PresCal™
Pre-adjustable pressure reducing valves

535H series

01265/25





All models come with UV outdoor protective cover as pictured here.



ICC ES c PMG LOW LEAD

NSF/ANSI/CAN 61

ASSE 1003/CSA B356

NSF/ANSI/CAN 372

Function

Pressure reducing valves are devices which, when installed on water systems, reduce and stabilize the pressure of the water entering from the water supply main. This pressure, in general, is too high and variable for domestic systems to operate correctly.

The 535H series pressure reducing valves, ideal for residential and commercial applications, feature a dial indicator with direct readout allowing easy pressure pre-adjustment. After installation, the valve will control at the pre-adjusted pressure setting.

The valve is constructed of DZR low-lead forged brass and incorporates a unique noise reducing and high flow seat design, is easily serviced with a replaceable cartridge and has an integral stainless steel filter (35 mesh), suitable for water systems that may contain sediment and debris.

The valve is ICC-ES certified to ASSE 1003/CSA B356, NSF/ANSI/CAN 61 (180°F/82°C Commercial Hot), NSF/ANSI/CAN 372, low lead laws and listed by ICC-ES. It meets codes IPC, IRC, UPC and NPC for use in accordance with the US and Canadian plumbing codes. Plenum rated: compliant with the requirements of standard UL 2043, without the outdoor protective cover.

Product range

5353H series	Pre-adjustable pressure reducing valve with or without pressure gauge and NPT female threaded union connections..... sizes ½", ¾", 1", 1¼" , 1½" & 2"
5355H series	Pre-adjustable pressure reducing valve with or without pressure gauge and union PEX expansion connections.....size ¾" & 1"
5356H series	Pre-adjustable pressure reducing valve with or without pressure gauge and union press connections..... sizes ½", ¾", 1" & 1¼", 1½" & 2"
5357H series	Pre-adjustable pressure reducing valve with or without pressure gauge and union PEX crimp connections.....sizes ¾" & 1"
5359H series	Pre-adjustable pressure reducing valve with or without pressure gauge and union sweat connections..... sizes ½", ¾", 1" & 1¼", 1½" & 2"
NA5358H series	Pre-adjustable pressure reducing valve with or without pressure gauge, body only, connections field installed..... sizes ½", ¾", 1" & 1¼", 1½" & 2"

Technical specifications

Materials

- body: DZR low-lead forged brass CR EN 1982 CC768S
- housing: glass reinforced nylon PA66M40/1
- outdoor protective cover: UV stablized ABS, gray
- control stem and moving parts: DZR low-lead brass CR EN 12164 CW724R
- diaphragm: peroxide-cured EPDM
- seals: peroxide-cured EPDM
- compensation piston rings: PTFE
- filter: stainless steel EN 10088-2 (AISI 304)
- seat: stainless steel EN 10088-3 (AISI 303)
- shuttle cartridge: PPSG40

Performance

Suitable fluids:	water
Max. working pressure:	300 psi (2000 kPa)
Downstream pressure setting range:	15 - 90 psi (100 - 600 kPa)
Factory setting:	45 psi (300 kPa)
Maximum working temperature:	180°F (80°C)
Flow rates at 6 fps (gpm):	½": 7.3; ¾": 12.5; 1": 19.0; 1¼": 34.0; 1½": 44.0; 2": 70.0
Pressure gauge scale:	0 - 100 psi (0 - 700 kPa)
Filter mesh size:	½" - 1": 35 mesh (0.51 mm) 1¼" - 2": 25 mesh (0.65 mm)

