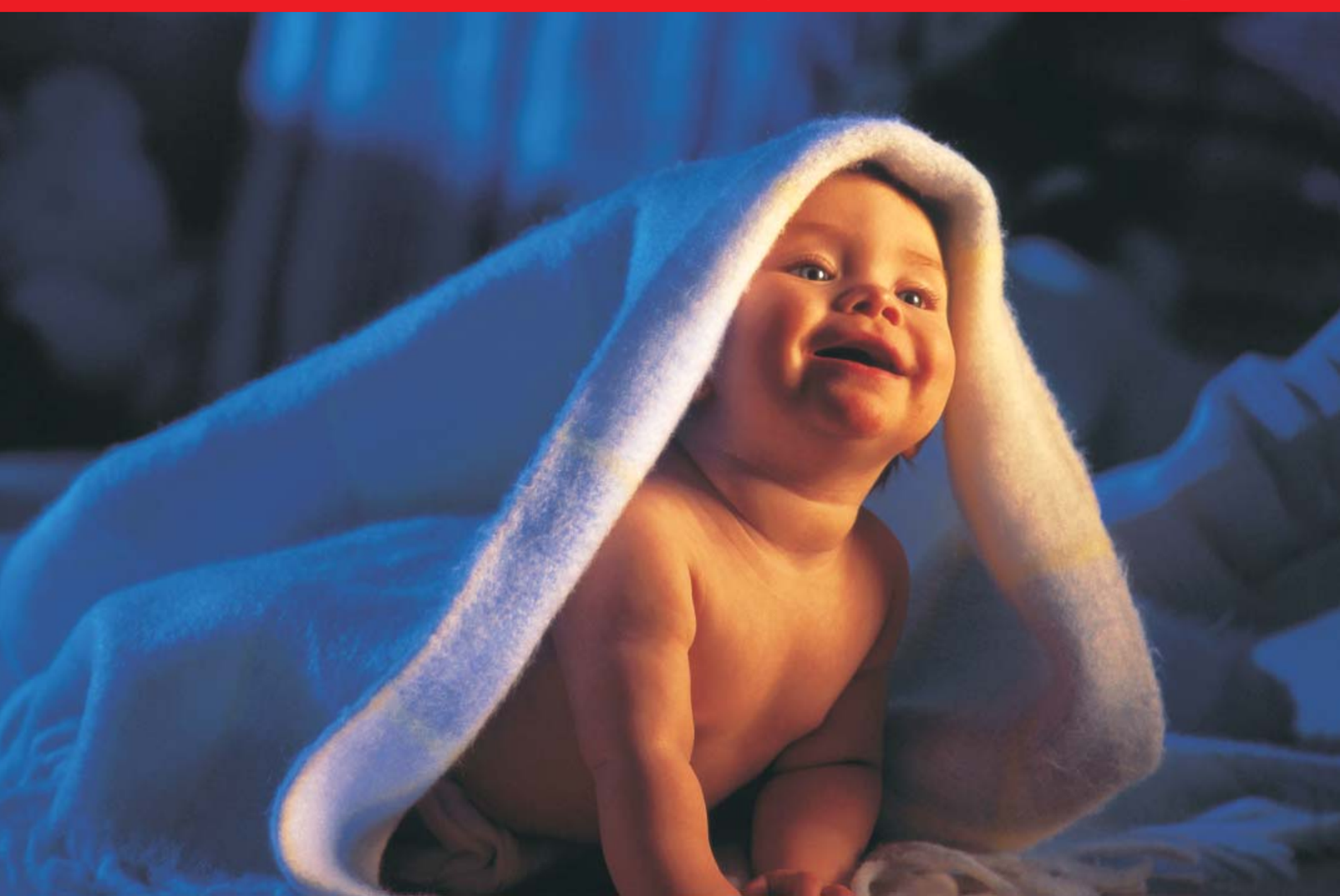
Herz®

Room heating and cooling for floors, walls and ceilings



Contents

Over the last few years there has been a sharp increase in the demand for, and acceptance of, surface heating and cooling systems. Due to the many advantages that this system brings, An increasing number of all new detached and semi-detached homes have now been equipped with floor heating. The use of modern materials, such as the HERZ multi-layered composite pipe, guarantee the durability of the equipment, with the installation costs similar to that of conventional radiator heating systems. The installation costs for room cooling are lower than traditional systems and they are silent in operation.

If surface and radiator heating are used together, care should be taken that the controls for the surface heating are always run independently from the controls for the radiator heating. Surface heating requires different operating temperatures to radiator heating. The same applies to cooling systems using cold water.

The advantages of surface heating

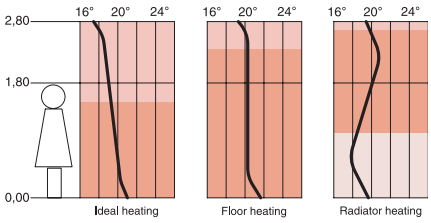
Floor or wall heating uses the whole floor or wall area of a room as a radiant area while radiators are only a single-point heating source and are mainly convective.

- **Radiant heat always generates an even temperature profile in the room. With the radiant heat from floor heating there is a considerably lower heat exchange between people and the surrounding room spaces than there is with radiator heating. The room temperature can therefore be kept around 2-3 °C lower without affecting the feeling of comfort. This means a considerable decrease in heating costs of up to 12 %.**
- **All surrounding walls are fully accessible, giving freedom of design. Underfloor heating is child friendly and there is less restriction on furniture placement with no radiators on the walls.**
- **Dust and dust particle circulation is minimised due to very low air movement.**
  The dust circulation by radiators, which is created by rising hot air on one side of the room and the fall of cold air on the opposite side of the room, is eliminated. This means low air pollution, which increases the quality of life, especially for people with allergies.
- **Surface heating uses lower flow and return temperatures than conventional heating systems with radiators. This provides the advantages and energy efficiency of low temperature heating systems. The lower flow temperature of underfloor heating makes it easier to combine with alternative or renewable heating sources like heat pumps, solar panels, etc.**
- **In bathrooms and other rooms, normally cool floors made of stone, slate, ceramic tiles or marble can convert into convenient heat emitting surfaces, creating comfortable, natural warmth throughout the year.**
- **Energy savings with low temperature operation**
- **Improved air quality due to minimum air movement**
- **No cold spots such as in front of windows**

Insulation materials

Insulation underneath the heating pipes is necessary regardless of the system used, to meet the requirements of the building regulations and BS EN 1264 part 4.

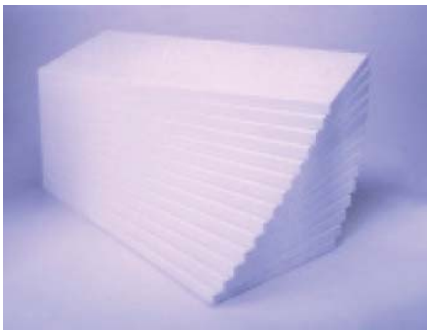
Temperature profile



Ground floors or floors in direct contact with the ground will require a damp proof membrane (DPM). Edge insulation is used to allow the heated screed to expand and is laid between all walls and the screed. Additional expansion joints in the floor need to be considered for large areas (see BS EN 1264 part 4). Pipes running through those expansion joints are covered with a protective tube.
The following components are required for screeded underfloor heating systems.

Thermal insulation

Underfloor heating generates heat above and below the floor which is limited by the thermal insulation. Thermal insulation below the pipes minimises any heat loss with thickness according to BS EN 1264 part 4. For rooms on ground level an appropriate damp proof layer is required.



Damp protection:

To protect the insulation from the wet screed a protective layer is required, the insulation should be covered with a PE sheet (200 µm) with joints overlapped by 300 mm. This is not a DPM which should be installed below the top layer of concrete.

With Tacker systems the protective layer is bonded to the top of the insulation as it also provides the fixing for the pipe clips. To ensure a good seal all joints must be taped.

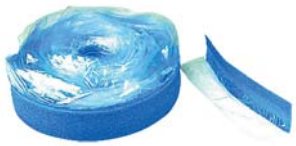
Summary

Edge insulation strips

The edge insulation allows the screed to expand to all sides and must be applied to all external and internal walls. This is necessary as screeds with underfloor heating have an increased heat expansion in comparison to non-heated screeds. The edge insulation creates an expansion joint between the wall and floor to provide the necessary expansion. Minimum thickness for edge insulation is 10 mm depending upon the material's characteristics.
Edge insulation also creates the crucial separation between the screed and other fixed building elements (e.g. walls, pillars, etc.). The material used needs to be able to be compressed by at least 5 mm.

Suitable materials are:
8 mm Polyethylene (PE) – foam.
12 mm Polystyrene (PS) – foam.
10 mm Corrugated cardboard strips

On site available material can be used as long as the compressibility is guaranteed.

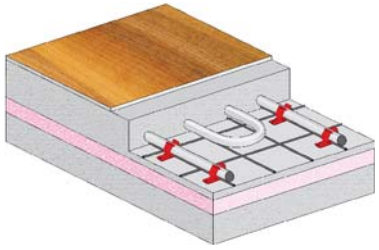


Screed and Floor covering

Screeding should be carried out to the appropriate standard (BS8204) and codes of practice (BS8000).

The screed depth will depend upon the type of screed and the application. For sand and cement screeds the thickness will be between 65 mm and 75 mm and less for anhydrite screeds. Minimum thicknesses to BS EN 1264 are 30 mm above the heating pipe for sand and cement screeds. With anhydrite screeds the covering thickness can be less and the recommendations of the screed manufacture should be adopted.

Additives can be added to the screed to increase the viscosity of the screed and improve the thermal conductivity.



> 35 mm for anhydride strips
> 45 mm for cement strips

Flooring

There are few restrictions on the floor coverings used as long as they are suitable for the temperatures used (pay special attention to the properties of any adhesive used).
Carpets and their adhesives need to be suitable for underfloor heating with a maximum thermal resistance of 0.15 m^2k/W (1.5 Tog). The thermal resistance influences the heat emission and is incorporated in the underfloor heating system calculations. Ceramic floors generally perform better than carpets due to their lower thermal resistance.

Expansion joints

Underfloor heating pipes laid in the screed expansion joints or through a door way need to be protected with a sleeve. Purpose made expansion joint profiles complete with expansion material and pipe sleeves are available and should be used if possible.

Heating pipes

Heating pipes are laid within the floor screed and therein form part of the building structure. It is therefore important that the pipework is manufactured from high quality material to the highest standards. Pipework should be manufactured to BS7291/ DIN4726 or similar standards and produced under an ISO9000 quality control scheme.

Plastic pipes are corrosion free when used for underfloor heating and therefore do not require water treatment to prevent corrosion. Water treatment will not damage the pipe and can be used to protect other components in the heating system. Manufacturers' instructions should be followed in all cases.

Plastic pipe is permeable to Oxygen which can result in serious corrosion of heating components. An oxygen diffusion barrier is therefore required with an oxygen permeability of not more than 0.1 g/m^3d.

For underfloor heating multi-layer plastic pipes are usually installed. They are made of high stabilised or cross-linked polyethylene with a butt-welded aluminium layer and a covering layer of PE or PE-X. The aluminium layer should be between 0.15 and 0.3 mm thick to achieve the correct bending characteristic and flexibility. This reduces the spring-back resilience of the inner pipe but is strong enough to increase the compression strength of the whole pipe. Furthermore the aluminium layer acts as an oxygen barrier, which guarantees the pipe is oxygen impermeable. Multi-layer pipes used for underfloor heating should be quality controlled and certified.

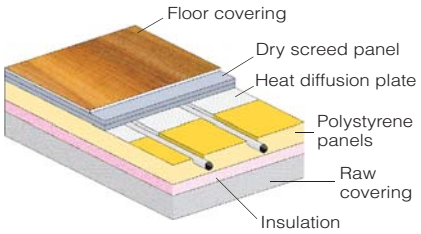
Generally all current connection techniques can be applied like radial compression or press-fittings. Welding procedures are not usually used.

Installation systems for underfloor heating

- **The dry installation system:** The pipes are laid into the insulation material underneath the flooring (wood or parquet flooring). The advantages are a low floor height and low weight.
- **The wet installation system:** The pipes are bedded directly into the wet screed.

Dry installation system

The heating pipes are positioned above the solid concrete floor and are not part of the floor construction. The heat induction is slightly less than for the wet system. The pipes are bedded into polystyrene panels with pipe recesses for different installation distances. Additionally, heat transfer plates are fixed to ensure sufficient heat conductivity. Dry screed panels or wooden floor boards can be laid above the insulation layer, which allow a low overall floor height. This can be very useful when installing a heating system at a later stage or when renovating an existing building.



Important characteristics for dry installation of underfloor heating systems:

- **A maximum thermal resistance of R=0.5 m²K/W for the dry screed or wood/parquet flooring. If the resistance is higher then only floor warming can be achieved and the heat output will not be sufficient to heat the room.**
- **The pipes are clipped into the aluminium diffusion plates, which provide an even heat transmission. These diffusion plates are in direct contact with the bottom of the wood or dry screed flooring.**
- **The flow temperature will depend on the thermal resistance of the floor covering and the heat loss for the room. Generally the maximum flow temperature should be 60 °C and the maximum floor surface temperature 29 °C. (Under certain circumstances 35 °C floor surface temperature is acceptable.)**
- **Polystyrene panels are suitable for holding the heating pipes and heat transfer plates and are laid directly onto the solid concrete floor. The polystyrene panels are installed between support battens and need to be 1 to 2 mm higher than the battens. This allows for a positive contact between the flooring and the diffusion plates. The distance between the support-battens needs to be same as the polystyrene.**

Edge insulation with a minimum thickness of around 10 mm is laid along the floor boundary. This allows the expansion of the floor and furthermore it creates the essential separation between the flooring components and any other fixed building elements. (e. g. walls, columns, etc.)

Advantages of the dry installation underfloor heating

- **Immediate access to the floor**
- **Little static weight**
- **Universal for all floor surfaces and quick responding due to lightweight floor construction**

Floor construction for dry installation

- **Basement and ground floors e.g. concrete, screed or mixtures with sand or similar material. Sand mixtures require a building protection foil. (Supplied by construction contractors)**
- **Insulation layer 20 to 30 mm thick covering the base floor, impact sound attenuation layer, etc.**
- **Polystyrene fixing panels, 50 mm mounted between supporting battens**
- **Underfloor heating pipe: Aluminium multi-layer pipe, dimension 16 x 2 mm**
- **Aluminium diffusion plates**
- **Floor covering panels, wood or parquet flooring**

Floor construction for wet installation

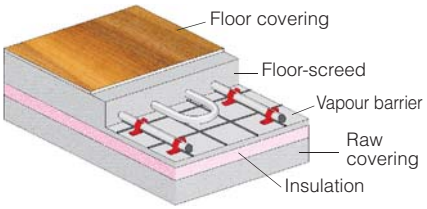
The heating pipes are directly embedded in the screed for this type of underfloor heating system. This system has a very good heat transmission. A variety of fixing panels for the heating pipes are available e.g. steel reinforcing mesh, clip rails, tacker sheets Nap plates.

For wet installation the pipes are directly in-bedded into the screed.

It is essential that the heating screed has a minimum thickness. The pipe top surface should be covered by a minimum of 45 mm for sand and cement screed and a minimum of 35 mm for anhydrite screeds. The flooring, especially carpets and adhesives, must to be suitable for underfloor heating.

Floor construction for a wet laying system
(from bottom to top)

- **Basement and ground floors e.g. concrete, screed or mixtures with sand or similar material. Sand mixtures require a building protection foil. (Supplied by construction contractors)**
- **Insulation layer 20 to 30 mm thick covering the base floor, impact sound attenuation layer, etc.**
- **Vapour barrier (PE foil)**
- **Laying plates made of polystyrene with stapling needles, nub plates, holding rails, steel mesh mat or plates for clamping pipes**
- **Underfloor heating pipe: Aluminium multi-layer pipe, dimension 16 x 2 mm to diameter 20 x 2mm**
- **Floor screed**
- **Floor covering**



Wall heating

Wall heating is installed using dry and wet systems.
It is necessary to have exact plans of the installation to facilitate fixings to the wall (placing pictures, etc).
Wall heating creates a radiant heat, which gives a natural feeling of warmth and high comfort levels. In addition to this comfort effect the requirement for higher insulation levels results in lower heating power.

New design trends for homes support this technical solution without the use of radiators which block and visually disrupt valuable wall space. The inexpensive solution for convenient installation and efficient operating costs is the integral temperature transfer model (ITTM) systems. The heating elements are easily integrated into the wall surface and are installed beneath the plaster. Increasingly used in museums, prestigious apartment and renovation projects as well as a cost effective solution to control damp in older buildings.

ITTM systems are used in the renovation sector and for museums to conveniently control the climatic temperature and provide the required heating. Where it is not possible to use insulation layers or horizontal damp barriers to control damp problems ITTM systems make it possible to keep the historical appearance of walls and surroundings. The success with ITTM's is undisputed and well proven.
As a consequence of the advantages of ITT modules for room design and climate control, this heating system is also increasingly used for private restoration projects and in new buildings.

The ITTM system is a construction of a heat distribution system, which uses the walls of a building to control the temperature climate with heating pipes. The ITT modules are mounted behind the plaster and are therefore in direct contact with the wall and plaster. This system is design and calculated so that no additional heating is required. Copper pipes are generally used but plastic multi-layer pipes are also possible.
During the summer months permanent heating in cellars and basements is advisable to ensure dry environment in colder areas, especially during periods with high humidity.

Main advantages of Integral temperature transfer module systems (ITTM):

- **The building structure of renovated buildings is automatically dried and stays dry.**
- **It is an invisible heating element (no visual impact and additional available space)**
- **Clean and radiant warmth**
- **No convection and therefore minimum air movement which is especially beneficial to allergy sufferers**
- **Generally no additional damp preventions necessary and therefore lower renovation costs**
- **Generally new build constructions have lower installation costs compared to traditional heating systems.**

The ITTM system reduces the risk of damage caused by damp to the plasterwork in more complicated building structures and utilises the increased use of special plaster systems for renovation projects.

Wet laying system

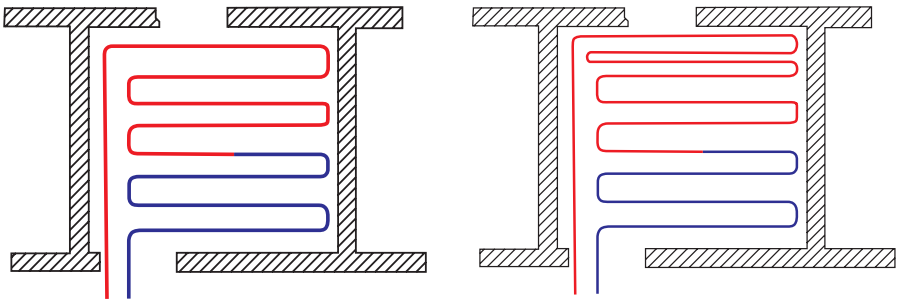
The heating assembly is mounted onto the wall. It can be a pre-assembled element or can be fixed onto wall with clip rails. The clip rails are screwed onto the wall with fixing dowels. The heating pipes are fixed in the clip rails at spacing's according to the heat requirement. The pipe structure is then covered with a layer of plaster just above pipe surface. Following heating the plaster dries out which creates surface cracks. These cracks are then covered with an exterior plaster layer (silicate plaster is recommended) combined with a grid to cover the pipe system up to a minimum of 20mm. For the wall heating system the pipe diameter is dependent upon the heat requirement. If the heat output is not enough additional heating elements are required.

Dry laying system

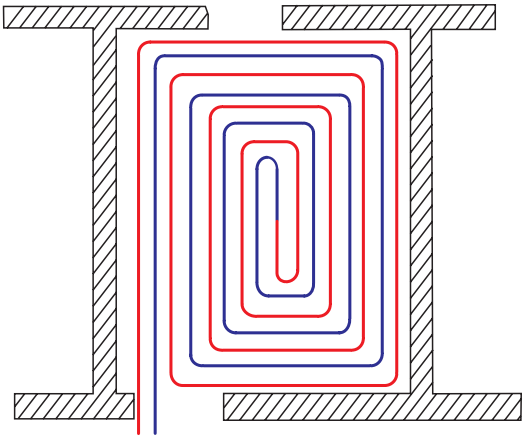
Wall heating panels are 18 mm thick and made of plaster fibre material with integral multi-layer pipe 10 mm x 1.3 mm. The heating pipes are integrated into the plaster fibre panel during manufacture of the panels. The panels are then directly mounted onto the wall with the smooth surface of the panel facing the room. Various panel dimensions are available for mounting onto the wall and underneath windows. Following the application of plaster surface coat to cover all joints and fixings the walls can be wallpapered, painted or tiled. Wall heating panels are connected directly onto the manifold or return flow temperature limiter, the maximum panel area that can be connected in series is 5 m^2.

Relevant control can be implemented using electronic moisture probes.

There are very flexible design options with these panels, such as direct workplace heating for factory areas and wall heating and room cooling in office premises.



Meander bedding without/with peripheral zones



Spiral bedding

Installation types for surface heating

Various pipe beddings are possible and influenced by following criteria:

- **Room shape**
- **Number of heating circuits**
- **Screed and building Expansion joints**
- **Peripheral zones with increased surface temperature**
- **Dimension of underfloor and wall heating systems as a whole, part or combined heating system**
- **Balanced surface temperature**
- **Keeping the minimum-bending radius for pipes**

The aim is to reach the most balanced temperature distribution along the whole surface.

This is accomplished with meander and spiral pipe bedding systems. The flow and return flow are always next to each other which creates an alternating flow of hot and cold heating water. The floor temperature is measured above the pipe top surface and between the pipes. The measured temperature difference is called wave ratio. It is desirable to keep the wave ratio very low, which is achieved with maximum spacing's of 300 mm and low flow temperatures.

In very large areas laid in meandering form, a reversal of direction of the flow of water may follow at certain intervals of time in order to achieve an even surface temperature. This is called reverse or perpendicular heating.

The advantage of this system is the parallel position of the flow and return, which allows a balanced and well distributed surface temperature.
This type of system is applied by preference, in peripheral zones, only advance flow pipes are laid next to one another.

With various heating circuits the heating circuit with the highest specific heat load controls the flow temperature. All other heating circuits are controlled via the pipe spacings which range from 70 mm up to 300 mm. It mainly depends on the system calculation and bedding type.

Design and calculation of surface heating systems

As with all heating systems an accurate design is the key for the efficient functioning of the underfloor heating systems. The calculation and design is done according to general rules and standards. This results in a comfortable room temperature, efficient system with low operating costs. The dimensioning of the underfloor heating is according to BS EN 1264 and the heat load calculation is according to BS EN 12831. The starting point for the calculation is the heat requirement for one room. This depends on the room's location, building materials, insulation, number of windows and other given factors. With the heating requirement known the dimensioning of the underfloor heating can begin.

Floor excess surface temperature

In the calculation of the system, the floor surface temperature should stay below the physical comfortable temperature (stated in BS EN 1264). Floor surface temperatures above 25 °C are uncomfortable over a period of time and can also lead to health problems. As the maximum floor temperature is only essential on a few days during the year, a maximum temperature of 29 °C can be applied in the calculation process for living rooms. For zones which are not constantly used, like peripheral zones and transitional areas, a maximum temperature of 35 °C is permissible. These temperatures are set according to BS EN 1264 which states the limit values for floor excess surface temperatures (living space 9K, peripheral zones 15 K).

