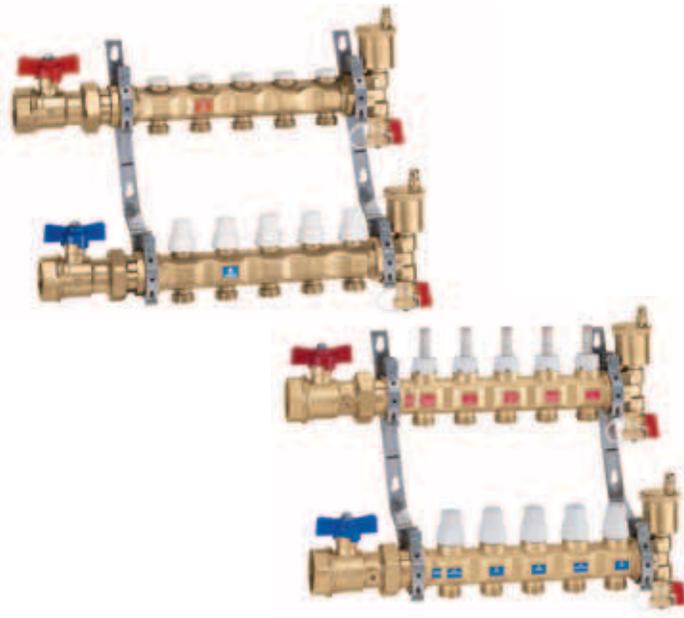


Pre-assembled distribution manifolds for radiant panel systems

series 663 & 668S1


 BSI EN ISO 9001:2000
 Cert. n° FM 21654

 UNI EN ISO 9001:2000
 Cert. n° 0003


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 1/4"
 Series 668S1 TwistFlow™ pre-assembled distribution manifold for radiant panel systems _____
 with built-in sight flow gage/balancing valve _____ 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

Flow rate regulating valve for 668S1 series

- control device upper part: brass
 - valve plug: brass
 - flow meter body: PSU
 - spring: stainless steel
 - seals: EPDM
 - regulating unit cover: 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%

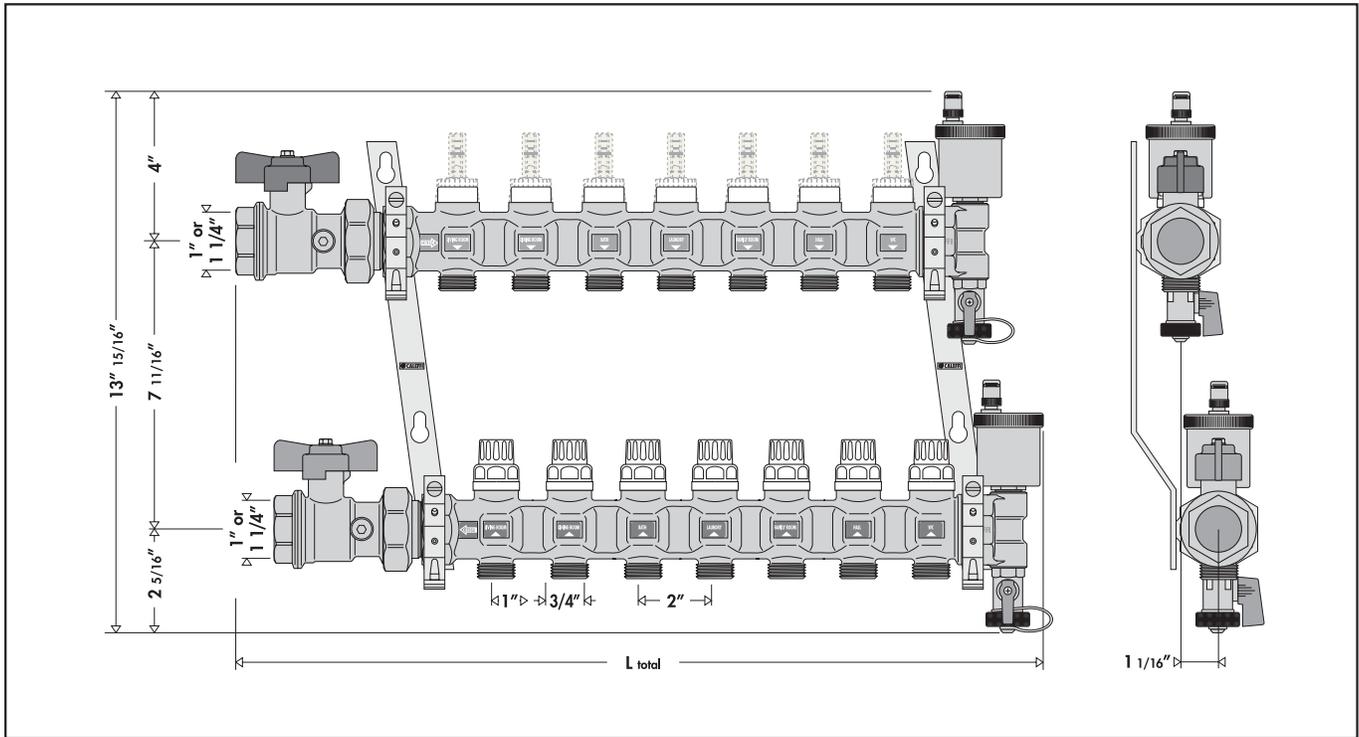
Max. working pressure: 150 psi (10 bar)
 Max. air vent discharge pressure: 35 psi (2.5 bar)
 Working temperature range: - 668S1 series: 32 to 180°F (0 to 80°C)
 - 663 series: 32 to 210°F (0 to 98°C)

Flow meter scale for 668S1 series: 1/4–2 GPM - (1–8 l/min)
 Accuracy: ±15%

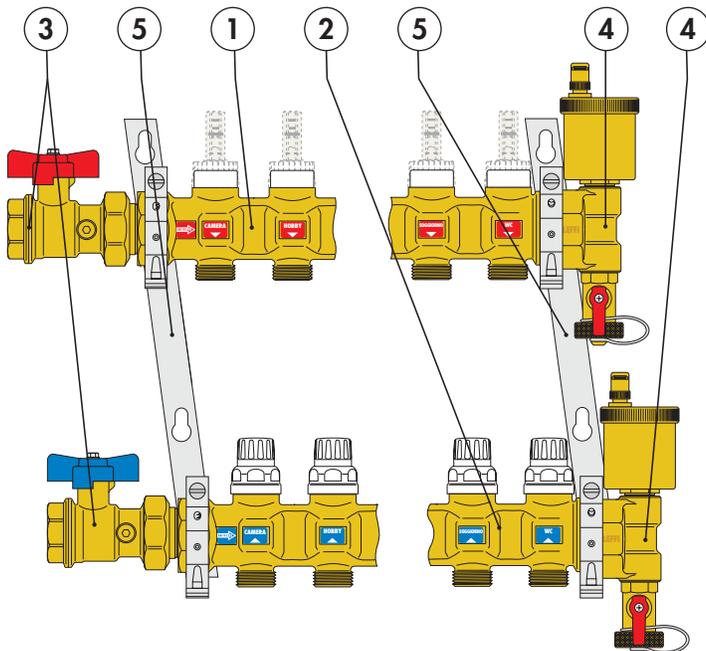
Main connections: 1", 1 1/4" F
 Connection center distance: 7 11/16" (195 mm)