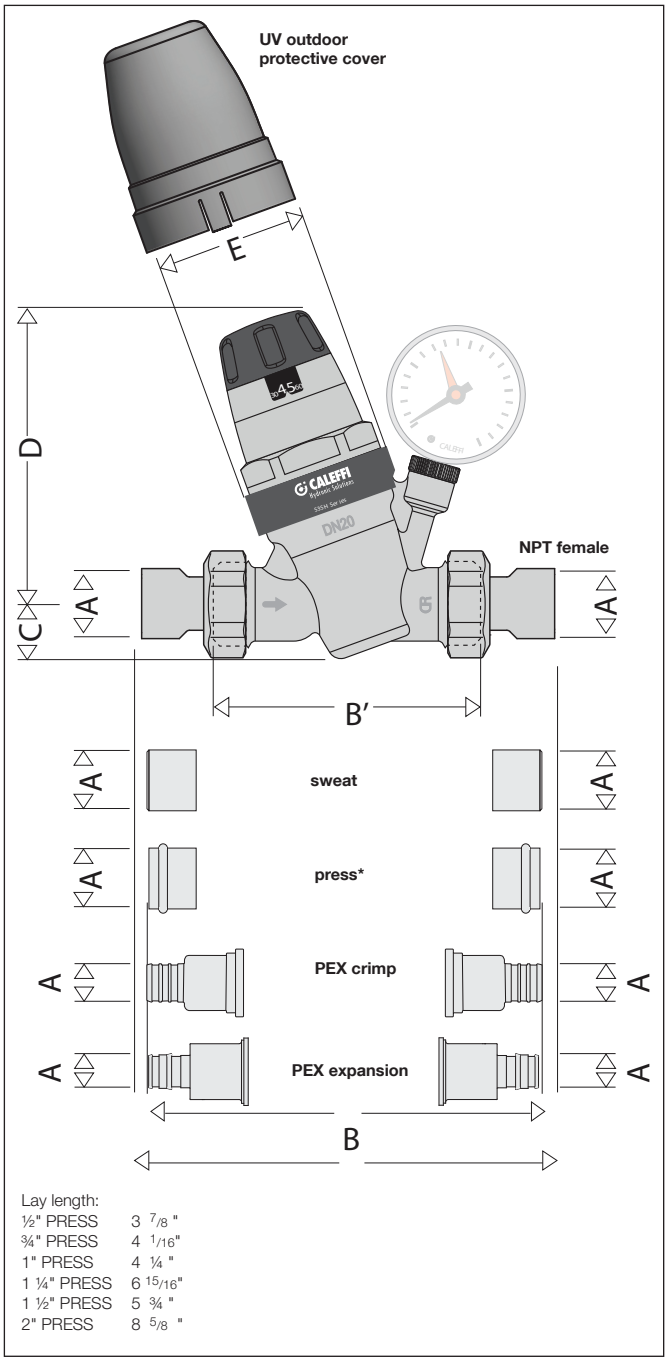
Certifications

1. Complies with codes IPC, IRC, UPC and NPC. ICC-ES certified to ASSE 1003, CSA B356 (R2015).
2. Complies with NSF/ANSI/CAN 61 (180°F/82°C Commercial Hot), as certifed by ICC-ES, file PMG-1356.
3. Complies with NSF/ANSI/CAN 372, Drinking Water System Components- Lead Content Reduction of Lead in Drinking Water Act, California Health and Safety Code 116875 S.3874, Reduction in Drinking Water Act, Vermont Act 193 - The Lead in Plumbing Supplies Law and Maryland's Lead Free Law HB.372, as certified by ICC-ES, file PMG-1360.
4. PEX crimp fittings certified to ASTM F 1807.
5. PEX expansion fittings certified to ASTM F 1960.
6. Plenum rated: Evaluated in accordance with the standard UL 2043 and was found compliant with the standard's requirements (This does not pertain to the outdoor protective cover)

Connections

Main connections:	½", ¾", 1", 1¼", 1½" & 2" NPT female and sweat union ½", ¾", 1", 1¼", 1½" & 2" press union ¾" & 1" PEX expansion union ¾" & 1" PEX crimp union
Pressure gauge connection:	⅛" NPT female

Dimensions



Lay length:

½" PRESS	3 7/8 "
¾" PRESS	4 1/16"
1" PRESS	4 ¼ "
1 ¼" PRESS	6 15/16"
1 ½" PRESS	5 ¾ "
2" PRESS	8 5/8 "



PVC jumper nipple

PVC jumper nipple with male union thread. The length of the jumper nipple matches the 535HA series valve body face-to-face dimension (B'), allowing the piping to be completed prior to the installation of valve and permitting quick change out from the jumper to the valve.

Code	Description	Wt (lbs)
NA11405	Jumper nipple for 535HA ½" series	0.1
NA11375	Jumper nipple for 535HA ¾" series	0.1
NA11376	Jumper nipple for 535HA 1" series	0.2
NA11406	Jumper nipple for 535HA 1¼" series	0.3
NA11407	Jumper nipple for 535HA 1½" series	0.3
NA11408	Jumper nipple for 535HA 2" series	0.5

Code	A	B	B'	C	D	E	Wt (lb)
535340HA	½" FNPT	5 ½"	3 1/16"	13/16"	4 ½"	2 3/8"	2.2
535341HA*	½" FNPT	5 ½"	3 1/16"	13/16"	4 ½"	2 3/8"	2.4
535640HA	½" PRESS	5	3 1/16"	13/16"	4 ½"	2 3/8"	2.1
535641HA*	½" PRESS	5	3 1/16"	13/16"	4 ½"	2 3/8"	2.3
535940HA	½" SWEAT	4	3 1/16"	13/16"	4 ½"	2 3/8"	2.1
535941HA*	½" SWEAT	4	3 1/16"	13/16"	4 ½"	2 3/8"	2.3
535350HA	¾" FNPT	6 ¼"	3 5/8"	13/16"	4 ½"	2 3/8"	2.5
535351HA*	¾" FNPT	6 ¼"	3 5/8"	13/16"	4 ½"	2 3/8"	2.7
535650HA	¾" PRESS	6 ½"	3 5/8"	13/16"	4 ½"	2 3/8"	2.4
535651HA*	¾" PRESS	6 ½"	3 5/8"	13/16"	4 ½"	2 3/8"	2.6
535550HA	¾" PEX	6	3 5/8"	13/16"	4 ½"	2 3/8"	2.5
535551HA*	¾" PEX	6	3 5/8"	13/16"	4 ½"	2 3/8"	2.7
535750HA	¾" PEX CRIMP	6	3 5/8"	13/16"	4 ½"	2 3/8"	2.4
535751HA*	¾" PEX CRIMP	6	3 5/8"	13/16"	4 ½"	2 3/8"	2.6
535950HA	¾" SWEAT	5 5/8"	3 5/8"	13/16"	4 ½"	2 3/8"	2.4
535951HA*	¾" SWEAT	5 5/8"	3 5/8"	13/16"	4 ½"	2 3/8"	2.6
535360HA	1" FNPT	6	3	13/16"	4 ½"	2 3/8"	3.2
535361HA*	1" FNPT	6	3	13/16"	4 ½"	2 3/8"	3.4
535660HA	1" PRESS	6	3	13/16"	4 ½"	2 3/8"	2.9
535661HA*	1" PRESS	6	3	13/16"	4 ½"	2 3/8"	3.1
535560HA	1" PEX	6 ½"	3	13/16"	4 ½"	2 3/8"	3.0
535561HA*	1" PEX	6 ½"	3	13/16"	4 ½"	2 3/8"	3.2
535760HA	1" PEX	5 ½"	3	13/16"	4 ½"	2 3/8"	2.8
535761HA*	1" PEX	5 ½"	3	13/16"	4 ½"	2 3/8"	3.1
535960HA	1" SWEAT	5 1/8"	3	13/16"	4 ½"	2 3/8"	2.8
535961HA*	1" SWEAT	5 1/8"	3	13/16"	4 ½"	2 3/8"	3.0
535370HA	1 ¼" FNPT	6	4 7/16"	1 9/16"	7"	3 1/16"	6.2
535371HA*	1 ¼" FNPT	6	4 7/16"	1 9/16"	7"	3 1/16"	6.4
535670HA	1 ¼"	9 1/8"	4 7/16"	1 9/16"	7"	3 1/16"	6.9
535671HA*	1 ¼"	9 1/8"	4 7/16"	1 9/16"	7"	3 1/16"	7.1
535970HA	1 ¼"	5	4 7/16"	1 9/16"	7"	3 1/16"	5.8
535971HA*	1 ¼"	5	4 7/16"	1 9/16"	7"	3 1/16"	6.0
535380HA	1 ½" FNPT	6 7/8"	4	1 9/16"	7"	3 1/16"	7.7
535381HA*	1 ½" FNPT	6 7/8"	4	1 9/16"	7"	3 1/16"	7.9
535680HA	1 ½"	10	4	1 9/16"	7"	3 1/16"	8.7
535681HA*	1 ½"	10	4	1 9/16"	7"	3 1/16"	8.9
535980HA	1 ½"	6"	4	1 9/16"	7"	3 1/16"	7.1
535981HA*	1 ½"	6"	4	1 9/16"	7"	3 1/16"	7.3
535390HA	2" FNPT	7	5 3/16"	1 9/16"	7"	3 1/16"	9.4
535391HA*	2" FNPT	7	5 3/16"	1 9/16"	7"	3 1/16"	9.6
535690HA	2" PRESS	11	5 3/16"	1 9/16"	7"	3 1/16"	11.8
535691HA*	2" PRESS	11	5 3/16"	1 9/16"	7"	3 1/16"	12.0
535990HA	2" SWEAT	6"	5 3/16"	1 9/16"	7"	3 1/16"	8.4
535991HA*	2" SWEAT	6"	5 3/16"	1 9/16"	7"	3 1/16"	8.6

