Inclined pressure reducing valves

series 5330

cert. n° 0003 ISO 9001

01024/03 GB

Replaces 01024/99 GB

Function

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

The 533**.** series is specially designed for small systems in apartments for example and for protecting water storage heaters where size and noise are a concern.

Product range

Series 5330 Inclined pressure reducing valve	Sizes 1/2” and 3/4” F
Series 5331 Inclined pressure reducing valve	Size 3/4” M x 3/4” F with connecting nut
Series 5332 Inclined pressure reducing valve with pressure gauge	Sizes 1/2” and 3/4” F
Series 5334 Inclined pressure reducing valve with pressure gauge connection	Sizes 1/2” and 3/4” F
Series 5336 Inclined pressure reducing valve	Sizes Ø 15 and Ø 22 for copper pipe
Series 5337 Inclined pressure reducing valve with pressure gauge connection	Sizes Ø 15 and Ø 22 for copper pipe
Series 5338 Inclined pressure reducing valve with pressure gauge	Sizes Ø 15 and Ø 22 for copper pipe

Technical specifications

Materials:

Body	
- Series 5330/1/2/4;	brass EN 12165 CW617N, chrome plated
- Series 5336/7/8;	dezincification resistant alloy CR EN 12165 CW602N
Cover:	PA 66 GF 30
Control spindle:	dezincification resistant alloy CR EN 12165 CW602N
Cartridge:	POM
Internal components:	brass EN 12165 CW617N
Diaphragm:	NBR
Seals:	NBR
Strainer:	stainless steel

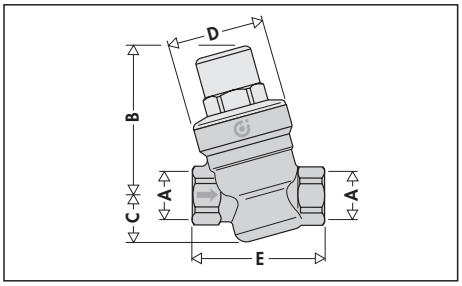
Performance:

Max. inlet pressure:	16 bar
Outlet pressure setting range:	1÷6 bar
Factory setting:	3 bar
Max. working temperature:	65°C
Pressure gauge range:	0÷10 bar
Medium:	water

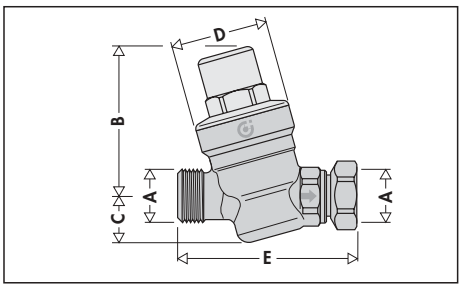
Connections:

Main connections:	see product range
Pressure gauge connection:	1/4” F

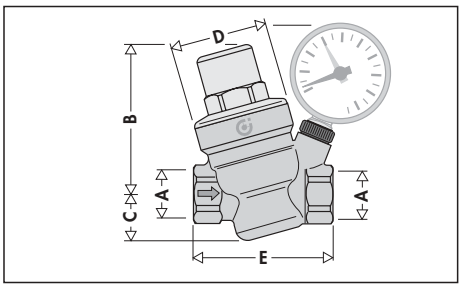
Dimensions



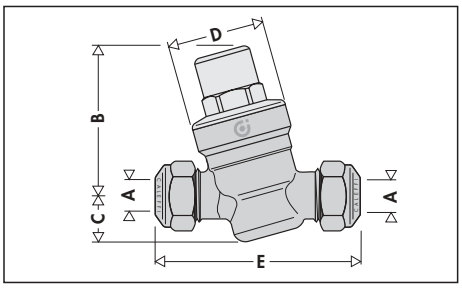
Code	A	B	C	D	E	Weight (kg)
533041	1/2"	72,5	22,5	Ø 46	64	0,39
533051	3/4"	72,5	22,5	Ø 46	66	0,41