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

Dimensions



Code (1 1/4")	6637C5A	6637D5A	6637E5A	6637F5A	6637G5A	6637H5A	6637I5A	6637L5A	6637M5A	6637N5A	6637O5A
Code (1")	6686C5S1A	6686D5S1A	6686E5S1A	6686F5S1A	6686G5S1A	6686H5S1A	6686I5S1A	6686L5S1A	6686M5S1A	6686N5S1A	6686O5S1A
Code (1 1/4")	6687C5S1A	6687D5S1A	6687E5S1A	6687F5S1A	6687G5S1A	6687H5S1A	6687I5S1A	6687L5S1A	6687M5S1A	6687N5S1A	6687O5S1A
No. outlets	3	4	5	6	7	8	9	10	11	12	13
Total length	15 3/16"	17 1/8"	19"	21"	23"	25	28 1/8"	30 1/8"	32 1/16"	34 1/16"	36"
Weight (lb)	16.1	17.3	18.5	20.9	22.5	23.6	25.4	27.1	28.9	30.4	32.2



Characteristic components

- 1** Supply manifold (complete with balancing valves only for 663 series).
Supply manifold (complete with with flow meters and built-in flow rate balancing valves only in TwistFlow 668S1 series).
- 2** Return manifold complete with shut-off valves that can be used with thermo-electric actuators.
- 3** Pair of shut-off ball valves (complete with port for optional temperature gauge only for 1 1/4" version).
- 4** End fittings consisting of a 3-way end fitting, automatic air vent valve and drain cock.
- 5** Pair of mounting brackets for use with series 659 boxes or direct wall installation.

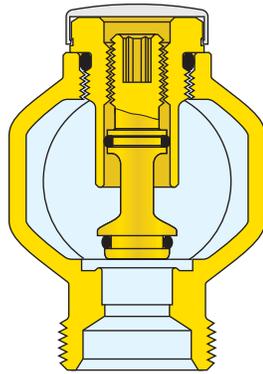
Construction details

Supply manifold

663 series

Supply manifold has manual balancing valves for regulating flow delivered to system circuits. The balancing is accomplished by turning a hex wrench into the balancing valve in each supply outlet.

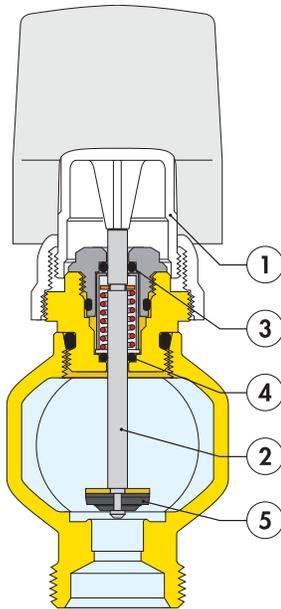
The chart on page 7 shows the number of turns for reaching the desired value of flow and Δp .



663 and TwistFlow 668S1 series 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 thermo-electric actuator which, when used with a room thermostat, maintains the room temperature at the set limits when thermal load varies. The stem (2) is made of polished stainless steel to minimize friction and prevent the formation of harmful corrosion. 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 molded to optimize the hydraulic characteristics of the valve and minimize noise as the fluid passes through and as it gradually opens and closes when operating with a thermo-electric actuator.

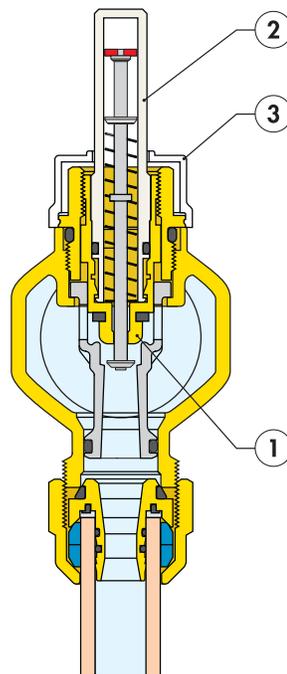


TwistFlow 668S1 series Supply manifold

The supply manifold is equipped with flow meters and built-in flow rate balancing valves.

Acting on the regulating valve with the special cone-shaped valve plug (1), the flow rate to the single circuits can be accurately adjusted to the required value, just by reading the value on the single flow meter with a scale of 1/4 - 2 gpm (2). This simplifies and speeds up the operation of circuit calibration, with no need for reference graphs. After adjustment, the valve can be locked open by means of its tamper-proof cover (3), which also acts as a knob for adjusting the flow rate.

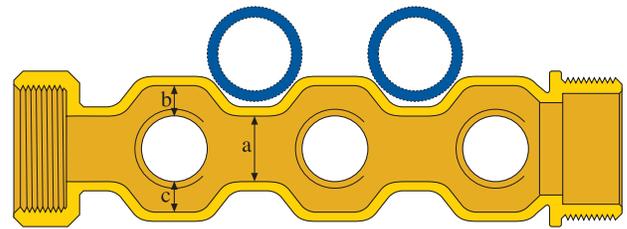
This valve makes it possible to seal off the single circuit, should this be necessary.



Exterior shape of the manifolds and mounting brackets

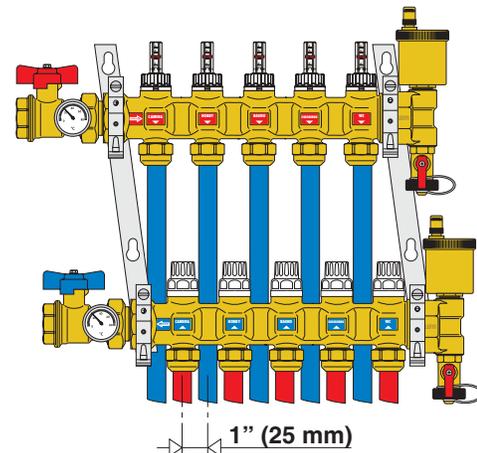
The exterior of the manifold deserves special mention because it can be cast in any shape to meet any requirements.

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.



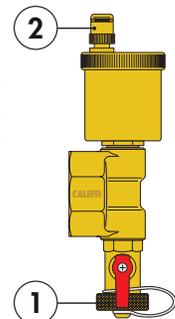
The partial accommodation of the pipes in the indentations created in the manifold is further enhanced by the angle of the mounting brackets, which are slanted to create a 1" (25 mm) offset between the upper and lower manifolds.

