

Watts Heating System Manual

Centenary Watts Quality Life



American Water Industry Expert
Since 1874

Centenary Watts Quality Life



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As the world's leading innovative aquatic product manufacturer and service provider founded in 1874, Watts Water Technologies, Inc. manufactures the products in four application areas: commercial and residential water, water reuse & supply and drainage, HVAC and water quality control and enjoys a reputation of "Setting the Standard in Valve Technology". By constantly optimizing the product R&D and production process, Watts is committed to providing comfortable, safe and energy-saving integrated solutions for the customers.

Watts is a renowned global business with factories in Europe, America and Asia. Watts entered the Chinese market in 1994 and directly invests and establishes Watts (Shanghai) Management Co., Ltd., Watts Water Equipment Manufacturing (Ningbo) Co., Ltd. and Watts (Ningbo) International Trading Co., Ltd. In China. With the constantly improving international economic position of China and even Asia, Watts decided to establish its Asia-Pacific headquarters in Shanghai, China in 2007 and has set up operational branches in Beijing, Guangzhou, and Chengdu, China, as well as in Singapore, Australia, and South Korea.

Moreover, Watts has established Watts floor heating product production bases in Germany, Italy and France to provide a series of advanced and reliable high-performance products including manifold, pipe and thermostat.

Watts Dumser, established in 1959, is in the industry leading level in terms of floor heating system, boiler linkage technology, solar energy system and heat pump technology and constantly provides innovative and high-quality solutions for HVAC market; Watts Italian Production Center, as the well-known heating, air conditioning and plumbing production base in Europe, mainly manufactures the modular manifold, regional controller, quick coupling, balancing valve, heat meter/energy meter and hydraulic backflow preventer.

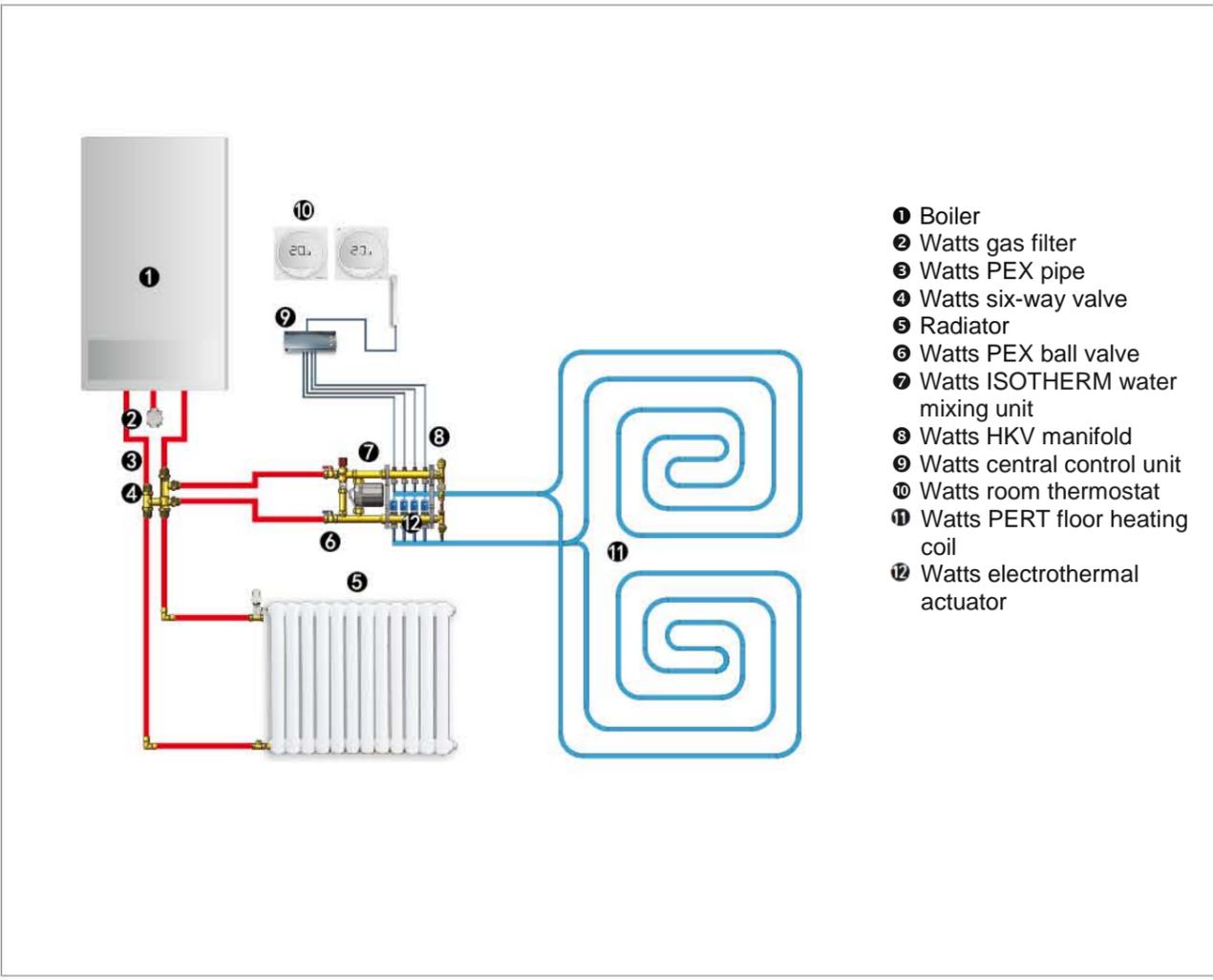


Watts heating system total solution



Watts heating system total solution

Typical Watts heating system diagram



Our advantages:



- Complete configuration and good compatibility

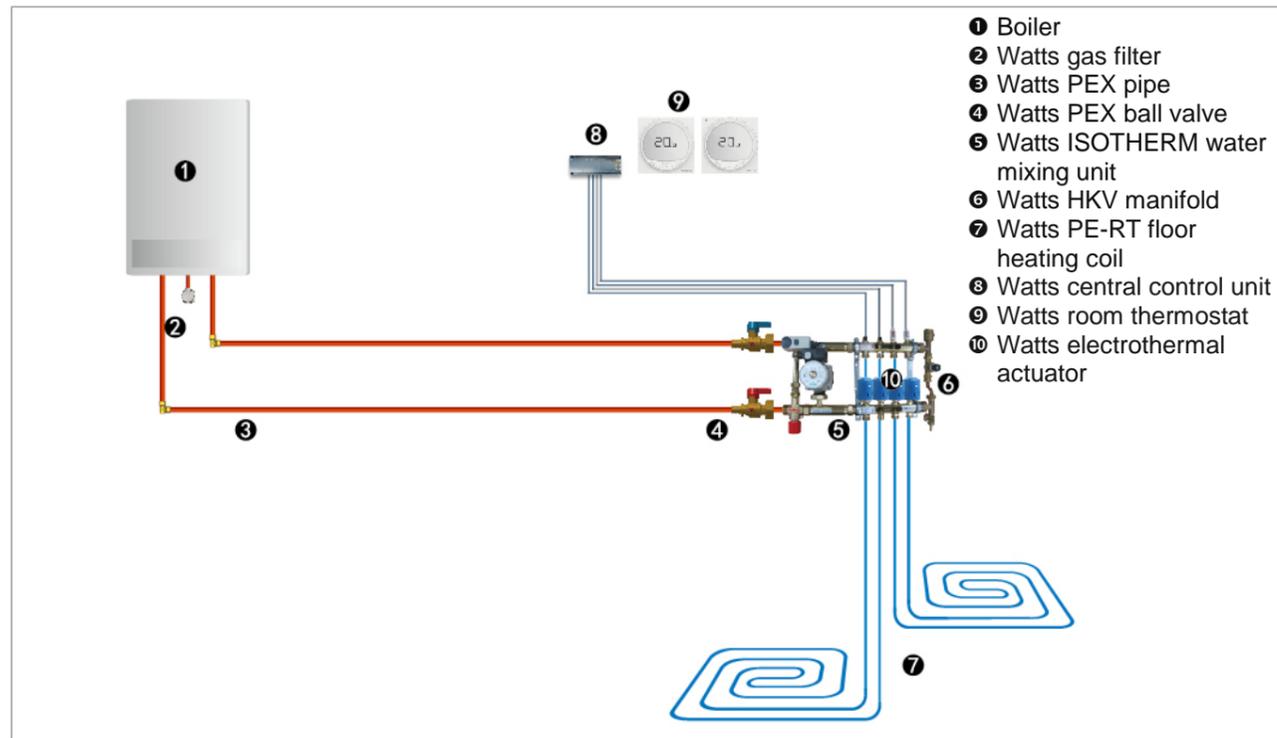


- European technology, quality assurance

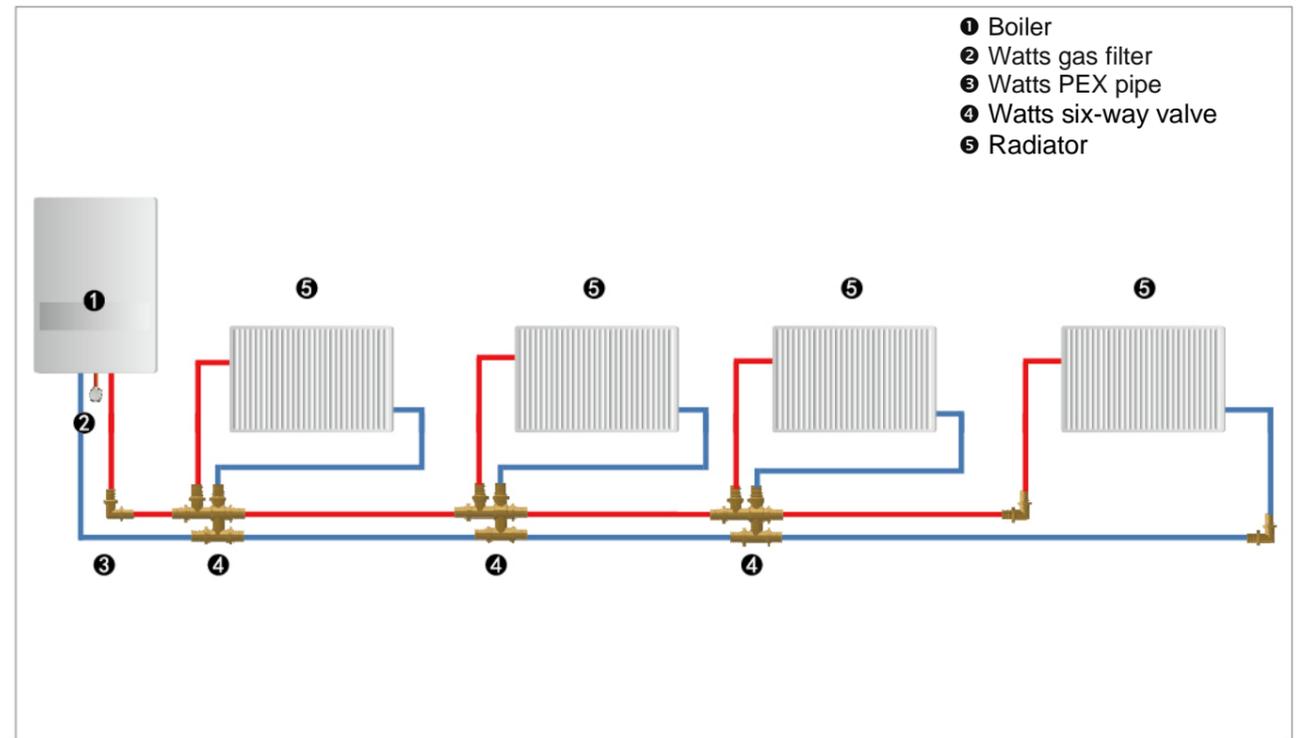


- Energy saving and environmental protection

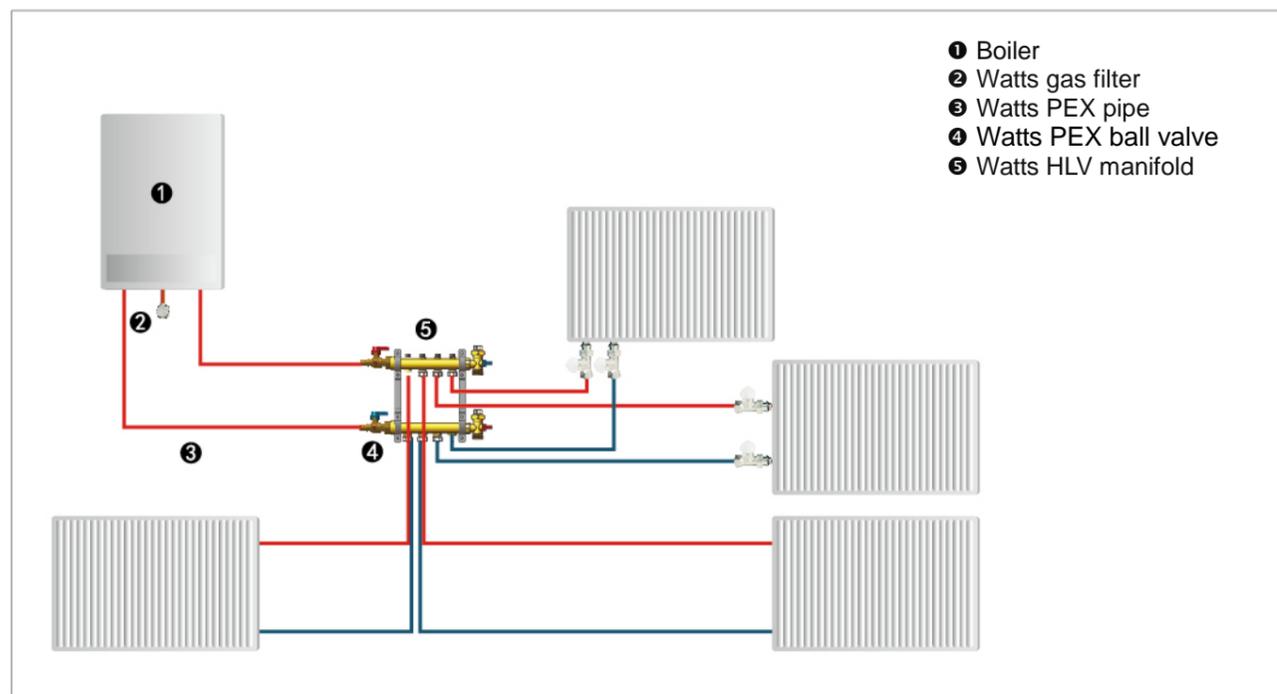
Application 1: Floor heating system



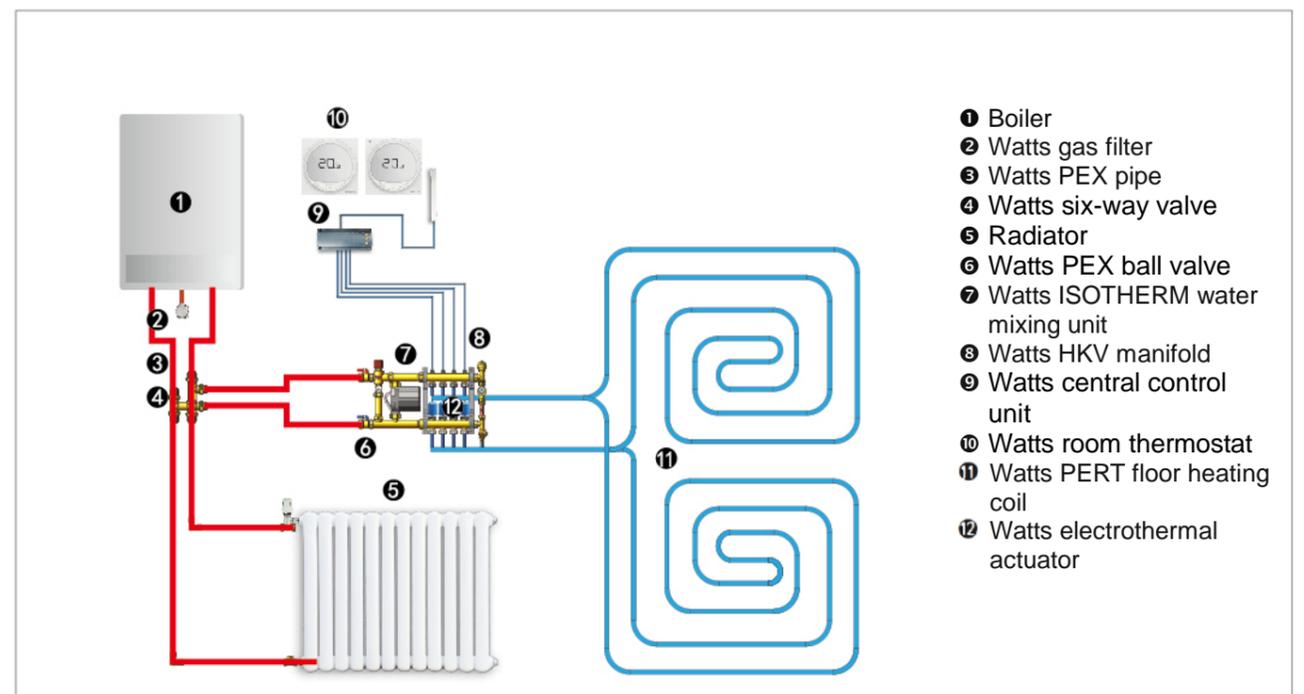
Application 3: Radiator system-parallel devices



Application 2: Radiator system-octopus



Application 4: Floor heating radiator composite system

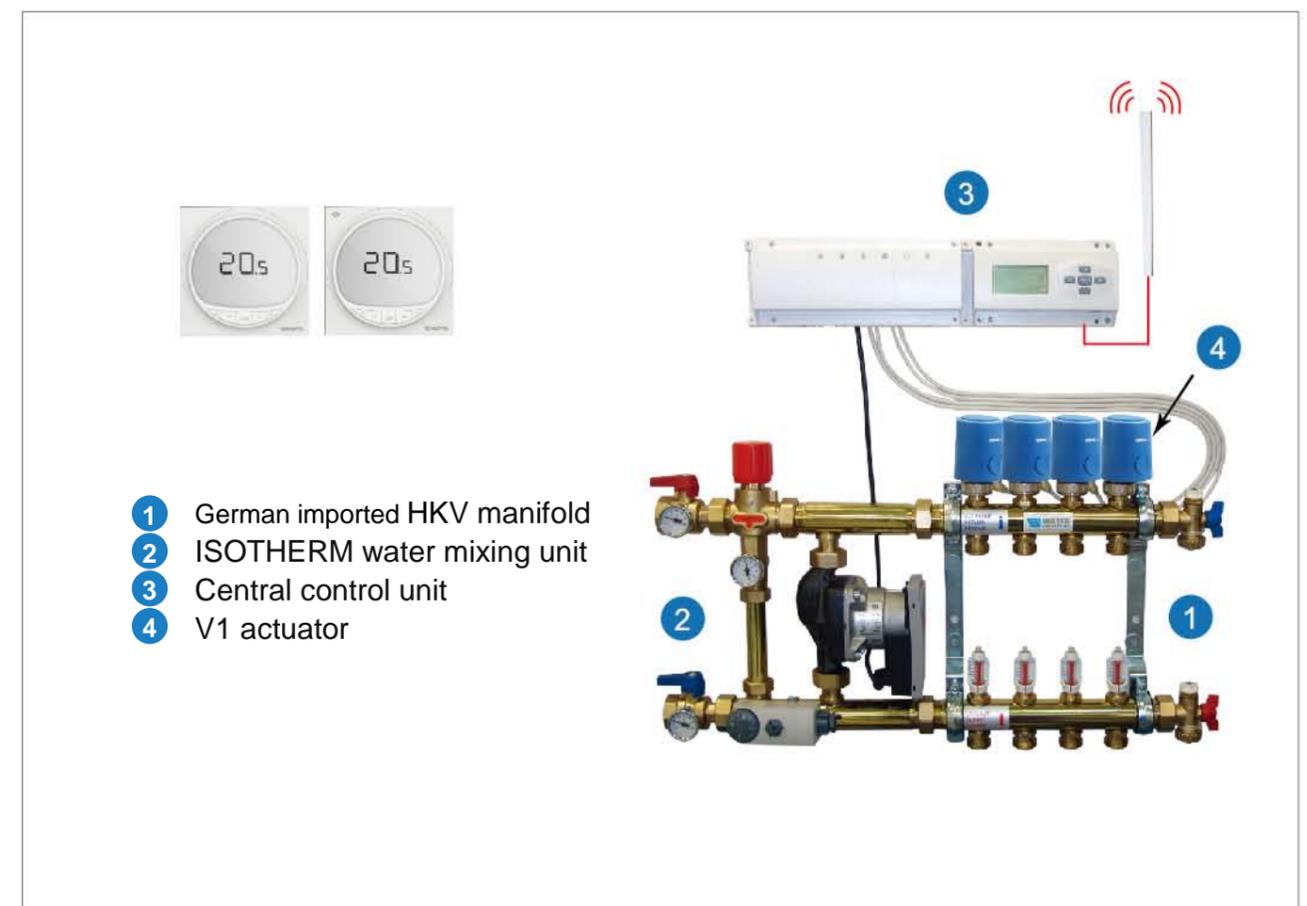




Watts hydraulic control system



Watts hydraulic control system



If the boiler is compared to the vehicle engine, the manifold is the vehicle transmission; if the floor heating pipe is compared to the human vascular network, the manifold is the central nervous system.