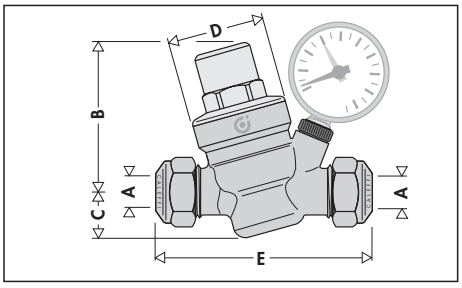
Code	A	B	C	D	E	Weight (kg)
533151	3/4"	72,5	22,5	Ø 46	85,5	0,46



Code	A	B	C	D	E	Weight (kg)
533241 - **5334**41	1/2"	72,5	22,5	Ø 46	70	0,51
533251 - **5334**51	3/4"	72,5	22,5	Ø 46	72	0,52



Code	A	B	C	D	E	Weight (kg)
533641	Ø15	72,5	22,5	Ø 46	91	0,43
533651	Ø22	72,5	22,5	Ø 46	93	0,46



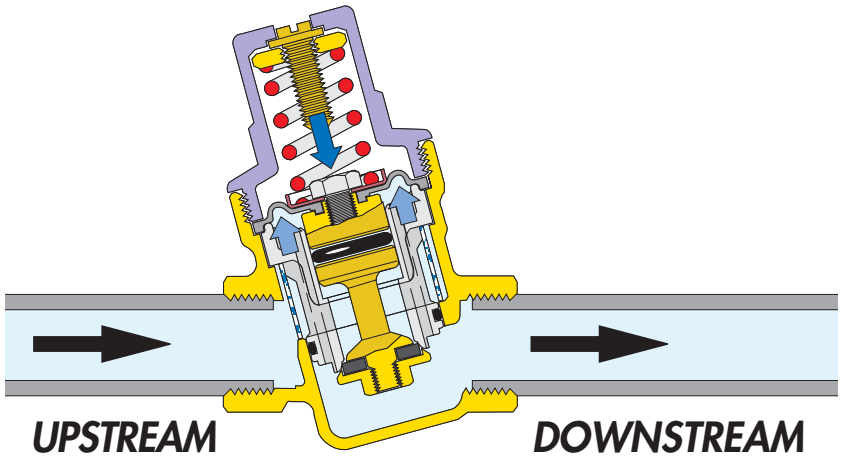
Code	A	B	C	D	E	Weight (kg)
533741 - **5338**41	Ø 15	72,5	22,5	Ø 46	103	0,55
533751 - **5338**51	Ø 22	72,5	22,5	Ø 46	107	0,57

Operating principle

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

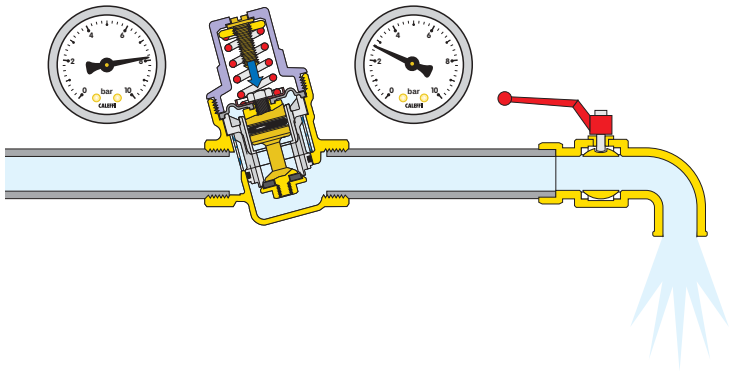
1 the thrust of the **spring** to **open** the flow through the cross section.

2 the thrust of the **diaphragm** to **close** the flow through the cross section.



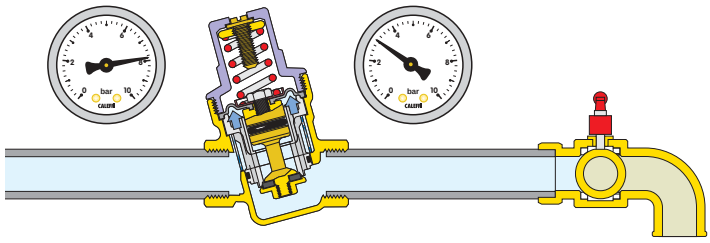
Operation with water flow

When a draw-off outlet is opened on the water system, the force of the spring becomes greater than that of the diaphragm; the obturator 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.



