

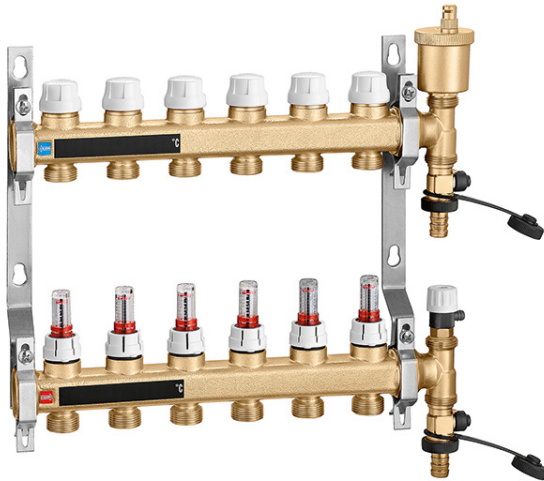
# Distribution manifold for radiant panel systems

## 664 series



01260/18 GB

replaces 01260/14 GB



### Function

The distribution manifold for radiant panel systems is used to optimally distribute the thermal medium in underfloor heating system circuits, in order to improve the control of the panel thermal emission. This series of manifolds is composed of:

- flow manifold complete with built-in flow meters and regulating valves, with indicators that can be cleaned and replaced with the system operating;
- return manifold complete with shut-off valves fitted for thermo-electric actuator;
- end fittings complete with automatic and manual air vent with fill/drain cocks;
- LCD thermometers, on the flow and return manifolds.

### Product range

664 series Distribution manifold for radiant panel systems \_\_\_\_\_ size 1"

### Technical specifications

#### Materials

##### Flow manifold

Body: brass EN 1982 CB753S

##### Flow rate regulating valve:

Stem and obturator: PA  
Hydraulic seals: EPDM  
Protective cover: ABS  
Spring: stainless steel EN 10270-3 (AISI 302)

##### Return manifold

Body: brass EN 1982 CB753S

##### Shut-off valve:

Headwork: brass EN 12164 CW614N  
Obturator stem: stainless steel EN 10088-3 (AISI 303)  
Obturator: EPDM  
Spring: stainless steel EN 10270-3 (AISI 302)  
Hydraulic seals: EPDM  
Cap: ABS

Brackets and supports: Steel EN 10027-1 S235JR

### Performance

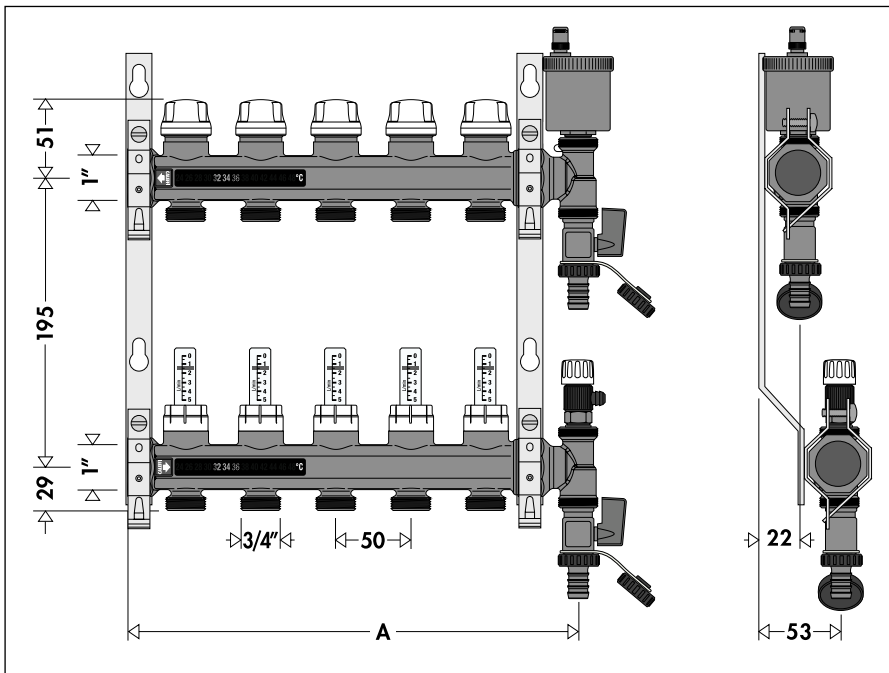
Medium: water, glycol solutions  
Max. percentage of glycol: 30%

Maximum working pressure: 6 bar  
Working temperature range: 5–60°C

Liquid crystal digital thermometer scale: 24–48°C  
Flow meter scale: 0–5 l/min  
Accuracy: ±10%

Main connections: 1" F (ISO 228-1)  
Outlets: 3/4" M - Ø 18  
Centre distance: 50 mm

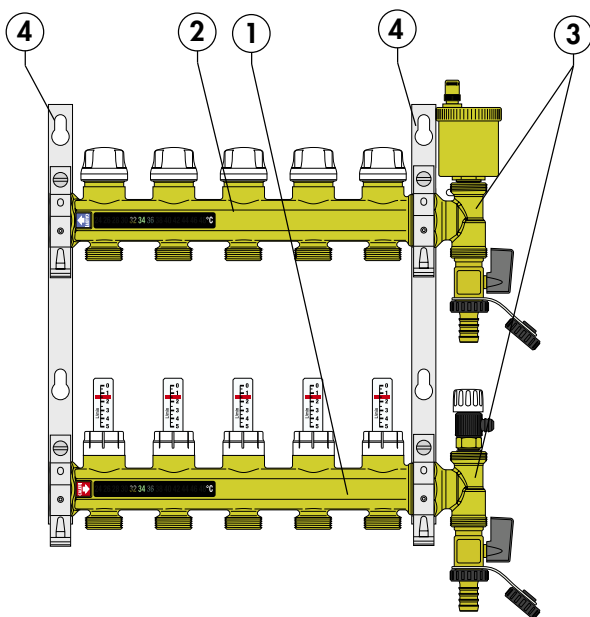
## Dimensions



Code	No. of outlets	Total L (A)	Mass (kg)
6646B1	2	165	2,7
6646C1	3	215	3,1
6646D1	4	265	3,6
6646E1	5	315	4,2
6646F1	6	365	4,8
6646G1	7	425	5,2
6646H1	8	475	5,7
6646I1	9	525	6,3
6646L1	10	575	7,1
6646M1	11	625	7,6
6646N1	12	675	8,1
6646O1	13	735	9

