Underfloor heating
Discover our full service portfolio online.
It might not be possible to control outdoor weather conditions, however you can take complete control of the temperature indoors. With our complete range of surface heating and cooling pipes, fittings and accessories, you can make sure that the interior conditions of your home, office space or large-scale facility feel comfortable at all times, regardless of how hot or cold it feels outside. Whether you are planning a new construction or giving an old building an energy upgrade, our extensive range of flexible and robust surface heating and cooling solutions guarantee reliability and efficiency, even for the most challenging installations.
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1. INTRODUCTION

The comfort of radiant heating is not a modern invention. The floor has been used for this purpose for long and became a well proven, widely applied solution everywhere.

Advantages of surface heating

The energy released through radiation generates a pleasant temperature sensation. In order to reach the same comfort sensation as the temperature sensation caused by traditional heating methods a room temperature of even 2-3°C lower is enough in the case of surface heating. As a 1°C lower temperature means approximately 6% saving of the heating costs, so surface heating not only improves the temperature sensation but also saves money.

The low supply medium temperature can be generated through a heat pump or condensation boiler as well (the efficiency of these is bigger by lower supply temperature).

The less energy input – not to neglect – means a smaller environment load as well, which is a very important point of view nowadays.

The favorable effect of surface heating types on physiology is to be mentioned, too. By surface heating there is no dust stirred by the weak air flow generated through the convection of the radiator heating, and the air is not so “dry” either, because the air temperature being 2-3 grades lower is accompanied by a favorable (higher) relative humidity.

In the case of such a heating type the radiators also do not take away space (although, the wardrobes and other furniture objects have to be considered during planning of the surface heating as well).

To sum up, the definite advantages of surface heating are the following:

- pleasant temperature sensation
- efficient operation
- preserves the environment
- favorable effect on physiology

2. SCOPE OF APPLICATION

By underfloor heating the warm water flowing through the heating pipelines laid into the floor heats the structure of the floor, which releases the heat in the room evenly. Underfloor heating can be applied either in by itself or together, combined with other surface heating types (e.g. wall heating, ceiling heating). As the heating, respectively the cooling of the floor structure (concrete) takes a relatively long time, the system has great temperature inertia. That is why underfloor heating, combined with other surface heating types, is to be used as tempering heating. Now underfloor heating ensures a permanent heat import and pleasant, mild floor temperature, while the wall or ceiling heating covers the rest of the needed heat performance, and takes care of regulating the temperature relatively quickly and according to the demand (the heat inertia of the 2-3 cm thick plaster is small). In this case we talk about floor tempering, as the increased heating surface always results in lower supply water temperature, as well as floor temperature, eliminating the flutter of dust caused by underfloor heating.

For the sake of healthcare the surface temperature of underfloor heating can be max. 29°C in the living zone (in the bathroom 33°C), and - if necessary - 35°C in the border zone (50 cm along the wall).

Important! Modern underfloor heatings work with low temperature water, resulting low (27-29°C) floor temperature in the living zone. This low temperature difference between the room air and the floor surface does not cause dust circulation in the air (as it was in old days when floor was heated up much higher).

By the measuring the surface covered by furniture is subtracted from the available floor surface, or a 15-20% smaller surface is to be calculated with. For the layers applied by underfloor heating see Figure 7.

Advantages of underfloor heating:

- better temperature sensation
- heat energy saving (lower heating water average temperature)
- even surface temperature distribution
- flexible positioning of furniture and other contents

3. ELEMENTS OF THE UNDERFLOOR HEATING SYSTEM

Underfloor heating pipes

Two types of pipes are available in the FLOORHERM underfloor heating system. One of them is a PERT/AL/PERT (with aluminum layer) pipe of five layers and of type “M”, which is applicable to the usage in underfloor heating systems because of its flexibility, form stability and the oxygen tightness due to the aluminum layer. The other pipe type is PERT-EVOH-PERT. This pipe is type “P”, and has five layers as well. Here the pressure pipe is PERT (polyethylene with raised temperature resistance), combined with a plastic layer of EVOH (ethyl-vinyl-alcohol), protecting against oxygen, too. The closing layer made of EVOH significantly decreases the oxygen diffusion through the walls of the inner pipe, hindering effectively the oxidation processes in the heating circuit – so corrosion of the boiler or
the radiators can be avoided. The EVOH layer is surrounded by a layer of the same material than the inner pipe, which protects it from external damage. The continuous contact between the layers is provided by a layer of glue. The PERT underfloor heating pipes have to be tempered below 10°C before laying, and they are not allowed to be laid below 5°C.

The FLOORTHERM (FT-ROLLE+) insulation is an EPS polystyrene floor insulation, slit into sections for better handling, 3 cm thick, with fiber glass reinforced heat mirror film on it. The insulation is provided with raster net marking of 5 cm, which allows the simple cut of the insulation, and quick laying of the heating pipes. It is recommended to make a prior design for the installation. The FLOORTHERM insulation has a 4 cm wide overlapping, so they can be easily fixed to each other. The EPS 100 insulation has up to 2,4 t/m² load capacity and sectioned for easier handling in blocks (packed in one).

Expansion insulation strip

It serves for absorption of thermal expansion of concrete along the wall, as well as for the inner dilatation of the surface. Its material is not absorbent, expanded polyethylene. Thickness 10 m, coil length 25 m. In the lower section of 30 mm of the total 130 mm high border strip there is a notch to make the placing easier.

Tools and fixing materials

The underfloor heating pipe has to be fixed on the insulation with a fixing clip. A stapler gun is used for effort free work, quicker installation, eliminating the need of bending and kneeling. The quantity and position of the clips are to be chosen by the pipe type and the designed pipe distance. Depending on the used pipe type fix the arc with double clips on both end when using PERT-EVOH-PERT pipe or just with one when using PERT-AL-PERT pipe. On straight sections clip the pipe on every half meter. (The aluminium layer pipe has more shape stability, hence needs less clips.) Due to the fiber glass reinforced material pulling out the clips in a non-destructive way is not possible.
Manifold

The underfloor heating manifold with 2-12 circuits is completely equipped and ready for use.

Every 1" manifold body has ¾ eurocone connecting ports for circuits.

This type contains the flow meters placed on supply side, which helps regulating the flow and comes with shut off valves embedded into flow meters with a revolutionary new solution. The combined regulating valve-closing armatures are positioned on the return side. The package also contains 1" ball valves as main shut off valves (2 ball valves) and the filling-draining-aerating end piece that can be mounted to the other end of the manifold. These are all mounted to the relevant bracket, facilitating immediate use. (Even screws, dowels and circuit marking labels are included in the box.)