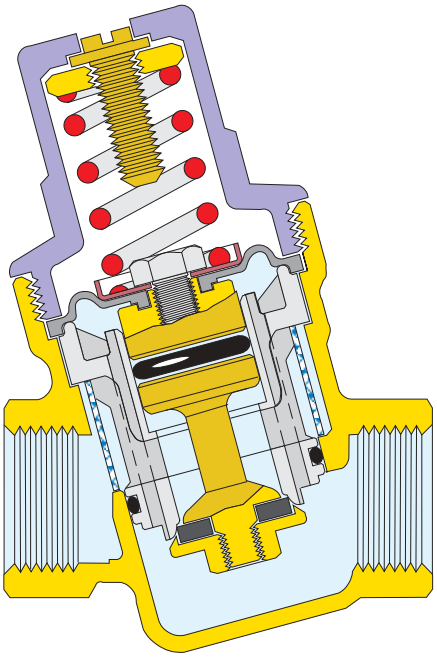
Operation without water flow

When the draw-off outlet 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.

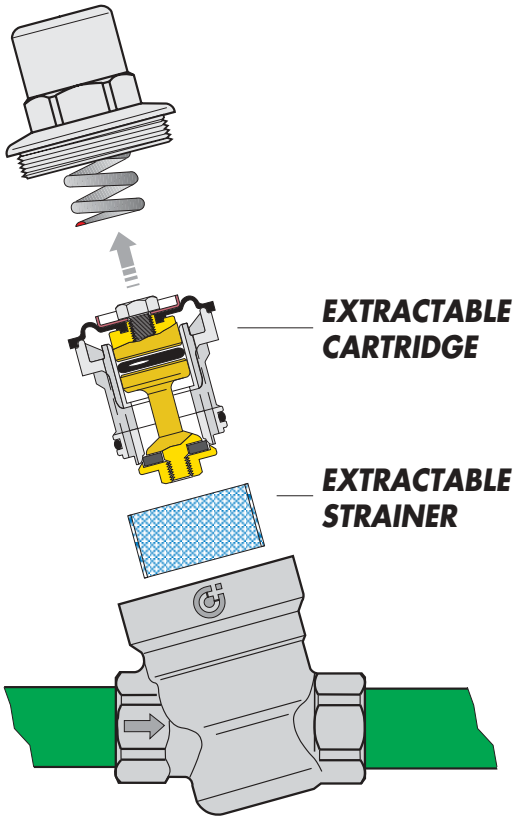


Constructional details

Contoured diaphragm
The membrane was designed with a special shape to give an accurate pressure regulation as a function of changes in the downstream pressure.
This design feature also extends the valve life because the diaphragm is more resistant to pressure sudden changes and to wear.



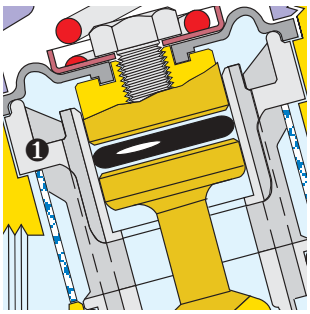
Extractable cartridge
The cartridges in the Caleffi 533**.** series of pressure reducing valves can be removed for periodic cleaning and maintenance.



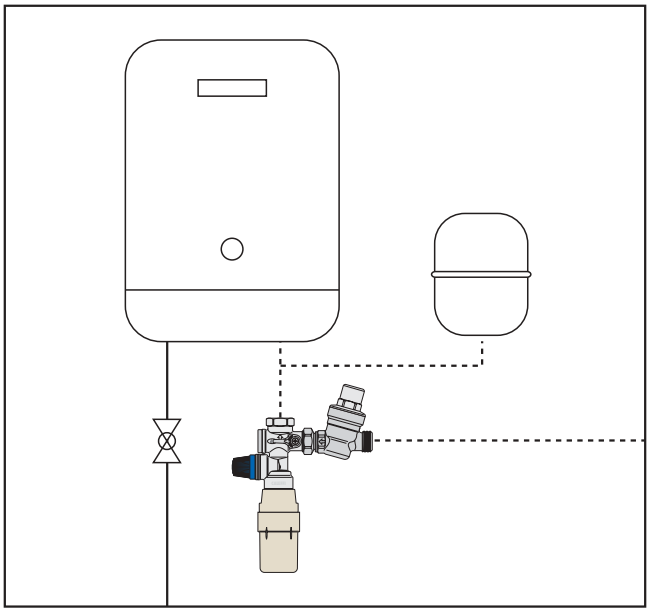
Silent operation
The large chamber on the outlet side of the reducing valve creates a low flow speed zone, which is particularly effective in reducing noise generated by narrowing the width of the passage through which the water flows when the valve is reducing pressure.

