

**PRE-ASSEMBLED MANIFOLD FOR HEATING SYSTEMS
WITH THERMOSTATIC MIXING**

R557

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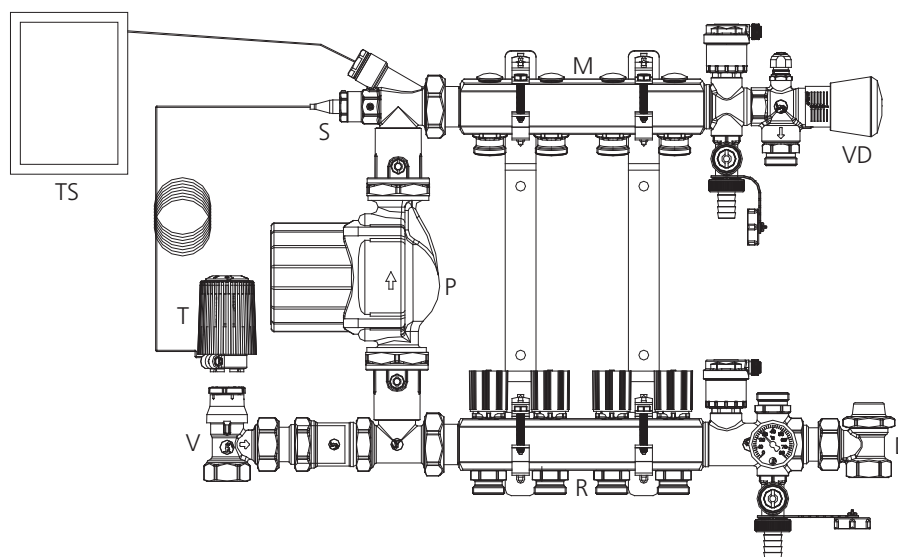


PRE-ASSEMBLED MANIFOLD FOR HEATING SYSTEMS WITH THERMOSTATIC MIXING

► Application

During recent years, planning and installation of heating systems has shown a considerable evolution, due to customer requirements seeking higher environmental comfort by limiting management and maintenance costs. One of the most popular solutions is the mixed system, where in the same property radiators are supplied at high temperature and circuits with underfloor heating are supplied with water at low temperature and used in the same system. The R557 pre-assembled manifold is particularly useful in these applications, i.e. where the system dimensions are limited and where the installation of an electronic regulator with the relevant component controls is not used. The mixing and regulating manifold R557 allows distribution of water at low temperature to the secondary circuit at a fixed point by drawing off from the primary circuit at a higher temperature, which is necessary for supply to a towel rail, radiators etc.

► Operating



The valve V and lockshield D constitute the connection points to the primary circuit at high temperature. The valve V receives water at a temperature of $70 \div 80 \text{ }^\circ\text{C}$, while from the lockshield D a flow similar to that received through the valve V returns to the boiler at a temperature similar to that of the return to the underfloor heating system. The R462L thermostatic head T is fitted to the valve body limiting the range to $20 \div 70 \text{ }^\circ\text{C}$ and is supplied with a sensor S inserted into the upper flow manifold M of the underfloor heating system. The return water from the underfloor heating arrives to the lower manifold R where a small part flows towards the lockshield D and consequentially to the return primary circuit, while the larger quantity drawn from the pump P is mixed with the high temperature water coming from the valve V. By positioning the thermostatic head T to a prefixed flow temperature for underfloor heating, we will obtain movement of the valve V allowing the relevant amount of hot water to enter the inlet of the manifold, depending on the heat load being sufficient to maintain constant flow temperature.

In order to avoid an unrequired temperature increase of the primary circuit, it is recommended to fit a security thermostat TS to the R557 manifold which in case of failure will interrupt the pump supply P. In these conditions water at high temperature is pushed by the pump of the primary circuit (required for correct operation of the manifold). Arriving from valve V flows from the lockshield valve D without entering the underfloor heating system as pump P is switched off.