## Characteristic components

- 1) Flow manifold with built-in flow meters and flow rate regulating valves
- 2) Return manifold complete with shut-off valves fitted for thermo-electric actuator
- 3) End fittings complete with manual and automatic air vents, double radial end fitting and drain cocks with plugs
- 4) Pair of mounting brackets for box or wall installation



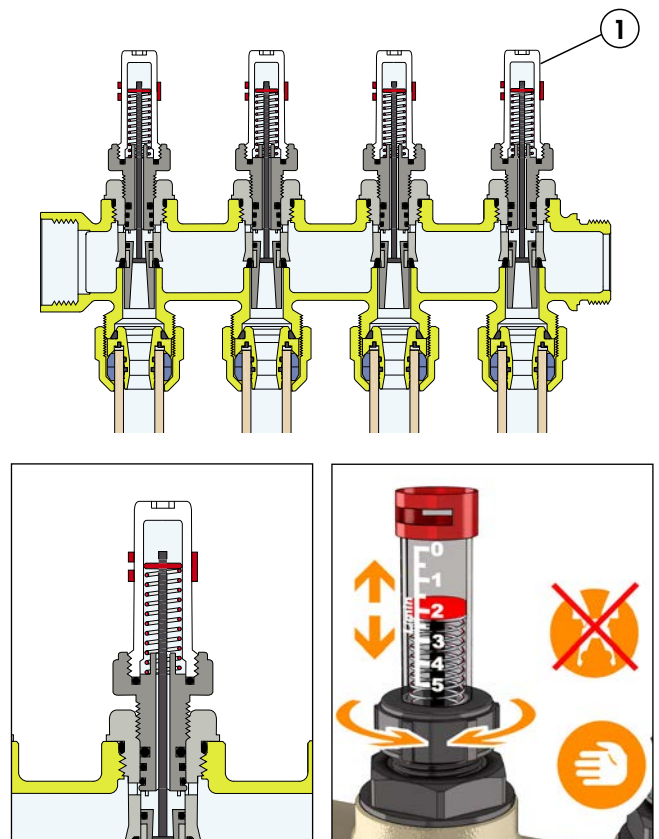
## Construction details

### Flow manifold

The flow manifold is equipped with built-in flow meters and flow rate regulating valves (1).

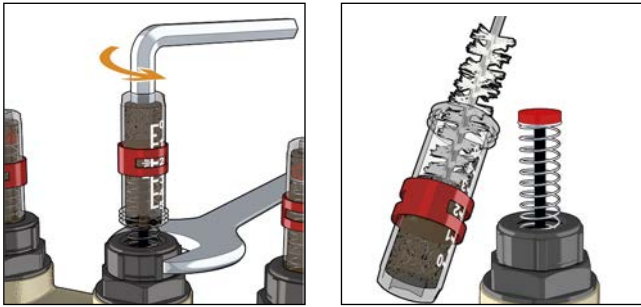
Using the regulating valve the flow rate to the individual circuits can be adjusted accurately as required, with the setting being read directly from the single flow meter with a scale of 0–5 l/min. This simplifies and speeds up the circuit setting process, with no need for reference graphs. After regulating, the valve can be locked in its open position by means of its protective cover.

The valve itself makes it possible to shut-off each individual circuit, if necessary.



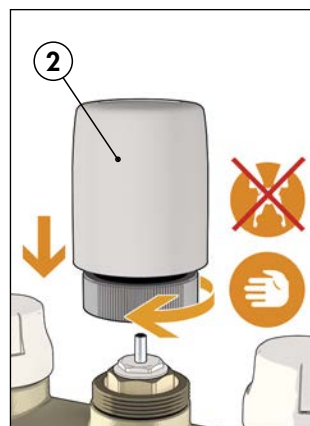
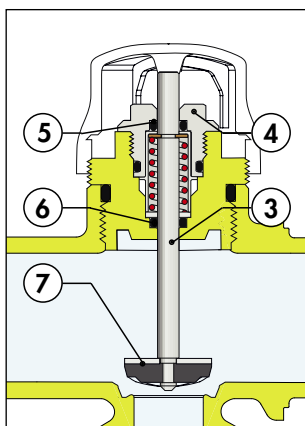
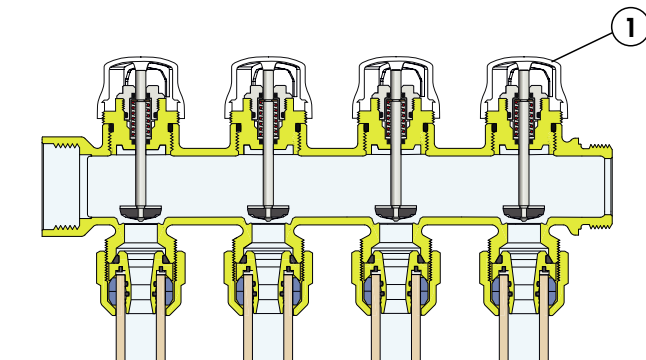
**Flow meters cleaning or replacement with circuit in operation**

The flow meter indicators, supplied with the flow manifold, are easily removed for cleaning or replacement purposes without having to empty the system (spare part code R69913). The setting position indicator makes it possible to rebalance the circuit correctly at the design flow rate after maintenance operations.



