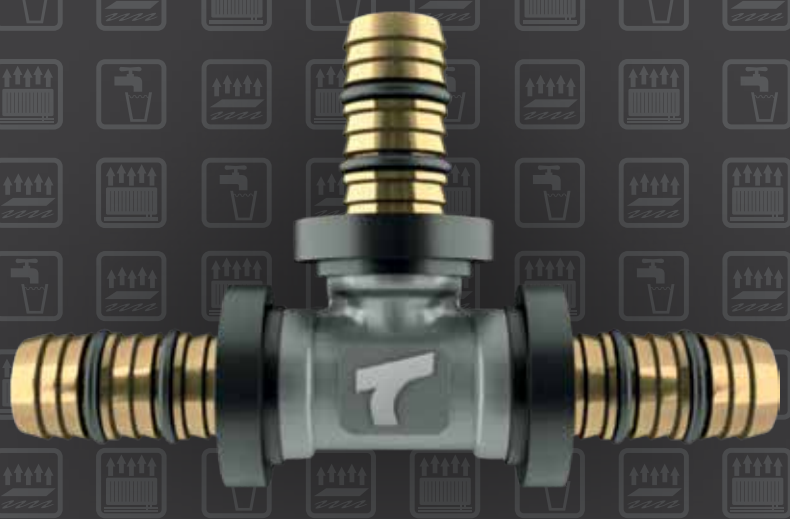
TWEETOP™



Fitters guide

Contents

TWEETOP system, thanks to the construction of pipes and joining system, is one of the most modern installation solutions on the market.

Tweetop pipes have a multilayer structure. The core is made from longitudinally ultrasonically sealed aluminum pipe which withstands a pressure of approx. 10 bar. A layer of plastics (PERT) is applied inside and outside of an aluminum pipe. Thanks to that, pipes can work at maximum parmeters of 10 bar and 95°C. This unique solution has the advantages of both, traditional and plastic pipes, while eliminating their defects.

The main advantages of Tweetop system:

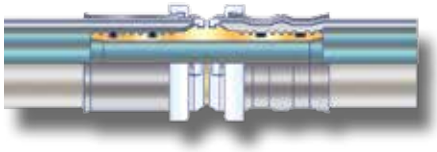
1. durability - assessed at a minimum 50 years,
2. energy savings - low pressure loss, optimal heat conductivity coefficient,
3. hygienic - PERT is non-toxic and inert to water,
4. versatility - Tweetop system can be mounted in the following installations:
   - cold / hot water,
   - central heating,
   - surface heating,
   - chilled water,
   - technology in industry
5. flexibility - bending radius of the pipe is 4-5 Dz (external diameter of the pipe),
6. no shape memory – the pipe can be bent without the need for stabilizing arcs,
7. very low thermal elongation (0.025mm / mK), comparable to steel and copper pipes,
8. tightness of the oxygen diffusion - both pipes and fittings are 100% tight to penetration of oxygen into the system,
9. tightness of joints
10. the ability to connect with any type of installation,
11. low weight (200 linear meters of Ø16mm pipe weights only 24kg)
12. fire resistance - class B2, low smoke and halogens

The offer includes full scope of pipes and fittings in Ø16-75mm range, as well as pipes in Ø12 and 14mm diameters, dedicated for manifold distributed radiator connections and UFH systems. Necessary tools package and wide selection of accessories dedicated to particular uses is available as well.

Tweetop system fittings are made of pressed, resistant to dezincification, type CW617 brass, nickel plated form the outside, which makes them corrosion resistant. In the Tweetop system, pipes can be connected using three types of fittings.

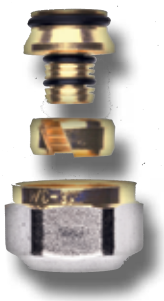
Pressed fittings

The primary method of joining Tweetop pipes is the use of pressed fittings. Pipe and fitting can be connected by pressing the pipe in the fittings profile (in the connector zone) using the U-crimping jaws. Two O-ring seals provide a tight seal of the chamber joint. This connections are possible in the floor groove or in wall furrow.



Half thread clamp

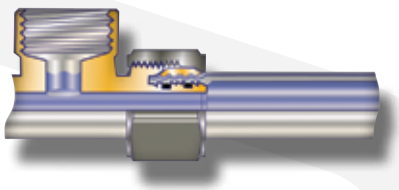
Half thread clamp is used to connect radiators and manifolds in underfloor and radiator heating systems. It is available in Ø12, 14, 16, 18 and 20 mm nut with an internal ¾' thread and consists of a body, a crossed ring and an outer cap. Connection with fittings is created by kneading the pipe into the fittings profile. Proper tools should be used for that. The connection is sealed by two O-rings. Half thread clamp is characterized by the end of the body fitting in a form of a taper type (euroconus), sealed by O-ring, which allows for perfect integration into the manifolds or radiator nipple. Installation of this type of fittings is possible only in visible places.

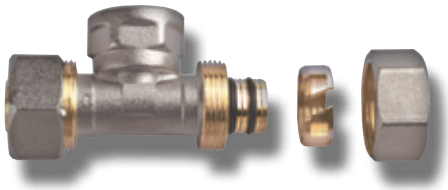


- Euroconus
- Crossed ring
- Outer cap

Threaded Fittings

Connections made by using the threaded fittings are the same as described above for half thread clamp. Available range of threads and diameters is increased and includes Ø25mm, ½ " and 1" threads. Threaded fittings should be terminated by eroconus type chamfering.



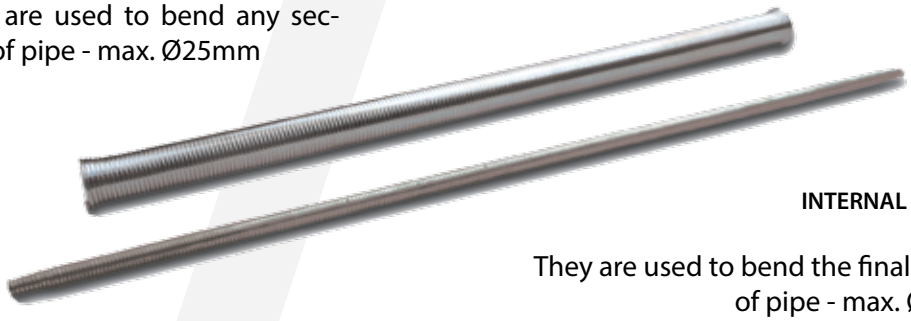


Pipe bending

Due to pipes flexibility they can be bend with minimum bending radius of 4xDz pipes. In order to protect the pipe from collapsing or constriction it is necessary to use the following tools:

EXTERNAL SPRINGS

They are used to bend any section of pipe - max. Ø25mm



INTERNAL SPRINGS

They are used to bend the final section of pipe - max. Ø32mm

MANUAL OR MECHANICAL BENDERS

By using a bending machine regular arches can be achieved.

Cutting

Pipes should be cut orthogonally to the axis and only with dedicated tools:

- scissors ratchet for pipes in diameters of 16-32mm
- pipe cutter for pipes in diameters of 14-25mm
- roller cutter for pipes in diameters of 40-75mm

Before trimming the pipe, it is advisable to mark the place of cutting. The cut should not be discontinued to avoid the creation of cracks that would result in risk of undermining the strength of the pipe.

Calibrating and chamfering

After cutting the pipe we restore its original shape and chamfer the inside of the pipe. This facilitates the placing of fitting in the pipe and prevents displacement of O-ring seals.

In order to calibrate and chamfer the pipe, use only the following tools:

Connecting pipes - step by step

Pressed connections

The order of actions in pressed fittings montage is as follows:

1. Cutting the pipe perpendicular to its axis using scissors or cutter.

2. Chamfering the edges of the pipe using a calibrated-reamer or the reamer.

3. Inserting the pipe into the fitting between the stainless steel ring and the connector body, until white pipe ring appears in the control openings of the clamping ring.

4. Using manual or electric crimper equipped with U- jaws (stones), remembering that the plastic ring must adhere to the edge of the crimper jaws.

Comments

- pressed joints (as non-separable ones) may be used for leading pipes in wall chases and floor screed
- in order to make pressed connection, one have to use only U profile jaws
- turned joints (screw connections) may be used only in visible locations – locating connections under the plaster or in screed is prohibited
- it is recommended to make the connections in temperature of over 0°C
- endings of pipes should be chamfered with usage of beveling tool before making the connection
- pipes may be cut only with system pipe cutters perpendicular to the axis

Screw connections

The order of actions in screw - pressed fittings montage is as follows:

1. Cuting the pipe perpendicular to its axis using cutter.

2. Chamfering the edges of the pipe using a calibrated-reamer or the reamer.

3. Applying the nut on the pipe.

4. Sliding the connector's body in the pipe.

5. Tightening of the connection using a spanner; in the course of tightening, the pipe cannot rotate; after 15-20 minutes it should be tightened again.

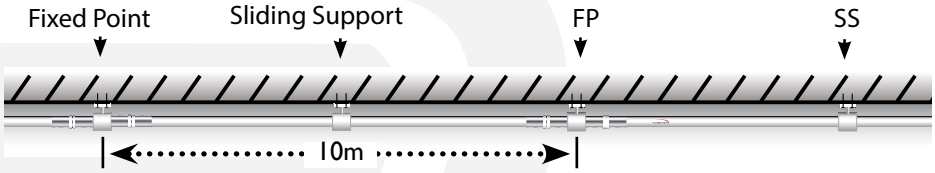
Compensation of thermal elongation

Before installation, thermal elongation of pipes should be taken into consideration. It is caused by changes in temperature of the heating medium in installation. Linear expansion coefficient of Tweetop pipes is 0.025 mm/mK. Depending on the location of pipes, we offer the following solutions.

