ENSTO

Saves Your Energy

Electrical Heating Solutions

Energy efficient building technology

Electrical heating

This brochure provides practical tips for energy efficient electrical heating solutions, installation as well as benefits homeowners will be enjoying for years to come.

Ensto electrical heating products offer a great combination of energy efficiency, comfort, safety, reliability, flexibility and low capital costs. Add ease of installation and an almost non-existent need for the maintenance – Ensto electrical heating is clearly the smart choice.

Content

Ensto Hybrid House

Meets all challenges

Ensto Hybrid House owes its brilliance to an energy-efficient ventilation system with integrated heat recovery and precise, controlled electric heating. This combination ensures a high comfort of living while guaranteeing a low initial heating system investment as well as low running costs.

The Ensto Hybrid House building technology solutions surpass strict Finnish building code requirements for energy-efficiency. Hybrid House technology is a sustainable investment in which smart and cost-efficient building technology enables carefree, energy-efficient and healthy living.

Comparison values NBCF 2010 W/m^{2}K	
Wall	0.17
Upper floor	0.09
Base floor (foundation slab)	0.16
Doors, windows	1.0
Air leakage n50	2.0 1/h
Heat recovery yearly efficiency	45 %

Going beyond the new energy-efficiency regulations

The Ensto solutions are designed and built to comply and surpass the EU regulations, so you know you are getting the best in the market when it comes to efficiency and quality. Over the years the investment pays itself back through lower electric bills and clear savings. But energy-efficiency is also important when renovating an older house.

The greatest savings are achieved in indoor heating costs

With respect to conventional houses, heating corresponds to approximately 65 % of the building's energy consumption. The net heating energy demand of a low energy building is 40–60 kWh m^2/a. Correspondingly, according to European definitions in a passive house, the heating energy requirement is 15 kWh m^2/according to the Passive House Institute. In a low energy house, the requirement for heating energy is clearly smaller than for a conventional house. Short-term heating requirements can be covered by electrical heating, for example, which is available for a low investment cost. During the life cycle of a building, a small heating energy requirement translates into notable savings.

Ventilation is the basis of a healthy indoor climate

Ventilation ensures that indoor air is clean and healthy by filtering harmful particles from outdoor intake air, and by removing air containing impurities. High performance ventilation keeps living quarters slightly under-pressurized to minimise moisture damage to the structure, thus preventing mould damage. Proper ventilation is the cornerstone of a safe and healthy low-energy building.

Controls ensuring that building technology function together

Functional building technology requires the energy-efficient adjustment of heating, ventilation and cooling systems to ensure that energy is consumed in accordance with requirements. At best, control and adjustment is easily accomplished both locally, using a simple interface, and remotely by mobile phone.

On demand energy-efficient and comfortable lighting when you need it

Lighting energy can be saved by making the most of control systems and daylight. Savings and extra comfort can be created using efficient lighting control based on motion detection.

Saving energy is an investment in the future

By using the right building technology solutions for energy saving, you can guarantee permanently low energy costs throughout the life cycle of the building. You will save money, while reliable solutions will not burden you with servicing needs. A small initial investment in energy saving will keep your house warm, despite the uncertain energy future.

Ensto Hybrid House

Energy-efficient solutions

Ensto Hybrid House combines the best technologies to create an energy-efficient, cost-effective and more comfortable alternative. The solutions work whether you are building new or renovating a property.

Ventilation

- Ventilation ensures good and healthy indoor air quality.
- An efficient heat recovery system transforms wasted heat into energy.
- The air-source heat pump integrated into the ventilation system produces cost effective heat while reducing the need for electric heating.
- According to the new strict Finnish building regulations, the annual heat recovery efficiency ratio for ventilation equipment must exceed 45%. Ensto Enervent ventilation system's annual heat recovery efficiency is over 70 %. And thanks to the integrated air-source heat pump, the efficiency figures can exceed 90%.
- The rotating heat exchanger of the Enervent ventilation system keeps humidity at a healthy level by retaining some from the moisture in the used air and transferring it back into fresh incoming air. This feature is especially welcome in winter when the air inside the house is dry.

Heating

- The benefits of modern electric heating are low cost of initial investment, minimum energy loss, and quick and accurate response time to temperature changes.
- Electric heating combined with a ventilation system equipped with integrated heat recovery is the ideal choice for new, airtight houses built in accordance with the latest building regulations.
- An effective electric heating system can be built using electric panel heaters, floor heating cables or mats.

Control system

- Controls the electricity consumption, heating, ventilation, socket outlets, water supply, and alarm systems in your home.
- Monitors your home and gives an alarm, if necessary.
- Can be used either on site or remotely via a mobile phone.
- Ensures energy-efficiency, comfort, and safety.

- Ensto eGuard monitors on the energy consumption of your home and helps you live more energy-efficiently.
- eGuard measures electricity, water and district heating consumption.

- Ensto offers energy-efficient indoor and outdoor lighting.
- Ensto motion detector luminaires use up 60% less electricity, saving you money, while improving the comfort and safety of your home.
- eLED lighting is up to ten times more energy efficient than regular light bulbs. Switching to eLEDs multiplies the life span of your luminaires and cuts maintenance costs considerably.

- Safe and stylish electricity distribution and data connection.
- A comprehensive, flexible and easy to control system that adapts to your needs.

- Be ready to start energy efficient motoring. Equip your home with an easy-to-use and safe electric vehicle charging pole.

New, airtight houses do not require extensive heating systems. All you need is a ventilation solution equipped with a heat recovery system and an integrated air-source heat pump, with rapid, accurately adjusting electric panel heaters for possible top-up heating.

Finding the right solution
for new buildings and renovation

When choosing a heating system, the total costs, low maintenance, safety, personal preferences and user-friendliness have a significant influence on decision-making. A heating system is a long-term investment, and its reliability is a major comfort factor. Naturally, the choice also has a great influence on energy efficiency.

Criteria	Feature
Costs	• Energy pricing and tariff structures • Maintenance, construction and running costs • Expectation of energy price development • Total energy consumption
Benefits of the heating system	• Easy to use • Reliable in daily use • Thermal comfort • Health and safety • Possibility to design interiors with fewer limitations • Possibility to use additional heat sources
Investment costs	• Building, renovation and subscriber costs • Other related costs (insulation, space requirements etc.) • Life time expectancy

Renewing a heating system

Renewing or changing a functioning heating system is usually needed when living comfort and energy efficiency have to be increased. Before the final decision is made, the following needs must also be taken into account: What kind of structural improvements does the building require, and is there a need for better ventilation and air conditioning.

Heating should be planned in the same way as for a new house, when

- changing the whole heating system
- improving the structures (better insulation, windows etc.)
- enlargement of the building
- changing the purpose of the building
- improving the ventilation system

Tip:

Floor structures should be insulated to ensure that the heat flow is directed upwards. Otherwise, the heat flow will also be directed into the structure. This will remarkably improve the energy efficiency of the building.

Reason for renewal	Need/problem	Solution
Bathroom renovation	• Reduction of humidity • Increased comfort	• Ventilation • Underfloor heating
Existing under-floor heating	• Not working	• Measurement of heating cable and thermostat. Repair/change non-working products
Cold floor	• Increasing comfort	• Underfloor heating
Updating of old panel heaters	• Lower heater surface temperature • Ticking thermostat • Heater in poor condition	• Change the panel heaters
Changing or renewing the heating system	• Old obsolete system	• Electrical heating solution

Designing an electrical heating system

Finding a successful heating solution is not just a question of the right heating devices – there are also many other factors that affect the designing e.g. structures and surfaces, heating control, adjustments, and other heat sources.

Heat losses in buildings

The building's heat loss forms the starting point when designing a heating system. To plan an efficient heating system, a heat loss calculation is needed for each room. The room specific wattage is gained from the calculation, enabling the right choice of devices.

To complete a heat loss calculation, the following is the minimum information needed:
- the area of each building element in square metres
- the thermal transmittance of each building element
- the design temperatures (external, internal)
- ventilation system data
- external air exchange rate

Heat loss in a new detached house with normal insulation is typically 15 to 25 W/m^3 (~ 45 to 70 W/m^2). Whereas, in low-energy houses, the heating requirement may be below 10 W/m^3.

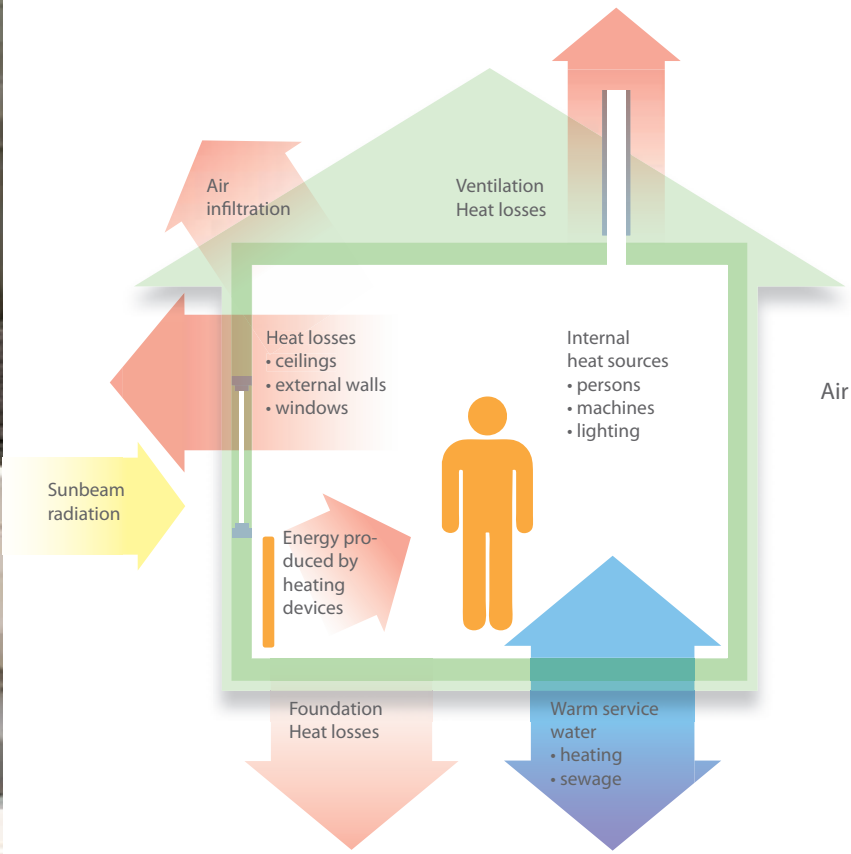
Panel Heaters

Panel heaters have nearly 100 % efficiency, so they can be chosen based on room-specific heat loss. The heater's width should, however, be close to the width of the window.

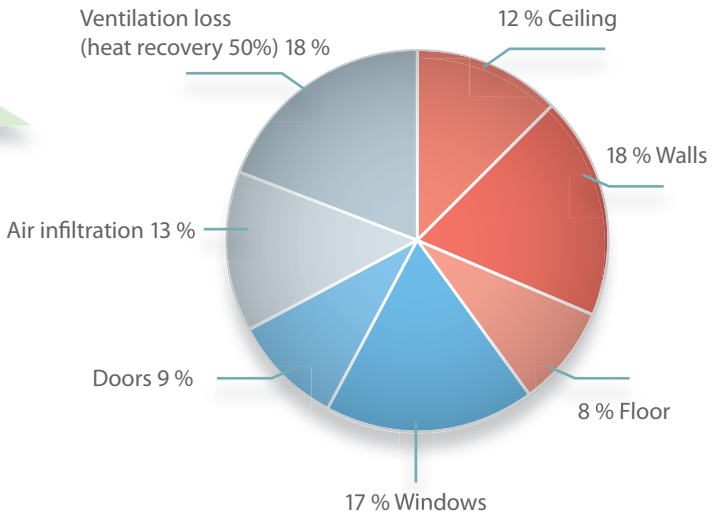
Underfloor Heating

When designing underfloor heating for an area the calculated heat loss and the calculated installation spacing must be taken into consideration. The recommended installation power for continuously operating underfloor heating is around 70 to 100 W/m^2 for concrete floors and 70 to 80 W/m^2 for wooden and plasterboard floors. The cable type used for concrete floors has a power-per-meter rating of 20 W/m. In wooden and plasterboard floors, and in spaces with very low heat loss, 10 W/m cable can also be used. When designing underfloor heating, you should check whether sufficient heating power is conducted from the floor to the room without unpleasant rises in floor surface temperature (conducted power around 10 W/m^2 K). In order to guarantee sufficient power, the installation area of underfloor heating should be around 80 to 90 % of the room's surface area.

Heat losses and heat sources in buildings



The heat loss distribution of the building



Heating control and adjustment

Fast responding heating control is important for both living comfort and energy efficiency. The most common control requirements are temperature according to room use, and the possibility to reduce temperature when absent.

Controlling continuous heating

Continuous heating systems are usually non storage-based. Heating can be planned to respond quickly to changing needs by using thermostats or other control systems. Continuous heating of a concrete floor is controlled, depending on the room, either solely by floor or as a combination of floor and room temperature. With highly conductive flooring materials such as clinker, the floor temperature can be the deciding factor. The speed and accuracy of underfloor heating depends on the structure: Slab thickness and flooring material.

Control systems

ECO601 control system is based on three different scenarios: Away, Arriving, and Present. Control commands can be entered on-site via the controller or remotely by telephone call or via SMS message.

Control of other devices

The ECO601 will control all devices connected to it, e.g. heating, ventilation, socket outlets, water valves, lighting – however you wish your property to function.

The device also monitors your property while you are away. You can connect various alarm systems to the device, monitoring your property for occurrences such as power failures, burglaries, fire, and excessive humidity.