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

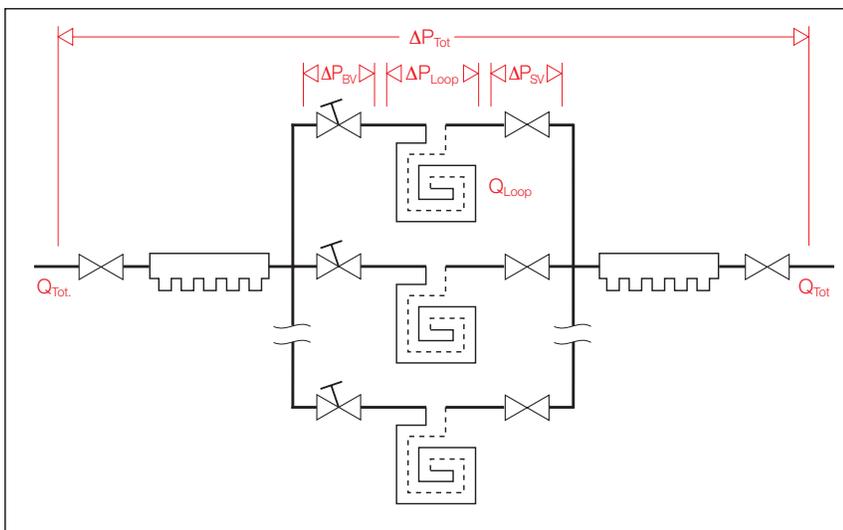
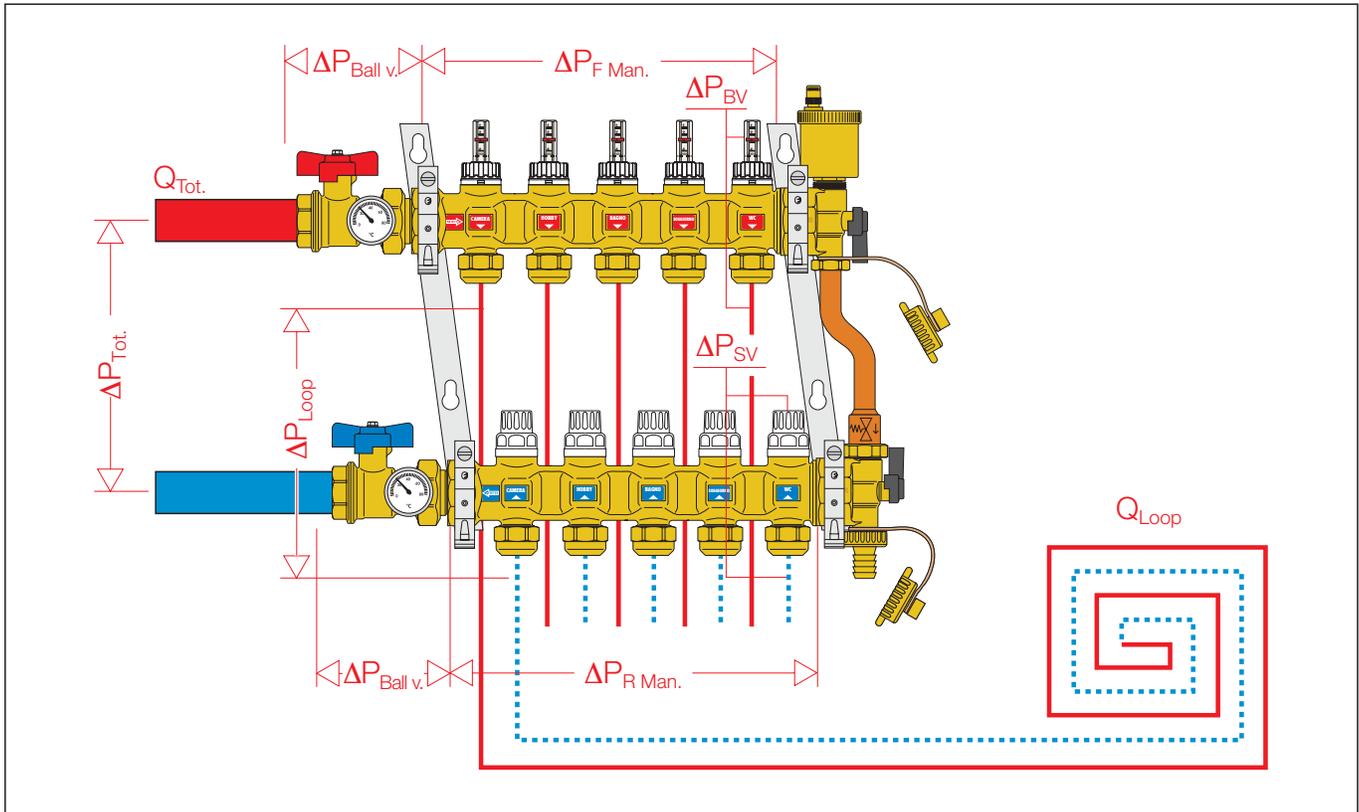
The end fitting consists of a fill/drain cock (1) and an automatic air vent valve with a hygroscopic safety cap (2). It has been specifically designed to close the air vent valve automatically if there is water near the vent itself.



Hydronic characteristics for TwistFlow- 668S1

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)

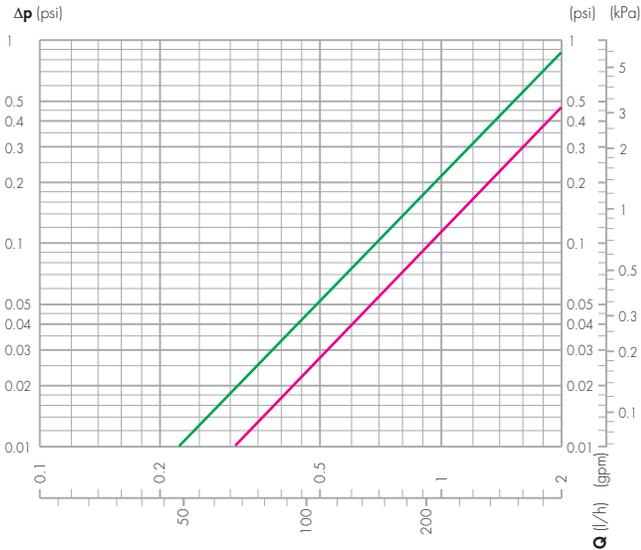
ΔP_{Loop} = Loop loss (loop flow)

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

$$\Delta P_{Tot} = \Delta P_{BV} + \Delta P_{Loop} + \Delta P_{SV} \quad (1.1)$$

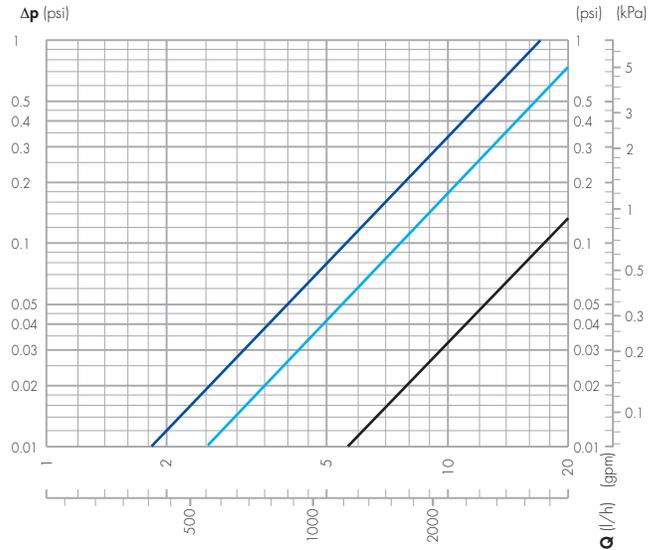
After noting the hydronic characteristics of the individual components and the design flows, the total loss can be calculated as the sum of the partial pressure losses of each specific component in the system, as shown in the formula (1.1).