Linear expansion coefficient of Tweetop pipes is

0,025mm/mK

Installation of the pipes under the ceiling or in the service space



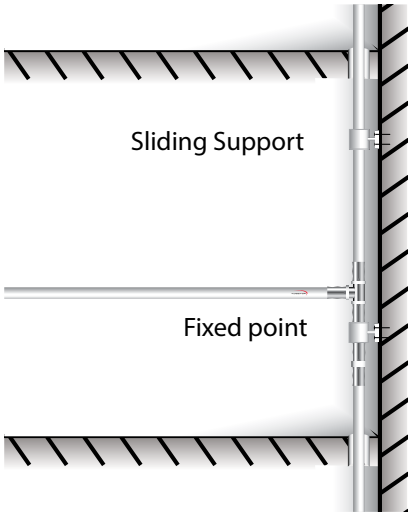
Compensation is made by instalation of fixed points spaced every 10 meters.

Assemble sliding support between fixed points at a spacing consistent with the table on page 10 of this manual.

Installation of plumb-line

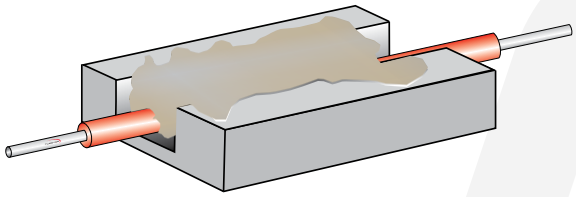
Compensation is made by installation of fixed points under the tee pipe fittings. The distance between the fixed points is a height of storey plus the thickness of the ceiling minus max. 3 - 4 m.

Assemble the sliding support between fixed points at a spacing consistent with the table on page 10 of this manual.



CONCEALED OR UNDERFLOOR INSTALLATION

Compensations in concealed or underfloor installations is obtained by using the casing pipes (conduits or thermal insulation).



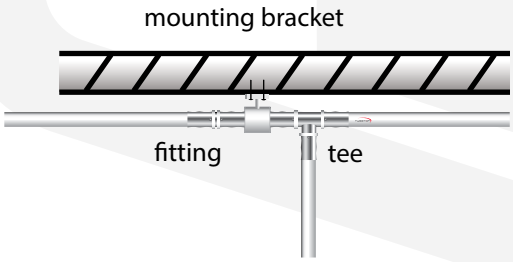
This method of compensation for thermal elongation may cause slight buckling of axial cable, however, besides aesthetics, it is not in any way harmful to the proper functioning of the system.

In case of design-assembly doubts related with compensation, please contact Tweetop technical department (contact details on the cover).

Fixing the system

STABLE (POINT) SUPPORT

System of two joints blocking the mounting bracket, limiting axial movement of the cable - is used to divide installation into sections consisting of separate elongations (thermal elongation is not transmitted beyond a fixed point). Appropriate compensation is provided by the spacing of fixed points.

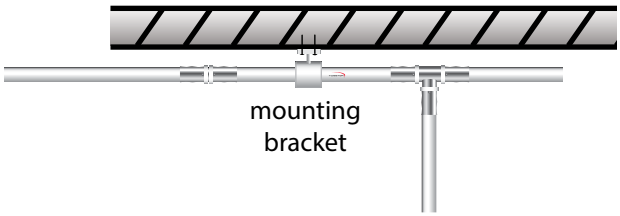


Installation of the fixed points is mandatory in the following cases:

- under the elbow - wall bracket type (near the tap)
- on both sides of valves, filters and similar fixture

Sliding support

Holder used to anchorage system to the structural elements of the building and protecting the pipe from excessive buckling.



The recommended spacing is given in the table below:

Distance between the sliding supports [m]

16x2	18x2	20x2	25x2.5	32x3	40x4	50x4.5	63x6	75x7.5
1.2	1.3	1.3	1.5	1.6	1.7	2	2,2	2,4

More tips for routing of an installation

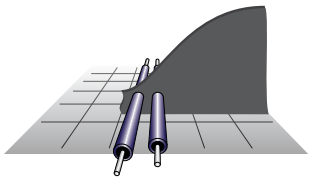
Thermal insulation

Tweetop system pipes are excellent insulators when compared to traditional materials like steel and copper. Additional pipe insulation should be done in case of:

- moisture condensation (retting) and increasing the temperature of transferred water - it concerns cold water wiring,
- lowering the temperature of transferred water - applies to hot water and heating systems.

Penetrations through walls and building envelope

The pipes should pass through the baffle construction in casing pipes made from PVC, PP, PE or steel, having a diameter twice as big as the diameter of the working pipe. Protective pipes should be longer than thickness of the wall or ceiling by a minimum of 2cm.



Fire protection

The Tweetop multilayer pipes, in accordance with the first part of the DIN 4102 standard, belong to the B2 fire resistance class (normally flammable components). To secure the building against fire spreading, fire insulation should be applied on the baffle construction crossings. Fire resistance class should be consistent with the baffle resistence class. In this case, for pipe insulation, a product of fire class resistance A1 or A2 (for example special coatings for mineral wool) should be used. It is also recommended to use certified HILTI transition.

UV radiation impact on the stability of installation

Long-term exposure of UV rays on Tweetop pipes deteriorates their function. This applies to outside storage and outdoors wall mounting. Tweetop pipes and fittings should be secured by additional insulation and transferred to roofed warehouses.

In case of installation inside the building, at the balcony doors, windows or under the skylights, UV radiation does not effect the durability of Tweetop pipes and fittings.

Effect of low and high temperatures on the durability of installation

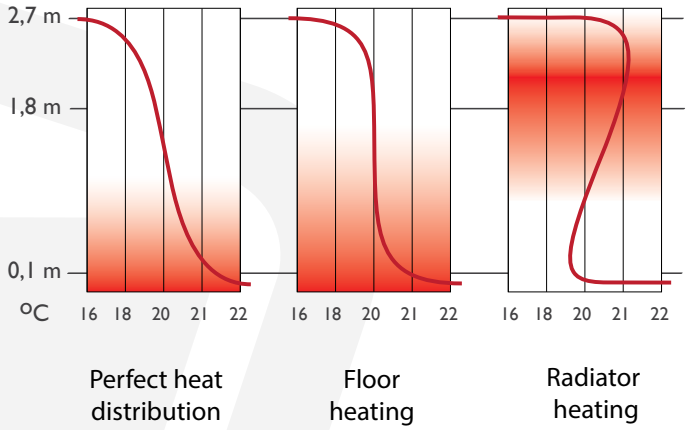
Tweetop pipes stored in temperature below 0°C shall be protected against impacts and mechanical overloads. Installation work can be carried out only at temperatures above 0°C. Pipes should also be protected from heat radiation.

The way of installation

Pipes should be installed with a slope which will enable dehydration and venting of the installation. While installing the pipes one should also take into consideration the necessity of thermal expansion compensation - see page 9

Introduction

Floor heating is a low temperature system of central heating, in which equal heat distribution over the entire surface is assured and therefore it provides a sense of thermal comfort inside the room. The vertical distribution of temperature makes underfloor heating close to the ideal heating source.



The main advantage of underfloor heating is its economy, resulting from the fact that radiant heating systems operate at low power (most commonly used calculation parameters to 45/35 ° C, AT = 10 K, and the max. temperature 50°C).

Work parameters

Max temperature on the floor surface

In relation to BS-EN 1264-2 standard max floor surface temperature shouldn't exceed 29oC (9°C above the room temperature) in typically occupied areas. This limitation is extremely important because Establishing the correct operating temperature for the floor surface is essential in a sense of keeping balance between temperature (too high temp. may cause discomfort) and sufficient heat output which will cover calculated heat losses.

Hydraulic calculations

Are required due to:

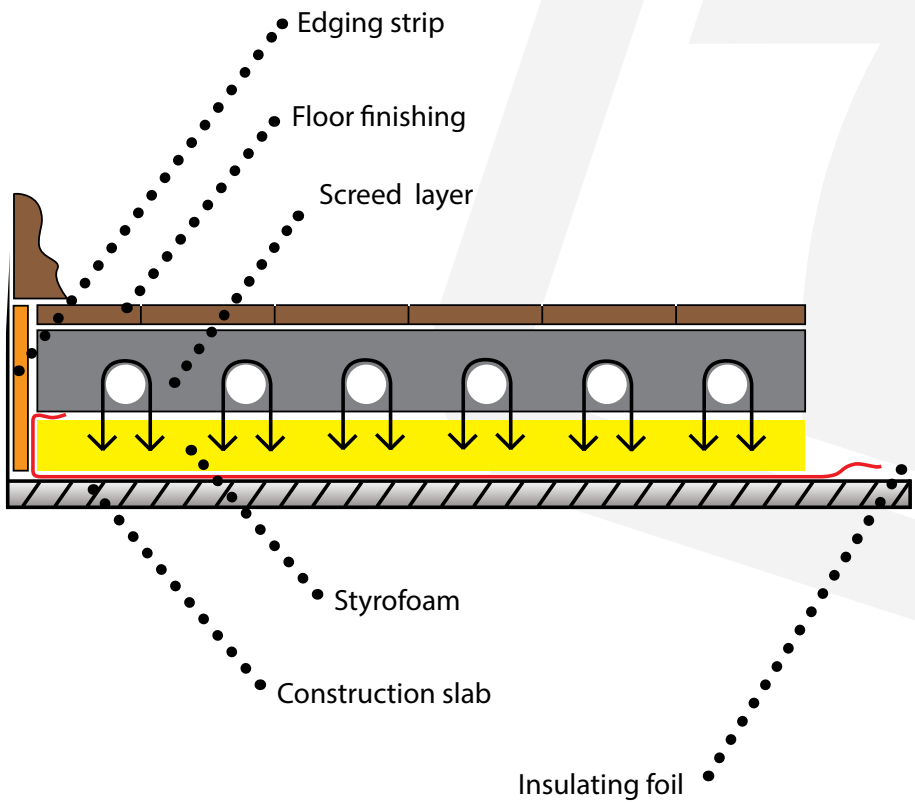
- excessive pressure drops in the various heating loops ,
- exceeding the normative floor temperature

In order to determine the appropriate pipes spacing in the loop, it is necessary to perform hydraulic calculations of floor heating.