Ensto eGuard Home energy monitor

Ensto eGuard an easy way to monitor and manage the energy efficinecy and safety at home.

Ensto eGuard makes saving energy and money an easy read. eGuard monitors your home's energy consumption: electricity, water and district heating. It provides information on the overall energy consumption and consumption history of your home, and shows an easy route to energy efficient living, lower electricity bills and eco-friendly lifestyle.

Ensto eGuard energy monitor makes it easy for you to stay on top of the energy consumption in your home.

Heating method	Control method	Features
Panel heaters	Heater specific thermostat	• Even room temperature • Fast response time to the heating requirements • Available as master or slave heaters • Temperature reduction control can be controlled with any phase (230 V)
Underfloor heating	Underfloor heating thermostat	• Floor temperature is controlled by the floor sensor • Floor temperature can be set according to heating requirements • Temperature reduction control can be controlled with any phase (230 V)
Underfloor heating	Combination thermostat	• Floor surface temperature can be limited • Heating according to air temperature • Floor temperature changes according to heating requirements • Temperature reduction control can be controlled with any phase (230 V)

Controlling and adjusting panel heaters

Panel heaters are controlled by heater specific thermostats – electronic or mechanical – often with a built-in temperature reduction function. The reduction function is available in panel heaters with electronic thermostats and is driven by a separate home/away switch or by a control system. The function can be fixed (5 °C) or adjustable (2–20 °C) depending on the panel heater type. Temperature reduction can be controlled with any phase (230 V).

Electronic thermostats are accurate and silent, which makes them ideal for living rooms and bedrooms. Mechanical thermostats are less expensive and better withstand network disturbances. They are used in locations affected by severe weather (thunderstorms) or a low quality electricity supply. When using mechanical thermostats, a slight sound will be heard when the heating is switched on or off.

Controlling and adjusting underfloor heating

Underfloor heating is a stable heating method. The heating power of underfloor heating is directly relative to the temperature difference between the floor and the air. The bigger the difference, the greater the transferred heat. Underfloor heating is controlled either by an underfloor or combination thermostat. The choice is based on the usage of underfloor heating and the calculation of power losses as well as comfortability.

The following questions will help in selecting the right thermostat:

- Is underfloor or ceiling heating used?
- Do the flooring materials used (wood, parquet or laminate) require a thermostat with temperature limitation?
- How much power (W) should be controlled by one device?
- What are the room temperature stability requirements?
- What is the best cost-benefit ratio, a normal underfloor heating thermostat (ECO10) or a dual-mode (ECO16)?
- What is the purpose of the room?
- What is the preferred design and colour of the thermostat?

Product key for thermostats

E	**E**nsto	**J**	**J**ussi
CO	**CO**ntrol	**E**	**E**lko
10	**10** A (2300 W)	**I**	**I**mpressivo
16	**16** A (3600 W)	**D**	**DIN** rail mounting
F	**F**loor	**W**	residual current device
R	**R**oom	**LCD**	Thermostat with display
FR	**F**loor/**R**oom combination		

Panel heaters

– A cost efficient and reliable solution

Heaters are a common solution for the heating of different areas because they are easy to install and replace with new ones. A comfortable level of temperature is reached quickly as most of the energy consumed is transformed into heat. Heaters are suitable for new buildings, renovations, and as an additional heat source.

Common features

All Ensto panel heaters are safe due to their low surface temperature and automatic overheating protection. Heaters with electronic thermostats are accurate, energy efficient, silent and give excellent comfort thanks to even heat distribution. All heaters are made of hot-dip zinc coated steel so they do not rust. Panel heaters are available in different dimensions.

All heaters are double insulated class II devices. The heaters are easily controlled with an on/off switch and a numerical temperature scale. Heaters respond quickly to temperature changes caused by other heat sources and have good efficiency, because they primarily heat room air instead of house structures.

Heaters Beta Mini, Beta and Tupa

Beta-heaters

Beta heaters can be installed in dry and damp areas (IP21). The heaters also have a low surface temperature because of the X-shaped heating element. The heaters can be wall mounted or free standing (with separate feet).

Beta M

- Mechanical thermostat and plug
- Accurate temperature control with +/-0.5 °C thermostat accuracy
- Mechanical thermostat is better to withstand network disturbances and is therefore suitable for use in cottages etc.

Beta E

- Electronic thermostat
- Connection box or plug
- Temperature reduction (5 °C) in models with a connection box
- Extremely accurate and completely silent electronic thermostat, accuracy +/-0.1 °C
- Fast reaction to temperature changes increases comfort and ensures an even room temperature
- The surface temperature of the heater is low because of the electronic thermostat

Beta Mini

- Mechanical or electronic thermostat
- The narrower Beta Mini fits under higher windows and into other confined spaces.

Panel heater with plug

Free standing heater with separate feet

Narrow Beta Mini

Sizing and installation of Beta panel heaters

The following tables are sizing values for reference only. The room area (room height 2.5 meters) or the room volume must be known. A rule of thumb with standard insulation is 15-35 W/m³. For low energy houses it is 15 W/m³ or even lower.

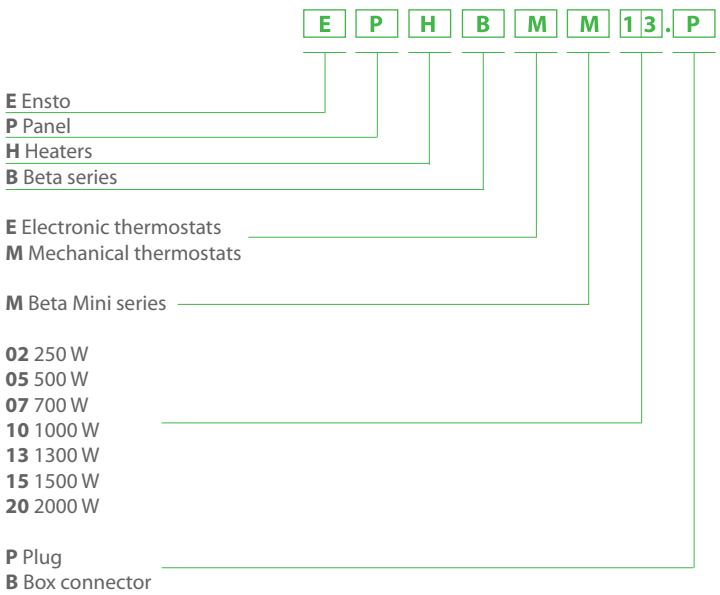
OUTPUT/W	AREA TO BE HEATED (M²) WHEN SIZING OUTPUT IS			VOLUME OF ROOM TO BE HEATED (M³)		
	15 W (M²)	25 W (M²)	35 W (M²)	15 W (M³)	25 W (M³)	35 W (M³)
250	7	4	3	17	10	7
500	13	8	6	33	20	14
750	20	12	9	50	30	21
1000	27	16	11	67	40	29
1500	40	24	17	100	60	43
2000	53	32	23	133	80	57

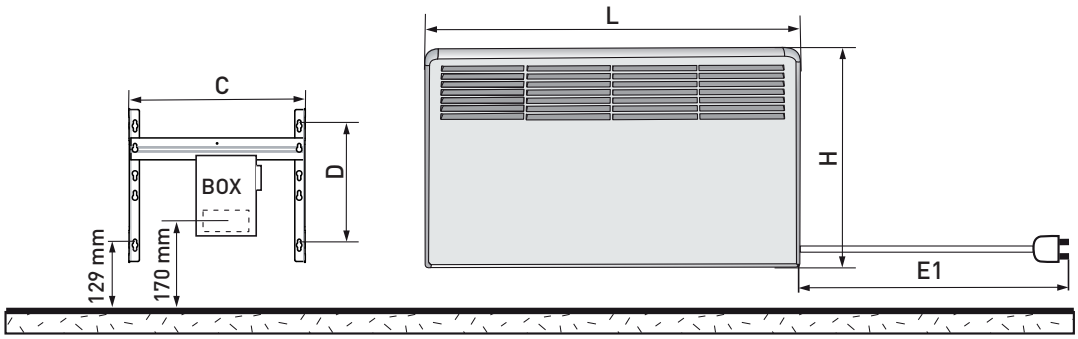
BETA PANEL HEATER	P (W)	U (V)	LENGTH	HEIGHT	WALL BRACKET		PLUG
			L (MM)	H (MM)	C (MM)	D (MM)	E1 (MM)
EPHBM02/EPHBE02	250	230	451	389	300	205	1000
EPHBM05/EPHBE05	500	230	585	389	300	205	1000
EPHBM07/EPHBE07	750	230	719	389	440	205	1000
EPHBM10/EPHBE10	1000	230	853	389	440	205	1000
EPHBM15/EPHBE15	1500	230	1121	389	700	205	1800
EPHBM20/EPHBE20	2000	230	1523	389	1000	205	1800

BETA MINI PANEL HEATER	P (W)	U (V)	LENGTH	HEIGHT	WALL BRACKET		PLUG
			L (MM)	H (MM)	C (MM)	D (MM)	E1 (MM)
EPHBMM02/EPHBEM02	250	230	585	235	300	89	1000
EPHBMM05/EPHBEM05	500	230	853	235	440	89	1000
EPHBMM07/EPHBEM07	750	230	986	235	700	89	1000
EPHBMM10/EPHBEM10	1000	230	1121	235	700	89	1800
EPHBMM13P/EPHBEM13	1300	230	1523	235	1000	89	1800

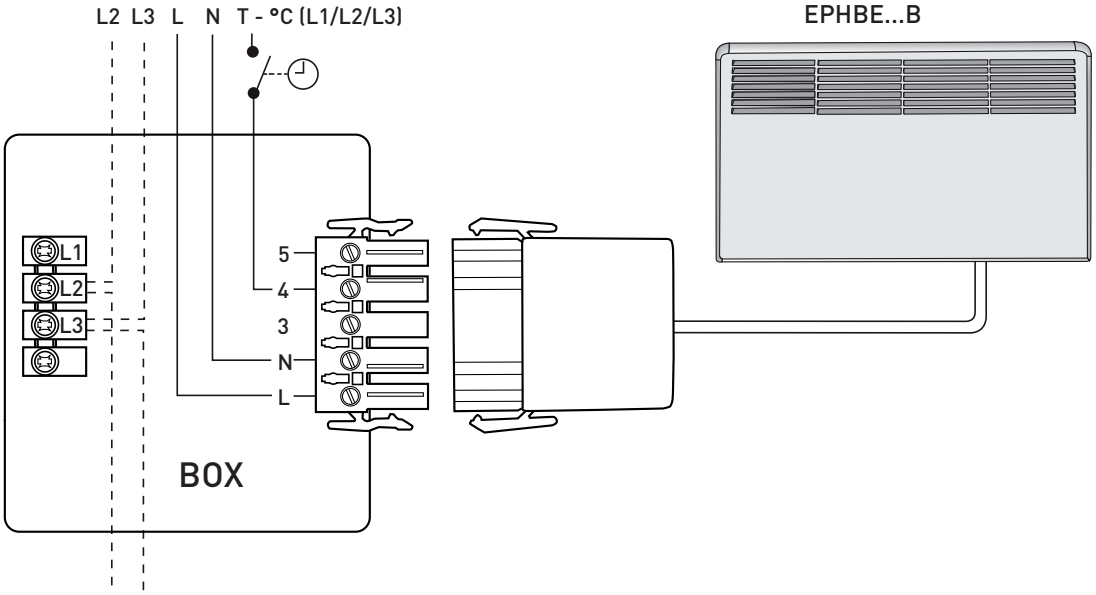
Product code key for Beta and Beta Mini series

EPHBMM13P





U(V) = 230V +10%, -15%, 50 Hz



Tupa panel heaters

Tupa-heaters can be installed in dry and damp areas (IP20, IP24). The product family consists of Taso, Lista, Peta and Roti heaters.