The distance of the circuit connections are 50 mm. The M30x1,5 thread on the top of the regulating valve allows after the removal of the shut-off-cap the easy assembly of the thermo-electric actuator (not included in the package).

Each manifold is made of stainless steel or brass and leaves the factory after a pressure test.

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<td>L [mm]</td>
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<td>210</td>
<td>260</td>
<td>310</td>
<td>360</td>
<td>410</td>
<td>460</td>
<td>510</td>
<td>560</td>
<td>610</td>
<td>660</td>
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The supply side can be placed at the top as well, depending on design.
4. CONSTRUCTION PRINCIPLES

Floor insulation

It is recommended to apply a polystyrene layer of 4-5 cm thickness for floor insulation if heated room below, and 8-10 cm if not heated room below.

Expansion clearances:

- use expansion insulation strips for compensating thermal expansion of the floor (generated always on the circumference of the floor)
- a significant thermal expansion in the heating zones is generated in the following cases:
  - area of the zone is greater than 40 m²
  - relation of zone length and width is greater than 2
  - zone length is more than 8 m
  - the zone goes through openings (e.g. door)
- The harmful impacts of thermal expansion can be avoided by constructing expansion zones. Where underfloor heating pipes cross dilatation, protection pipes have to be used in both directions, in length of 10-10 cm.

Layout of heating circuit

- layout in spiral form – equal heat division on the complete heating surface
- layout in serpentine (or snake) form – unequal heat division – not recommended
- layout in spiral form with border zone – if higher temperature is needed in border zone (e.g. by outer walls)
- applying smaller spacing along the wall to reach higher temperatures (than by border zone)
- it is desirable to have a maximum pipe length of 100 m per circuit, but in no case should it exceed 120 m.
Concrete floor with fluxing additives

The concrete floor above the pipe should be at least 5 cm thick. It is recommended to apply a cement smoothing layer – recommended cement content is 300-350 kg/m³, water/concrete ratio is 0.45; particle dimension of gravel: less than 8 mm. In order to improve the plasticity and thermo-technical features, fluxing additive to the concrete mixture is advisable. By preparing the concrete mixture the system has to be filled up with water, and kept under 0.3 MPa (3 bar) pressure.

Pressure test and installation

The pressure test of the underfloor heating has to be accomplished before placing the concrete on the pipes, with a pressure of 6 bar, 24 hours long. Leave the concrete to solidify and dry under natural circumstances (3-4 weeks), then start the first heating with 25°C of water temperature. Keep this temperature up for 3 days, and then increase it daily with 5°C, until the biggest working temperature is reached.

5. INSTALLATION

Mount the expansion insulation strips along the walls (they are in “L” form breakable and can be set on the base). Then roll out the insulations, fix them to each other with adhesive tape at the overlapings.

At the wall, floor insulation should be placed on the “bottom” part of the dilatation strip. Laying the pipes is possible in two layouts: serpentine (snake line) or spiral (because of equal surface temperature the spiral layout is recommended). Fasten the fixing clips on the straight sections every half meter, by the curves – at their beginnings and ends – double (tightly next to each other).

The pipes crossing the dilatation should be lead through the expansion clearance in a protection pipe so the length of the protection pipe is at least 10 cm on both sides. For standing up with pipe to the manifold, bend supports should be used.

Connection with pipes

1. Cut the underfloor heating pipe perpendicularly, cut the burrs and calibrate it. Pull the sleeve nut onto the pipe.

2. Push the mounted pipe end into the connector with thread.

3. Screw the sleeve nut onto it manually. Push the pipe in until the block.

5. Hold against it with a 24 mm open-end wrench by the connection collar, and fasten the sleeve nut with a 30 mm open-end wrench (with a torque of approximately 25-30Nm).

The pipes are connected to the flow metered manifold with eurocone connectors.

By keeping the rules of the pressure test and concreting under pressure, there has to be at least 5 cm concrete covering the pipes, counting from their upper edges.

5. INSTALLATION

Mount the expansion insulation strips along the walls (they are in “L” form breakable and can be set on the base). Then roll out the insulations, fix them to each other with adhesive tape at the overlapings.

Connection to the manifold

The end of each manifold has an outer thread of 1”, where the ball valves and the filling-draining-aerating valves are connected. These are industrial armatures and can be mounted with the flat sealing attached to the sleeve nuts. We can only guarantee failure-free work in case of using such armatures.
Washing through and filling the heating circuits

For the filling and washing through connect a hose to the 1⁄2” or 3⁄4” thread of the filling cock. Open / close the filling cock with the help of the arm or the square axis. Each and every circuit has to be rinsed separately. Avoid too great a pressure, by keeping the draining cock open. The manifold can only be used with water.

Adjusting the flow

The aim is to let heating water of the planned quantity (l/min) into each underfloor heating circuit. This is typically different for each circuit.

1. Screw off the plastic cap, and close the regulating valve rotating it to the right with the help of an adjusting wrench (closed = smallest quantity).

2. Adjust the desired flow by rotating the adjusting wrench to the left. Read the displayed value from the flow meter. After setting every circuit, check the values and adjust them, if still needed.

3. After the setting turn back the protection cap or mount the actuator in order to protect the valves from contamination or unintended misadjusting.

4. The thick thread on the setting spindle of the regulating valve should not be visible after the upper plane of the hexa-hedral part. As compared to the completely closed position, the valve is in a completely open position after 2,5-3 left turns.

5. The return regulating valves can be closed, e.g. for the sake of filling and rinsing the circuits. Here the plastic cap has to be rotated clockwise for closing. The flow meters can be closed with the help of the adjusting wrench. These meters are not capable of regulating.

Close the ball valves in the main circuit. Close all the regulating valves with the help of the protection caps. Connect the hose to the filling and draining cock. The draining tap of the return circuit should be open! All the flow meters should be completely open! Close the regulating valves of the circuits in the return line, and leave only the one completely open that you wish to rinse! Rinse each one of the circuits separately with clear water. Dismount the hoses from the cocks after the filling and rinsing.

The heating circuits can be marked easily with the stickers attached to the manifold. This can ensure that the circuits of the relevant rooms will be connected to the relevant place on the manifold. The manifold has undergone a pressure test in the producing factory, and its function is controlled. The value of the test pressure is 6 bar.

For the permanent closure of a circuit always use a blind cap with 3⁄4” thread and sealing.