For this please contact the Tweetop technical department (contact details on the cover).

Construction of heating plate

Heating plate is constructed in the following way:



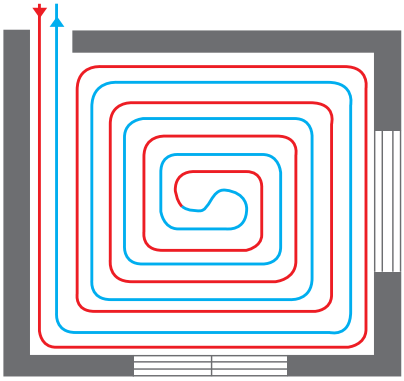
Conducting pipes in the loop

Pipes in the loops can be carried out:

Cochlear

It provides equal distribution of floor temperature and pressure drops in the loops.

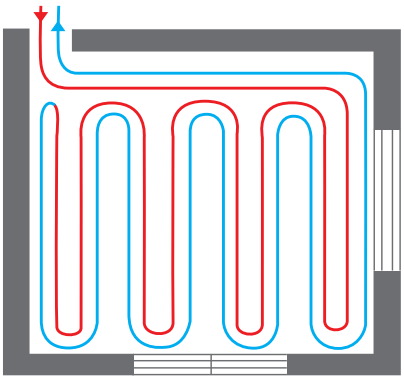
Pipes spacing: 100-300mm.



Winding

Designed for elongated rooms or frame constructions. The beginning of the coil pipe, where the highest temperatures occurs, is placed in the walls adjacent to unheated rooms or external walls in the building.

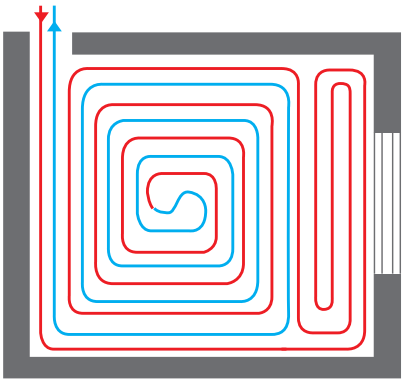
Pipes spacing: 100-300mm.



Cochlear with the shore zone

In the shore zone adjacent to the external wall of a building or to non-heated wall, temperature of the floor may be higher than in the middle of the room. In the shore zone a more dense spacing of pipes should be applied. The shore zone can be used in cochlear and winding systems.

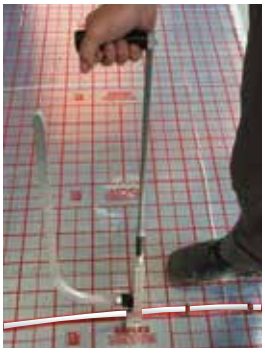
Pipes spacing 100 - 200 mm.



Pipe fixing

With use of the mounting grid and mounting clips to the grid.

Reinforced screed is a steel mesh with 150 x 150mm spacing, made of Ø 4 to 6mm wire. The grid is also used to determine spacing of heating pipes and fittings. Pipe spacing is 150 mm or multiples. The pipe is attached with plastic handles.



Attaching the pipes to the insulating layer.

Tweetop insulation foil with louver applied on the insulating layer, for example on styrofoam. Pipes montage should be started with fixing using the clips gun. Mounting clips should cover a heat pipe from the top. Specially developed shape prevents the mounting clips from breaking out of insulation.

Using mounting strip

This mounting system is similar to that with the use of clips gun. Tweetop insulation foil with louver should be applied on the insulating layer, for example on styrofoam. Then mounting rails can be installed in a cross system. Heating pipes should be pushed into the grooves in the mounting rail. Using mounting rails streamlines specifying spacing required between the pipes.

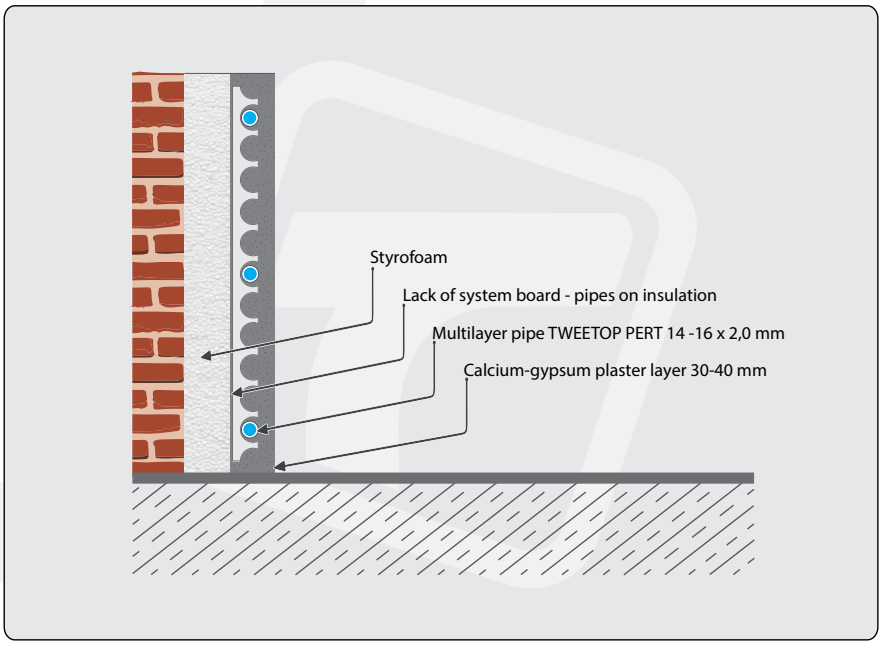
Wall heating system – Tweetop -Wall

Wall heating Tweetop-Wall is an economical alternative to be used when productivity of underfloor heating is too low to fulfil the demand for heat or there are other reasons preventing the usage of underfloor heating. „Hot wall" is a healthy heating, because it radiates the heat with minimal convection (90%/10%,) therefore dust doesn't float and embend.

Wall heating is designed to be mounted directly on the wall or by using mounting rails on isolation. Then a layer of plaster reinforced with glass fiber should be applied to strengthen the grid (see below). Plaster provides the ability to conduct heat. Primer for finishing the wall surface, such as wallpaper or paint, is also required. Wall heating provides the effect of extraordinary thermal comfort, while quickly heating the air in the room, mailnly due to smaller plaster thickness of 3-4 cm (compared to 6,5cm in underfloor heating). Thermal radiation is absorbed and reflected through all items in the room, which ensures a constant, pleasant and comfortable temperature level. All this combined, makes this system very flexible and tailored to the needs of its users.

In most rooms we can connect wall heating to the floor and what's most important, Tweetop-Wall system is suitable for both, new and renovated buildings.

The Tweetop-Wall can also be used in the cooling function by switching the heat pump circuit and adding moisture control devices in the walls.



The advantages of Tweetop-wall heating

- Hypoallergenic – similary to underfloor heating, there is practically no movement of air which produces convection and floating dust, therefore comfort is ensured, not only for allergy sufferers, but for everyone.
- It operates in low temperature range, and is able to provide thermal comfort while the room temperature is 2-3°C lower compared to a conventional radiator (which translates to energy savings of 10-15%).
- Ideal for use with heat pumps and condensing boilers.
- Can be used to cool the air in summer.
- Wall heating makes installation invisible thus offering maximum flexibility in terms of interior design, the pipe can be easily located in a wall using metal detector.
- Short response time, low thermal inertia and high heat output - max 35°C on the surface.

Technical features of the Tweetop-wall system

- Insulation – should be made if mounted on an outer wall or wall next to the room with lower temperature. Possibility of condensation in the wall should be taken into consideration.

- Maximum surface and water supply temperature:

  Surface temperature can be higher than in underfloor heating because people in the room do not directly touch it. The average surface temperature should not exceed 35 °C.

  The maximum flow temperature cannot exceed:
  - 50 °C when using gypsum plaster / earthen / limestone
  - 70 °C in the case of cement-limestone plaster

- Pressure test:
  Execute like in heating loops. After laying the pipes, pressure test should be executed with cold water. The loop must be completely filled with water and the system must be completely vented. The pressure test must take place before and after the work of masonry. Test should be executed at a pressure about 1.3 times higher than the working pressure. Testing pressure shall remain between 5 and 6 bar within 24 hours. Supply and return valves should be closed. The pressure drop should not be larger than 0.2 bar. For frost protection you have to add antifreeze liquid, for example glycol. If antifreeze is no longer needed, you should flush the system by replacing the water at least 3 times.

- starting heating
- the heating can be started 21 days after using the plaster of cement and lime or lime plaster, in case of gypsum after 7 days. For the next 4 days the installation should work with the maximum temperature.

Installation of wall heating

One exterior wall shall be sufficient for installations with low heat demand (approx. 50 W / m^2). Tubes can be mounted below the window. Furniture and paintings on the wall may cause lowered thermal efficiency. We recommend to move furniture about 5 cm away from the wall.

Space requirements:

- Wall heating systems can be used on walls made of any solid material (concrete, bricks, plasterboards).
- Gaps between floor, wall and ceiling should be secured with edge strip. Cut off the protruding edge strip after installation.
- Check the location of electrical cables and other cables before laying the installation on the wall.
- Heating loops cannot be located in the same places as expansion joints. Expansion joints of the heating system should be made at the same places as expansion joints in the walls.
- Wall dedicated for the installation of the heating system should be dry, smooth and free from mortar.