- Connection box
- The heater can be installed also by using a separate connection cable kit (plug)
- Extremely accurate and completely silent electronic thermostat, accuracy +/-0.1 °C
- Adjustable temperature reduction control between 2-20 °C from the set value
- Can be controlled by a separate home/away switch or e.g. by a building automation system (230 V by any phase)
- Taso and Lista heaters are available with or without a thermostat (master/slave)

TASO (IP20) Basic heater for homes and holiday homes

LISTA (IP20) A low profile heater under large windows

PETA (IP20) A cover-proofed heater with manually resetable over-heating protection e.g. for walk-in closets

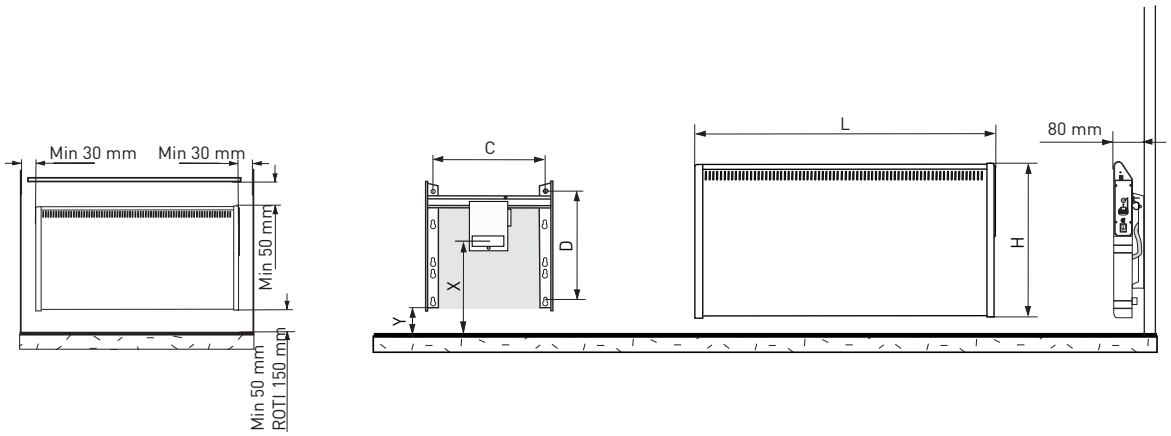
ROTI (IP24) A splash-proof heater suitable for bathrooms, saunas, cellars and garages

OUTPUT/W	AREA TO BE HEATED (M^2) WHEN SIZING OUTPUT IS			VOLUME OF ROOM TO BE HEATED (M^3)		
	15 W (M^2)	25 W (M^2)	35 W (M^2)	15 W (M^3)	25 W (M^3)	35 W (M^3)
150	4	2	2	10	6	4
200	5	3	2	13	8	6
350	9	6	4	23	14	10
500	13	8	6	33	20	14
550	15	9	6	37	22	16
700	19	11	8	47	28	20
800	21	13	9	53	32	23
900	24	14	10	60	36	26
1000	27	16	11	67	40	29
1200	32	19	14	80	48	34

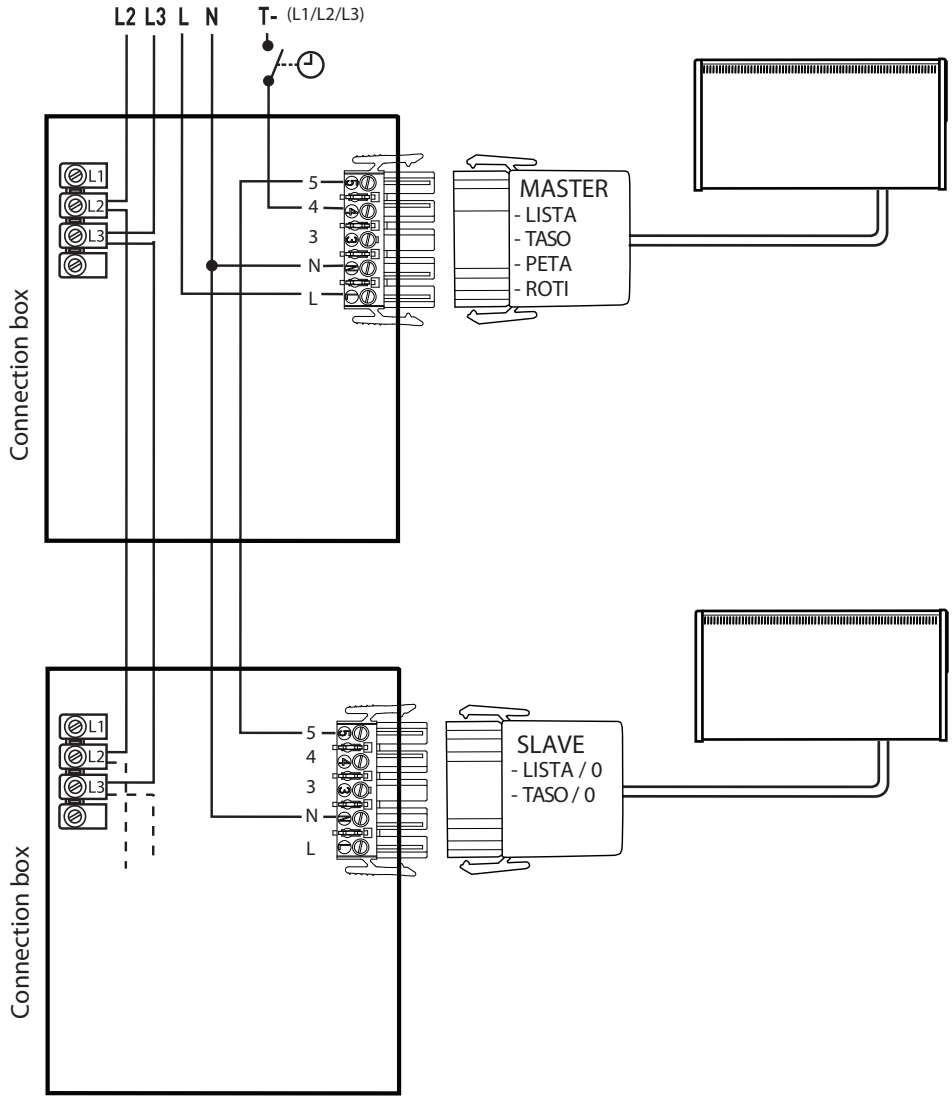
TYPE	P (W)	U (V)	LENGTH	HEIGHT	WALL BRACKET				IP
			L (MM)	H (MM)	C (MM)	D (MM)	X (mm)	Y (mm)	
TASO2	200	230	300	400	100	280	75...200	70	20
TASO3	350	230	500	400	225	280	75...200	70	20
TASO5	550	230	800	400	300	280	75...200	70	20
TASO8	800	230	1100	400	600	280	75...200	70	20
TASO10	1000	230	1370	400	600	280	75...200	70	20
TASO12	1200	230	1670	400	1200	280	75...200	70	20
LISTA2	200	230	500	200	225	90	75	70	20
LISTA3	350	230	800	200	300	90	75	70	20
LISTA5	500	230	1100	200	600	90	75	70	20
LISTA7	700	230	1370	200	600	90	75	70	20
LISTA9	900	230	1670	200	1200	90	75	70	20
ROTI1	150	230	300	400	100	280	200...270	170	24
ROTI3	350	230	500	400	225	280	200...270	170	24
ROTI5	500	230	810	400	300	280	200...270	170	24
ROTI7	700	230	1100	400	600	280	200...270	170	24
PETA2	200	230	500	200	225	90	75	70	20
PETA3	350	230	500	400	225	280	75	70	20

Sizing and installation of Taso, Lista, Roti and Peta panel heaters

The following tables are sizing values for reference only. The room area (room height 2.5 meters) or the room volume must be known. A rule of thumb with standard insulation is 15-35 W/m^3. For low energy houses it is 15 W/m^3 or even lower.



U(V) = 230V + 10%, -15%, 50Hz



Underfloor heating

Comfortable, energy-efficient and evenly distributed warmth

Underfloor heating is suitable for most floor structures and flooring materials as a sole or combined heating solution. Heat storing and the implementation can be either direct, indirect or a combination of both. Underfloor heating and efficient ventilation in damp areas helps reduce the risk of moisture damage. As underfloor heating provides a higher operative temperature, it is possible to lower the room temperature by 1–2 °C without compromising comfort. This will save 5–10 % in heating costs.

Ensto eWoodMat - low-power, quick-response underfloor heating mat

Comfortable living starts with warm feet

Floor heating is a terrific solution for new and renovated buildings alike. A warm floor underneath your feet adds to your comfort of living.

Floor heating generates a higher-than-normal operating temperature, so the room temperature can be reduced by 1–2° without compromising comfort. This alone translates into savings in heating costs.

Ensto eWoodMat saves up to 30% on electricity consumption

The Ensto eWoodMat underfloor heating mat, installed directly under parquet or laminate flooring, is a low-power solution, consuming up to 30 percent less energy than conventional electric floor heating products do.

The heat generated by the Ensto eWoodMat is directed upward instead of being stored in the floor structures. It responds accurately and rapidly to the temperature changes detected by the thermostat.

This is the Ensto eWoodMat's competitive advantage over conventional heat-storing floor heating systems.

Ease of installation in a class of its own

The convenience of the Ensto eWoodMat system becomes apparent during the installation phase. The underfloor heating mat can be installed directly under laminate or parquet flooring that is 8–22 mm thick. It is easy to install and is suitable not only for new buildings but also as an additional heat source in renovated buildings.

The Ensto eWoodMat is designed for installation directly under parquet or laminate flooring. The foil layer of the heating mat distributes heat evenly throughout the surface of the floor. The XPS insulating plate installed under the Ensto eWoodMat prevents heat from being conducted into the floor structures while also reducing heat loss.

TECHNICAL SPECIFICATIONS	
Nominal voltage	230 V, 50 Hz
Nominal power	(W) ~ 5 W/m
Power	(W/m²) 70 W/m²
Resistance	13.5 - 0.20 Ω
Size classes	2, 3, 4, 5, 6, 7, 8, 10, 13 and 16 m²
Cold lead	3G1.0; 1 x 4 m
Thickness and width	4.0 mm ja 500 mm
Standards	EN 60335-1 and EN 60335-2-96.

Tassu and Tassu S underfloor heating cables

Tassu and Tassu S are maintenance-free products for long-term solutions in dry and damp areas. Tassu cable is available as 20 W/m and is used primarily for new concrete floor structures.

Tassu S cable is available as 10 W/m and is used for renovations together with wooden floor structures. Both Tassu-cables are preterminated twin conductor cables and a PVC-sheath.

Tassu

Thin solutions for renovations and thin floor structures

Ensto thin solutions, ThinMat and ThinKit, are easy and fast to install directly on top of an existing floor.

ThinKit

- Ideal for small and cramped areas
- Cable must always be laid on top of a fire proof material
- Round cable does not twist when fastened
- Installations must always be covered with levelling compound

ThinKit with thermostat, cable diameter 4.2 mm

ThinMat

- Can also be installed on top of wooden floor surfaces (e.g. chipboard and plywood)
- ThinMat 100 W/m^2 is sufficient for comfort heating in dry and damp indoor conditions. Whereas, ThinMat 160 W/m^2 is used for structures with less insulation and when concrete, stone or clinker is used as a flooring material
- Wooden surface material can not be used with ThinMat 160 W/m^2
- The cable is enclosed in a strong adhesive mesh that prevents the cable from floating during casting
- Standard width 50 cm
- Installations must always be covered with levelling compound

The low height of the products minimizes additional increase in floor height. Products are easy and fast to install with low total costs and are suitable for concrete, stone and clinker and, with certain limitations, for wood, laminate and parquet.

ThinMat, cable diameter 3.4 mm

Ensto eWoodMat

- The Ensto eWoodMat underfloor heating mat, installed directly under parquet or laminate flooring, is a low-power solution, consuming up to 30 percent less energy than conventional electric floor-heating products do.

Ensto eWoodMat with thermostat ECO16LCD

Designing underfloor heating

Basic planning assumptions:

1. Adequate heating power throughout the cold season
- Power of constant underfloor heating cables is > 1.2 x thermal loss of the calculated area
- Power of partially storing underfloor heating cables is > 1.4 x the thermal loss of the calculated area

2. Floor surface temperature should feel comfortable in use
- Even heat across the living quarters, cable laying distance 10–30 cm
- Adequate floor temperature during warm seasons – not too hot during cold seasons

3. Floor temperature must not damage the flooring materials
- The right choice of flooring materials
- The right choice of temperature according to the flooring material

4. Adequate response speed to changing heating needs
- Concrete thickness 80–100 mm

Selecting heating cables

Choose the right cable type, power output and installation method to suit the flooring material and structure. See the "Sizing and selection chart". Cable installation depth, surfacing and distance between two cables can also affect the system. Local regulations must be taken into account.

Installing underfloor heating to an existing building

The floor structure must be first inspected to determine the best installation method and heating solution. Adding underfloor heating is easier when the floor surfaces are being replaced or the whole floor construction is opened in order to improve insulation. In damp areas (new floor construction), underfloor heating cable is always laid under a waterproofing membrane. The laying distance between heating cables should be 10–20 cm to provide an even surface temperature.

Sizing

Based on the selection of the desired power/m^2, the installation spacing for Tassu, Tassu S and ThinKit cables can be found from the adjacent tables.
Installation spacing can also be calculated based on the following formula:

$$\text{Installation spacing} = \frac{\text{Surface area/m}^2}{\text{Cable length/m}}$$

Example:
The floor area to be heated is 11 m^2 and the selected cable is the Tassu12 with a length of 54 meters. The installation spacing is:

$$\text{Installation spacing} = \frac{11\ \text{m}^2}{54\ \text{m}} = 0.2\ \text{m} = 20\ \text{cm}$$

Power per surface area is calculated using the following formula:

$$\text{Power/W/m}^2 = \frac{\text{Cable power/W}}{\text{Floor surface area/m}^2}$$

$$\text{Power/W/m}^2 = \frac{1160\ \text{W}}{11\ \text{m}^2} = 105.4\ \text{W/m}^2$$

Tassu (20 W/m)

Bending radius min. 40 mm

Power per area	Installation spacing/cm
80	25
90	22
100	20
110	18
120	17
130	15
140	14
150	13

TassuS (10W/m)

Bending radius min. 40 mm

Power per area	Installation spacing/cm
60	17
70	14
80	13
90	11
100	10
110	9

ThinKit (10 W/m)

Bending radius min. 25 mm

Power per area	Installation spacing/cm
60	17
70	14
80	13
90	11
100	10
110	9
120	8.5
130	7.5
140	7
150	6.5

Sizing and selection chart

TYPE	Tassu	Tassu S	ThinKit	ThinMat		eWoodMat	
	20 W/m	10 W/m	10 W/m	100 W/m²	160 W/m²	70W/m²	
NEW CONSTRUCTION							
CONCRETE							
Low heat-loss space	••	•••		•			
Concrete floor, single cast	•••	••					
Concrete floor, doublecast	••	•••					
Concrete/under laminate or parquet						•••	*)
WOODEN STRUCTURE AS SEEN ON PAGE 26		•••					
PLASTERBOARD		•••	••			•••	*)
RENOVATION AND THIN FLOOR CONSTRUCTION							
CONCRETE							
Concrete/Laminate or Parquet		••	•••	•••		••	
Concrete/Tile		••	•••	•••	••		
Plaster board		•••	••	••		••	
WOODEN STRUCTURE AS SEEN ON PAGE 26		•••					
CHIPBOARD AND PLYWOOD/TILE				•••			

••• recommended •• suitable • can be used

*) eWoodMat should be installed on min. 6mm thick XPS insulation plate so the floor material can be wood, concrete, plasterboard etc.