**Return manifold**

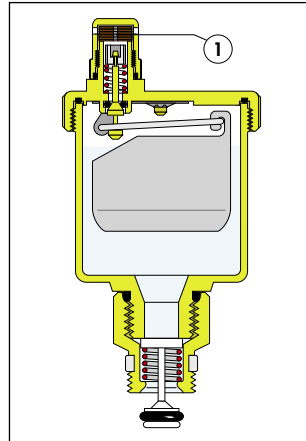
The return manifold is equipped with manual shut-off valves (1), in order to cut off the flow to the individual circuits. They can also be fitted with a thermo-electric actuator (2) that, when used with a room thermostat, maintains the ambient temperature at the set values in spite of thermal load variations. The obturator stem (3) consists of a single piece of ground stainless steel, in order to minimise friction and prevent building up of dangerous limescale deposits. The headwork (4) has a double EPDM O-Ring seal (5) – (6) on the sliding stem. The EPDM obturator (7) is shaped so as to optimise the hydraulic characteristics of the valve and minimise the noise caused by the flow of the medium, also during the progressive opening or closing action when operating with thermo-electric actuator.



**Return manifold end fitting**

The automatic air vent automatically expels the air accumulating in the circuits of the air conditioning system.

It is equipped with a hygroscopic safety cap (1) that prevents water from getting out in order to protect the installation.



**Digital thermometers**

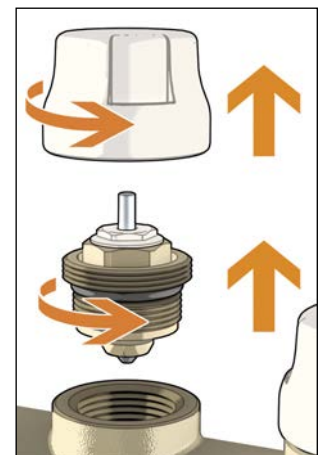
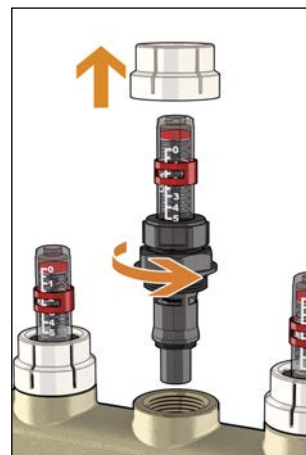
Both sides of the flow and return manifold body are equipped with LCD thermometers, with 24–48°C temperature range. The LCDs automatically illuminate green in correspondence with the measured temperature value to ensure easy reading even in low light conditions.

This thermometer is calibrated to display the actual temperature of the medium, which is essential in evaluating the operating conditions and thermal load of the system.