Requirements for plaster:

- The plaster should have good thermal conductivity. You can improve it by compacting the plaster. Plaster layer should be as thin as possible in places where pipes are fixed.
- The minimum conductivity coefficient for the plaster should be: 0.37 W / m^2K gypsum; 0.58 W / m^2K limestone; 0.87 W / m^2K cement
- In rooms with high moisture contents (like bathrooms), gypsum plaster is not recommended.
- Plaster needs to be strengthened with a fiberglass mesh (min. 4x4mm and max. 7x7mm) to avoid cracks. The mesh must extend about 25 cm on each side beyond the area of the heating part. At least 2 layers of plaster should be placed. The first layer should have a thickness of about 2/3 of the total thickness, then the mesh and

another layer of plaster with approx. 1/3 of the total thickness (mostly 1,5 cm) should be applied.

OTHER REQUIREMENTS:

- When installing the wall heating, pipes can be laid directly on the wall. When insulation is required it shall be installed on a wall first.
- Mounting rail should be mounted vertically to the substrate using pegs at a distance of maximum 80 cm. Mounting must be done in a minimum distance of 30 cm at both ends of the rails. Arches of pipe should extend beyond the extreme mounting rail by at least 20-25 cm. There should be at least 10cm gap between window openings and door openings.
- Heating loops shall be placed according to the project. Coils have to be Hand-developed and connected to the manifold at one end and to the mounting rail at second end, starting from the bottom of the installation. Depending on the heat demand, gaps between the pipes should be set to 5-10-15-20-25-30cm. Arches can be done manually or with external spring with a minimum bending radius of 4-5 Dz (64-80mm in the pipe Ø16mm). In the event of pipe breakage, a broken fragment should be removed. Pressed fittings can be used to fix the pipe. The same procedure can be applied in case of tube extension.
- We recommend installation of wall mounted elbow with a ½ vent in the highest point. Air is pushed out from the installation by slow movement of water.

Tweetop-floor-IA systems for heating of industrial halls

The large surface area and height of industrial buildings and warehouses causes difficulties in heating them in a traditional way. In such buildings, heaters, fan heaters, or various types of radiators mounted under the ceiling can be used. These solutions are effective but require large financial outlays.

The entire floor area in both, churches and large warehouses can become a heater. In this case, use of Tweetop-floor-IA system is the best choice. Vertical heating curve can be designed individually to customer needs. A suitable temperature may be ensured on the level of 2-3 m above the floor or higher.

Heating costs are lower than traditional heating because of 2-3 degrees lower temperature at which we still feel the same thermal comfort. Lowering of internal temperature by 1 degree saves about 6% of heat energy.

In industrial buildings heat resistance may be high due to screed panel thickness of up to 18 cm. In such buildings floors burdens are large, hence the thickness of the floor. Therefore, the TWEETOP-floor-IA system uses TWEETOP PERT Ø 20 and 25 mm pipes and industrial stainless steel manifold beams with diameter of 1 ½ and 2'. Manifolds are equipped with standard control valves on the power circuits, shut-off valves on the return circuits, vent, the trigger and damped suspension.

System of mounting rails for pipes installation (Ø 20 and 25 mm) on expanded polystyrene is also avaliable.

Renovation system Tweetop Renova

General information

Where pouring out of standard screed layer with about 130 kg / m^2 is not possible, Tweetop-Renova renovation system can be applied.

In this case, renovation system boards can be used, optionally in combination with dry screed boards, which are mounted on the finished floor. Recommended thickness of wood on the floor should not exceed 15 mm. Thicker layers can disturb the flow of heat. Tweetop - Renova is also suitable for use with wet screed based on cement or anhydrite. Cement screed thickness should be about 35-45 mm.

Tweetop - Renova is composed of two types of molded expanded polystyrene EPS200 boards witch a thickness of 25 mm. STYROSYSTEM PLUS is a board which has the factory embossed grooves where aluminum stampings should be installed. They help to evenly transfer heat from pipes.

Boards with grooves coated with 0.4 mm thick aluminum foil is called STYROSYSTEM PLUS ALU. Because of the fact, that there is already an aluminum foil inside the board, installation of aluminium radiators is not necessary. Boards are prepared for installation of Tweetop - PERT Ø 14x2 and 16x2 mm or EVOH-PERT 16mm pipes. Pipes should be connected to the distributor using a half clamping screw connection. Other details of installation are described below.

Basic parameters of the renovation boards and Styrosystem ALU foil types are shown in the table below:

Product features	STYROSYSTEM-PLUS ALU	STYROSYSTEM-PLUS
Scope	Insulation of floors in a dry floor heating systems	Insulation of floors in a dry floor heating systems
The dimensions of board	1000x500mm	1000x500mm
The board surface	0,5m^2	0,5m^2
Pipe dimension	14-16mm	14-16mm
Pipe spacing	125	125
The nominal thickness of insulation [mm]	25	25
Symbol	EPS-EN 13163-T4-L1-W1-S1-P3-DS.(N)5-BS100-Sd30-CP2	EPS-EN 13163-T4-L1-W1-S1-P3-DS.(N)5-BS100-Sd30-CP2
Range of application with DIN 4108-10	DEO	DEO
Material class	B1	B1
Fire class according to EN 13501	E	E
Destiny / Predistination	20 kg/m^3	20 kg/$m3^3$
Noise reduction coefficient	26db	26db
Thermal conductivity [W/mK]	0,033	0,038
Thermal resistance [W/m^2K]	0,6 m^2K/W	0,6 m^2K/W
Material	EPS 200	EPS 200

Installation step by step

- Styrofoam boards with dimensions B = 500 mm L = 1000 mm H = 25mm system STYROSYSTEM-PLUS or STYROSYSTEM-PLUS- ALU should be spread on a clean and smooth ceiling. Boards should be combined so that they overlap each other. Additional edge strip should be installed, in case of later screed installation.

- Aluminum plaques (heat sinks) should be mounted in the grooves of the Styrofoam board. The distance between the plaque should be equal to 5mm because of the thermal expansion.

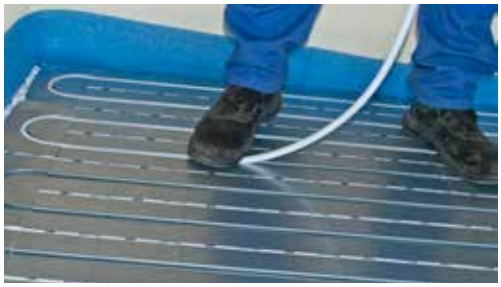
  Dimensions of the metal heating sheets are listed below:

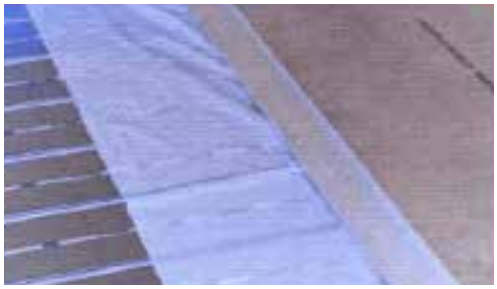
Straight section	L=750mm B=120mm H=0,5mm
Shape section	L=50mm B=120mm H=0,5mm

Installation of radiators is not necessary in STYROSYSTEM-PLUS ALU plates.

- Pipes (Ø 14x2 or 16x2) should be installed by pressing them in the grooves in a sytrofoam and metal heating sheets. The minimum distance between tubes is 125mm.

- In order to protect the heating system, after installation and pressure test execution, an isulation layer of PE foil should be put on the entire surface. On such prepared surface, the next step is to put the dry screed boards or pour out the wet screed and then the installation of floors, such as parquet or floor panels can be conducted.





STYROSYSTEM-PLUS ALU plate

Guidelines for dry screed

Choose dry screed suitable for use in underfloor heating, according to offer of their producers. According to the guidelines of DIN 18202, before laying the screed, check that the ground is uniform. Uneven floors should be smooth down with fill mass in small areas and using a self-leveling screed on large surfaces. In case of wooden ceilings, loose boards should be fastened. On the wooden ceilings only one layer of insulation can be used.

If it is necessary, install an additional thermal insulation made of:
- polystyrene EPS DEO - WLG 035 - 200 kPa
- polyurethane DEO - WLG 025

and optional additional acoustic insulation of:
- fibreboard
- mineral wool board

Load values for floors with dry screed are listed in the following table:

Areas of application	Dry screed 25mm max point load	Dry screed 20mm max point load
Residential buildings	2,5kN	1,5kN
Office space	2,5kN	1,5kN
Restaurants, schools	2,5kN	1,5kN
commercial spaces <50m2	2,5kN	1,5kN

Weight of the system with dry screed, depending on thickness looks like as follows:
- board thickness of 30 mm - 35 kg / m^2

Guidelines for wet screed

Minimum thickness of wet screed should be considered, depending on the type and surface load in kN/m^2. Recommended thickness of screed – covered according to DIN 18560mm above the top renovation board is listed in the table below.

Screed type	Cement screed CT		Screed based on self leveling lime CAF	
Ability for stretching while bending	Class F5	Class F4	Class F5	Class F7
2kN/m^3	40mm	45mm	30mm	30mm
≤ 3kN/m^3	55mm	65mm	45mm	40mm
≤ 4kN/m^3	60mm	70mm	50mm	45mm
≤ 5kN/m^3	65mm	75mm	55mm	50mm

The weight of the system together with wet cement screed board with a thickness of 35mm is 76 kg / m^2 (weight of standard 65mm board is 130 kg / m^2).

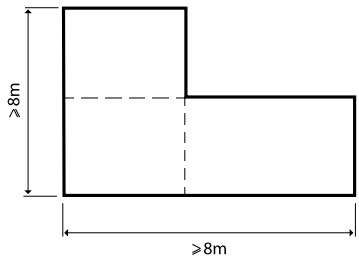
Expansion joints

Heating panels should be separated from structural elements of the building using:

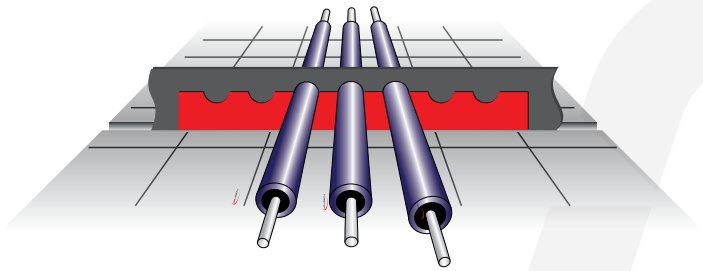
- Edge strip (expansion joints between the boards and the walls),
- Styrofoam boards (dilation from the ceiling).