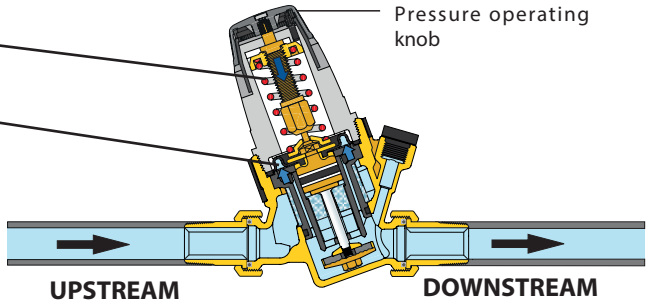
*Product includes outlet pressure gauge. All products include outdoor UV protective cover

Operating principle

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

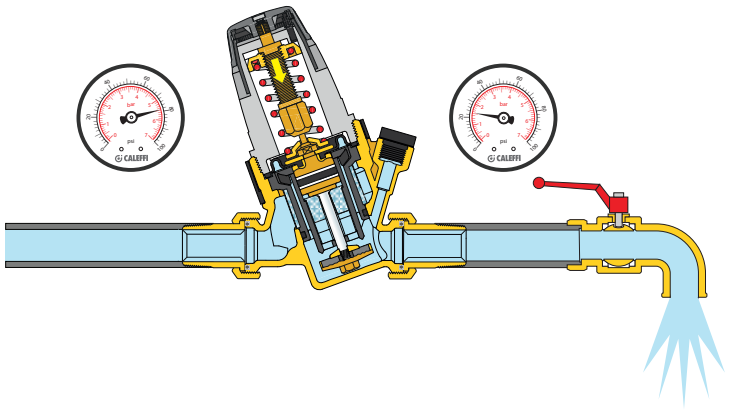
1 The force of the spring towards the opening of the valve.

2 The force of the diaphragm towards the closure of the valve.



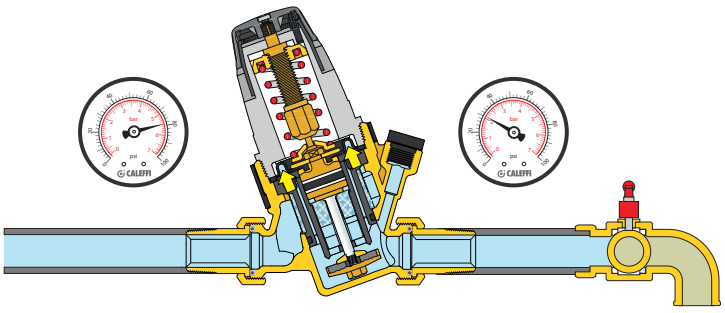
Operation with water flow

When a faucet is opened on the water system, the force of the spring becomes greater than that of the diaphragm; the shuttle moves downwards opening the 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.

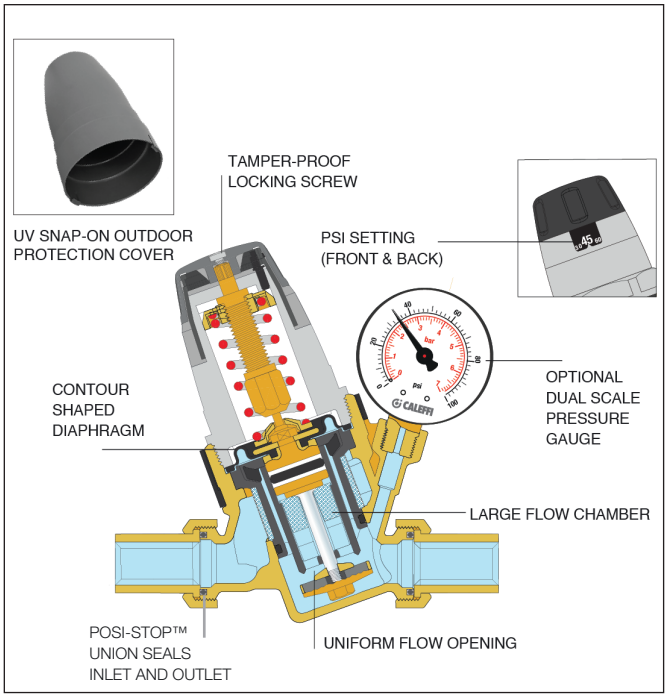


Operation without water flow

When the faucet is closed, the downstream pressure rises and pushes the diaphragm upwards. As a result the shuttle closes the valve to the flow of water and maintains the pressure at the pressure setting. The slight difference between the force of the diaphragm compared to that of the spring causes the valve to close.

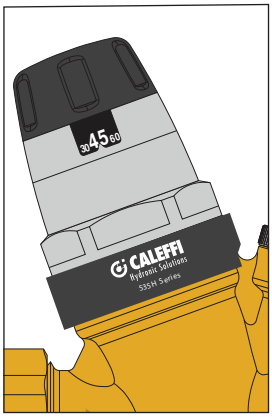


Construction details



Pre-adjustment

Caleffi 535H series pressure reducing valves have an operating knob and a pressure setting indicator which is visible on both sides. This pressure indicator features incremental step operation, where the pressure can be adjusted continuously with the value displayed at 15 psi increments. The pressure can be pre-set to the desired value, even before the pressure reducing valve is installed.