By using an actuator, the adjusting spindle should be open for a 0,5-1 turn, independent from the adjustable flow. This way the room temperature will be set by the actuator.

Pressure test

After the whole system is securely pressed, a pressure test to ensure tightness of the complete system has to be carried out. For this, each circuit has to be separately filled with water and afterwards bleded to release the air from the system. The test pressure is twice the operating pressure but at least 5 bars. Maximum allowed pressure drop after 24 hours is 0.2 bars. In case of bigger deviation, it is very likely that there is an untight connection in the system and the leak has to be localized and repaired immediately.
After the pressure test, the pressure in the system shall be lowered to and maintained at the planned operating pressure, as plastering should be carried out when pipes are pressurized. This way, the pipes align to their final position and reach their operating size as they extend (very slightly) when pressurized.

**Thermal insulation of pipes and fittings**

For heat insulation preferably choose closed cell material, as this type of insulation will not take up water from the fresh concrete covering it and thus will keep its insulating capacity. Fittings should be covered all over with self adhesive insulating strips. In addition to thermal insulation, this covering also provides mechanical protection for the fittings, needed during concreting.

Adjustment of supply temperature

The flow temperature may be adjusted gradually between 20 to 70°C (68 to 158°F). The regulating hand wheel of the thermostat is supplied with a scale 1-7 (A). Please see the temperatures set on the scale in the table below:

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<tr>
<td>20°C</td>
<td>28°C</td>
<td>37°C</td>
<td>45°C</td>
<td>53°C</td>
<td>62°C</td>
<td>70°C</td>
</tr>
<tr>
<td>68°F</td>
<td>82.4°F</td>
<td>98.6°F</td>
<td>113°F</td>
<td>127.4°F</td>
<td>143.6°F</td>
<td>158°F</td>
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Limitation of the floor heating flow temperature

As a rule, the flow temperature in floor heating systems should not be higher than 50°C (120°F). However, the data of the floor heating system can deviate and should be considered. The flow temperature of the system is often lower than the adjustable maximum value of the thermostat. To avoid damages in the floor structure caused by excess temperature, the flow temperature set value may be defined and limited on the thermostatic head.

There fore, it is most important to set the determined value and check it by means of thermometer during operation of the floor heating system. If it is correct, place the blocking elements (B) right before and behind the pointer (C).

Furthermore the temperature set value can be protected against inadvertent manipulation using the tamper-proof cover.

Mode of operation of the control unit

The mixing valve is designed as a proportional controller and operates without auxiliary energy. The thermostat situated in the supply is in continuous contact with the flow temperature at all times. Deviations from the target value result in an immediate change in valve stroke and, accordingly, a change in the volume of the hot water injected from the boiler circuit. The injected water volume is mixed with the return water from the manifold at the inlet to the circulation pump and, in this way, keeps the flow temperature constant within a narrow temperature range.
6. REGULATION

Depending on the complexity of regulation requirements, Radopress Watt offers several solution options including the important possibility of optimising related costs.

• wall/ceiling cooling and heating, wired
• wall/ceiling cooling and heating, wireless

Generally speaking, regulation of a heating system is simpler and less expensive than that of cooling systems which require sensor(s) to continuously monitor the air’s relative humidity, embedded into a suitable regulation environment. The following sections present the regulation options offered by Radopress Watt.

Elements of the regulation system

All heating installations require an accurate and properly functioning regulator system that allows settings for thermal comfort and energy efficient operation according to the relevant construction regulations. To get the most out of a heating system, we ideally recommend independent regulation for each room. The valves of the specific heating circuits are opened or closed by a thermoelectric actuator controlled by the room thermostat. The room thermostat takes into account the total amount of heat generated in the room, including sunshine. From boiler control to air temperature regulation in the room and radio frequency versions, several different types of regulation devices are available. Some thermostats offer special options such as night program, weekly program, exterior installation, etc. The system also includes a connecting box that provides connections between the different components of the regulation.

Description of control elements

Valve actuator

The thermoelectric valve actuator opens or closes the control valves of the heating circuits depending on the heating level set by the user. Using its M30x1.5 thread, it can be mounted directly on the control valves of the manifold. The currently opened or closed position can be seen through a small sight glass. The actuator operated with 230 V, with a 2-core cable is IP54 protected, and is built with approx. 1 m cable, and can be used in ambient temperatures of up to 50°C. It is closed by default.

Electronic room thermostat (with dial)

The room thermostat is used to control the room temperature. Adjustable temperature range: 5 to 30°C. Sensitivity: 0.5 K, noiseless triac switching, to be used at an ambient temperature of max. 50°C. Output power: 15 W, IP protection: 30. Available in simple or 3 mode version.
Electronic room thermostat with LCD display and floor sensor

Electronic room thermostat with 3 detecting methods:
- with room temperature sensor
- with floor temperature sensor
- with room temperature sensor and floor temperature limiter
The floor temperature limitation can be set in the range of 10 to 40°C and is delivered with a 3 m cable.
Adjustable temperature range: 5 to 30°C. Sensitivity: 0.5 K, noiseless triac switching, to be used at an ambient temperature of max. 50°C. Output power: 15 W, IP protection: 30. Normal, reduced or timer modes. (Only for heating)

Room thermostat with weekly program

Electronic thermostat that can be programmed separately for each day of the week, with LCD screen, 3 x 1.5 V (AA) batteries and low battery display. Adjustable temperature range: 5 to 35°C. Normal and reduced mode. 9 selectable basic programs, 4 user defined programs, antifreeze mode, holiday mode, code protection, reset function. Output signal: 8 A – 50 V AC, IP protection: 30.

Electronic Room Thermostat with cover preventing unauthorised adjustment

A closed panel protects the front plate of the thermostat from unauthorised access. Electronic room thermostat with 3 detecting methods:
- with room temperature sensor
- with floor temperature sensor
- with room temperature sensor and floor temperature limiter
The floor temperature limitation can be set in the range of 10 to 40°C and is delivered with a 3 m cable. Adjustable temperature range: 5 to 30°C. Sensitivity: 0.5 K, noiseless triac switching, to be used in an ambient temperature of max. 50°C. Output power: 15 W, IP protection: 30. Normal, reduced or timer modes (only for heating).

Connecting box Master

It provides connection between the different control elements (thermostat, valve actuator or controller). Proportional integral regulation. It controls 6 zones altogether with up to 2 valve actuators per zone. 6 additional zones can be added as an extension. The box should be mounted on the wall, near the manifold. To be used in an ambient temperature of max. 50°C, having IP30 protection, pump relay output (to control switching on and off the pump): 8A.