**Replaceable components**

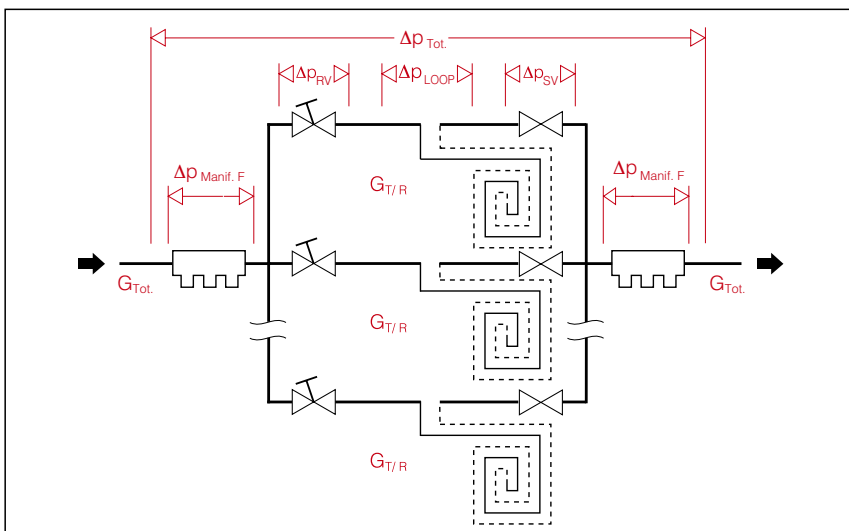
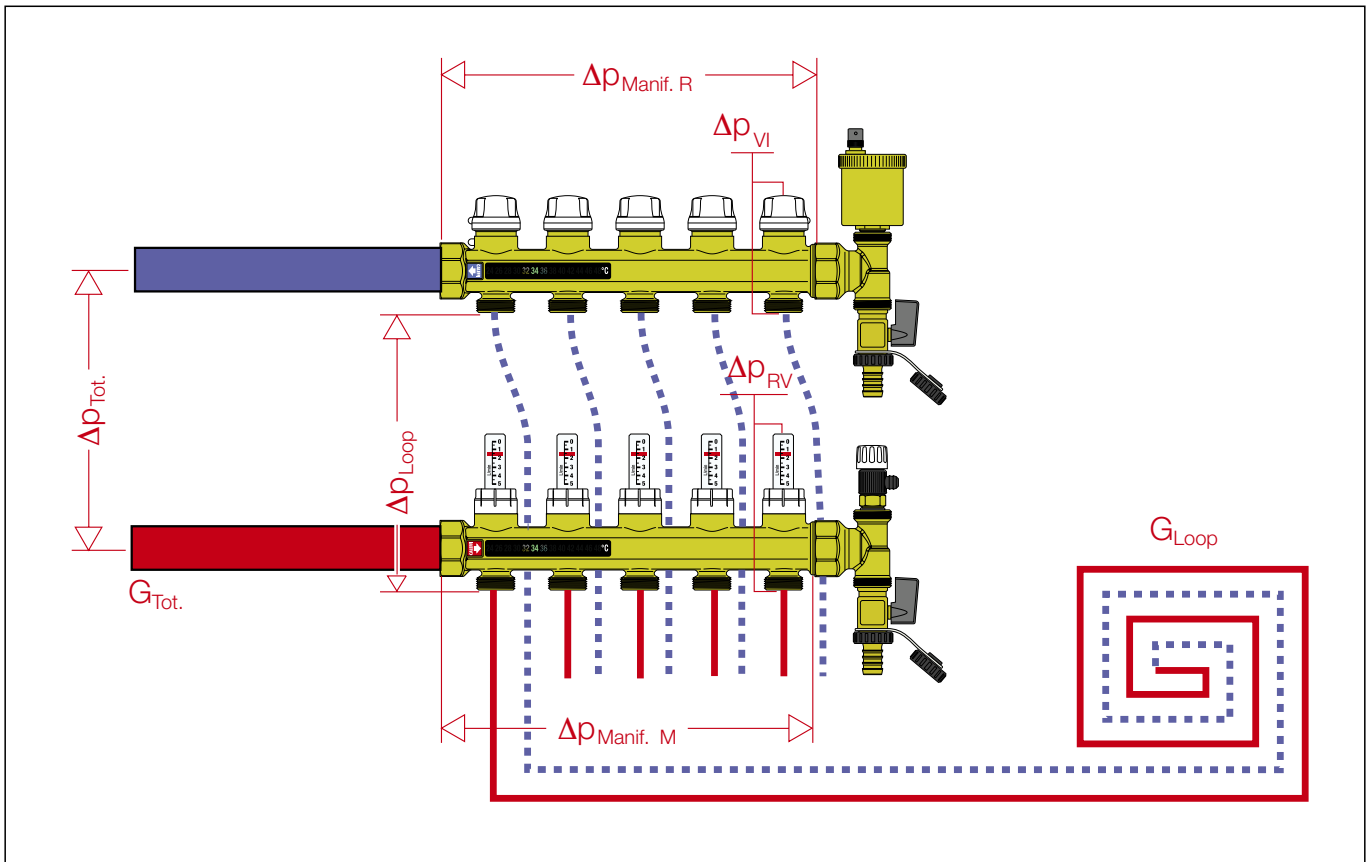
The headwork of the regulating valve with flow meter and the shut-off valve can be removed and replaced with spare parts.



## Hydraulic characteristics

In order to determine the hydraulic characteristics of the circuit, it is necessary to calculate the total head loss suffered by the flow rate of medium on passing through the devices forming the manifold assembly and the radiant panel circuits.

From a hydraulic point of view, the system consisting of the manifold assembly and the circuits can be represented as a set of hydraulic elements arranged in series and in parallel.

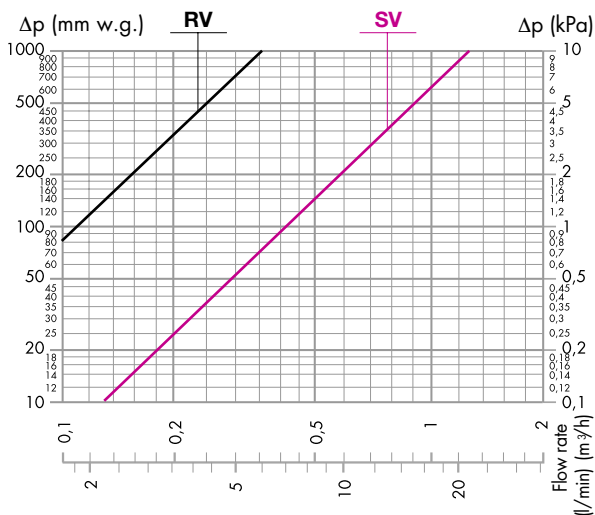


- $\Delta p_{Tot}$  = Total head loss across the manifold (Flow + Return + Loop)
- $\Delta p_{RV}$  = Localized loss at loop balancing valve (loop flow rate)
- $\Delta p_{Loop}$  = Loop head loss (loop flow rate)
- $\Delta p_{SV}$  = Localized loss at panel circuit shut-off valve (loop flow rate)
- $\Delta p_{Manif. F}$  = Distributed loss of the flow manifold (total flow rate)
- $\Delta p_{Manif. R}$  = Distributed loss of the return manifold (total flow rate)

$$\Delta p_{Tot.} = \Delta p_{RV} + \Delta p_{Loop} + \Delta p_{SV} + \Delta p_{Manif. F} + \Delta p_{Manif. R} \quad (1.1)$$

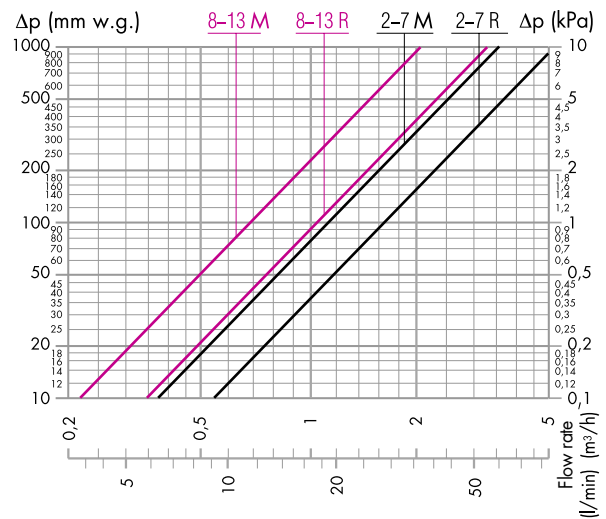
When the hydraulic characteristics of each component and the design flow rates are known, the total loss can be calculated as the sum of the partial head losses for each specific component in the system, as indicated by the formula (1.1).