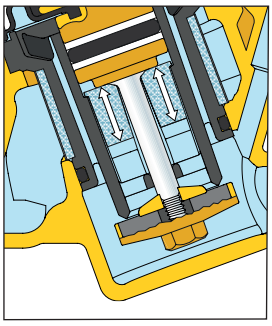


Adjustment lock

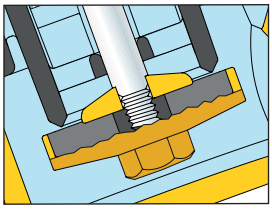
Tighten the screw in the top of the set point knob to prevent tampering.

Pressure balanced seat

Caleffi 535H series pressure reducing valves are designed with pressure balanced seats. This means the setting pressure value remains constant, regardless of variations in the upstream pressure value. In the figure, 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 that of the shuttle, the two forces cancel out each other.



The special cross-section of the flow path between the seat and shuttle seal stablizes upstream pressure fluctuations and high flow rates, reducing noise levels caused by the flowing water.



Low head losses

The large cross-section flow chamber of the 535H series pressure reducing valve minimizes pressure drop within the valve which results in superior falloff pressure, enabling more flow capacity to fixtures.

Working pressures

The zone exposed to upstream pressure is constructed so that it can operate at high pressure. The PTFE heavy duty rings on the compensating piston make it possible for the valve to be used continuously at upstream pressures up to 300 psi.

Non-sticking materials

The central support assembly, containing moving parts, is made of plastic material with a low adherence coefficient. This minimizes the formation of lime scale, a common cause of flow inconsistencies.

Stainless steel stem

The stainless steel stem minimizes the harmful affects associated with the use of hard and aggressive water.

Contoured diaphram

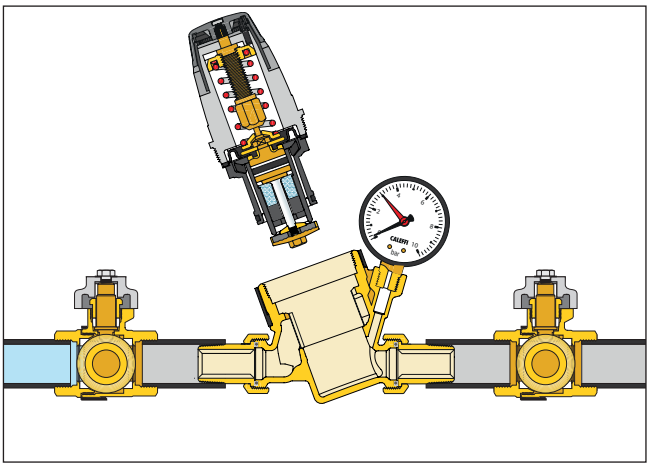
The diaphragm is designed with a special shape to assure more accurate pressure regulation in accordance with downstream pressure fluctuations.This feature also extends the life of the valve, since the diaphragm is more resistant to sudden pressure fluctuations and to normal wear. The diaphragm and seals in the 535H series are peroxide-cured EPDM that is resistant to water treated with chlorine or chloramine for longer operating life.

Compact dimensions

The “inclined” configuration makes the 535HA series pressure reducing valves compact for easy installation, especially in domestic water systems.

Removable self-contained cartridge

The cartridge containing the diaphragm, filter, seat, shuttle and compensating 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 the 535H series pressure reducing valves allow installation also on hot water booster circuits with temperatures up to 180°F (80°C).

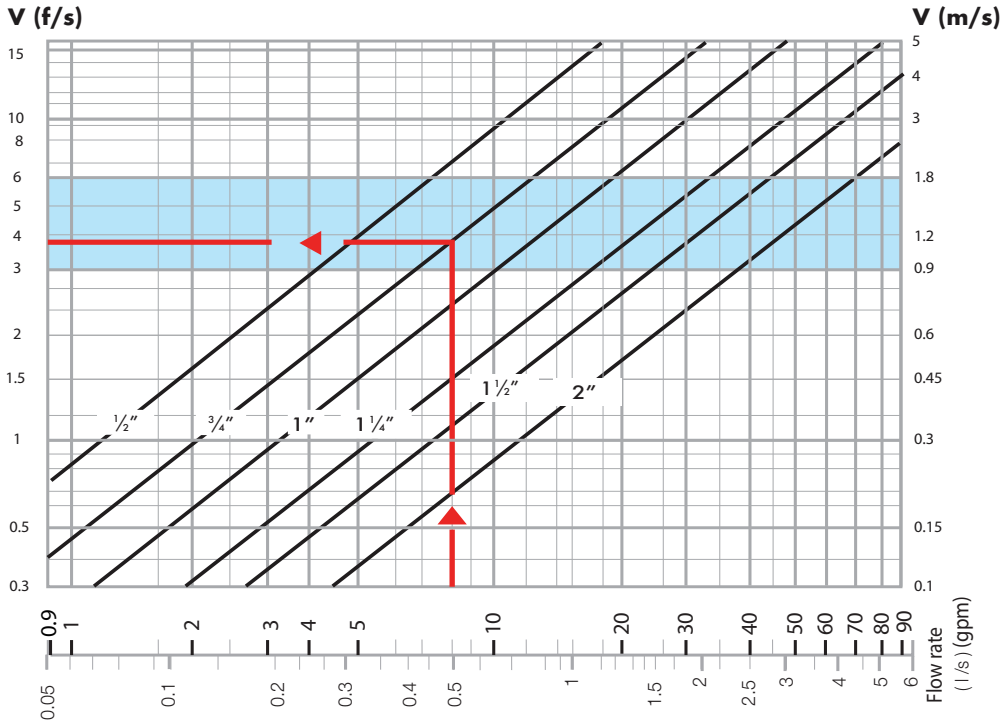
Pressure gauge

The pressure gauge (optional) shows the exact downstream pressure value regardless 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.