Connecting box extender

To be used together with the Master junction box with single-handed attachment. It controls 6 zones altogether with up to 2 valve actuators per zone. To be used in an ambient temperature of max. 50°C, having IP30 protection.
Program controller

To be used together with the Master junction box. Allows complex multi-channel programming. Using this unit means you can choose the simplest of thermostats as most of the functions are provided by the controller. 7-day programming capability, autonomous power source for 3 hours in case of power outage. To be used in an ambient temperature of max. 50°C, having IP30 protection. The program set on the controller overrides the program set on the room thermostat (if suitable).

Wireless (RF) control elements

As radio frequency thermostats and control elements do not require any cables between the room thermostat and the controller/junction box, they can be freely installed anywhere (respecting the rules of positioning) even in a later phase. Each room thermostat communicates with the RF junction box/controller at a different frequency. Their range is approx. 50 m (in open space) and they receive signals through an antenna. They are triggered by the radio signal coming from the thermostat to open or close the valve actuators (or to start or stop the pump) that are cable connected (similarly to wired versions) so they also have to be installed near the manifold.

Wireless room thermostat with LCD display

Adjustable temperature range: 5 to 30°C. Sensitivity: 0.3K, to be used in an ambient temperature of max. 50°C. Range: 50 m (in open space), frequency: 433 MHz. Works with 2 AAA batteries. (For heating and cooling).

Wireless room thermostat with weekly program

Electronic thermostat that can be programmed separately for each day of the week, with LCD screen, 3x1.5V (AA) batteries and low battery display. Adjustable temperature range: 5 to 35°C. Normal and reduced mode. 9 selectable basic programs, 4 user defined programs, antifreeze mode, holiday mode, code protection, reset function. Output signal: 8 A-50V AC, IP protection: 30. Range: 40 m (in open space), frequency: 433 MHz. Delivered with RF receiver.

RF-Connecting box- Master with Receiver and Timer

Wireless connecting box controlling 6 zones, 2 actuators per zone. Can be extended with 6 additional zones. To be mounted on the wall, near the manifold. Can be used in an environment of max. 50°C, has a protection of IP 30, pump relay output 8A (for controlling the pump switching on and off). The radio signal is received by the controller with an external antenna. There is a controller with radio frequency, programmable for every day of the week. LED display in two colors for easy radio and program setup, with an own power source enough for 3 hours. Adjustable temperature 5-35°C. Normal and decreased mode of operation. 9 selectable basic programs, 12 user programs, frost-free operating mode, holiday operating mode, protectable with code, reset function. Output signal 8A-50VAC, IP protection 30. Frequency 433 MHz, open space range 50 m. Suitable for heating and cooling.
RF-Connecting box - Slave

6-zone extension for RP-CBSRF; extends Connecting box – Master with 6 zones, 2 actuators per zone. Operation only when used with RF-Connecting box. Can be used in an environment of max. 50°C, has a protection of IP 30. Operating temperature 0-50°C, IP 30, for normally open (NO) or normally closed (NC) actuators.

RF Receiver for one zone

Control unit to be used with Connecting box - master RP-CBM. Normal and decreased mode of operation. 9 selectable basic programs, 12 user programs, frost-free operating mode, holiday operating mode, protectable with code, reset function.

EASY mixing modul

Responsible for providing the optimal supply water temperature to all circuits by controlling mixing valve actuator. LCD display for configuring connected 3-point actuator and operating modes by enclosed manual.

Inputs: outside temperature sensor, supply temperature sensor, room temperature and relative humidity sensor, voltage free connection for receiving pump operation signal and heating/cooling change over signal.

Outputs: thermoelectric actuators 24 or 230 V, mixing valve actuator

Features: heat curves for heating and cooling, optional 0-10 V or 3-point actuator, Power supply: 12 V

Compatible with 24 V and 230 V thermoelectric actuator

REGULATING UNDERFLOOR HEATING

Underfloor heating as an independent heating

For regulating rooms independently choose any of the thermostats listed in the catalogue. Thermostats send signals to connecting box placed near the manifold, which transmits it to the thermoelectric actuators. These open and close valves belong to the heating circuits. So the circuits open or close independently from each other according to the heating demand based on the signals coming in from the thermostats in the single rooms.

If there is one actuator opened the connection box switches the boiler and the circulating pump on and off.

If you wish to control the function of a single room according to a program, choose room thermostats capable of this, or a timer with connection box, where every room parameter can be adjusted. In case of using a timer there is no need for “smart” room thermostats. Should you apply thermostats functioning according to a program, timer (attached to connecting box) will overwrite it, i.e. the control function will take place according to the program set in the timer.

The use of timer allows of course a number of other system parameter adjustments optimizing heating system's operation.

Besides the facts described previously, the hydraulic system includes a mixing unit (FT-FWR/N), that keeps constant underfloor heating supply water temperature regardless of the primary water temperature from boiler. The mixing unit is simply connected to the manifold with a sleeve nut and contains the circulating pump and the temperature limiter.

In the following schematic drawings a wired regulating system and a wireless are shown. (Next to the regulating elements the product codes can be seen necessary for the solution. Different room thermostats represent different choices for particular room thermostats.)
Underfloor heating combined with radiator heating

In mixed heating system, radiators with smaller heat inertia make underfloor heating more flexible, especially in transition periods when satisfying regulation is difficult. (If it is still cold at night, but warm during the day, overheating can happen.) Due to the facts mentioned above, for those who choose mixed heating method it is recommended to cover 30-40% of the heat demand with radiator heating.

The regulation does not differ from previously mentioned ones. If the heat source (boiler) produces water of high temperature necessary for the radiators, then the temperature step is bigger between the primary and secondary (mixed) circuits. Note: The radiators can be fed also by a supply line of low temperature, but in this case ones with bigger dimensions have to be chosen (according to calculation).

In the following schematic drawings a wired regulating system and a wireless system are shown.
7. WARRANTY

According to joint decree No. 11/1985 (VI.22.) of ÉVM-IpM-KM-MÉN-BKM, Pipelife Hungária Műanyagipari Kft. provides a statutory warranty of 10 years on all components of the FLOORHERM system. According to Act X of 1993 on product responsibility, the company recovers damages resulting from justified other defects of any system components for a period of 10 years. This warranty is valid for FLOORHERM systems that were constructed using FLOORHERM system components, i.e. exclusively FLOORHERM pipes and fittings, and only if the user followed storage and installation requirements, as well as relevant technical regulations and standards. To validate this warranty, please send us a copy of the report on the pressure test subsequent to installation, right after it was carried out e-mail (radopress@pipelife.com).

