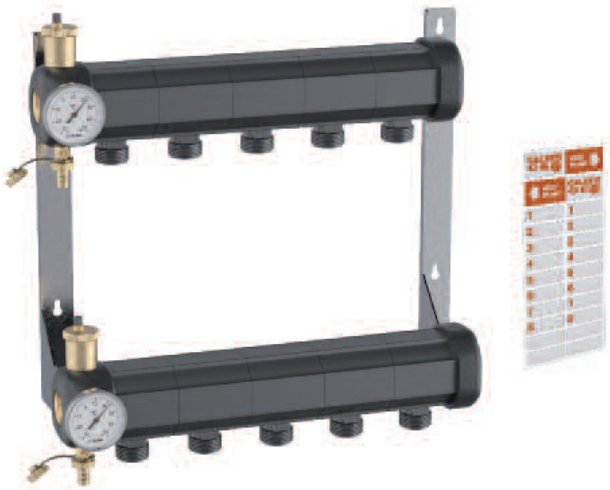
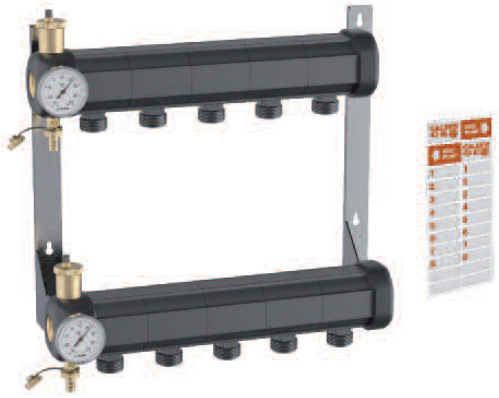
110

composite material
distribution manifold



altecnic
Caleffi group

110 distribution manifold in composite material for geothermal systems



Introduction

Altecnic GEO® series manifolds are used to control and distribute the medium in closed circuit geothermal systems.

In circuits with a geothermal heat pump, the thermal medium is generally a mixture of water and anti-freeze liquid since the temperatures can be extremely low. The components are made with high-performance materials for this type of application.

They are supplied pre-assembled, complete with end fittings and temperature gauges, or as separate pieces to be assembled.

Product Range

110 Pre-assembled geothermal manifold

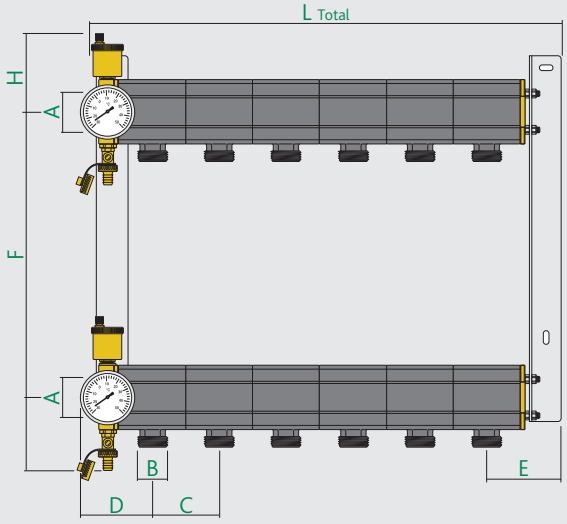
Materials

Component	Material	Grade
Manifolds		
Body:	Nylon 66	PA66G30
End Fitting		
Air Vent		
Stem:	Brass	BS EN 12164 CW614N
Spring:	Stainless steel	
Seals:	EPDM	
Float:	Polypropylene	PP
Fill/drain cock		
Body:	Brass	BS EN 12164 CW617N

Technical Specification

Medium:	Water, glycol solution & saline solution
Max. percentage of glycol:	50%
Max. flow rate:	7 m^3/h = 116 l/min
Max. working pressure:	6 bar
Max. system test pressure:	10 bar
Working temperature range:	-10 to 60°C
Ambient temperature range:	-20 to 60°C
Main connections:	1¼" female
Outlet threads:	42 p. 2.5 TR
Outlet center distance:	100 mm