Small size
The “inclined” design makes the 533**.** series reducers small in size so that they are easy to fit especially in domestic systems.

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 reduces the probability of scale deposits being formed, the main cause of malfunction.



Use with boiler hydraulic safety groups
The 5331 model is specially designed for use with the Caleffi hydraulic safety groups for hot water storage heaters series 5261. The 3/4" nut provided can be used for an easy direct connection to the hydraulic safety groups.

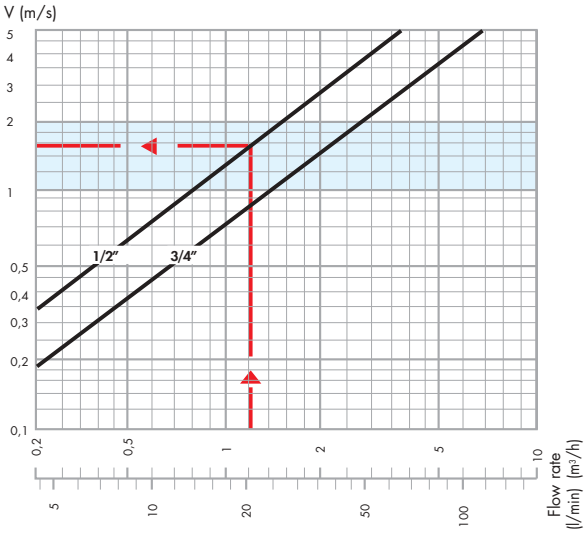


Certifications

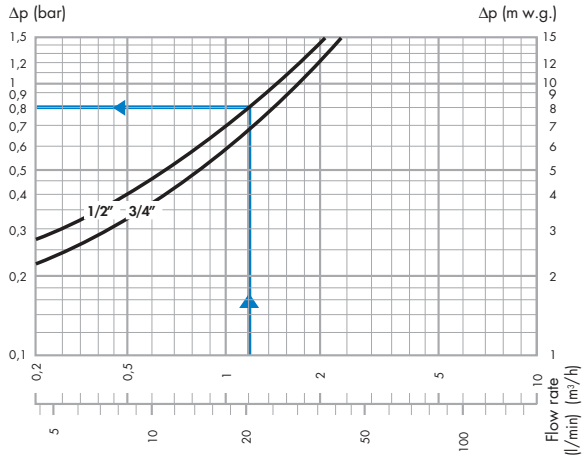
Pressure reducing valves are certified as conforming to UK WBS standards.

Hydraulic characteristics

1 Flow velocity diagram



2 Pressure drop diagram



Under the following conditions *Inlet pressure = 6 bar*
Outlet pressure = 4 bar

Sizing the valve

The flow rates of commonly used appliances in domestic plumbing systems are given below to assist in the selection of the correct valve diameter:

Table of typical flow rates

Bath tub, kitchen sink, dishwashing machine	12 l/min
Shower	9 l/min
Wash basin, bidet, washing machine, w.c. with cistern	6 l/min

The coefficient of simultaneous use must be taken into consideration to avoid selecting a valve that is too large. Basically the fewer the people using the system the lower the probability will be of two appliances being used at the same time.

Table showing simultaneos-use factor as %

Number of appliances	Residential	Community	Number of appliances	Residential	Community	Number 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 steps to take for selecting the correct size are 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:

  One living unit 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 l/min*
  No appliances = 6

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

  Example:

  $G_{ds} = G_{tot} \cdot \% = 51 \cdot 41\ \% = 21$ *l/min*

  It is recommended that flow velocity is kept within 1 to 2 metres per second when calculating the correct reducer size. This will prevent noise in the pipes and rapid wear of appliances.