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
Flow meter with built-in flow rate balancing valve fully open	2.14
Shut-off valve	2.90

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



	Cv
Supply or return manifold 3 to 7 outlets	24.3*
Supply or return manifold 8 to 13 outlets	17.3*
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:

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

- Q = 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: ΔPTot 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:

$$\Delta P_{Bv} = 1.3^2 / 2.14^2 = 0.37 \text{ psi}$$

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

$$\Delta P_{Sv} = 1.3^2 / 2.90^2 = 0.20 \text{ psi}$$

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

$$\Delta P_{Tot} = 0.37 + 6.90 + 0.20 = 7.47 \text{ psi}$$

Using the balancing valves with flow meter

Determine the design flow requirement for each circuit based on the heating requirement.
The balancing valves in the flow manifold make it possible to adjust each individual circuit in the panels to obtain the design flow rates in each loop.

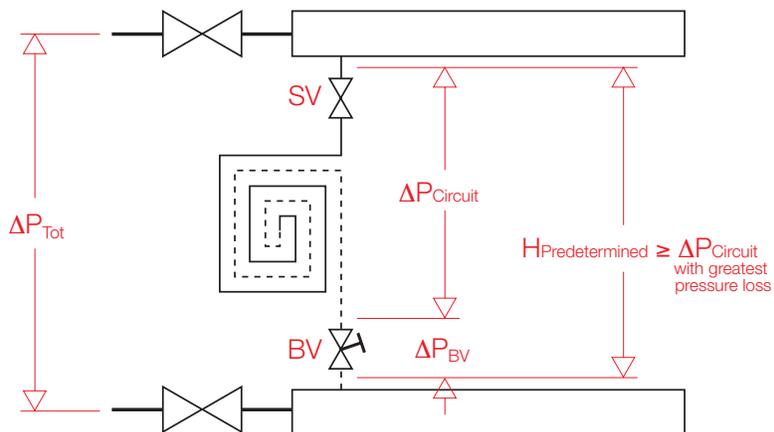
Considering the following data:

- medium flow rate across each circuit
- head loss generated in each circuit by this flow rate: $\Delta P_{\text{Circuit}} = \Delta P_{\text{Loop}} + \Delta P_{\text{SV}}$ ($\Delta P_{\text{Shut-off valve}}$)

- available head on the panel circuit or predefined head:

$$H_{\text{Predefined}} \geq \Delta P_{\text{Circuit with greatest pressure loss}} = \Delta P_{\text{BV}} + \Delta P_{\text{Loop}} + \Delta P_{\text{SV}}$$

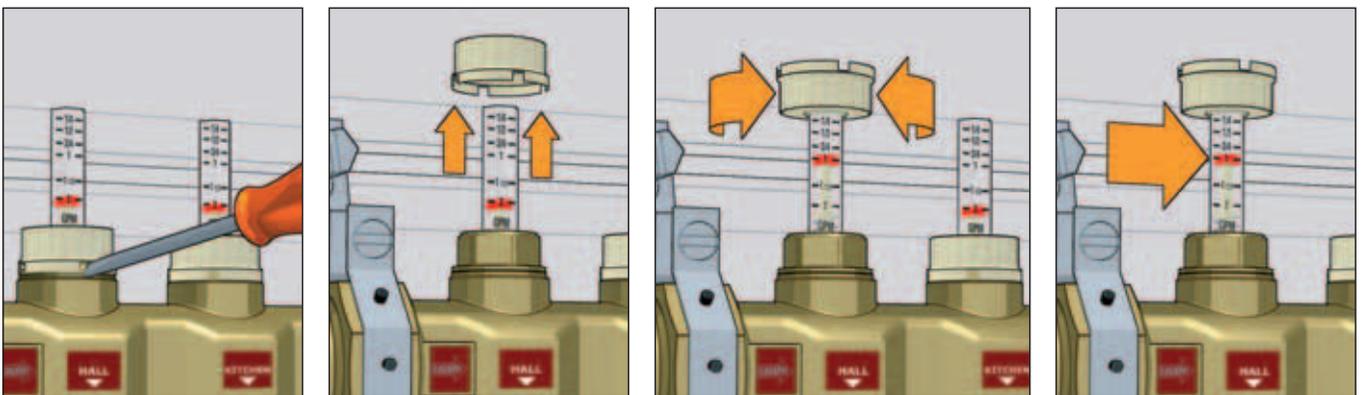
Referring to the diagram alongside, for the loop flow rate the balancing valve must provide an additional head loss equal to the difference ΔP_{BV} ($\Delta P_{\text{Balancing valve}}$).



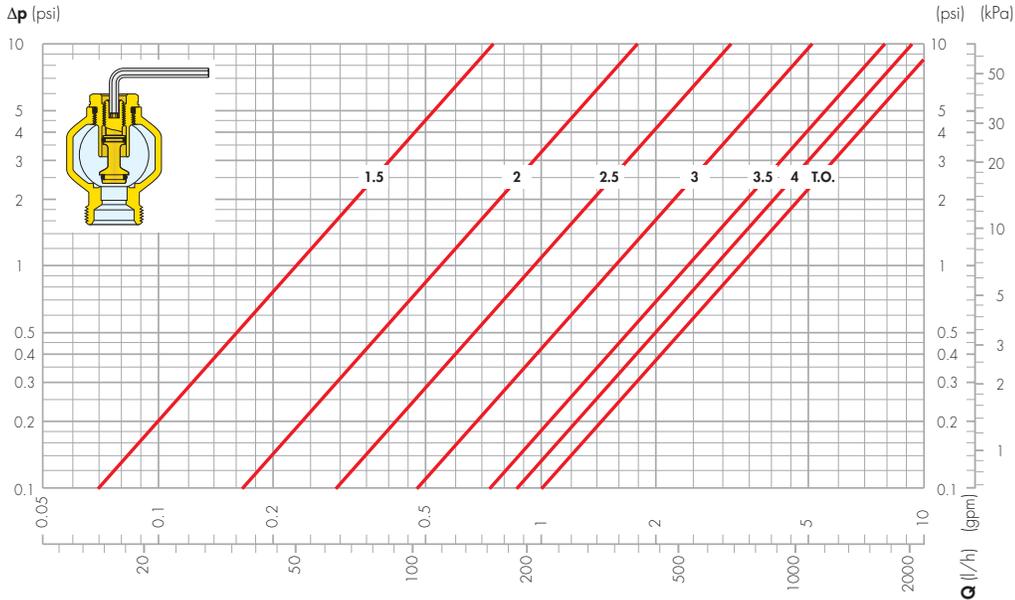
Flow rate adjustment and reading

To balance the circuits start by setting all balancing valves to their wide open positions. Then set the circuit with the greatest flow requirement to its design flow rate (gpm). Adjust the other circuits, reducing to each circuit design flow rate from greatest to least. Raise the block cover with the aid of a screwdriver and turn it over onto the flow meter. Adjust the flow rate of the single circuits by turning the flow meter body acting on the built-in balancing valve.