For floor heating, many loops shall be distributed according to different functions of the building and the heat demand of each room. A good manifold shall be made of good material and manufactured carefully and shall be able to flexibly adjust the hydraulic equilibrium of the system and distribute the flow.

Problems possibly caused by low-grade simple manifold:

- System circulation blocking, resulting in low boiler efficiency, short service life or other faults;
- Unable to satisfy the system pressure and flow equilibrium, resulting in hydraulic disorder, underflow or overflow and local non-heating or overheating.

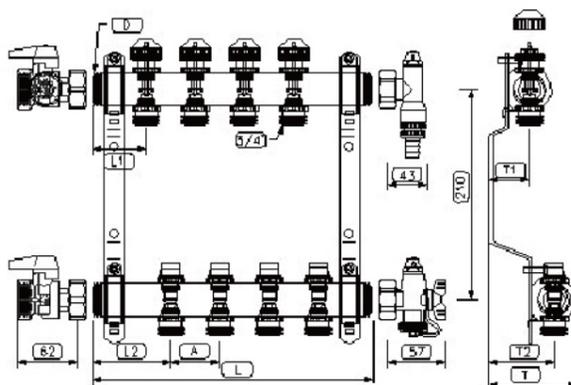
- DZR is selected as the raw material, with strong corrosion resistance and long service life.
- The world's exclusive flow drilling process guarantees smooth and uniform inner diameter, low hydraulic loss and good sealing performance.
- The end face seal, supplemented by EPDM O ring, is leakproof and permanently water-tight.