Expansion joints on the walls and ceilings are rquired. Expansion joints in heating panels should be done when:

- the screed board surface exceeds 40m^2,
- one edge of the screed board is longer than 8m,
- floor (screed plate) has the shape of L, C,
- ratio of the sides of screed board is larger than 2:1.



Expansion joints should be marked on the building and installation plan. Heating pipe should be protected by the protective tube as shown below. The pipe should be protected on the distance of 20 cm, on each side from the gap.



For screed expansion joints use Tweetop joint profile, consisting of foamed polyethylene tape assembled to plastic support. It is possible to use similar components if they guarantee the same effect (allowing for small movements of the screed).

Expansion joints **can't** be routed through the center of heating loops!

The laying of screed

When covering the screed, pipes must be filled with water.

Use of cement screed brand 20 or anhydrite brand 20 to perform screeds is advised. The route must be lined with boards if transport to the place of outpouring is done using wheelbarrows. The minimum screed thickness is 67 mm (min. 50mm over pipes).

Plasticizer should be added to the screed. Screed for underfloor heating shall be prepared by a specialized concrete mixing plants. The optimal screed grain diameter is 2-8mm while containing approx. 250 kg of cement per 1m^3 of concrete. Humidity shall be close to the consistency of class K-2 concrete.

Starting the installation

After laying the screed follow the steps below:

1. dry the floor at ambient temperature for at least three weeks,
2. run the installation - set the supply temperature at 15 - 20°C and maintain for another 21 days, bleed, pre-adjust a system,
3. raise the flow temperature of 5°C per day until it reaches the calculated supply temperature,
4. maintain the flow temperature for 3 days,
5. decrease the flow temperature of 5°C per day until reaching the calculated power supply level of 15 - 20°C,
6. put top floor layer (tiles or other covering),
7. make sure that all the recommendations of the floor manufacturer as to its implementation have been fulfilled,
8. again, raise the temperature to a calculated value in the project at 5°C,
9. regulate the system.

Adjustment of the system is carried out using flowmeters on the manifold's supply beams. Calculated flow in l/min should be set for each of the heating loops.

Control of underfloor heating is possible using thermostats, actuators and throttle valves on the manifolds.

Before laying of the floor's finishing layer, check the moisture content using PE foil (permissible moisture content for cement screed is 2.0%).

Tweetop pump - mixing kit

When, besides underfloor heating, there are heaters with higher flow temperature applied, a Tweetop mixing kit can be used. It's equipped with a circulating pump and a four-way thermostatic valve. In this manner the floor heating can be integrated with the rest of the building's heating system. Tweetop mixing kit should be connected to a floor heating manifold with a diameter of 1', accessorized with flow meter.

The kit consists of:

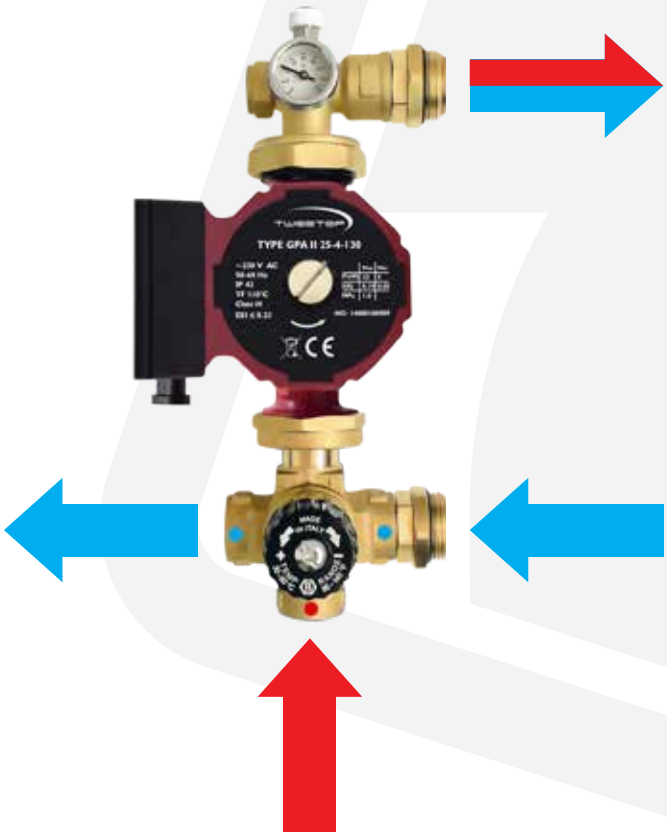
- four-way thermostatic valve ¾ '- control range 30-60°C with a built-in temperature sensor,
- Tweetop pump 25-40-130,
- thermometer with a measuring range of 0-80°C,
- manual vent/bleed,
- nipple connection 1' with O-ring gaskets for connection with the manifold.

How does it work?

The heating medium of high parameter, for example 70°C, is connected to a four-way thermostatic valve (red arrow). After passing through the valve, the heating medium is led through the circulating pump to the upper manifold beam (red-blue arrow), from where it is distributed to the circuit. Four-way thermostatic valve constantly controls the temperature of fluid in the system. Sensor closes the flow of fluid from the high parameter, when the parameter exceeds the set temperature (for example 45°C). Under-floor heating works normally until the temperature of the liquid stays below the assumed 45°C. Then, the sensor will open the four-way valve and allow the water at high parameter to reach the temperature of 45°C again. Four-way thermostatic valve measures the pressure and removes excess water from the system. Just set the desired temperature for the floor heating on the four-way thermostatic valve to handle this kit.

Tweetop 25-40 pump allows independent work of the underfloor heating from circulating pump, installed in the boiler room. The maximum delivery head of the pump is 3.8m H20. Tweetop system also offers the junction box to control the operation of the pump.

To secure the circulation pump, create a small loop bypass by connecting the drain valves of Tweetop manifold with ¾ ' braided steel pipe on the differential pressure opening order of 20 kPa.



Automation of floor heating

Thermostats (230V) in cooperation with actuators (230V), mounted directly on the manifold or through a junction box, can be used as regulatory components in floor heating systems. They can complement the back valves and weather based heat source regulations. The Tweetop system offers a full range of standard and programmable controllers, available in wired and radio-controlled options.

Control principle

The temperature in each room is regulated by a programmable or basic thermostat, which controls the actuator opening or closing the valve (located at the manifold back beam) at the right moment. If the room temperature reaches the set temperature, the thermostat sends an electrical or radio impulse to the junction box, which directs it to the actuator, closing the valve. Thermostat can control several circuits in the room. If there is too many circuits, additional thermostats should be installed.

Bimetallic room standard thermostat

Principles of operation

The thermostat is used for temperature control in dry and closed rooms. The internal sensor registers the current temperature. Set control knob in the proper position on the scale in order to increase the room temperature. The signal is transmitted through the junction box to the actuator and therefore increases the flow of heating medium in the circuit. The thermostat has a supply voltage of 230V and operates on intensity of up to 10A. Temperature control range is 5 - 30°C. Thermostats included in our offer are equipped with thermal loopback resistor to prevent excessive temperature rise in the room. Check given thermostat parameters for the maximum number of actuators that can be controlled.

Mounting the thermostat

The thermostat is mounted on the wall at a height of 150 cm, sheltered from direct sunlight, heat sources and aeration. The thermostat should have a free air flow, so there should be nothing obscured. Thermostat should be mounted in the middle of the room, on the partition wall. Details of installation can be found in the instruction manual inside the thermostat packaging.

- remove the regulation knob
- unscrew the cover
- screw the thermostat to the wall

Setting the desired temperature

The temperature can be set by turning the knob.

Offer

In a group of simple thermostats, Tweetop offer includes type RTR-E 3520, capable of controlling up to 10 actuators at 3W each. In this model, the possibility of regulation can be reduced by appropriate blocking pins under the knob.

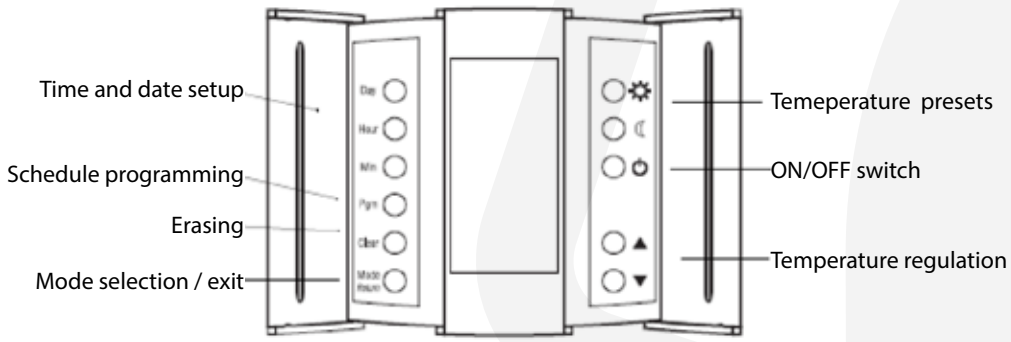
Concealed installation room thermostat with weekly programmer and floor sensor type TH232-AF-230

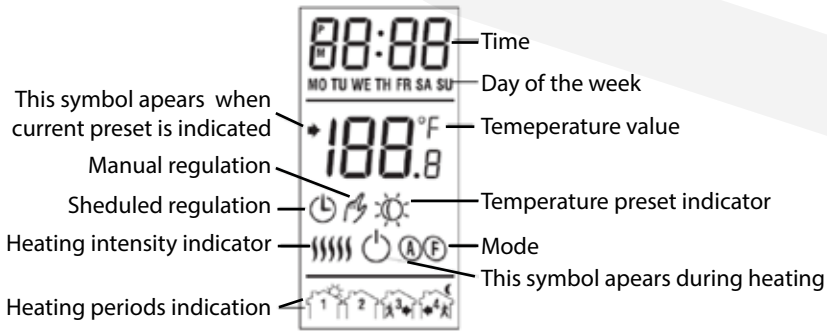
Thermostat type TH232-AF-230 allows control of heating on a weekly basis with the option to program up to 4 switching times per day with two temperature settings - comfortable and economical. The thermostat comes complete with a floor sensor.