The flow rate must be read off the graduated scale, expressed in gpm, printed on the flow meter.
After making all the adjustments, reposition and lock all the knobs in their seat to prevent tampering.



Hydronic characteristics of supply manifold for 663 series only



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

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. Cast brass body. EPDM seals. 1 1/4" threaded Female connections. 3/4" Male outlet connections for self-adjusting PEX fittings. 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). Air vent 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 complete with port for optional temperature gage;
- Pair of mounting brackets.

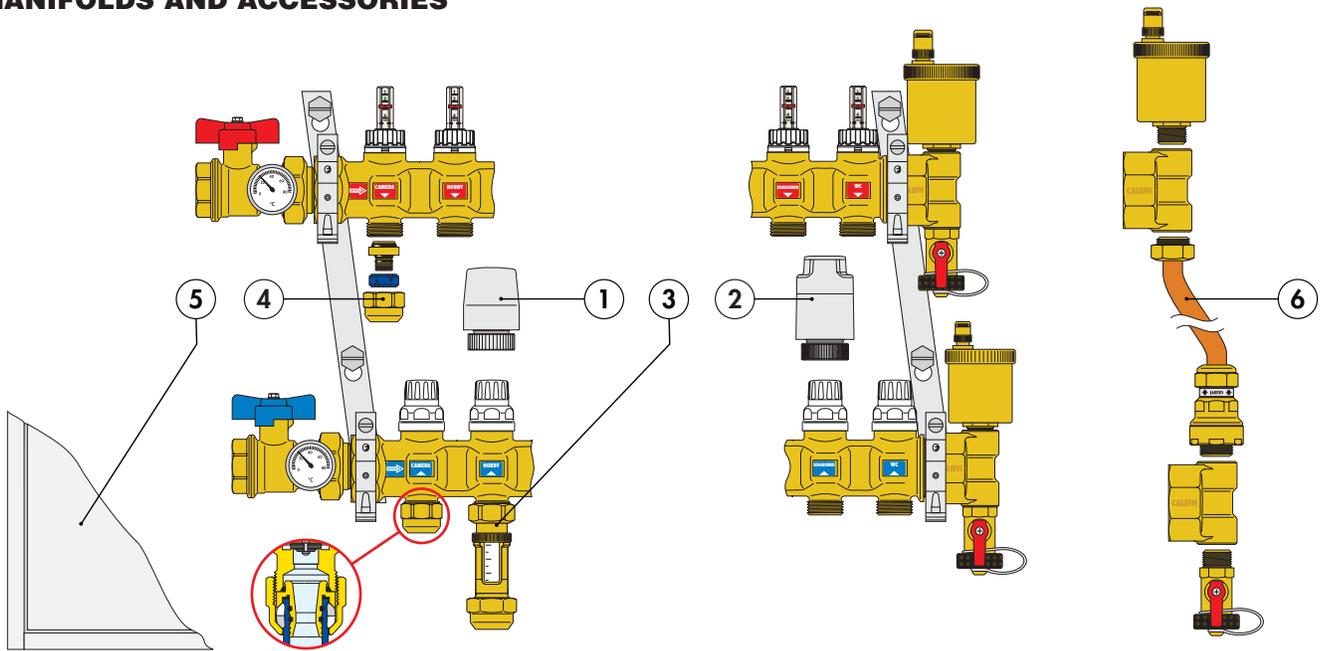
TwistFlow series 668S1

Pre-assembled distribution manifold for radiant panel systems with 3 to 13 outlets. Cast brass body. EPDM seals. 1" and 1 1/4" threaded Female connections. 3/4" Male outlet connections. Medium: water, glycol solutions. Maximum percentage of glycol: 50%. Maximum working pressure 150 psi (10 bar). Temperature range 32 to 180°F (0 to 80°C). Air vent maximum discharge pressure 35 psi (2.5 bar).

Consists of:

- Supply manifold complete with sight flow gage with adjustable balancing valves scale from 0–2 gpm;
- 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 complete with port for optional temperature gage;
- Pair of mounting brackets.

MANIFOLDS AND ACCESSORIES



1. Thermo-electric actuator, series 6561
2. Thermo-electric actuator with manual open handle, series 6563
3. Flow meter, code 669050

4. Self-adjusting Universal PEX fitting, series 680
5. Inspection wall box, series 659
6. Differential by-pass kit, code 668000

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 1 to 4 LPM High	_____	Size 3/4"
Code NA669150	Flow meter 1/4 to 1 GPM High Temperature	_____	Size 3/4"
Code NA669250	Flow meter 1/2 to 2 GPM High Temperature	_____	Size 3/4"
Code NA669450	Flow meter 1 to 4 GPM High Temperature	_____	Size 3/4"

Technical specification

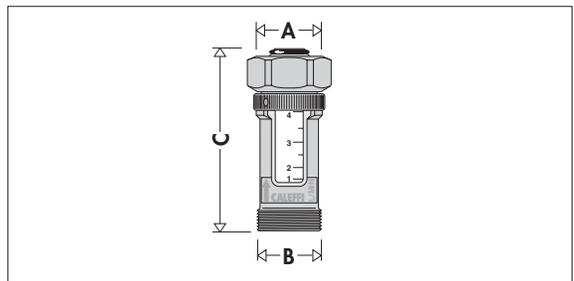
Materials: - body: brass
 - measuring spring: stainless steel
 - seals: EPDM
 - transparent cylinder and internal protection: PSU
 - float-indicator: POM/PTFE

Medium: water, glycol solutions
 Max. percentage of glycol: 50%
 Max. working pressure: 85 psi (6 bar)
 Max. Temperature: NA Series: 210°F (98°C)
 669050: 180°F (82°C)

Accuracy: ±10%
 Dual readout scale

Connections: 3/4" M x 3/4" F nut

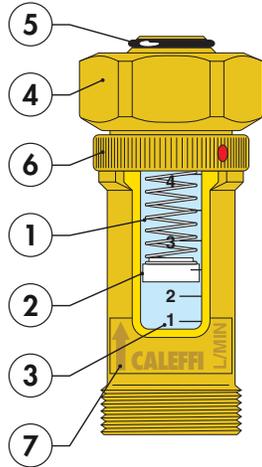
Dimensions



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 stabilized 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