Electric partial storage heating

By using lower priced electricity (night time), heat can be stored in the concrete slab. This stored heat will transfer into the room during the day.

The concrete slab is heated with heating cables. The heat is transferred to the room creating a comfortable feeling. The heating characteristics are affected by the thickness of the concrete slab, cable installation depth and flooring material.

Ensto heating cables are suitable for both single and two stage casting concrete floors. Storage heating is mostly used in rooms with high heat resistance floor surfaces such as wood, vinyl mats and fitted carpets. Ensure sufficient concrete slab mass for partial storage underfloor heating. Consider if complementary heating is required.

Tassu cable is ideal when using partial storage heating. Output power should be 80–150 W/m², cable spacing 15–25 cm and installation depth 5–10 cm.

Correct temperatures

To obtain maximum cosiness and comfort, the following floor surface temperatures are recommended: Flooring material must be suitable for underfloor heating – ask the manufacturer of the flooring material!

Wood and cork surface	**23–27 °C**
Vinyl mat	**26–28 °C**
Ceramic tiles or concrete surface	**26–28 °C**
Laminate	**23–27 °C**

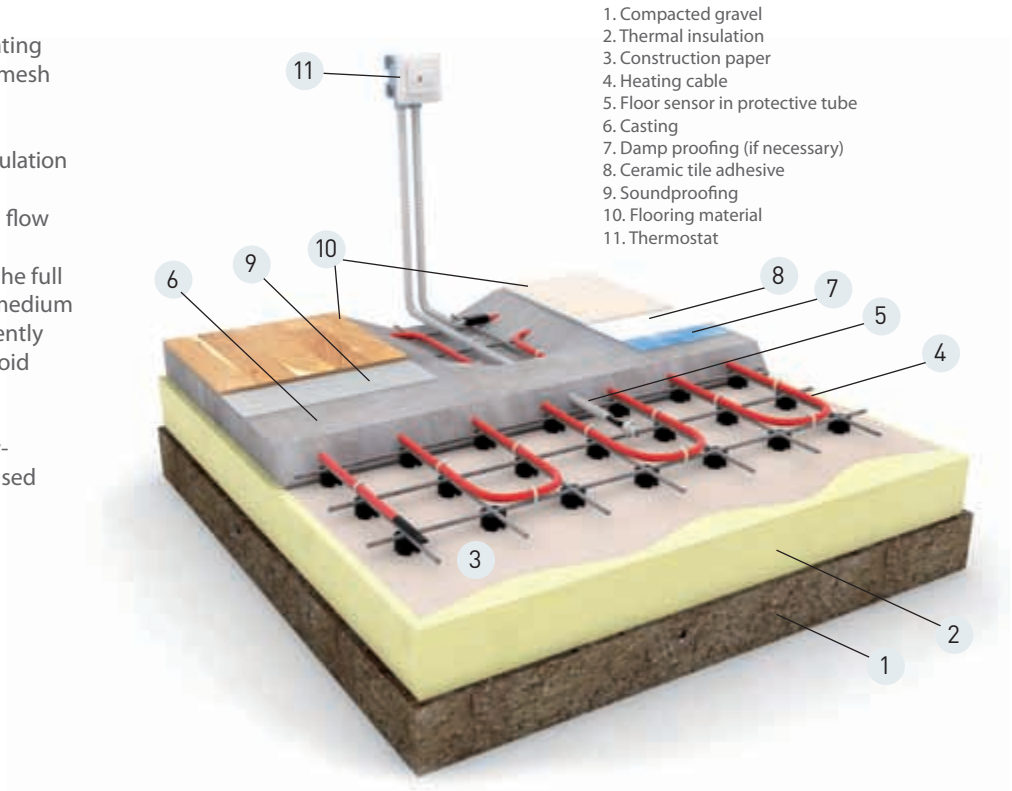
The maximum floor temperature can be limited by using a combination thermostat. If you have doubts concerning the temperatures, please contact the manufacturer of the flooring material.

Note! Thick wood flooring is a good insulation material.

Heating in concrete structures

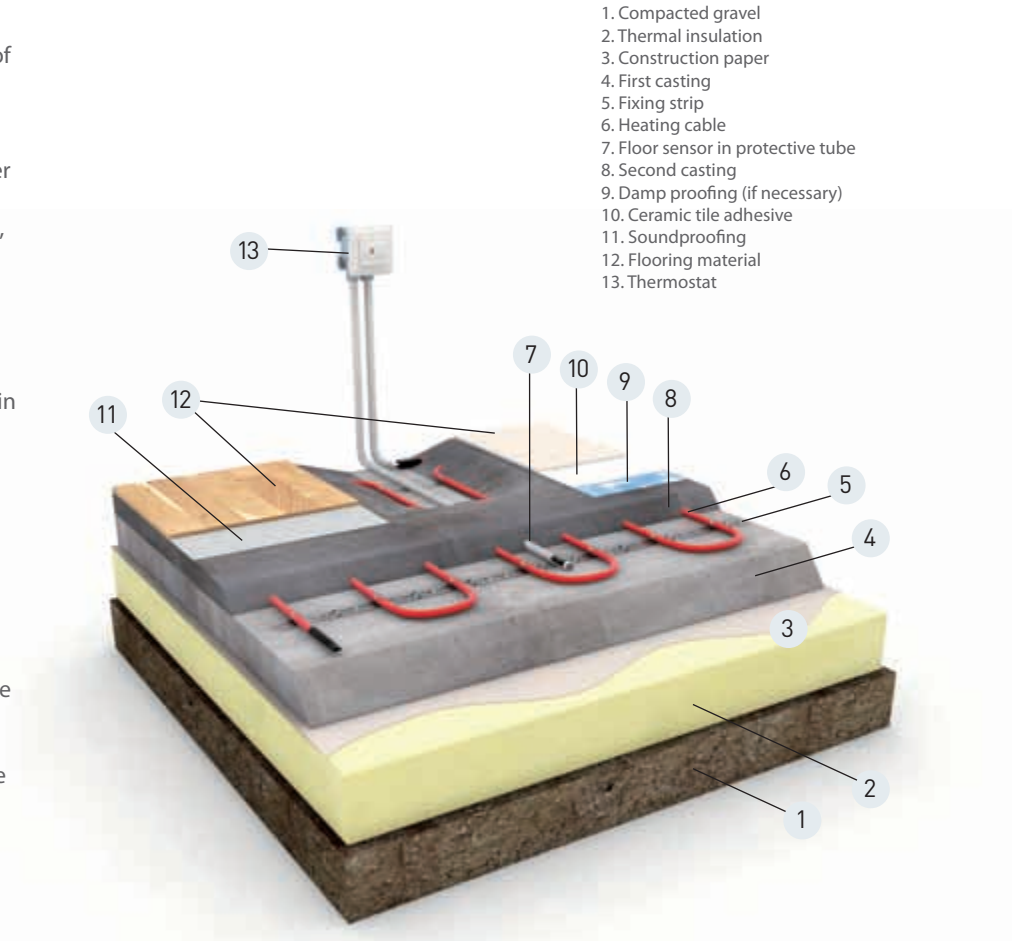
1-stage casting

- With 1-stage casting, attach the heating cable directly to the reinforcement mesh
- Be careful not to damage the cable or change the laying distance
- It is recommended that a layer of insulation is placed under the underfloor heating structure to reflect the heat flow upwards into the room
- During casting, you can make sure the full length of the cable is installed in a medium of equal thermal conductivity, by gently lifting the mesh and the cable to avoid possible air pockets
- Tassu cable is ideal for the this floor construction. For well-insulated low-energy houses also Tassu S can be used



2-stage casting

- Recommended for concrete floors of a thickness over 100 mm
- The reinforced steel grid and the electrical conduit pipes can be installed within the first casting layer (> 6 cm)
- Lay the cable on top of the first cast, after it has dried
- Secure the heating cable in place with fixing strips XBC1230 (cut to required length) attached to the concrete. The sensor of the thermostat must be installed in a protection tube placed between the heating cables
- The thickness of the second cast depends on the desired storage characteristics and the flooring material
- With tile and stone floors, place the cables deeper for even surface temperature
- With wood flooring, the temperature will be consistent even when the cable is closer to the surface
- All Ensto floor heating cables can be used for the this construction

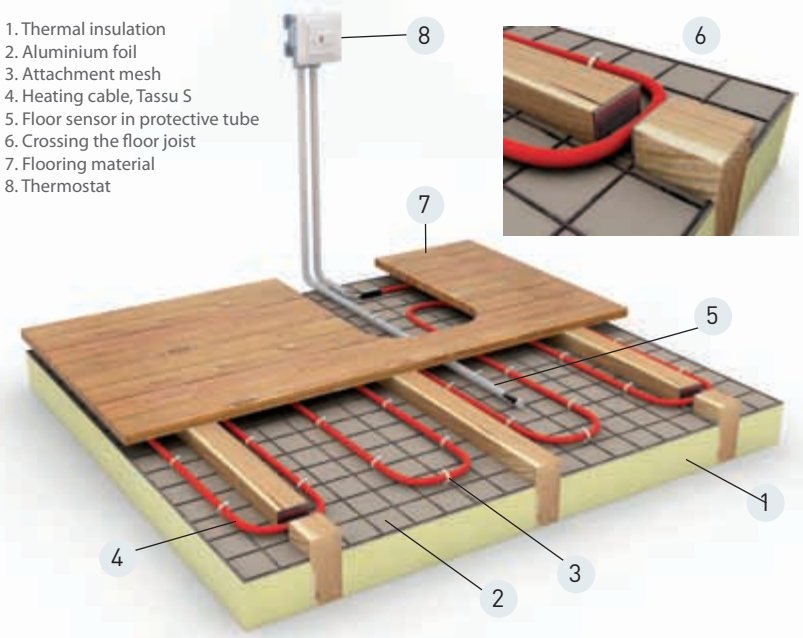


Structures are described in accordance with the Finnish installation method

Heating in wooden structures

- Although they have very limited heat storage capacity, underfloor heating works well with wooden floors
- Suitable for base and intermediate floors
- Use only a heating cable that has the right structure and power (10 W/m) for your installation method. The maximum heat load with materials such as wood, parquet and laminate is 80 W/m^2
- Only Tassu S cable can be used
- The heating cable is attached to a steel mesh situated between the insulation and the flooring material. The sensor of the thermostat must be installed in a protection tube at the floor joint/floor material connection point without touching the cables
- The mesh prevents the heating cable from sinking into the insulation and, therefore, prevents the cable from overheating
- You must leave a gap of 30 mm between the cable and flooring material and a similar space between the cable and any flammable materials such as wood
- When installing the cable across the floor joists, cut out a notch and place a protective metal plate where the cable crosses the runner
- Flooring material must be suitable for underfloor heating – ask the manufacturer of the flooring material

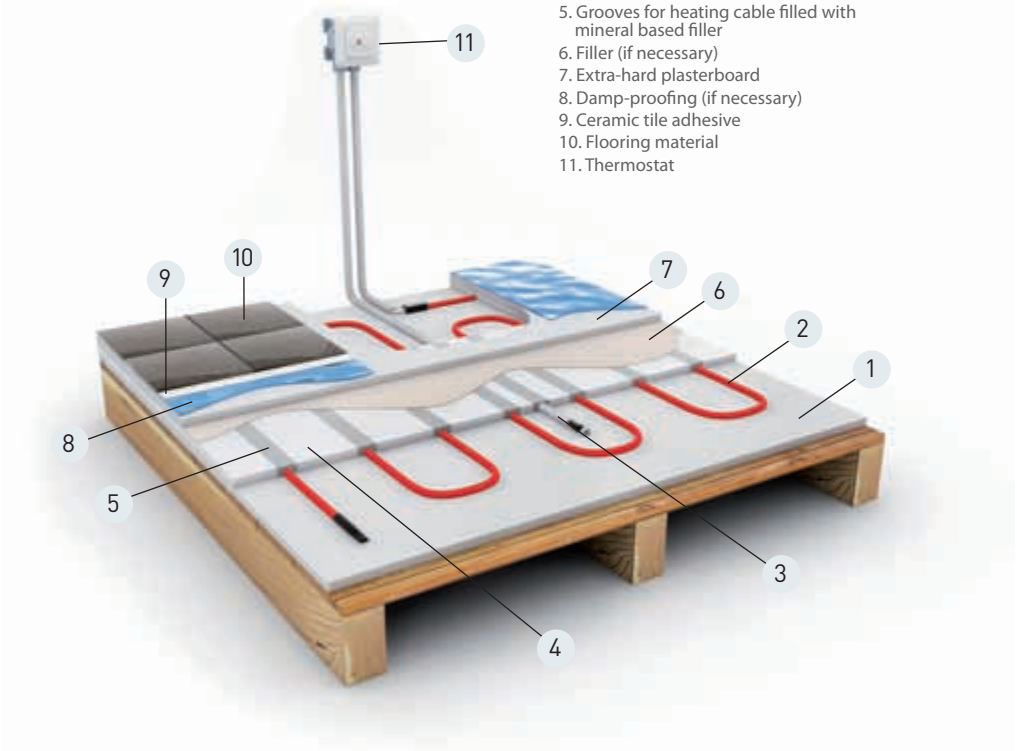
1. Thermal insulation
2. Aluminium foil
3. Attachment mesh
4. Heating cable, Tassu S
5. Floor sensor in protective tube
6. Crossing the floor joist
7. Flooring material
8. Thermostat