In order to regulate the different circuits of the underfloor heating system, actuators type A thermostatic head with remote sensors or room thermostats can be fitted to the manifold. The differential valve VD installed on the manifold avoids pressure changes when the actuators close.

▸ Components

The pre-assembled manifold for underfloor heating systems is supplied with:

- **R553S** flow manifold with built-in balancing lockshield valves
- **R553V** return manifold with built-in balancing valves
- **R588L** adjustable brackets
- **R557B** T with nut and tail piece
- **R557D** T with nut and tail piece
- **R252** Isolating pump valve
- **R462L** Thermostatic head temperature limiting with 20 ÷ 70°C field
- **R554D** self-sealing connection, thermometer, automatic air vent
- **R554A** self-sealing connection with automatic air vent, differential valve
- **R557P** tail piece

In order to complete the Group, the following products have to be added according to the requirements:

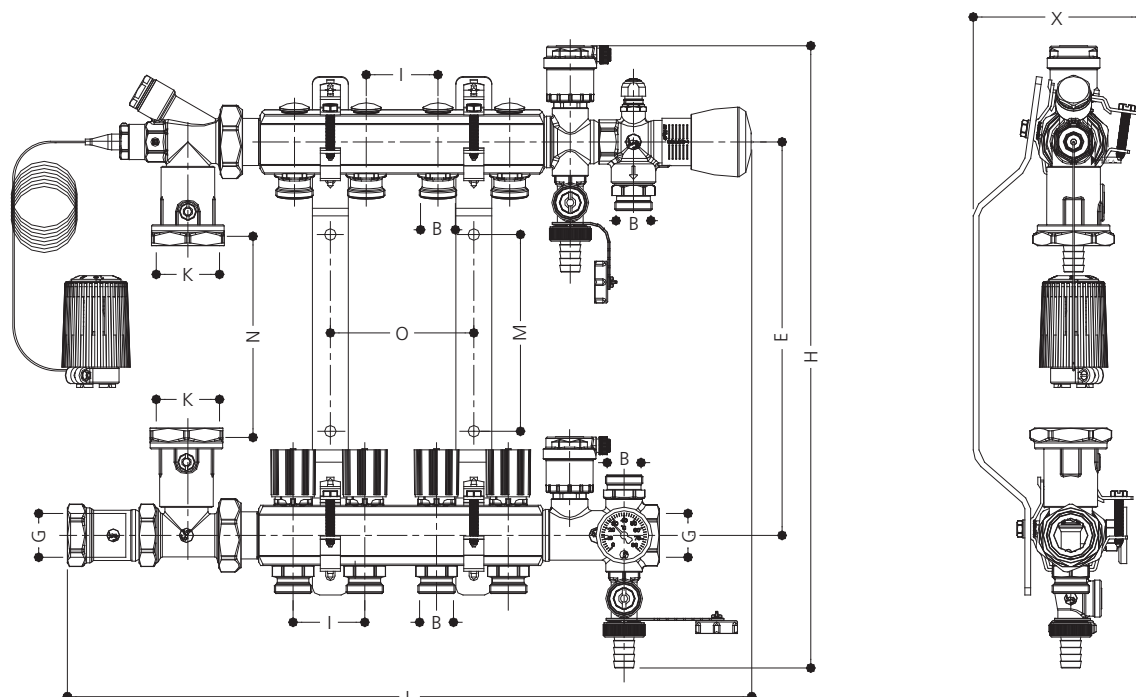
- **R401TG/R402TG** Angle or straight valve or **R411TG/R412TG**
- **R14TG** or **R15/TG** angle or straight lockshield valve or **R29TG, R31TG**
- **R593** Plug with air vent connection of the suitable size, for valve and radiator connection
- **K373** Thermostat with immersion temperature sensor, with **R227** flow temperature sensor housing
- **R179** adaptors for PE-X or Pb pipes, **R179AM** for multilayer pipes or **R178** adaptors for copper pipes
- **R473/R478** actuators or **R463** thermostatic heads with remote sensors
- Circulating pump having 130/180 mm interaxis
- **R500** manifold cabinet, stove enamelled