If the heating requirement cannot be achieved with the use of peripheral zones then additional heat emitters will be required.

By using appropriate insulation below the pipes then the heat lost to the ground or room below should be lower than 25 % of the heating output, but definitely lower than 20 W/m².

Calculation steps

Starting point is the heat requirement PN (according to BS EN 12831)

1) Actual heat requirement

The heat loss from the floor surface can be deducted from the total heat loss for the room (as this is the heat emitter):

$$P_{NB} = P_N - P_{FB}$$

P_{NB} **actual heat requirement (W)**
P_N **standard heat requirement (W)**
P_{FB} **heat loss from the surface (W)**

Example:

Nominal heat requirement of the standard room:

P_N = 1000 W

Heat Loss above floor surface:

P_{FB} = 150 W

Actual heat requirement:

P_{NB} = 1000 - 150 = 850 (W)

2) Calculation of the specific heat requirement

With the actual heat requirement and the available heating surface area (room floor) the specific heat requirement is calculated:

$$q_{spec} = \frac{P_{NB}}{A_R} \text{ (W/m}^2\text{)}$$

q_{spec} **specific heat requirement (W/m²)**
P_{NB} **actual heat requirement (W)**
A_R **room area (m²)**

Example:

Actual heat requirement of standard room:

P_{NB} = 850 W

Room surface:

A_R = 15 m²

Specific heat requirement:

$$q_{spec} = \frac{850}{15} = 57 \text{ (W/m}^2\text{)}$$

For the calculation of the flow temperature the room with the highest specific heat requirement (not including bathrooms) is used and called the standard room for the calculation.

3) Calculation of the standard room

Only for the calculation of the standard room the temperature difference between flow and return is chosen

– **according to BS EN 1264 σ < 5 K**

Bathrooms are not taken into account as standard rooms.

4) The average heating excess temperature

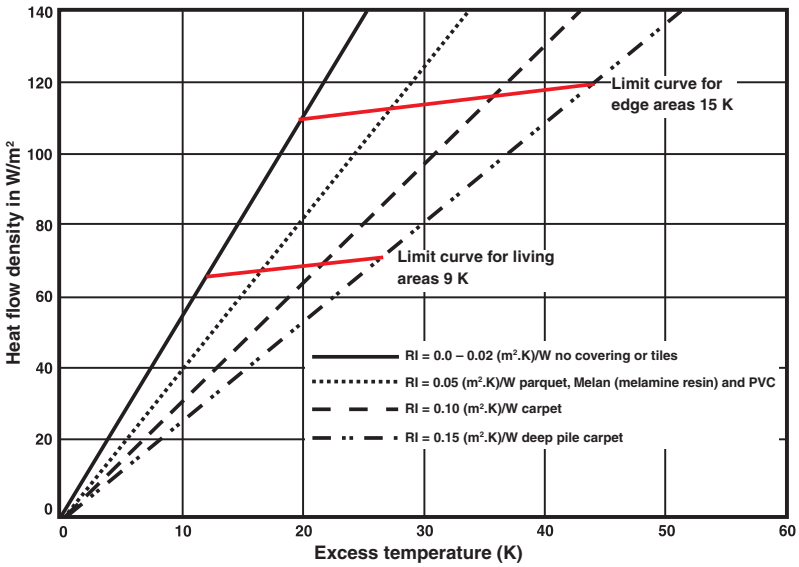
The average heating excess temperature is the average difference determined between the average heating temperature and the standard indoor temperature.

To calculate the standard room, the layout average heating excess temperature is used, which exists for selected heat conductivity resistance for the floor covering and the layout heat flow density.

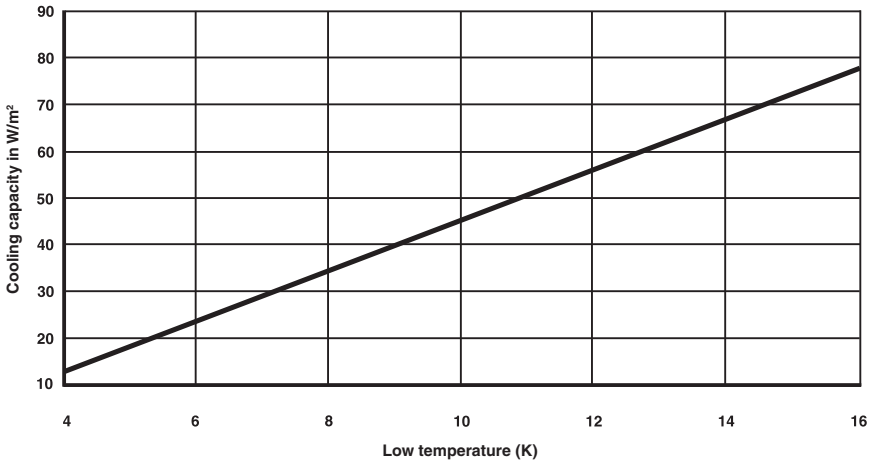
The average heating excess temperature can be viewed in the diagram (page 8).

The average heating under-temperature for room cooling is then taken from the diagram (page 8).

Average heating excess temperature for standard floor coverings



Average heating low temperature for room air conditioning



5) Calculation of the flow temperature:

$$t_{VL} = t_i + t_{mH} + \frac{\sigma}{2} \ (^{o}C)$$

t_{VL}	**Flow temperature (°C)**
t_i	**Room internal temperature (°C)**
t_{mH}	**Heating water excess temperature (°K)**
σ	**Temperature Difference (flow – return flow temperature)**

Example:

Heating water excess temperature:

t_{mH} = 18.5 K

Room temperature:

t_i = 20 °C

Temperature Difference:

σ = 5 K

Flow temperature:

$$t_{VL} = t_i + t_{mH} + \frac{\sigma}{2} = 20 + 18.5 + \frac{5}{2} = 41 \ (^{o}C)$$

This flow temperature is valid for all heating circuits. To apply the correct heat output to each heating circuit the temperature difference (flow-return temperature difference) is varied.

6) Calculation of the temperature difference for all other heating circuits

As with the standard room the heating water excess temperature is calculated using the specific heating requirement and the pipe spacing.
The temperature difference is calculated using this heating water excess temperature and flow temperature.

$$\frac{\sigma}{2} = t_{VL} - (t_i + t_{mH})$$

$$\sigma = 2 \times (t_{VL} - (t_i + t_{mH}))$$

t_{VL}	**Flow temperature (°C)**
t_i	**Room temperature (°C)**
t_{mH}	**Heating water excess temperature (°K)**
σ	**Temperature difference (flow- return temperature difference)**

7) Border zones

If the heating requirement is not enough using the maximum floor temperature of 29 °C and the minimum pipe installation spacing, the calculation for peripheral zones is required. The calculation uses a maximum floor temperature of 35 °C in the peripheral zones to reach the required heating output. If the minimum pipe spacing of 100 mm is not sufficient, then flow temperature is increased for all rooms. The system limits for the design are to follow.

8) Additional heating elements

If the heating requirement cannot be fulfilled including the use of peripheral zones, an additional heat source is necessary. Wall heating, which uses the same flow temperature as underfloor heating, would be a suitable additional heat source. Ceiling heating, conventional radiator heating and electrical heaters are also possible heat sources.

9) Calculation of the water flow quantity

The water flow rate is calculated from the heating power and calculated temperature difference.

$$m = \frac{P_{NB}}{\sigma \times c} \times 3600 \text{ (kg/h)}$$

m	**Water flow quantity (kg/h)**
P_{NB}	**Actual heat requirement (kW)**
σ	**Temperature difference (K)**
c	**specific heat capacity of water = 4.19 (KJ/kgK)**
	3600 multiplication factor to convert kg/s to kg/h

Example:

Actual heat requirement:

P_{NB} = 0.825 kW

Temperature difference:

σ = 5 °C

Specific heat capacity:

c = 4.19 (kJ/kgK)

Water flow:

$$m = \frac{P_{NB}}{\sigma \times c} \times 3600 = \frac{0.825}{5 \times 4.19} \times 3600 = 142 \text{ (kg/h)}$$

10) Calculation for the pipe length

The total pipe length for one heating circuit should be no more than 100 m.

$$L = \frac{A_R}{a} + 2 \times L_{zu} \text{ (m)}$$

L	**Pipe length of the circuit (m)**
A_R	**Room area (m²)**
a	**Pipe Spacing**
L_{zu}	**Pipe length of the feed pipe and return pipe**

Also the pipe tails (L_{zu}) to and from the manifold have to be included.

Example:

Room area:

A_R = 15 m²

Installation distance:

a = 0.2 m (200 mm)

Length of the feed pipes (off plan):

L_{zu} = 2 m

Length of the pipes for the heating circuit

$$L = \frac{A_R}{a} + 2 \times L_{zu} = \frac{15}{0.2} + 2 \times 2 = 79 \text{ m}$$

If the circuit length is greater than 100 m it has to be divided into 2 circuits (e.g. peripheral zone and main zone)

11) Calculation of the pressure loss

Using the table and values, L and m, the pressure loss of the floor heating can be calculated. The maximum water velocity should not exceed 0.8 m/s.

The single resistances of all fittings are added up for the pressure drop calculation. These resistances are calculated from the resistance index, which is converted into equivalent pipe lengths.

It is necessary to count all single components to achieve an accurate total pressure drop for the pipe circuits. It is advisable to put all single components into a table. Every single resistance index is added up using the above table.

Now the loss coefficients of individual resistances can be taken from the table above and added up. Using this total and the formula detailed below, it is now possible to calculate the total loss arising from the fittings used.

To calculate the total pressure loss of a unit, this sum of the losses, which arises from the piping and other components used, is added up.

$$Z = \Sigma \zeta \times v^2 \times 5$$

Z	**Summary of single resistances**
v	**Flow velocity (m/s)**
ζ	**Resistance index (shape depending)**

The summary and formula below show the total resistance of all fittings used in the system. The total pressure drop is then calculated with the summary of all single resistances and the pressure loss caused by the pipelines and other components.

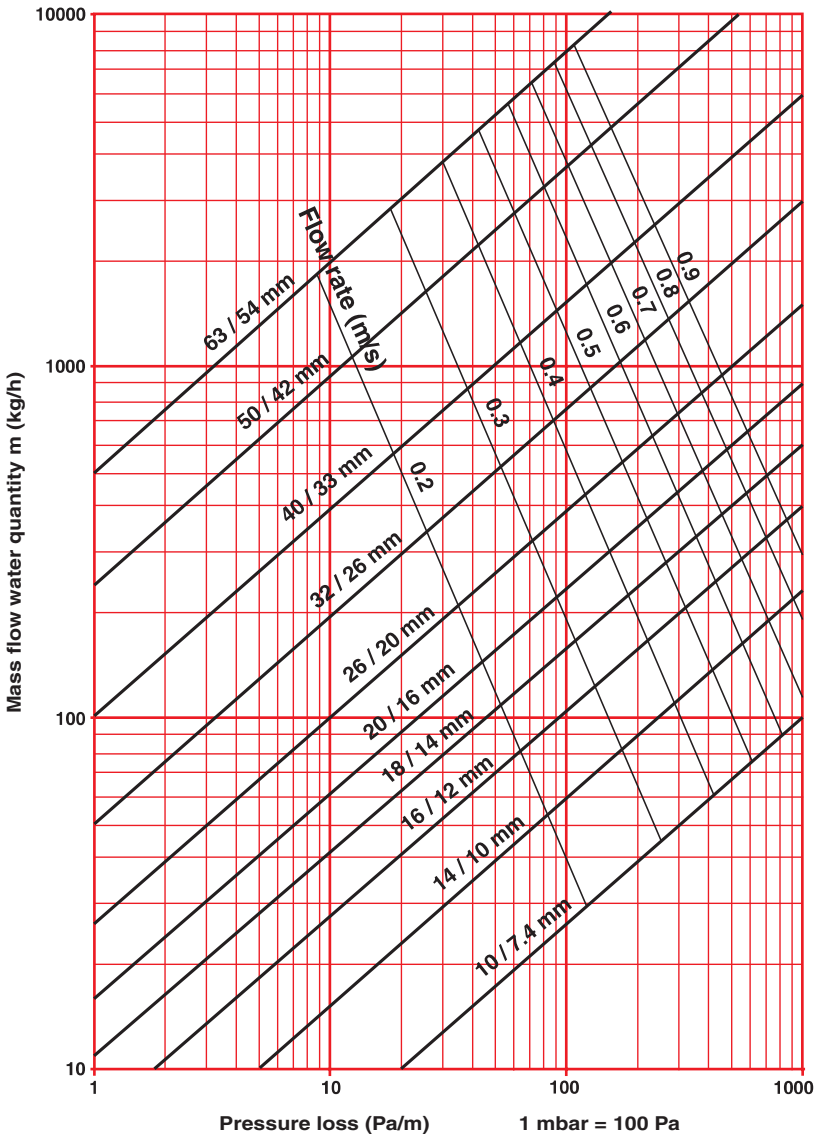
$$\Delta p_g = R \times I + Z + \Delta p_v$$

Δp_g	**Total pressure drop of the heating circuit**
R	**Pressure drop per 1 metre pipe (Pa/m)**
I	**Pipe length in m**
Z	**Total of single resistances**
Δp_v	**Pressure loss of the thermostatic valves**

For the heating installation all connections are permanent and the flow can be in one direction. Based on this assumption the following table was created.
This table is a helpful tool for the system calculations.

Using the values of the column (flow-return flow) the calculation for two pipe and one-pipe systems is possible. (It is assumed that flow and return are identical)
The same formulas used in sanitary installation can be applied. Added to the result are the pipe fraction losses and losses from other components (e.g. thermostatic valves, radiators, etc.) This data is provided by the component manufacturers.

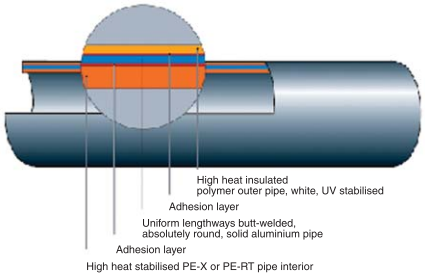
Pressure drop in the HERZ pipe



Resistances of the connections								
Pipe dim.	Pipe bend	Angles	T-piece flow redirection, one-way	T-piece flow mixing	T-piece flow redirection, two-way	T-piece flow collection	Flow piece	Wall angles
	Values in equivalent pipe length in m							
14	0.70	1.50	1.30	1.60	1.70	1.70	1.00	1.40
16	0.60	1.40	1.20	1.50	1.60	1.60	0.90	1.30
18	0.55	1.20	0.90	1.40	1.50	1.50	0.70	1.20
20	0.50	1.10	0.60	1.30	1.40	1.40	0.50	1.10
26	0.40	1.00	0.50	1.20	1.30	1.30	0.40	
32	0.30	0.80	0.30	1.00	1.10	1.10	0.30	
40	0.26	0.76	0.28	0.95	1.00	1.00	0.26	
50	0.22	0.72	0.26	0.90	0.95	0.95	0.22	
63	0.18	0.70	0.24	0.85	0.90	0.90	0.18	

HERZ plastic and aluminium composite pipe, PE-RT

Polyethylene is a versatile plastic and can be recycled after being separated from the aluminum, for example, as an oil substitute in combustion plants. Plastic and aluminium composite pipes consist of five layers with a middle layer made of aluminium. This aluminum layer gives the pipe rigidity, 100 % watertightness and an oxygen barrier.



The inner tube is made of a special PE-RT (Polyethylene – Resistant Temperature) with increased temperature resistance according to DIN 16833. PE-RT is an ethylene-octane-copolymer. Its molecular structure with linear ethylene main cells and octane side cells results in a high viscosity and flexibility with long-term stability.

The pipes are supplied in straight lengths or coils and are connected using HERZ press fittings or HERZ screw connections. HERZ pipe and HERZ connection fittings are tested for conformity to standards and accredited by externally recognised testing centres in many European countries. The system is registered as **HERZ PipeFix.** HERZ pipes have good electrical conductivity due to the **"continuous"** aluminium layer. **"Lateral"** to the pipe shaft, the polyethylene layer works as an electrical insulator up to a voltage of around 35,000 V. It is not possible to earth the piping.

Advantages:

- **100 % oxygen and steam impermeable**
- **Laser butt-welded aluminium tube 0.20 mm/0.25 mm**
- **Extensive guarantee**

Application

The HERZ- pipe is an ideal plastic multi-layer pipe for both underfloor heating and radiator connections having a maximum operating temperature of 95 °C (short-time resistance up to 110 °C) and a maximum operating pressure of 12 bar.

Technical data:

- **Outside diameter: 10 – 63 mm**
- **Pipe tolerances for the thickness of the tube wall:**
  Pipe outside diameter + 0.2 mm
  Pipe inner diameter + 0.2 mm
- **Standard pipe length: 200 mm, other lengths upon request**
- **Pipe colour: white, other colours upon request**

Maximum operating temperature 95 °C
Maximum operating pressure 10 bar
Durability at 70 °C / 10 bar minimum 440,000 (50 years)
Breakdown temperature / pressure 110 °C, 15 bar
Internal surface roughness 0.007 mm
Heat conductivity 0.5 W/m x °K
Linear expansion coefficient, 0.024 mm/m °K
Colour – white
Oxygen diffusion < 0.005mg/l d
Minimum bending radius without tools 5 d
Minimum bending radius with tools 3 d

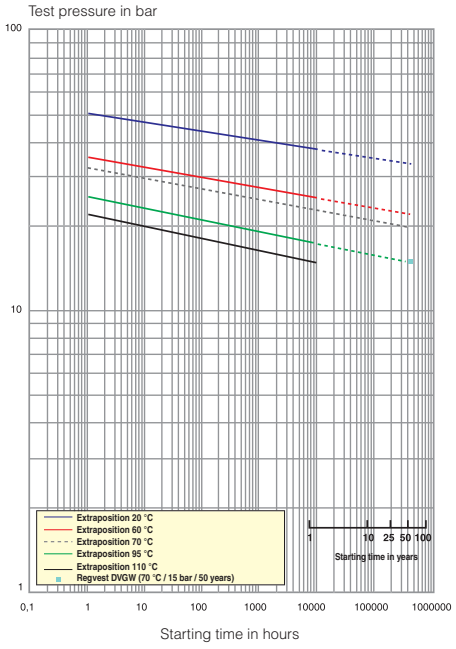
Creep behaviour of HERZ pipe

The creep behaviour indicates what maximum pipe wall stress (pipe internal pressure) is permissible under constant operating temperatures, in order to achieve a certain operating time. The hoop stress resistance, particularly due to the creep strength of the relatively thick aluminium layer, is proven in HERZ pipes.

The creep behaviour of HERZ pipes is far above the temperatures relevant to the housing market for heating and domestic water installations. The HERZ pipe consists of various layers of materials, the individual contributions of which add to the creep strength of the whole pipe. An appropriate creep diagram can therefore be drawn for each individual pipe size.

The creep behaviour is indicated by testing the pipe over 10,000 hours, with a temperature 40 °C higher than the maximum operating temperature. Afterwards, these results are extrapolated to 50 years with a safety factor of 1.5. In accordance with the standards, the pipes are dimensioned for 50-year durability. A decrease in the durability must be calculated where higher temperatures or pressures are used.

Creep behaviour of the pipe interior
Aluminium composite pipe, PE-RT, 26 x 3 mm



Example: DN 16 mm pipe
Diagrams are available on request for other dimensions or tools

Pipe connections

All current connection techniques including press fitting or compression fittings, can be used for pipe connections or for connections between valves and manifolds.

Welding or adhesive applications are generally not used with underfloor heating systems.
Compression fittings are reusable and press fittings are permanent.

Reusable connections are only allowed in accessible locations. Non-reusable connections can also be used under plaster.

Press fitting connections are made using the appropriate press-fitting tool with the correct pressing profile supplied by the fittings manufacturer. The connections can be carried out with hand or electrical tools depending on the fitting dimension. The pipe manufacturer and the fittings manufacturer will provide the temperature limits for working on site.

The electrical press fitting tool manufactures guidelines need to be followed carefully to guarantee the essential pressing strength when working under low site temperatures.

HERZ installation aids and HERZ fittings

HERZ press fittings can be connected quickly and with absolute safety in conjunction with Herz multilayer pipes. Herz, with its decades of experience in pipe connections, produces radial press fittings of dezincification-resistant brass with stainless steel bushes, of recognised higher quality, based on its own in-house patented developments. These are available in a large range of forms and sizes for the connection of plastic composite pipes for heating and cooling systems. Our experience is your security, with a 10-year guarantee for **HERZ PipeFix** systems.

The sealing is provided by two O-rings and electrical insulation of the aluminium core from the tube prevents any corrosion caused by creeping current.
These fittings are connected by a “TH” profile with the radial press fitting method. It is necessary to calibrate and to chamfer the pipe before connecting it to the fitting. This ensures that there is no damage to the sealing rings or the sealing rings are dislodged.
There is an inspection hole in the side of the fitting so that the placement depth of the pipe can be checked.

HERZ Pipe-fix press fitting system

The HERZ plastic and metal multi-layer pipe can be connected with the fast and reliable PRESS system. In addition other current connection methods can also be used.

Non-detachable connections such as press fittings can also be installed under the plaster. To avoid corrosion, the fittings are galvanically separated from the concrete or masonry using moisture insulation. This insulation can be carried out using heat-shrinking materials or corrosion protection bands, for example. In each case, the insulation material must be compatible with the pipe material and fitting.

Advantages of the PRESS Fitting-System

- **Radial pressing**
- **All water carrying parts are made of de-zincification resistant brass**
- **Press sleeve made of stainless steel V2A**
- **Patented press bolt die and nozzle shape with O-ring position**

Compression connections

Compression connections are manufactured using HERZ plastic pipe connections.

The HERZ adapter and screw connections are also used for pipe connections. The plastic pipe connection represents a completely safe connection between the pipe and valve. This connection can be detached at any time as required.
Compression connections must not be used for buried systems. Perfect liquid tightness is only achieved if the installation is carried out in accordance with the HERZ installation instructions.
It is imperative that the stated pipe diameter and pipe wall thickness are adhered to when installing compression connections.

Compression pipe connections must not be used for buried systems.

Installation of HERZ plastic screw connections

The pipe is cut perpendicular to the pipe axis and calibrated.

The plastic screw connections are installed and tightened by hand. The grommets are fitted with an insulation plate for electrical insulation from the aluminium.

For easier tightening, connection pieces (spigot piece and clamp nut) can be lubricated. Silicone or Teflon-based lubricants are permitted. Lubricants containing mineral oil or hydrocarbon must not be used as they can damage sealing elements.

For detachable pipe connections, it can also be combined with HERZ screw fittings made of nickel-plated brass.