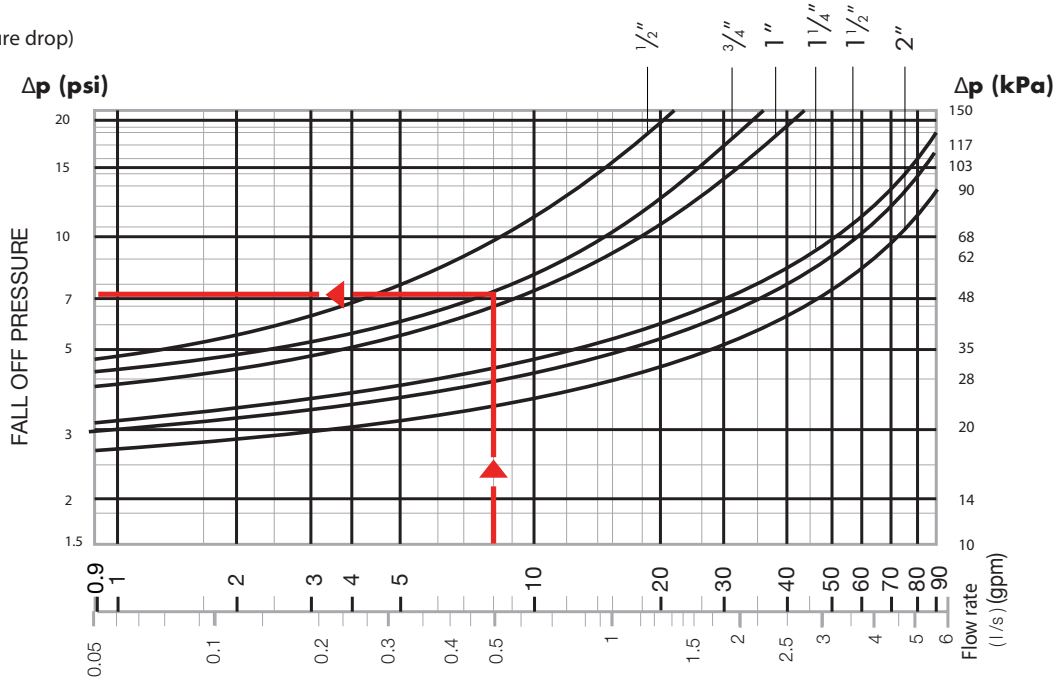
Outdoor Protective cover

Each 535H PRV comes with a snap-on protective cover which is designed to resist UV rays, for outdoor locations, and to provide a significant level of protection against dust, dirt and water. It does not protect against freezing; do not mount the valve in locations where it may freeze. Protective cover not approved for use in plenum installations

Graph 1 (Maximum velocity for sizing)



Graph 2 (Pressure drop)



Reference values: Upstream pressure = 116 psi (800 kPa)
Downstream presssure = 43 psi (300 kPa)

Sizing procedure

Maximum flow velocity is recommended to be kept within 3 to 6 feet per second when calculating the correct pressure reducing valve size. This will prevent noise in the pipes and rapid wear of appliances. Minimum flow velocity to prevent excessive wear on the valve and to reduce the chance of noise due to low flow is 1 foot per second.

The correct size of the pressure reducing valve is taken from graph 1 on the basis of the design flow rate taking into account an ideal maximum flow velocity in the valve body of between 3 and 6 f/s (blue band).

Example:
For 8 gpm, select the 3/4" size valve (see arrow on graph 1).

The pressure drop is taken from graph 2 also on the basis of where the design flow rate intersects the curve for the valve size already selected (the downstream pressure falls by an amount equal to the pressure drop, with respect to the set pressure at no flow condition). Make sure the falloff pressure (pressure drop) of the chosen valve, at the specifed flow rate, will result in the valve supplying the required pressure to the system fixtures.

Example: For 8 gpm the Δp = 7.3 psi (see arrow on graph 2).

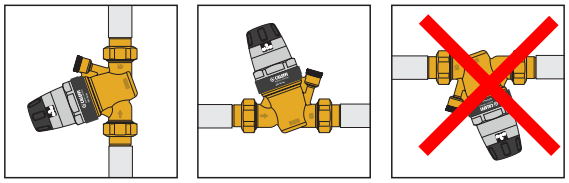
	Design Flow Rate					
Size	½"	¾"	1"	1¼"	1½"	2"
gpm	4 to 7.3	7 to 12.5	10 to 19	17 to 34	24 to 44	37 to 70

Installation

1) Turn all the faucets on before installing the pressure reducing valve, to flush the system and expel any air remaining in the pipes.

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

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



4) Close the downstream shut-off valve.

5) Remove the factory-installed UV protective cover before adjusting the setting. Pull the tabs open before lifting up. Reinstall after setting the pressure for UV protection if needed.

6) This mechanical pre-adjustment system, with the operating knob and pressure indicator visible from both sides, allows the pressure reducing valve to be set to the required value in the system prior to installation. The pressure indicator features incremental step operation, where the pressure can be adjusted continuously with the value displayed at 15 psi increments.

7) Set the pressure using the operating knob on the upper part of the valve. The pressure reducing valves are factory set to a pressure of 45 psi.

8) Because the pre-adjustment dial displays in 15 psi increments, the optional downstream outlet pressure gauge can be used to show the exact outlet pressure, which is especially useful for applications requiring this precision.

9) After installation, the internal mechanism will automatically control the pressure, until the set value has been reached.

10) Slowly reopen the downstream shut-off valve.

Installation recommendations

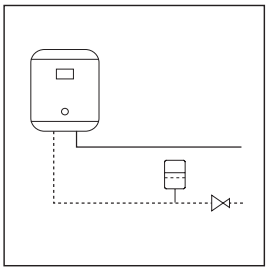
1. Outdoor installation
   Pressure reducing valves should not be installed outside the building unless properly protected from freezing and the weather.
2. Each 535H PRV includes a snap-on protective cover that resists UV exposure and provides protection against dust, dirt, and water. The cover does not provide freeze protection; do not install in areas subject to freezing. Protective cover not approved for use in plenum installations.

3. Water hammer
   Water hammer is a common reason for pressure reducing valve failures. Specific devices should be installed to absorb water hammer for systems with this risk.