Dimensions



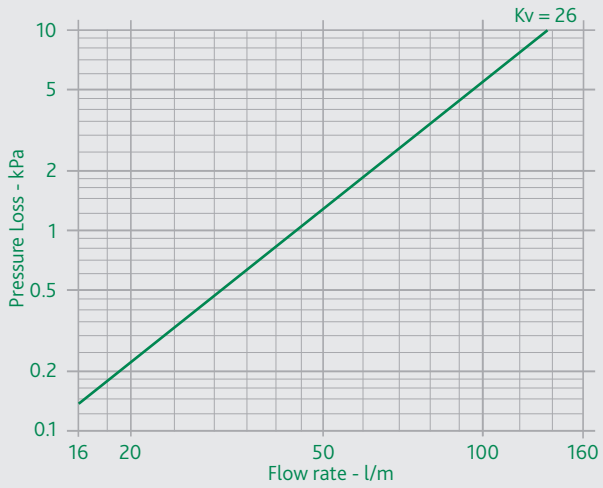
DN	A	B	C	D	E
50	1¼	42 p. 2.5. TR	100	99	111

DN	F	G	H
50	380	111	117

Pre-assembled code	1107B5	1107C5	1107D5	1107E5	1107F5
Modular manifold	x	x	x	x	x
Number of outlets	2	3	4	5	6
L TOTAL	296	396	496	596	696

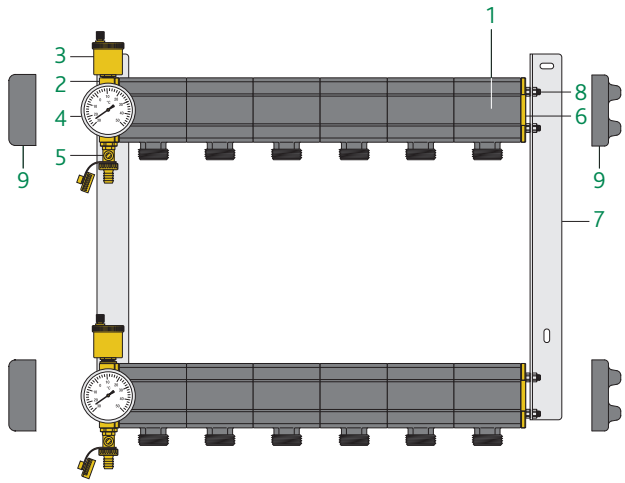
Pre-assembled code	1107G5	1107H5			
Modular manifold	x	x	x	x	x
No. of outlets	7	8	9	10	12
L TOTAL	796	896	996	1096	1296