HERZ quality

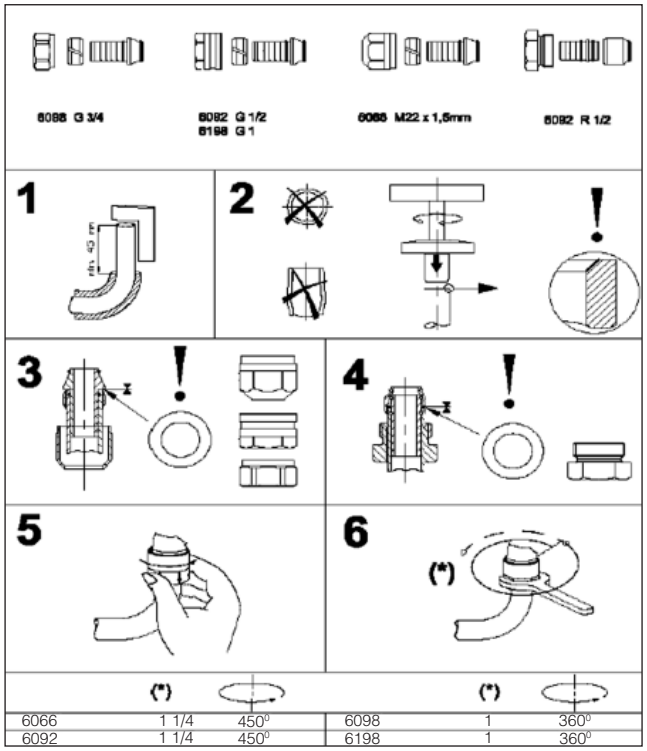
We put high emphasis on the level of our quality guarantee and have ongoing in house and independent quality control in place.

Our in in-house quality controls are:

- **Raw material incoming check**
  - **Melting index**
  - **Drying loss index**
- **Automated checks on the production line**
  - **Surface check of the tube**
  - **Control of the welding seam**
- **Dimension check**
  - **Outside diameter**
  - **Inner diameter**
  - **Wall thickness**
- **Check for the cross-linked grade of the inner tube according to DIN 16892**
  - **Control of the inner diameter**
  - **Control of the composition adhesiveness**
  - **Time sensitive inner pressure tests (information on the life time span)**

Beside our in house control of the HERZ-pipe production a regular quality control is carried out by the SKZ (Süddeutsches Plastic-Centre Würzburg)

See also the HERZ Pipe brochure and HERZ catalogues



6066	1 1/4	450	6098	1	360
6092	1 1/4	450	6198	1	360

HERZ System components for dry installation

A new system for dry installation

The installation panels for underfloor heating fix and hold the underfloor heating pipes and provide the insulation layer. They work as a heat diffusion layer or emission panels for dry installation systems and for flowing and standard screed systems.

Technical data:

Polystyrene panel made of hard foam for increased load capacity according to DIN 181164

Density: 40 kg/m³
Panel Dimensions
1000 mm x 500 mm x 30 mm
Heat conductivity:
0.035 W/m²K according to ÖNORM B6010. DIN 52612 WLG 035
Fire Rating:
B1 according to ÖNORM B3800-T1 and DIN 4102
Compressive stress: 0.20 N/mm²
Traffic load: 30 kN/m²
Pipe Spacing: 125 mm to 250 mm
Pipe diameter: 16 mm or 17 mm

Easy installation with a new patented clip-fix system without any additional pipe fixing items. The heating pipes are pressed into the panel and are immediately fixed providing an even and instantly accessible floor surface. The 70 µm thick reinforced aluminium foil with grid creates balanced and effective heat distribution. Also unique is the aluminium coated guide plate.

Even and effective area heat distribution is generated by means of 70 µm thick reinforced pure aluminium foil with grid. A Fully aluminium coated guide plate is used for fixing distances of 125 mm or 250 mm

No additional pipe fixing material is necessary with the patented clip-fix system.

Multi clip plate, density 40 kg/m³
1000 x 500 x 30 mm Article no: 3 **F020** 01

Multi clip plate, density 30 kg/m³
1000 x 500 x 50 mm Article no: 3 **F020** 02

Guide plate: 500 x 250 x 30 mm
Article no: 3 **F020** 03

Guide plate: 500 x 250 x 50 mm
Article no: 3 **F020** 04

Filling plate: 1000 x 500 x 30 mm
Article no: 3 **F020** 05

Filling plate: 1000 x 500 x 50 mm
Article no: 3 **F020** 06

Additional material required

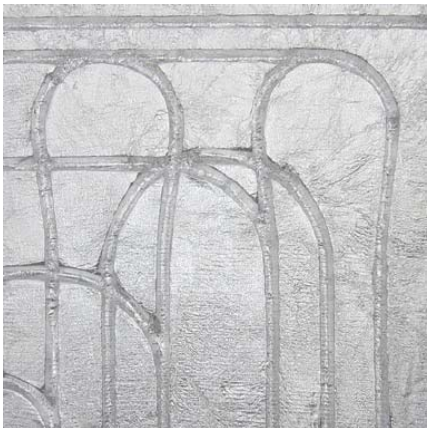
- **Edge insulation band**
- **Additional insulation sheet**
- **Impact sound attenuation layer**
- **Hot cutting device**
- **PE foil in wet systems**

Any amendments to the panels are possible with a knife or hot cutting device.

The multi-clamp system plates are also most suitable for wall heating. To protect against aggressive floor-fill or wall plaster, the system has to be covered using PE foil.

When using floor heating, a load distribution layer, e.g. with 2 x 10 mm Fermacell plates or wood fibre plates, is required, which can be laid over the multi-clamping plates.

For floor heating with wooden floor covering, the maximum pipe interval of 200 mm must be adhered to.



Baffle plate

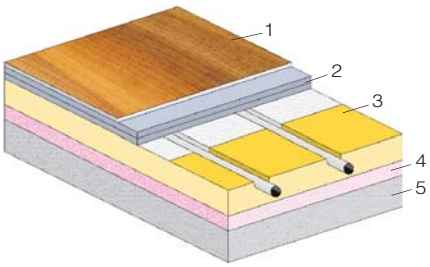
Laying of multi-clamp plates and overlapping of the sticking foil

Pressing down of the heating pipes

Multi-clamp plate

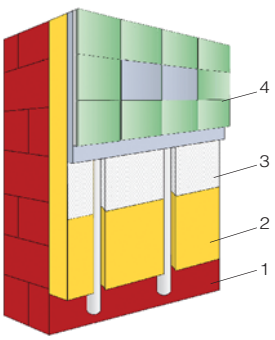
Filling plate

Floor layout with multi-clamp



1 ... Floor covering
2 ... Load distribution layer, 2 x 10 mm
3 ... Multi-clamp plates
4 ... Additional insulation
5 ... Raw covering

Wall layout with multi-clamp



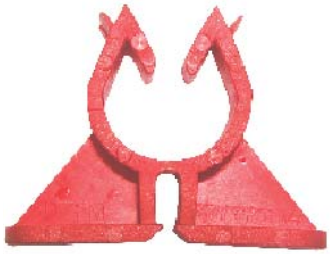
1 ... Raw wall
2 ... Additional insulation
3 ... Multi-clamp plates
4 ... Plaster, minimum 20 mm or dry laying plates

Floor construction for steel reinforcing mesh system (from top to bottom)

- **Flooring**
- **Screed**
- **Heating pipes fixed with clips onto steel grid mat**
- **Steel grid mat**
- **PE foil**
- **Thermal insulation and impact sound attenuation layer**
- **Solid concrete base floor**

HERZ system components for steel reinforcing mesh system

The heating pipe is fixed with clips onto the steel reinforcing mesh. Special clips also establish the distance between the steel reinforcing mesh.



Special Clip 1620 red, for steel reinforcing mesh, bearing mat thickness 0.4 or 5 mm

Article no: 3 **F110** 05

Supplementary required accessories:

- **Additional insulation**
- **Cover foil**
- **Screed measurement point**
- **Screed additives**
- **Edge insulation band**
- **Expansion joint set**

Material requirement for 1 m² floor heating with laying interval of 50 mm:

19 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
60 units Clips	3 **F110** 05
1 m² mesh mat	on-site
1 m² PE foil	3 **F100** xx
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 01
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1m² floor heating with laying interval of 100 mm:

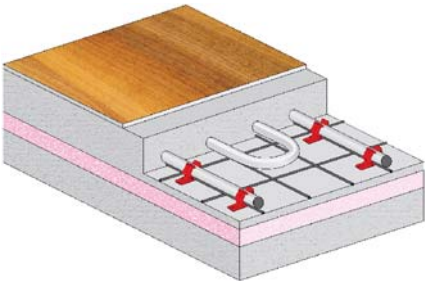
10 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
30 units Clips	3 **F110** 05
1 m² mesh mat	on-site
1 m² PE foil	3 **F100** xx
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 01
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1m² floor heating with laying interval of 150 mm:

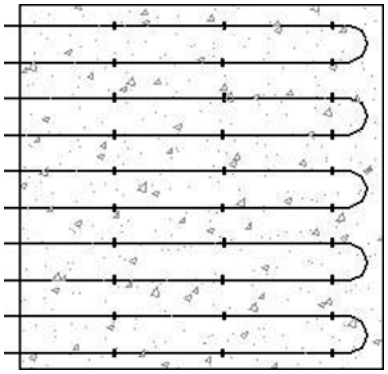
6.5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
21 units Clips	3 **F110** 05
1 m² mesh mat	on-site
1 m² PE foil	3 **F100** xx
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 01
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1m² floor heating with laying interval of 200 mm:

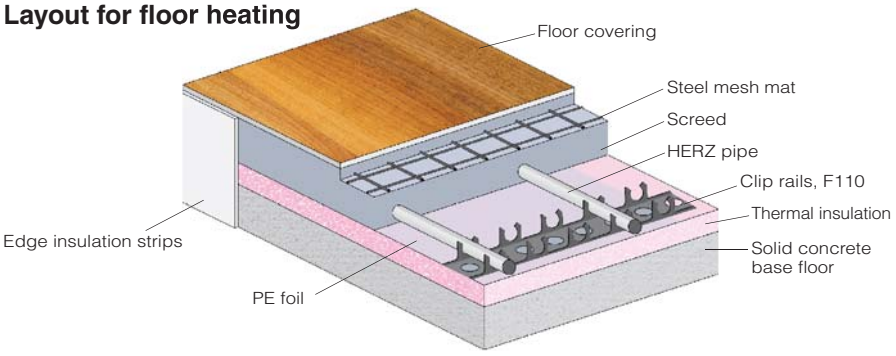
5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
15 units Clips	3 **F110** 05
1 m² mesh mat	on-site
1 m² PE foil	3 **F100** xx
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 01
0.2 litres of screed additive	3 **F080** 02



Recommended clip interval, 300-500 mm
Bending radius 5 x D



Layout for floor heating

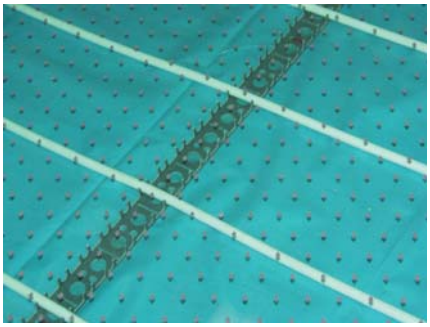


Floor construction for clip rail system (from top to bottom)

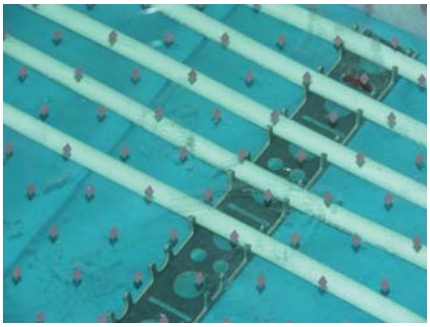
- **Flooring**
- **Screed**
- **Heating pipes fixed with clamp-pins onto clip rail**
- **Fixing-pins**
- **PE foil**
- **Thermal insulation and impact sound attenuation layer**
- **Solid concrete base floor**

HERZ system components for clip rail structure

The clip rails are mounted onto the impact sound attenuation layer or onto the thermal insulation with a joint of 500 up to1000 mm. The heating pipes are then fixed at the required spacing into the clip rails.



Heating pipe interval



Heating pipe interval at edge areas

Plastic support bars

Self-adhesive, installation distance 500 to 1000 mm
Pipe diameter: 16 or 20 mm
Preset breaking point every 100 mm
Length 0.1 m Article No: 3 **F110** 01
Length 0.9 m Article No: 3 **F110** 02

Material requirement for 1 m² floor heating with laying interval of 50 mm:

19 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 01
1 run metre adhesive tape	3 **F090** 02
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1 m² floor heating with laying interval of 100 mm:

10 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
1 m² heat insulation	3 **F070** xx
1m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 01
1 run metres adhesive tape	3 **F090** 02
1 run metres adhesive tape	3 **F080** 02

Material requirement for 1 m² floor heating with laying interval of 150 mm:

6.5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 01
1 run metre adhesive tape	3 **F090** 02
0.7 running metres Edge insulation strips	3 **F080** 02

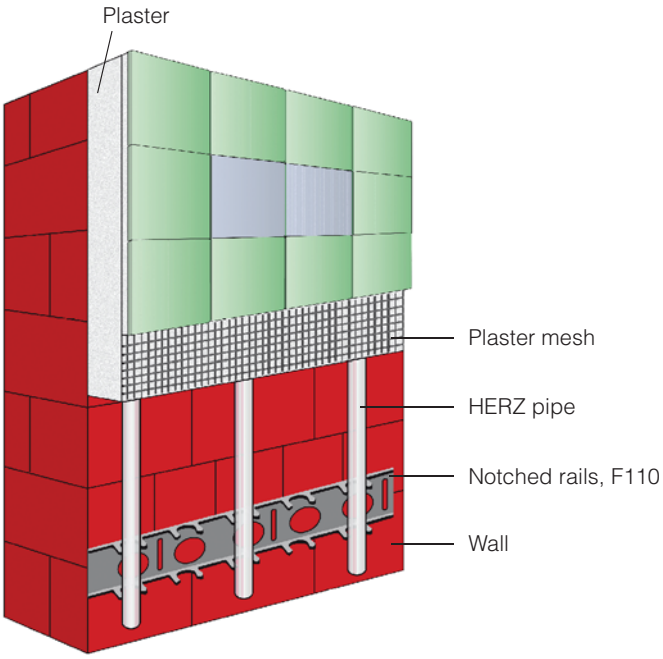
Material requirement for 1 m² floor heating with laying interval of 200 mm:

5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 01
1 run metre adhesive tape	3 **F090** 02
0.7 running metres Edge insulation strips	3 **F080** 02

Wall layout system with Clip rails
(to interior):

- **Concrete or brick wall**
- **Clip rails with fixed dowels**
- **Heating pipes fixed with clip rails**
- **Rough plaster**
- **Refined plaster with plaster mesh**
- **Painting or wallpaper**

Layout for wall heating



HERZ system components for clip rails variants

The clip rails are installed on the wall at intervals of 50-100 cm. The heating pipes are installed on these clip rails at the appropriate interval.

Material requirement for 1 m² wall heating with laying interval of 50 mm:

19 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres clip rails	3 **F110** 0x
4 units Screws and dowels	on-site
1 m² plaster mesh	on-site

Material requirement for 1 m² wall heating with laying interval of 100 mm:

10 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
4 units Screws and dowels	on-site
1 m² plaster mesh	on-site

Materialbedarf für 1 m² Wandheizung mit VA 150 mm:

6.5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
4 units Screws and dowels	on-site
1 m² plaster mesh	on-site

Material requirement for 1 m² wall heating with laying interval of 200 mm:

5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
2 running metres Clip rails	3 **F110** 0x
4 units Screws and dowels	on-site
1 m² plaster mesh	on-site

For additional fixing of the pipes or fixing of the holding rails, the holding needles used may be red or green.

Fixing-pins, red

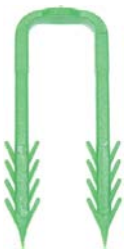
For direct installation onto the insulation layer with a thickness of over 30 mm. Due to the special material used, these fixing-pins have outstanding fixing strength, which can be increased by inserting the pin at an oblique angle.

HERZ Article No: 3 **F110** 03

Fixing-pins, green

For direct installation onto the insulation layer with a thickness of over 40mm. Due to the special material used, these fixing-pins have outstanding fixing strength, which can be increased by inserting the pin at an oblique angle.

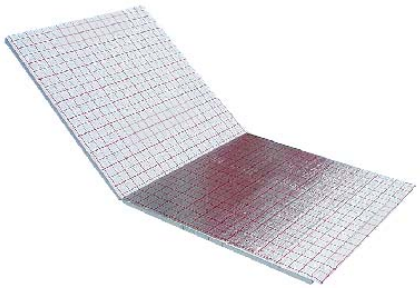
HERZ Article No: 3 **F110** 04



HERZ system components for rolled tacker or folding tacker insulation

Ready to install thermal insulation and impact sound attenuation panel made of foamed polystyrene EPS according to DIN EN 13163 and DIN 4108 with tear resistant and water- tight laminated foil and printed grid pattern.

System roll



Folding plate

If necessary an additional insulation layer can be put underneath the rolled tacker or folding tacker insulation. The heating pipes are fixed with fixing-pins at the required spacing.
The grid printed on to the laminated foil is very helpful with the positioning the pipework. The PE foil between the panels is fused to eliminate any water entry when the screed is laid.

Rolled Tacker

Installation ready thermal insulation and impact sound attenuation rolled tacker insulation made of quality controlled foamed polystyrene EPS-TK according to DIN 18164 part 2. With tear resistant and water- tight laminated foil and printed grid pattern.

Folding panels

Made of EPS-TK according to DIN 18164 part 2. With tear resistant and water- tight laminated foil and printed grid pattern.

Ultra thin, installation ready thermal insulation material made out of quality controlled foamed polystyrene EPS 040 DEO dm according to DIN EN 131163. To be used underneath screed according to DIN 18560. Laminated with a tear resistant and watertight textile fabric composition foil with printed positioning grid in black. Overlapping sides to create a better seal from the screed especially for flowing screed.

Especially suitable for low height floor constructions. The system design needs to be checked according to BS EN 1264.

Build height	**15 mm**
Grid Spacing	**50 mm, and multiples**
Heat conductivity	**R = 0.37 m²K/W**
Maximum load	**100 kPa/m³**
Building material category	**B 2 according to DIN 4102**

The particular advantage of this system is its very low weight and storage volume.

If necessary a complimentary insulation layer can be put underneath the rolled tacker insulation or folding tacker insulation. The heating pipes are fixed with tacker-pins at appropriate spacing's onto the insulation. The printed grid pattern is very helpful with pipe spacing during installation. The PE foil between the panels is fused to eliminate any water entry when the screed is laid.

Roller mat

Type 15/2 1000 x 10000 mm
Article No 3 **F040** 01

Type 22/20 1000 x 10000 mm
Article No 3 **F040** 02

Type 32/30 1000 x 10000 mm
Article No 3 **F040** 03

Folding panel

Type 15/2 1000 x 2000 mm
Article No 3 **F040** 04

Type 22/20 1000 x 2000 mm
Article No 3 **F040** 05

Type 32/30 1000 x 2000 mm
Article No 3 **F040** 06

Tacker-pins

The tacker-pins fix the heating pipes onto the insulation. Packed with adhesive tape in 30 piece units.

HERZ Article No 3 **F110** 06

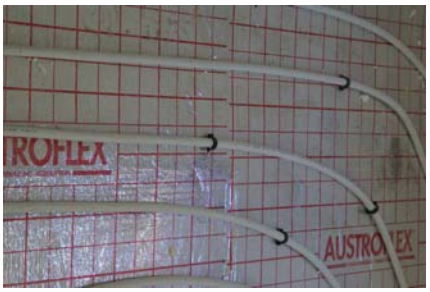
Tacker-pins special

Extra long pin shape, made of high quality polyamide, especially suitable for non-laminated surfaces, packed in 30 pieces

HERZ Article No 3 **F110** 07

Supplementary required accessories:

- **Additional insulation**
- **Cover foil**
- **Screed measurement point**
- **Screed additives**
- **Edge insulation band**
- **Expansion joint set**



Material requirement for 1 m² floor heating with laying interval of 50 mm:

19 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
70 units Tacker needles	3 **F110** 0x
1 m² roll mat or folding panel	3 **F040** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1 m² floor heating with laying interval of 100 mm:

10 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
35 units Tacker needles	3 **F110** 0x
1 m² roll mat or folding panel	3 **F040** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

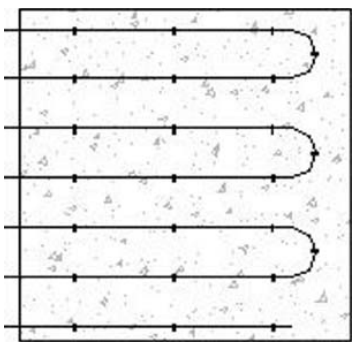
Material requirement for 1 m² floor heating with laying interval of 150 mm:

6.5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
24 units Tacker needles	3 **F110** 0x
1 m² roll mat or folding pane	3 **F040** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1 m² floor heating with laying interval of 200 mm:

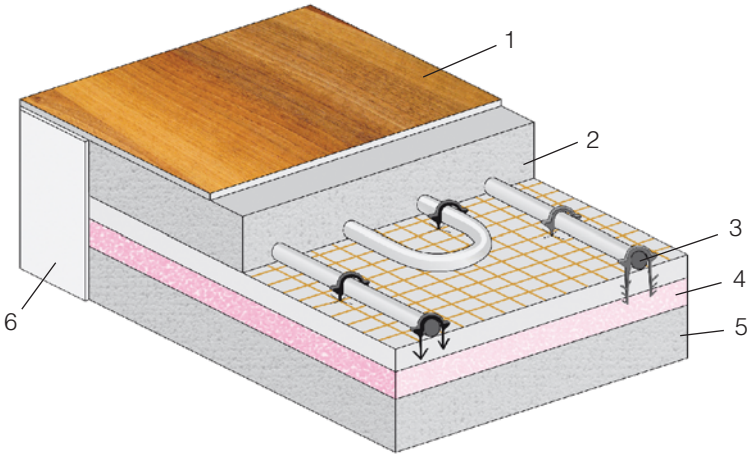
5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
18 units Tacker needles	3 **F110** 0x
1 m² roll mat or folding panel	3 **F040** 0x
1 m² heat insulation	3 **F070** xx
1 m² PE foil	3 **F100** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

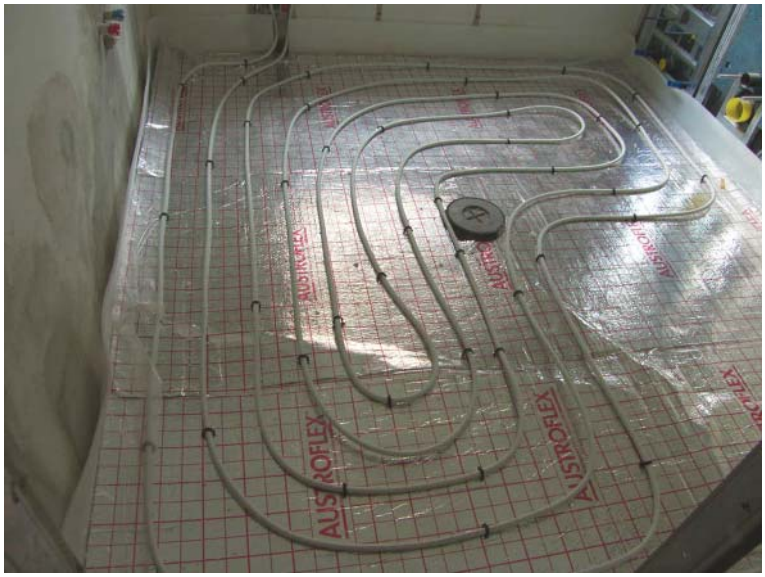
Fixing interval, 30-50 cm
Bending radius 5 x D

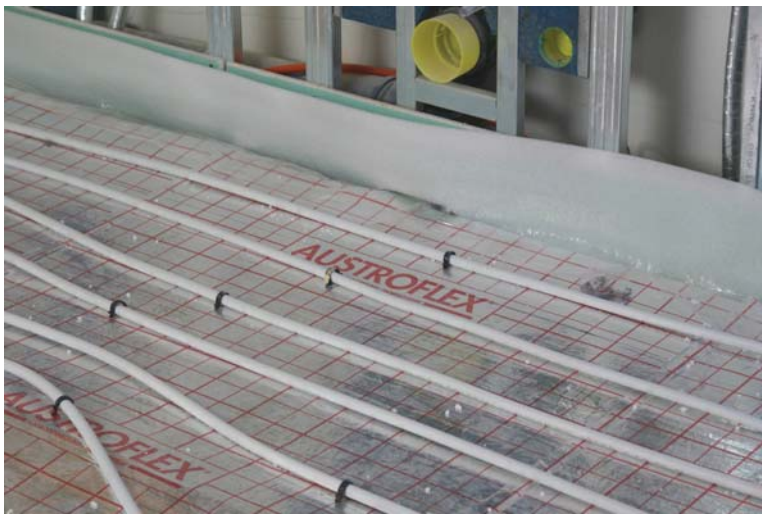


Floor construction for nap panel system (from top to bottom)

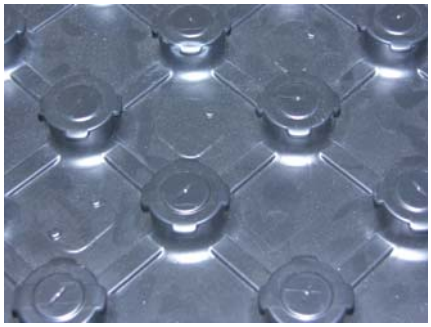
- **Floor covering (1)**
- **Screed (2)**
- **Heating pipe stapled to tacker board in rolls or folding panel with PE foil (3)**
- **Heat/sound Insulation (4)**
- **Solid concrete base floor (5)**
- **Randdämmstreifen (6)**







HERZ system components for nap panel structure



The heating pipes are pressed into the nap panels according to the required pipe spacing.
The nap panel also acts as reinforcement for the screed. Additional insulation and impact sound attenuation can be laid below the nap panels. Nap panels are joined together by over lapping and pressing together. The overlapping foil peripherals create an entire floor covering and watertight screed trough.