Troubleshooting

System failures are not always caused by the pressure reducing valve. Most frequently:

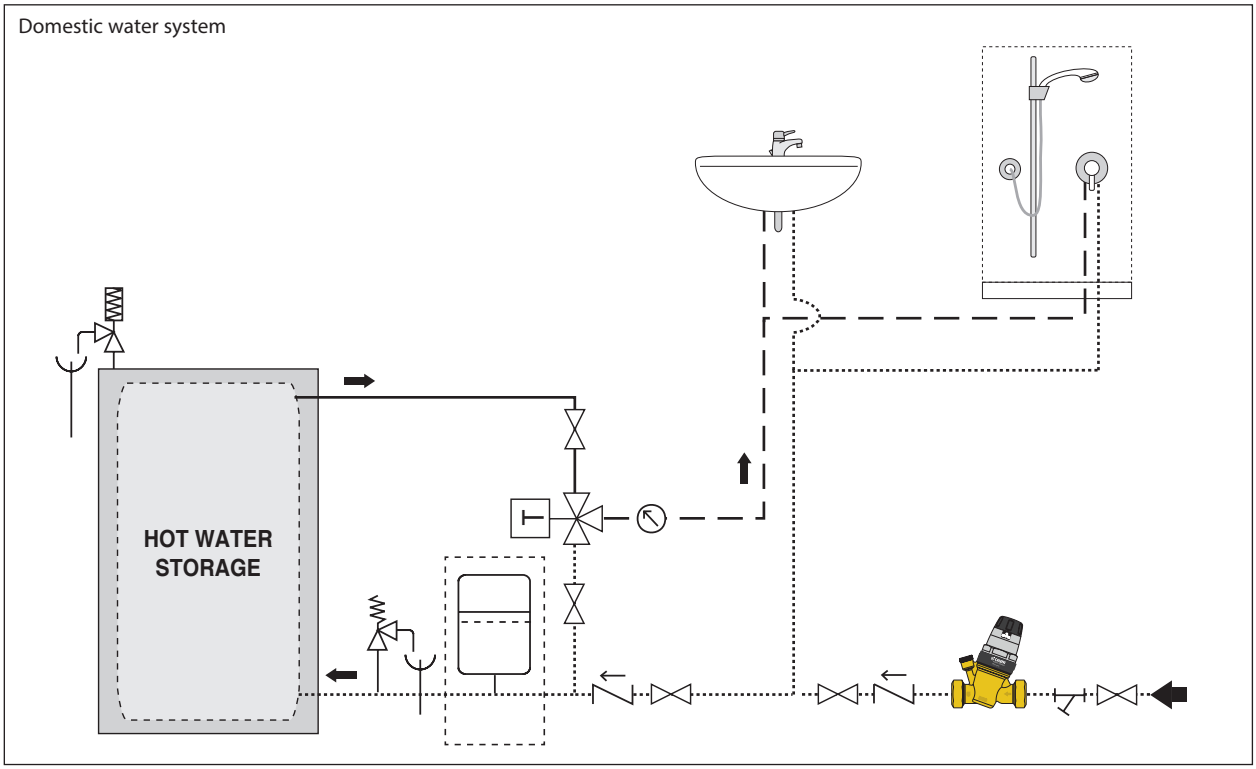
1. Increased downstream pressure in the presence of a water heater
   If the downstream pressure increases beyond the desired setting due to an inline water heater, install an expansion tank between the pressure reducing valve and the water heater to absorb the increased pressure, caused by water expansion from heating.



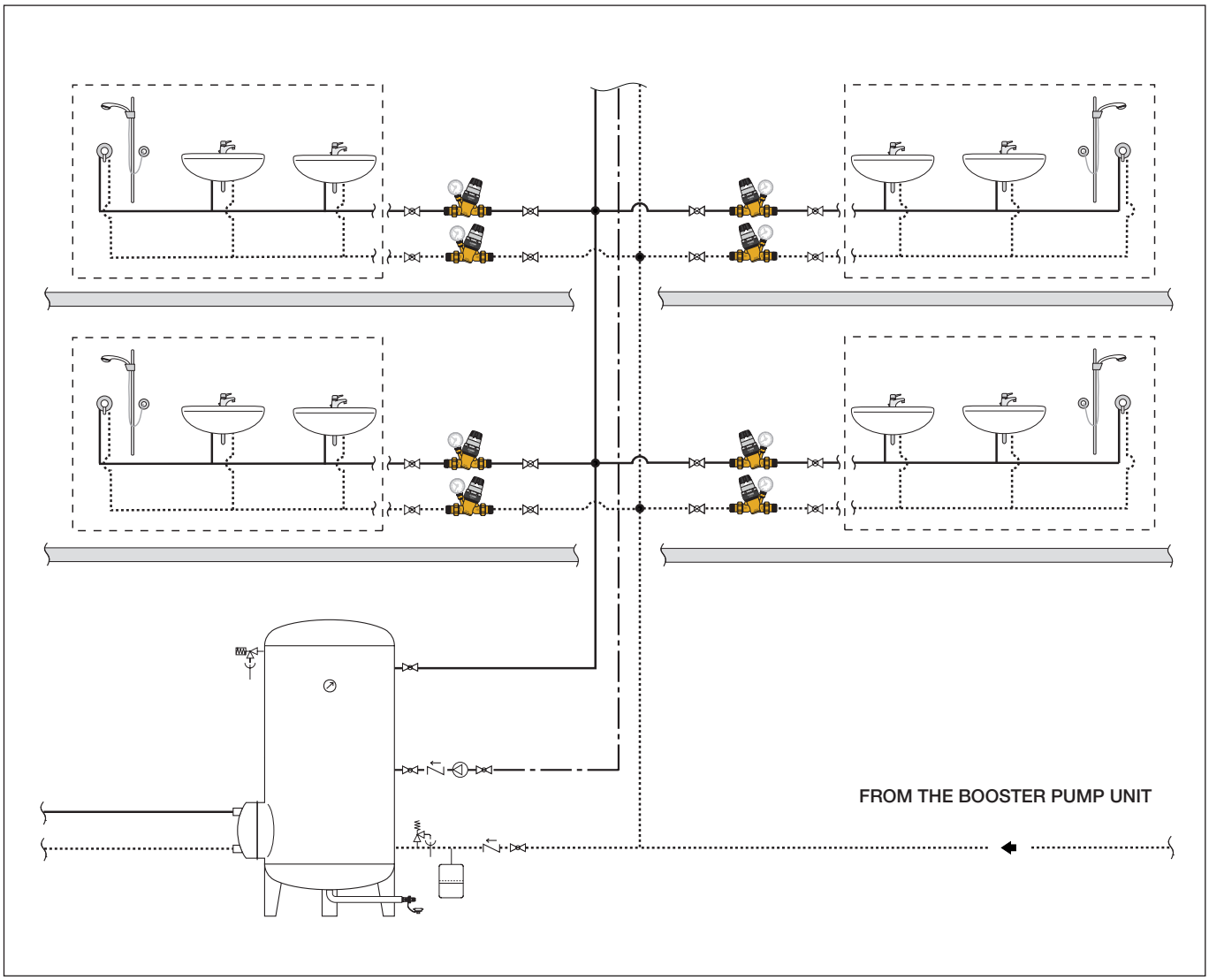
2. The pressure reducing valve does not maintain downstream setting value
   If the pressure reducing valve does not maintain the downstream setting, it most likely is due to impurities acccumulating on the valve seat, causing unnecessarry flow to pass-through, increasing the downstream pressure. Proper maintenance and cleaning of the removable cartridge is recommended.