Hydraulic Characteristics



110 distribution manifold in composite material for geothermal systems

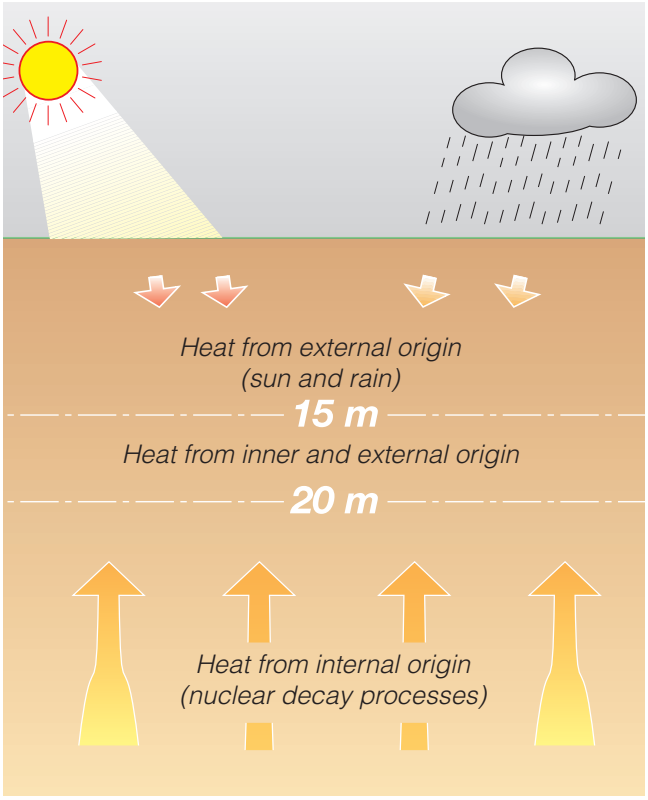
Components



Pre-assembled unit complete with:

1 Technopolymer manifold complete with sealing gaskets
2 Brass end fitting
3 Air vent
4 Temperature gauge with pocket
5 Fill/drain cock
6 Closure plate
7 Pair of stainless steel brackets
8 Stainless steel rods including screws and bolts for bracketing
9 Insulation

Application



Application Continued

The ground contains a large amount of heat from two origins: one external and one internal.

Heat from external sources comes mainly from sun and rain and penetrates the outer layers of the earth up to a depth of 15 m.

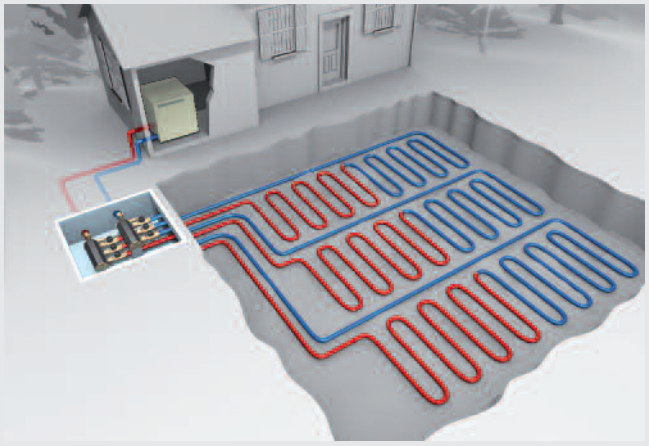
Heat from inside is generated by the nuclear decay of radioactive substances in rocks and the substratum: this is the source that heats the soil to a depth of more than 20 m which, technically speaking, can be defined geothermal heat.

Actually the term geothermal is now used for any type of heat stored in the ground.

Ground source heat pumps use this type of energy: the heat exchange between the ground and the pump takes place via the closed circuit probes.

The Altecnic GEO® series geothermal manifold is the main connection between the various geothermal probe circuits and the heat pump, which is the fulcrum of the system.

Horizontal Geothermal Probe System



Heat pump systems with horizontal probes use the heat stored in the layers of the earth nearest to the surface (up to a depth of 15 m); this heat comes primarily from the sun and rain.

For this reason horizontal probes particularly withstand fluctuations in surface temperature and, to be installed, they need large areas clear of constructions, paving or vegetation that can prevent heat reaching the ground.

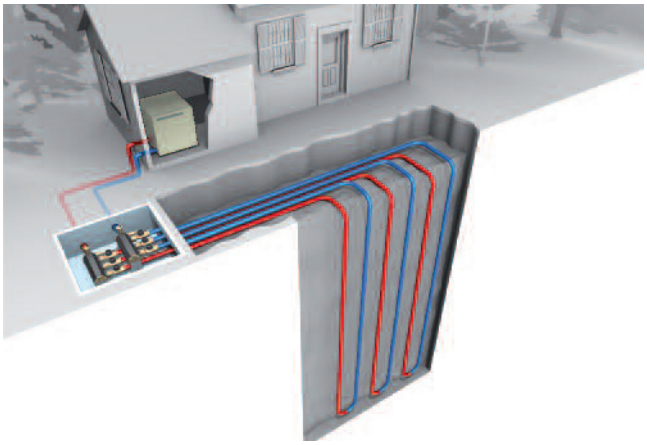
Pipes made of polyethylene (or reticulated polyethylene, depending on the type of ground) are inserted horizontally into the ground in an excavation from 1 to 3 m deep with a centre distance of 50 to 80 cm.