Bifilare Verlegung mit Noppenplatten

Nap panel NP 30-2

Thermal insulation and impact sound attenuation element made of hard and soft foamed polystyrene EPS according to DIN 18164 part 2. The covering and overlapping polystyrene foil acts as a sealant against screed and flowing screed according to DIN 18560. The positioning of the naps allow spacing's of 50 mm, 100 and 150 mm and multiples as well as flexible pipe directions.

Total build height:	52 mm
Floor thickness:	30 mm
Thermal conductivity resistance:	Rλ = 0.75
Dimensions:	1400 x 800 mm
Pipe diameter:	14-17 mm

HERZ Article No 3 **F030** 01

Nap panel NP 11

Polystyrene hard foam element (EPS) according to DIN 18164 part1 for low floor build heights. The covering and overlapping polystyrene foil acts as a sealant against screed and flowing screed according to DIN 18560. The positioning of the naps allow spacing's of 80mm, 160 and 240 mm and their multiply as well as flexible pipe directions. Pipework can be positioned diagonally.

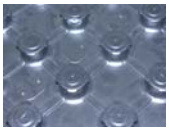
Total build height:	30 mm
Floor thickness:	11 mm
Thermal conductivity resistance:	Rλ = 0.31
Dimensions:	1400 x 850 mm
Pipe diameter:	14-17 mm

HERZ Article No 3 **F030** 02

Nap panel NP

Cupped polystyrene component without insulation layer especially suitable for building renovations. Installed directly onto the base floor or on top of a pre-laid thermal insulation and impact sound attenuation layer.

HERZ Article No 3 **F030** 03



Supplementary required material (see accessories):

- **Additional insulation**
- **Cover foil**
- **Screed measurement point**
- **Screed additives**
- **Edge insulation band**
- **Expansion joint set**

Material requirement for 1 m² floor heating with laying interval of 50 mm:

19 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
1 m² nap panel	3 **F030** 0x
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1 m² floor heating with laying interval of 100 mm:

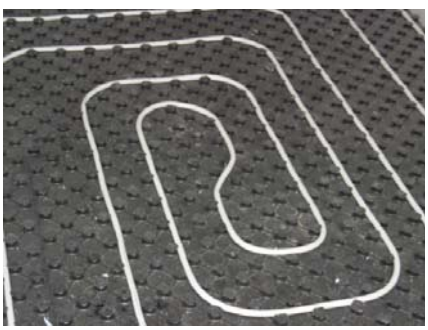
10 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
1 m² nap panel	3 **F030** 0x
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

Material requirement for 1 m² floor heating with laying interval of 150 mm:

6.5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
1 m² nap panel	3 **F030** 0x
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02

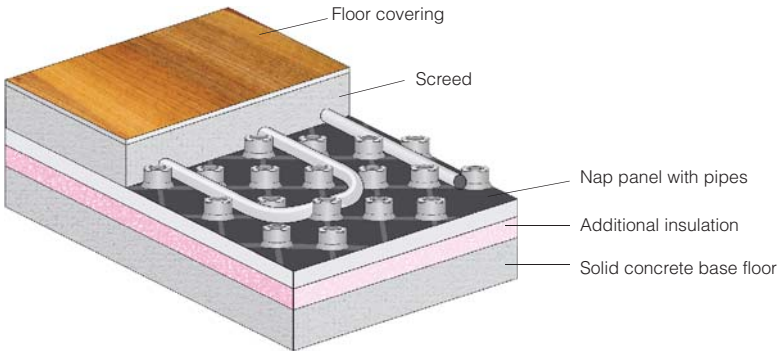
Material requirement for 1 m² floor heating with laying interval of 200 mm:

5 running metres HERZ floor heating pipe, 16 x 2	3 **D160** 20
1 m² nap panel	3 **F030** 0x
1 m² heat insulation	3 **F070** xx
0.2 litres of screed additive	3 **F090** 91
0.7 running metres Edge insulation strips	3 **F080** 02



Floor layout system
(from top to bottom):

- **Floor covering**
- **Screed**
- **Heating pipes laid in the nap panel system**
- **Thermal insulation and impact sound attenuation layer**
- **Solid concrete base floor**



Heating for floors with nap plate system components

Heating for floor with nap plate system components

Comforting warmth with plate system for heating

Spiral control with pimples plate

Distributed pipe and plate system for heating in the hallway

Comfort in residential areas

HERZ accessories for dry and wet laying systems

Screed measurement point

The screed measurement point marks measurement positions in the screed according to BS EN 1264

HERZ Article No: 3 **F090** 00

Screed additives

The screed additive homogenises the screed and increases its thermal conductivity, the compression strength and bending strength characteristic. The consumption is approximately 0.2 l/m^2.

HERZ Article No: 3 **F090** 01

Edge insulation band

The edge insulation is made of polyethylene with PE foil flange and tear cuts for the impact sound attenuation layer. The edge insulation band is available with a self-adhesive back and foil flange or without adhesive backing.

Type: 8/160 with adhesive back
Article No: 3 **F080** 02

Type: 8/160 without adhesive back
Article No: 3 **F080** 03

Edge insulation strip to surrounding walls and pillars

Expansion joint set

The Expansion joint set ensures the safe partition of the screed areas according to DIN 18560. The 8mm wide polyethylene insulation band is clamped into the polystyrene double “T” profile bar. This 2 m long and self-adhesive profile allows the fixing of the heating pipes in distances of 50 mm and it’s multiples.
The set consists of 20 m Expansion joint profile bar, 20 m Expansion insulation band 8/100 and 50 pieces if protection tube, each 400 mm long.

HERZ Article No: 3 **F100** 00

Tacker staple device

The tacker staple device allows easy, quick and efficient installation of the heating pipes onto the panels in one working step. Combination device for both tacker pins sizes R1PP and R1PPL and other similar plastic coated pins.

HERZ Article No: 3 **F110** 13

HERZ room air-conditioning system for walls, floors and ceilings

For heating and cooling rooms in buildings, observing low energy costs, healthier air circulation with silent operation and with “invisible” comfort.

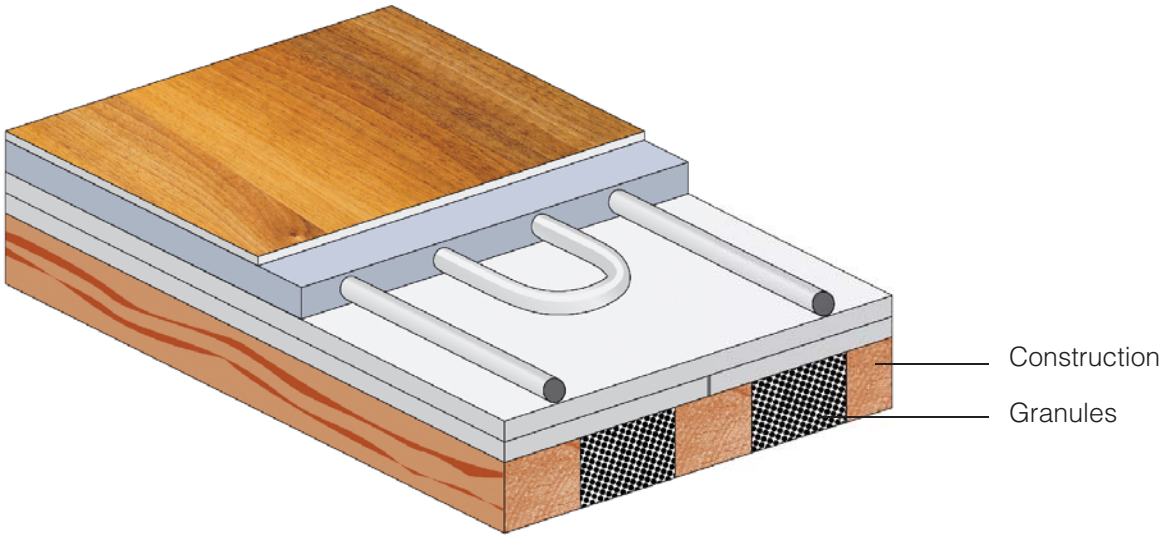
15mm Fermacell plaster with ex-factory fitted 10 x 1.3 mm Herz composite pipe with an average pipe interval of 75 mm in four different panel sizes for fast and clean installation in dry systems in walls, floors or ceilings. Performance values for cold and hot water operation tested in accordance with EN 14037 at the accredited heating, ventilation and air-conditioning testing centre in Stuttgart.

The panels are directly mounted onto the wall with the smooth surface of the panel facing the room. Various panel dimensions are available for mounting onto the wall and underneath windows. Following the application of plaster surface coat to cover all joints and fixings the walls can be wallpapered, painted or tiled. Wall heating panels are connected directly onto the manifold or return flow temperature limiter, the maximum panel area that can be connected in series is 5 m^2.

Usage in floors

The heating panels can also be used for floor heating. A dry base of 2 x 10 Fermacell plates is installed and the heating panels are then stuck and screwed to this dry base. The top covering is laid directly on the heating panels and may be plastic, carpet, tiles or wood. The floor covering must be suitable for the floor heating. The single or net load is to be adhered to in accordance with DIN 1055-3 (traffic load for ceilings).

Floor construction with 2 x 10 mm Fermacell plates as load distribution layer



Usage on ceilings

For suspended ceilings the usual commercially available systems are used. To fix these constructions on solid floors, technically approved dowels must be used, which are suitable for this application and load.

The profile of the suspension must be measured so that the static safety of the ceiling to be suspended from it is guaranteed. The intervals on the subconstruction for installing the heating plates is to be selected for the heating plate in accordance with the drilling plan.

The construction must be measured so that the approved deflection of 1/500 of the support range is not exceeded.

Where heating plates are used for ceiling heating, an insulation layer made of rock wool or polystyrene with a thickness of at least 100 mm is recommended. The weight of the insulation must be taken into account for calculating the ceiling construction.

Wall heating panels

Type WH 75 (1/1),
panel size 625 x 2000 mm,
Pipe Ø 10 x 1.3 mm, pipe interval 75 mm,
Order no. 3 **F120** 75

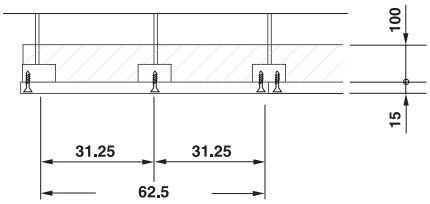
Type WH 75 (2/3),
panel size 625 x 2000 mm,
Pipe Ø 10 x 1.3 mm, pipe interval 75 mm,
Order no. 3 **F120** 76

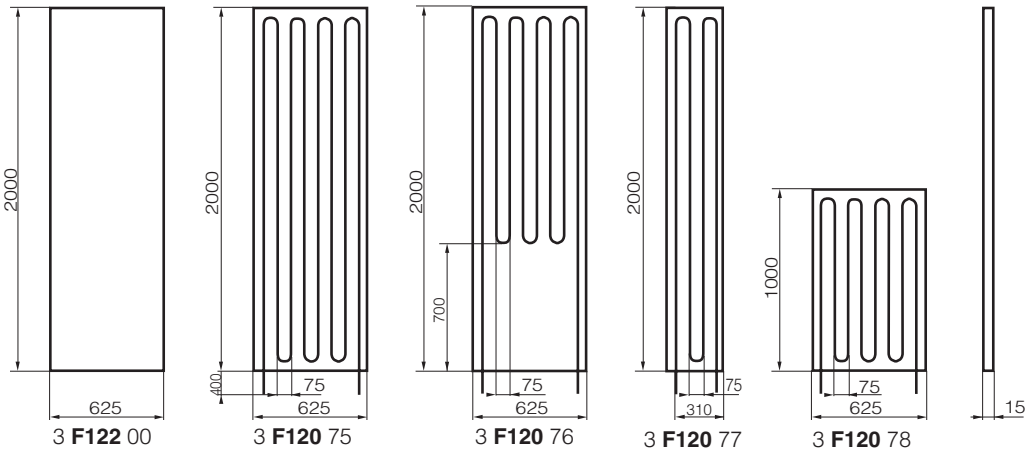
Type WH 75 (1/2 breadth),
panel size 310 x 2000 mm,
Pipe Ø 10 x 1.3 mm, pipe interval 75 mm,
Order no. 3 **F120** 77

Type WH 75 (1/2 height),
panel size 625 x 1000 mm,
Pipe Ø 10 x 1.3 mm, pipe interval 75 mm,
Order no. 3 **F120** 78

Non pre-cut filling plates

625 x 2000 mm, without pipe
Type WHP-L
Order no. 3 **F122** 00





The heating plates are stuck tightly together. The glue is applied from the cartridge. The surplus glue is scraped away after drying out (around 24 hours) with a putty knife or wooden chisel.

The glue is frost-proof but requires moisture from the air to set.

Plate customisations must, where possible, be laid with the cut edge in the direction of the expansion joint.

The screws for fixing the panels are countersunk 2 mm and puttied.

When fixing panel sections under 5 cm wide care must be taken to avoid breakages. The thin panels could be pre-drilled prior to fixing.

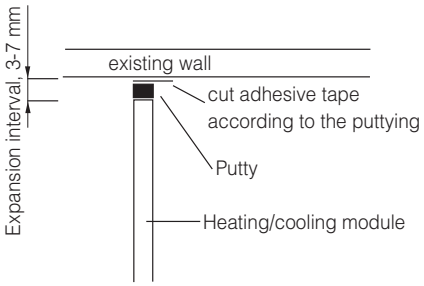
Fixing of the plaster fibre plates with quick build screws.

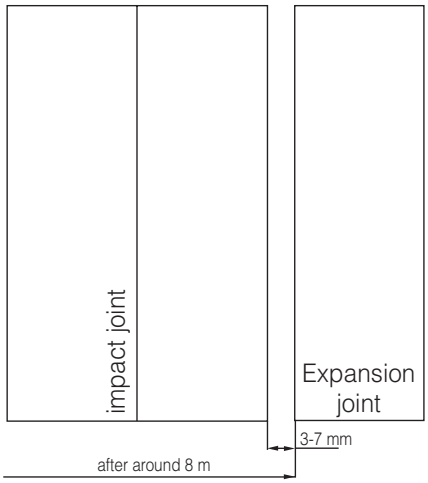
Screw length = plate strength x 2 for metal frame constructions (30 mm)

Screw length = plate strength x 3 for wooden constructions (45 mm)

Care should be taken when storing the wall heating panels and empty panels as they are in danger of breaking at the upper edge. Storage of the plaster fibre plates > + 5 °C.

It is recommended to use a joint from 3 to 7 mm wide. The joint has to be covered with tape to prevent penetration of water from the floor screed. Thus stress cracks will be avoided by using the expansion joint. To avoid the crossover joints it is also recommended to butt the plates up to each other.



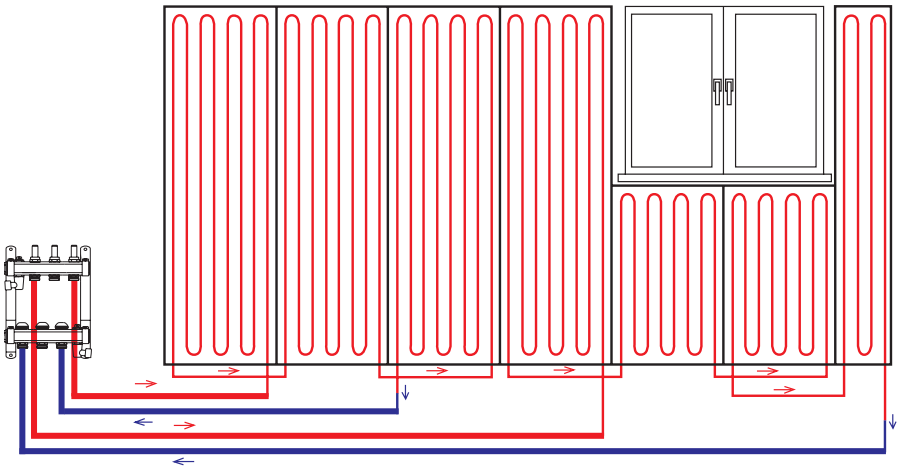


To avoid fissures the joints and bore holes are always puttied only after all work (floor-filling, etc.) that may allow moisture into the room.

Each set of heating panels (serial connection up to approx. 55 m pipe-length) must be connected either directly to a distributor outlet or to a return temperature limiter. (Tichelmann system recommended).

The capacity value of Herz panels have been tested at the performance test station according to EN 14037 at the accredited and DINCERTCO-recognised testing institute at HLK Stuttgart in accordance with EN 14037. See the following tables.

The nominal power radiation of 79 Watt/m^2 at an average over-temperature of 15 K is related to a flow-temperature of 40 °C, a return-temperature of 30 °C and a room-temperature of 20 °C. Conversions to other temperatures are calculated according to ÖNORM M 7513.



Connection of the panels to heating circuits (maximum 3 units) and connection to distributors

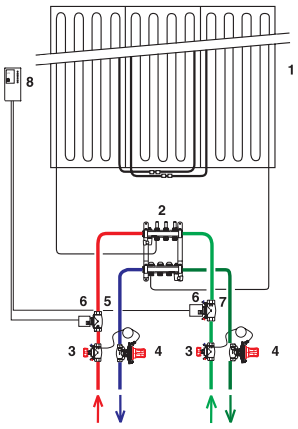
Capacity values for room heating

Herz panel		3 F120 75					3 F120 76					3 F120 77 / 3 F120 78					Herz panel	
VL (°C)	RT (°C)	RT(°C)					RT(°C)					RT(°C)					RT (°C)	VL (°C)
		25	**30**	35	40	45	25	**30**	35	40	45	25	**30**	35	40	45		
45	15	122	144	165	182		78	92	105	116		61	72	82	91			45
40		107	128	145			68	81	92			53	64	72				40
35		92	109				58	70				46	55					35
30		76					48					38						30
45	18	101	122	142	160		64	78	91	102		50	61	71	80			45
40		86	106	123			55	67	79			43	53	62				40
35		71	88				45	56				35	44					35
30		55					35					28						30
45	**20**	87	108	128	145		55	69	81	92		43	54	64	72			45
40		72	**92**	109			46	**58**	70			36	**46**	55				**40**
35		57	76				37	48				29	38					35
30		42					27					21						30
45	22	73	93	113	131		46	60	72	83		36	47	57	65			45
40		59	78	95			37	50	61			29	39	48				40
35		44	62				28	40				22	31					35
30		30					19					15						30
45	24	59	80	99	116		38	51	63	74		30	40	49	58			45
40		45	64	83			29	41				23	32	41				40
35		32	49				20	31				16	24					35
30		18					11					9						30
45	26	46	66	85	102		29	42	54	65		23	33	42	51			45
40		33	51	69			21	32	44			16	25	34				40
35		19	36				12	23				10	18					35
30		7					4					3						30
45	28	33	53	71	88		21	33	45	56		17	26	36	44			45
40		21	38	55			13	24	35			10	19	28				35
35		8	24				5	15				4	12					30

Capacity values per panel in watts, tested according to EN 14037

When used as cooling panels, we recommend control using a dew point sensor. The panels may only be operated above the dew point and must be protected from moisture.