The thermostat can operate in the following modes:

- **Mode A** regulates and displays the temperature of the ambient air
- **Mode F** regulates and displays the temperature of the floor (in collaboration with an external temperature sensor) - Standard mode
- **Mode AF** regulates and displays the ambient air temperature and keeps the floor temperature within set limits (in cooperation with an external temperature sensor)

Below the schematic view of the display is shown:





Tips for the thermostat location are consistent with those described in the standard thermostats section. Details of the Installation and programing can be found in the instruction manual inside the thermostat packaging.

The thermostat has a power supply voltage of 230V and operates under intensity of 15A. It can work with the junction box system. Control range of air temperature is 7-32°C and floors 10-40°C.

The thermostat can control up to 15 normally closed actuators.

The thermostat should be connected to the junction box according to diagram of connections for the junction box.

The cables coming out from the box to the thermostat should be connected according to the following rules:

- live (L) to connector 1
- neutral (N) to connector 5
- control actuators cable (arrow) to connector 2 (L)
- floor temperature sensor to connector 6 and 7
- optional remote control wire to connector 3 F.P.

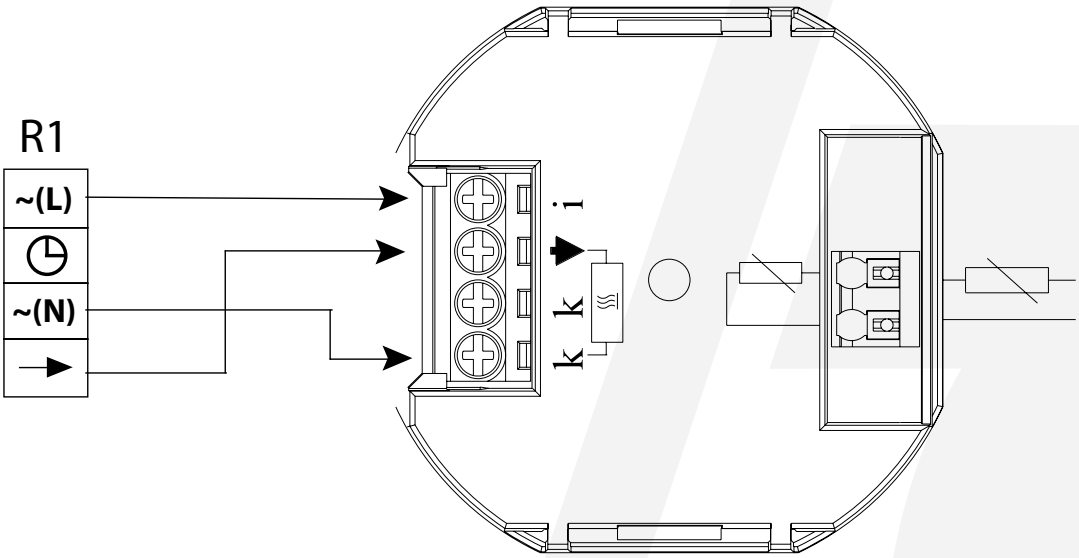
Concealed installation room thermostat with weekly programmer and the possibility of connecting a FIT type floor sensor

FIT type programmable room thermostat allows to program time intervals (up to 9 per day in a weekly cycle) and temperature according to preferences. The controller automatically shows time of the day and room temperature after installation and connection of the power supply. Temperature control is done by reading the air temperature sensor and optionally the floor sensor. Three programs are installed to control the temperature at certain time intervals. Program 1 is the standard program. To define individual programs, follow the instruction
manual.

Tips for the thermostat location are consistent with those described in the section on standard thermostats. Details of activities to be done during the installation and programming of the device are given in the instruction manual included in the package.

The thermostat has a power supply voltage of 230V and operates under the intensity of 10A. It can work with the system junction box. Control range of temperature is 5-30°C,for air and 0-40°C for floor. The thermostat can operate in real time to achieve the desired in room temperature. After moving to another room, the thermostat learns it again. FIT type thermostat has functions of communicating the approximate cost of heating in one room and reducing the possibility of regulation by unauthorized persons.

The thermostat can control up to 15 actuators. Connect the thermostat to the junction box according to diagram below:



Junction box type EV 230 (EV-PL 230)

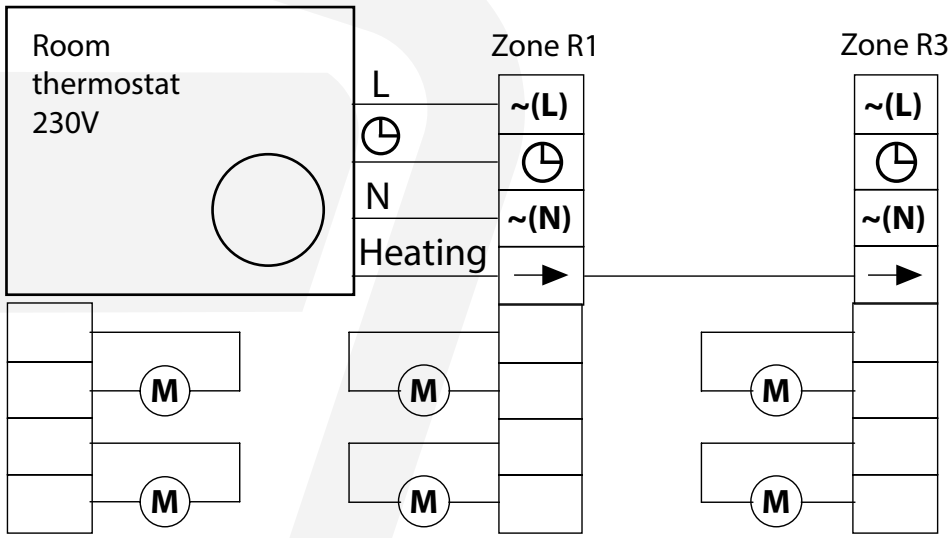
Junction box is a place, where thermostat cables connect to the actuator and optionally to the pump relay. The signal is send from the thermostat, after passing through a junction box, out the individual actuators - opening or closing them. Junction box can be equipped with a pump control module, a set of mixing pump. The signal sent from the thermostat to open the actuators also launches pump, closing the electrical circuit controlling its operation, controlling the pump in such way that is only possible for actuators „normally closed". Junction box works at 230V and is secured against overloads by a fuse.

Connecting thermostats and actuators

The junction box can handle a maximum of 14 actuators and 6 thermostats in the following configuration:

- R1 and R2 zones - max 1 thermostat, 4 actuators
- R3 and R4 zones - max 1 thermostat, 2 actuators
- R5 and R6 zones - max 1 thermostat, 1 actuator

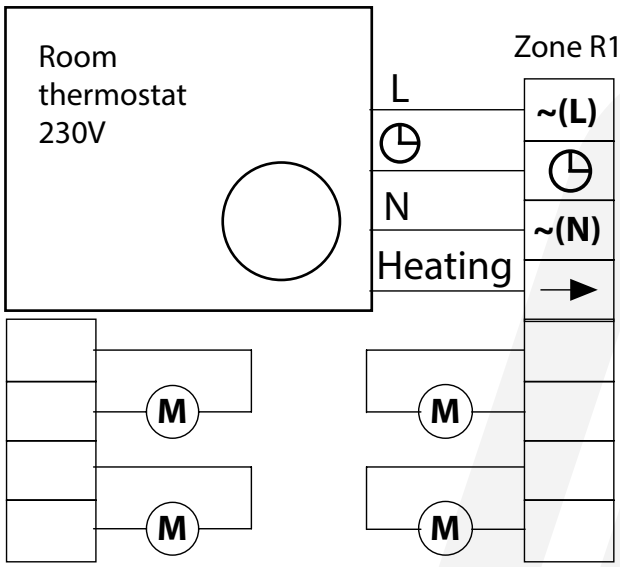
By combining the zones the number of actuators in the zone can be increased. An example below shows the connection of zone R1 to zone R3. Connecting zones does not allow you to connect more than one thermostat.



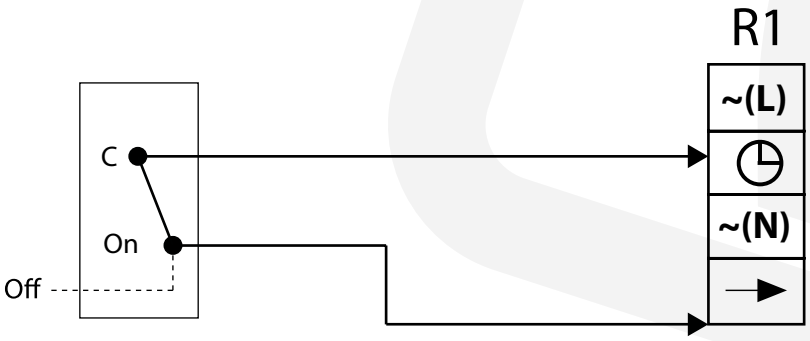
Description :

M	– actuator
L	– current (phase) cable
N	– neutral cable
Heating	– actuator control cable
Clock symbol	– optional timed switch

Thermostats supply from the box connected with the junction box in the following way:



Battery-powered thermostats combine with the junction box as follows:

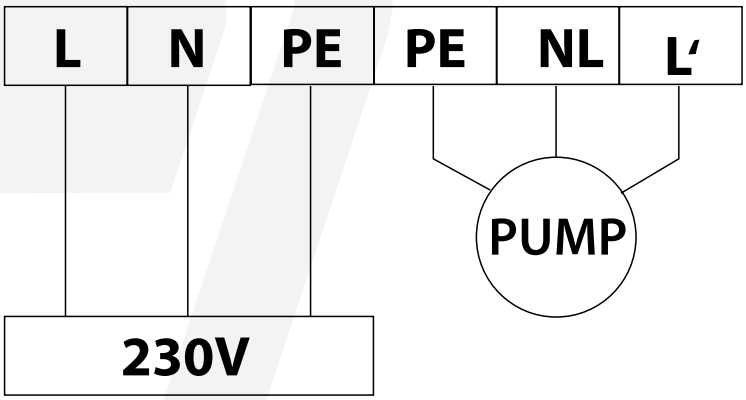


Connecting the pump

Control of the pump is possible with the junction box type EV-PL 230.