## Hydraulic characteristics



	Kv	Kv <sub>0,01</sub>
Flow rate regulating valve fully open (BV)	1,10	110
Panel circuit shut-off valve (SV)	4,10	410

- Kv = flow rate in m<sup>3</sup>/h for a head loss of 1 bar
- Kv<sub>0,01</sub> = flow rate in l/h for a head loss of 1 kPa



	Kv	Kv <sub>0,01</sub>
Flow manifold 2-7 outlets	11,10*	1110*
Return manifold 2-7 outlets	16,70*	1670*
Flow manifold 8-13 outlets	6,90*	690*
Return manifold 8-13 outlets	10,40*	1040*

\*Average value

### Example of total head loss calculation

Supposing we need to calculate the head loss of a manifold with three circuits with the following characteristics:

Total manifold flow rate: 450 l/h

The flow rate and head loss of the three loops are as follows:

Circuit 1	Circuit 2	Circuit 3	
$\Delta p_1 = 10$ kPa	$\Delta p_2 = 10$ kPa	$\Delta p_3 = 7$ kPa	(1.2)
$G_1 = 120$ l/h	$G_2 = 150$ l/h	$G_3 = 80$ l/h	

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

$$\Delta p = G^2 / Kv_{0,01}^2$$

- G = flow rate in l/h
- $\Delta p$  = head loss in kPa (1 kPa = 100 mm w.g.)
- Kv<sub>0,01</sub> = flow rate in l/h through the device, which corresponds to a head loss of 1 kPa

It should be stressed that the calculation of  $\Delta p_{Tot}$  must be carried out taking account of the circuit in which there are the greatest head losses distributed along the entire panel pipe loop.

In the case we are examining, the relevant circuit is No. 2.

It follows that:

$$\left. \begin{aligned} \Delta p_{BV2} &= 150^2 / 110^2 = 1,86 \text{ kPa} \\ \Delta p_{Loop2} &= 15 \text{ kPa} \\ \Delta p_{SV2} &= 150^2 / 410^2 = 0,13 \text{ kPa} \\ \Delta p_{Manif. F} &= 350^2 / 1110^2 = 0,1 \text{ kPa} \\ \Delta p_{Manif. R} &= 350^2 / 1670^2 = 0,04 \text{ kPa} \end{aligned} \right\} \text{Values obtained by neglecting the changes due to the flow rate sent to each branch circuit}$$

Using formula (1.1), adding up all the calculated terms, we obtain:

$$\Delta p_{Tot} = 1,86 + 15 + 0,13 + 0,1 + 0,04 \approx 17 \text{ kPa}$$

Note:

Because of the low head losses associated with the manifolds, the two terms relating to them can be disregarded. In general, the total head loss is fairly close to the branched panel circuit head loss.

## Using the balancing valves with flow meter

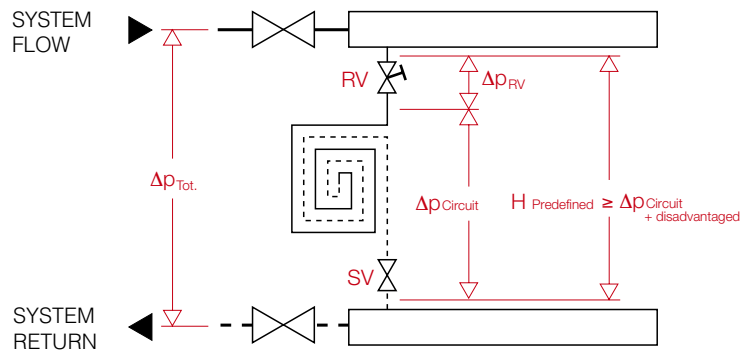
The regulating valves in the flow manifold make it possible to balance each individual panel circuit to obtain the design flow rates in each loop.

Considering the following data:

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

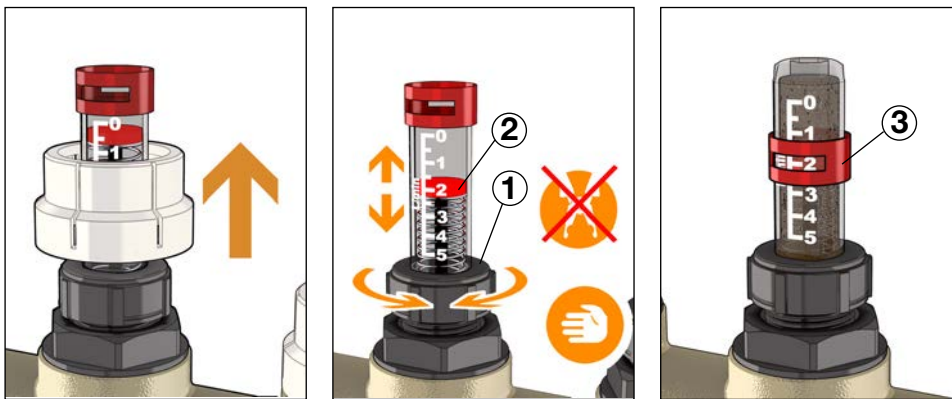
- available head on the panel circuit or predefined head:  
 $H_{\text{Predefined}} \geq \Delta p_{\text{Circuit}} + \Delta p_{\text{RV}} + \Delta p_{\text{Loop}} + \Delta p_{\text{SV}}$   
disadvantaged

Referring to the adjacent diagram, for the loop flow rate the regulating valve must provide an additional head loss equal to the difference  $\Delta p_{\text{SV}}$  ( $\Delta p_{\text{Balancing valve}}$ ).



