set to the desired value, even before the pressure reducing valve is installed.

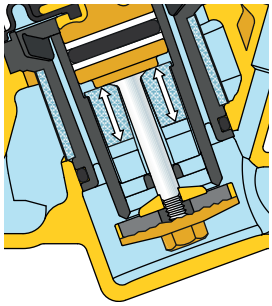
Compensated seat

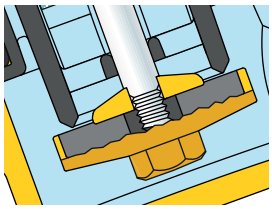
535H pressure reducing valves are fitted with compensate seats. This means the set pressure value remains constant, regardless of variations in the upstream pressure value.

In the diagram, 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.

The special cross-section of the passage zone between the seat and obturator seal makes for stable behaviour in relation to upstream pressure fluctuations and operation with high flow rates, with reduced noise levels caused by the passage of water.





Low head losses

The internal fluid dynamic structure of the pressure reducing valve allows the achievement of very low head losses, even if a large number of consumer outlets are opened.

Working pressures

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 16 bar.

Non-sticking materials

The central support assembly, containing moving parts, is made of plastic material with a low adherence coefficient. This solution minimises the chance of lime scale formation, the main cause of malfunctions.

Stainless steel stem

The stainless steel stem makes it possible to minimise the typical problems associated with the use of hard and aggressive water.

Contoured membrane

The membrane is designed with a special shape to ensure more accurate pressure regulation in accordance with downstream pressure fluctuations.

This feature also extends the life of the valve, since the diaphragm is more resistant to sudden pressure fluctuations and to normal wear.

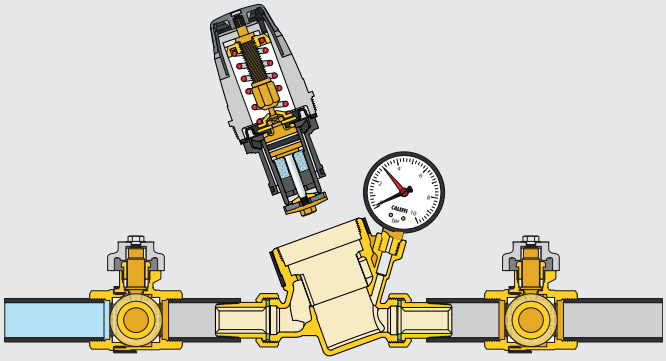
Compact dimensions

The “inclined” configuration makes for more compact dimensions of the 535H pressure reducing valves with consequent easy installation, especially in domestic systems.

Removable self-contained cartridge

The cartridge containing the membrane, strainer, seat, obturator and compensation piston is a pre-assembled self-contained unit with a cover, and can be removed to facilitate inspection and maintenance procedures.

The special construction of the regulating element does not require any modification of the setting pressure value, which may be left unchanged.



High temperatures

The materials used for the construction of this series of pressure reducing valves allow installation also on the hot water circuit with temperatures of up to 80°C.

Pressure gauge

The pressure gauge shows the exact downstream pressure value irrespective of the adjusted knob pressure setting.

For special conditions, e.g. in the presence of a downstream water heater, the pressure may rise above the set value.

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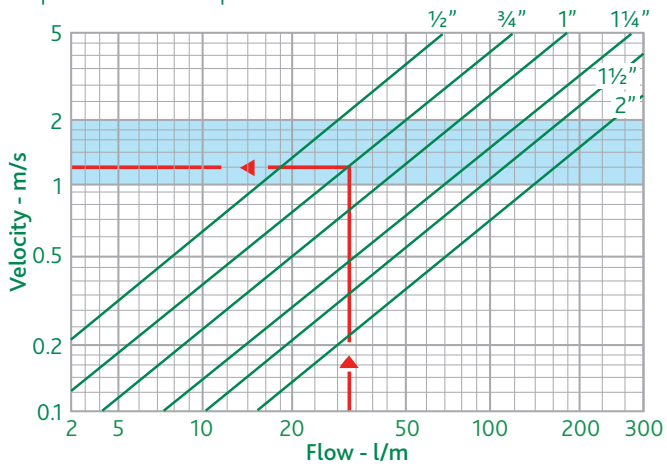
Certification

535H pressure reducing valves comply with the requirements of standard EN 1567 for use with hot water up to 80°C.

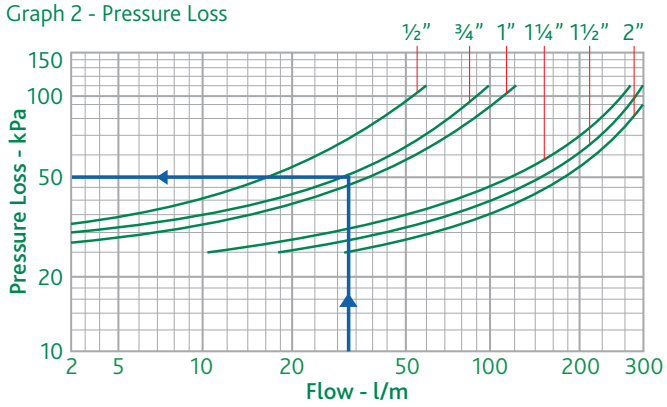
Certified as a WRAS approved product for use with potable water.

Hydraulic Characteristics

Graph 1 - Circulation Speed



Graph 2 - Pressure Loss



Reference conditions - Upstream pressure = 8 bar
Downstream pressure = 3 bar

Sizing

NOTE: *the criterion described below makes it possible to size the pressure reducing valves using a rapid design flow rate calculation method. For detailed sizing of the hydraulic and domestic water system with design flow rate calculation, refer to the national regulations.*

To facilitate selection of the correct valve diameter, typical flow rates of the most common appliances used in hydraulic and domestic water systems are listed in the table.