Examples of surface heating or cooling applications, and both



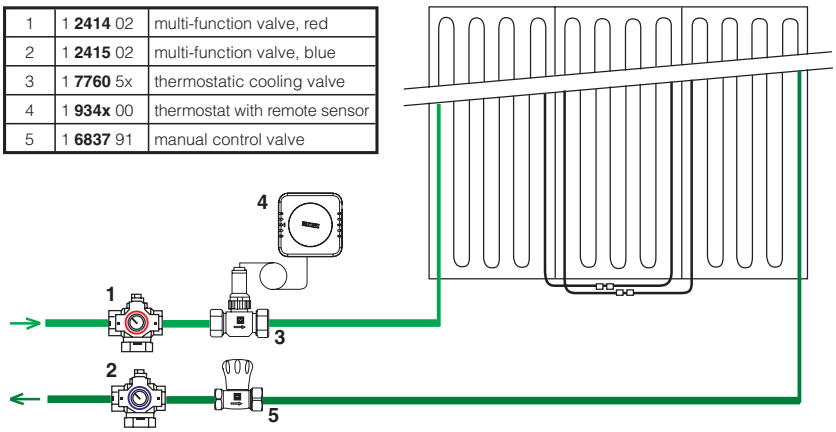
1	Wall heating panel	3 **F120** 75
2	Distributor	1 **8532** xx
3	Circuit regulating valve	1 **4217** xx
4	Differential pressure controller	1 **4007** xx
5	Zone valve	1 **7723** 00
6	Thermal actuator	1 **7710** xx
7	Control valve	1 **7217** xx
8	Room temperature controller	1 **7794** 23

Capacity values for room cooling

Herz Panel		F120 75						F120 77 - 3 F120 78					
RL	RT	VL						VL					
		16	17	18	19	20	21	16	17	18	19	20	21
19	22	24	21	18				12	11	9,2			
19	23	31	27	24				15	14	12			
19	24	37	34	31				18	17	15			
19	25	43	40	37				22	20	18			
19	**26**	50	**46**	43				25	23	22			
19	27	56	53	50				28	27	25			
19	28	63	60	56				32	30	28			
19	29	70	66	63				35	33	32			
20	22	21	18	15	13			11	9	8	6		
20	23	27	24	21	18			14	12	11	9		
20	24	34	31	27	24			17	15	14	12		
20	25	40	37	34	31			20	18	17	15		
20	**26**	46	43	40	37			23	22	20	**18**		
20	**27**	53	50	46	43			27	25	23	**22**		
20	**28**	**60**	56	53	50			30	28	27	**25**		
20	**29**	66	63	60	56			33	32	30	**28**		
21	**22**	18	15	13	10	7		9	8	6	**5**	4	
21	23	24	21	18	15	13		12	11	9	8	6	
21	24	31	27	24	21	18		15	14	12	11	9	
21	25	37	34	31	27	24		18	17	15	14	12	
21	26	43	40	37	34	31		22	20	18	17	15	
21	27	50	46	43	40	37		25	23	22	20	18	
21	28	56	53	50	46	43		28	27	25	23	22	
21	29	63	60	56	53	50		32	30	28	27	25	
22	22	15	13	10	7	5	2	8	6	5	4	2	1
22	23	21	18	15	13	10	7	11	9	8	6	5	4
22	24	27	24	21	18	15	13	14	12	11	9	8	6
22	25	34	31	27	24	21	18	17	15	14	12	11	9
22	26	40	37	34	31	27	24	20	18	17	15	14	12
22	27	46	43	40	37	34	31	23	22	20	18	17	15
22	28	53	50	46	43	40	37	27	25	23	22	20	18
22	29	60	56	53	50	46	43	30	28	27	25	23	22
23	22	13	10	7	5	2	0	6	5	4	2	1	0
23	23	18	15	13	10	7	5	9	8	6	5	4	2
23	24	24	21	18	15	13	10	12	11	9	8	6	5
23	25	31	27	24	21	18	15	15	14	12	11	9	8
23	26	37	34	31	27	24	21	18	17	15	14	12	11
23	27	43	40	37	34	31	27	22	20	18	17	15	14
23	28	50	46	43	40	37	34	25	23	22	20	18	17
23	29	56	53	50	46	43	40	28	27	25	23	22	20

Capacity values for cooling per panel in watts, tested according to EN 14037

1	1 **2414** 02	multi-function valve, red
2	1 **2415** 02	multi-function valve, blue
3	1 **7760** 5x	thermostatic cooling valve
4	1 **934x** 00	thermostat with remote sensor
5	1 **6837** 91	manual control valve



Room temperature under the target value, valve closed

Room temperature above the target value, valve opened

HERZ system components for all surface heating and cooling systems

Combinations with radiator heating

Surface heating and radiator heating systems are frequently combined. Surface heating works at lower operating temperatures than radiator heating systems and therefore needs a separately controlled circuit. This can be achieved by separating the two systems or for smaller surface heating systems incorporating its own control circuits and then connecting it to the radiator heating system. The control of the surface heating circuits can be achieved electrically or mechanically.

Regulating one heating circuit with connection to the radiator heating

The HERZ 3-way valve mechanically controls the maximum permissible flow temperature. A thermostat with contact sensor is attached to the valve. The bypass opens as soon as the set operating temperature is reached and remains so until the heating circuit temperature drops. The water flow rate for each heating circuit is controlled with the circuit regulating valves. A thermostatic valve with actuating drive regulates the room temperature in conjunction with a room thermostat. The valve closes when the desired temperature is reached. In addition the pump is equipped with a safety switch. This switch reacts when the system temperature is above safe levels and protects the surface heating system and building from damage.

The amount of heat for the heating circuit is controlled via the circuit regulating valve.

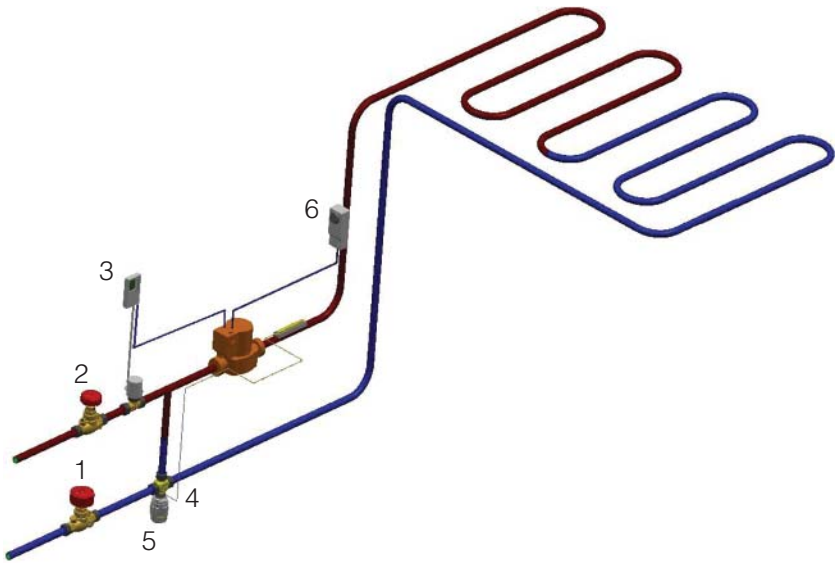
The room temperature is controlled via a thermostatic valve with actuating drive by means of the room temperature controller. The valve is closed after the desired room temperature is reached.

HERZ room temperature controller, e.g. thermostat with remote sensor and remote adjustment, controls the cold water inflow to the cooling surfaces or cooling devices via self-activating valve operation when the room temperature is increasing. The valve is installed in the usual way in the cold circulation advance flow. Care should be taken with regard to the installation location based on the flow direction.

In addition the pump is equipped with a safety switch. This switch reacts when the system temperature is above safe levels and protects the surface heating system and building from damage.

The individual components required are:

1. **Thermostatic valve, 1 7723 91**
2. **Actuating drive for thermostatic valve, 1 7710 00**
3. **Room temperature controller, 1 7791 23**
4. **3 way valve, HERZ Calis 1 7761 38**
5. **Thermostatic head with contact sensor, 1 7420 06**
6. **Electric pipe contact controller, 1 8100 0**



Regulating one or more heating circuits, connection to radiator heating and underfloor heating control set.

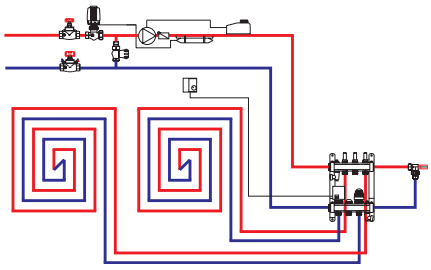
This underfloor heating control set is installed before the heating circuit manifold. Therefore the flow temperature can be controlled for different heating circuits.

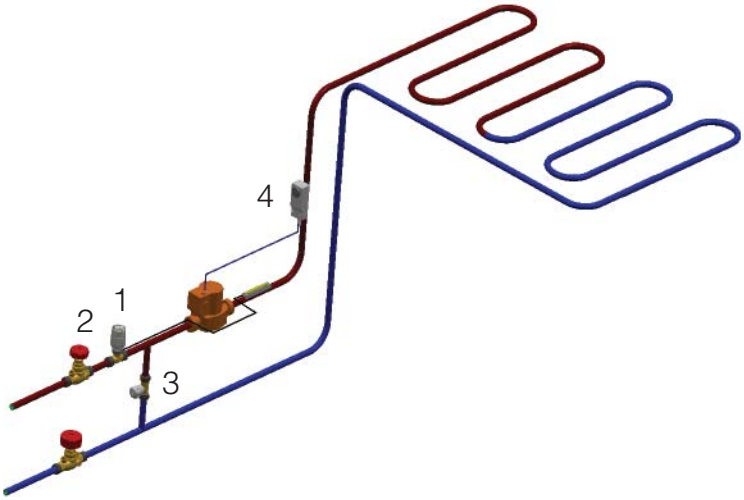
Maximum operating temperature of 35 °C for underfloor heating recommended
Maximum operating pressure 10 bar
Nominal value range 20 to 50 °C
Heating water quality according to ÖNORM H 5195 or VDI guidelines 2035

When the flow and bypass return flow is mixed, the flow temperature of the underfloor heating circuit is kept inside the necessary P-band, which is essential for the regulating purposes. The contact sensor of the thermostatic head to the thermostatic valve instigates changes to the flow temperature. If there is a fault, the electrical pipe contact sensor switches off the pump (fail safe). The control setting is done with an open bypass valve. The desired flow temperature is set with the thermostatic head. If the flow temperature cannot be achieved, the bypass valve is closed step by step until the set temperature value is reached.

When using large-flow valves the control set can also be used in front of distributors.

This is also an option for systems with distributor valves.





	Parts	Up to 45 m² 1 **8100** 01	Up to 85 m² 1 **8100** 02	Up to 120 m² 1 **8100** 03	Up to 160 m² 1 **8100** 04
1	Herz thermostat with contact sensor	1 **7420** 06	1 **7420** 06	1 **7420** 06	1 **7420** 06
2	Thermostatic valve	1 **7723** 61	1 **7723** 01	1 **7723** 02	1 **7723** 03
3	Bypass valve	1 **5537** 01	1 **3723** 02	1 **3723** 03	1 **4115** 04
4	Safety switch	1 **8100** 00	1 **8100** 00	1 **8100** 00	1 **8100** 00

Regulating one heating circuit, connection to radiator heating

Due to increasing demands for comfort and efficiency for modern dwellings, products and systems need to be designed to fulfil these requirements.

HERZ offers new control systems, which connect underfloor heating systems with a conventional radiator heating system. The aim is to provide the highest functionality with the least installation effort.

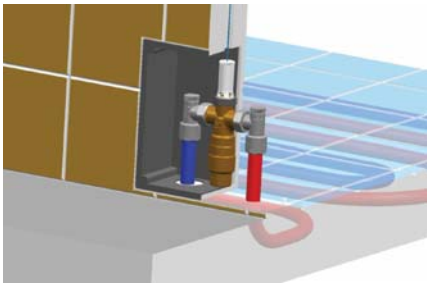
HERZ Floorfix

The HERZ Floor-fix is installed inside a plastic box (included with the valve).
The heating water temperature for the underfloor heating is set with the adjusting screw and the temperature scale. This means circulation is only achieved when the operational temperature reaches the optimum for the underfloor heating. This guarantees a healthy and comfortable environment and a long life span for the flooring. The thermostat with contact sensor and remote adjuster control the room temperature. For pipe connections with ¾ euro cone the HERZ compression sets for copper or soft steel pipes, stainless steel or plastic multi-layer pipes can be used.

Intake flow temperature max.	max. 75 °C
Room temperature set range	6 °C up to 30 °C
Nominal range of the return flow temperature limiter	20 °C up to 60 °C
Recommended set value for the temperature limiter	max. 55 °C
Operating pressure	max. 10 bar
Differential pressure	max. 0.2 bar
Nominal room capacity	max. 1000 Watt

Heating water quality according to ÖNORM H 5195 or VDI guidelines 2035

The HERZ Floor-fix has to be positioned in the middle of the underfloor heating system to enable its functionality. It is installed inside a buried plastic box and mounted onto a pipe clip.
It is advisable to check that the rubber inset of the pipe clip is used to reduce any sound transmission. Delivery includes HERZ return valves RL1 (1 **3742** 01) for both sides with metal cone seal and union connection.



Example:
Set conditions:
Room temperature = 20 °C
Flow temperature = 50 °C
Return flow temperature = 45 °C
Excess temperature = 20.5 °C
Pressure Drop = 10 kPa,
Floor diffusion resistance = 0.10 m^2K/W

Rohr	Floor area at 125 mm pipe centres	Floor area at 250 mm pipe centres
20 x 2 mm	15 m^2	30 m^2
18 x 2 mm	7 m^2	15 m^2
16 x 2 mm	4 m^2	8 m^2

HERZ Floorfix, 1 **8100** 10 **+ Thermostatic head with remote sensor and remote adjuster for controlling the room temperature**

Floor heating in combination with radiators

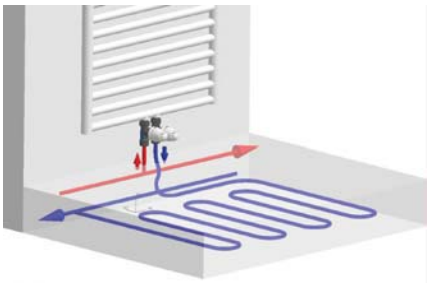
HERZ Floorfix order no. 1 **8100** 10

The combination of a radiator and underfloor heating system is with separate control zones, central room temperature control, heating medium control of the underfloor heating, water quantity limitation and mechanical shut-off valve for the radiator.

In bathrooms with tiled surfaces the desire for modern designs is to have a towel rail and underfloor heating which can be accomplished by using the heating circuit return flow via the Herz return flow temperature controller. The return flow limiter limits the maximum underfloor heating temperature of 55 °C. If the return flow temperature of the radiators is above the valves shuts automatically.

Intake flow temperature	max. 70 °C
Room temperature set range	6 °C up to 30 °C
Nominal range of the return flow temperature limiter	20 °C up to 60 °C
Recommended set value for the temperature limiter	max. 55 °C
Operating pressure	max. 10 bar
Differential pressure	max. 0.2 bar
Nominal room capacity	max. 1000 Watt
Underfloor heating circuit length	max. 20 m

Heating water quality according to ÖNORM H 5195 or VDI guidelines 2035



Connecting bathroom radiators and surface heating using the "Mini" return temperature limiter, 1 **9102** 00

HERZ room temperature control set for radiators and floor connection

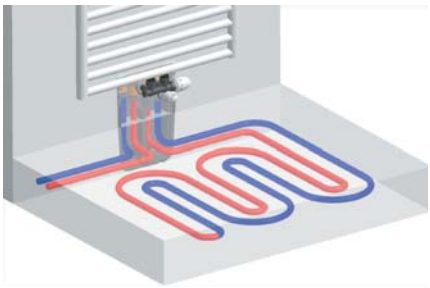
For installation under the plaster, a set consisting of a flush mounted box with covering plate, chrome-plated with an RL-1 shut-off valve, TS-98-V thermostatic valve and mini return temperature limiter as well as double connection distributor.

HERZ order no. 1 **8100** 25

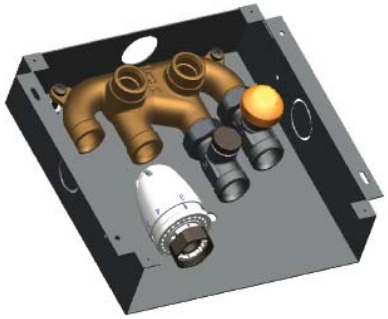
Underfloor heating in combination with radiators

Return flow temperature limiter with radiators with integral valves and HERZ-TS-3000

Radiators with an integral valve have the thermostatic valve already built in. Connections for these radiators only require single shut-off valves or the HERZ-3000 system. In combination with the underfloor heating system the connection with the HERZ-3000 system with thermostatic function is the best solution. The return flow temperature limiter is connected to the thermostatic valve.



1 **8100** 25 **+ HERZ TS-3000**



Electronic controls for room temperature and heating circuit temperature

The control for heating and cooling systems influences the functionality, its energy costs and functionality. Regulation of the heating circuit and room temperature can be achieved mechanically, electronically or electromechanically. Additionally the heating temperature can be controlled to provide weather compensation where the flow temperature of the heating system increases with a reduction in the outside temperature. Cooling systems operate in reverse with decreasing flow temperature for increasing outside temperature.
During the night or other non heating periods a decrease of 5 °C of the radiator heating flow temperature improves the cost efficiency of the heating system.
This is not recommended for underfloor heating systems, which have naturally slow response to heating up and cooling down periods and operate with low flow temperatures. Generally thermostatic mixing or diverting valves control the heating circuit temperature. The thermostat can be controlled mechanically or electrically.

Control systems:

Two-point control

For two point control a rest signal is transmitted to the mixing or diverting valve. Now the valve fully shuts or opens. This control type is mainly used for less demanding systems, where the reaction time is not so important. (Surface heating)

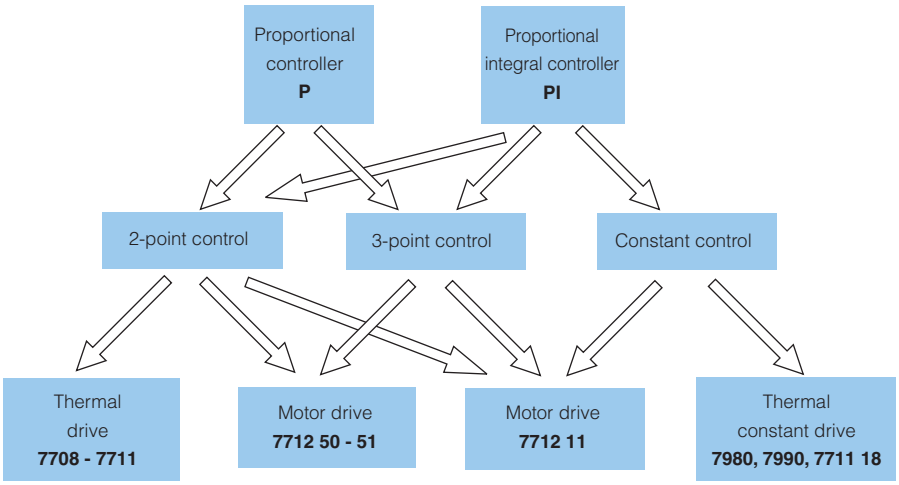
3-point control

Different to the 2-point control this type has the additional function 0 or Stop. This means the valve is gradually opened and shut. In between the control commands the position 0 is set and the valve halts in this setting until the next command. A alternative description is OPEN/0/SHUT. This is the most common regulating type

Step control

This control type uses a continuous signal to operate the actuating drive. This signal is either 0-10 Volts or 4-20 mA depending on the controller or valve type. The position 0 Volt or 4 mA represent the closed valve setting and depending on the voltage and amperage the valve is gradually opened or closed. This control system allows very accurate regulating of the heating circuit temperature and room temperature and is used for superior requirements. (E.g. for laboratories, etc)

The heating circuit temperature control consists of modules with integral timers. They can automatically decrease the temperature during the night and for holiday periods.
The room temperature control consists of modules with or without timers. Control devices with timer have the advantage to set different temperatures for different times. However controllers without timers are less expensive and easier to operate.



HERZ temperature controller for heating or cooling circuits

Herz heating controller, **7793**, guarantees the highest level of comfort and convenience even when operating.

Order no. 1 **7793** 23, 230 V version
Order no. 1 **7793** 24, 24 V version

With an easy to use operating guide, increased functionality, more information and unbeatable price/value ratio.

The **HERZ 7793** is a compact heating controller, which operates with outside or inside temperatures. The flow temperature and/or room temperature control is dependent on the application. The intuitive function guide and the clear display allow for easy operation and installation. The display shows the measured temperature and system state as well as the time and day of the week. Increased functionality offers additional options including

- **return flow limiting**
- **manual operation**
- **set value control**
- **operation as a room temperature regulated flow temperature controller (P+PI cascade control)**
- **display options while regulating process**
- **yearly digital program with self erasing or actualising commands**
- **reset function**

The **HERZ 7793** modern and natural design works for home environments as well as for hotel rooms, offices or medical premises. The automated functions increase the cost efficiency. Three different temperature levels can be programmed. Additionally holiday periods, short time absence and external temperature influences can be part of the program. The best performing temperature-profile for maximum every day comfort and cost efficiency. The **HERZ 7793** is easy to operate and is energy efficient.

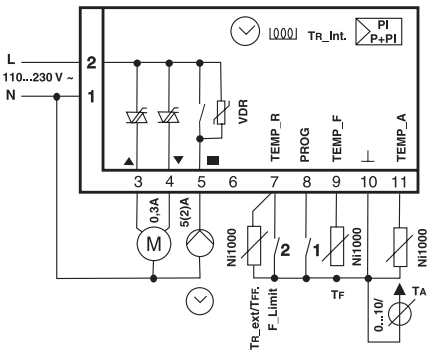
Accessories:

Outside temperature sensor 1 **7793** 01

Contact sensor 1 **7793** 00

The element is a thin nickel-plated sensor according to DIN 43760
Outside temperature sensor, white plastic socket and cover (RAL 9010) for surface and flush mounting.

Contact sensor with tightening strap for pipes with diameter 15 up to 90 mm and heat conducting paste is included in package.



HERZ room temperature controller for heating and air conditioning units

HERZ room temperature controller, 1 **7794**.. 230 V ~ or 24 V

Order no. 1 **7794** 23, 230 V version
Order no. 1 **7794** 24, 24 V version

Compact heating controller for following applications:

- **Weather compensated PI flow temperature controller**
- **Room temperature regulated room temperature controller (PI)**
- **Room temperature regulated flow temperature controller (P+PI cascade controller) with sensor internal/external.**
- **Limitation (Min/Max) for the flow and return flow temperature**
- **Set value control of the flow temperature for the drinking water system?**
- **For actuating drives on valves and mixing valves (3-point) and for pumps (on/off)**
- **Wall-mounting for reception areas**

Basic program (pre-set) for first operation

Easy adaptable to the system with 3 basic control modes and service parameters

Intuitive and easy operation with clear LCD display and simple keyboard

Possibility to choose the displayed temperature

- **Automatic switch from summer to wintertime**
- **Three programmable temperature levels, reduced/normal/comfort, to control the room temperature and an additional one for coefficient control**
- **Programmable temperature levels and times**
- **Frost protection can be activated in stand-by mode**

- **Digital timer with weekly and yearly program**
- **Programmable input function,**
- **two Triac outputs and a relay with operating hours counter Instead of function “circulation pump” the relay can be used as a pilot clock**

Safety function if valve or pump seal is stuck

Manual operation of valve and pump

Housing made of clear white non-inflammable plastic (RAL 9010)

Easy installation, surface and flush mounting possible

Electrical connection in socket with screw clamps for cables with a maximum length of 2.5 m, cable entry from behind, electronics in housing

Functions as a room temperature controller:

- **Heating and cooling (4-cable model)**
- **Cooling (2-cable model).**

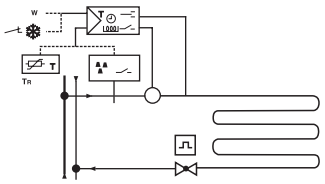
Connection of two thermal actuating drives for heating and cooling operation.

Connection of a thermal actuating drive for cooling operation.

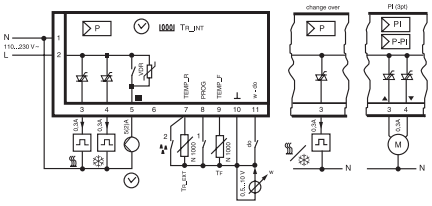
Additional in/out control for pump or fan.