After laying, the excavated ground is put back and compacted.

The sizing of these manifolds is performed according to the thermal efficiency of the ground, which is affected by its composition, compactness and the quantity of water it contains.

It is necessary to pay attention to the sizing to prevent not only malfunctioning and low output of the heat pump, but also to prevent harmful consequences for vegetation such as freezing roots.

Vertical Geothermal Probe System

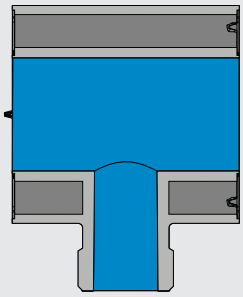


Systems with vertical ground source probes are based on the fact that, below a depth of 20 m, the temperature of the subsoil is constant and no longer depends on daily or seasonal temperature changes: below 20 m, the temperature of the ground increases by approximately 3°C every 100 m in depth.

Vertical probes, varying in length from 20 to 150 m, are made with holes in which one or two U-circuits are sunk, made with high-resistance PE pipes (generally with diameters DN 25, DN 32 and DN 40) that are specific for ground source applications.

To aid their insertion in the holes, these circuits are ballasted with special disposable weights of 15 – 20 kg. After laying the circuits, the gap between the wall of the hole and the pipe is filled with a highly thermal conductive mixture comprising cement and bentonite (a clay material).

Specific Composite Materials



The manifolds are made of a technopolymer - Nylon 66 (PA66G30) selected specifically for it's geothermal properties.

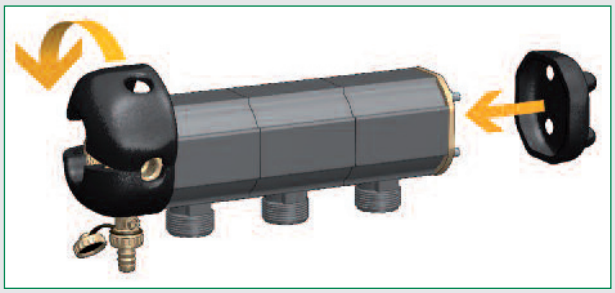
Polyamide features good characteristics such as mechanical strength, excellent impact strength and high toughness.

PA66 is more resistant to hydrolysis and glycol.

Moreover, by adding 30% glass fibre the material gains resistance to tensile stress, higher rigidity and dimensional stability.

These properties of the raw material, combined with an appropriate shape of the most stressed areas, make the manifold ideal for geothermal applications.

Condensation Protection

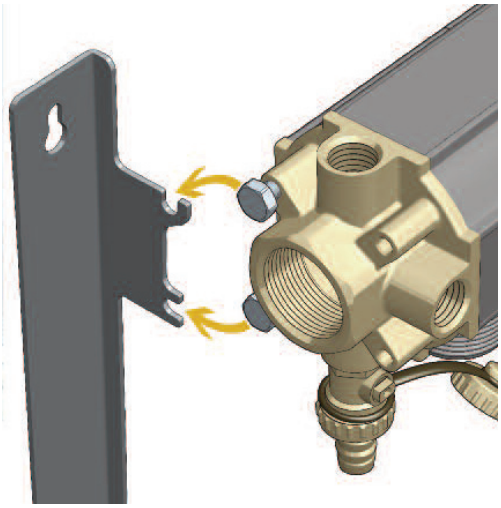


The reduced thermal conductivity of polyamide allows a barrier to be created against heat transmission; this property, combined with the air gap in the manifold, insulates the medium from the outside and limits condensation.

Insulation is applied to the brass parts of the end fitting and closure plate, designed specifically to ensure the continuous insulation of the manifold.