Application diagrams

Domestic water system



Application: Distribution circuit with booster pump



Application: High/low flow

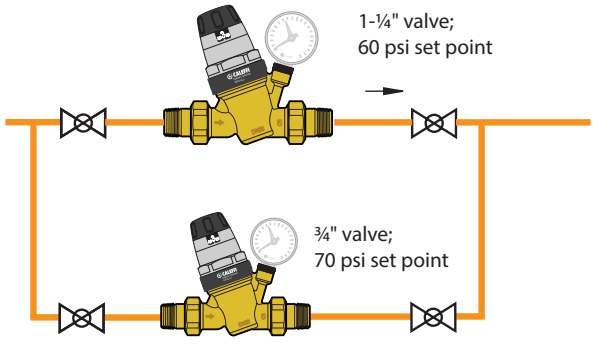
Small valve is set to the desired outlet pressure set point. It will handle all demand up to the point where the small valve's "falloff" pressure reaches the setpoint of the larger valve, at which point the larger valve will open to handle the increasing demand. The set point difference between the small and larger valves ranges from 7 to 10 psi.

Example:

1) 3 gpm to 30 gpm required flow range at 70 psi.

2) ¾" valve will handle 2 to 12 gpm flow range.

3) 1-¼" valve will handle 5 to 35 gpm flow range.

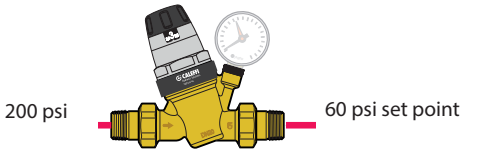


Application: 2-stage reduction for high pressure water supply mains

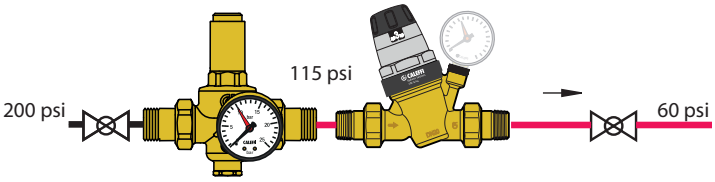
Necessary when the pressure in the water supply main is greater than or equal to 3 times the required plumbing pressure set point; the amount of pressure reduction is too great for one pressure reducing valve.

Example:

200 psi water supply main, 60 psi building pressure required. A typical first stage high pressure reducing valve, pictured below, can be a piston type with 90-150 psi adjustment range, Caleffi 536A series PresCal HP1.



This causes undesirable cavitation and noisy service.



First stage PRV Second stage PRV

Replacement parts



Replacement cartridge for PresCal 535H series pressure reducing valve.

535006HA .....fits 535H ½", ¾", 1"
535009HA.....fits 535H 1¼", 1½", 2"



Pressure gauge fits 535H series pressure reducing valves. Pressure range 0 to 100 psi (0 to 7 bar).

NA10273.....1/8" NPT male



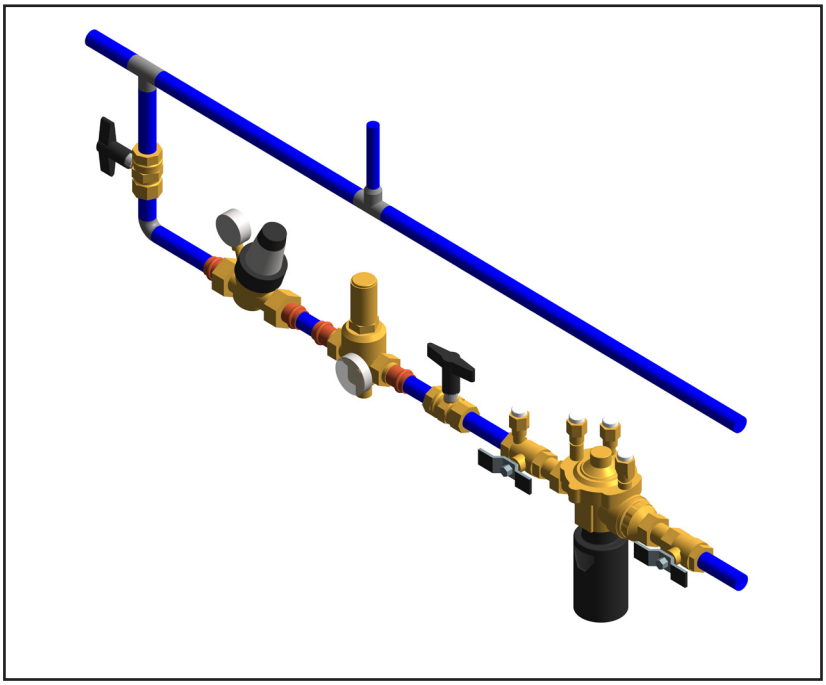
Gauge port plug.

