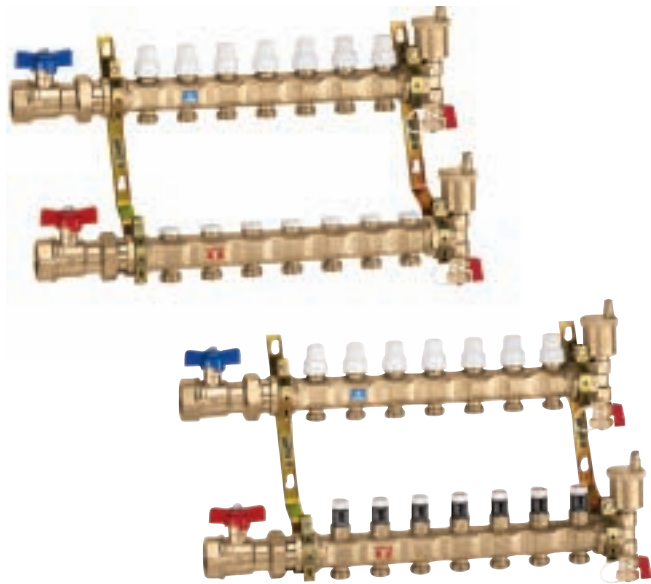


Pre-assembled distribution manifolds for radiant panel systems

series 663 & 668


 cert. n° 0003
ISO 9001


Function

Distribution manifolds for radiant panel systems are used to optimally distribute the heating fluid in floor heating system circuits and ultimately improve the control of heat emission from the panels. The manifolds ensure that the flow to each circuit is regulated precisely and also control the shut-off, venting and automatic removal of air from the system.

Product range

Series 663 Pre-assembled distribution manifold for high temperature and flow systems _____ Sizes 1" and 1 1/4"
Series 668 Pre-assembled distribution manifold for radiant panel systems _____ Sizes 1" and 1 1/4"

Technical specification

Materials:

Supply manifold

- body: brass

Balancing valve for 663 series

- body: brass
- control device upper part: brass
- seal: EPDM

Micrometric balancing valve for 668 series

- body: PA
- control device upper part: brass
- seal: EPDM
- knob: ABS

Return manifold

- body: brass

Shut-off valve

- control device upper part: brass and PA
- stem: stainless steel
- springs: stainless steel
- seals: EPDM
- knob: ABS

Ball valve

- body: brass
- ball: brass, chrome plated
- handle: aluminium

End fitting

- body: brass

Automatic air vent valve

- stem: brass
- spring: stainless steel
- seals: EPDM
- float: PP

Performance:

Medium: water, glycol solutions
Max. percentage of glycol: 50%

Max. working pressure: 150 psi (10 bar)
Max. end fitting discharge pressure: 35 psi (2,5 bar)
Working temperature range: - 668 series: 32 to 176°F (0 to 80°C)
- 663 series: 32 to 210°F (0 to 98°C)

No. adjustment curves for 668 series: 10
Micrometric balancing valve scale for 668 series: 0-10
Turns of balancing valve for 663 series: 0-T.O.
Accuracy: ± 5%

Main connections: 1", 1 1/4" F
Connection centre distance: 7 11/16" (195 mm)

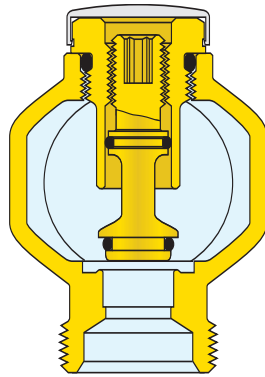
Outlets: 3/4"M (18 mm)
Outlet centre distance: 2" (50 mm)

Construction details

Supply manifold

663 series

Supply manifold has manual balancing valves for regulating flow delivered to system circuits. The balancing is accomplished by turning an hex wrench into the balancing valve in each supply outlet. The chart on page 7 shows the number of turns for reaching the desired value of flow and Δp .

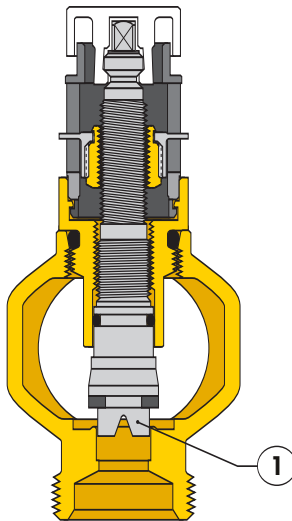


668 series

The micrometric balancing valve is made of plastic (POM) and features an upside down V channel (1) to provide greater precision when regulating the flow delivered to the system circuits.

This solution offers the following advantages with respect to the traditional conically shaped valve:

- greater precision, particularly for the low flow rates usually encountered in radiant system.
- proportional flow rates due to the V channel in the fluid passage.
- the chart on page 7 shows the micrometric graduated scale number for setting the desired value of flow and Δp .

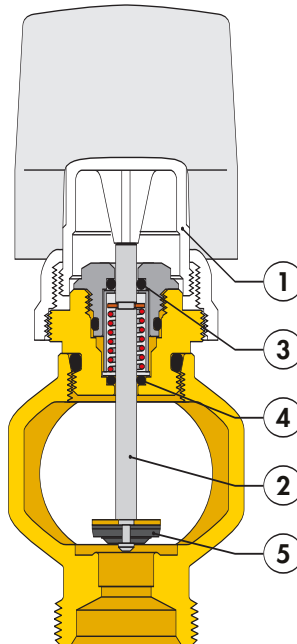


Return manifold

The return manifold is equipped with manual shut-off valves (1) which are used to shut off the flow to individual circuits.

They can also be used with a thermoelectric actuator which, when used with an ambient thermostat, maintains the ambient temperature at the set limits when thermal load varies. The stem (2) is made of polished stainless steel to minimise friction and prevent harmful encrustation from forming. The control device upper part features a double EPDM O-ring seal (3) – (4) on the sliding stem.

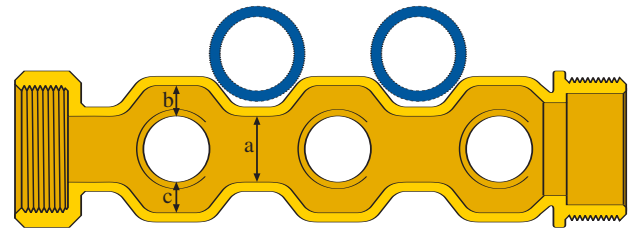
The valve (5) is made of EPDM and is moulded to optimise the hydronic characteristics of the valve and reduce noise to a minimum as the fluid passes through and as it gradually opens and closes when operating with a thermo-electric actuator.



Exterior shape of the manifolds and mounting brackets

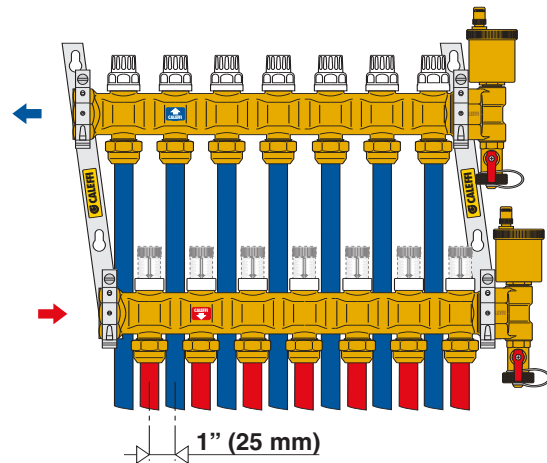
The exterior of the manifold deserves special mention because it can be cast in any shape to meet any requirements.

In the example shown below, indentations have been created in the manifold to correspond to the plastic pipes exiting from the upper manifold, thus partially accommodating the pipes and reducing their overall thickness. This does not interfere with the pressure loss values because the sections with the indentations (a) are equal to the sections in which the pipes are branched (b) and (c) and where the regulating parts (micrometric regulating and shut-off valve) obstruct the passage of the fluid.