8. HANDLING AND STORING

- Components of the RADOPRESS WATT system should not be stored outdoors or exposed to continuous direct sunlight and climatic factors. System components should be deposited in a storage room, in a dry and dust free environment.
- The system should not be stored together with organic solvents, products containing solvents or other chemicals, unless inactivity of the stored product (gasoline, oils, chemicals containing sulphur, etc.) is guaranteed.
- System components should not be exposed to heat radiation; a minimum distance of 1 m should be guaranteed from radiators with a temperature of 40°C or higher.
- Pipes should be stored in the coils or cardboard boxes used for delivery.
- Storage temperature should not exceed +40°C.
- The pipes should not be placed on sharp supporting surfaces during storage and handling.
- Pipes delivered in coiled up form should be stored in horizontal position, at least 0.10 m above floor level; a maximum of 10 coils should be stacked on top of one another.
- Be careful not to damage packaging when handling FLOORHERM system components.
- Pipes and other components should not be slid across the floor or touch sharp objects, and components should not be subject to strong mechanical impacts (shocks, cuts).
- When taking over the delivery, check the following:
  - Material quantities, accuracy of the data in the documentation
  - Apparent integrity of the goods and packaging
  - Compliance of the specified dimensions
9. DESIGN SUPPORT

Our HVAC consulting centre provides professional support for the RADOPRESS WATT and FLOORTHERM system to be installed.

Our HVAC consulting centre is always at your disposal. Based on the information you provide, our designers will make a proposal and design the heating & cooling system composed of elements of the RADOPRESS, FLOORTHERM and RADOPRESS WATT system. Technical specifications and schematic diagrams are available for all system components. Our designers provide access to the diagram(s) used for calculation as well. If you find this opportunity interesting, do not hesitate to contact our sales representatives or directly our HVAC consulting centre using the following e-mail: something@pipelife.com.
### 10. DESIGN DATA

**Pressure loss data**

By planning the system the pressure loss of the elements has to be taken into consideration in connection with flow rate. The pressure loss values of FLOORHERM pipes can be seen in the charts below.

<table>
<thead>
<tr>
<th><strong>16+2.0 mm</strong></th>
<th><strong>16+2.0 mm</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heating 40/35°C</strong></td>
<td><strong>Cooling 17/20°C</strong></td>
</tr>
<tr>
<td>Specific pressure loss</td>
<td>Velocit</td>
</tr>
<tr>
<td>Pa/m</td>
<td>m/s</td>
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<th><strong>20+2.0 mm</strong></th>
<th><strong>20+2.0 mm</strong></th>
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<tbody>
<tr>
<td><strong>Heating 40/35°C</strong></td>
<td><strong>Cooling 17/20°C</strong></td>
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<tr>
<td>Specific pressure loss</td>
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<td>480</td>
<td>1.496</td>
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<tr>
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Diagrams of manifold with flow meter

Adjustment of regulating valve

Total pressure loss

Flow rate/pressure loss diagram for 3 way mixing valve
11. PRODUCT OVERVIEW

PERT-EVOH-PERT UNDERFLOOR HEATING PIPE

FT-R18L3Q Ø18x2 MM PERT-EVOH-PERT PIPE, 300 M
FT-R18L4Q Ø18x2 MM PERT-EVOH-PERT PIPE, 400 M
5 LAYER PERT-EVOH-PERT PIPE FOR UNDERFLOOR HEATING, ACC.TO: EN ISO 22391-2, PIPE APPLICATION, CLASS 4, 20-60°C DESIGN TEMPERATURE, 6 BAR DESIGN PRESSURE.

PERT-AL-PERT UNDERFLOOR HEATING PIPE

FT16x2-200PERT Ø16x2 MM PERT-ALU-PERT PIPE, 200 M
FT16x2-400PERT Ø16x2 MM PERT-ALU-PERT PIPE, 400 M
5 LAYER PERT-ALU-PERT PIPES FOR UNDERFLOOR HEATING, ACC.TO: EN ISO 21003-1, PIPE APPLICATION, CLASS 4, 20-60°C DESIGN TEMPERATURE, 10 BAR DESIGN PRESSURE.

EUROCONE CONNECTOR

RP-KVA16/3/4 EUROCONE SCREW CONNECTOR
FT-KVA18/3/4 CONNECTS PIPE TO MANIFOLD WITH ONLY USE A WRENCH. NO POWER TOOL NEEDED.

UNDER FLOOR HEATING INSULATION

FT-ROLLE+ 30 MM EPS GLASS FIBER REINFORCED, HEAT MIRROR LAMINATED FLOOR INSULATION 2X5 M2/ROLL
INSULATES HEAT AND FACILITATES PIPE FIXING. EPS 100, 2X5 M2/ROLL, LOAD CAPACITY: 2.4 T/M2, ROLLED IN BRICK SHAPE FOR EASY TARSPORTATION.