Construction Details

Manifold Modularity



The fully modular design of the manifold was engineered to allow it to be easily fitted on a bench then mounted onto wall brackets. This assembly feature facilitates the setting up of the probes and their connection to the manifold.

The modules are assembled on the threaded rods inserting a seal between them to isolate the water channel and the individual air gaps.

The brass end fittings compact the manifold and provide a housing for the control devices.

Fit the brackets on the wall, place the manifold in position and lay the pipes for the connection to the manifold. This makes it possible to adjust the length of the geothermal pipes.

The manifold can then be hooked to the brackets using the specially designed quick-connection.

The probes can be easily disconnected using the DECA fitting on the balancing valve (see 112,113 & 111 series) and the manifold unhooked from the support brackets.

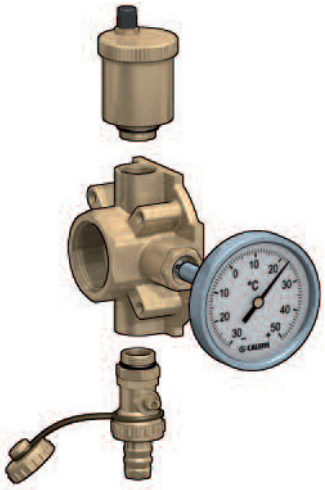
End Fitting

The end fitting is equipped with an automatic air vent, temperature gauge and fill/drain cock.

The air vent features an air-release mechanism with PP float and can be easily replaced thanks to the threaded connection, thus facilitating any control and maintenance procedures.

The scale on the temperature gauge with back connection is from -30 to 50°C, suitable for working temperature ranges of the geothermal system.

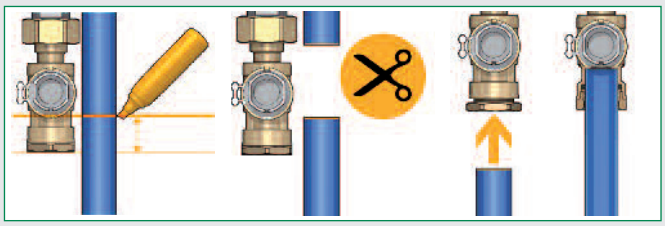
The difference between flow and return temperatures is in fact the first indication that a geothermal system is working properly.



The fill/drain cock allows the filling of the circuit.

Filling & Draining

Circuit Outlets



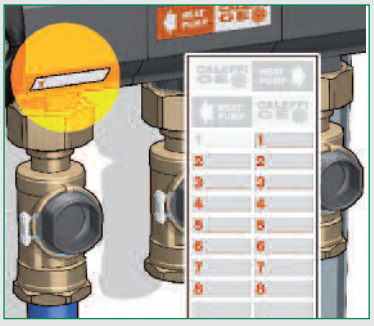
The outlet connections of each individual circuit have a special threading to be used with the special nut fitted on the shut-off valves.

The trapezoidal threading increases mechanical resistance as it improves load transmission.

Pipe of the geothermal circuit is connected to the manifold via the shut-off valve or balancing valve using a polyethylene pipe fitting.

Circuit Identification

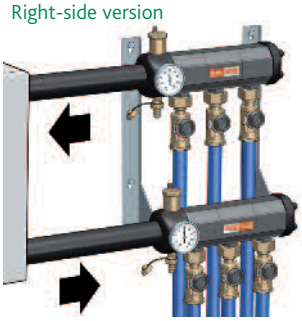
An adhesive label with the circuit number or ID can be affixed at the outlet point of each circuit. This can be very useful for system maintenance or in case of leakages.