Time switch with weekly program (42 switching commands) and yearly program (6 switching commands)

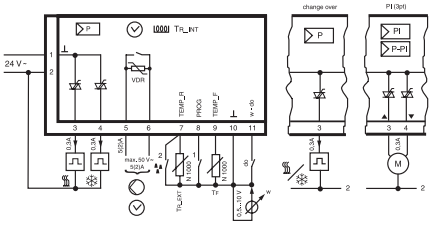
Example:



Room control for cooling two-pipe equipment with internal temperature sensor and dew point monitoring or external temperature sensor, slide for room temperature target value and 2-point output

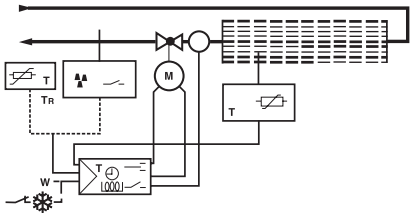


Connection plan, 230 V version, 1 7794 23



Connection plan, 24 V version, 1 7794 24

Example:



Advance flow temperature control (cascade) for cooling, e.g. cooling ceilings with internal temperature sensor and dew point monitoring or external temperature sensor

HERZ room temperature controller

Herz 7791 room temperature controller is easy to use.

Order no. 1 **7791** 23, 230 V version
Order no. 1 **7794** 02, 3 V version

The 7791 from Herz is an intelligent digital temperature controller for

- **Living rooms**
- **Practice rooms**
- **Offices**
- **Apartments**
- **Detached houses.**

It provides comfort control while reducing the temperature during the night and increasing it during the day. It independently operates valves, pumps, burners and other heating or cooling equipment.

Advantages of this room thermostat:

3 temperature levels, individually programmable for each day of the week Weekly and holiday period program Housing with easy to read symbols Easy operation with only 5 keys

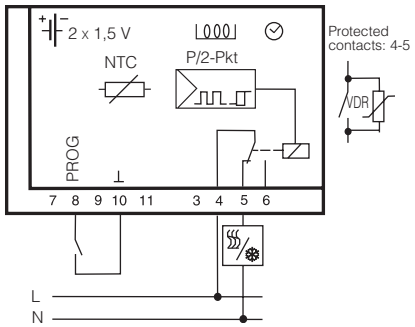
Highest engineering technology can be found inside this modern and well-designed thermostat. The 7791 has 3 temperature levels to provide the most comfortable and efficient room temperature control with 2 point and variable control characteristic. The display for the functions of the system is with common and easily understood symbols. The temperature is digitally displayed with eco metre (now and relative energy consumption)
The 7791 is available for battery operation with 2-wire connection and for mains circuit operation with 4-wire connection. The desired individual temperatures can be set using the standard programme. The set programmes are retained if the power is lost during a power cut. Additionally the programme can be set for unlimited and limited periods (e.g. parties, holidays) from 2 hours to five days with the remaining time displayed. Obviously the 7791 comes with automatic switch between summer and wintertime, frost protection in stand by mode and safety function if the valve and pump seal is stuck.

With its control qualities and simple operation it is suitable for

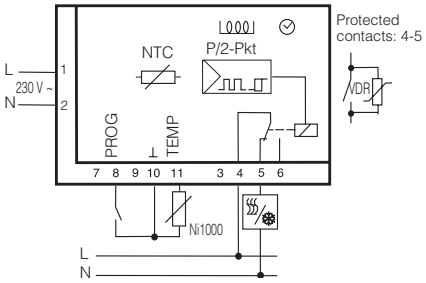
- **Controls and actuating drives**
- **Underfloor and radiator heating**
- **Burners for oil and gas boilers**
- **Circulating pumps**
- **Fans in storage heater units**
- **Heat pumps or gas units**

The battery version is recommended for old and renovated buildings.

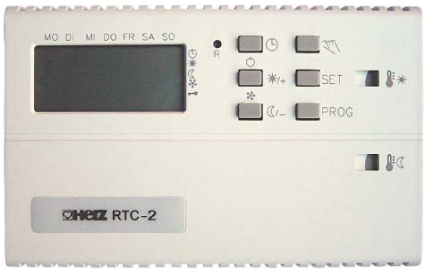
Connection plan, 3 V version, 1 7791 02



Connection plan, 230 V version, 1 7791 23



HERZ RTC-2 Room Temperature Computer



Order no. 1 **7940** 62, 24 V version

The HERZ RTC is a continuous electronic room temperature controller with an operating voltage of 24 V offering a high degree of reliability and safety for children. The output voltage for operating DDC-actuating drives is 0-10 V. The integral NTC sensor measures the ambient temperature. Operating and programming is achieved with seven function keys and two switches.

Characteristics:

- Basic programme preset
- 4 temperature levels per programme
- Optical LCD display
- Five system operation modes
- 112 switching points
- Easy programming
- Selection of heating or cooling function mode
- Temperature change possible without programme interference
- Permanent operating circuit
- Party circuit
- Summer circuit
- Key blocking function as safety measure for children
- Frost protection
- Actual temperature display
- Adjustable proportional band
- Stand by power reserve
- Shockproof casing
- Supplied with 3 basic programmes

Accessories:

DDC- actuating drive
Thermo electronic continuous drive in compact appearance with precise actuating behaviour, long service life and noise free operation. The control voltage of 0-10 Volt is thermo electronically transformed into a proportional lift.

HERZ room temperature controller without time switch

Order no. 1 **7790** 15, 230 V version
Order no. 1 **7790** 25, 24 V version

Used for individual room temperature control in private and commercial premises. Suitable to control electric heating, burners, pumps, thermal drives, fans or cooling equipment in air conditioning systems.

Casing 76 x 76 mm made of non-inflammable clear white plastic (RAL 9010). Front cover in modern design with °C scale.

Socket made of white plastic with membrane sensor and contact system (Different modes: thermal reset, night time mode, additional switch and control lamp).

Coefficient adjuster with mechanically minimum and maximum limitation for setting range.

Designed for surface mounting or onto a flush box. Cable entry from behind, screw clamps for cables up to 1.5 mm^2.

Input voltage 230 V or 4 ±10 %
Input circuit fuse 50-60 Hz
P-range approximately 3 K
Permissible circuit powe 230 V or 10 (0.5) A
Shortest circuit period response approximately 19 minutes (E = 0.5)

Cooling 5 (0.5) A
Permissible circuit power 24 V – minimum 0.2 A
Permissible ambient temperature 0…50 °C, 24 V = max 1 A
Weight 0.11 kg
Protection type IP 20 (EN 60529)
Set temperature range 5-30 °C
Protection category II (IEC 60536)
Night time switching difference (N/R) approximately 5 K

Function:

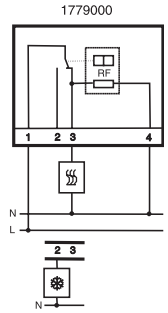
A membrane sensor expands in relation to the temperature changes and activates an electric switch. The operating points of the controller are specified by the preset data and the switching difference.

Without thermal reset

The contact switches only when the room temperature changed to same amount of the switching difference. The preset value corresponds to the upper switch point.

With thermal reset

To keep the room temperature fluctuations low, the membrane sensor is heated up in combination with a thermal resistor. The interacting maximum excess temperature of 0.5 K is greater then the switching difference. Therefore the thermostat independently switches on and off even if the room temperature is constant. If the room temperature matches the preset value the on and off impulses are equally long (Switching on proportion = 0.5)
When the room temperature increases the switching on impulse is shorter and the switching off impulse longer. Consequently a continuous P regulating is achieved with a P-range of Xp = 3 K and a maximum and constant control difference of Xp/2. With the impulse modulation the room temperature changes to the same value as it does with a switching period (10 minutes On, 10 minutes Off). As a result the temperature fluctuation is only 0.1…0.5 K depending on the time constant.



With thermal night time temperature decrease

The membrane is heated up in combination with a heat resistor to decrease the room temperature. Consequently the temperature level in the housing is approximately 5 K higher and the controller reacts with a corresponding room temperature decrease. The night time temperature decrease can be activated with an external timer.

“BELUX” mechanical room thermostat

Room temperature – target value is adjustable mechanically

Temperature range 5 °C to 50 °C
Switching differential at 20 °C = 0.6 °K
Protection category IP30
Output 2 or 3 contact (alternator)

Order no. 3 **F791** 00 230 V~, 50 Hz.
Order no. 3 **F791** 01 24 V
Order no. 3 **F791** 00 230 V~, 50 Hz.
With signal lamp
Order no. 3 **F791** 00 230 V~, 50 Hz.
With signal lamp and resistor for faster response time,
Switching differential at 20 °C = 0.4 °K

Electronic room thermostat for floor heating

For controlling the room temperature via a switch for comfort. Night reduction operation via an external time switch.

Temperature range 5 °C to 50 °C
Switching differential at 20 °C = 0.5 °K
Triac output maximum 15 W
Protection category IP30

Order no. 3 **F792** 00 230 V~, 50 Hz.
Order no. 3 **F792** 01 24 V

Electronic room thermostat for Underfloor heating

For controlling the room temperature or floor temperature in conjunction with a temperature sensor.
This temperature sensor must be designed as a temperature limiter. There is the option of connecting an external time switch for night reduction.

Temperature range, 5 °C to 50 °C
Switching differential at 20 °C = 0.5 °K
Triac output maximum 15 W
Protection category IP30

Order no. 3 **F792** 00 230 V~, 50 Hz.
Order no. 3 **F792** 03 24 V

Temperature sensor for floor heating

Can be used as a temperature limiter for the control of floor heating.
Length 3 m

Order no. 3 **F790** 06

Set with electronic room thermostat

Order no. 3 **F792** 04 230 V
Order no. 3 **F792** 05 24 V

Electronic room thermostat

Displays the room temperature digitally and the operation mode for controlling the room temperature or the floor temperature in conjunction with a temperature sensor.

This temperature sensor must be designed as a temperature limiter.

There is the option of connecting an external time switch for night reduction.

Temperature range, 5 °C to 50 °C
Switching differential at 20 °C = 0.5 °K
Triac output maximum 15 W
Protection category IP30

Order no. 3 **F793** 00 230 V~, 50 Hz.

Order no. 3 **F793** 01 24 230 V
Set with temperature sensor

Order no. 3 **F793** 00 230 V~, 50 Hz.

Order no. 3 **F793** 03 24 V

HERZ Wireless control

Wireless thermostat

LRT-230 V room temperature controller with battery function, special flat edition, width 70 mm, length 87 mm, depth 22 mm.

Non-inflammable plastic housing, white RAL 9010. batteries 2 x LR03 accessible from the front, control knob with setting range, LCD display for low battery levels.

Temperature-range of 5-50 °C
Actual value transmission every 4 to 10 minutes
Nominal value change 1 minute
Display reserve 2 months Class III, IEC 60536

Transmission frequency 860.3 MHz

Model for receiver 230 V
Article no: 3 **F794** 23

Model for receiver 24 V
Article no: 3 **F794** 24

Wireless Receiver

Radio receiver

Intelligent radio receiver with 230 V or 24 V, with integral frost protection circuit, to control

- **2 to 4 thermal actuators each channel**
- **one pump exit 230 V**
- **16 A, pump blocking protection weekly**
- **LCD display for radio thermostat and route assignments**

integral radio receiver, connection possibility for one antenna, alarm via flashing LED light or acoustically.

Housing made of plastic, white RAL 9010. IP43

Wireless receiver, LET230-4, with 4 channels. 230 V supply voltage ~

to control up to 4 thermal actuators (230 V~) per channel

automated minimum operation with saved preset data during signal failure

Change between heating/cooling with additional accessories, monitor,

Connection for frost point

Outlet for heating or cooling device

Order number 3 **F795** 04

Wireless receiver, LET230-6, with 6 channels, 230 V~,

Order number 3 **F795** 06

Wireless receiver, LET24-4, with 4 channels, 24V~,

Order number 3 **F796** 04

Wireless receiver, LET24-6, with 6 channels, 24 V~,

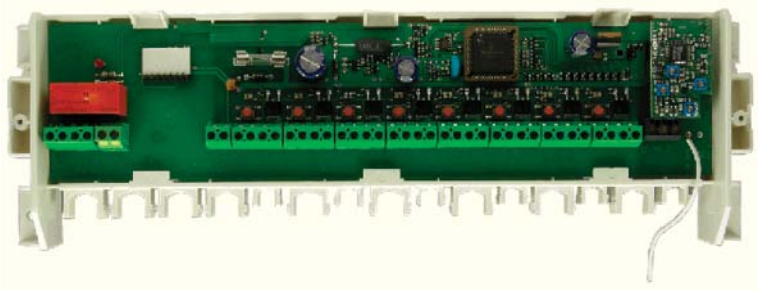
Order number 3 **F796** 06

Wireless receiver, LET24-8, with 8 channels, 24 V~,

Order number 3 **F796** 08

Wireless receiver, LET230-1, with 1 channel, 230 V~,

Order number 3 **F795** 01



Wireless Receive

The remote radio control centrally operates the entire heating system, with operating switch.

Batteries on the front side, casing similar to wireless thermostat LRT.

Remote radio control with 4 modes
- Automated operation
- Standard temperature
- Decreased temperature (- 3 °C)
- Frost protection 8 °C room temperature

Article no: 3 **F797** 04

Remote radio control with 5 modes
- Automated operation
- Standard temperature
- Decreased temperature (- 3 °C)
- Frost protection 8 °C room temperature
- Cooling operation

Article no: 3 **F797** 05

HERZ "MILUX" wireless control

Room temperature controller (transmitter) with analogue display and receiver with coded transmission signal.

Switch equipped with 3 positions for

- **Heating**
- **Night reduction**
- **Off**

LED operation display on receiver for

- **Heating**
- **Operation mode**
- **Signal receiver**

Transmitter with battery operation, 2 x 3 V
Batteries: CR 2430
Durability of batteries approximately 2 years

Setting range 5 °C up to 30 °C

Radio frequency 433.92 MHz
Outdoor signal range approximately 40 m
IP30 protection

Receiver:
Power supply, 230 V~, 50 Hz.
IP44 protection

Switch for manual or automatic operation

HERZ order number 3 **F799** 04

HERZ "BELUX" wireless control

Room temperature controller (transmitter) with digital display for room temperature and operation mode, and receiver with coded transmission signal.

Switch equipped with 3 positions for

- **Heating**
- **Night reduction**
- **Off**

LED operation display on receiver for

- **Heating**
- **Operation mode**
- **Signal receiver**

Transmitter with battery operation, 2 x 3 V
Batteries: CR 2430
Durability of batteries approximately 2 years

Setting range 5 °C up to 30 °C

Radio frequency 433.92 MHz
Outdoor signal range approximately 40 m
IP30 protection

Receiver:
Power supply, 230 V~, 50 Hz.
IP44 protection

Switch for manual or automatic operation

HERZ order number 3 **F799** 05

HERZ LCD wireless control

Room temperature controller (receiver) with digital display for room temperature and operation mode, and receiver with coded transmission signal with time switch for weekly programme.

Switch equipped with 3 positions for

- **Heating**
- **Night reduction**
- **Off**

LED operation display on receiver for

- **Heating**
- **Operation mode**
- **Signal receiver**

Transmitter with battery operation, 3 x 1.5 V
Batteries: AA, LR 6
Durability of batteries approximately 3 years

Setting range 5 °C up to 30 °C

Radio frequency 433.92 MHz
Outdoor signal range approximately 50 m
IP30 protection

Receiver:
Power supply, 230 V~, 50 Hz.
IP44 protection

Switch for manual or automatic operation

HERZ order number 3 **F799** 06

HERZ Thermal actuators

1 **7710** 00 **HERZ Thermal actuator**

Closed without current, can be switched over to open without current,
Operating voltage 230 V,
thread connection M 28 x 0.5

1 **7710** 01 **HERZ Thermal actuator**

Closed without current, can be switched over to open without current,
operating voltage 24 V,
thread connection M 28 x 0.5

1 **7710** 80 **HERZ Thermal actuator**

Closed without current, can be switched over to open without current,
operating voltage 230 V,
thread connection M 30 x 0.5

1 **7710** 81 **HERZ Thermal actuator**

Closed without current, can be switched over to open without current,
operating voltage 24 V,
thread connection M 30 x 0.5

1 **7711** 18 **HERZ Thermal actuator for continuous regulating**

Thermal electric continuous drive, 3 lead connection cable,
operating voltage 24 V =,
control voltage 0-10 V =,
thread connection M 30 x 0.5

1 **7710** 50 **HERZ Thermal actuator with relieve contact**

Closed without current, can be switched over to open without current,
operating voltage 230 V,
thread connection M 28 x 0.5.
The relieve contact signals the system status or activates a pump.

1 **7710** 51 **HERZ Thermal actuator with relieve contact**

Closed without current, can be switched over to open without current,
operating voltage 24 V,
thread connection M 28 x 0.5.
The relieve contact signals the system status or activates a pump.

1 **7710** 55 **Relieve contact**
For later installation with thermal actuator

Characteristic

The thermal actuator is activated by an external electric contact e.g. from a room thermostat and opens or shuts the valve.

The actuating movement is achieved with an electrically heated expansion element.

When the heating current is switched off, the actuator shuts or opens the valve.

The HERZ thermal actuator is maintenance free and works silently.

1 **7990** 00 **Herz DDC actuator drive**

Thermal electric continuous drive, 3 lead Connection cable,
operating voltage 24 V,
Control voltage 0-10V DC
Electric resistance100 kΩ
For use with HERZ RTC-2 room temperature controller

1 **7790** 00 **HERZ DDC actuator drive**

Thermo-electronic continuous drive, 3-conductor
Connection cable, operating voltage 24 V,
driving voltage 0-10 V DC
electric resistance10 kΩ
For use with HERZ RTC-2 room temperature controller

Functioning principle

The actuator drive contains an electrically heated expansion element. The lift is directly transmitted to the valve.

While the actuator drive is under voltage (24 V) the expansion element is heated to operating temperature within 2 minutes and can then be operated.

By means of an external electric signal of 0-10 V from a control device, the actuator drive is moved to the appropriate position.

For a movement of 1 mm lift the actuator drive takes approximately 30 seconds.

The closing operation is done in synchronisation with the opening. The expansion element cools down and the valve is closed using elastic force.

The actuator drive is maintenance-free and works silently.

Flow valves and three-way valves

Herz distribution valves and three-way valves, simple, reliable and versatile

Thermostatic three-way valve without bypass
for mixing and switching use, flat seal, thread connection for thermomotor, M 30 x 1.5

Order no 1 **7762** 50, DN 10, kvs = 0.4 m³/h
Order no 1 **7762** 60, DN 10, kvs = 0.63 m³/h
Order no 1 **7762** 70, DN 10, kvs = 1.0 m³/h
Order no 1 **7762** 80, DN 10, kvs = 1.6 m³/h
Order no 1 **7762** 51, DN 15, kvs = 2.5 m³/h
Order no 1 **7762** 61, DN 15, kvs = 4.0 m³/h
Order no 1 **7762** 62, DN 20, kvs = 5.0 m³/h

Thermostatic flow control valve
flat seal, thread connection for thermomotor, M 30 x 1.5

Order no 1 **7760** 21, DN 10, kvs = 0.16 m³/h
Order no 1 **7760** 01, DN 10, kvs = 0.4 m³/h
Order no 1 **7760** 02, DN 10, kvs = 0.63 m³/h
Order no 1 **7760** 03, DN 10, kvs = 1.0 m³/h
Order no 1 **7760** 04, DN 10, kvs = 1.6 m³/h
Order no 1 **7760** 05, DN 15, kvs = 2.5 m³/h
Order no 1 **7760** 07, DN 15, kvs = 4.0 m³/h
Order no 1 **7760** 08, DN 20, kvs = 5.0 m³/h

The distributing and mixing PN16 control valve with proportional characteristic curve is designed to work with the continuous drive **7711**.

Easy connection with universal shut off direction. It requires only an on drive mode regardless of thermal or continuous operation with the function open without current as all valve types have the identical shut direction. Fully secure shutoff position even for the mixing branch of the valve. The valve can be used as a mixing valve, distributing valve and even a switch over valve.

- **Proportional characteristic curve along the entire lift range of 4 mm**
- **Distributing branch closes when spindle is press in**
- **Reduced kvs value for 3 way valve with or without bypass**
- **Nominal pressure, Nominal width and kvs value are displayed on valve body**
- **Connection with outside thread**
- **Adapters for various pipe connections**
- **Stuffing box can be changed under full operating pressure**
- **Sealed control branch and sealed mixing branch**
- **identical closing direction = easy decision for operating drive**

HERZ Calis TS- RD three-way valve

Distributor valve 100 % for thermostatic operation, flat seal, thread connection for M 28 x 1.5

Order no 1 **7761** 38, DN 15, kvs = 3.0 m³/h
Order no 1 **7761** 39, DN 20, kvs = 3.0 m³/h
Order no 1 **7761** 40, DN 25 kvs = 6.44 m³/h
Order no 1 **7761** 41, DN 32 kvs = 6.44 m³/h

HERZ three-way distributor and mixing valve 1 4037 ..

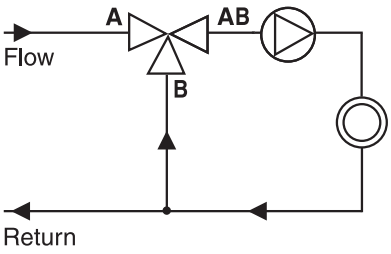
Mixing valve for the continuous control of cold water, hot water or air. Water quality in accordance to VDI 2035 regulations. In combination with a hand wheel or with the valve actuating drive 1 **7712** .. as a control device and in combination with 1 **7712** .. as a diverting valve. Adjustable characteristic curve (linear, proportional or square) with the valve drive 1 **7712** ..
Brass valve body and seal, spindle made of Nirosta-steel, brass valve cone with glass fibre reinforced Teflon sealing ring. Brass stuffing box with EPDM O-ring.
When the spindle is pulled out capacity A-AB is shut.

Dimensions 1/2" up to 2"

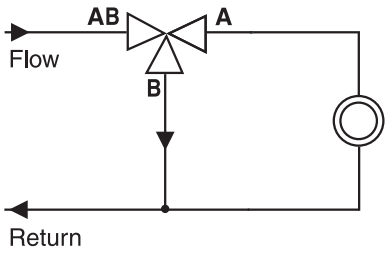
HERZ Valve drive 1 7712 ..

Valve drive with positioner for 3 way valves, operated by heat controller 1 **7723** 01 for 3 point control. 2 part housing and console made of self-extinguishing plastic, brass connection nut for valve. Manual adjustment and positioning of the valve by means of circuit breaker. Vertical and horizontal mounting is possible (not hanging)

Versions 230 V and 24 V



as a mixing valve

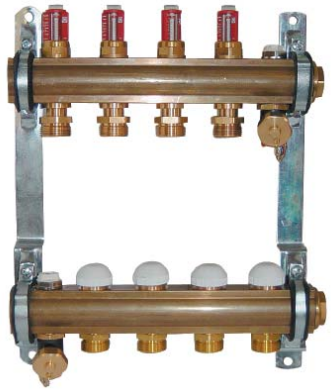


as a distributor valve

HERZ Distributor Technology

HERZ floor rod-type distributor set

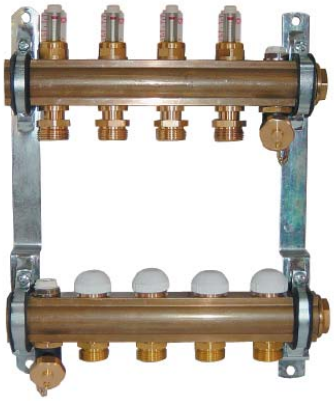
Made of brass with flow meter control in the flow, for adjusting water quantities 0-2.5 l/min, DN 25, consisting of intake flow distributor with flow meter and return flow distributor with thermostatic valves, bleeding, draining with hose connection, end caps and holding brackets, offset distributor outlet, pipe connection G 3/4, number of possible pipe connections: 3 – 16 outlets



HERZ order number 1 **8532** ..