## Flow rate balancing and reading

Manually remove the red protective cover from the flow meter. While the system is running, manually adjust the design flow rate using the adjustment nut (1). The flow rate value is indicated by vertical movement of the red indicator disc (2). When the red indicator disc is positioned on the desired flow rate value, set the external indicator (3) in line with the internal indicator disc.



## SPECIFICATION SUMMARY

### 664 series

Distribution manifold for radiant panel systems with 2 (from 2 to 13) outlets. Brass body. EPDM seals. Main connections 1" F (ISO 228-1). Outlet connections 3/4" M - Ø 18 threaded, centre distance 50 mm. Medium water and glycol solutions. Maximum percentage of glycol 30%. Maximum working pressure 6 bar. Working temperature range 5–60°C.

Complete with:

- Flow manifold with flow rate balancing valves and flow meter with 0–5 l/min graduated scale. Accuracy  $\pm 10\%$ .
- Return manifold complete with shut-off valves fitted for thermo-electric actuator.
- Pair of end fittings complete with automatic air vent with hygroscopic cap on the return manifold and manual air vent and plug on the flow manifold. Complete with fill/drain cock.
- Pair of mounting brackets for box or wall installation and mountable manifold supports.

## ACCESSORIES



Insulation for distribution manifolds 664 series. For heating and cooling systems. For use with box code 659..4 (adjustable depth from 110 to 140 mm).

Code

**CBN6646F1** for manifolds from 2 to 6 outlets

**CBN6646N1** for manifolds from 7 to 12 outlets

**CBN6646O1** for manifolds with 13 outlets

### By-pass kit



## 662010

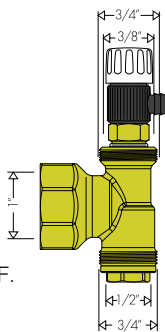
Off-centre by-pass kit fixed setting 25 kPa (2500 mm w.g.) Max. working pressure: 10 bar. Working temperature range: -10–110°C.

### Gruppo di testa



## 599662

End fitting composed of air vent cock, double radial connection and plug. Max. working pressure: 10 bar. Working temperature range: 5–100°C. Main connection: 1" F. Lower connection: 3/4" M. Upper air vent connection: 3/8" F. Lower plug connection: 1/2" F.



### Air vent



## 502033

Automatic air vent. In hot-stamped brass. With hygroscopic safety cap. Max. working pressure: 10 bar. Max. discharge pressure: 2,5 bar. Max. working temperature: 120°C. Connection: 3/8" M.



## R59681 AQUASTOP

Hygroscopic safety cap. For air vents 5020 series.



## 337231

Drain cock with metal seal. **Adjustable outlet.** PTFE seal on. Max. working pressure: 10 bar. Max. working temperature: 100°C. Connection: 3/8" M.



### Drain cock



## 538400

Drain cock with hose connection and cap. Max. working pressure: 10 bar. Max. working temperature: 110°C. Connection: 1/2" M.



## R69913

Spare glass with graduated scale for flow meter.

### Valvole di intercettazione



## 391066

Pair of ball shut-off valves with female-male connections and union with O-ring seal. Max. working pressure: 10 bar. Working temperature range: 5–100°C. Connection: 1".

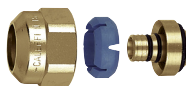
### Brackets



## 658101

Pair of mounting brackets in steel. For distribution manifolds 664 series. For use with box 659..5 series or directly wall mounted

### Fittings



## 680 DARCAL

Self-adjustable diameter fitting for single and multi-layer plastic pipes. Max. working pressure: 10 bar. Working temperature range: 5–80°C (PE-X) 5–75°C (Multi-layer marked 95°C)

Code

Ø<sub>inner</sub>

Ø<sub>outer</sub>

**680507** 3/4" 7,5- 8 10,5-12

**680502** 3/4" 7,5- 8 12 - 14

**680503** 3/4" 8,5- 9 12 - 14

**680500** 3/4" 9 - 9,5 14 - 16

**680501** 3/4" 9,5-10 12 - 14

**680506** 3/4" 9,5-10 14 - 16

**680515** 3/4" 10,5-11 14 - 16

**680517** 3/4" 10,5-11 16 - 18

**680524** 3/4" 11,5-12 14 - 16

**680526** 3/4" 11,5-12 16 - 18

**680535** 3/4" 12,5-13 16 - 18

**680537** 3/4" 12,5-13 18 - 20

**680544** 3/4" 13,5-14 16 - 18

**680546** 3/4" 13,5-14 18 - 20

**680555** 3/4" 14,5-15 18 - 20

**680556** 3/4" 15 -15,5 18 - 20

**680564** 3/4" 15,5-16 18 - 20

**680505** 3/4" 17 22,5



## 347

Compression fitting for annealed copper, hard copper, brass, mild steel and stainless steel pipes. With O-Ring seal. Max. working pressure: 10 bar. Temperature range: -25–120°C.

Code

**347510** 3/4" - Ø 10

**347512** 3/4" - Ø 12

**347514** 3/4" - Ø 14

**347515** 3/4" - Ø 15

**347516** 3/4" - Ø 16

**347518** 3/4" - Ø 18



## 386500

Screw plug with nut, for distribution manifold outlets. Connection: 3/4".

## Thermo-electric actuators



# 6561

tech. broch. 01042

Thermo-electric actuator for manifolds 662 and 664 series. Normally closed.