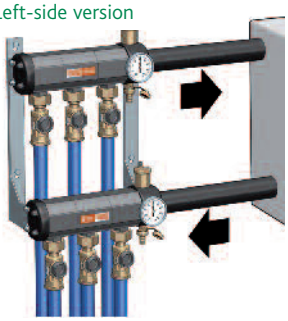
110 distribution manifold in composite material for geothermal systems

Reversible Installation

Right-side version



Left-side version

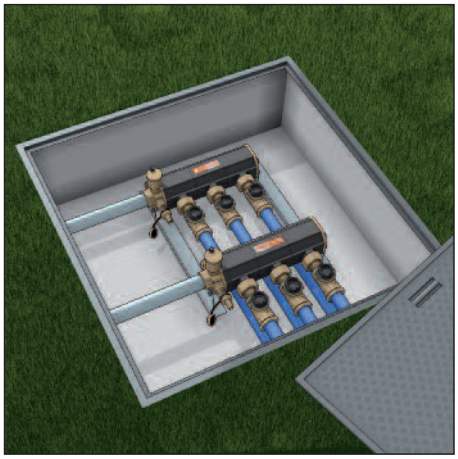


The manifold is reversible to adapt to the position of the probes with respect to the heat pump.

The pre-assembled version is fitted with the connections to the main pipes on the right side. This means that the heat pump would be on the right of the manifold.

Alternatively, the manifold can be assembled with the connections on the left side.

Flexible installation



The manifold was designed for vertical (wall) or horizontal (in an outside weather proof box for example) installation.

This allows the maximum flexibility when choosing a suitable place, depending on the range of the geothermal probes and their relative configuration.

Accessories for Manifold

111 series

Shut-off valve

Fitted for Vortex-effect sensor for flow rate integrated reading

DN 25	DN 32	DN 40
Code 111 620	Code 111 630	Code 111 640

Manifold connection 42 p.2.5 TR

Pipe connection		
Ø 25	Ø 32	Ø 40

Insulation for shut-off valves

DN 25	DN 32	DN 40
Code 111 001		Code 111 003

Control lever

Code 111 002

Flow rate measuring sensor

Code 111 010

Flow rate electronic measuring station

Code 130 010

112 series

Balancing valve with flow meter

Complete with fitting for polyethylene pipe

DN 25	DN 32	DN 40
Code 112 621	Code 112 631	Code 111 641

Manifold connection 42 p.2.5 TR

Pipe connection		
Ø 25	Ø 32	Ø 40

Balancing valve with with flow meter

Complete with ball valve and polyethylene pipe fitting

DN 25	DN 32
Code 112 622	Code 112 632

Manifold connection 42 p.2.5 TR

Pipe connection	
Ø 25	Ø 32

Insulation for balancing valve

DN 25	DN 32	DN 40
Code 112 001		Code 112 003

Insulation

DN 25	DN 32
Code 112 001	

113 series

Float flow meter

Complete with fitting for polyethylene pipe

DN 25	DN 32
Code 113 621	Code 113 631

Manifold connection 42 p.2.5 TR

Pipe connection	
Ø 25	Ø 32

Flow meter insulation

DN 25	DN 32
Code 113 001	

871 series

Shut-off valve

Complete with fitting for polyethylene pipe

DN 25	DN 32	DN 40
Code 871 025	Code 871 032	Code 871 040

Manifold connection 42 p.2.5 TR

Pipe connection		
Ø 25	Ø 32	Ø 40

Insulation for shut-off valves

DN 25	DN 32	DN 40
Code 111 001		Code 111 003

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Geothermal System Components