EXPANSION INSULATION STRIP

FT-RAND16KF EXTRUDED PE DILATATION STRIP, 25 M

FT-TACKNAD-600

FT-TACKNAD-600 FIXING CLIP FOR STAPLE GUN, 600 PCS/BOX
Fasten pipes on floor insulation. To be used with FT-ROLLE+ and FT-TACKGERAT.
<table>
<thead>
<tr>
<th><strong>STAPLE GUN</strong></th>
<th><strong>FT-TACKGERAT</strong></th>
<th><strong>STAPLE GUN</strong></th>
<th><strong>FOR EFFORTLESS AND QUICK FIXING OF PIPES ON FLOOR INSULATION. AVOIDS BENDING AND KNEELING.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ADHESIVE TAPE</strong></td>
<td><strong>FT-SZ</strong></td>
<td><strong>ADHESIVE TAPE FOR FT-ROLLE+</strong></td>
<td><strong>SEALS GAP BETWEEN ADJACENT FLOOR INSULATIONS APPLY ON OVERLAPPING FLAPS.</strong></td>
</tr>
<tr>
<td><strong>TAPE DISPENSER</strong></td>
<td><strong>FT-SZA</strong></td>
<td><strong>ADHESIVE TAPE DISPENSER</strong></td>
<td><strong>USE IT FOR EASY AND QUICK SEALING WITH ADHESIVE TAPE</strong></td>
</tr>
<tr>
<td><strong>MOUNTING RAIL</strong></td>
<td><strong>WH-FR16/2M</strong></td>
<td><strong>MOUNTING RAIL FOR 16X2 MM FLOOR HEATING PIPE</strong></td>
<td><strong>FOR LAYING PIPES ON FLOOR INSULATION WITH MOUNTING RAILS. FOR FIXING, APPLY FT-NADEL ANCHORING PINS ON EACH 0.5 M.</strong></td>
</tr>
<tr>
<td><strong>ANCHORING PIN</strong></td>
<td><strong>FT-NADEL</strong></td>
<td><strong>ANCHORING PIN FOR WH-FR16/2M</strong></td>
<td><strong>ANCHORING PIN FOR FIXING THE MOUNTING RAIL (WH-FR16/2M) ONTO THE INSULATION; 500 PCS PER BOX.</strong></td>
</tr>
<tr>
<td><strong>LOW PROFILE FLOOR PLATE</strong></td>
<td><strong>FT-NOPPLA10</strong></td>
<td><strong>FORM PLATE FOR LOW HEIGHT UNDERFLOOR HEATING</strong></td>
<td><strong>SUITABLE FOR 30 MM THICK UNDER FLOOR HEATING. HOLDS Ø10 MM PIPE WITH 50 MM DISTANCE. 1 SQM/PIECE, 10 PCS/BOX. CONNECTS WITH CLICK TO EACH OTHER.</strong></td>
</tr>
</tbody>
</table>
PERT WALL HEATING PIPE, WITH OXYGEN BARRIER - CLASS 4, 10 BAR, 60°C

WH-10X1,3-120 Ø10X1,3 MM PERT-EVOH-PERT PIPE, 120 M
WH-10X1,3-240 Ø10X1,3 MM PERT-EVOH-PERT PIPE, 240 M

SMALL DIAMETER PIPE, FITS INTO LOW PROFILE FLOOR PLATE. 5 LAYER PERT-EVOH-PERT PIPE
ACC.TO: EN ISO 22391-2
PIPE APPLICATION, CLASS 4
20-60°C DESIGN TEMPERATURE,
10 BAR DESIGN PRESSURE

MANIFOLDS

MANIFOLD FOR SURFACES FOR HEATING

FT-V2A 2 CIRCUITS
FT-V3A 3 CIRCUITS
FT-V4A 4 CIRCUITS
FT-V5A 5 CIRCUITS
FT-V6A 6 CIRCUITS
FT-V7A 7 CIRCUITS
FT-V8A 8 CIRCUITS
FT-V9A 9 CIRCUITS
FT-V10A 10 CIRCUITS
FT-V11A 11 CIRCUITS
FT-V12A 12 CIRCUITS

EVERY CIRCUIT HAS A FLOWMETER (4 L/MIN). CONTAINS EVERY ARMATURE NECESSARY FOR FASTENING AND OPERATING. WITH A SPACING OF 50 MM. DELIVERED WITH FLAT SEALING.

INSULATION KIT FOR MANIFOLD

RP-MI-6 1”, FOR 6-CIRCUIT, WITH A SPACING OF 50 MM

SNAP-ON EPP INSULATION ELEMENT. THE KIT CONTAINS 2 PIECES OF INSULATION ELEMENT (1 FOR SUPPLY AND 1 FOR RETURN CIRCUIT), AND A KNIFE. THE EXCESS CIRCUITS SHOULD BE CUT OFF. FOR BIGGER MANIFOLDS ADDITIONAL PIECE SHOULD BE USED.

BLIND PLUG WITH THREAD FOR MANIFOLD 3/4”

RP-BP3/4 3/4” DELIVERED WITH FLAT SEALING

SERVES FOR PERMANENT SHUTTING OFF THE UNUSED CIRCUITS.
**MANIFOLD CABINET – BEHIND THE PLASTER**

**FT-VK1**  2-3 CIRCUITS. ZINK PLATED STEEL BODY, WHITE PLASTIC (ABS) DOOR AND RIM.

**FT-VK2**  4-6 CIRCUITS. ZINK PLATED STEEL BODY, WHITE PLASTIC (ABS) DOOR AND RIM.

**FT-VK3**  7-12 CIRCUITS (2-8 CIRCUITS WITH MIXING UNIT), WHITE STEEL

**FT-VK4**  9-12 CIRCUITS WITH MIXING UNIT, WHITE STEEL

**MEASURES IN MM**

<table>
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<tr>
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<th>A</th>
<th>B</th>
<th>C</th>
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<td>670</td>
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</tr>
<tr>
<td>4</td>
<td>1130</td>
<td>560</td>
<td>110</td>
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</tbody>
</table>

**ATTENTION! PRECISE MEASUREMENTS OF CABINETS MAY VARY. PLEASE ALWAYS CHECK ACTUAL MEASUREMENTS ON OUR WEBSITE BEFORE ORDERING.**

**MANIFOLD CABINET – ABOVE THE PLASTER**

**SF-WEK0**  MANIFOLD CABINET, ABOVE THE WALL WITH 2-3 CIRCUITS, WHITE

**SF-WEK1**  MANIFOLD CABINET, ABOVE THE WALL WITH 4-5 CIRCUITS, WHITE

**SF-WEK2**  MANIFOLD CABINET, ABOVE THE WALL WITH 6-10 CIRCUITS, WHITE

**MEASURES IN MM**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
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</tr>
<tr>
<td>3</td>
<td>800</td>
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</tbody>
</table>

**ATTENTION! PRECISE MEASUREMENTS OF CABINETS MAY VARY. PLEASE ALWAYS CHECK ACTUAL MEASUREMENTS ON OUR WEBSITE BEFORE ORDERING.**

**ACCESSORIES**

**BEND SUPPORT**

**FT-IV18**  BEND SUPPORT Ø16-18 MM

**ALLOWS AN EASY AND SPACE-SAVING BEND CONSTRUCTION; FOR PIPE Ø16-18 MM. MATERIAL: GLASS FIBER REINFORCED NYLON.**
MIXING UNIT WITH PUMP FOR UNDERFLOOR HEATING

FT-RST/F  MIXING UNIT FOR UNDERFLOOR HEATING

ELECTRONICALLY CONTROLLED, HIGH EFFICIENCY
MIXING UNIT FOR UNDERFLOOR HEATING SYSTEMS,
INCL. PUMP AND 2-WAY VALVE; SELF CONTROLLED
PUMP - RED KNOB TECHNOLOGY; UNIQUE LED
USER INTERFACE; SELF-PROTECTING MODES;
DESIGNED FOR OPTIMISED INTEGRATION; WATER
TEMPERATURE RANGE: 0°C TO 95°C; AMBIENT
TEMPERATURE RANGE: 0°C TO 70°C

TOOLS

CALIBRATOR

WH-EK10
RP-EK16
RP-RK18
RP-EK20

SINGLE CALIBRATOR FOR CALIBRATING AND
CHAMFERING RADOPRESS AND FLOORHERM
MLCP. IF HANDLE REMOVED, CAN ALSO BE APPLIED
TO DRILLING TOOLS.