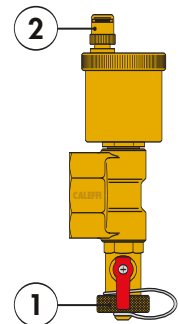
The partial accommodation of the pipes in the indentations created in the manifold is further enhanced by the angle of the mounting brackets, which are slanted to create a 1" (25 mm) offset between the upper and lower manifolds.

As shown in the figure below, this offset positions the pipes so that they perfectly match the profile of the manifold during installation.



End fitting and automatic air vent valve

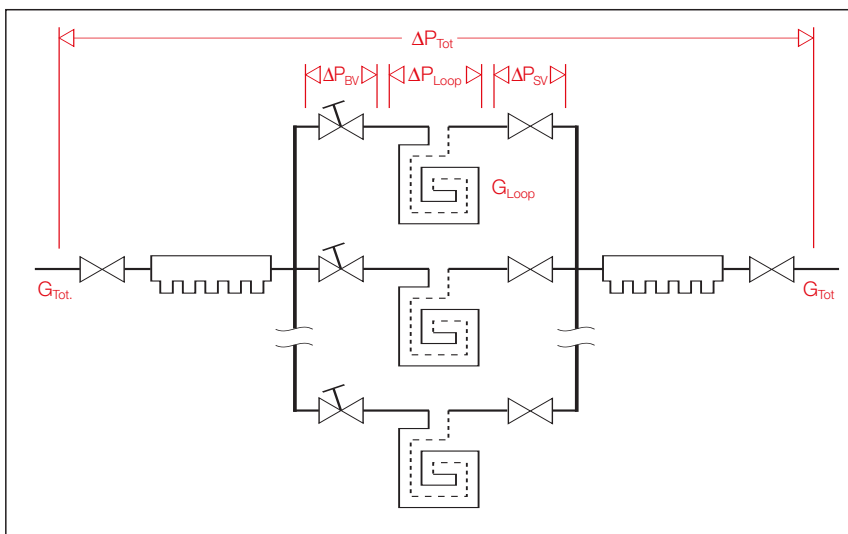
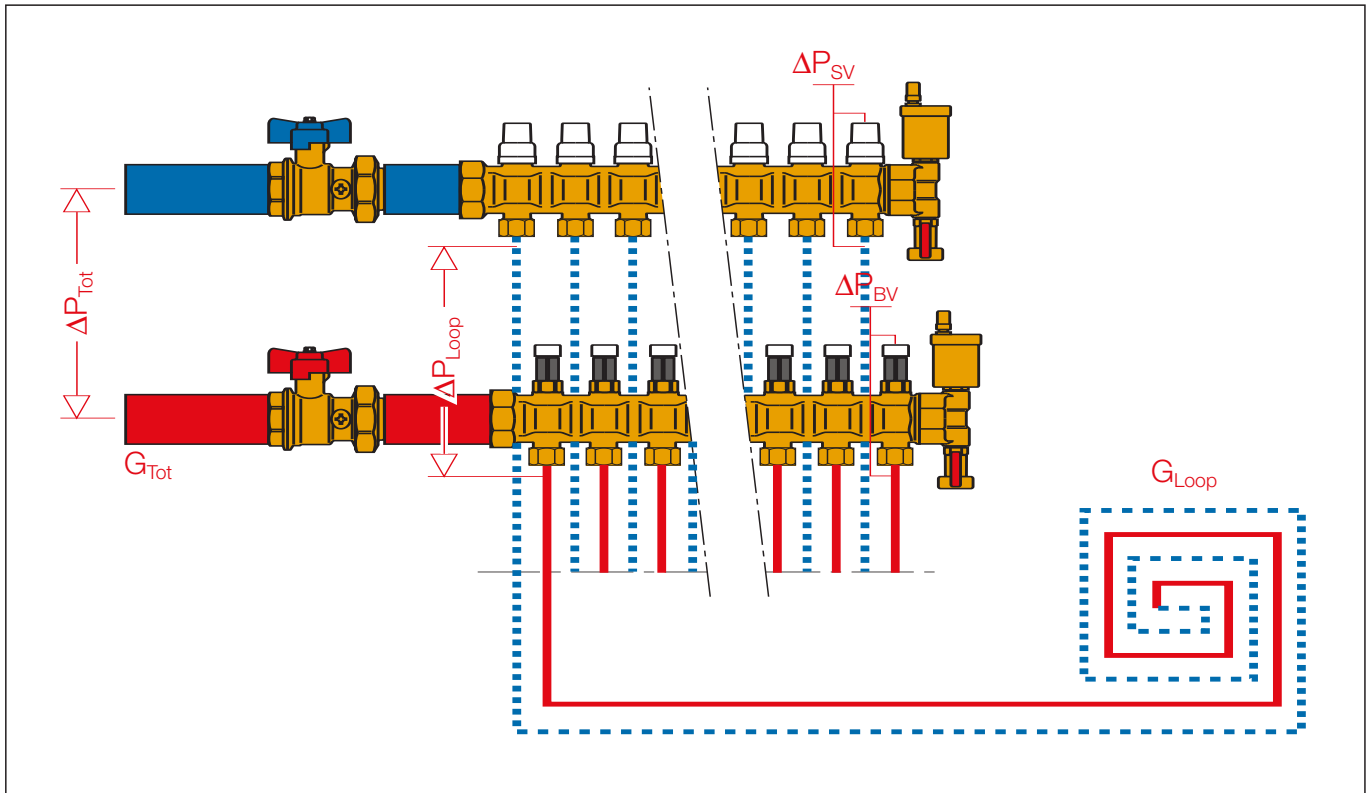
The end fitting consists of a fill/drain cock (1) and an automatic air vent valve with a hygroscopic safety cap (2). It has been specifically designed to close the air vent valve automatically if there is water near the vent itself.



Hydronic characteristics

To determine the hydronic characteristics of the circuit, we must calculate the total pressure loss experienced by the flow of fluid as it passes through the manifold components and the radiant panel circuits.

From a hydronic standpoint, the manifold unit and circuits can be shown as an assembly of hydronic elements that are arranged in series and parallel to each other.



ΔP_{Tot} = Total loss at the manifold heads
(Flow + Return + Loop)

ΔP_{Bv} = Localized loss at the micrometric
balancing valve loop (loop flow)

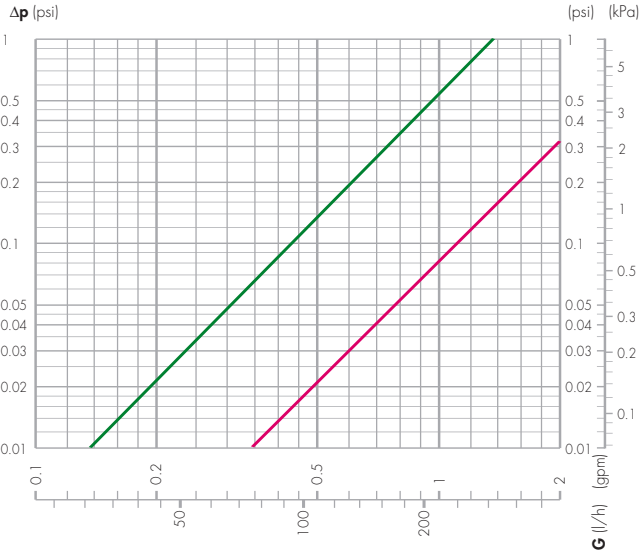
ΔP_{Loop} = Loop loss (loop flow)