German imported manifold

1) HKV2010

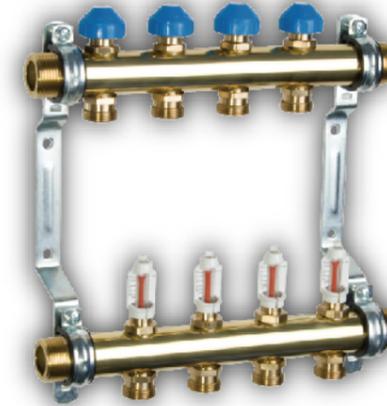


- Imported with original packaging from Germany
- MS63 DZR is used as the raw material, with long service life
- EPDM plane sealing form is adopted, reliable and durable
- All branch pipe interfaces are designed by Eurocone



Loop number	L(mm)	A(mm)	Specification	T1(mm)	T2(mm)	T(mm)
2	160	55 (50)	1"	37	62	83
3	210					
4	260					
5	310					
6	360					
7	410					
8	460					
9	510					
10	560					
11	610					
12	660					

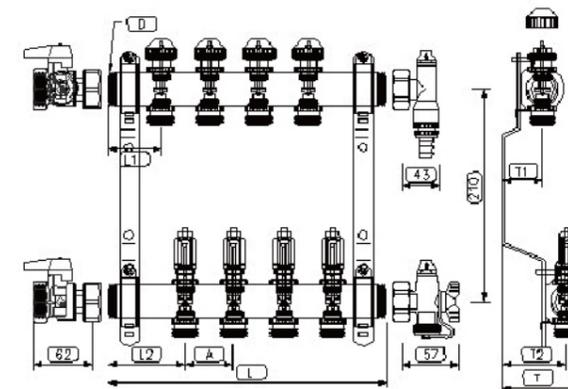
1) HKV2013 - with flowmeter, more convenient to adjust hydraulic equilibrium



Technical parameters	
Maximum operating temperature	90 C
Minimum operating temperature	-10 C
Maximum working pressure	12bar

Material data	
Couplings joint	Brass Ms58; CW614N
Body	Copper pipe Ms63; CW508L
Bonnet	Temperature and pressure resistant (PP)
Washer	EPDM or AFM 34
Bracket	Galvanized steel

* Specification: 1", 1 1/2" and 1 1/4", with 2-12 ways



Loop number	L(mm)	A(mm)	Specification	T1(mm)	T2(mm)	T(mm)
2	160	55 (50)	1"	37	62	83
3	210					
4	260					
5	310					
6	360					
7	410					
8	460					
9	510					
10	560					
11	610					
12	660					

2) German HLV manifold



- It may be used in the radiator system with DZR, plane sealing and external threaded connection.
- Low installation depth, saving the space. It has passed the pressure test.
- Specification: 1", provide 2-12 ways

Loop number	L(mm)	L1(mm)	Specification	A(mm)	H(mm)
2	110	35	1"	50	210
3	160				
4	210				
5	260				
6	310				
7	360				
8	410				
9	460				
10	510				
11	560				
12	610				

*Tips: Octopus connection

Octopus connection of the radiator is suitable for the indoor heat supply of various types of civil buildings. The heat source supplies heat to the radiators in all rooms simultaneously by means of the manifold device, so as to guarantee the water inlet temperature of each group of radiators and so that the uniform heat supply effect can be achieved in any area in the room.

3) Smart Sunshine® stainless steel manifold



- Imported with original packaging from Germany and manufactured by advanced techniques
- The world's leading "flow drilling" manufacturing technique effectively eliminates the leakage hidden danger, safe and reliable.
- The stainless steel material meets the drinking water standard, durable and environmentally friendly.
- The plane sealing mode is used, safe and reliable.
- Meet European standards, with strict quality
- Flowmeter display for easy adjustment and small flowmeter differential pressure.

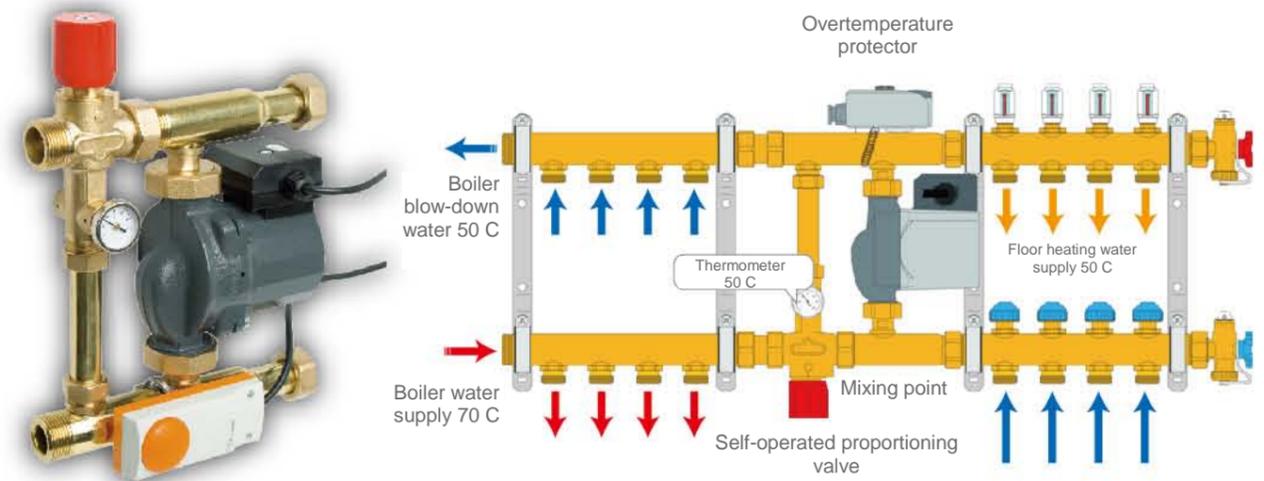


German imported mixing unit

Roles and advantages of the mixing unit:

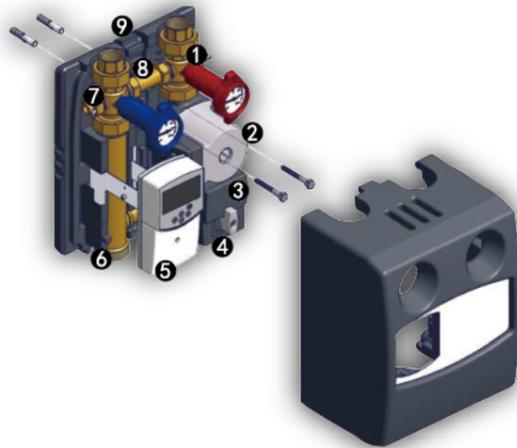
- Protect the floor heating pipe
Prevent the high-temperature water supply from causing excessive room temperature and ground fracturing and extend the service life of the floor heating pipe system
- Extend the boiler service life
The boiler is operating at low temperature for long time in case of no mixing unit, which will cause frequent start and condensate water flowing backward to the hearth, resulting in boiler life shortening and energy consumption increase.
- Save the gas cost
The boiler efficiency at the rated power is generally 93-94% and at the low load is generally below 90%. After configuration of the mixing unit, the boiler can be guaranteed to operate efficiently, so as to save the gas use cost.
- Balanced and comfortable
Guarantee to reach a comfortable heating temperature when each area is opened separately.
- Improve the heat transfer effect
The additional function of the circulating water pump configured in the mixing unit is to improve the heating water flow speed and to increase the heat transfer speed, so as to accelerate the floor heating warming up time and to save the gas.

1) German ISO-Therm mixing unit



The available compact hydraulic control system, with the maximum thermal capacity up to 15kW, adopts plane sealing and 1" external thread. It may set the temperature through the constant-temperature mixing injection valve. The pump and water temperature range is 20-90 C and the unit has passed the pressure test.

2) High-power hydraulic control unit HKM8180



- ❶ Water supply shut-off ball valve
- ❷ Circulating pump
- ❸ Three-point actuator
- ❹ Three-way mixing valve
- ❺ Climate controller
- ❻ Return water pipe
- ❼ Return water shut-off ball valve
- ❽ Spacer tube
- ❾ Facade mounting bracket

FlowBox HKM may be used for the fixed point supply water temperature control of the low-temperature heating system (such as floor/wall heating) and high-temperature heating system (such as radiator system). The water temperature is set and adjusted through the three-point electrothermal actuator in the three-way mixing valve. The input signal is provided by an external controller (such as boiler controller). Watts also provides optional climate controller series control products.

Immediately-installed compact mixing valve device, isolating valve with thermometer, gravity flow. Configured with the pump and the three-way mixing valve with valve driving circuit before delivery; EPP heat preservation box, connection fittings and wall mounting bracket It has passed the pressure test.

Apply to 500-1000m² grand villa type

3) German FWR rear water mixing unit



The available compact control unit may be used for the plane-sealed manifold with 1" external thread. The water inlet temperature may be set through the temperature control head. Pump and water temperature range 20-90 C, B-10kW thermal capacity; passed the pressure test.

The pump assembly includes sluice valve and vent valve, saving the cost and easy to use.