HERZ Floor rod-type distributor set for high flow rate amounts

Made of brass with flow meter control in the flow, for adjusting water quantities 0-6 l/min, DN 25, consisting of intake flow distributor with flow meter and return flow distributor with thermostatic valves, bleeding, draining with hose connection, end caps and holding brackets, offset distributor outlet, pipe connection G 3/4, number of possible pipe connections: 3 – 16 outlets



HERZ order number 1 **8533** ..

HERZ-Floor rod-type distributor set,

made of brass DN 25, consisting of intake flow distributor with shut-off upper parts, return flow distributor with thermostatic upper parts for actuator drive, bleeding, draining with hose connection, end caps and holding brackets, offset distributor outlet, pipe connection G 3/4, distributor with female thread 1, number of possible pipe connections: 3 – 16,

HERZ order number 1 **8531** ..

HERZ thermostatic upper part
for rod-type distributor set DN 25

Order number 1 **6403** 31

HERZ shut-off upper part
for rod-type distributor set DN 25

Order number 1 **6413** 01

HERZ Flowmeter

Setting range 0 - 2.5 l/min

Order number 3 **F900** 01

HERZ Flowmeter
Setting range 0 - 6 l/min

Order number 3 **F900** 02

HERZ-Seat insert
for rod-type distributor set DN 25

Order number 3 **F900** 03

HERZ Pre-setting key for the flow meter

HERZ distributors 1 851x 93

Supplied as pairs of distributors with 2, 3 or 4 outlets with distributor brackets, ventilation valve and end caps.

HERZ distributors can be combined for up to 12 outlets. Distributor coupling with O-ring seal. They are produced as single nickel-coated components. Consisting of flow intake distributor with shut-off upper parts and return flow distributor with thermostatic upper parts for fitting manual drives or actuators.

Vents and drains are fitted on the end cap.

The balancing of the individual heating circuits is conducted via the controls for the valves on the advance flow distributor using an internal hexagonal driver.

The distribution outlets are supplied with G 3/4 external thread. The connection of the distributor outflows to the HERZ pipes is carried out using plastic connectors.

HERZ distributor cabinets

Distributor cabinets are available for HERZ distributors for wall installation.

Distributor cabinets are produced from hot-galvanised sheet steel, with front frame and front doors fitted with bolts or cylinder lock, and white powder coated to RAL9003.

Fixing rails for distributor brackets are provided in the distribution boxes.

Height-adjustable feet mean that the box can be adjusted to a height of 705 to 775 mm. The installation depth for distribution box **8569** and **8570** can be adjusted to between 80mm and 110 mm. For distributor box **8572** the installation depth can be selected between 110 mm and 140 mm.

The frame of the distribution box has pre-punched holes for inserting the pipes.

The front panel is for balancing the different installation heights and is removable.

1 **8569** xx distribution box, installation depth 80-110 mm, with bolts
1 **8570** xx distribution box, installation depth 80-110 mm, with cylinder lock
1 **8572** xx distribution box, installation depth 110-140 mm, with bolts

HERZ distributor system, ready for connection

Distributor system, ready for connection to surface heating, consisting of:

- **Brass compact distributor set, nickel-plated, with one bleed valve and 2 end caps**
- **Distributor holding devices**
- **Ball valves 1, brass version, with full flow**
- **Spacer and connection angle, nickel-plated**

Pre-assembled in distributor cabinet made of galvanized steel sheet, front frame and door white powder coated (RAL 9010). Adjustable installation depth (80 – 110 mm), cabinet height 705 – 775 mm, with removable pipe rail tracks.

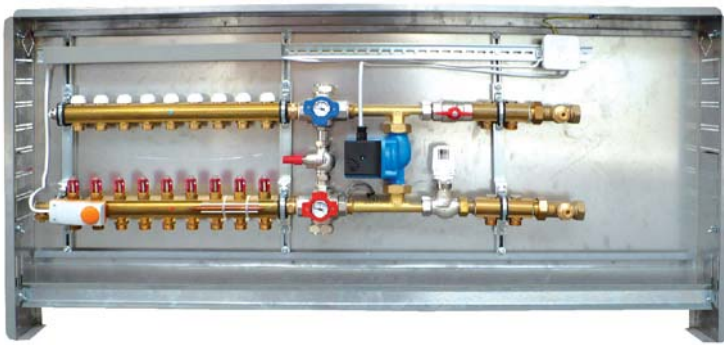
Number of pipe connections: 3 – 12,

HERZ Order number 1 **8574** xx

Distributor system, ready for connection as previously mentioned, but with top-meter control inserts
Number of pipe connections: 3 – 12,

HERZ Order number 1 **8575** xx

Control station ready for connection, HERZ compact floor



Control station ready for connection of 3 – 12 heating circuits for surface heating and two radiators. The flow temperature for the underfloor heating is mechanically controlled by a temperature limiter. Including circulator pump for underfloor heating and control of heating circuits. Differential control by means of mechanical overflow valve. Two multi-function valves guarantee the flushing of the underfloor heating circuits and the draining and bleeding. The valves are also equipped with a temperature dial which indicates flow and return temperatures. All electrical parts are mounted in a splash-proof switch box (IP54).

The control station is mounted in a distributor cabinet made of galvanized steel sheet. The front door and front frame are white powder coated (RAL 9003) and shut by means of bolts. A cabinet door with cylinder lock is available upon request.

The connection of the supply pipes for the control station is located on the right hand side with an external thread 1" (G). It is for direct connection to the HERZ plastic pipe connections 1 **6198** xx or the HERZ compression adapter 1 **6273** 01.

The pipe connection for non-regulated heating circuits and surface heating is accessed from below. The distributions are supplied with G 3/4 external threads (eurocone). The connection with the pipe connections is carried out using HERZ compression adapters or HERZ plastic pipe connections. We recommend HERZ plastic angle pipe sleeves 3 **F110** 0x to insert the pipes into the control station.

The integrated switch box is to be connected with a power supply of 230 V ~, 50 Hz (AC) IP54. All necessary electrical cables of the control station are already mounted and tested. The connection is only to be done by authorised staff.

The multi-function valves serve to flush the entire station or single heating circuits. These valves are intended for flushing and can be mounted underneath the cover using a 1 ¼" external thread or a 1" female thread. The flow or return temperature is displayed at the hand wheels.

In order to control the room temperature of the corresponding heating circuits, a distributor is installed in the switch box which is wired with the actuators and the HERZ distributor circulating pump. The setting of the room thermostats with the corresponding heating circuits at the distributor is done during the installation of the systems. The power supply of the control station should be 1 ~ 230 V, 50 Hz

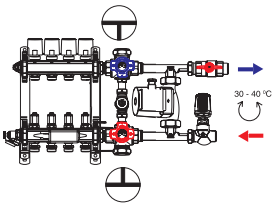
An additional electrical safety thermostat switches the pump off as soon as it reaches excess temperature.

Maximum operating temperature 110 °C
Minimum operating temperature - 25 °C
with glycol-based frost protection of maximum 45%
Maximum operating pressure 10 bar
Electrical connection: AC 230 V~, 50 Hz.

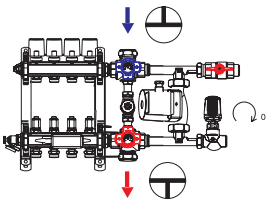
Differential pressure, factory setting:
Set point of 1
Differential pressure can be set:
Set range 0.5 - 5
Heating water quality according to ÖNORM H5195 or VDI guideline 2035.

Number of pipe connections: 3-12,
HERZ order number 3 **F533** xx

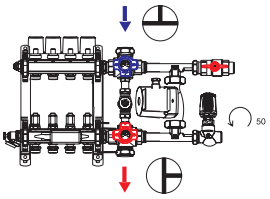
Control station ready for connection 230 V~, 50 Hz,
As previously described however without radiator distributor, number of pipe connections: 3 – 12,
HERZ order number 3 **F532** xx



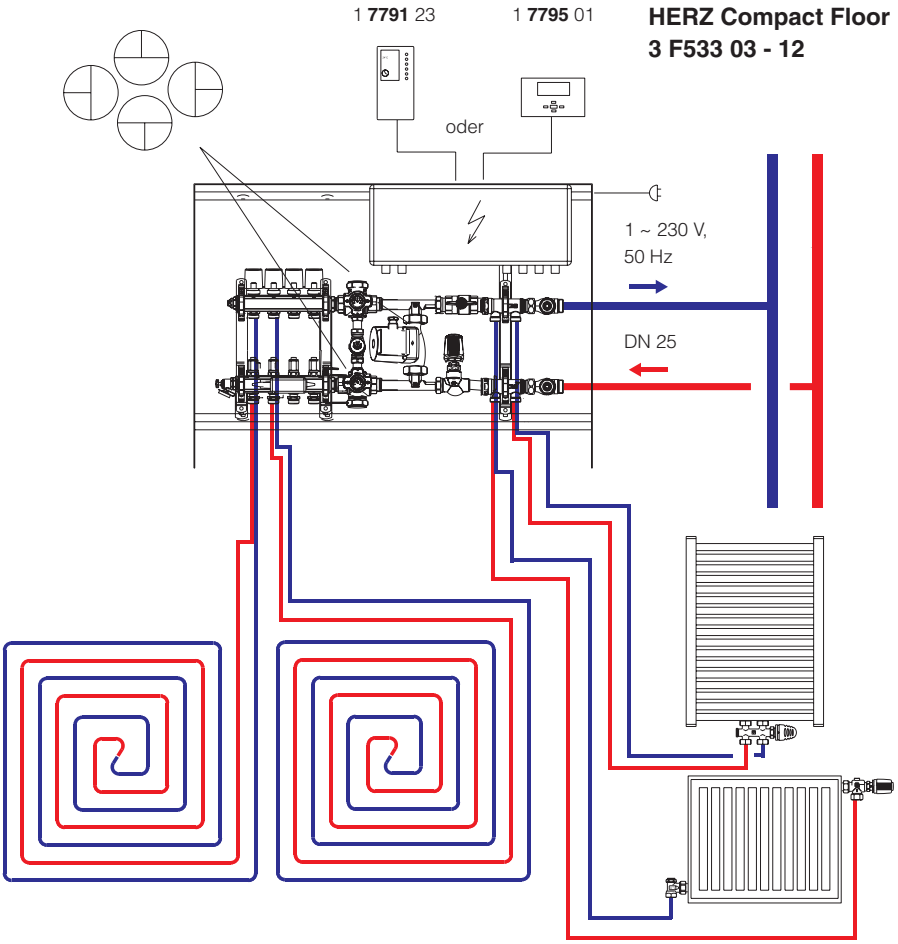
Normal operation



Rinsing of heating circuit



Rinsing of system



HERZ Compact Floor 3 F533 03 - 12

HERZ Compact floor F533

Control station ready for connection of 3 – 12 heating circuits for underfloor heating and two non-controlled radiator heating circuits.

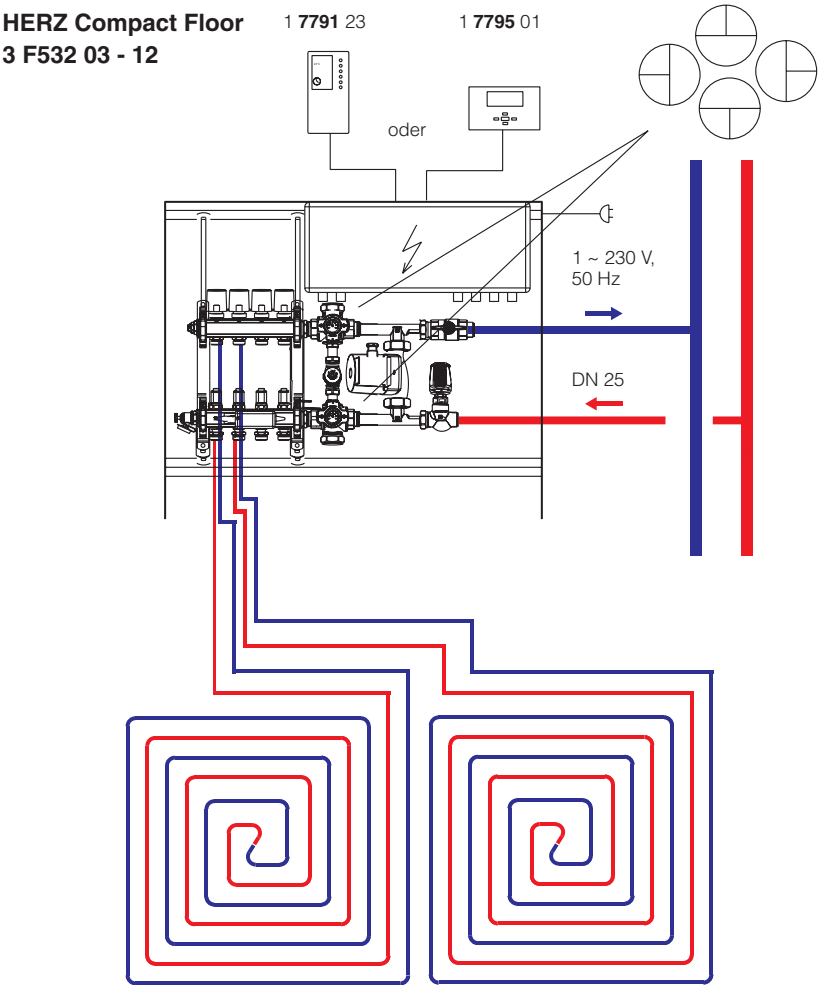
Depending on the settings the bleeding and flushing of underfloor heating circuits and the installation can be done by means of multi-function ball valves.

The setting of the medium temperature of the underfloor heating can be selected between 20 °C and 50 °C and is set manually.

The 2-point control of the underfloor heating circuits is done by pre-installed actuator drives which are wired in the switch box. Room temperature controller devices supplied by HERZ as well as external control signals have to be wired in the switch box.

The room temperature and the radiator heating circuits are manually controlled by thermostatic valves and thermostatic heads.

HERZ Compact Floor 3 F532 03 - 12



HERZ Compact floor F532

Control station ready for connection of 3 – 12 heating circuits for surface heating.

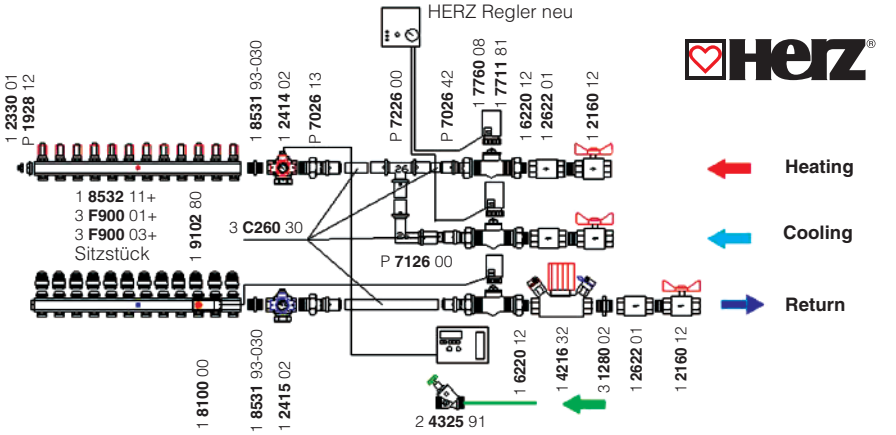
Depending on the settings the bleeding and flushing of underfloor heating circuits and the installation can be done by means of multi-function ball valves.

The setting of the medium temperature of the underfloor heating can be selected between 20 °C and 50 °C and is set manually.

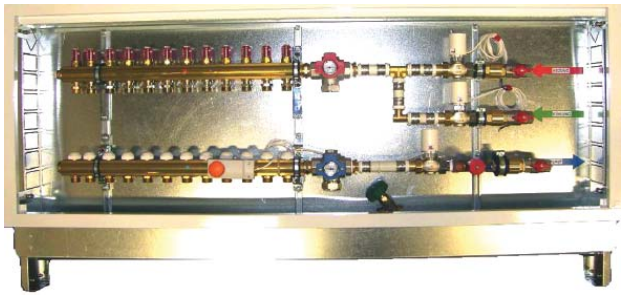
The 2-point control of the underfloor heating circuits is done by pre-installed actuator drives which are wired in the switch box. Room temperature controller devices supplied by HERZ as well as external control signals have to be wired in the switch box.

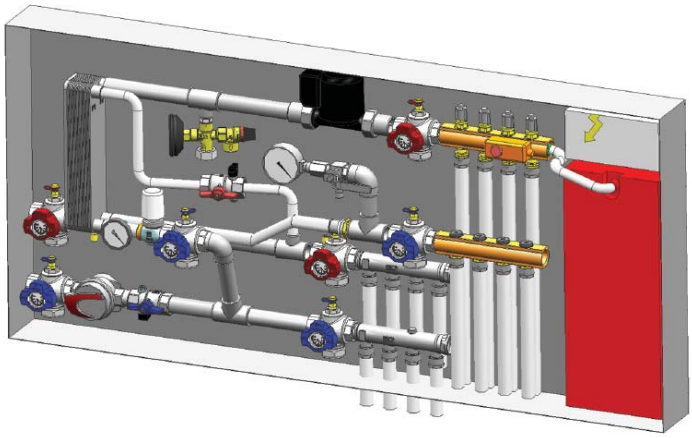
HERZ Distributor stations for heating and cooling

Distributor stations for surface heating and cooling with common return flow. Control is effected by zone valves that are controlled by room thermostats. The return flow temperature control is also done by a zone valve. The flow rate is controlled by means of a circuit regulating valve. It is possible to install heat meters for individual calculation. A shutoff valve for the drinking water supply is supplied. The distributor station can be delivered with or without the distributor cabinet.



Project:
Dubotechnick b.v.
New HERZ Control
Renovatie & Nieubouw “De Lichttoren”
Te Eindhoven
Netherlands





Heat Transfer Systems for Home Connections in modular design

These heat transfer systems are equipped and manufactured according to requirements. The advantage of the installation is its' functional and ready to use distributor station. These heat transfer stations mainly consist of HERZ standard parts, i.e. spare parts are available worldwide at short notice.

The basic module has the simplest design for the heating system. Various combinations are possible with this basic module and are pre-assembled in a built-in wall cabinet.

The primary circuit consists of shutoff ball valve, bleeding and draining device, flushing unit, insertion sleeve, filter, and panel heat exchanger, connection piece for heat meter, manometer and thermometer.

The secondary circuit consists of 3-way valve, heating pump, bleeding and draining device, flushing unit, safety valve for 3 bar, overflow valve, shutoff ball valve, filter, thermometer and manome

Unit connection with hydraulic circuit breaker by means of panel heat exchanger

Manual temperature control of the secondary circuit

- **Maximum operating temperature primary circuit 130 °C**
- **Maximum operating pressure primary circuit 10 bar**
- **Maximum operating temperature secondary circuit 110 °C**
- **Maximum operating pressure secondary circuit 3 bar**
- **Nominal power approximately 10 kW**
- **Power supply 230 V-, 50 Hz**

Pre-assembled inside a distributor cabinet (zinc-plated sheet steal), front frame and front door white powder coated (RAL9010), built-in depth 110 mm, cabinet height 705-775 mm and width 1500 mm.

HERZ multi-functional ball valve

When heating systems are completed by the builder it must be ensured that the installations have been flushed according to ÖNORM B 2531-1. The HERZ multi-functional ball valve makes this system flushing easier and therefore reduces the working time.

According to ÖNORM the flushing is required every two minutes with a flow velocity of 15 m/s. Thanks to its large outlets the HERZ multi-functional ball valve guarantees this requirement (1 ¼ or 1).

Ball valve with 4 connections to be installed in cold or hot water piping in the form of isolation valve, fill cock and drain valve. Especially suitable for flushing and filling of floor heating, ceiling or wall heating or cooling systems.

Multi functional ball valve DN 25 with red handle
HERZ Order number 1 **2414** 02

Multi functional ball valve DN 25 with blue handle
HERZ Order number 1 **2415** 02

Ball valve with T bore, i.e. 3 outlets are constantly open. Various application options for bleeding, draining, connection of manometer or temperature sensors and many more.

Technical data:

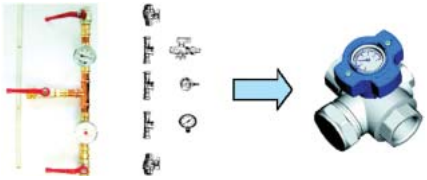
Maximum operating pressure 25 bar
Minimum operating temperature -10 °C
Maximum operating temperature 110 °C
Heating water quality in accordance with ÖNORM H 5195 or VDI guideline 2035.

Threaded connection DG G1
Threaded connection for flushing,
Rp 1 1/4 + G1
Threaded connection 1/2 with plug

Hand wheel with integrated thermometer for direct reading of medium temperature.

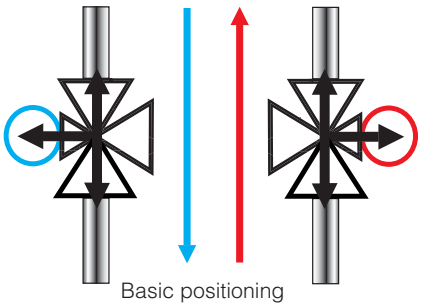
The HERZ multi functional valve does not need any special maintenance operation. It is recommended that the hand wheel be turned 360 °C twice per year.

Thanks to the short face to face dimension and the various functions, the HERZ multi-functional ball valve can be installed compactly and inexpensively in different places.

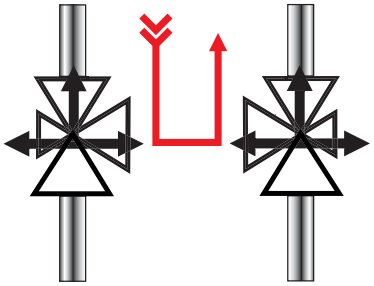


Traditional installation

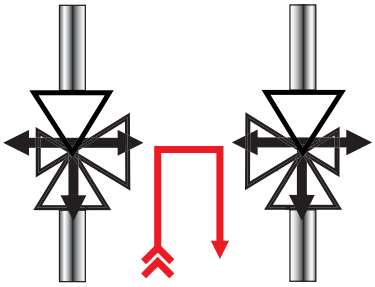
HERZ multi-functional ball valve



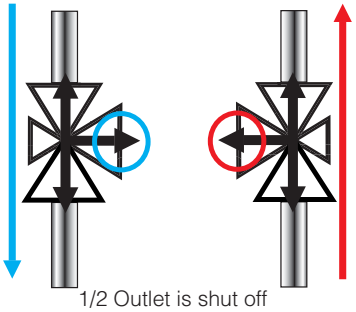
Basic positioning
Filling & flushing
outlet are shut off



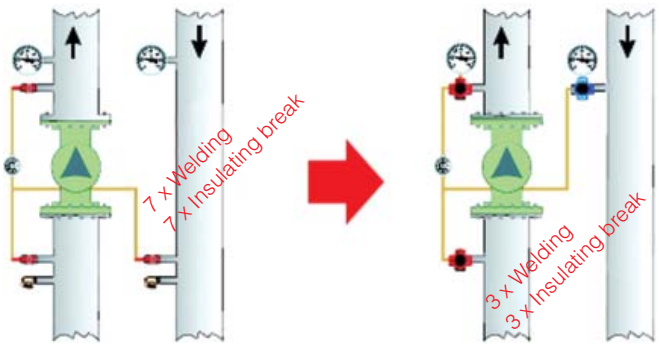
"Up" is accessible
"Down" shut-off
"Flush top"



"Up" is accessible
"Down" shut-off
"Flush top"



1/2 Outlet is shut off
Multi-functional opening
Shut-off for maintenance/
changing



Pressure tests

Pressure test for floor heating according to DIN4725

The piping is put under pressure and ventilated.
The water pressure is to be tested directly before and after the Screed is laid.