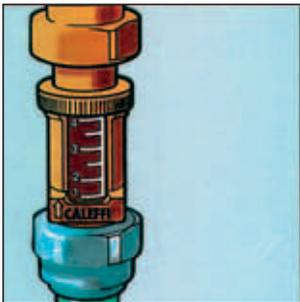
The flow meter is equipped with a captive nut (4) that is mounted onto the manifold and sealed with an O-ring (5) mounted on the tail piece. The captive nut solution simplifies assembly because it allows the flow meter to be mounted at the front of the manifold without having to change the optimal readout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

Dual readout scale

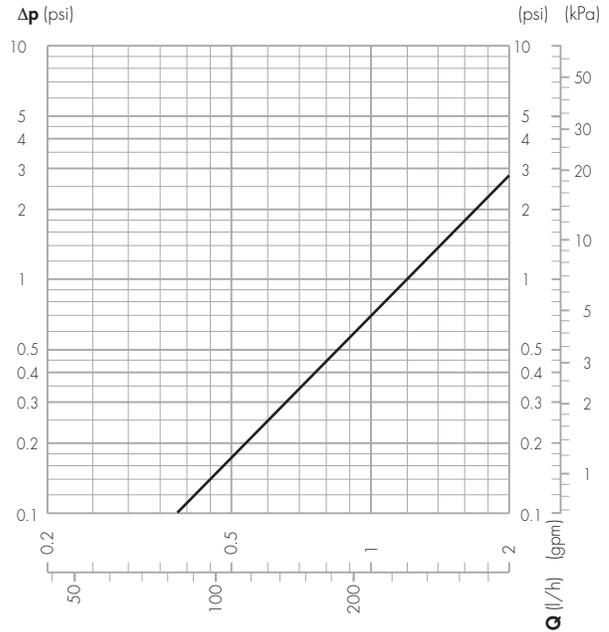
The flow meter is equipped with a spare graduated scale that can be used if flow needs to be checked or the system rebalanced but the float can no longer be seen due to deposits on the transparent cylinder.

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 to 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). Max. Temperature for NA Series: 210°F (98°C) and for 669050: 180°F (82°C). Flow measurement: 0.25 to 1.0 gal/min (1–4 l/min). Accuracy ± 10%.

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%

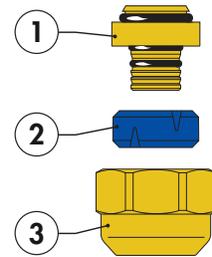
Max. working pressure: 150 psi (10 bar)

Temperature range when using ASTM F876 PEX tubing:
 41°F (5°C) to 180°F (82°C)

Temperature range when using ASTM F1281 PEX-AL-PEX tubing:
 41°F (5°C) to 167°F (75°C) with tubing rated 200°F (93°C)
 41°F (5°C) to 122°F (50°C) with tubing rated <200°F (93°C)

Characteristic components

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



Code	Thread size	PEX size
680507	3/4"	5/16"
680503A	3/4"	3/8"
680504A	3/4"	1/2"
680555A	3/4"	5/8"
680505A	3/4"	3/4"

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

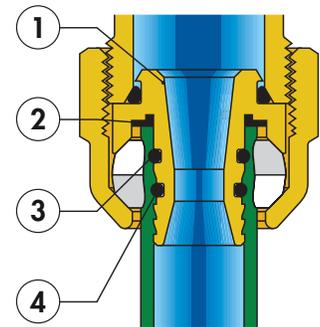
The internal profile of the adapter (1) has been shaped to obtain a Venturi effect when the fluid passes through, reducing pressure losses by 20% compared to those created by passages with a similar diameter.

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 180°F (5 to 82°C) (PEX); 41 to 167°F (5 to 75°C) with tubing rated 200°F (93°C); 41 to 122°F (50°C) with tubing rate <200°F (93°C) (PEX-AL-PEX).

Off-center differential by-pass 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 by-pass kit for series 663 or 668S1 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 668S1 manifolds, reducing overall size to a minimum.

Product range

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

Technical specification

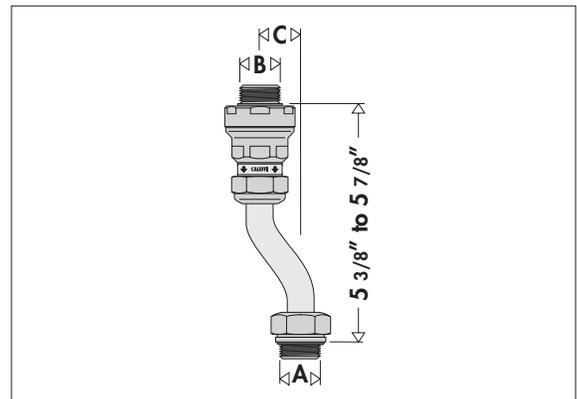
Materials: - body:	brass
- nuts:	brass
- pipe with plate:	copper
- check valve:	PA
- spring:	stainless steel
- seals:	EPDM
- gaskets:	asbestos-free fibre

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
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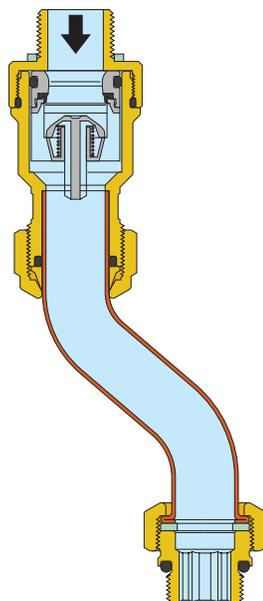
Dimensions



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

Operating principle

The by-bass valve contains a check valve connected to a contact spring. When the fixed setting pressure is reached, the valve plug 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.

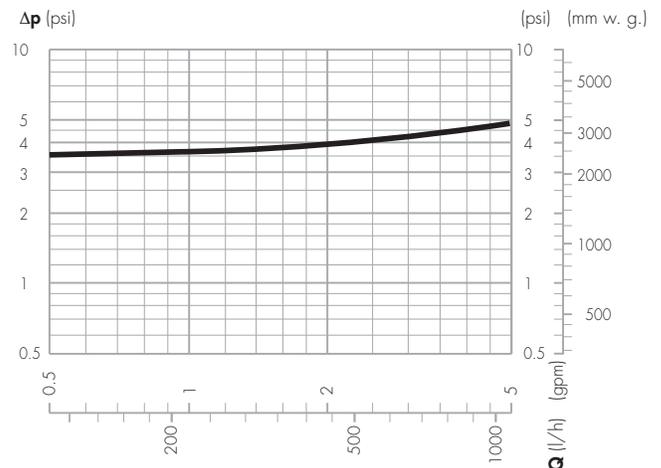


Construction details

The differential by-pass assembly features a fixed setting that cannot be changed because it does not contain accessible adjustment parts. The small, compact size and offset connections make 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