4) Magical Hat™ series-hydraulic balancing valve



Magic Hat is designed for hydraulic equilibrium and flow regulation and is energy-saving and environmentally friendly. Due to strong differential pressure regulating ability, it can adapt to different devices and flows and the maximum energy-saving efficiency can reach 26%.

- Three-step installation, simple and convenient
- Constant flow in each loop
- Conservation and comfort
- Reliable performance
- Solid and compact design
- Innovative solution

System accessories

1) V1/W1 electrothermal actuator

The electrothermal actuator, as a required actuating element to achieve single-room temperature control and automatic room temperature control in the floor heating, is generally installed in the manifold return valve element, radiator valve seat and fan coil valve seat.

The electrothermal actuator may be used to replace mechanical conditioning and achieve remote control. The room thermostat, timing thermostat or the control assembly of the control system may be placed in the most suitable position of each room for adjustment and connected to the electrothermal actuator for control.

Watts mainly provides the German imported electrothermal actuator V1.

*Tips:

In the temperature control of the floor heating system, the valve closing time is generally greater than the valve opening time, so the electrothermal actuator is normally closed, so as to increase the product life and reduce the power consumption.

● V1



- Imported with original packaging from Germany and manufactured by advanced techniques;
- Ultra low power (1W), energy-saving and environmentally friendly;
- Excellent waterproofness (CLAS II /IP54), meeting the working requirements in the humid environment;
- Unique split lock design, easy for installation and debugging;
- German TUV and CE certification.

● W1



- Imported with original packaging from Germany and manufactured by advanced techniques;
- Ultra low power (1W), energy-saving and environmentally friendly;
- Excellent waterproofness (CLAS II /IP54), meeting the working requirements in the humid environment;
- Unique split lock design, easy for installation and debugging;
- German TUV and CE certification.

2) Manifold ball valve assembly



Model	Specification	Handle
KH-1"	1" UMx1" IG	Red /blue
KH-1"	1" UMx1" IG, nickel plated	Red /blue

3) PEX ball valve assembly

After introducing PEX sliding pipe solution, Watts continues to research and develop the innovative manifold brass ball valve, which provides the solution of the system connecting the manifold and main pipe with more reliable connection, more convenient construction and installation and lower workout cost. The system connection solution is as follows:



Characteristics and advantages

- Refined in Watts original factory to guarantee the quality;
- Fewer connection points and reliability improved by 100% compared with the traditional valve connection;
- Advanced sliding connection type, which provides the highest reliability and avoids the leakage hidden danger compared with the traditional PPR welding and adapter connection type;
- A number of models optional and compact structure, saving the manifold installation space;

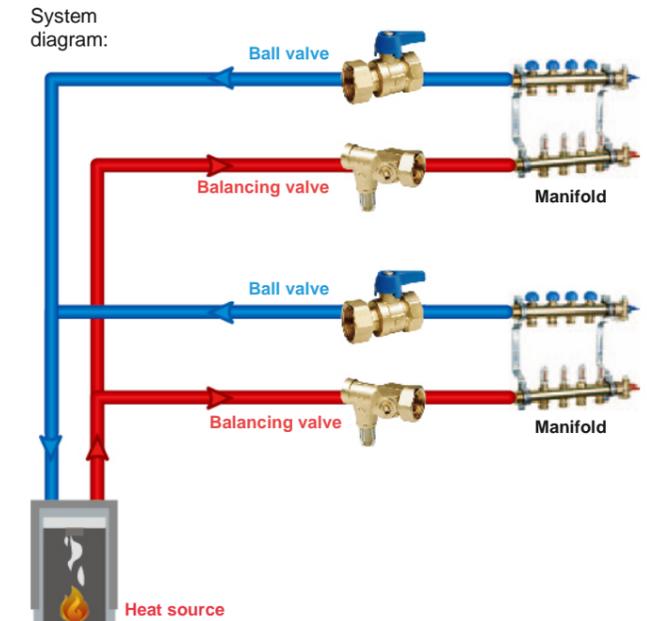
Product code	Product description	Product specification
61923351	PEX Ball V .set 20-G 1-S PEX ball valve assembly 20-G1 straight type	20X2.8-G1"
61923352	PEX Ball V .set 25-G 1 -S PEX ball valve assembly 25-G1 straight type	25X3.5-G1"
61923353	PEX Ball V. set 20-G1-A PEX ball valve assembly 20-G1 angle type	20X2.8-G1"
61923354	PEX Ball V. set 25-G1-A PEX ball valve assembly 25-G1 angle type	25X3.5-G1"

4) German balancing valve assembly

Exceeding or not reading the user's setting temperature is the common problem of the floor heating system. The hydraulic equilibrium regulation is particularly important when a number of manifolds are working simultaneously. By matching use of the balancing valve and the ball valve, the heat may be reasonably distributed through the piping system to avoid underheating or overheating and to save the energy.



Used with the ball valve and installed in the front of the manifold



5) Tailpiece ES-SET-1 "



Role: Brass valve body, with union nut and seal washer. T-handle ball valve is easy to open and close and used for backwash and draining.

Specification: Automatic/manual vent tailpiece, 1" internal thread.

6) Differential pressure bypass assembly

Preloaded differential pressure bypass valve, with compact structure and flat thread seal, subject to the integral seal test with the manifold and integrated into one-piece packaging.

Role: When the differential pressure on both sides of the valve exceeds the set value, the valve is open automatically to maintain the manifold differential pressure, so as to achieve the system operation stability.

Specification: Apply to the manifold with 1" external thread, with the regulating range of 0.03-0.5bar.



7) Regional control two-way valve 2131



Two-way brass valve used for the fan coil.
Maximum operating temperature: 100 C, nominal pressure: 16 bar.
Compatible with 22C and 26LC electrothermal actuators.

8) Mixing three-way valve 63C



Mixing valve.
With 10 set positions, setting range: 25 C /50 C.
Maximum differential pressure: 2bar, specification: 3/4", 1".

9) Local TRV - angle valve



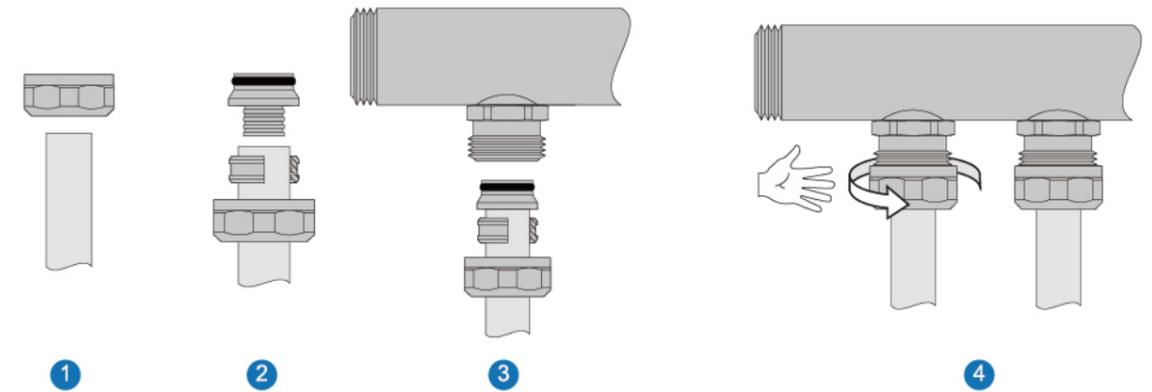
Used to set and adjust the room temperature heated by the cooling fin.

- High regulation accuracy and high thread accuracy
- Soft seal combined with hard seal for the valve and joint, safe and reliable
- Normally open return water locking valve
- Connect with the cooling fin by taper pipe threads, more reliable sealing
- A number of connection types to the heating pipe for choice

10) Adapter

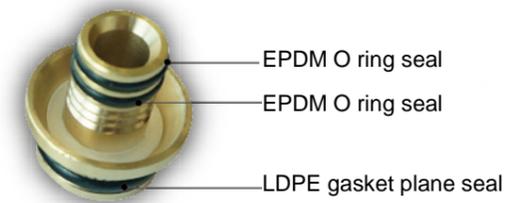
The manifold adapter, as a brass accessory used to connect PE-RT/PEX/PE-AL-PE pipe and other floor heating coils and manifold brand pipes, is mainly to prevent leakage in the connection between the manifold branch and the floor heating pipe, so as to ensure normal operation of the floor heating system.