Heating in plasterboard floors

- Place strips of plasterboard on the top of the extra strong plasterboard that covers the whole floor. The width of the strips is related to the heating power needed (W/m^2)
- A typical output is 70–100 W/m^2 corresponding to a cable spacing of between 10–14 cm
- Carefully install a low-power (10 W/m) heating cable between the strips. The sensor of the thermostat must be installed in a protection tube covered with plaster between the heating cables
- Fill in the grooves with mineral-based plaster
- Place an extra strong plasterboard layer on top of everything
- Tassu S and ThinKit cables are recommended to this construction.
- Local building regulations must be followed

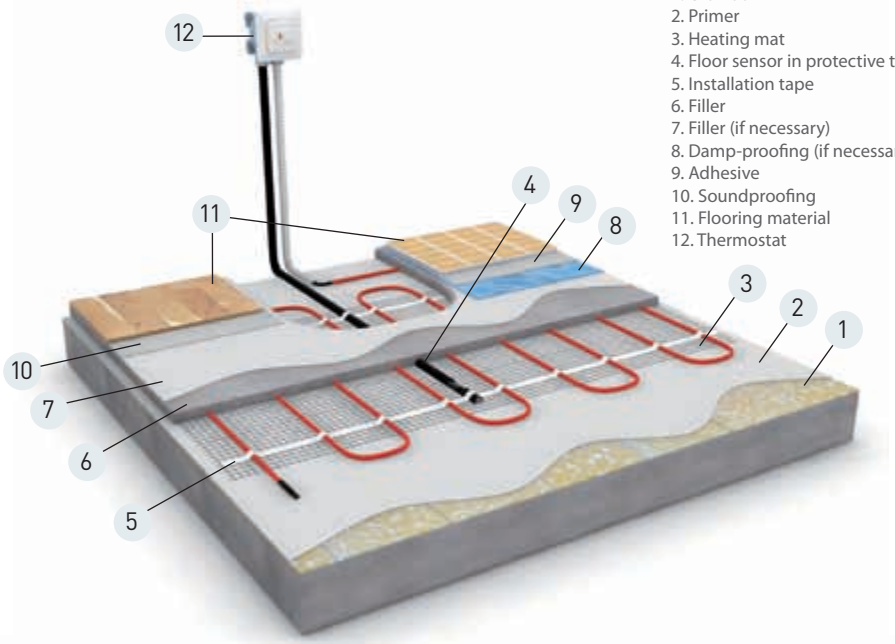
1. Plaster board
2. Heating cable
3. Floor sensor in protective tube
4. Plasterboard strips
5. Grooves for heating cable filled with mineral based filler
6. Filler (if necessary)
7. Extra-hard plasterboard
8. Damp-proofing (if necessary)
9. Ceramic tile adhesive
10. Flooring material
11. Thermostat



Structures are described in accordance with the Finnish installation method

Heating for renovations and thin floor constructions

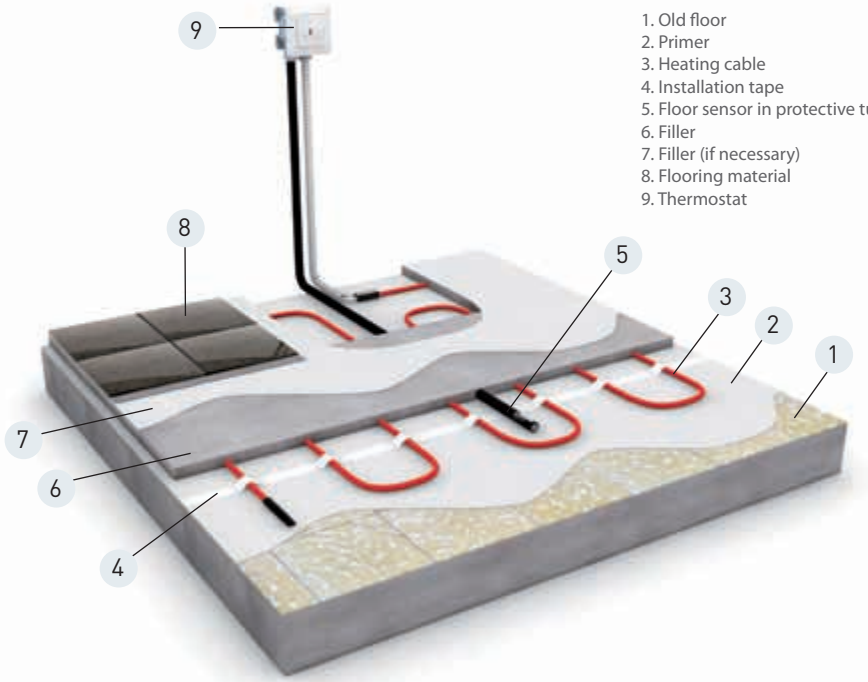
- Heating mats can be installed directly on the top of the existing floor surface. No glue is needed because the mat is attached easily to the floor surface with a self adhesive mesh. The laying direction can be varied by just cutting the mesh and bending the cable. The sensor of the thermostat must be installed in a protection tube between the heating cables without it touching them. Cover the mat with filler and install the actual flooring material after the filler has dried
- ThinMat can also be installed on plywood and similar materials



1. Old floor
2. Primer
3. Heating mat
4. Floor sensor in protective tube
5. Installation tape
6. Filler
7. Filler (if necessary)
8. Damp-proofing (if necessary)
9. Adhesive
10. Soundproofing
11. Flooring material
12. Thermostat

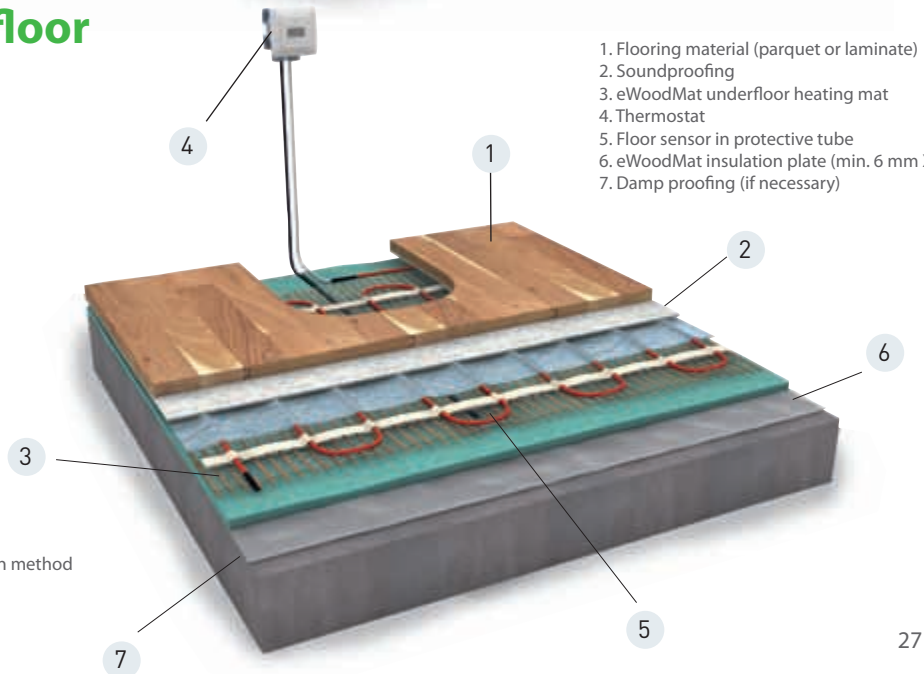
- ThinKit heating cables can be installed directly on top of the existing fireproof floor surface (not on wood). Cables can be installed with tape, fixing strips or glue. The sensor of the thermostat must be installed in a protection tube between the heating cables without touching them. Cover the cables with filler and install the actual flooring material after the filler has dried

ThinKit and ThinMat are designed especially for renovations where the floor height is crucial. If the floor height does not limit the installation, then Tassu S can be used.



1. Old floor
2. Primer
3. Heating cable
4. Installation tape
5. Floor sensor in protective tube
6. Filler
7. Filler (if necessary)
8. Flooring material
9. Thermostat

Ensto eWoodMat underfloor heating



1. Flooring material (parquet or laminate)
2. Soundproofing
3. eWoodMat underfloor heating mat
4. Thermostat
5. Floor sensor in protective tube
6. eWoodMat insulation plate (min. 6 mm XPS)
7. Damp proofing (if necessary)

Structures are described in accordance with the Finnish installation method

Underfloor heating checklist

- The cable is not installed under closets or similar fixtures
- The cable laying distance is within given specifications
- The cable bending radius has to be a minimum of 40 mm for Tassu-cables and a minimum of 25 mm for ThinKit-cables
- Cables must not touch each other
- The cable lies fully in a homogenously heat conductive substance across its length
- Do not install cable inside insulation material to prevent the cable from overheating
- The installation surface must be clean and free of rubbish that might damage the cables
- The cable must not be fed through expansion joints or in areas with a risk of slab breaking or overheating (e.g. the minimum distance to a sauna stove or fireplace is 0.5 m)
- Flooring material must be suitable for underfloor heating – ask the manufacturer of the flooring material
- Cable element lengths intended for underfloor heating are not allowed to be shortened
- A 30 mA residual current circuit breaker (RCCB) must be used in all areas
- The bending radius of the thermostat sensor protection pipe must be such that the sensor element can be replaced, if necessary. The sensor must be installed between the heating cables without touching them
- The underfloor heating cable installation spacing should be smaller close to windows, doors and areas where heat loss is greatest
- Concrete takes approximately 30 days to dry, while levelling plaster takes approximately one week. Always follow the instructions given by the concrete manufacturers concerning the drying time
- Heating cable is to be installed at distance of at least 30 mm from conductive parts of buildings, such as waterpipes

Thermostats

- Energy savings and comfort

By using reliable and accurate thermostats, the temperature in each room stays even and comfortable. At the same time, energy and money can be saved. Stylish and easy-to-use. Screwless connectors make connecting fast and reliable.

Underfloor heating thermostats

Underfloor heating thermostats are used together with electrical underfloor heating cables and controlling the heating system through a sensor placed in the floor construction. Underfloor heating thermostats are most suitable when the floor surface material is ceramic tile. The thermostat can be located outside the heated area – only the floor sensor must be inside the heated area. All underfloor heating thermostats have a fixed temperature reduction function and the hysteresis of the floor temperature is ± 0.5 °C.
The ECO10F thermostat is used for mounting flush in the wall. When installing the thermostat in damp areas, the ECOAC44 protective casing must be used (IP44).
Screwless connectors make connecting fast and reliable. The adjustment range of the temperature can be limited using the adjustment knob limiters.
The ECO16FD thermostat is used for DIN-rail mounting. The floor sensor can be extended by up to 25 meters.
ECO16FJW is a 16A thermostat with in built 30mA residual current circuit breaker (RCCB). This makes the thermostat ideal for renovations where it would be difficult to connect the residual current circuit breaker at any other point in the circuit.

DIN-rail mounting

Impressivo

ECO16FJW

Ceiling heating thermostats

The flush mounted ECO10R room thermostat is used to control ceiling heating. The thermostat responds fast and accurately to room temperature variations providing an even temperature. The thermostat is equipped with a built-in temperature sensor. The adjustment range of the temperature can be limited with the limiters of the adjustment knob.

Jussi

Combination thermostats for room heating

The flush mounted ECO16FR thermostat is used for controlling either underfloor or ceiling heating. Underfloor heating can be controlled based on floor temperature (floor mode) or room temperature (room mode). In combination mode, the thermostat uses floor and room temperatures to control the heating. It is also possible to set the minimum and maximum values for the floor surface temperature. Ceiling heating control is based only on room temperature. The adjustment range of the temperature can be limited by using the adjustment knob limiters. The combination thermostat is the best solution for bedrooms and living rooms because of the fast and accurate response to temperature variations. When the floor surface material is ceramic tile, it is recommended to use a combination thermostat in floor mode.
The ECO16LCD is a timing-enabled combination thermostat with a display, used for floor heating control. In addition to the combination feature, the ECO16LCD can also be used as a power regulation thermostat. Its adjustment range is 0 to 10, with adjustments taking place at 30-minute intervals. Moreover, the thermostat allows you to program four different settings for weekdays (morning, day, evening, night) and two for the weekend (day, night).
The thermostat's energy-efficient features enable you to cut consumption of heating energy without compromising your comfort of living.

Impressivo

Jussi

ECO16LCD

Thermostats for flush and surface mounting

Ensto thermostats are available in Jussi and the Impressivo series. The Jussi series is white and has timeless design. The Impressivo series is cost-efficient and easy to install. Impressivo thermostats are delivered in modules so it is possible to choose between different colours and cover frames.