- The correct diameter of the reducing valve is taken from diagram 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} *= 21 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_{ds} *= 21 l/min* *1/2"* $\Delta p = 0{,}8$ *bar*
  (see indications on diagram 2)

Recommended flow rates

For an average flow velocity of 1,5 m/s, the recommended flow rates for each diameter are as follows:

Diameter	1/2"	Ø 15	3/4"	Ø 22
Flow rate m³/h	1,2	1,2	2,1	2,1
Flow rate l/min	20	20	35	35

installation

1. Turn all taps on before installing the valve to flush the system and expel any air remaining in the pipes.
2. Install shut off valves upstream and downstream from the pressure reducer to facilitate future maintenance operations. The upstream valve may have a check valve incorporated (Caleffi BALLSTOP).
3. Install the pressure reducer in any position.
4. Close downstream shut-off valve.
5. Calibrate it by turning the screw on the top of the plastic cover. Turn it clockwise to increase the pressure and anticlockwise to decrease it.

6. Adjust until the correct pressure is read on the pressure gauge. Series 533**.** reducers are factory set at 3 bar.

Recommendations for installation

1. Installation below ground

Installing pressure reducing valves below ground is not recommended, for three reasons:

- there is a risk of the reducing valve being damaged by frost
- inspection and maintenance is difficult
- reading the pressure gauge is difficult.

2. Water hammering

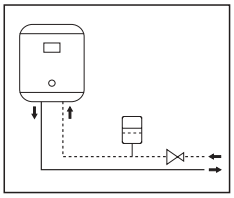
This is one of the main causes of faults in pressure reducers. It is best to fit special devices to absorb water hammering when fitting pressure reducers in systems at risk.

Trouble-shooting

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 not relief of the pressure because the reducing valve is rightly closed. The solution is to install an expansion vessel (between the heater and the reducer) to "absorb" the pressure increase.



2. The reducer does not maintain its calibrated value

In most cases this is the result of impurities that deposit on the valve seat causing leakage with a resulting increase in pressure downstream. The solution is to fit a filter upstream from the reducer and subsequently to maintain and clean the extractable cartridge (see *Maintenance*).

Maintenance

Proceed as follows for periodic cleaning of the strainer and inspection or replacement of the cartridge:

1 Shut off the reducer

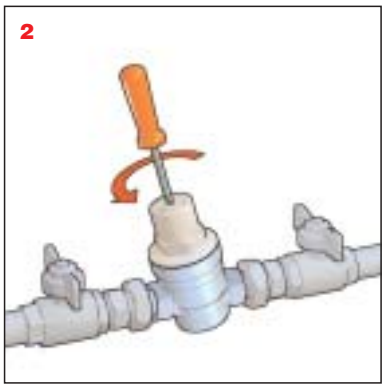
2 Unscrew (anticlockwise) the calibrating screw to decompress the spring inside.

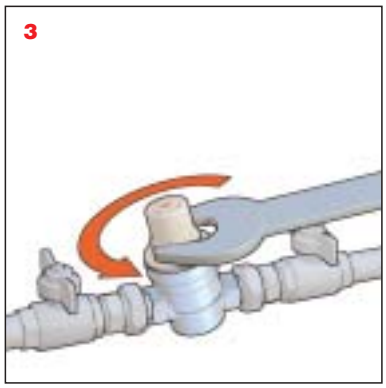
3 Unscrew the cover.

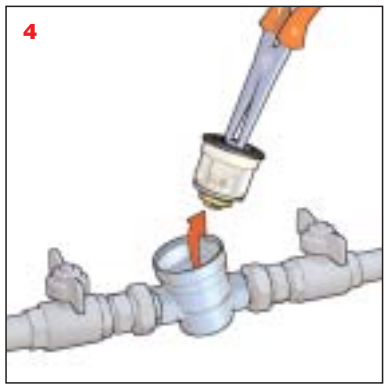
4 Extract the cartridge with the aid of pincers to grip the head of the screw.

5 The cartridge can be fitted back into the valve after inspection and cleaning or alternatively a replacement cartridge can be fitted.