The test pressure must correspond to 1.3 times the operating pressure of the equipment and may fall by 0.2 bar maximum during the test period. The system must remain water-tight.
During the laying of the screed, the pressure in the pipes must be reduced to the maximum permissible operating pressure.

A pressure test of 6 bar is recommended over a period of 24 hours.

Pressure test for wall heating

The piping is put under pressure and vented. The test pressure is 1.3 times higher than the maximum operating pressure, however, at least 5 bar over pressure.

A report is to be written on the density and test pressure. Then the operating pressure is set, which must then be maintained even during cleaning.

- recommendation:

We recommend that the piping be flushed out with warm water at least three times before the equipment is started up, in order to remove dirt or manufacturing residues from the equipment. We also recommend the installation of strainers.

Drying out of screed via hot water floor heating (laying preparation)

Principally the preparation **for the laying of screed (residual moisture) is essential before installing the floor covering.** especially for the laying of wooden floors.

The remaining humidity of cement screed must not exceed 1.8%. For anhydrite floors the value of 0.3%. should not be exceeded. The surface must be solid and dry. After manufacturing and corresponding laying time of the screed (approximately 4 weeks) as well after functional heating, the preparation for the laying of screed must be specified by means of CM measuring, which is critical for the installation of the floor covering. The drying times of the screed may vary depending on the manufacturer. Foil test: Place the PE foil approximately 50 x 50 cm on the floor-fill and stick using adhesive tape. At the maximum flow temperature, it is essential that within 12 hours no condensation water is found underneath the foil. During this time the room must be ventilated.

This corresponds to a residual moisture of approximately 0.1 %. **The coating test does not replace the CM measurement! The floor-layer decides whether heating of the screed is necessary.** During this heating the flow temperature is increased daily in 5 °K stages. As soon as 2/3 of the heat load is achieved the screed is constantly heated for a period of approximately 2 weeks.

Then the heating is sharply reduced for another 3 days. The moisture which had been forced to the bottom will then return to the top again. After this step the screed will be again heated for one week with a 2/3 heat load.

Before laying the top covering the temperature must be decreased.

Functional heating for wall heating

Wall heating with cement filler or putty may only be heated after a 21-day period.

If plaster or loam has been used, the heating may only be started after 7 days.

Please take note of the manufacturer's instructions.

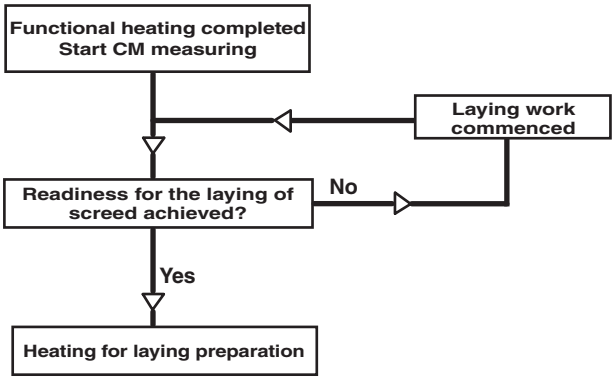
The functional heating starts at an advance temperature of 25 °C, which should be respected for 3 days. After this period the value is increased to the maximum flow temperature, which then has to be respected for 4 days. When using wall heating with wall coverings (HERZ air-conditioning system) the functional heating can be started right after the installation.

Maximum allowable moisture of the screed determined by means of a CM measuring device

Floor covering	Cement screed	Anhydrite screed
Elastic coverings	1.8	0.3
Textile coverings, steam-tight	1.8	0.3
Vapour permeable	3.0	1.0
Parquet/cork	1.8	0.3
Laminates	1.8	0.3
Ceramics, natural stone, thick mortar bed	3.0	-
Thin mortar bed	2.0	0.3

Guide values for floor coverings glued all over the floor heating

Floor covering	Thickness (mm)	Heat conductivity (W/(mk))	Thermal resistance (m^2 K/W)
Mosaic parquet (oak)	8	0.21	0.038
Multi-layer parquet	11-14	0.09-0.12	0.055-0.076
Strip flooring (oak)	16	0.21	0.09
Laminates	9	0.17	0.044
Ceramics	13	1.05	0.012
Marble	12	2.1	0.0057
Natural stone plate	12	1.2	0.01
Concrete stone	12	2.1	0.0057
Carpet		-	0.07-0.17
Needle felting	6.5	0.54	0.12
Plastic covering	3.0	0.23	0.011
PVC without support	2.0	0.20	0.010



Heating report for heating for laying preparation for heating floor-fill

Builder:	Installing company:
Building site:	Project manager:

☐ Cement screed, brand: _____

☐ Anhydrite screed, brand: _____

☐ Others, brand: _____

Heating system:	Medium Thickness of screed: _____ mm
Installation of screed on:	Covering over of heating element: Min: mm Max: mm

Heating (heating for laying preparation):

Date	Outside temperature °C	Intake flow temperature °C	Signature

Drying testing:

Date	Drying method	yes/no	Signature

Decrease of Flow temperature:

Date	Outside temperature °C	Intake flow temperature °C	Signature

Heating for laying preparation completed:

Date	Outside temperature °C	Intake flow temperature °C	Signature

Place / Date: .....

Signature of project manager: .....

Heating report for heating for Wall Heating

Builder:	Installing company:
Building site:	Project manager:

☐ Cement putty, brand: _____

☐ Plaster, brand: _____

☐ Others, brand: _____

Heating system:	Medium Thickness of coating: _____ mm
Application of plaster on:	Covering over of heating element: Min: mm Max: mm

Heating up:

Date	Outside temperature °C	Intake flow temperature °C	Signature

Functional heating:

Date	Outside temperature °C	Intake flow temperature °C	Signature

....

Place / Date: **Signature of project manager:**

Pressure test procedures for plate system for heating

Builder: Building site:	Installing company: Project manager:

Heating/cooling type (floor/wall/ceiling): _____

Pipe material/Pipe connection (product/type): _____

Type of pipe connections (pressed/screwed/welded): _____

System/distribution partner: _____

Pressure test:

Test pressure _____ **bar** **Test start on** _____ **at** _____ **h**

Test pressure _____ **bar** **Tested on** _____ **at** _____ **h**

Pressure loss during test period _____ **bar**

Result of visual check: _____

.....	.....	.....
Place / Date:	**Signature of project manager:**	**Signature of builder:**

Reference table for HERZ pipes

According to heat capacity or flow. Values are only given for water, 70 °C and 20 °C temperature difference and the pipe selection.
A pipe network calculation is required for piping with press fittings. Grey background fields should not be used.

kW capacity		1	2	3	4	5	10	15	20	25	30	35	40	45	50	60	70	80	90	100	150	200
Water capacity l/h		**43**	**86**	**129**	**172**	**215**	**430**	**645**	**860**	**1075**	**1290**	**1505**	**1720**	**1935**	**2150**	**2580**	**3010**	**3440**	**3870**	**4300**	**6045**	**8600**
Pipe 14 x 2	**Pressure loss Pa/m**	46	150	302	499	731	2501	5147														
	Flow rate m/s	0.15	0.3	1.28	0.61	0.76	1.52	2.28														
Pipe 16 x 2	**Pressure loss Pa/m**	17	63	128	210	310	1048	2150														
	Flow rate m/s	0.11	0.21	0.32	0.42	0.53	1.06	1.59														
Pipe 18 x 2	**Pressure loss Pa/m**	7	31	62	101	149	502	1029	1566													
	Flow rate m/s	0.08	0.16	0.23	0.31	0.39	0.78	1.16	1.48													
Pipe 20 x 2	**Pressure loss Pa/m**	3	16	33	54	79	266	544	906													
	Flow rate m/s	0.06	0.12	0.18	0.24	0.3	0.59	0.89	1.19													
Pipe 26 x 3	**Pressure loss Pa/m**					38	92	188	312	464	641											
	Flow rate m/s					0.23	0.38	0.57	0.76	0.95	1.14											
Pipe 32 x 3	**Pressure loss Pa/m**					8	27	54	89	133	183	241	305	376	454							
	Flow rate m/s					0.11	0.23	0.34	0.45	0.56	0.68	0.79	0.9	1.01	1.13							
Pipe 40 x 3.5	**Pressure loss Pa/m**						9	17	29	43	59	77	98	120	145	201	265	336				
	Flow rate m/s						0.14	0.21	0.28	0.35	0.42	0.49	0.56	0.63	0.7	0.84	0.98	1.12				
Pipe 50 x 4	**Pressure loss Pa/m**								9	14	19	24	31	28	46	63	83	106	131	158	327	
	Flow rate m/s								0.17	0.22	0.26	0.3	0.35	0.39	0.43	0.52	0.6	0.69	0.78	0.86	1.29	
Pipe 63 x 4.5	**Pressure loss Pa/m**										6	7	9	11	14	19	25	32	39	47	98	146
	Flow rate m/s										0.16	0.18	0.21	0.23	0.26	0.31	0.37	0.42	0.47	0.52	0.78	1.04

Recomended area

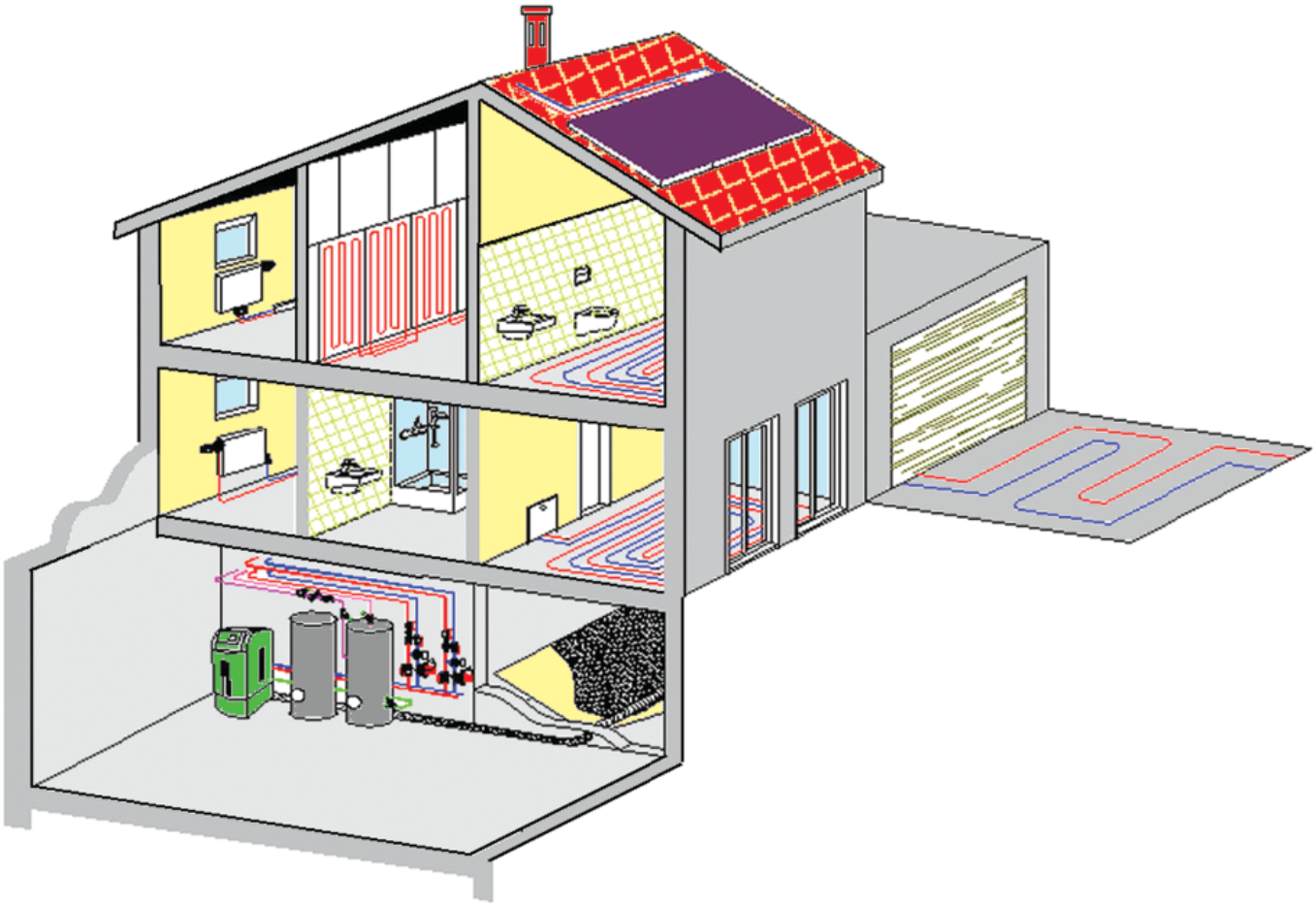
Border area

Quick reference/summary of HERZ pipes, dimension 16 x 2.0 mm

Power of surface heating W/m²					40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130
Surface temperature of surface heating at a room temperature of 20 °C					24	25	25	25	26	26	27	27	27	28	28	29	29	29	30	30	31	31	31
Surface temperature of surface heating at a room temperature of 24 °C					28	29	29	29	30	30	31	31	31	32	32	33	33	33	34	34	35	35	35
Intake flow temperature **40 °C**	Room temperature **20 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm	250		200		150			100				70							
		(m³K)/W		Amax in m²	36.7		30.3		22.1			14.3				8.9							
		Rλ.B=0,02	wood/ parquet	VA in mm		200		150		100			70										
		(m³K)/W		Amax in m²		30.2		22.4		15.5			9.75										
		Rλ.B=0,02	Carpet	VA in mm	200		150		100		70												
		(m³K)/W		Amax in m²	28.3		18.9		12.4		9.8												
		Rλ.B=0,02	Ceramic tiles	VA in mm	200	150	100																
		(m³K)/W		Amax in m²	25	20	13.5																
	Room temperature **24 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm	200		150		100			70											
		(m³K)/W		Amax in m²	28.3		20.8		14.3			8.5											
Intake flow temperature **45 °C**	Room temperature **20 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm		250			200			150				100				70			
		(m³K)/W		Amax in m²		38.1			28.8			20.3				14.5				9			
		Rλ.B=0,02	wood/ parquet	VA in mm				200		150			100			70							
		(m³K)/W		Amax in m²				30		20.6			14.4			8.7							
		Rλ.B=0,02	Carpet	VA in mm	250		200		150		100	70											
		(m³K)/W		Amax in m²	36.5		26.4		17.6		12.6	8.8											
		Rλ.B=0,02	Ceramic tiles	VA in mm	250	200	150	100															
		(m³K)/W		Amax in m²	36	28.3	18.5	11.7															
	Room temperature **24 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm		200			150		100					70							
		(m³K)/W		Amax in m²		31.2			20.5		14.5					9.5							
Intake flow temperature **50 °C**	Room temperature **20 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm					250		200			150			100						
		(m³K)/W		Amax in m²					39.3		32.2			22			11.3						
		Rλ.B=0,02	wood/ parquet	VA in mm						200			150			100				70			
		(m³K)/W		Amax in m²						31.3			21.9			12.1				8.5			
		Rλ.B=0,02	Carpet	VA in mm			250	200		150			100			70							
		(m³K)/W		Amax in m²			40	34.5		24.8			15.4			8.4							
		Rλ.B=0,02	Ceramic tiles	VA in mm		250	200		150		100		70										
		(m³K)/W		Amax in m²		40	33.4		23.9		23		8.5										
	Room temperature **24 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm				200			150			100						70			
		(m³K)/W		Amax in m²				34.5			24.5			16.2						9.7			
Intake flow temperature **55 °C**	Room temperature **20 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm							250		200			150							100
		(m³K)/W		Amax in m²							38		29.5			21.6							18
		Rλ.B=0,02	wood/ parquet	VA in mm								200			150			100					
		(m³K)/W		Amax in m²								30.5			21.5			15.5					
		Rλ.B=0,02	Carpet	VA in mm				250		200			150			100			70				
		(m³K)/W		Amax in m²				39.4		32.3			23			15.5			8.5				
		Rλ.B=0,02	Deep-pile carpet	VA in mm			250		200		150			100	70								
		(m³K)/W		Amax in m²			40		32.5		22.5			14	7.9								
	Room temperature **24 °C**	Rλ.B=0,02	Ceramic tiles	VA in mm						200				150				100			70		
		(m³K)/W		Amax in m²						32.5				23.7				17.3			15		

Overview reference for thermomotors and thermostatic valves

	DN	kvs	dp max.	l/h	Watt	1 **7990** 00	1 **7980** 00	1 **7710** 00	1 **7710** 01	1 **7711** 18	1 **7711** 80	1 **7711** 81	1 **7712** 11	1 **7712** 50	1 **7712** 51	1 **7712** 80
1 **7760** 21	10	0.16	2.5	253	1.177					✓	✓	✓				
1 **7760** 01	10	0.4	2.5	632	2.942					✓	✓	✓				
1 **7760** 02	10	0.6	2.5	949	4.413					✓	✓	✓				
1 **7760** 03	10	1.0	3	1.732	8.058					✓	✓	✓				
1 **7760** 04	10	1.6	3	2.771	12.892					✓	✓	✓				
1 **7760** 05	15	2.5	3.5	4.677	21.758					✓	✓	✓				
1 **7760** 07	15	3.5	3	6.062	28.201					✓	✓	✓				
1 **7760** 08	20	4.5	1.5	5.511	25.639					✓	✓	✓				
1 **7217** 67	15	1.1	0.2	492	2.288	✓	✓	✓	✓							
1 **7217** 11	15	1.0	0.2	447	2.080	✓	✓	✓	✓							
1 **7217** 21	15	2.0	0.2	894	4.161	✓	✓	✓	✓							
1 **7217** 01	15	4.9	0.2	2.191	10.194	✓	✓	✓	✓							
1 **7217** 02	20	5.3	0.2	2.370	11.026	✓	✓	✓	✓							
1 **7217** 03	25	7.6	0.2	3.399	15.811	✓	✓	✓	✓							
1 **4037** 15	15	4	4	8.000	37.216								✓	✓	✓	✓
1 **4037** 20	20	6.3	3	10.912	50.762								✓	✓	✓	✓
1 **4037** 25	25	10	2	14.142	65.789								✓	✓	✓	✓
1 **4037** 32	32	16	1.5	19.596	91.160								✓	✓	✓	✓
1 **4037** 40	40	25	1	25.000	116.300								✓	✓	✓	✓
1 **4037** 50	50	40	0.8	35.777	166.435								✓	✓	✓	✓



Commissioning and regulation made easy

STRÖMAX-M 4017 M

HERZ-STRÖMAX-MS

4218 GMF

4218 GF

4218 AGF

HERZ-STRÖMAX 4218 GF, 4218 GMF und 4218 AGF

Circuit regulating valve

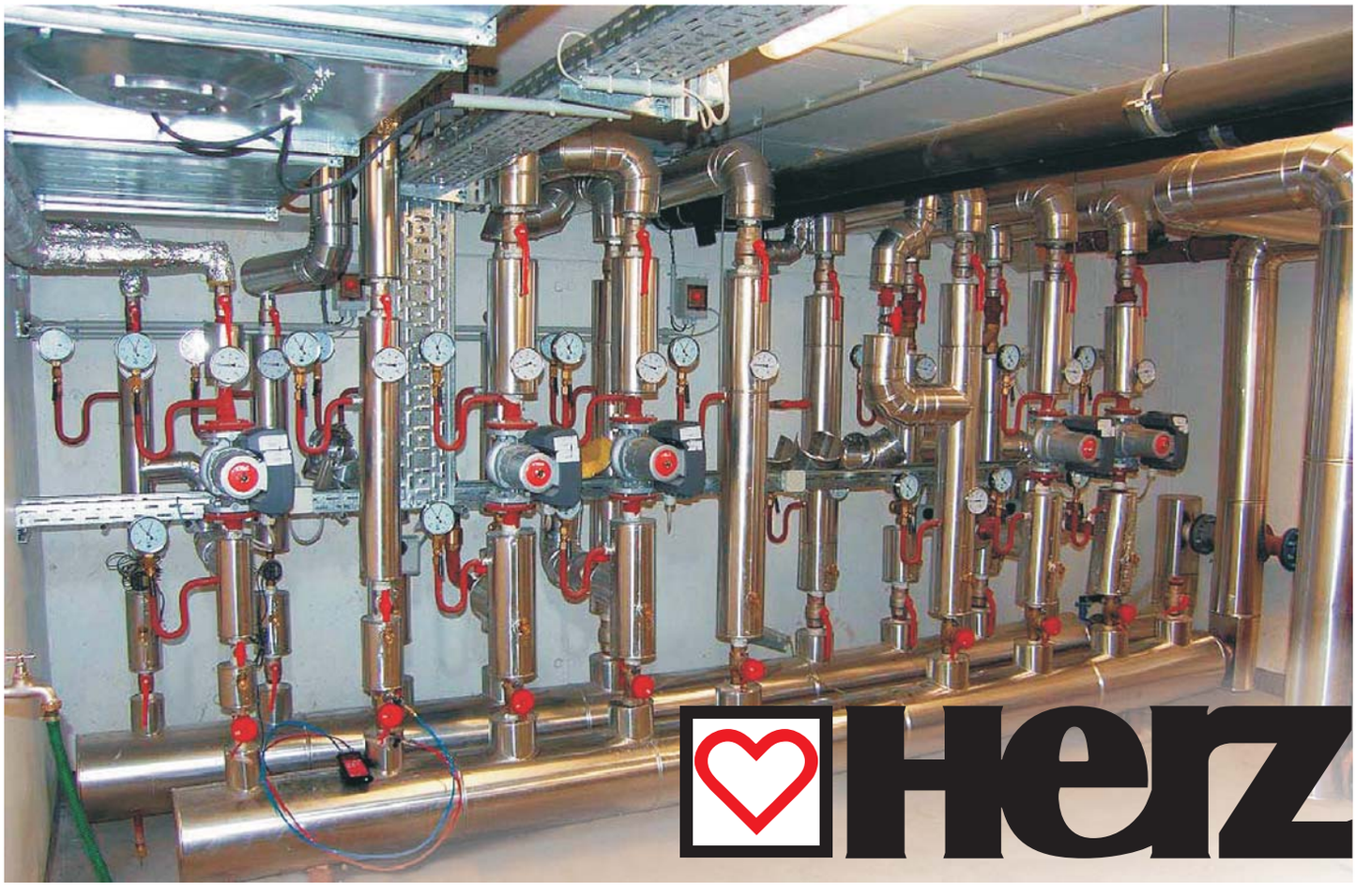
HERZ-Differential pressure controller 4007

HERZ-STRÖMAX-TS-E

HERZ-STRÖMAX-TS-98-V

HERZ-STRÖMAX 4117 MW

HERZ-Measuring Computer



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