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► Overall dimensions

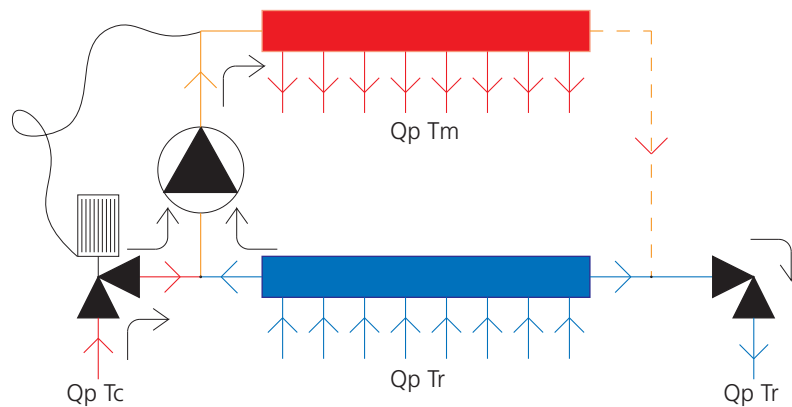
If the R557 is supplied with a circulating pump having 130 mm interaxis, the R500 stove enamelled cabinet can be used. For pumps having 180 mm interaxis (the application of which is limited to certain circumstances due to the height of the manifold), a suitable cabinet must be made up on site by the installer.



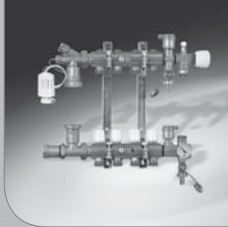
PART NUMBER	G	B	OUTLETS	I	K	H	E	M	N	O	L	X
R557Y002	1"	18	2	50	1"1/2	433-473	274-314	137	130-180	/	377	116,6
R557Y003	1"	18	3	50	1"1/2	433-473	274-314	137	130-180	/	427	116,6
R557Y004	1"	18	4	50	1"1/2	433-473	274-314	137	130-180	100	477	116,6
R557Y005	1"	18	5	50	1"1/2	433-473	274-314	137	130-180	150	527	116,6
R557Y006	1"	18	6	50	1"1/2	433-473	274-314	137	130-180	200	577	116,6
R557Y007	1"	18	7	50	1"1/2	433-473	274-314	137	130-180	250	627	116,6
R557Y008	1"	18	8	50	1"1/2	433-473	274-314	137	130-180	300	677	116,6
R557Y009	1"	18	9	50	1"1/2	433-473	274-314	137	130-180	350	727	116,6
R557Y010	1"	18	10	50	1"1/2	433-473	274-314	137	130-180	400	777	116,6
R557Y011	1"	18	11	50	1"1/2	433-473	274-314	137	130-180	450	827	116,6
R557Y012	1"	18	12	50	1"1/2	433-473	274-314	137	130-180	500	877	116,6

► Application example

The R557 manifold is supplied without thermostatic valves and lockshields, as they should be chosen in accordance with the requirements of the water flow at high temperature. The quantity of water circulating in the manifold and consequentially in the circuits of the underfloor heating is not the only consideration allowing this choice, as it must be related to the radiator outputs and to the difference in temperature between primary and secondary circuits. It is important to choose the correct size of thermostatic radiator valve body on the primary flow to ensure accurate flow rates to the system. This phenomenon happens where the temperature of the primary circuit is not constant and subjected to wide variations (i.e. wall hung boilers where we have low inertia and limited on-off operations). In certain cases this phenomenon is so evident that a high level thermostat must be used to close the pump to avoid relevant operational problems. Otherwise if the valve with thermostatic option is not of the correct size the start up time will be longer and the system will have limited performance: in these cases the water velocity to the manifold is increased by the additional flow rate from the valve with a consequent increase in pressure loss (not always allowed for by the pump of the primary circuit) and increased noise will be evident. In order to select the correct sizes of valves with thermostatic option it is necessary to study the following diagram:



Q_p	Water flow for underfloor heating circuits (l/h)
Q_c	Water flow from the primary circuit at high temperature (l/h)
T_c	Water flow temperature from the primary circuit at high temperature (°C)
T_m	Flow temperature to the panel radiator circuits (°C)
T_r	Return temperature from the panel radiator circuits (°C)



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By taking into consideration a constant specific heat and density of water at high temperatures used in the R557 manifold the following can be expressed

$$Q_p \times (T_m - T_r) = Q_c \times (T_c - T_r)$$

from this formula the Q_c flow is obtained which will select the valve dimension.

$$Q_c = Q_p \times \frac{(T_m - T_r)}{(T_c - T_r)}$$

If for example water temperature of the primary circuit which supplies the manifold is $T_c=80^\circ\text{C}$ and the circuit with underfloor heating is calculated with $T_m=40^\circ\text{C}$ and $T_r=35^\circ\text{C}$ (then with a difference of temperature $Dt = 5^\circ\text{C}$) for a total flow of the manifold with underfloor heating of $Q_p=1000 \text{ l/h}$ we will obtain the following.

$$Q_c = 1000 \times \frac{(40 - 35)}{(80 - 35)} = 111 \text{ l/h}$$

With this flow value from the pressure loss diagrams of the valves with thermostatic option, can see that a 3/8" valve will have a pressure loss of ca. 400 mm water column and a 1/2" valve will have a pressure loss of ca. 290 mm water column and so it will be suitable for this operation.

If in the previous example we had a water temperature of the primary circuit supplying the manifold $T_c= 55^\circ\text{C}$ the water flow entering under the same conditions, the secondary circuit will be

$$Q_c = 1000 \times \frac{(40 - 35)}{(55 - 35)} = 250 \text{ l/h}$$

which in a 1/2" thermostatic valve will have a pressure loss of 1700 mm water columns extreme for many applications, while in a 1" valve the pressure loss is of 370 mm water columns, admitting value.

These considerations indicate that in case of high primary circuit temperatures, the water entering the manifold inlet becomes low and requires the use of thermostatic valves and lockshields of limited sizes. Otherwise if the primary temperatures are low as i.e. in systems with condensing boilers, the inlet flow increases and valves with larger dimensions are required.

► Positioning of the head with thermostatic option



The flow temperature of the system with underfloor heating can be pre-determined by positioning the R462L thermostatic head according to the values reported in the following table. Regulation precision is very high ($\pm 1^{\circ}\text{C}$ ca.) and it is suggested to proceed with the calibration by making some adjustments of the head position with the system. In order to avoid tampering it is possible to lock the head by using the setting on the regulation valve, which is adjusted by key .

Position	★	1	2	3	4	5	6
T[°C]	20	23	34	45	56	67	70

► Circuits balancing



The flow manifold has built-in adjustment with mechanical memory for circuit balancing. By using R558 key it is possible to fully open the regulation valve with a screwdriver and then starting from the fully closed position, open the lockshields the number of turns obtained from the calibration diagrams. After having completed the balancing, tighten the regulating valve again on the relative lockshield valves. This operation will allow to open and close the circuits without losing the initial calibration position.