Jussi for flush mounting

Everything needed for installation and use in one package

Jussi for surface mounting

Jussi-termostats can be surface mounted by using surface mounting box

Impressivo for flush mounting

Insert

+

Cover frame

+

Centre plate

=

Product ready for installation and use

Colour options:

white

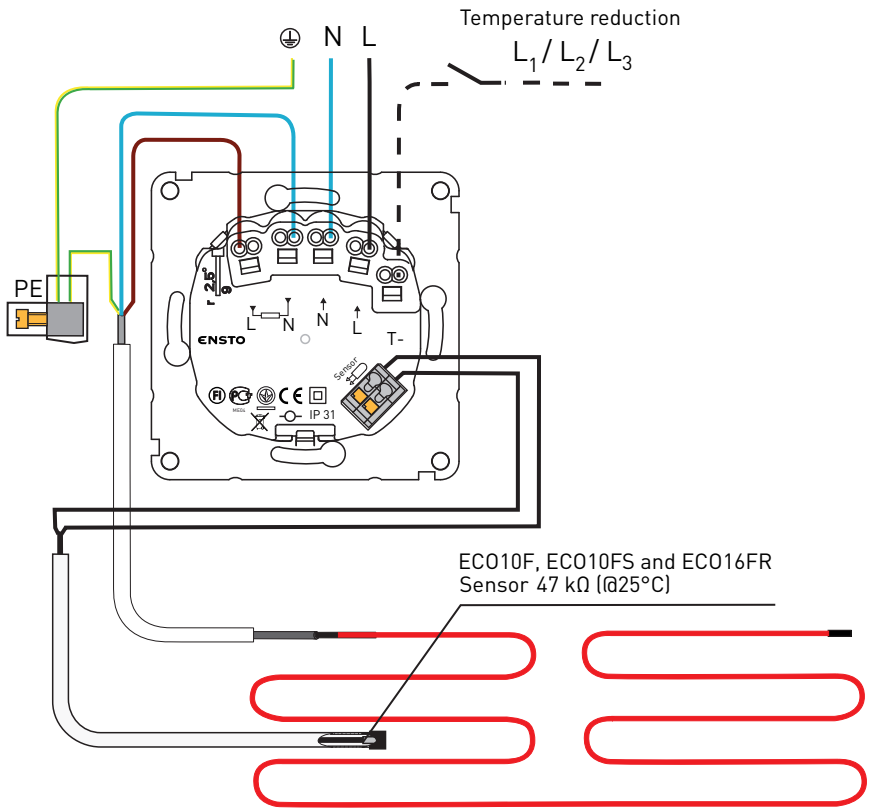
aluminium

grey

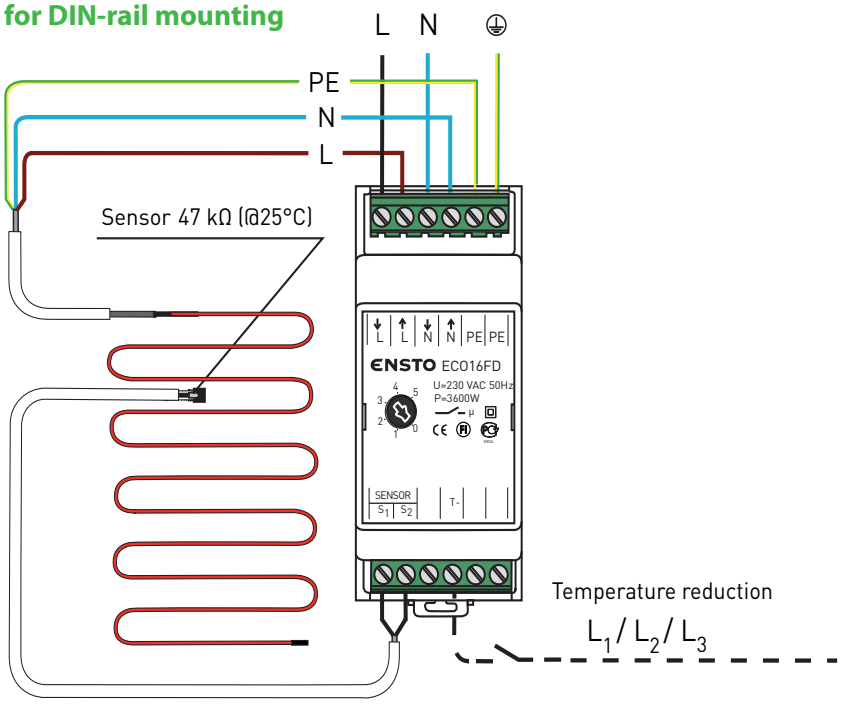
anthracite

Connection diagrams for thermostats

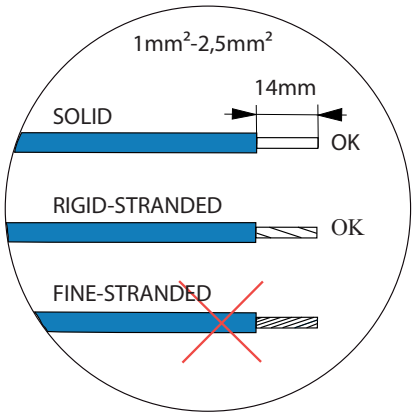
ECO thermostats for flush mounting



ECO16FD thermostats for DIN-rail mounting



Flush mounting of ECO16FJW thermostat



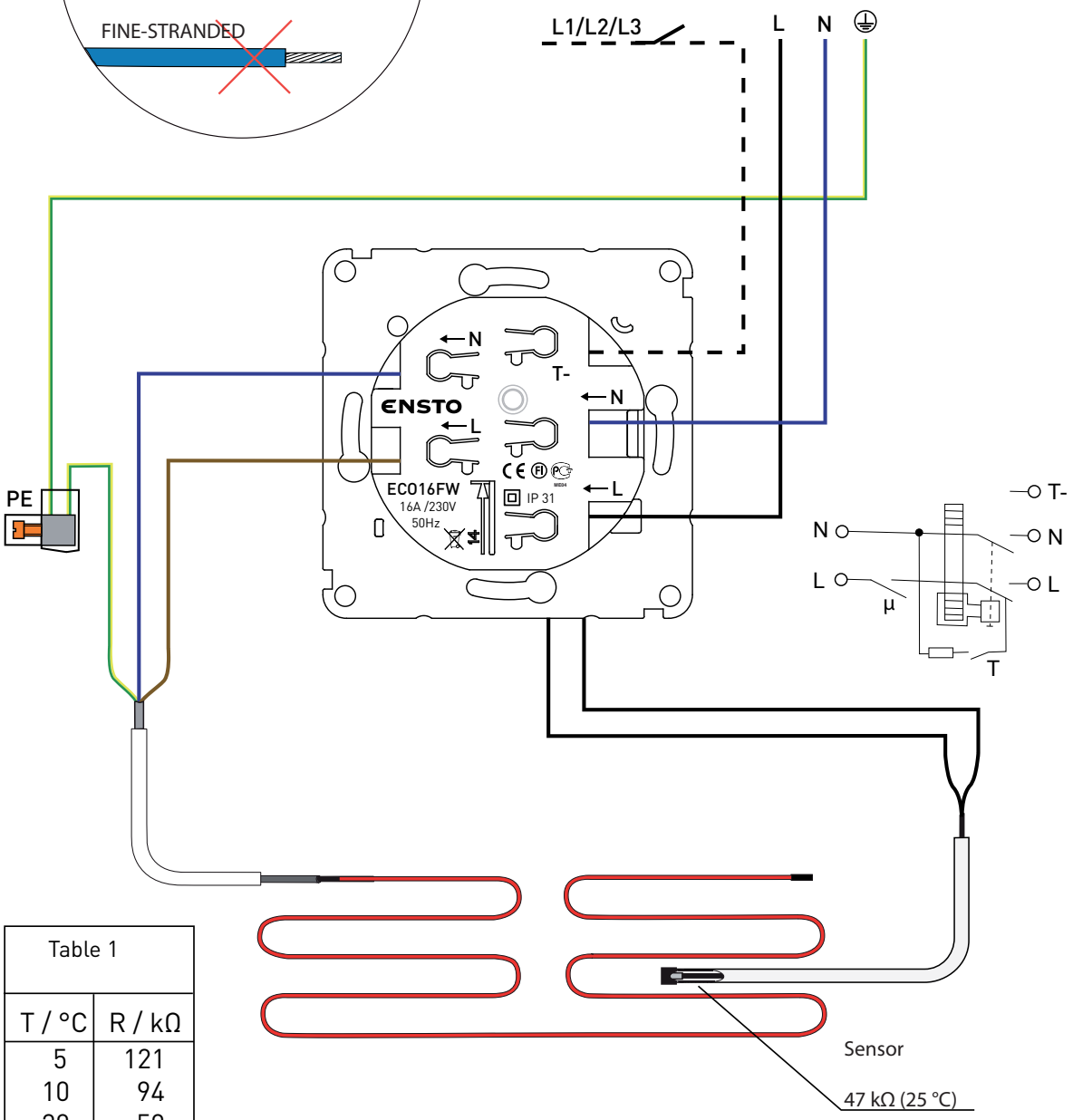
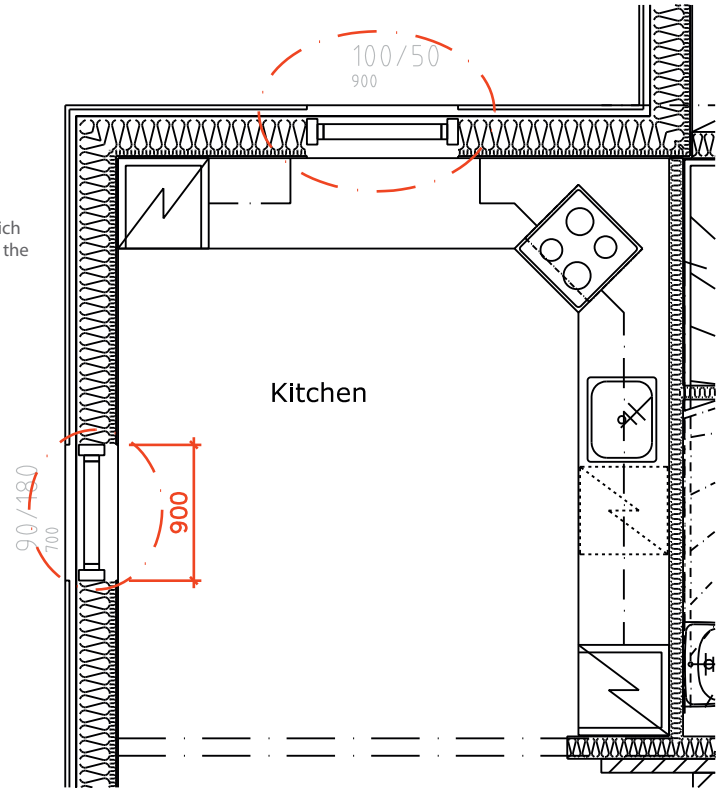


Table 1	
T / °C	R / kΩ
5	121
10	94
20	59
30	38
40	25
50	17
60	11

Planning a heating system with panel heaters

- Calculating heat losses for each room
- Checking all window sizes

There should not be any barrier above Tupa-heater which could prevent rising of heat (needed holes or notch on the table board).



Heaters in kitchen

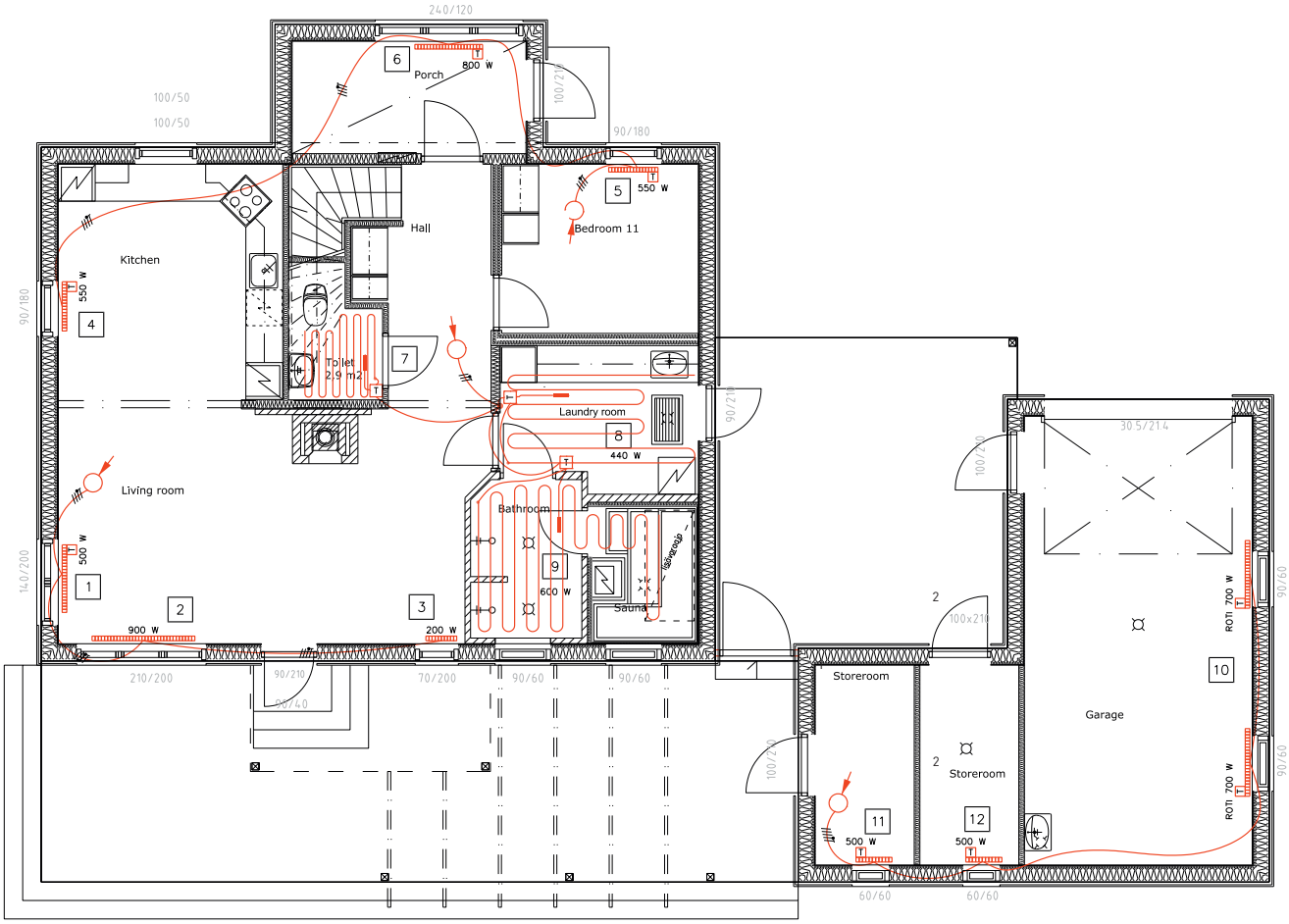
If there are many Tupa-heaters in the same room, you can use one thermostat controlled heater that drives connected slave heaters. Remember to check heater type specific highest allowed power.