ΔP_{Sv} = Localized loss at the shut-off valve in the
panel circuit (loop flow)

$$\Delta P_{Tot} = \Delta P_{Bv} + \Delta P_{Loop} + \Delta P_{Sv} \quad (1.1)$$

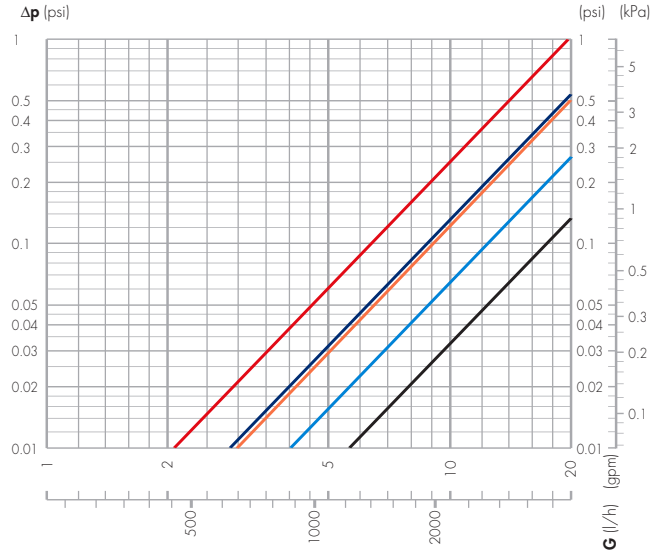
After noting the hydronic characteristics of the individual components and the design flows, the total loss can be calculated as the sum of the partial pressure losses of each specific component in the system, as shown in the formula (1.1).

Note: We can ignore the pressure losses associated with the ball valves and manifolds because their values are so low.
Generally speaking, the total pressure loss is fairly close to the pressure loss of the branched circuit of the panel.



	Cv
Micrometric balancing valve fully open	1.33
Shut-off valve	3.3

Cv = flow in gal/min for a pressure loss of 1 psi



	Cv
Supply manifold 3 to 7 outlets	27.7*
Supply manifold 8 to 13 outlets	19.6*
Return manifold 3 to 7 outlets	38.7*
Return manifold 8 to 13 outlets	27.2*
Ball valve	54.9

* Average value

Example of how to calculate the total pressure loss

Suppose we need to calculate the pressure loss of a manifold with three circuits with the following characteristics:

Total manifold flow: 3.0 gpm (400 l/h)

The characteristics of the three piping loops are as follows:

Loop	Flow (gpm)	Tube length (ft)	Δp (psi)*
1	0.7	150	1.13
2	1.3	300	6.90
3	1.0	300	4.32

*Δp Value for each loop calculated from data published by tubing manufacturers

Each segment of the formula (1.1), is calculated using the following relationship:

$$\Delta P = G^2 / Cv^2$$

- G = flow in gpm
- ΔP = pressure loss in psi
- Cv = flow in gpm through the device in question, with a pressure loss of 1 psi

Important: ΔP_{Tot} must be calculated taking into account the circuit with the greatest pressure losses distributed along the entire piping loop of the panel.

The circuit in question in our example is circuit 2.

Thus:

$$\Delta P_{BV} = 1.3^2 / 1.33^2 = 0.96 \text{ psi}$$

$$\Delta P_{Loop} = 6.9 \text{ psi}$$

$$\Delta P_{SV} = 1.3^2 / 3.3^2 = 0.16 \text{ psi}$$

Using the formula (1.1) we can add all the calculated terms to obtain:

$$\Delta P_{Tot} = 0.96 + 6.90 + 0.16 = 8.02 \text{ psi}$$

Use of the micrometric balancing valve

The micrometric balancing valves balance each individual circuit in the panels so that the actual design flow is obtained in each one. Each individual circuit consists of a micrometric balancing valve, panel piping and shut-off valve. The following information must be taken into account in order to calibrate the system correctly:

- The flow of fluid that must pass through each circuit (design data).
- The pressure loss that occurs in each circuit in accordance with the flow:

$$\Delta P_{\text{Circuit}} = \Delta P_{\text{Loop}} + \Delta P_{\text{SV}} \quad (1.3)$$

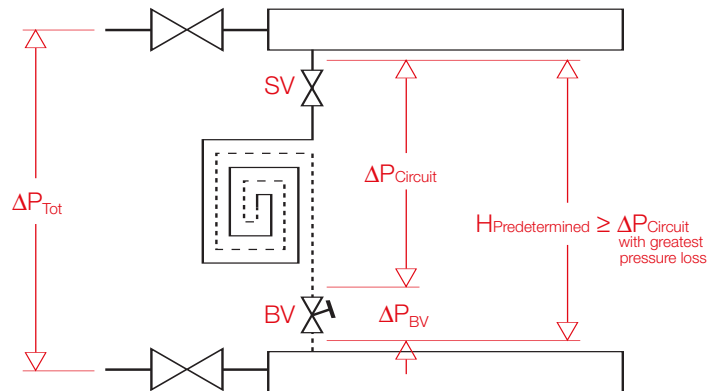
- The available head on the panel circuit or predetermined head:

$$H_{\text{Predetermined}} \geq \Delta P_{\text{Circuit with greatest pressure loss}} = \Delta P_{\text{BV}} + \Delta P_{\text{Loop}} + \Delta P_{\text{SV}} \quad (1.4)$$

In accordance with the passage of the flow G_{Loop} the micrometric valve must ensure an additional pressure loss in all the circuits equal to the difference, indicated as ΔP_{BV} (**ΔP micrometric balancing valve**).

To allow for an eventual increase in flow, the micrometric balancing valve of the circuit with the greatest pressure loss may sometimes be considered as 80% open.

Once the two pieces of information, ΔP_{BV} and G_{Loop} , are known for each circuit, the optimal adjustment curve corresponding to the adjustment position of the valve must be chosen from the graph.



Example of preregulating the valve

Suppose that we need to balance three circuits in the previous example that have the same pressure loss and loop flow characteristics shown in example (1.2):

Since circuit 2 is the greatest pressure loss in the panel piping, the remaining circuits must be adjusted as follows:

Circuit 2

$$\Delta P_{\text{Loop}} = 6.9 \text{ psi}$$

$$G_2 = 1.3 \text{ gpm}$$

$$\Delta P_{\text{MV}} = 1.30^2/1.33^2 = 0.96 \text{ psi}$$

$$\Delta P_{\text{SV}} = 1.30^2/3.3^2 = 0.16 \text{ psi}$$

With the relationship (1.4):

$$\Delta P_{\text{Circuit}} = 6.9 + 0.96 + 0.16 = 8.02 \text{ psi}$$

with greatest pressure loss

Circuit 1

$$\Delta P_{\text{Loop}} = 1.13 \text{ psi}$$

$$G_1 = 0.7 \text{ gpm}$$

$$\Delta P_{\text{SV}} = 0.7^2/3.3^2 = 0.04 \text{ psi}$$

with the relationship (1.3):

$$\Delta P_{\text{Circuit}} = 1.13 + 0.04 = 1.17 \text{ psi}$$

Circuit 3

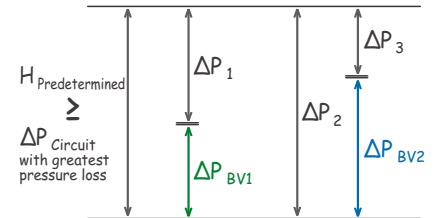
$$\Delta P_{\text{Loop}} = 4.32 \text{ psi}$$

$$G_3 = 1.0 \text{ gpm}$$

$$\Delta P_{\text{SV}} = 1^2/3.3^2 = 0.09 \text{ psi}$$

with the relationship (1.3):

$$\Delta P_{\text{Circuit}} = 4.32 + 0.09 = 4.41 \text{ psi}$$



$$H_{\text{Predetermined}} \geq \Delta P_{\text{Circuit with greatest pressure loss}} = 8.02 \text{ psi}$$

To adjust circuits 1 and 3, we need the following information to determine the adjustment position of the micrometric valves:

Loop 1

$$\Delta P_{\text{BV1}} = 8.02 - 1.17 = 6.85 \text{ psi}$$

$$G_1 = 0.7 \text{ gpm}$$

Adjustment position ~ 3

Loop 2

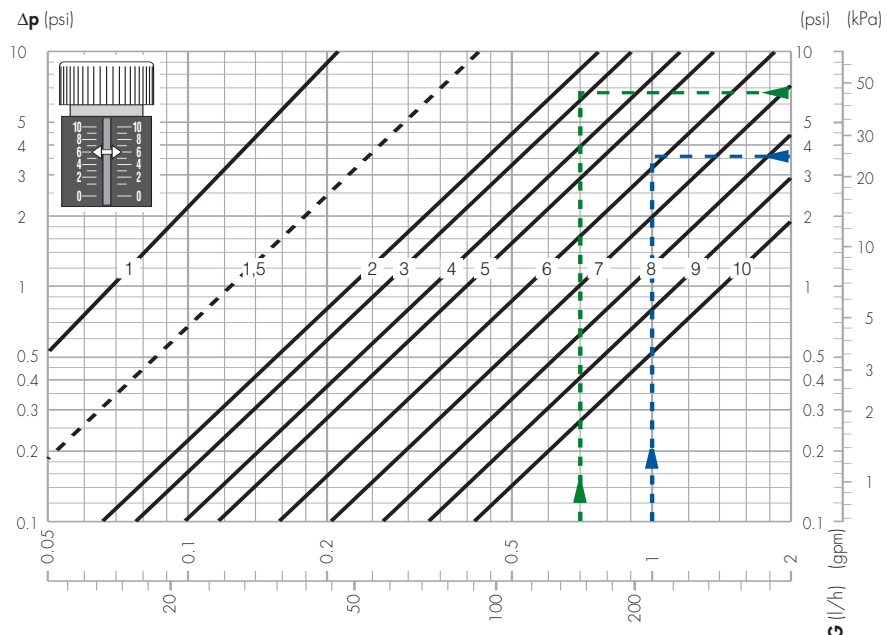
Adjustment position completely open

Loop 3

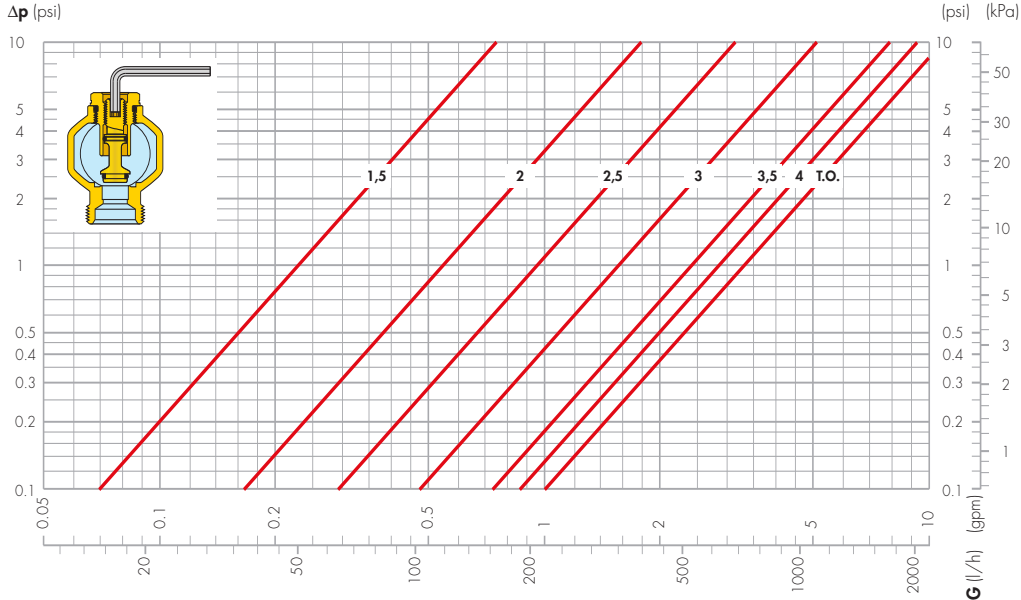
$$\Delta P_{\text{BV3}} = 8.02 - 4.41 = 3.61 \text{ psi}$$

$$G_3 = 1 \text{ gpm}$$

Adjustment position ~ 6



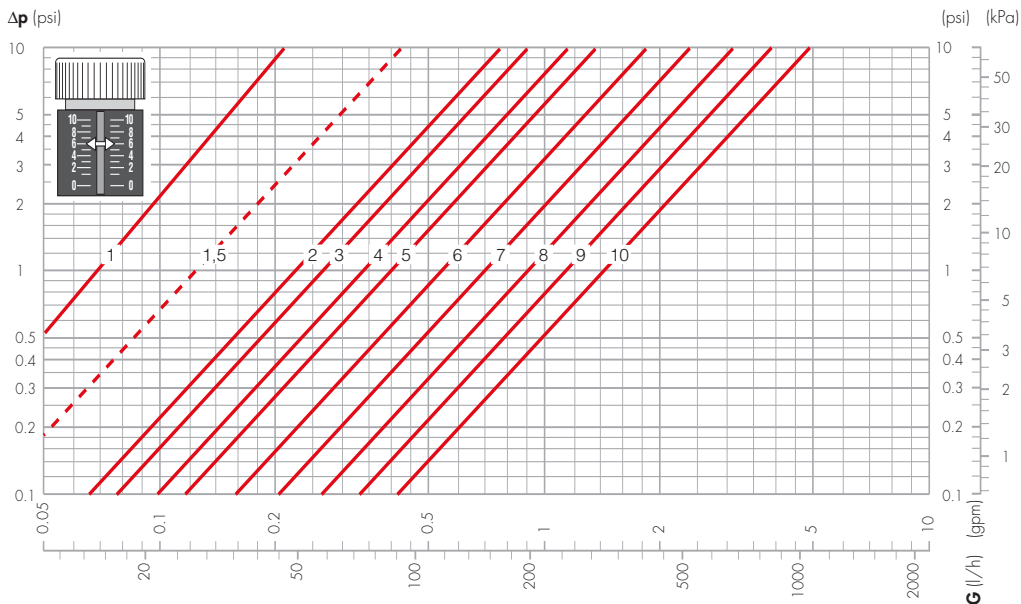
Hydronic characteristics of supply manifold for 663 series



Adjustment turns	Cv
1.5	0.25
2	0.55
2.5	1.0
3	1.7
3.5	2.5
4	3.0
T.O.	3.2

Cv = flow in gal/min for a pressure loss of 1 psi

Hydronic characteristics of the supply manifold's micrometric valve for 668 series



Adjustment position	Cv
1	0.069
1.5	0.104
2	0.208
3	0.243
4	0.312
5	0.358
6	0.486
7	0.613
8	0.809
9	1.029
10	1.330