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▸ Actuator assembly

R473



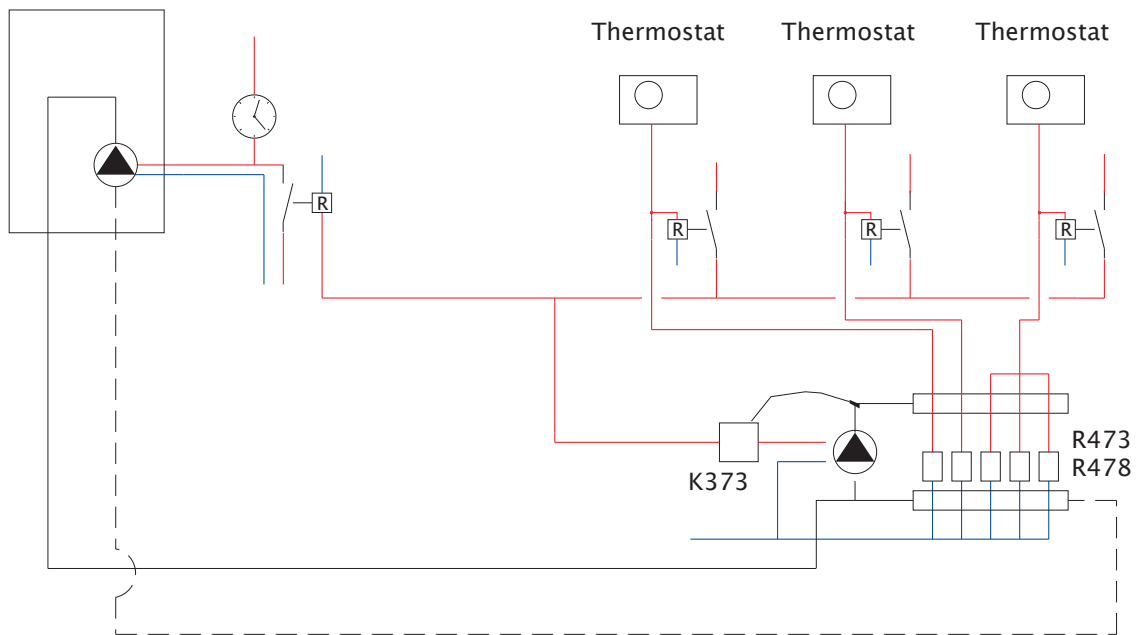
R478



If the R557 manifold supplies circuits installed in the same apartment or house, we suggest to regulate the room temperature by installing a thermostat able to directly control the pump by fitting a simple timer to limit the on and off switch. If circuits for heating different rooms are connected to the manifold, the higher comfort and saving is obtained by installing in each room (K480 thermostats) connected to R473 or R478 actuators, or to the R463 thermostatic heads with remote sensors. Our actuators are easily installed on the return manifold by removing the valve shut-off cap.