The pump is connected to a box in a simple way:

- cutting the power cable of the pump - usually it's the three-core cable (L-live, N-neutral, PE-Ground),
- switching the ends of the cable into the slot in pump relay - the diagram below for the slot L, N, PE on the left,
- going back to the pump cable and supplying it with slots PE, N, L ,on the right,
- the relay acts as a switch providing an electrical current to the pump only when the signal from the thermostat will short circuit L,
- the pump switches off when all circuits are closed.



Comments

- Control of the pump is only possible for actuators normally closed.
- The pump should be connected to an external power source. It cannot be powerd from the junction box.
- Control system is kitted in pump actuating system for 5 minutes every day, during summer break from operation.
- Cable routing should be checked with the electrical diagram inside the building before connecting the devices.
- Minimum cross-section of thermostats power cables is 0,5mm2.
- Box is equipped with a fuse. Burnout of a fuse is a signal that there is too much actuators plugged into a single thermostat.

Wired System - battery powered thermostats

General Information

Based on our long experience in design and sale of surface heating systems, we created the Tweetop automation system. System based on battery-powered thermostats is characterized by:

- comfort of use,
- modernity,
- ease of installation,
- economy of purhase and exploitation.

TWEETOP 1000 room thermostat

Electronic thermostat Tweetop 1000 is used for temperature control in dry and closed rooms. The internal sensor registers the current temperature. It comes in two versions:

- 1000i standard version, equipped with an internal temperature sensor.
- 1000ie version is also equipped with an external sensor (led out on the cable with a length of 3 meters) measuring the temperature of the floor. In this version thermostat can work with two or only one of the connected sensors.

Tweetop 1000 has 3 operation modes:

- Mode 1 - maintaining the daily comfort,
- Mode 2 - night temperature reduction,
- The conservation status of frost protection by keeping the temperature at 7°C.

Technical data

Power source	alk. batteries 2x 1,5V (LR6)
Current demand	<30uA
Air temperature regulation range	
Floor temperature regulation range	0-45°C
Temperature reading accuracy	+/- 1°C
Hysteresis	+/- 0,1°C
Max. current	16A 230VAC
Protection rating	IP30
Max. number of actuators connected	20 pcs.

Mounting the thermostat

The thermostat is mounted on the wall at a height of 150 cm, sheltered from direct sunlight, heat sources and aeration. The thermostat should have a free air flow, so there should be nothing obscured. Thermostat should be mounted in the middle of the room on the partition wall. Details of the installation can be found in the installation instructions inside the thermostat packaging.

Setting the desired temperature

The temperature is set by using the buttons marked "+" and "-".
To start antifreeze mode hold down the "off" button.

Connecting the thermostat to the junction box

Connect a cable with a minimum cross section of 0.5mm2 to corresponding sockets in the thermostat and in the junction box.

Other guidelines

Guidelines for the location of the thermostat are similar with the guidelines for the Tweetop 1000 model. Details of the installation are in the instruction manual included with each device.

TWEETOP 900 room thermostat with weekly programmer

The Tweetop 900 thermostat allows to control heating on a weekly basis with an option to program up to 24 switching times per day (with an accuracy rounded up to full hours). It has two temperature settings: comfort and economic.

The thermostat is available in two versions:

- 900i standard version, equipped with an internal temperature sensor.
- 900ie version is also equipped with an external sensor (led out on the cable with a length of 3 meters) measuring the temperature of the floor. In this version, thermostat can work with two or only one of the connected sensors.

If there is need for slight change in temperature, the third program can be set without changing the comfort or economic mode. Both temperatures can be programmed for individual days of the week. The is a total of 9 different programs. In Tweetop 900ie the floor temperature can be set based on measurments taken by an external sensor. It can control the air sensor, floor sensor or both at the same time. After programming, switching between each program becomes automatic and requires no user intervention. The thermostat has a program memory and power back-up in its front panel. It allows comfortable programming without standing in front of the wall. There is a possibility to lock the keyboard, so any unwanted changes in the program settings can be avoided.

Technical data

Power source	2 x LR6
Max. current	Max 16(6)A 230VAC
Temperature regulation range	0-35°C
Temperature reading range	0-35°C
Hysteresis	+/- 0,1°C
Max. number of actuators connected	20 szt.

Connecting the thermostat to the junction box

Use the socket on the thermostat marked as NO and COM, in order to connect the thermostat to the junction box.

Other guidelines

Guidelines for the location of the thermostat are similar with guidelines for the Tweetop 900 model. Details of the installation are in the instruction manual included with each device.

Tweetop junction box

Junction box is a place, where thermostat cables connect to the actuator and optionally to the pump relay. The signal is send from the thermostat and after passing through a junction box, it's send to the individual actuators - opening or closing them. Junction box can be equipped with a pump control module, a set of mixing pump or boiler and heat control module. Signal send from the thermostat to open the actuators runs a pump or a heat source, closing the electrical circuit and controlling the operation of those devices. Junction box works at 230V and is secured against overloads by a fuse.

We offer a "master" module, controlling the operation of up to 5 thermostats and 20 actuators and a "slave" module, controlling the operation of up to 6 thermostats and 24 actuators. The is a maximum of 3 "slave" modules attached to 1 "master" module.

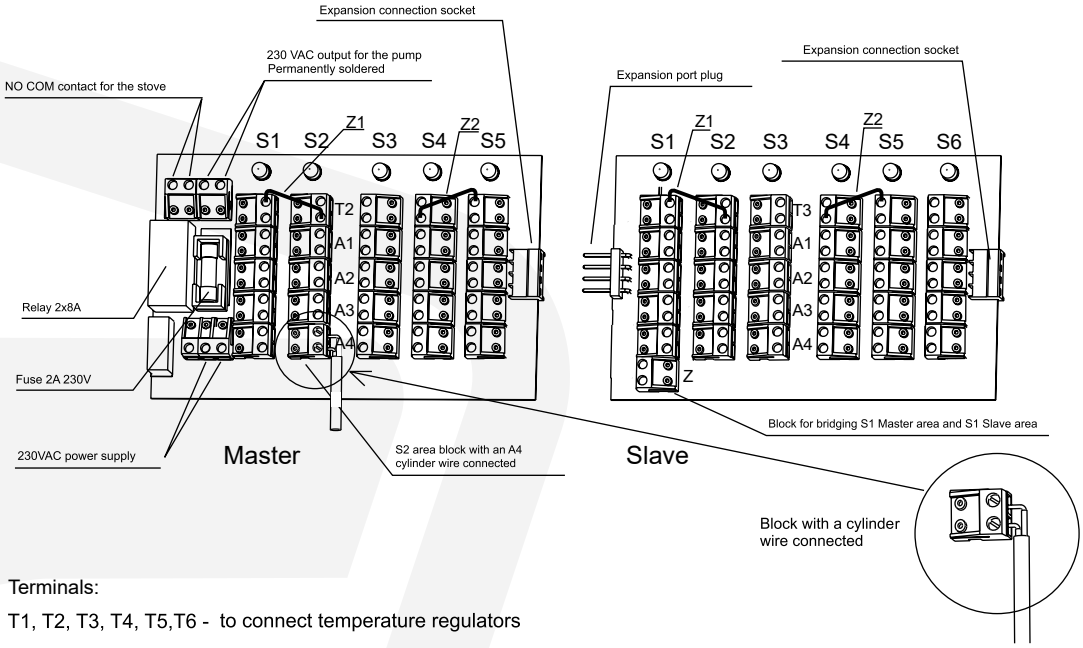
Tweetop junction box is designed to operate only with battery-powered thermostats

!

Connecting the slave module

The connector plug of the slave module's expansion slot needs to be plugged into the master module's expansion slot in order to connect the two modules together.

Wiring diagram:



Terminals:

T1, T2, T3, T4, T5,T6 - to connect temperature regulators

A1, A2, A3, A4, A5, A6 - to connect heads
S1, S2, S3, S4, S5, S6 - respective areas of the strip

Z1, Z2 - example locations of the jumpers bridging areas

Connecting thermostats and actuators

The "master" box can handle up to 20 actuators and 5 thermostats. Connect the thermostat to "T" marked dice and the actuators to"A" marked dice. Master module is equipped with 5 connection zones for connecting the thermostat + actuator systems. Maximum of 1 thermostat and 8 actuators (two actuators for one dice) can be connected to 1 zone. Actuators connected to the adjacent zone can be bridged if the thermostat has to control them. In this case, between the upper zone T1 clamp and a lower zone T2 clamp, a short length of cable shall be installed. The bevel rule: top left-bottom right applies to all connections in the bridge module for master and slave modules. The number of actuators in a particular zone can be increased by combining zones. In order to bridge the zone T5 master module with the zone T1 slave module, a bridge with an additional Z dice (in the slave lath) is required.

The pump has to have the ground properly connected !