Master-slave connection with Tupa-panel heaters

Example A

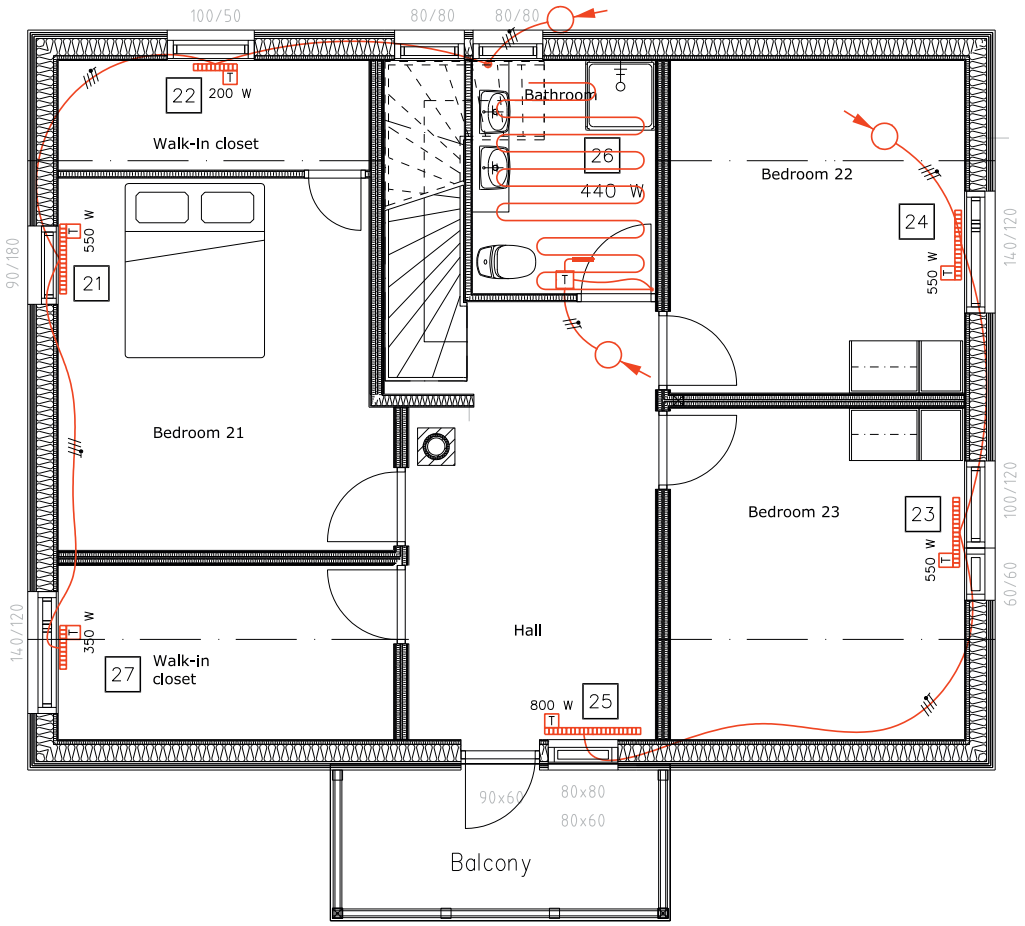
Panel heaters in main areas and underfloor heating in damp areas (ceramic tiles)

Panel heaters are generally placed under windows. Windows have a higher heat conductivity, resulting in larger heat loss and colder air at that point. Cold air is heavier than warm which makes it flow down, creating an airflow – a draught – and a heater placed on a windowless wall may increase it. When choosing a heater, in addition to having the right power, try to match the heater´s width with the window´s width. If a panel heater is too short it can cause cold downflows at both ends and if it is too wide it will ruin the visual aspect of the window. Also check the minimum distance from structures.



Code	Room	Heat losses [W]	Type	Power [W]	Amount	Inst. area m²	Length	Resistance [Ω]	Power/sqrm [W/m²]	Distance [m]	Control
	Living room+hall	1381			1						
1	Living room		LISTA5	500	1						Electr.
2	Living room		LISTA9.0	900	1						Slave
3	Living room		LISTA2.0	200	1						Slave
4	Kitchen	552	TASO5	550	1						Electr.
5	Bedroom	383	TASO5	550	1						Electr.
6	Porch	617	TASO8	800	1						Electr.
7	Toilet	39	EFHTK1	130	1	1.35	13.5	402	100	0.10	ECO10FJ
8	Laundry room	287	TASSU4	440	1	4.3	20	127	102	0.22	ECO10FJ
9	Bathroom + sauna	382	TASSU6	600	1	6	29	88	100	0.21	ECO10FJ
10	Garage	1498	ROTI7	700	2						Electr.
11	Storeroom 1	417	EPHBM05P	500	1						Mech.
12	Storeroom 2	324	EPHBM05P	500	1						Mech.
Total Ground Floor		**5880**		**6370**							

Low-energy house built in Finland year 2008, 165 m², 750 m³



Placing panel heaters

Control switch attributes:

Control of partially storing heating solution:

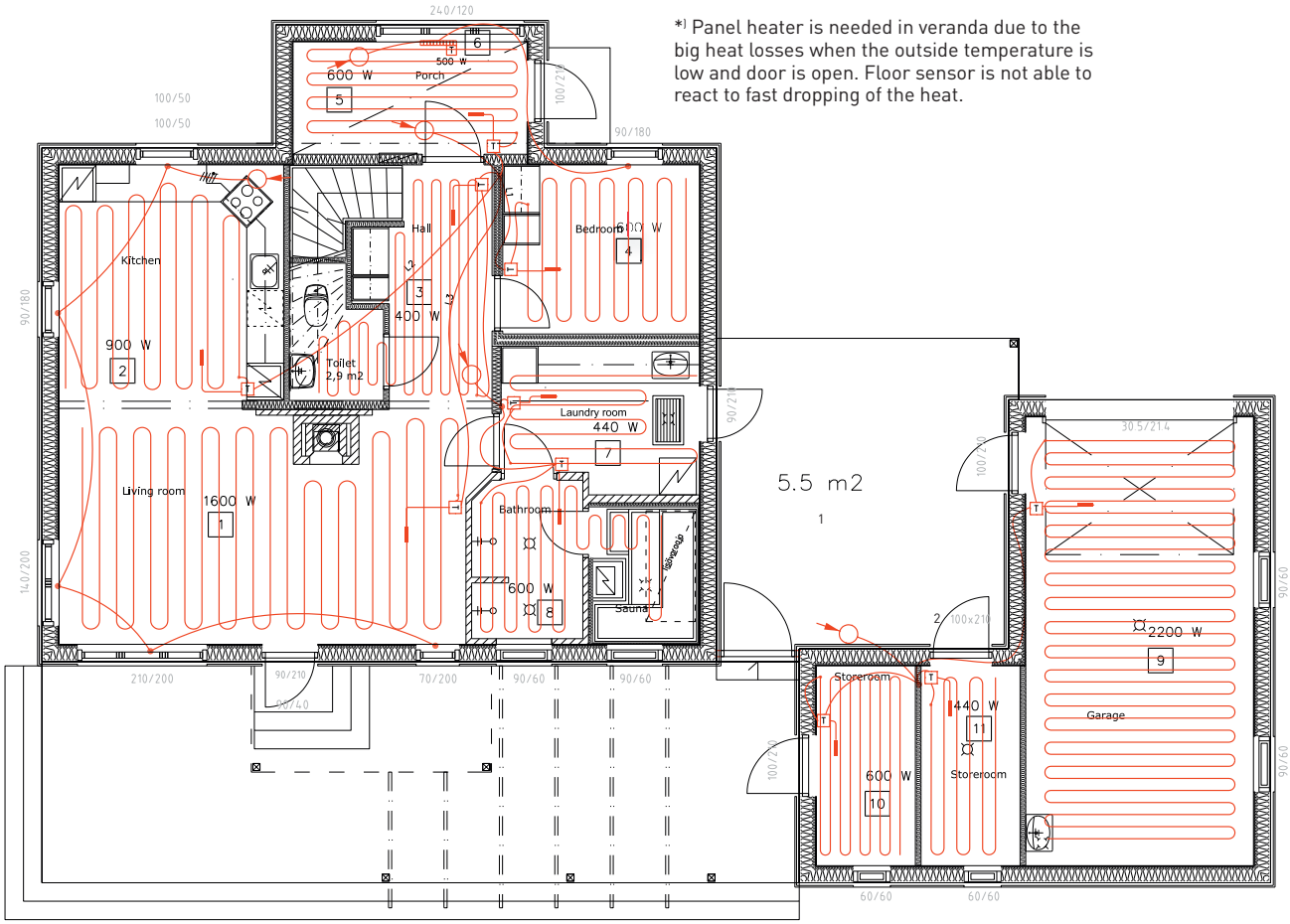
- Temperature control
- Temperature reduction with home/ away-switch

Code	Room	Heat losses [W]	Type	Power [W]	Amount	Inst. area m²	Length	Resistance [Ω]	Power/sqrm [W/m²]	Distance [m]	Control
21	Bedroom 21	501	TASO5	550	1						Electr.
22	Walk-in closet 1	221	PETA2	200	1						Electr.
23	Bedroom 23	513	TASO5	550	1						Electr.
24	Bedroom 22	507	TASO5	550	1						Electr.
25	Hall	644	TASO8	800	1						Electr.
26	Bathroom	175	TASSU4	440	1	4.3	20	127	102	0.22	ECO10FJ
27	Walk-in closet 2	361	PETA3	350	1						Electr.
Total Second Floor		**2922**		**3440**							
Total [W]		**8802**		**10510**							

Low-energy house built in Finland year 2008, 165 m², 750 m³

Example B

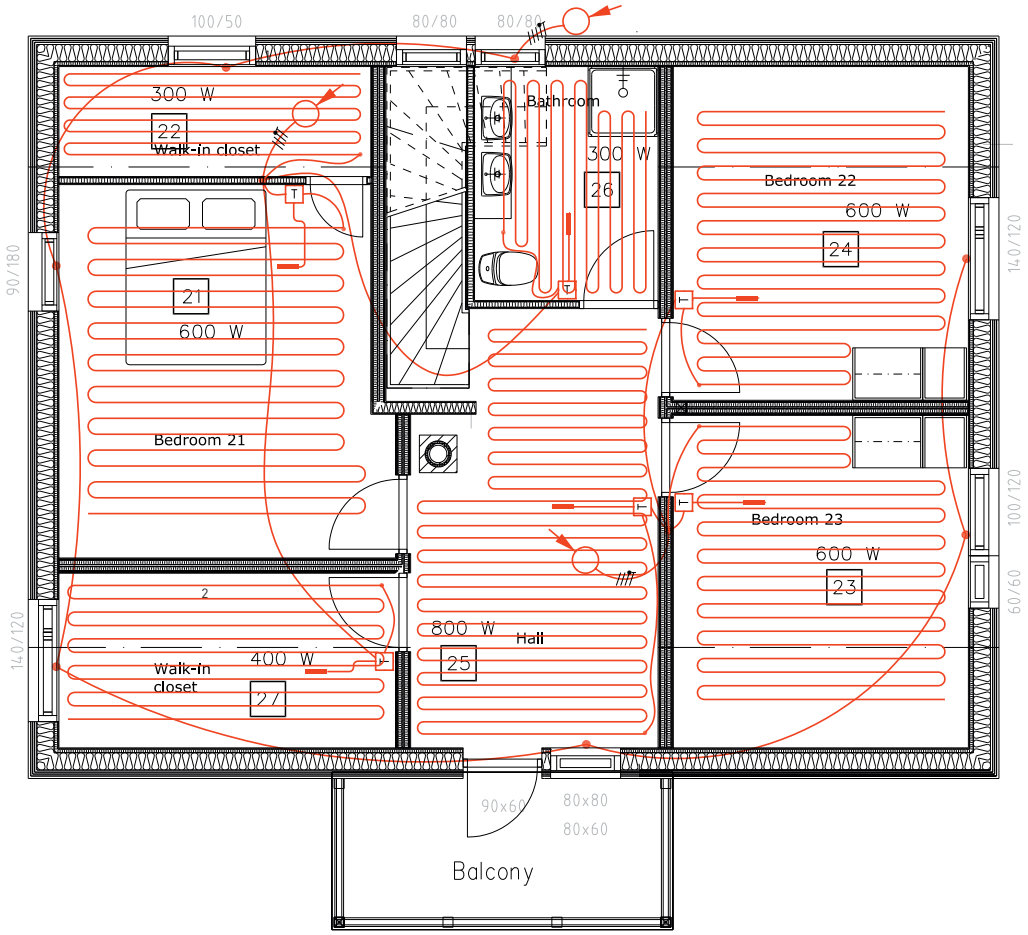
Underfloor heating in all areas



*) Panel heater is needed in veranda due to the big heat losses when the outside temperature is low and door is open. Floor sensor is not able to react to fast dropping of the heat.