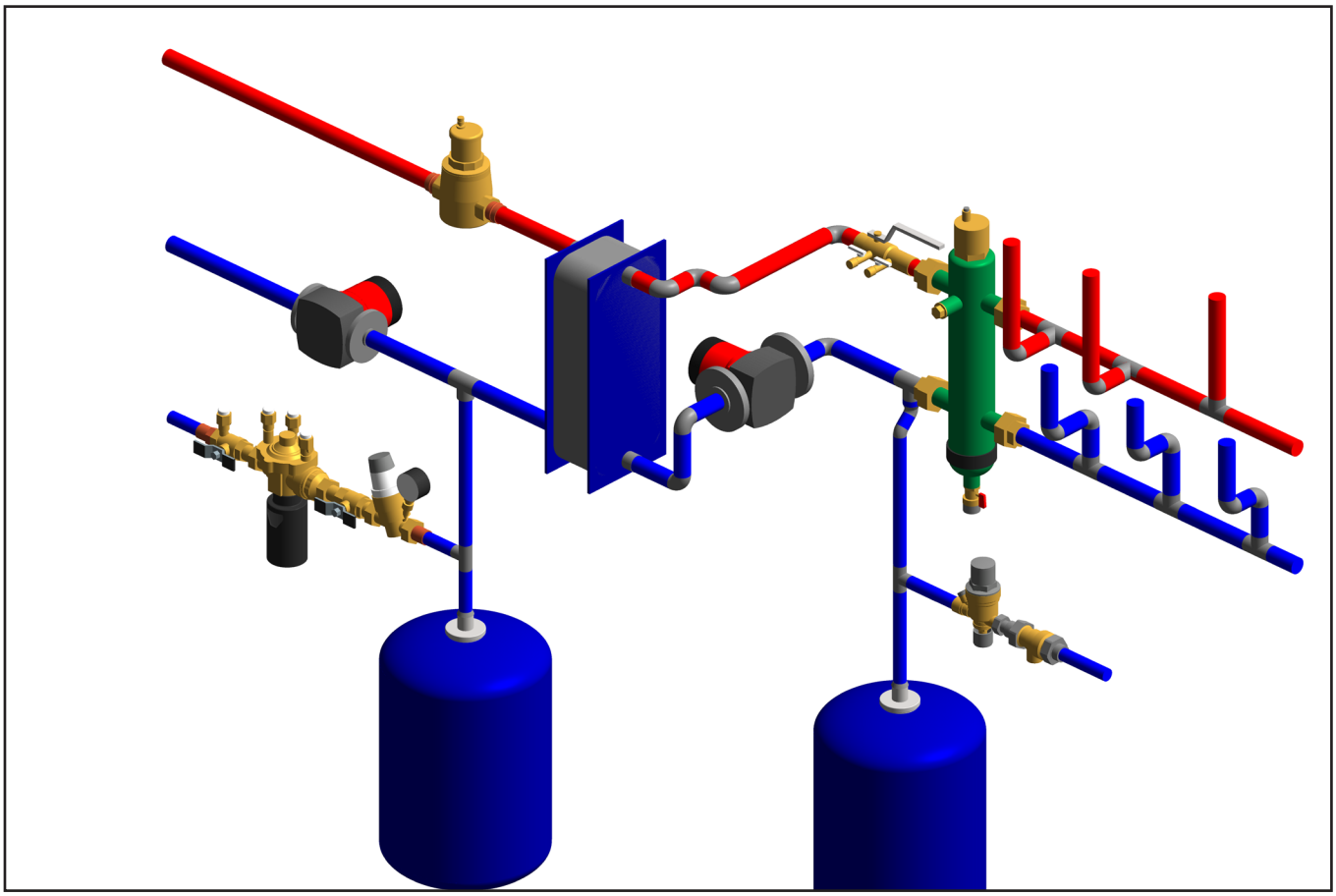
NA10438.....1/8" NPT male



Replacement UV outdoor protective cover for PresCal 535H series pressure reducing valve.

NA10811 .....fits 535H ½", ¾", 1"
NA10812.....fits 535H 1¼", 1½", 2"





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SPECIFICATION SUMMARY

535H series

Pre-adjustable pressure reducing valve with pressure balanced seat and self-contained cartridge, certified by ICC-ES to ASSE 1003, CSA B356, NSF/ANSI/CAN 61 (180°F/82°C Commercial Hot), and NSF/ANSI/CAN 372. Meets codes IPC, IRC and UPC for use in accordance with the US and Canadian plumbing codes. Plenum rated: compliant with the requirements of standard UL 2043, without outdoor protective cover. Sizes ½" to 2" with NPT female union, sweat union and press union connections, sizes ¾" and 1" PEX crimp union and PEX expansion union connections. PEX crimp fittings must comply with ASTM F 1807. PEX expansion fittings must comply with ASTM F 1960. Dezincification resistant low-lead forged brass body (<0.25% Lead content) certified by and listed by ICC-ES. DZR low-lead brass internal moving parts. Housing in glass reinforced nylon PA66M40/1 with outdoor protective snap-on cover in UV stabilzed ABS, gray. Stainless steel filter, mesh size 0.51 mm (35 mesh). Peroxide-cured EPDM diaphragm and seals. PTFE compensating piston rings. Maximum working temperature 180 degrees F (80 degrees C). Maximum upstream pressure 300 psi (2000 kPa). Downstream pressure setting range from 15 psi to 90 psi (100 kPa to 600 kPa). Factory setting: 45 psi (300 kPa). Self-contained cartridge removable for maintenance purposes. Equipped with: UV protective cover, operating knob with downstream pressure adjustment scale for manual setting and tamper-proof adjustment locking screw, and pressure gauge with 0 psi to 100 psi (0 bar to 700 kPa) pressure scale (version with pressure gauge). Pressure gauge connection 1/8" NPT female (version without pressure gauge).

We reserve the right to make changes and improvements to the products and related data in this publication, at any time and without prior notice. The technical brochure on www.caleffi.com always has the most up-to-date version of the document, which should be used for technical verification.

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