Cv = flow in gal/min for a pressure loss of 1 psi

SPECIFICATION SUMMARIES

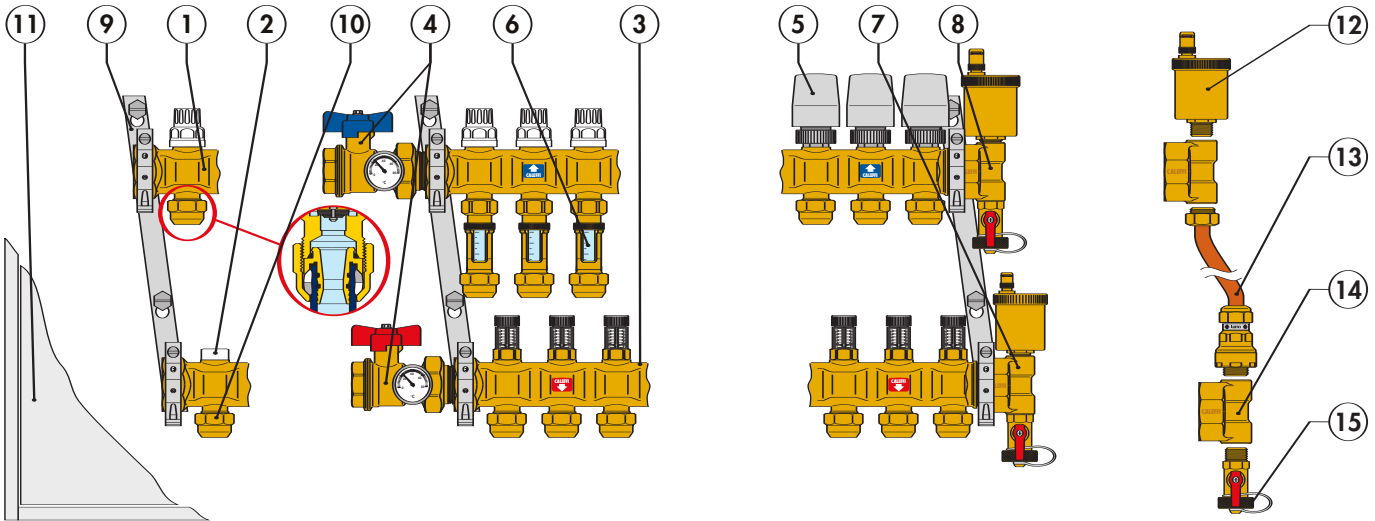
Series 663

Pre-assembled distribution manifold for radiant panel systems with 3 to 13 outlets. Brass body. EPDM seals. 1" (1" and 1 1/4") threaded F connections. 3/4" M outlet connections. Medium: water, glycol solutions. Maximum percentage of glycol: 50%. Maximum working pressure 150 psi (10 bar). Temperature range 32 to 210°F (0 to 98°C). End fitting maximum discharge pressure 35 psi (2.5 bar). Consists of: Supply manifold; Return manifold complete with shut-off valves for use with thermo-electric actuator; Pair of end fittings consisting of a fitting with automatic air vent and drain cock; Pair of shut-off ball valves; Pair of mounting brackets.

Series 668

Pre-assembled distribution manifold for radiant panel systems with 3 to 13 outlets. Brass body. EPDM seals. 1" (1" and 1 1/4") threaded F connections. 3/4" M outlet connections. Medium: water, glycol solutions. Maximum percentage of glycol: 50%. Maximum working pressure 150 psi (10 bar). Temperature range 32 to 176°F (0 to 80°C). End fitting maximum discharge pressure 35 psi (2.5 bar). Consists of: Supply manifold complete with micrometric balancing valves with graduated scale from 1 to 10. Accuracy $\pm 5\%$; Return manifold complete with shut-off valves for use with thermo-electric actuator; Pair of end fittings consisting of a fitting with automatic air vent and drain cock; Pair of shut-off ball valves; Pair of mounting brackets.

MANIFOLDS AND ACCESSORIES



1. Supply manifold complete with shut-off valves, series 666
2. Supply manifold complete with balancing valves, series 663
3. Return manifold complete with micrometric balancing valves, series 667
4. Shut-off ball valve, series 391
5. Thermo-electric actuator, series 656
6. Flow meter, code 669050
7. End fitting complete with automatic air vent valve
8. End fitting complete with automatic air vent valve

9. Pair of mounting brackets, code 658100
10. DARCAL fitting, series 680
11. Inspection wall box, series 659
12. Automatic air vent valve, code 502043
13. Differential bypass kit, code 668000
14. Double radial end fitting, code 599474
15. Drain cock, code 538402 FD

Flow meter series 669



Function

The flow meter is a device that is mounted on the return manifold of panel systems. It instantaneously displays the actual flow values in each individual circuit during the balancing phase, making the balancing operations of the system easier and more accurate.

Patented

Product range

Code 669050 Flow meter _____ Size 3/4"

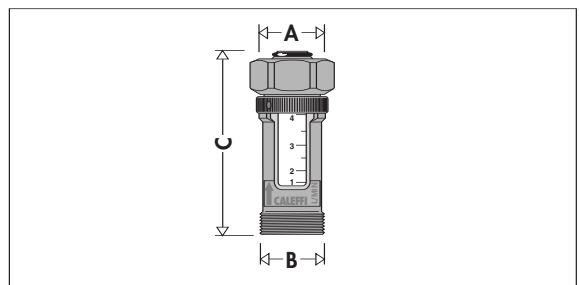
Technical specification

Materials: - body: brass
 - measuring spring: stainless steel
 - seals: EPDM
 - transparent cylinder and internal protection: PSU
 - float-indicator: POM/PTFE

Medium: water, glycol solutions
 Max. percentage of glycol: 50%
 Max. working pressure: 85 psi (6 bar)
 Temperature range: 41 to 210°F (5 to 98°C)
 Flow measurement scale: 1 to 4 l/min
 Accuracy: ± 10%

Dual readout scale
 Connections: 3/4" M x 3/4" F nut

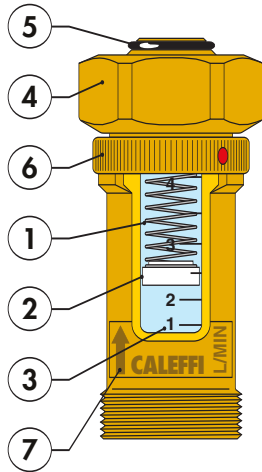
Dimensions



Code	A	B	C	Weight (lb)
669050	3/4"	3/4"	2 3/4"	0.32

Operating principle

A spring (1) connected to a float (2) is located inside the flow meter. The force applied by the water to the float as it flows through the flow meter is countered in proportion to the force applied by the spring. When the flow becomes stabilised at a particular value, the float reaches a specific position of equilibrium which also serves as an indicator. The system is balanced by moving the balancing valve on the supply manifold until it corresponds to the design flow, which can be read on the graduated scale printed on the transparent cylinder (3). The flow (l/min) readout value corresponds to the lower edge of the float.



Installation

The flow meter must always be installed in a vertical position on return manifold with the flow indication arrow pointing up (7) to ensure the greatest accuracy when measuring the flow.

Construction details

Easy installation

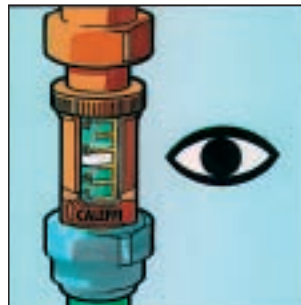
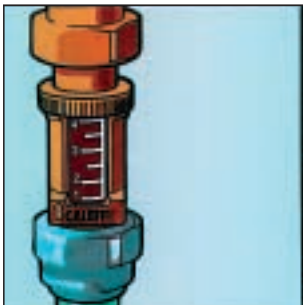
The flow meter is equipped with a captive nut (4) that is mounted onto the manifold and sealed with an O-ring (5) mounted on the tail piece. The captive nut solution simplifies assembly because it allows the flow meter to be mounted at the front of the manifold without having to change the optimal readout position.