Technical data

Power source	230 VAC
Max. current for pump power supply	1A, 230VAC
Max. current for contact points	8A, 230VAC
Max. current for pommel power supply	1A, 230VAC
Protection	F2A, 230V
Regulator zones number	5 (Master) lub 6 (Slave)
Number of pommel connections	5x4 (Master) lub 6x4 (Slave)
Recommended cable cross section and zone bridges specifictation	min 0.5mm /250VAC

Comments:

- Be sure to properly ground the pump when it is installed.
- Junction box cannot be installed in locations exposed to water.
- Junction box can be installed on DIN rail or mounted to the wall by pins.
- Cable routing should be checked with the electrical diagram inside the building before connecting the devices.
- The junction box is equipped with a fuse. Fuse burnout is a signal that there is too much actuators plugged into a single thermostat.

Other aspects related to the use of the junction box are defined in the instruction manual included in the package.

The wireless system - radio controlled

There is no need for a cable between the junction box and the thermostat In radio based systems. Communication between these elements is done by radio waves.

The Tweetop system offers many 6-channel thermostats with radio receiver, equipped with features dedicated to controlling the pump mixing set.

Standard radio controlled room thermostat

Principles and instructions of using the radio controlled thermostat are similar to wired thermostats.

In a group of regular thermostats the following models of the INSTAT 868-r series are avaliable:

- INSTAT 868-r1o - room regulator powered by two 1.5V AA batteries with manual setting of temperature. Construction of the junction box allows control of up to 4 actuators. The number of supported actuators can be increased to 10 by installing additional connectors (using electrical dice) to the junction box.

• INSTAT 868-r1 - it's previously mentioned version of the thermostat with „night reduction" switch which allows reduction of temperature by 2-4 °C at night. In this device you don't need to use the timer.

In the presented models of thermostat's regulation can be limited by blocking the mandrels under the knob.

INSTAT 868-r type room thermostat with weekly programmer

The INSTAT 868-r thermostat differs from the INSTAT 3-L model by power supply (2 x 1.5V AA batteries) and by having a radio transmitter. This thermostat model doesn't have a floor temperature sensor. Both models have a similar appearance and the same programming options. Construction of the junction box allows control of up to 4 actuators. The number of supported actuators can be increased to 10 by installing additional connectors in the junction box.

INSTAT 868-a6 type 6-channel radio junction box (radio receiver)

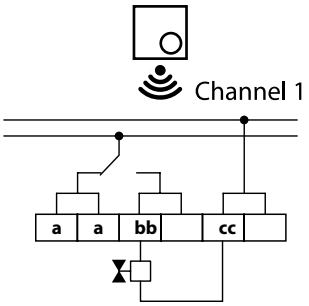
INSTAT 868-a6 radio receiver converts impulses from radio transmitters (thermostats) to control signals for receivers (actuators). Each of 6 thermostats (transmitters) controls one output (channels), equipped with the connectors where actuators are plugged. Junction box operates at 230V. The pump control may take one of the receiver channels. Then we can connect up to 5 thermostats. Box is equipped with a fuse. Fuse burnout is a signal that there is too much actuators plugged into a single thermostat.

The thermostat connection with the junction box

Way to create a radio connection between the transmitter (thermostat) and the receiver (box) is described in the instructions for these devices. Any thermostat functions associated with controlling the actuators are realized by radio signal.

Actuators connecting to the channels

Normally closed actuators are connected to the B and C contacts. Single channel is equipped with two contacts. For each of the contacts a maximum of two actuators can be connected, which gives 4 actuators per channel. Channel can handle up to 10 actuators and the entire junction box of up to 60 actuators. Junction box should be equipped with additional contacts (using electrical dice) to connect all actuators, they should be bridged.

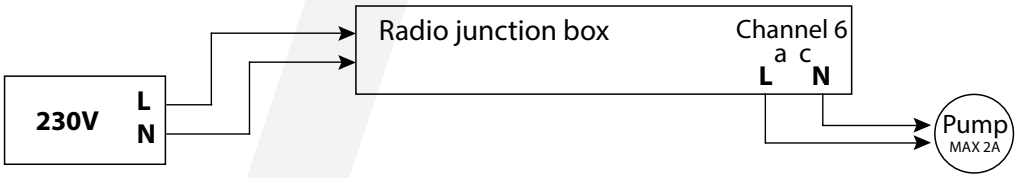


Connecting the pump

When the pump is controlled by the junction box, it is also powered by it. Connect it to contacts in channel A and C according to the following diagram.

The pump can work under current of max 2A. Typical pumps used in floor heating systems operate at a current intensity of <0.4A.

Radio junction box also has a function of assigning programmable thermostats from INSTAT 868-r series - parent function (supervision of switching times) over the standard thermostats type INSTAT 868-r1 and 868-r1o. Connecting programmable thermostats to channel 1 creates the possibility of supervision over standard thermostats assigned to channels 2-6. Connecting a second programmable thermostat to another channel e.g. 3, gives a possibility of switching times in standard thermostats connected to channels 4, 5 and 6.



Actuator type TS + 5.11 230V

Actuators are mounted in the circuits controlled by thermostat, in the upper part of valves. The actuator is screwed manually to the base of the valve (thread M30x1,5). No voltage applied at the terminals of the actuator means „closed" position of the valve. Red position indicator located in the upper part of the corps indicates the status of the actuator (open / closed). The supply voltage is 230V.

Technical data:

- voltage 230V
- power 2,5W
- leap 4,5mm
- basic status normally closed

TS + 5.11 actuator can be opened and closed in manual mode, which is very important in case of power failure or junction box failure. This is a unique solution as most actuators available on the market don't have it.

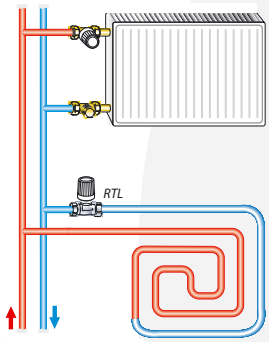
Regulating set for underfloor heating intended for individual rooms (RTL return temperature limiter)

Regulating set for underfloor heating, with RTL return temperature limiter is designed for small rooms (up to 15m2). Designed to control a single heating loop by keeping a constant return temperature of the heating medium in combined systems (floor heating - radiator). The control range of temperature is 20 - 50°C.

Comments:

The set consists of:

- RTL pommel with M30x1,5 connection and built-in sensor measures the temperature of the heating medium
- simple ½' radiator valve with type UBG valve insert



The temperature of the system should be adjusted in accordance with the construction of floor heating.

Not allowed:

- Setting the temperature on valves lower than the RTL ambient temperature.
- Adjacent instalation in other heat sources (e.g. the direct installation in closed distribution box of floor heating) causing the valve will be closed at all times.

RTL pommel cannot be used in combination with thermostatic radiator valves.

Pressure test

Heating installations test conditions :

- tests pressure – max. working pressure + 2 bar
- tests temperature – constant – water temperature change of 10 K causes pressure change of 0.5 – 1 bar.

Water installations test conditions :

- tests pressure – 1.5 x value of max. working pressure
- tests temperature – constant, water temperature change of 10 K causes pressure change of 0.5 – 1 bar.

Tests approval conditions :

Test type	Duration [min]	Test approval conditions
Preliminary stage 1	30	Pressure decrease of no more than 0.6 bar. No condensation or leaks
Pause	10	
Preliminary stage 2	30	Pressure decrease of no more than 0.6 bar. No condensation or leaks
Main	120	Pressure decrease of no more than 0.2 bar. No condensation or leaks

Remarks :

- Installation leak test can be performed after fulfilling the following requirements:
    - disconnecting the installation from the heat source,
    - disconnecting the armature and other items that could disturb the pressure test,
    - replacing the separate parts by end caps,
    - preparing and connecting the necessary equipment,
    - filling the system with water,
    - venting.

- During the partial acceptance the compressed air test can be made. Test pressure should exceed 3 bar.
- For tests use a manual piston pump equipped with:
    - water tank
    - shut-off valve
    - return valve
    - drain valve
    - hallmarked pressure gauge mounted on tap gauge (minimum disc diameter of 150mm, range of indications higher by 50% than the test pressure, accurate to 0.1bar).

Storage and transportation

Tweetop system pipes have to be:

- Protected against direct sunlight.
- Protected from high temperature <+ 30 ° C - distance from radiators and heating objects should not be less than 1 meter.
- Transported and stored horizontally on an even, flat surface to avoid bending. Tubes can be stacked up to 15 layers. In case of cardboard packaging, number of layers depends on the strength of the packaging.
- Protected against damage during loading and unloading.
- Unloaded without usage of steel ropes.
- The pipes should only be carried. It is prohibited to drop the pipes or drag them allong the ground.

TWEETOP™

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Your nearest reseller:

EcoHeat Complex

a complete solution for home

EcoHeat Complex is the ideal and cost-effective solution for house and domestic water heating due to its high COP (5.7). Advanced thermodynamic system in a heat pump obtains thermal energy from outdoor air even at temperature of -25 ° C. There is also a cooling function for the summer. Mounting of the pump does not require complicated and expensive earthworks. Usage of the inverter to control the operation of compressor, led to the introduction of an efficient heat pump, adapting it to the current demand of buildings and avoiding the frequent device launching. As a result, the heat pump's demand for energy has been reduced while its lifespan increased.

Tweetop EcoHeat Pro

the cheapest method of hot water preparation

EcoHeat Pro heat pump uses heat accumulated in the building's ventilation air for preparation of hot water. Thanks to this, hot water is available for 365 days a year, regardless of the current weather conditions. It is designed for prepation of domestic hot water in houses, cottages, small retail outlets and services. Costs of usage are low due to high COP (3.9). The water is heated in a hygienic storage tanks, made from stainless or enamelled steel with a capacity of 200 or 300l. In the summer, pump can also be used for cooling. Installed in the basement, it can be used for drying walls from the moisture. Tweetop EcoHeat Pro was awarded with a gold medal at the International Fair of Poznan in 2014.