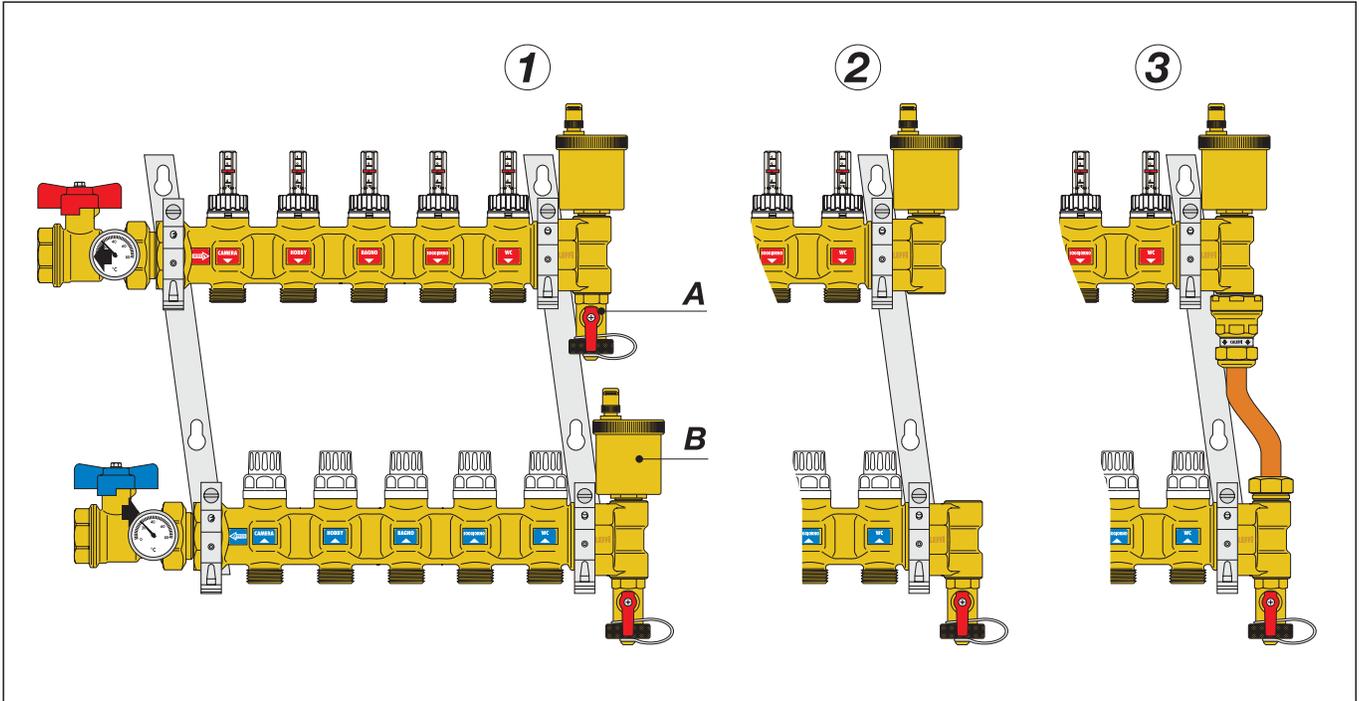
By-pass differential pressure: 3.6 psi (2500 mm w.g.)



Installation of the differential by-pass valve on series 663 and 668S1 manifolds

The differential by-pass on series 663 or 668S1 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 by-pass (code 668000) on the upper manifold and the lower manifold.



SPECIFICATION SUMMARIES

Code 668000

Off-center by-pass assembly with fixed setting. 1/2" Male threaded connections. Brass body and nuts. Copper pipe. PA check valve, stainless steel spring, EPDM seals, asbestos-free fiber 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.).

Thermo-electric actuators



6561

Thermo-electric actuator.
For series 663 and 668S1 manifolds.
Normally closed.



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

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: IP 44 (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)



6563

TwisTop™ thermo-electric actuator.
For series 663 and 668S1 manifolds.
Normally closed.
With manual open handle.
With green open indicator.



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: 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)

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

Using the thermo-electric actuator

1. Normal operation of the control in automatic mode.

In automatic mode, the thermo-electric actuator opens the valve when it is supplied with electricity. The opening is displayed by the central disc raising on the top of the knob and by the green circular indicator too.

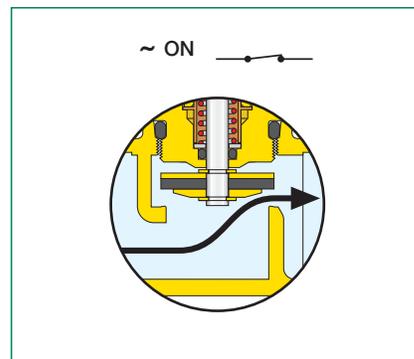
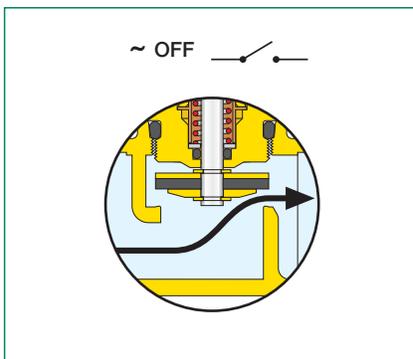
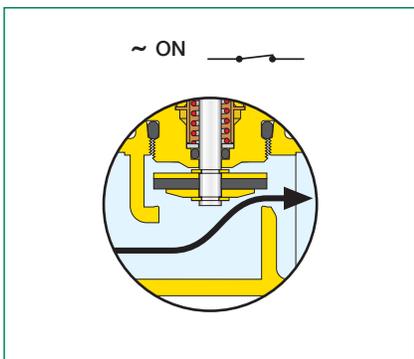
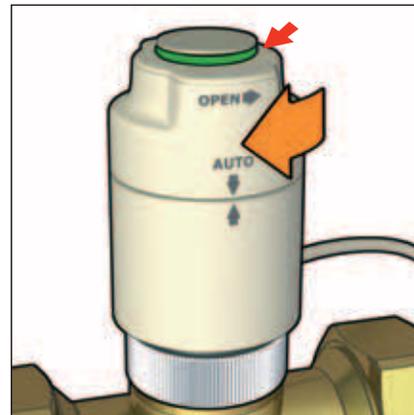
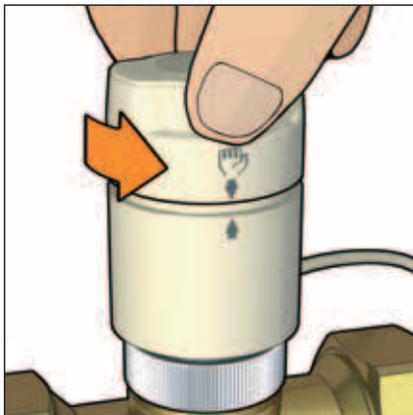
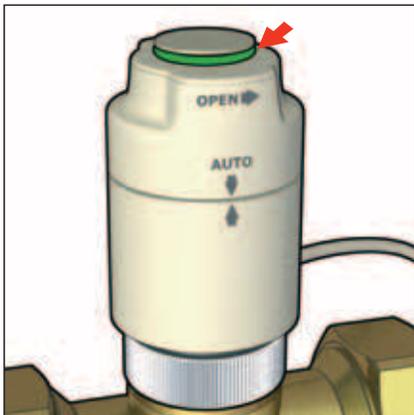
2. Simply twist to manually open actuator (and activate microswitch on 656314)

Turn the knob on the top of the control anticlockwise until its limit stop trips and the arrow symbols and  overlap. 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.