Code	Voltage (V)	
656102	230	
656104	24	
656112	230	With auxiliary microswitch
656114	24	With auxiliary microswitch

## Technical specifications

### Materials

Protective shell: self-extinguishing polycarbonate  
Colour: (code 656102/04) white RAL 9010 (code 656112/14) grey RAL 9002

### Performance

Normally closed  
Electric supply: 230 V (ac) - 24 V (ac) - 24 V (dc)  
Starting current:  $\leq 1$  A  
Running current: 230 V (ac) = 13 mA  
24 V (ac) - 24 V (dc) = 140 mA  
3 W  
Running power consumption:  
Auxiliary microswitch contact rating (code 656112/114): 0,8 A (230 V)  
Protection class: IP 44 (in vertical position)  
Double insulation construction:  CE  
Max. ambient temperature: 50°C  
Operating time: opening and closing from 120 s to 180 s  
Length of supply cable: 80 cm

## Thermo-electric actuators with manual opening knob and position indicator



# 6563

tech. broch. 01142

Thermo-electric actuator for manifolds 662 and 664 series. Normally closed.



Code	Voltage (V)	
656302	230	
656304	24	
656312	230	With auxiliary microswitch
656314	24	With auxiliary microswitch

## Technical specifications

### Materials

Protective shell: self-extinguishing polycarbonate  
Colour: (code 656302/04) white RAL 9010 (code 656312/14) grey RAL 9002

### Performance

Normally closed  
Electric supply: 230 V (ac) - 24 V (ac) - 24 V (dc)  
Starting current:  $\leq 1$  A  
Running current: 230 V (ac) = 13 mA  
24 V (ac) - 24 V (dc) = 140 mA  
3 W  
Running power consumption:  
Auxiliary microswitch contact rating (code 656312/14): 0,8 A (230 V)  
Protection class: IP 40  
Double insulation construction:  CE  
Max. ambient temperature: 50°C  
Operating time: opening and closing from 120 s to 180 s  
Length of supply cable: 80 cm

## Thermo-electric actuator, quick-coupling installation with clip adaptor



# 6562/4

tech. broch. 01198

Thermo-electric actuator for manifolds 662 and 664 series. Normally closed.



Code	Voltage (V)	
656202	230	
656204	24	
656212	230	With auxiliary microswitch
656214	24	With auxiliary microswitch

### Low power consumption version

Code	Voltage (V)	
656402	230	
656404	24	
656412	230	With auxiliary microswitch
656414	24	With auxiliary microswitch

## Technical specifications

### Materials

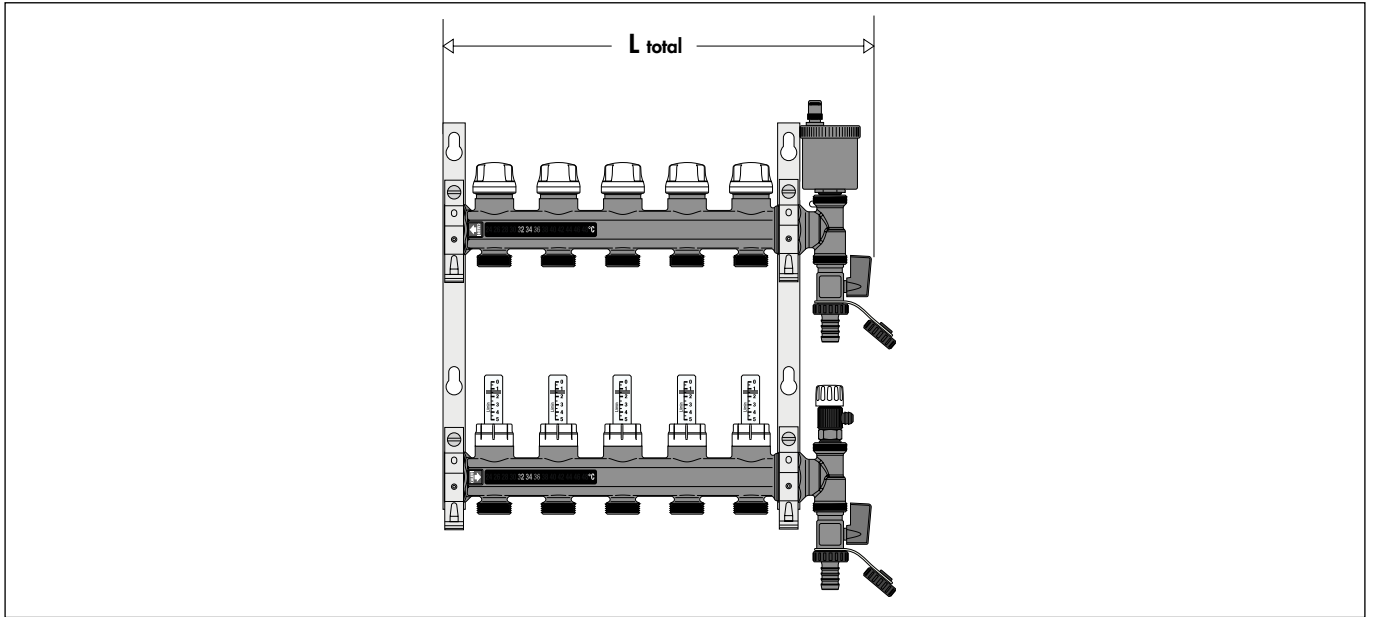
Protective shell: self-extinguishing polycarbonate  
Colour: (code 656.02/04) white RAL 9010 (code 656.12/14) grey RAL 9002