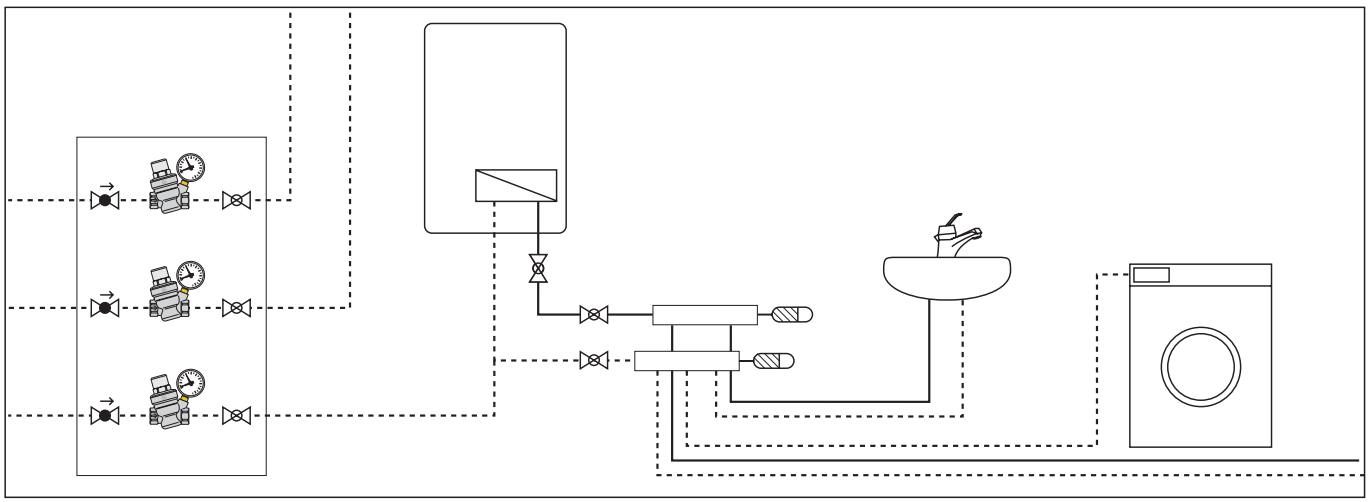
6 Recalibrate the reducer.







Application diagram



SPECIFICATION SUMMARIES

Series 5330

Inclined pressure reducing valve. Threaded connections 1/2" F (or 3/4" F). Brass body. Chrome plated. Control spindle in dezincification resistant alloy. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations.

Series 5331

Inclined pressure reducing valve. Threaded connections 3/4" M and 3/4" F with connecting nut. Brass body. Chrome plated. Control spindle in dezincification resistant alloy. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations.

Series 5332

Inclined pressure reducing valve with pressure gauge. Threaded connections 1/2" F (o 3/4" F). Pressure gauge connection 1/4" F. Brass body. Chrome plated. Control spindle in dezincification resistant alloy. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations. Complete with pressure gauge scale 0÷10 bar.

Series 5334

Inclined pressure reducing valve with pressure gauge connection. Threaded connections 1/2" F (or 3/4" F). Pressure gauge connection 1/4" F. Brass body. Chrome plated. Control spindle in dezincification resistant alloy. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations.

Series 5336

Inclined pressure reducing valve. Connections Ø 15 (or Ø 22). Body and control spindle in dezincification resistant alloy. Chrome plated. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations.

Series 5337

Inclined pressure reducing valve with pressure gauge connection. Connections Ø 15 (or Ø 22). Pressure gauge connection 1/4" F. Body and control spindle in dezincification resistant alloy. Chrome plated. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations.

Series 5338

Inclined pressure reducing valve with pressure gauge. Connections Ø 15 (or Ø 22). Pressure gauge connection 1/4" F. Body and control spindle in dezincification resistant alloy. Chrome plated. Cover in glass fibre reinforced nylon. Diaphragm and seals in NBR. Max. working temperature 65°C. Max. working pressure 16 bar. Downstream pressure calibration range from 1 to 6 bar. Extractable cartridge and filter for maintenance operations. Complete with pressure gauge with 0÷10 bar range.

CALEFFI

CALEFFI S.P.A. · I · 28010 FONTANETO D'AGOGNA (NO) · S.R. 229, N.25 · TEL.INT. +39 0322 8491 R.A. · FAX +39 0322 863723
· Http://www.caleffi.com · E-mail: info@caleffi.it ·