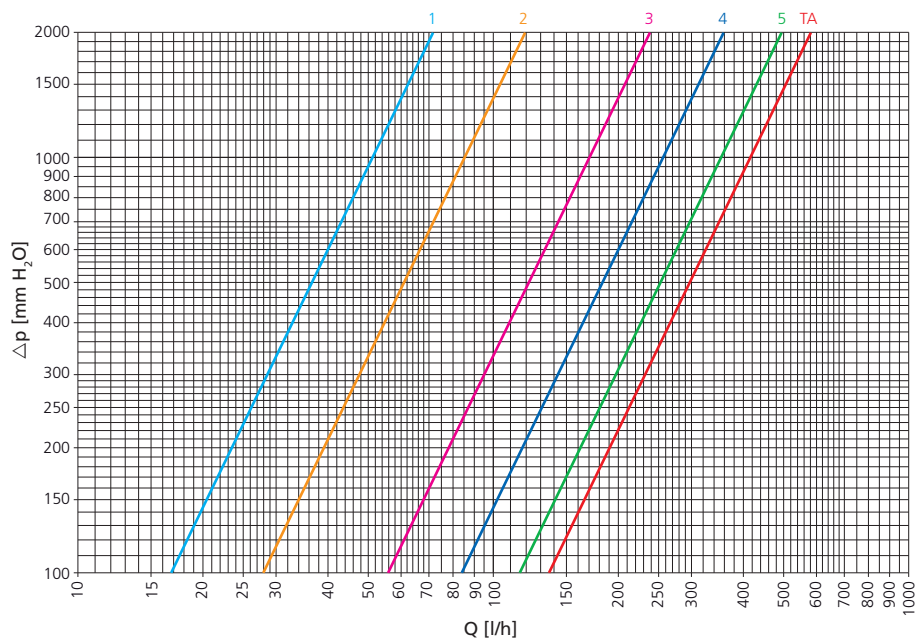
▸ Example of electrical connection

The following scheme shows a typical mixed system where standard radiators at high temperature are combined with R557 manifold for underfloor heating systems. The electrical system has to be made by allowing that the pump of the primary circuit is operating when the pump of the manifold is started and the side at high temperature is working also when the R557 group is switched off. The scheme has to be followed according to the type of actuator installed and system complexity, by using suitable electrical components.

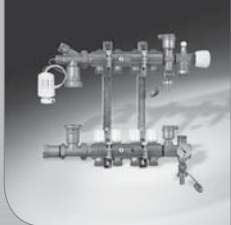


▸ Pressure loss diagrams

Manifold with R473/R478 actuators

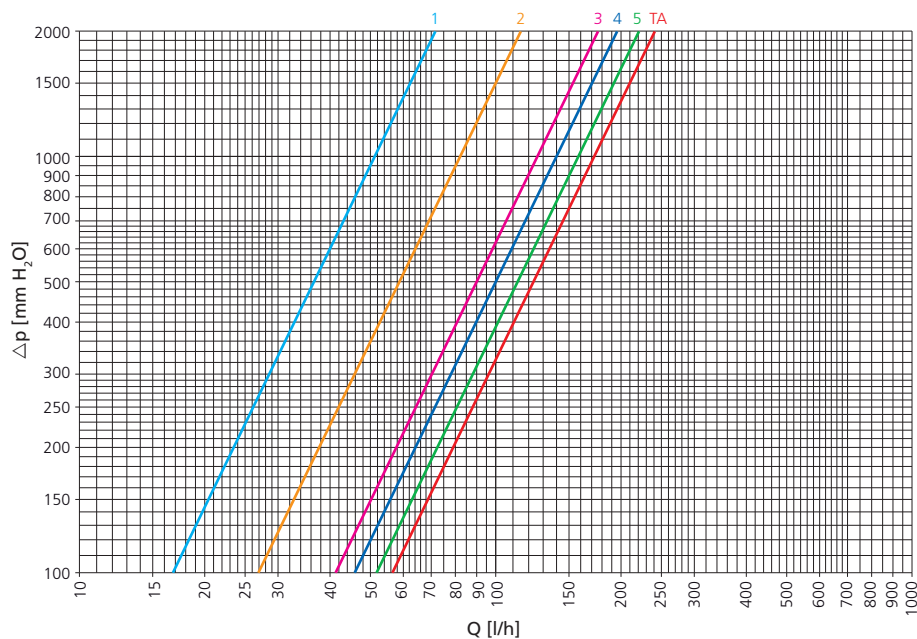


Opening turns	Kv
1	0,17
2	0,27
3	0,54
4	0,83
5	1,15
TA	1,35



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Group with R463 thermostatic heads with remote sensor in D 2°C



Opening turns	Kv
1	0,17
2	0,26
3	0,40
4	0,45
5	0,51
TA	0,55

▸ Technical specifications

Pre-assembled manifold for radiant systems with fixed point regulation, composed by a delivery manifold with regulation micrometric lockshield valves, and by a return manifold complete with micrometric valves with thermostatic option. It is equipped with temperature limiting thermostatic head and intermediate fittings with discharge cocks.

Max water temperature: 110°C.

Max system pressure: 10 bar.

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