### Performance

Normally closed  
Electric supply: 230 V (ac) - 24 V (ac) - 24 V (dc)  
Starting current: (6562)  $\leq 1$  A (6564)  $\leq 250$  mA (230 V)  
Running current: -6562 series: 230 V (ac) = 13 mA; 24 V (ac) - 24 V (dc) = 140 mA  
-6564 series: 230 V (ac) = 15 mA; 24 V (ac) - 24 V (dc) = 125 mA  
Running power consumption: 3 W  
Auxiliary microswitch contact rating (code 656.12/14): 0,8 A (230 V)  
Protection class (fitted in all positions): IP 54  
Double insulation construction:  CE  
**Operating time 6562 series**  
Operating time: opening and closing from 120 s to 180 s  
Aux. microswitch closing time: from 120 s to 180 s  
**Operating time 6564 series**  
Opening time: (80%): 300 s; (100%): 600 s  
Closing time: 240 s  
Aux. microswitch closing time: 300 s  
Length of supply cable: 80 cm



**Choice of box size, 659..5 series, according to the number of outlets**



Code	6646B1	6646C1	6646D1	6646E1	6646F1	6646G1	6646H1	6646I1	6646L1	6646M1	6626N1	6646O1
No. of outlets	2	3	4	5	6	7	8	9	10	11	12	13
Manifold total length (mm)	180	230	280	330	380	440	490	540	590	640	690	750
Box length (mm)	400	400	400	600	600	600	600	800	800	800	800	1000
Box code, 659 series	659045	659045	659045	659065	659065	659065	659065	659085	659085	659085	659085	659105

**Boxes**



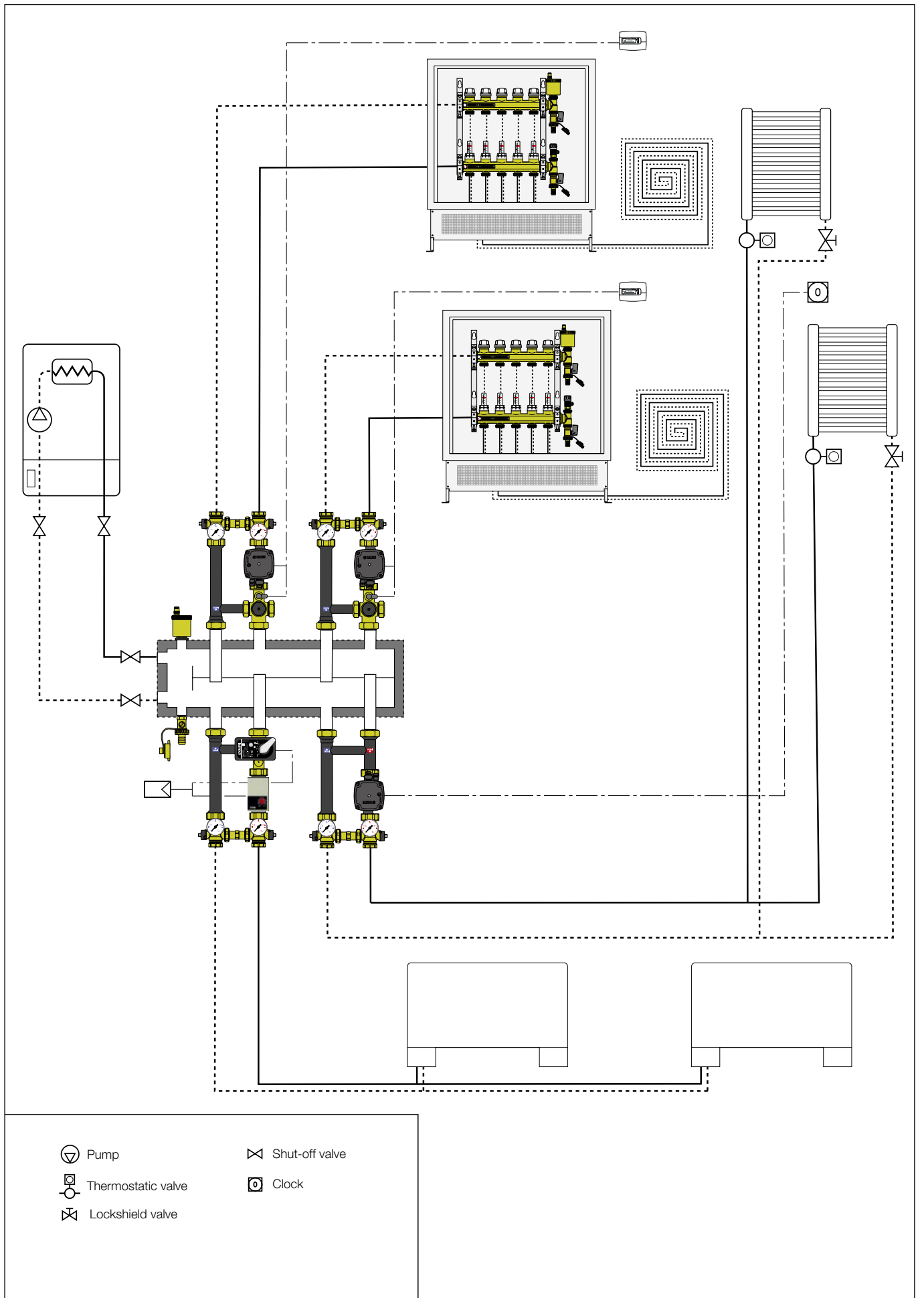
**659**

 **tech. broch. 01180**

Inspection wall box for distribution manifolds 664 series. Complete with specific support for manifold brackets. Closure with a push-fit clamp. In painted sheet steel. **Adjustable depth from 80 to 120 mm.**

Code	(h x w x d)
659045	500 x 400 x 80-120
659065	500 x 600 x 80-120
659085	500 x 800 x 80-120
659105	500 x 1000 x 80-120

# Application diagrams



*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.*

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