Dual readout scale

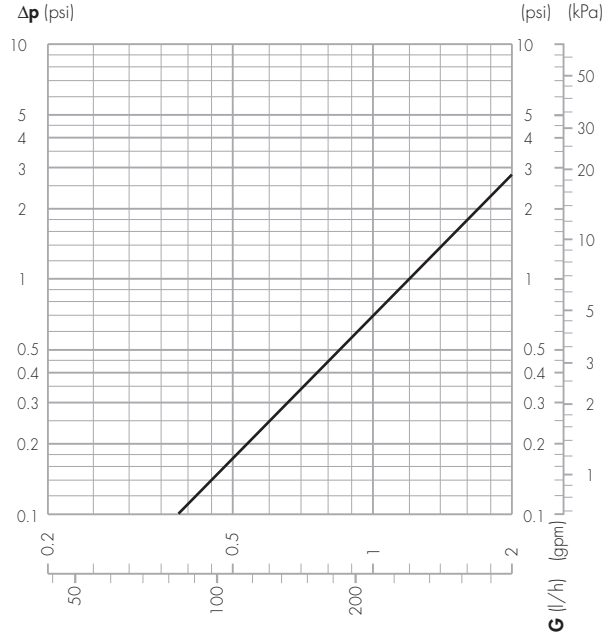
The flow meter is equipped with a spare graduated scale that can be used if flow needs to be checked or the system rebalanced but the float can no longer be seen due to deposits on the transparent cylinder.

Turning the knurled nut (6) to the left will bring into view another scale in yellow that always stays clean due to the hermetic seal that prevents water from entering while the system is operating.

The nut must be returned into the original position on the white scale after reading the measurement.



Hydronic characteristics



Cv = 1.16

Cv = flow in gal/min for a pressure loss of 1 psi

SPECIFICATION SUMMARIES

Series 669

Flow meter with float. 3/4" M x 3/4" F nut threaded connections. Brass body, stainless steel measuring spring, EPDM seals, transparent cylinder and internal protection in PSU, float-indicator in POM/PTFE. Medium: water and glycol solutions. Maximum percentage of glycol 50%. Maximum working pressure: 85 psi (6 bar). Temperature range 41 to 210°F (5 to 98°C). Flow measurement: 0.25 to 1.0 gal/min (1–4 l/min). Accuracy ± 10%. Dual readout scale 1 to 4 l/min.

Fitting with self-adjusting diameter for PEX and PEX-AL-PEX pipes series 680

DARCAL



Function

The self-adjusting fitting for PEX and PEX-AL-PEX pipes is a mechanical device that allows the pipes, the radiant panel system circuits and the manifolds to be connected easily and securely. This versatile fitting has been specifically designed to adapt to the varying pipe diameter tolerances.

Patented

Product range

Series 6805 . . . Self-adjusting fitting for PEX and PEX-AL-PEX pipes _____ Size 3/4"

Technical specification

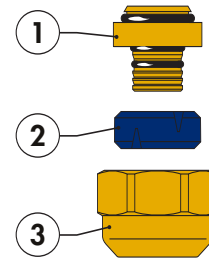
Materials:- nut: brass
 - adapter: brass
 - seals: EPDM
 - insulation ring: EPDM
 - olive: PA

Medium: water, glycol solutions
 Max. percentage of glycol: 50%

Max. working pressure: 150 psi (10 bar)
 Temperature range: 41 to 210°F (5–98°C) (PEX)
 41 to 122°F (5–50°C) (PEX-AL-PEX)

Characteristic components

- 1) Adapter
- 2) Olive
- 3) Nut



Code	Thread size	PEX size	Ø _{inside}	Ø _{outside}
680503A	3/4"	3/8"	8.5–9	12–14
680504A	3/4"	1/2"	11.5–12	14–16
680555A	3/4"	5/8"	14.5–15	18–20
680505A	3/4"	3/4"	17	22,5

Construction details

Versatility of pipe-fitting

This fitting has been specifically designed to adapt to several pipe diameters. The large variety of PEX and PEX-AL-PEX pipes available on the market and the wide range of permissible tolerances have made it necessary to find an innovative solution for mechanical fittings. While maintaining the nominal dimensions of the fittings currently available on the market, this new solution has been constructed so that the same fitting can be used for pipes with differences on external diameters of up to 2 mm and differences on internal diameters of up to 0.5 mm.

Resistance to pull out

This adapter offers a high degree of resistance to pull out of pipe. Its special clamping system makes it suitable for every application and ensures a leak tight fit.

Low pressure losses

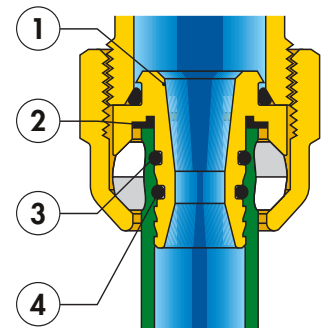
The internal profile of the adapter (1) has been shaped to obtain a Venturi effect when the fluid passes through, reducing pressure losses by 20% compared to those created by passages with a similar diameter.

Insulation ring

The fitting is equipped with a rubber insulation element (2) to prevent contact between the aluminium in PEX-AL-PEX pipe and the brass fitting, thus preventing galvanic corrosion generated by the two different metals.

Dual O-ring seal

The adapter is equipped with two O-ring seals (3) and (4) in EPDM to prevent leaks even when operating at high pressure.



SPECIFICATION SUMMARIES

Series 680

Self-adjusting fitting for PEX and pex-al-pex pipes with internal Venturi effect profile to limit pressure losses. 3/4" F connection. Brass nut and adapter, EPDM seals, EPDM insulation ring, PA olive coupling. Medium: water and glycol solutions. Maximum percentage of glycol: 50%. Maximum working pressure: 150 psi (10 bar). Temperature range: 41 to 210°F (5 to 98°C) (PEX); 41 to 122°F (5 to 50°C) (PEX-AL-PEX).

Off-center differential bypass assembly with fixed setting code 668000



Function

The distribution circuits of the heating fluid in radiant panel systems may be totally or partially shut off by closing the thermo-electric valves inside the manifolds.

When the flow decreases, the differential pressure inside the circuit may rise to levels that could cause problems with noise, high rates of fluid speed, mechanical erosion and hydronic imbalance of the system itself. The differential bypass kit for series 663 or 668 manifolds maintains the pressure of the supply and return manifold circuits in balance if the flow changes. The valve can be quickly connected to the series 663 or 668 manifolds, reducing overall size to a minimum.

Product range

Code 668000 Off-center differential bypass assembly with fixed setting _____ Size 1/2" x 1/2"

Technical specification

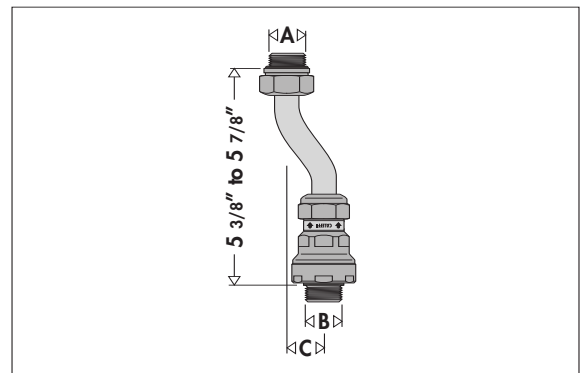
Materials: - body:	brass
- nuts:	brass
- pipe with plate:	copper
- check valve:	PA
- spring:	stainless steel
- seals:	EPDM
- gaskets:	asbestos-free fibre

Medium: water, glycol solutions
 Max. percentage of glycol: 50%

Max. working pressure: 150 psi (10 bar)
 Temperature range: 14÷230°F (-10 to 110°C)
 Fixed setting pressure: 3.6 psi (2500 mm w.g.)

Connections: 1/2" M x 1/2" M

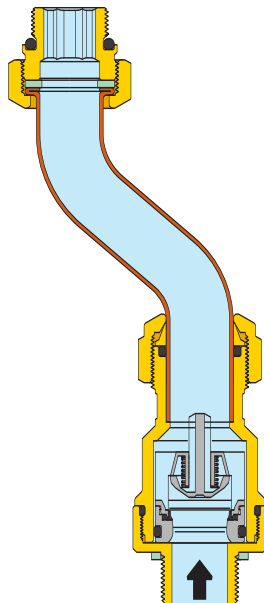
Dimensions



Code	A	B	C	Weight (lb)
668000	1/2"	1/2"	1 3/8"	0.74

Operating principle

The by-pass valve contains a check valve connected to a contact spring. When the fixed setting pressure is reached, the valve obturator gradually opens, recirculating the flow in proportion to the closing of the thermo-electric valves and maintaining a constant differential pressure in the manifold circuit.