3. When power is applied it returns to Auto position.

When the control in the manual position is powered, an internal mechanism enables automatic release from this position and a return to normal operation. A few seconds after powering up, the knob will automatically return to the "AUTO" position and the opening indicator will stay on the open position.



Box

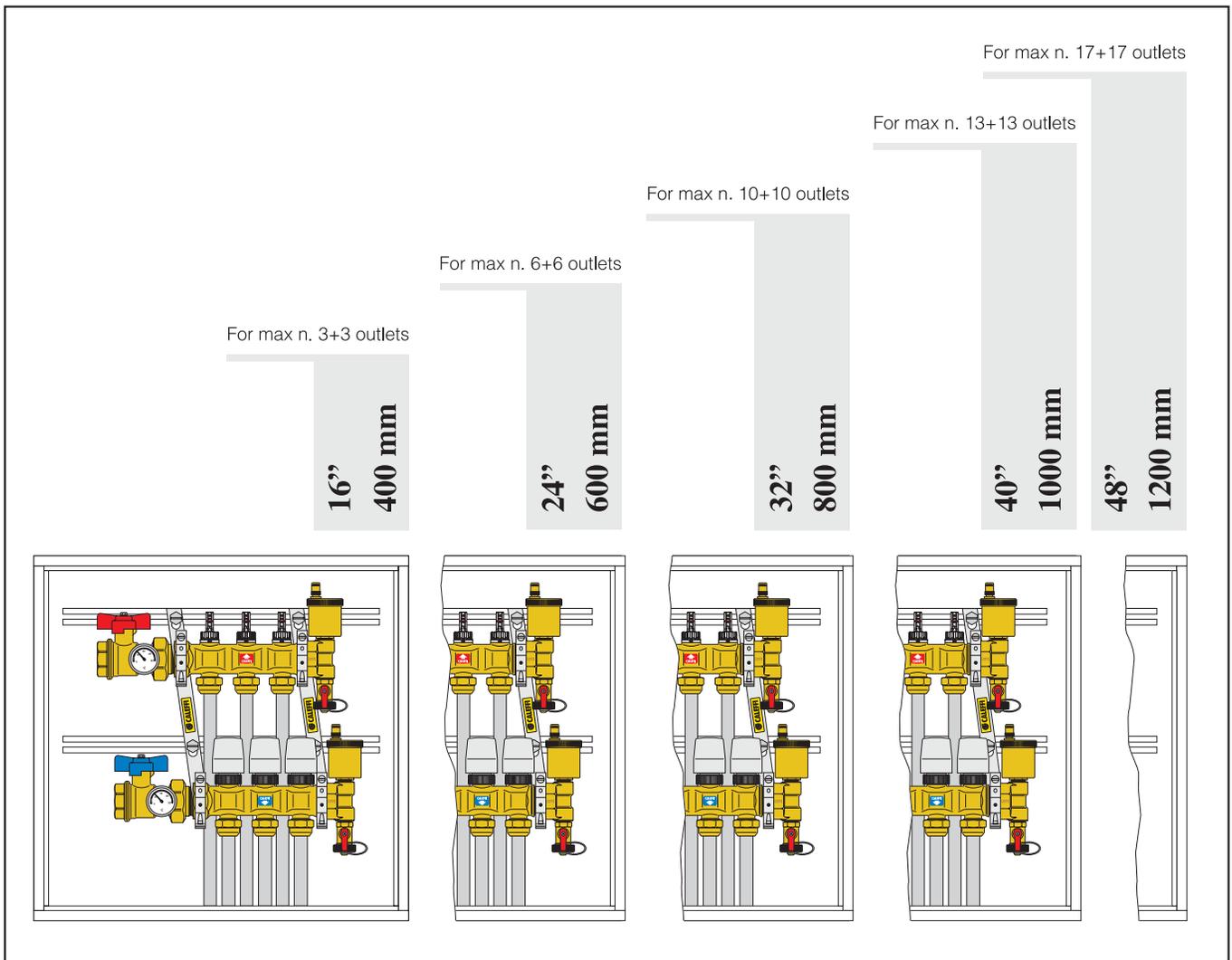


659

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 668S1.

Code	in (h x w x d)	mm (h x w x d)	Max number of outlets
659043	20" x 16" x 4 3/8" to 5 1/2"	500 x 400 x 110 to 140	3
659063	20" x 24" x 4 3/8" to 5 1/2"	500 x 600 x 110 to 140	6
659083	20" x 32" x 4 3/8" to 5 1/2"	500 x 800 x 110 to 140	10
659103	20" x 40" x 4 3/8" to 5 1/2"	500 x 1000 x 110 to 140	13
659123	20" x 48" x 4 3/8" to 5 1/2"	500 x 1200 x 110 to 140	17

659 series housing wall box dimension choice in accordance with the number of outlets



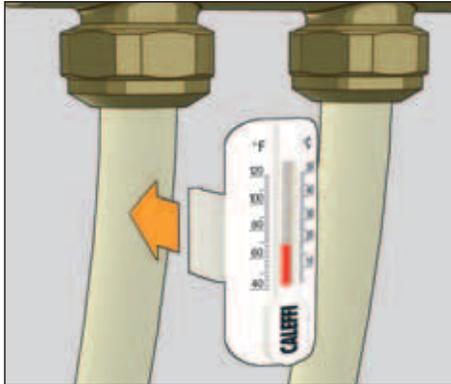
Thermometer



675 Snap-on thermometer

Snap-on thermometer directly to PEX or PEX-AL-PEX piping.

Material: - body: PA6GF
Thermometer fluid: alcohol
Thermometer scale: 40 to 120°F (5 to 50°C)
Max. working temperature: 140°F (60°C)
Range of use of pipe outside (Øe) diam.:
from 3/8 to 5/8 inch (15 to 18 mm)
Conducting paste supplied in package



Code

675900A 3/8", 1/2" & 5/8" PEX or PEX-AL-PEX



688

Temperature gage with well pocket fitting for inserting in connection on supply and return shut-off ball valves.

Working temperature range: 30–210°F
Face dial diameter: 2"

Code

688003A Gage with pocket well

End fitting



386

Cap to plug unused manifold outlets.

Code

386500 3/4"

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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