THREE BRANCH CALIBRATOR

PRO-CAL16-26

UPER ERGONOMIC CALIBRATOR
FOR PIPE Ø16, 20, 26 MM

FOUR BRANCH CALIBRATOR

RP-EK16/26

FOR PIPE Ø16, 18, 20, 26 MM

PIPE CUTTER

VAGOOLLOD35  SHEAR UP TO Ø35 MM

CUTS PLASTIC PIPES WITH RATCHET MECHANISM UP
TO Ø35 MM

PROFESSIONAL PIPE CUTTER

PRO-CUT16-26

PREMIUM PIPE CUTTER WITH
REPLACABLE BLADE FOR PIPE Ø16-26 MM

PRO-CUT2

SPARE BLADE FOR PIPE CUTTER
**THERMOELECTRIC ACTUATOR**

RP-Act1 2-Core Cable

**NORMALLY CLOSED THERMOELECTRIC ACTUATOR WITH POSITION INDICATOR FOR OPENING AND CLOSING CIRCUITS ON THE MANIFOLD. OPERATING VOLTAGE 230V, POWER CONSUMPTION 1.8 W, CABLE 1 M - 2X0.5 MM², PROTECTION CLASS IP54, STROKE 3.5 MM, MAX. AMBIENT TEMPERATURE 50°C, CONNECTING RING M30 × 1.5. THE ACTUATOR KEEPS THE VALVE CLOSED (NC) WHEN CURRENTLESS. SEE PAGE 10.**

**RADOPRESS WATT BASIC REGULATION RANGE**

**ELECTRONIC ROOM THERMOSTAT**

RP-RTH1 RP-RTH2

**3 OPERATING MODES**

**ELECTRONIC ROOM THERMOSTAT FOR HEATING TO REGULATE THE ROOM TEMPERATURE. ADJUSTMENT RANGE 5 - 30°C, DIFFERENTIAL GAP 0.5 K, OPERATING TEMPERATURE 0 - 50°C, NOISELESS TRIAC CONTACT, NTC TEMPERATURE SENSOR, OUTPUT 15/75 W, IP 30. WITH SELECTION MODE, SEE PAGE 10.**

**ELECTRONIC ROOM THERMOSTAT WITH LCD DISPLAY and floor sensor**

RP-RTD

**SEE PAGE 11.**

**ELECTRONIC ROOM THERMOSTAT TO REGULATE THE ROOM TEMPERATURE. ADJUSTMENT RANGE 5 - 30°C, DIFFERENTIAL GAP 0.5 K, OPERATING TEMPERATURE 0 - 50°C, NOISELESS TRIAC CONTACT, NTC TEMPERATURE SENSOR, OUTPUT 15/75 W, IP 30. MODE SELECTION NORMAL, REDUCED OR PILOT WIRE (CLOCK TIMER). FLOOR SENSOR WITH ADJUSTABLE TEMPERATURE LIMITATION 10 - 40°C, 3 M SENSOR CABLE. 3 CONTROL MODES: 1) VIA INTERNAL ROOM SENSOR. 2) VIA EXTERNAL ROOM SENSOR (FLOOR SENSOR). 3) VIA INTERNAL ROOM SENSOR AND FLOOR TEMPERATURE LIMITATION.**

**ROOM THERMOSTAT WITH WEEKLY PROGRAM**

RP-CTM

**SEE PAGE 12.**

**ELECTRONIC CLOCK THERMOSTAT WITH LCD DISPLAY. ADJUSTMENT RANGE 5 - 35°C. FOR NORMAL OR REDUCED MODE, 9 INTEGRATED STANDARD PROGRAMS AND 4 VARIABLE USER PROGRAMS, FROST PROTECTION AND HOLIDAY FUNCTION, KEY LOCK, RESET FUNCTION. OUTPUT 8 A - 250 V, 3 BATTERIES 1,5 V (AA), BATTERIES WEAK DISPLAY, PROTECTION CLASS IP 30.**
ELECTRONIC ROOM THERMOSTAT WITH TAMPER PROOF SETTINGS

RP-SENS

TEMPER-PROOF ELECTRONIC ROOM THERMOSTAT. ADJUSTMENT RANGE 5 - 30°C, DIFFERENTIAL GAP 0,5 K, OPERATING TEMPERATURE 0 - 50°C, NOISE-LESS TRIAC CONTACT, NTC TEMPERATURE SENSOR, OUTPUT 15/75 W, IP 30. INTERNAL SWITCH FOR NC/NO-ACTUATORS. MODE SELECTION NORMAL, REDUCED OR PILOT WIRE (CLOCK TIMER). FLOOR SENSOR WITH ADJUSTABLE TEMPERATURE LIMITATION 10 - 40°C, 3 M SENSOR CABLE.

3 CONTROL MODES:
1) VIA INTERNAL ROOM SENSOR.
2) VIA EXTERNAL ROOM SENSOR (FLOOR SENSOR).
3) VIA INTERNAL ROOM SENSOR AND FLOOR TEMPERATURE LIMITATION.

CONNECTING BOX, MASTER

RP-CBM

6-ZONE, PUMP LOGIC WIRING CENTRE WITH ALL MAIN CONNECTIONS FOR A HEATING SYSTEM. PROPORTIONAL INTEGRAL REGULATION. EACH ZONE HAS TWO SOCKETS FOR ACTUATORS. EXTENDABLE WITH FURTHER 6 ZONES (SLAVE). 2 ACTUATORS PER ZONE. MOUNTABLE DIRECTLY ON THE WALL OR ON A DIN-RAIL CLOSE TO THE MANIFOLD. CONNECTS THE ROOM THERMOSTATS TO THEIR CORRESPONDING ACTUATORS. FACE PANEL LED INDICATION OF THE STATES OF THE ACTUATORS, OPERATING TEMPERATURE 0 - 50°C, PUMP RELAY (OUTPUT 8 A), IP 30, MODULAR DESIGN.