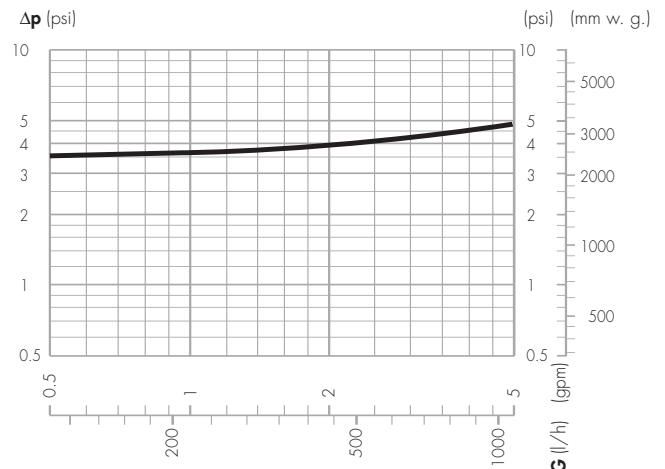


Construction details

The differential bypass assembly features a fixed setting that cannot be changed because it does not contain accessible adjustment parts. The small, compact size and offset connections makes this kit particularly easy to mount after installing thermo-electric valves on the manifold. It does not require a larger or deeper zone box than those used for normal manifolds.

Hydronic characteristics

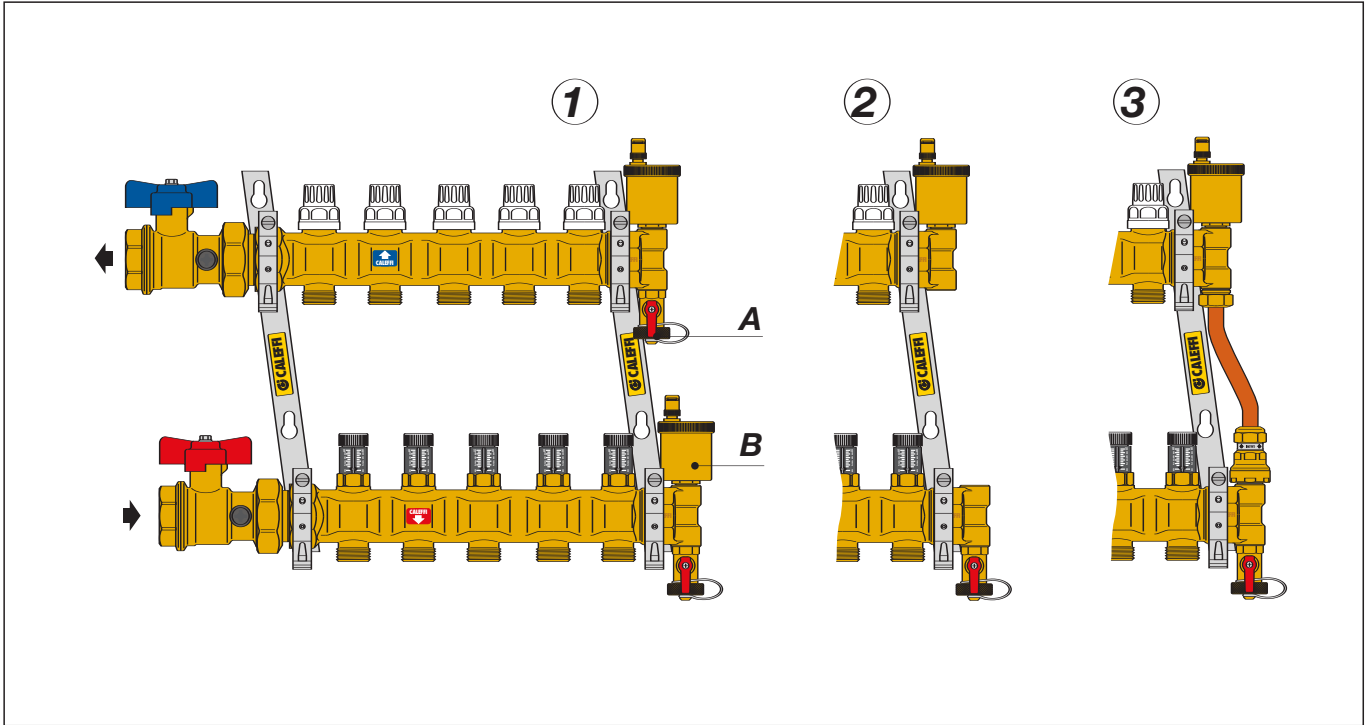
Bypass differential pressure: 3.6 psi (2500 mm w.g.)



Installation of the differential bypass valve on series 663 and 668 manifolds

The differential bypass on series 663 or 668 manifolds is mounted by following the procedure below:

- 1) Remove the drain cock (A) on the upper manifold.
- 2) Remove the automatic air vent (B) on the lower manifold.
- 3) Install the differential bypass (code 668000) on the upper manifold and the lower manifold.



SPECIFICATION SUMMARIES

Code 668000

Off-center bypass assembly with fixed setting. 1/2" M threaded connections. Brass body and nuts. Copper pipe. PA check valve, stainless steel spring, EPDM seals, asbestos-free fibre gaskets. Medium: water and glycol solutions. Maximum percentage of glycol: 50%. Maximum working pressure: 150 psi (10 bar). Temperature range: 14÷230°F (-10 to 110°C). Fixed setting pressure: 3.6 psi (2500 mm w.g.).

Manifolds



666

Return distribution manifold complete with shut-off valves suitable for thermo-electric actuators.

Code	Connections	N. outlets	Outlets
666735	1 1/4" F	x 3	3/4" M
666745	1 1/4" F	x 4	3/4" M
666755	1 1/4" F	x 5	3/4" M
666765	1 1/4" F	x 6	3/4" M
666775	1 1/4" F	x 7	3/4" M
666785	1 1/4" F	x 8	3/4" M



663

Supply distribution manifold complete with balancing valves for flow regulation.

Code	Connections	N. outlets	Outlets
663130	1 1/4" F	x 3	3/4" M
663140	1 1/4" F	x 4	3/4" M
663150	1 1/4" F	x 5	3/4" M
663160	1 1/4" F	x 6	3/4" M
663170	1 1/4" F	x 7	3/4" M
663180	1 1/4" F	x 8	3/4" M



667

Supply distribution manifold complete with micrometric balancing valves for flow regulation.

Code	Connections	N. outlets	Outlets
667735	1 1/4" F	x 3	3/4" M
667745	1 1/4" F	x 4	3/4" M
667755	1 1/4" F	x 5	3/4" M
667765	1 1/4" F	x 6	3/4" M
667775	1 1/4" F	x 7	3/4" M
667785	1 1/4" F	x 8	3/4" M

Technical specification

Materials:

Return manifold

- body: brass

Shut-off valve

- control device upper part: brass and PA
 - stem: stainless steel
 - springs: stainless steel
 - seals: EPDM
 - knobs: ABS

Supply manifold

- body: brass

Balancing valve for 663 series

- body: brass
 - control device upper part: brass
 - seal: EPDM

Micrometric balancing valve only for 668

- body: PA
 - control device upper part: brass
 - seal: EPDM
 - knob: ABS

Max. working pressure: 150 psi (10 bar)

Working temperature range:

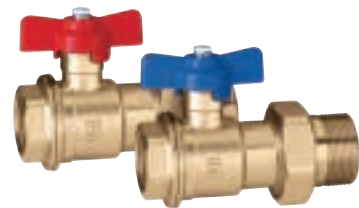
- for 663 series: 32 to 210°F (0 to 98°C)
 - for 667 series: 32 to 176°F (0 to 80°C)

Main connections: 1 1/4" F x M

Outlets: 3/4" M

Outlet centre distance: 2" (50 mm)

Shut-off valves



391

Pair of ball valves (1 supply & 1 return).
 Female-male connections with union.
 Max. working pressure: 150 psi (10 bar).
 Max. working temperature: 212°F (100°C).