Table of typical flow rates

Bath tub, kitchen tap dishwasher	12 l/min
Shower	9 l/min
Wash basin, bidet, washing machine, WC with cistern	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.

Hydraulic Characteristics Continued

Table of simultaneous use factors %

Number Appliances	Private Dwelling %	Public Building %	Number Appliances	Private Dwelling %	Public Building %	Number Appliances	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

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.

$G_{pr} = G_{tot}$ = 81 x 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 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).

  For G_{pr} = 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 loss, with respect to the set pressure at no flow conditions).

  For G_{pr} = 33 l/min - pressure loss Δ_p = 50 kPa

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.

Size		½"	¾"	1"	1 ¼"	1 ½"	2"
Flow rate	m^3/h	1.27	2.27	3.6	5.8	9.1	14
Flow rate	l/min	21.1	37.8	60	96.6	151.6	233.3

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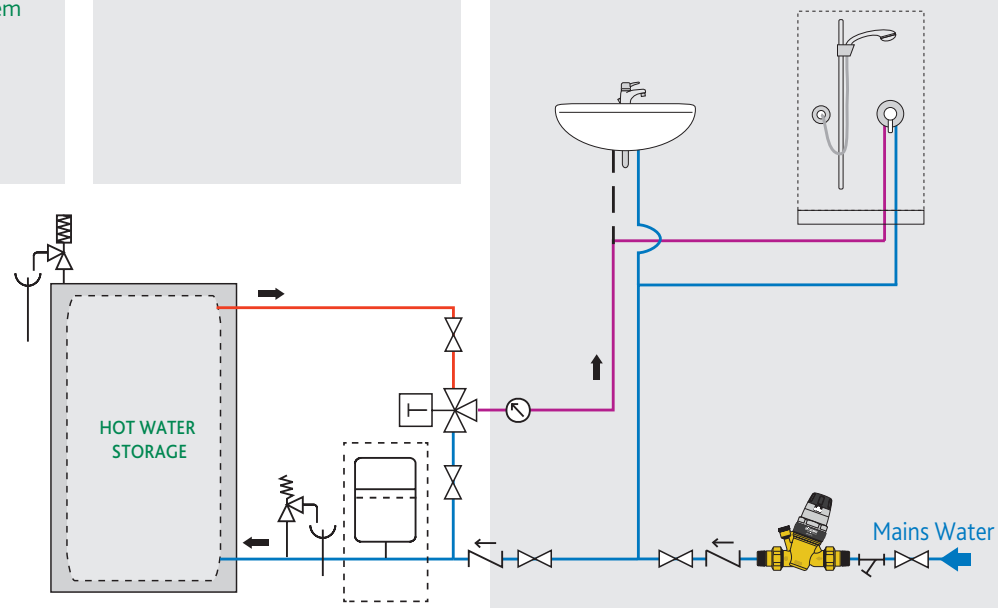
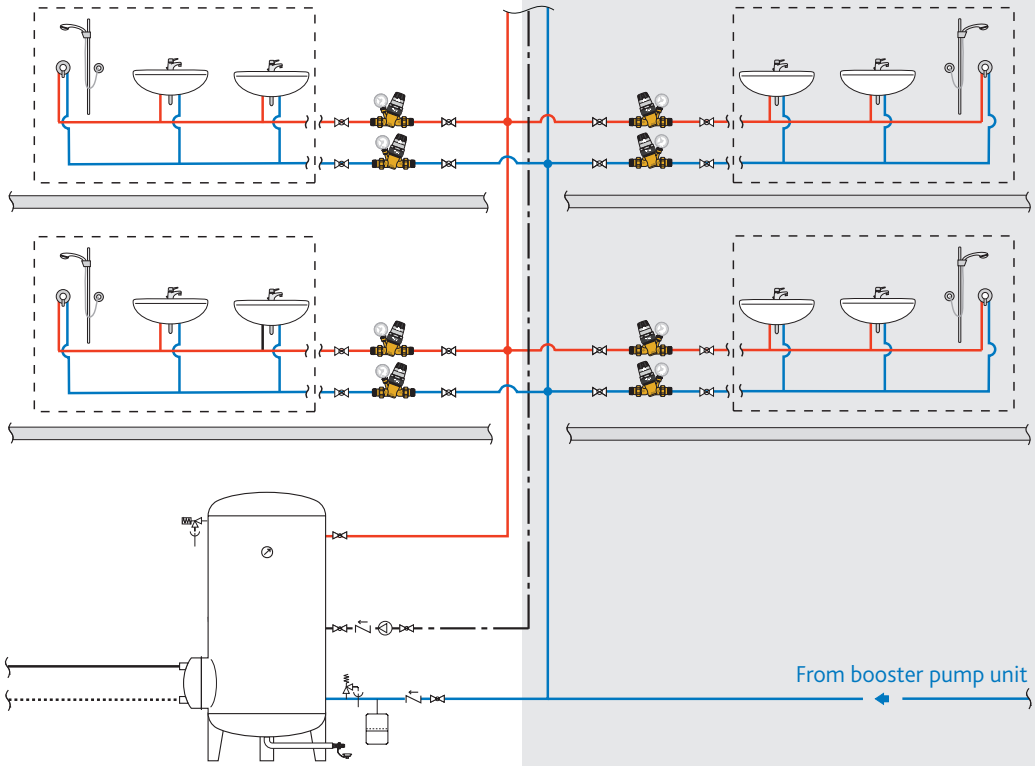
Typical Applications

Domestic water system



Distribution circuit with re-circulation



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AL 247 09-03-16

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