1 The probes transport the heat extracted from the ground to the manifold and then to the heat pump.

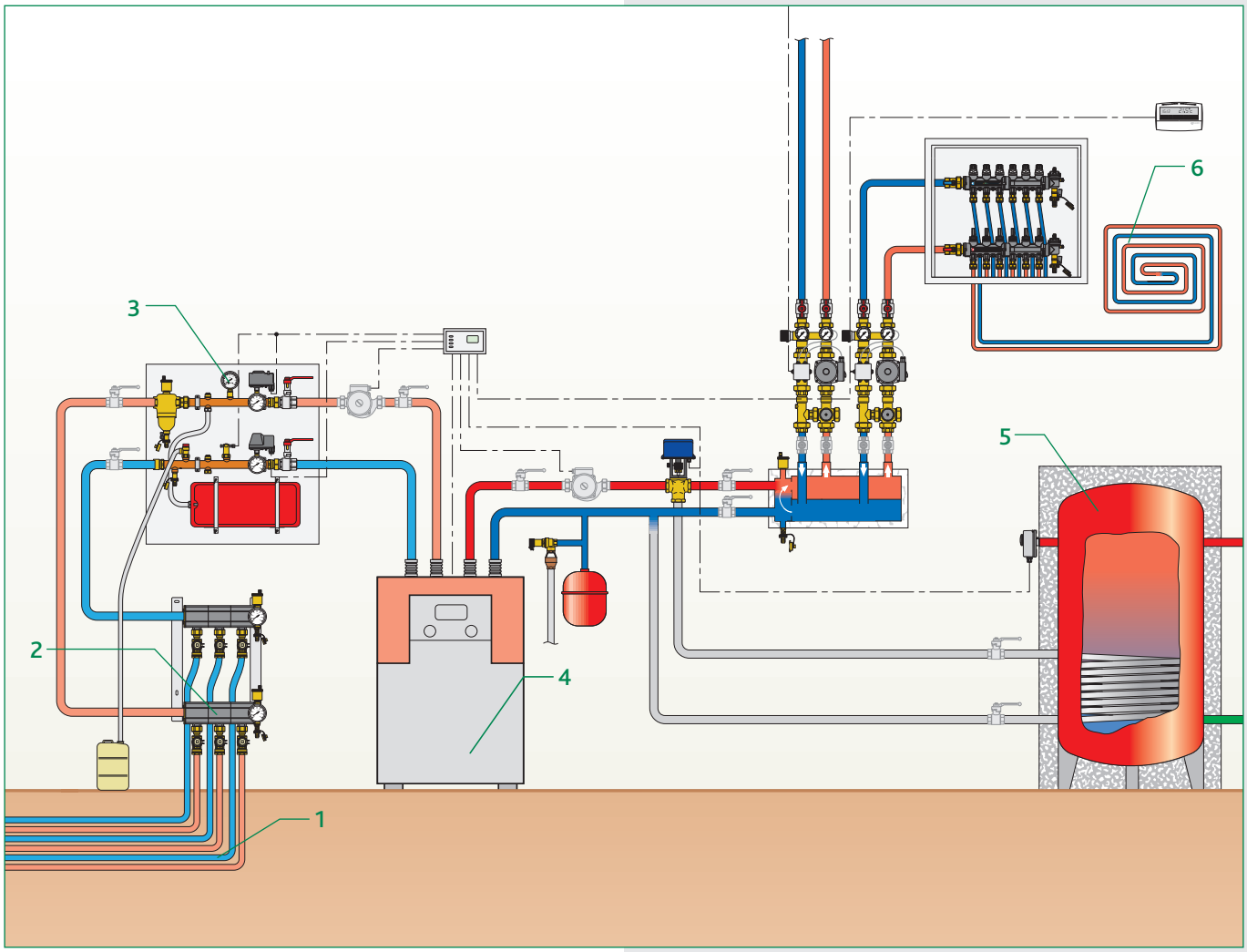
2 The geothermal manifold combines the different circuits into the main circuit connected to the heat pump. The balancing valves allows a better use of the heat exchange with the ground and reduces the energy consumption by the heat pump and circulators.

3 The purpose of the system control, regulation and safety devices is to protect the heat pump from malfunction or potential failures

4 The heat pump transfer heat from a source at a lower temperature to another at a greater temperature. It uses electrical energy during the compression and expansion phase of the medium contained within the internal cycle of the machine.

5 The storage ensures the heat pump can run constantly, improving system efficiency (COP) and extending the life cycle of the heat pump.

6 The heat emissions system must be the same low/medium temperature system used in underfloor heating.



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