Code

391167A	1" NPT	x 1 1/4" union straight threaded connections
391077	1 1/4" NPT	x 1 1/4" union straight threaded connections

Thermo-electric actuators



6561

Thermo-electric actuator.
For series 666 and 668 manifolds.
Normally closed.

Code	Voltage (V)
656104	24
656114 With auxiliary microswitch	24



6563

Thermo-electric actuator.
For series 666 and 668 manifolds.
Normally closed.
With manual open handle.
With green open indicator.

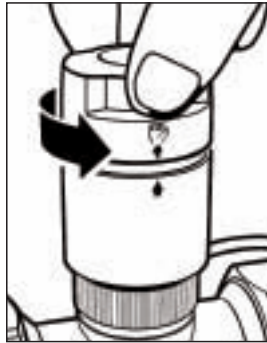
Code	Voltage (V)
656304	24
656314 With auxiliary microswitch	24

Using the knob to open the valve manually:

Turn the knob on the top of the actuator counter-clockwise until the open position (the arrow symbols and the hand symbol lined up).

To close the valve manually and restore automatic operation of the device, turn the knob clockwise to "AUTO".

Note: On the series equipped with an auxiliary microswitch, in the manual opening position the micro contact is closed.



Technical specification

- Materials: - protection shell self-extinguishing polycarbonate
- color white
version with micro: grey
- Normally closed
- Electric supply: 24 V (ac)
- Starting current: 800 mA
- Working current: 24 V (ac) - 140 mA
- Power consumption: 3 W
- Auxiliary microswitch contacts rating: 5 A
- Protection class: - 6561 series: IP 44 (in vertical position)
- 6563 series: IP 40 (in vertical position)
- Double insulation construction: CE
- Max. ambient temperature: 122°F (50°C)
- Operating time: opening and closing from 120 s to 180 s
- Length of supply cable: 31 1/2" (0,8 m)

Mounting brackets



658

Pair of mounting brackets for use with boxes 659 series or for direct fixing.
Complete with screws and fixings.

Code	
658100	for manifolds series 663, 666, 667 and 668

Automatic air vent valve



502043

Automatic air vent valve.
Hot forged brass.
Max. working pressure: 150 psi (10 bar).
Max. pressure loss: 35 psi (2,5 bar).
Max. working temperature: 230°F (110°C).

Code	
502043	1/2" M

Fittings



5994

Double radial end fitting.

Code	
599474*	1 1/4" F x 1/2" F x 1/2" F

* For use with kit 668000



386

Screw plug with nut for manifold outlets.

Code	
386500	3/4"

Drain valve



538

Drain valve with tap.
Max. working pressure: 150 psi (10 bar).
Max. working temperature: 230°F (110°C).

Code	
538402 FD	1/2" M x 3/4" M

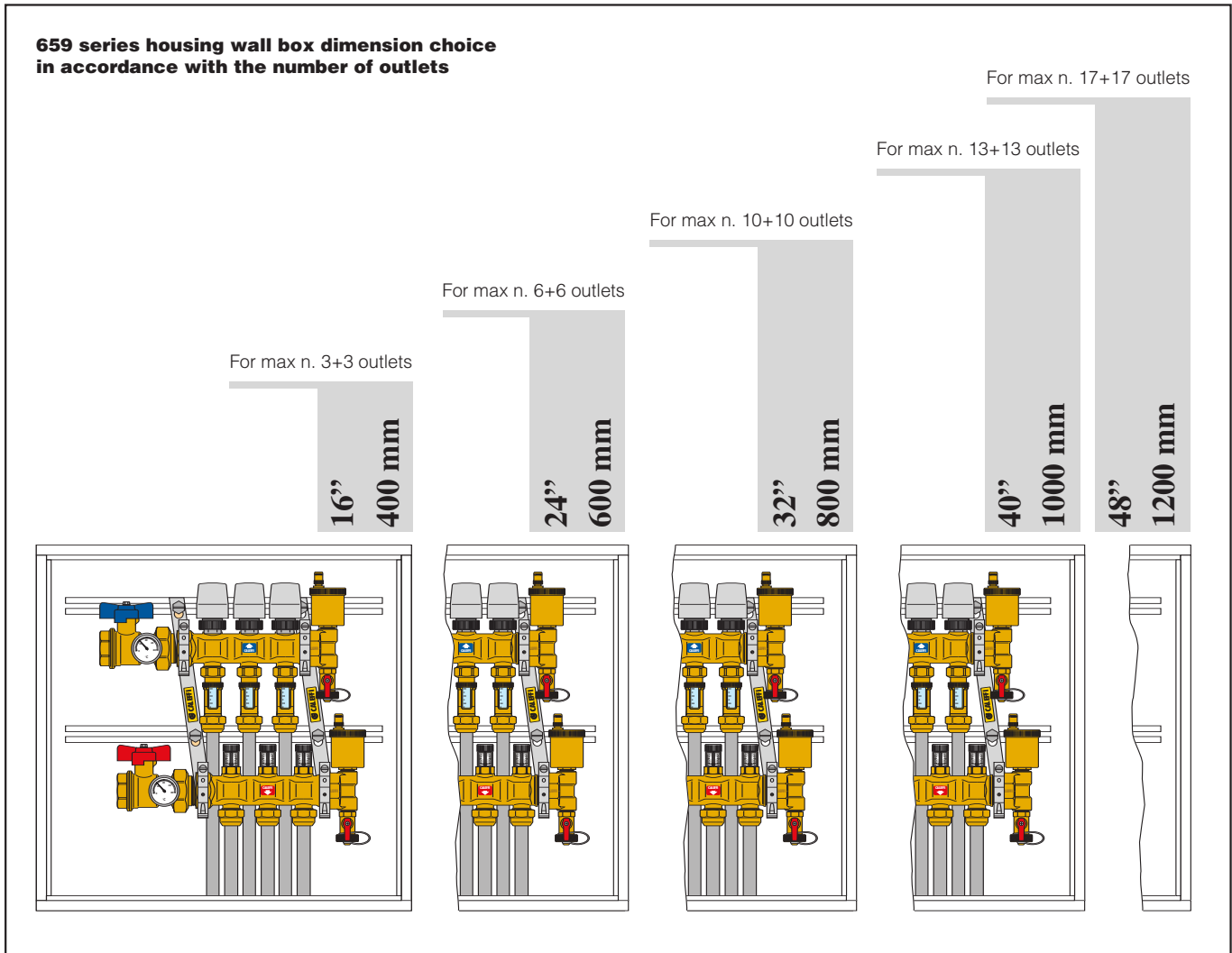
Box



659

Housing wall box for manifold systems.
 With lock.
 In painted 18 gage sheet steel.
 Adjustable depth from 4 3/8" to 5 1/2" (110 to 140 mm).
 For manifolds series 663 and 668.

Code	in (h x w x d)	mm (h x w x d)	Max number of outlets
659040	18" x 16" x 4 3/8" to 5 1/2"	450 x 400 x 110 to 140	3
659060	18" x 24" x 4 3/8" to 5 1/2"	450 x 600 x 110 to 140	6
659080	18" x 32" x 4 3/8" to 5 1/2"	450 x 800 x 110 to 140	10
659100	18" x 40" x 4 3/8" to 5 1/2"	450 x 1000 x 110 to 140	13
659120	18" x 48" x 4 3/8" to 5 1/2"	450 x 1200 x 110 to 140	17



We reserve the right to change our products and their relevant technical data, contained in this publication, at any time and without prior notice.



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