CONNECTING BOX EXTENDER E

RP-CBS

6 ZONE SLAVE UNIT, USED IN COMBINATION WITH CONNECTING BOX MASTER (RP-CBM) AS EXTENSION. OPERATING TEMPERATURE 0 - 50°C, IP 30, MODULAR DESIGN.

PROGRAM CONTROLLER

RP-DCT

CONTROL UNIT TO BE USED WITH CONNECTING BOX MASTER RP-CBM. NORMAL AND DECREASED MODE OF OPERATION. 9 SELECTABLE BASIC PROGRAMS, 12 USER PROGRAMS, FROST-FREE OPERATING MODE, HOLIDAY OPERATING MODE, PROTECTABLE WITH CODE, RESET FUNCTION.
WIRELESS - ROOM THERMOSTAT WITH LCD DISPLAY

RP-RTDRF  
SEE PAGE 13.  
User Manual

WIRELESS ELECTRONIC ROOM THERMOSTAT WITH LCD DISPLAY, ADJUSTMENT RANGE 5 - 30°C, DIFFERENTIAL GAP 0,3 K, OPERATING TEMPERATURE 0 - 50°C. HEATING OR COOLING FUNCTION. INPUT FOR EXTERNAL SENSOR FOR FLOOR LIMITATION ETC. OPERATES WITH 2 AAA BATTERIES, WITH ON-OFF SWITCH ON THE SIDE. RF DISTANCE WITHIN BUILDINGS APPROX. 30 M.

WIRELESS - ROOM THERMOSTAT WITH WEEKLY PROGRAM

RP-CTMRF  
SEE PAGE 13.  
User Manual

RF-THERMOSTAT WITH LCD DISPLAY, WEEKLY PROGRAM. HEATING AND/OR COOLING FUNCTION, ADJUSTMENT RANGE 5 - 35°C, ANTIFREEZE AND HOLIDAY FUNCTION, KEY LOCK. 3 BATTERIES WITH 1,5 V (AA). BATTERIES WEAK DISPLAY, PROTECTION CLASS IP 30. RF DISTANCE WITHIN BUILDINGS APPROX. 40 M.

WIRELESS - CONNECTING BOX MASTER WITH WIRELESS CONTROLLER

RP-CBSRF  
SEE PAGE 4.  
User Manual

WIRELESS CONNECTING BOX CONTROLLING 6 ZONES, 2 ACTUATORS PER ZONE. CAN BE EXTENDED WITH 6 ADDITIONAL ZONES. PROPORTIONAL INTEGRAL REGULATION. TO BE MOUNTED ON THE WALL, NEAR THE MANIFOLD. CAN BE USED IN AN ENVIRONMENT OF MAX. 50°C, HAS A PROTECTION OF IP 30, PUMP RELAY OUTPUT (FOR CONTROLLING THE PUMP SWITCHING ON AND OFF) 8A, LED DISPLAY IN TWO COLORS FOR EASY RADIO AND PROGRAM SETUP, WITH AN OWN POWER SOURCE ENOUGH FOR 3 HOURS. ADJUSTABLE TEMPERATURE 5-35°C. NORMAL AND DECREASED MODE OF OPERATION. 9 SELECTABLE BASIC PROGRAMS, 12 USER PROGRAMS, FROST-FREE OPERATING MODE, HOLIDAY OPERATING MODE, PROTECTABLE WITH CODE, RESET FUNCTION. OUTPUT SIGNAL 8A- 50VAC, IP PROTECTION 30. FREQUENCY 433 MHZ, OPEN SPACE RANGE 50 M. FOR HEATING AND COOLING.

WIRELESS - CONNECTING BOX, SLAVE

RP-BMRF  
SEE PAGE 12.

6 ZONE SLAVE UNIT, USED IN COMBINATION WITH CONNECTING BOX MASTER (RP-CBSRF) AS EXTENSION. OPERATING TEMPERATURE 0 - 50°C, IP 30, MODULAR DESIGN.
WIRELESS - RECEIVER FOR 1 ZONE

RP-RECRF

SEE PAGE 14.

User Manual

RECEIVER FOR ALL RF-THERMOSTATS. USING ONE RF-THERMOSTAT AS TRANSMITTER, MULTIPLE RECEIVERS CAN BE OPERATED. SWITCH FOR AUTOMATIC/MANUAL MODE AND RADIO CONFIGURATION. OUTPUT 12 A, PROTECTION CLASS IP 44. RF DISTANCE WITHIN BUILDINGS APPROX. 40 M.

RADOPRESS WATT EASY REGULATION RANGE

MIXING MODUL SET

WH-EYMIX

MIXING MODUL FOR HEATING AND COOLING. SEE PAGE 12.

PROVIDES THE OPTIMAL SUPPLY WATER TEMPERATURE TO THE CIRCUITS BY CONTROLLING 3-POINT ACTUATOR ON MIXING VALVE.

INPUTS: OUTSIDE TEMPERATURE SENSOR, SUPPLY TEMPERATURE SENSOR, ROOM TEMPERATURE AND RELATIVE HUMIDITY SENSOR.

OUTPUTS: THERMOELECTRIC ACTUATORS 24 OR 230 V, 3-POINT ACTUATOR.

FEATURES: HEAT CURVES FOR HEATING AND COOLING, OPTIONAL 0-10 V OR TIME CONTROLLED 3-POINT ACTUATOR.

POWER SUPPLY: 12 V.

COMPATIBLE WITH 24 V AND 230 V THERMOELECTRIC ACTUATOR.

VOLTAGE FREE CONNECTION FOR RECEIVING PUMP OPERATION SIGNAL AND HEATING/COOLING CHANGE OVER SIGNAL.

ALSO IN THE BOX

12 V POWER SUPPLY

SUPPLIES 12 V FOR THE MIXING MODUL AND ALL SENSORS

OUTSIDE TEMPERATURE SENSOR

READS OUTSIDE TEMPERATURE FOR UTILIZING HEATING CURVES.

INSTALL ON NORTH SIDE WALL, PROTECTED FROM DIRECT SUNLIGHT AND RAIN.

TEMPERATURE AND RELATIVE HUMIDITY SENSOR

READS ROOM TEMPERATURE AND RELATIVE HUMIDITY FOR DEW POINT CALCULATION TO BE USED IN THE REFERENCE ROOM (EX. LIVING ROOM).

SUPPLY WATER TEMPERATURE SENSOR

READS SUPPLY WATER TEMPERATURE AS FEEDBACK FOR MIXING VALVE.

INSTALL WITH A CABLE TIE RIGHT ON SUPPLY PIPE. WRAP IT IN INSULATION.