The specific installation is shown below:



Advantages:

- Watts manifold adapter has three seals to ensure reliable connection between the floor heating pipe and the manifold.
- Watts manifold adapter may connect PE-RT, PEX, PE-AL-PE and other floor heating pipes.



Product code	Product description	Product specification	Product picture
61923212	Union 16x2.0/WNV Manifold adapter 16X2.0	16X2.0-G3/4	
61923213	Union 20x2.0/WNV Manifold adapter 20X2.0	20X2.0-G3/4	

Note: 1. Adapter nut; 2. Adapter C snap ring; 3. Adapter card



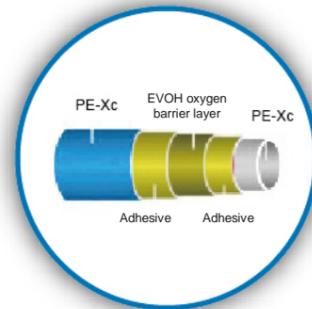
Watts piping system



Blaude™ pipe series

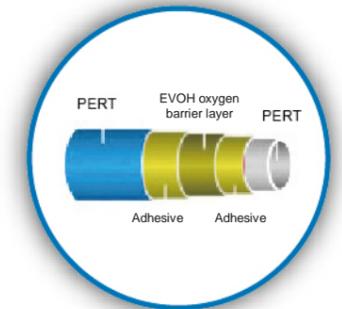
Blaude™ PE-Xc pipe series

- ◆ Imported with original packaging from Germany and manufactured by advanced techniques, passing German SKZ certification;
 - ◆ Advanced physical electron beam three-dimensional networked crosslinking technology, green and environmental protection, excellent compression and temperature resistance;
 - ◆ Five-layer oxygen barrier, with the oxygen barrier rate up to 99.6%; the outer PE-Xc protective layer effectively prevents EVOH oxygen barrier layer from damage in the construction process;
 - ◆ Resistance to high temperature up to 110°C, and long-term working temperature 90°C under application Class 5 (high temperature radiator heating);
 - ◆ Good impact strength and low-temperature impact strength as low as -50°C;
 - ◆ Excellent creep-resistant rupture strength and high temperature stability and service life up to 50 years in the specified application conditions*;
 - ◆ Excellent chemical corrosion resistance;
 - ◆ Meet the drinking water sanitation requirements;
- * Under standard Class 5 or Class4 stipulated service conditions.



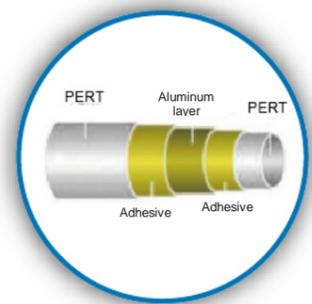
Blaude™ PERT II pipe series

- ◆ Imported with original packaging from Germany and manufactured by advanced techniques, passing German SKZ certification;
 - ◆ Resistance to high temperature up to 95°C, and long-term working temperature 70°C under application Class 4 (floor heating and low temperature radiator heating);
 - ◆ Good impact strength and low-temperature impact strength as low as -40°C;
 - ◆ Excellent creep-resistant rupture strength and high temperature stability and service life up to 50 years in the specified application conditions*;
 - ◆ Small elasticity modulus, good flexibility at the low temperature and easy pipe installation and construction;
 - ◆ Excellent chemical corrosion resistance;
 - ◆ Five-layer oxygen barrier, with the oxygen barrier rate up to 99.6%; the outer PE-RT II protective layer effectively prevents EVOH oxygen barrier layer from damage in the construction process and effectively guarantees durable use of the heating system;
- * Under standard Class4 stipulated service conditions.



Blaude™ PERT II/AL/PERT II PE-AL-PE pipe series

- ◆ Imported with original packaging from Germany and manufactured by advanced techniques, passing German SKZ certification;
 - ◆ Advanced aluminium layer ultrasonic hydrogen arc butt welding, anoxybiotic, safe and reliable;
 - ◆ Good impact strength and low-temperature impact strength as low as -50°C;
 - ◆ Resistance to high temperature up to 100°C and long-term working temperature 95°C under application Class 5 (high temperature radiator heating);
 - ◆ Integrating the characteristics and advantages of the plastic pipe and metal pipe, the metal aluminum layer may compensate and reduce the pipe rebound pressure and thermal expansion and has stronger high temperature and high pressure resistance. The service life is up to 50 years under the specified application conditions*;
 - ◆ Excellent chemical corrosion resistance;
 - ◆ Meet the drinking water sanitation requirements;
- * Under standard Class 5 or Class4 stipulated service conditions.



Product description	Outer diameter * wall thickness (mm)	Length per volume (m)	Weight (kg/m)	Water capacity (L/m)
PERT II five-layer oxygen barrier pipe	16X20	400	0.096	0.111
PERT II five-layer oxygen barrier pipe	20X20	300	0.197	0.197
PEX-C five-layer oxygen barrier pipe	16X20	400	0.096	0.111
PEX-C five-layer oxygen barrier pipe	20X20	300	0.197	0.197
PEX-C five-layer oxygen barrier pipe	16X2.2	400	0.105	0.105
PEX-C five-layer oxygen barrier pipe	20X2.8	300	0.287	0.189
PEX-C five-layer oxygen barrier pipe	25X3.5	150	0.351	0.198

Product description	Outer diameter * wall thickness (mm)	Length per volume (m)	Welding technology	Meet the standard
PERT 11-AL-PERTII PE-AL-PE pipe	16X20	400	Butt welding	SKZ certification
PERT 11-AL-PERTII PE-AL-PE pipe	20X20	300	Butt welding	SKZ certification
PERT 11-AL-PERTII PE-AL-PE pipe	16X2.2	200	Butt welding	SKZ certification
PERT 11-AL-PERTII PE-AL-PE pipe	20X2.8	100	Butt welding	SKZ certification
PERT 11-AL-PERTII PE-AL-PE pipe	25X3.5	50	Butt welding	SKZ certification

Tips:

* Why is there oxygen in the pipe?

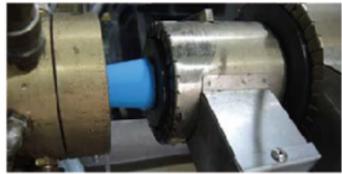
As a strong oxidant in the heating system, the oxygen in the water will enter the water in the pipe through the pipe surface, seriously corrode the heat transfer surface (such as domestic boiler, manifold and radiator) and reduce the system life. In particular, the oxygen diffusion is more serious in the floor heating system with large pipe heat transfer area and greatly harms the equipment and pipe.

* What is oxygen anti-diffusion layer?

Oxygen anti-diffusion is to apply a special protective coating on the plastic pipe to greatly reduce the amount of the oxygen permeating in the circulating water through the pipe surface. Compared with the plastic pipes without oxygen anti-diffusion function (such as ordinary PEX, PB, PPR, PPC and PERT), the oxygen anti-diffusion pipe may prevent up to 99.6% oxygen from entering.

Bluewo® PERT floor heating pipe

Advantages



- Adopt the raw materials imported from the well-known European supplier with original packaging and high purity quality to ensure that the produced pipe is of excellent temperature and pressure resistance. The service life is up to 50 years.
* Under standard Class4 stipulated service conditions.
- Adopted the advanced fully automatic extrusion equipment imported from batterfeld - cincinnati with original packaging to ensure that the produced pipe products meet DIN quality standards.
- Double-layer extrusion process effectively improves the pipe temperature and pressure resistance and effectively improves the wear resistance of the pipe surface.
- The patented carton packaging and unique center pipe drawing design effectively avoid pipe surface scratches in the construction process and facilitate storage and handling.

Product performance characteristics

- ◆ Bilayer structure, excellent pressure and wear resistance;
- ◆ Resistance to high temperature up to 95°C, and long-term working temperature 70°C under application Class 4 (floor heating and low temperature radiator heating);
- ◆ Excellent creep resistance and service life 50 years in the specified application conditions;
- ◆ Excellent chemical corrosion resistance;
- ◆ Small elasticity modulus, good flexibility at the low temperature and easy pipe installation and construction;
- ◆ Produced according to German DIN standard;

* Under standard Class4 stipulated service conditions.

Product description	Outer diameter * wall thickness (mm)	Length per volume (m)	Weight (kg/m)	Water capacity (L/m)
PERT non-oxygen barrier pipe	16X2.0	400	0.096	0.111
PERT non-oxygen barrier pipe	20X2.0	300	0.197	0.197
PERT three-layer oxygen barrier pipe	16X2.0	400	0.096	0.111
PERT three-layer oxygen barrier pipe	20X2.0	300	0.197	0.197

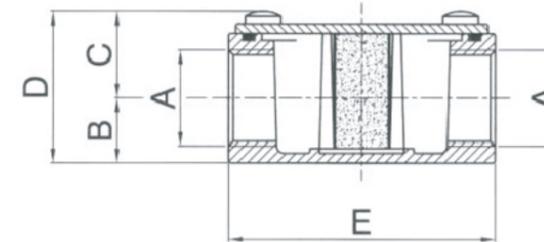
Italian gas filter — Protect the heart of the boiler!



- Filter the moisture and impurities in the gas medium to improve the gas medium combustion efficiency.
- Play a crucial role in protecting the pressure regulator and flowmeter in the thermodynamic system as well as other valve parts.
- Extend the boiler service life.

Application:

With small size, it is particularly suitable for installation in the wall-hanging stove, ground furnace and water heater. It is recommended to install a pressure gauge in the front and rear of the filter. Replace the filter element when the differential pressure Δp exceeds 10 mbar. It is recommended to replace the filter element once a year.



Boundary dimensions (mm)

Specification	A	B	C	D	E
70609	Rp 1/2"	17	22	39	70
70608	Rp 3/4"				

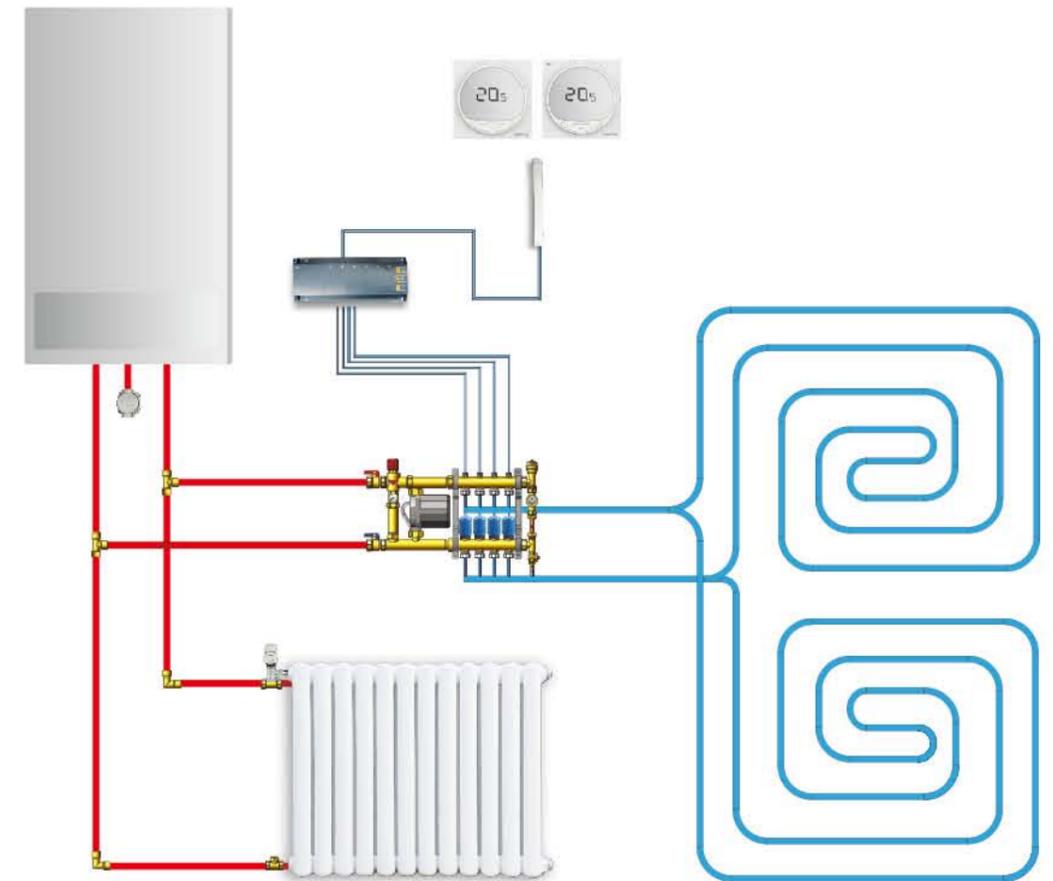
Characteristics:

- Small size for easy dismantling and installation
- The transcendental adsorption capacity of the filter element achieves the filter precision no more than 50 μm
- Operating temperature -20 - 80°C

The product has passed the test of China Quality Supervising and Test Center for Gas Appliances



Watts temperature control system



Control panel

Application: used to control the heating system temperature, sense, display, set and adjust the room temperature.

1) French BTM room temperature control panel



BTM series



BTM P-RF

- use the low voltage electricity (two 1.5V dry batteries) for display and strong current for execution to guarantee user safety
- Single region wireless controller may be selected to achieve the secondary upgrade of the floor heating control in the second decoration
- Intelligent temperature control function: automatically measure the time required to reach the setting temperature when the floor heating is activated for the first time, and automatically calculate this time in the weekly programming mode to reach the setting temperature in the set time.
- Display and control the following temperature: setting temperature, internal or external environment temperature, floor heating temperature and ceiling temperature
- Child safety lock function

2) Sunrise room temperature control panel



HA227-TL



HA9227

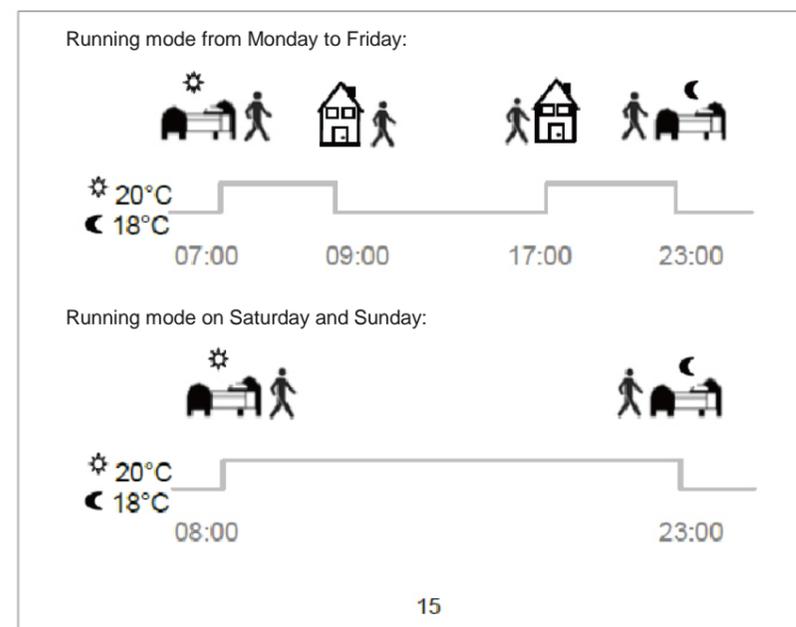
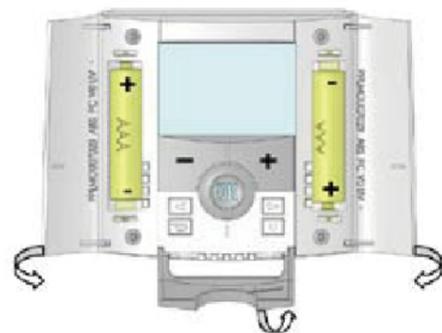
Basic functions:

- Indoor temperature setting and one-key temperature control
- Low temperature protection function
- Key lock function
- Temperature calibration
- Clock and programming function
- Mobile APP control function

Technical indexes:

- Supply voltage: AC 85-250V
- Temperature setting: 5-35 C
- Terminal: connect 2X 1, mm² or 1 X 2.5mm² wires
- Load current: 2A (resistive load), 1A (inductive load)
- Installment pitch of holes: 60mm
- Boundary dimensions: 86X86X 16.5mm (width X height X thickness)

Automatic programming (AUTO) example:



Centralized controller

French WFHC centralized controller



Master controller of four regions



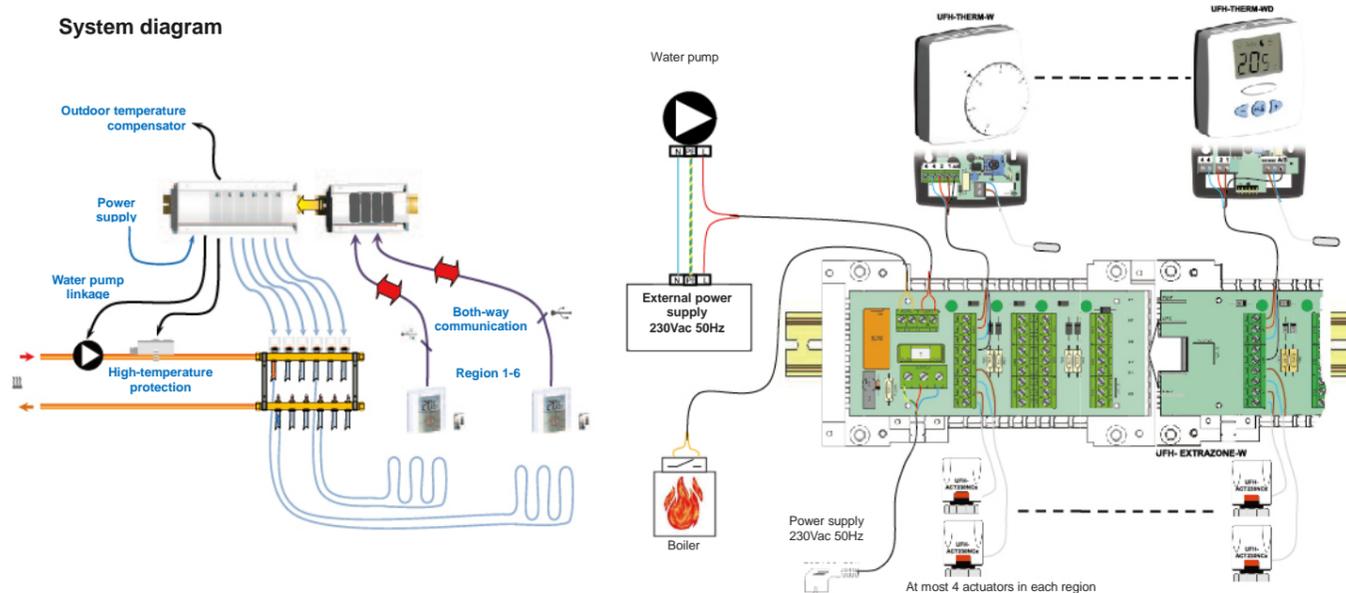
Master controller of six regions

Achieve the regional centralized control of the heating system and meet the energy saving and comfort needs

- The main module may be subject to coordinated control with the external equipment (such as pump and boiler): Stop the pump when the floor heating stops working to prevent pump idling
- Connect to the indoor temperature compensation controller and timely cope with the outdoor temperature changes, comfortable and energy-saving
- High temperature protection function to prevent floor overheating
- It may be connected to the smart home system or achieve regional control separately

Extended controller

System diagram



No.	Project	Year	Region	Product
Heating project				
Beijing				
1	Tianbao Golden Seaside		North region	Manifold and pipe fittings
2	NEWHOUSE		North region	Manifold and pipe fittings
3	Majestic Mansion		North region	Manifold and pipe fittings
4	East Bay		North region	Manifold and pipe fittings
5	Fuxi Avenue		North region	Manifold and pipe fittings
6	Xiaomi headquarters		North region	Manifold and pipe fittings
Jiangsu				
6	Yangzhou Vanke Golden Mansion		East region	PERT pipe
7	Nanjing Future City		East region	PERT pipe
8	Suzhou JINGHOPE		East region	Manifold and pipe fittings
9	Country Garden		East region	PERT EVOH pipe
10	Suzhou Yihewan		East region	PERT pipe
11	Jiangdao Huating		East region	PERT EVOH pipe manifold
12	Nanjing Biyao Garden		East region	Manifold and pipe fittings
13	Nanjing Future City		East region	Manifold and pipe fittings
14	Nanjing Zhengrong Runjiang City		East region	PERT pipe
15	Nanjing Shimao Yujhua Plot A		East region	PERT pipe
Zhejiang				
16	Ningbo Youngor Long Island Garden		East region	Manifold and pipe fittings
17	Ningbo new sea view villa		East region	Manifold and pipe fittings
18	Greentown Ningbo Baihe Garden		East region	Manifold and pipe fittings
19	Ningbo Sapphire Mansion		East region	Manifold and pipe fittings
20	Taizhou Lanting		East region	Manifold and pipe fittings
21	Hangzhou Singere Garden		East region	Manifold and pipe fittings
22	Wenzhou Yaoxi Xintiandi		East region	Manifold and floor heating pipe
23	Ningbo China Resources Wantou		East region	Manifold and pipe fittings
24	Wenzhou Pingjiang Property		East region	Manifold and pipe fittings
25	Zhejiang Greentown Daja Jinlin Mansion		East region	Manifold and floor heating pipe
26	Hangzhou Spring Residence		East region	Manifold and pipe fittings
Shanghai				
27	Bayside Garden		East region	Manifold and pipe fittings
28	Shanghai Renjie Bay		East region	Manifold and pipe fittings
29	Rich Garden		East region	Manifold and pipe fittings
30	Huazhe Waitan		East region	Manifold and pipe fittings
31	Meihua Garden		East region	Manifold and pipe fittings
32	Yanlord Riverside Garden		East region	Manifold, pipe fittings and pump station
33	Yanlord Sunland Garden		East region	Manifold, pipe fittings and pump station
34	Renjie Riverbay		East region	Manifold, pipe fittings and pump station
35	Yanlord Townhouse		East region	Manifold, pipe fittings and pump station
36	Greenland New Jiangwan City		East region	Manifold and floor heating pipe
37	SIIC Shanghewan		East region	PERT pipe, manifold, thermoelectric valve and thermostat
38	Gemdale Gucun		East region	PERT pipe, manifold, thermoelectric valve and thermostat
39	Qingpu Zhaoxiang Phase 2		East region	PERT pipe, manifold, thermoelectric valve and thermostat
Other regions				
40	Qingdao Greenland Dark Blue		North region	PERT pipe
41	Jinan CREC Yidu International		North region	PERT pipe
42	Tianjin Yanlord		North region	Manifold, pipe fittings and pump station
43	Dalian Greentown		North region	Manifold and pipe fittings
44	Shenyang Kerry Center		North region	PERT pipe
45	Hefei Xindi Center		East region	PERT pipe and manifold
Landsea projects				
46	Suzhou Renmin Road		Landsea	PERT pipe
47	Suzhou Landsea Green County phase 1		Landsea	PERT pipe
48	Suzhou Landsea Green County phase 2 and 3		Landsea	PERT pipe
49	SSTT phase 2		Landsea	PERT pipe
50	Zhangjiagang Landsea phase 1		Landsea	PERT pipe
51	Zhangjiagang Landsea phase 2		Landsea	PERT pipe
52	Wuxi Landsea Green County phase 2.1		Landsea	PERT pipe
53	Wuxi Landsea Green County phase 2.2		Landsea	PERT pipe
54	Wuhan Bellevue City plot C		Agent construction by Landsea	PERT pipe
55	Hefei Wanxin Cultural Square - residence		Agent construction by Landsea	PERT pipe
56	Yixing Landsea Red Star Macalline		Landsea	PERT pipe