Code	Room	Heat losses [W]	Type	Power [W]	Amount	Inst. area m²	Length	Resistance [Ω]	Power/sqrm [W/m²]	Distance [m]	Control
1	Living room	1261	TASSU16	1600	1	19	72	34	84	0.26	ECO16FRJ
2	Kitchen	552	TASSU9	900	1	10.5	40	61	86	0.26	ECO16FRJ
3	Hall	120	TASSU4S	400	1	6.7	42	127	60	0.16	ECO16FRJ
	Toilet	39									
4	Bedroom	383	TASSU6	600	1	6.7	29	88	90	0.23	ECO16FRJ
5	Porch *)	617	TASSU6	600	1	5.4	29	88	111	0.19	ECO16FRJ
6			EPHBE05B	500	1						Electr.
7	Laundry room	287	TASSU4	440	1	4.3	20	120	102	0.22	ECO10FJ
8	Bathroom	156									
	Sauna	227	TASSU6	600	1	6	29	88	100	0.20	ECO10FJ
9	Garage	1498	TASSU22	2200	1	21	106	24	105	0.20	ECO16FRJ
10	Storeroom 1	417	TASSU6	600	1	4.5	29	88	133	0.15	ECO10FJ
11	Storeroom 2	324	TASSU4	440		4.3	20	120	102	0.22	ECO10FJ
Total Ground Floor		**5880**		**7280**							

Low-energy house built in Finland year 2008, 165 m², 750 m³



Underfloor heating solution

Control switch attributes:

Control of heating solution:

• By a temperature boost command during storing period, thermostat ECO16

Temperature boost command

ECO16 thermostat enables temperature boost during storing period by informing the slave thermostats.

• Temperature can be set according to real needs

• The temperature is allowed to increase 1-5 °C from the set level during storing period

• Temperature drop function cannot be used together with boost command

• A partially storing heating system can be used on ground floor areas with concrete floors.

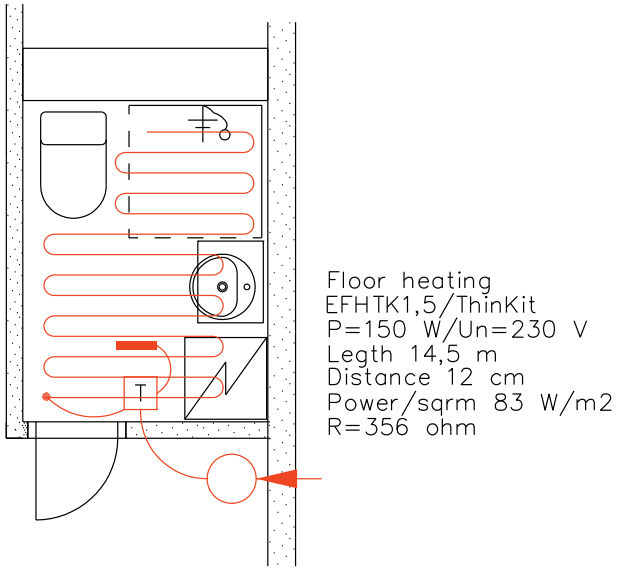
Code	Room	Heat losses [W]	Type	Power [W]	Amount	Inst. area m²	Length	Resistance [Ω]	Power/sqrm [W/m²]	Distance [m]	Control
21	Bedroom 21	501	TASSU6S	600	1	9	59	90	67	0.15	ECO16FRJ
22	Walk-in closet 1	221	TASSU3S	300	1	4.3	29	175	70	0.15	ECO16FRJ
23	Bedroom 23	513	TASSU6S	600	1	9	59	90	67	0.15	ECO16FRJ
24	Bedroom 22	507	TASSU6S	600	1	9	59	90	67	0.15	ECO16FRJ
25	Hall	644	TASSU8S	800	1	12	79	90	67	0.15	ECO16FRJ
26	Bathroom	175	TASSU3S	300	1	4.3	29	175	70	0.15	ECO10FJ
27	Walk-in closet 2	361	TASSU4S	400	1	6.1	42	127	66	0.15	ECO16FRJ
Total Second Floor		**2922**		**3600**							
Total [W]		**8802**		**10880**							

Low-energy house built in Finland year 2008, 165 m², 750 m³

Example C

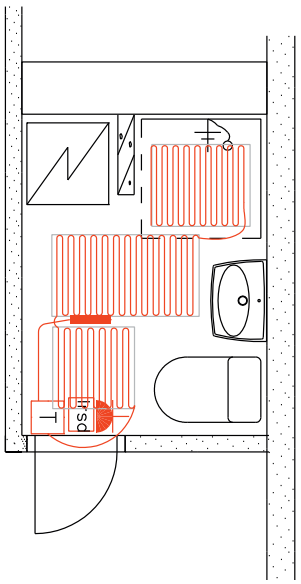
Bathroom renovations with underfloor heating solutions

A bathroom can be made more comfortable by installing ThinKit-cables or ThinMat in it. Underfloor heating can only be installed in areas where people walk if there is an other heat source present. ThinMat is used especially when installing with on existing flooring. ThinKit heating cable is a good solution for small and cramped areas. ThinKit and ThinMat must always be installed under the damp proof membrane. Insulation is always recommended under a underfloor heating.



Floor heating
EFHTK1,5/ThinKit
P=150 W/Un=230 V
Legth 14,5 m
Distance 12 cm
Power/sqrm 83 W/m2
R=356 ohm

ThinKit heating cable is a good solution for small or cramped areas. ThinKit is available with or without thermostat.



ThinMat is used when installing on existing flooring. ThinMat 160 does not include a thermostat.

The heating system must always be sized according to local climate and regulations.
N.B. The example is based on Finnish building practise and climate.

Tips for renovations

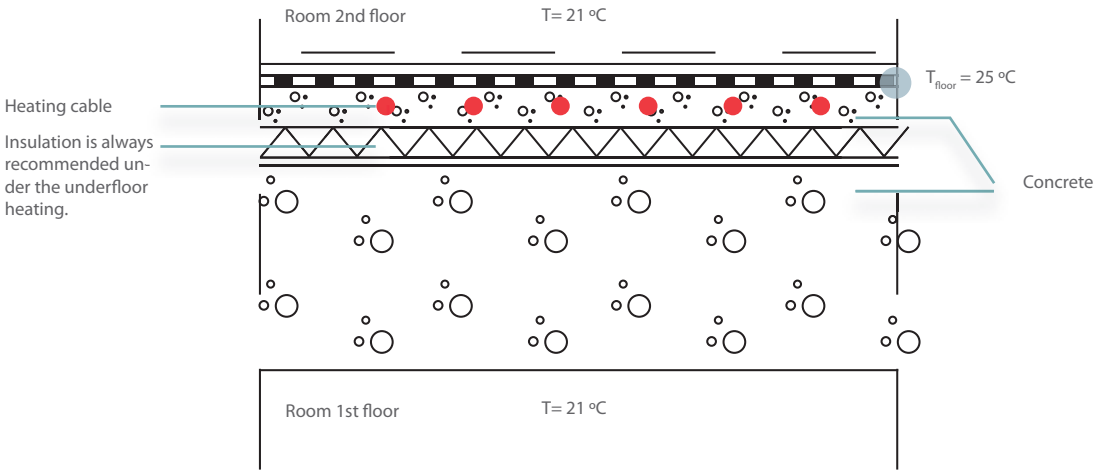
If using parquet flooring check with the manufacturer for the maximum temperature;

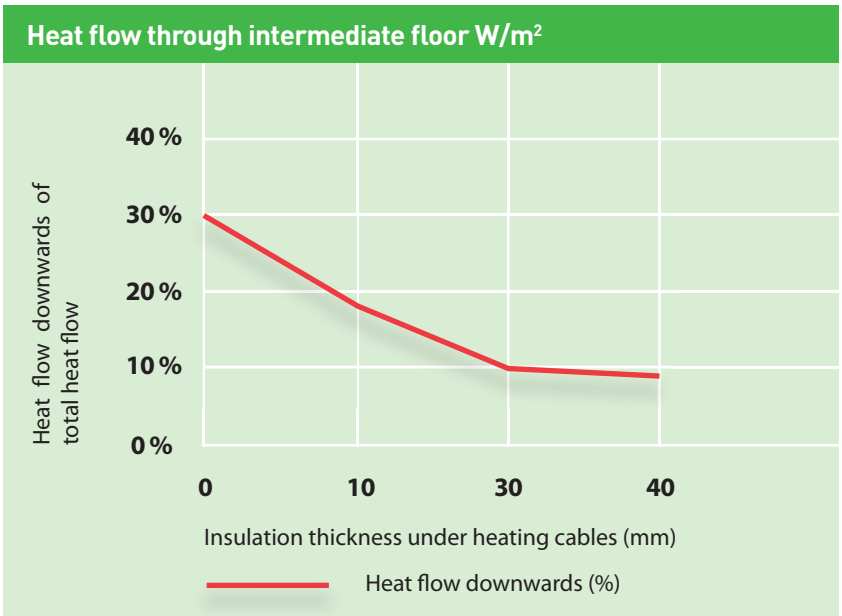
• thickness or parquet; 20 mm > temperature in the bottom of parquet is approximately 10 °C higher than the room temperature
• thickness or parquet; 28 mm > temperature in the bottom of parquet is approximately 12 °C higher than the room temperature

Replacing panel heaters during renovation

An easy job in an existing electrically heated house when using new ones of similar power and construction.
• Inspect the condition of the old cabling and control system
• Try to match heater and window widths
• If insulation and/or windows have not been upgraded, use equal or higher heating power
• When adding new heaters to old heating group cabling, always check not to exceed the capacity of cables, fuses and other safety switches
• Check the safety distance requirements of the new heaters

Influence of polystyrene insulation to heat flow downwards





Heating products

Underfloor Heating EFH

Tassu-underfloor heating cable

By using TASSU underfloor heating cables, a direct or partial storage floor heating can be carried out. The direct underfloor heating is used in wet or damp areas, where the floormaterial is low thermal resistant, e.g. clinker. The direct underfloor heating is suitable also in other areas as the only heating form. The partial storage underfloor heating is used for example in living rooms and kitchens. The output per square meter should be 80-150 W/m², the installation distance 13 – 25 cm and the installation depth 5-10 cm. The heating cable is a preterminated twin-conductor cable with a PVC sheath. The lowest installation temperature is -10 °C. The output of the cable is 20W/m with a nominal voltage of 230V. The heating cable is supplied with a cold lead of 2.5 meter.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
TASSU1	6418677637858	7 m, 1,0-1,7 m², 150 W	1/60
TASSU2	6410081682639	11 m, 1,6-2,7 m², 240 W	1/60
TASSU3	6418677631696	15 m, 2,0-3,7 m², 300 W	1/60
TASSU4	6410081682646	20 m, 2,9-5,0 m², 440 W	1/60
TASSU6	6410081682653	29 m, 4,0-7,2 m², 600 W	1/60
TASSU9	6410081682660	40 m, 5,8-10,0 m², 900 W	1/60
TASSU12	6410081682677	54 m, 7,6-13,5 m², 1200 W	1/30
TASSU16	6410081682684	72 m, 9,8-18,0 m², 1600 W	1/30
TASSU18	6410081682189	86 m, 11,4-21,5 m², 1800 W	1/30
TASSU22	6410081682691	106 m, 13,3-26,5 m², 2200 W	1/30

Tassu S -underfloor heating cables

The TASSU S underfloor heating cables are used in plasterboard floors, wooden floors and in renovation, where the cable is installed on top of the old floor. The output per square meter should be 60 – 110 W/m², the installation distance 9 – 17 cm and the installation depth 2.5 cm. The heating cable is a preterminated twin-conductor cable with a PVC sheath. The lowest installation temperature is -10 °C. The output of the cable is 10W/m with a nominal voltage of 230V. The heating cable is supplied with a cold lead of 2.5 meter. Power below 80 W/m² is for low energy houses.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
TASSU70S	6418677637780	7 m, 0,7-1,2 m², 70 W	1/60
TASSU100S	6418677637797	10 m, 1,0-1,7 m², 100 W	1/60
TASSU1S	6410081682806	16 m, 1,5-2,7 m², 165 W	1/60
TASSU3S	6410081682820	29 m, 2,8-4,8 m², 300 W	1/60
TASSU4S	6410081682844	42 m, 3,8-6,9 m², 400 W	1/60
TASSU6S	6410081682868	59 m, 5,3-9,7 m², 600 W	1/30
TASSU7S	6418677637803	71 m, 6,5-11,9 m², 700 W	1/30
TASSU8S	6410081682882	79 m, 7,1-13,0 m², 800 W	1/30
TASSU9S	6418677637810	87 m, 8,0-14,5 m², 900 W	1/30
TASSU11S	6410081682905	106 m, 9,3-17,0 m², 1100 W	1/30
TASSU13S	6418677637827	117 m, 11,5-20,0 m², 1300 W	1/30
TASSU15S	6418677637834	140 m, 13,7-24,0 m², 1500 W	1/30

ThinKit with thermostat

ThinKit is designed to be used as floor heating in small and cramped areas and it should be installed to thin layer of levelling compound. The cable is round with a diameter of only 4.2 mm. The small diameter enables the use of less casting material during installation. ThinKit may be used together with a wide range of flooring material, but the cable should always be laid upon fireproof material and have to be covered with levelling compound. The sizes of ThinKit cover an area of 1–20.6 m². ThinKit contains heating cable, a thermostat with Jussi and Elko compatible cover frames and center plates, flexible plastic tube and installation tape. The thermostat, ECO10FSJ+E, has an operating range of 10–35 °C. IP31. The length of the cold lead is 3 m. Power below 80 W/m² is for low energy houses.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EFHTK1+T	6418677635847	13,5 m, 0,9-2,2 m², 130 W + T	1/60
EFHTK1.5+T	6418677635854	14,5 m, 1,0-2,5 m², 150 W + T	1/60
EFHTK2+T	6418677635861	22,5 m, 1,5-3,7 m², 220 W + T	1/60
EFHTK3+T	6418677635878	28,5 m, 1,9-4,7 m², 280 W + T	1/60
EFHTK4+T	6418677635885	40 m, 2,7-6,7 m², 400 W + T	1/60
EFHTK5+T	6418677635892	45 m, 3,0-7,5 m², 450 W + T	1/60
EFHTK6+T	6418677637957	55 m, 3,7-9,2 m², 550 W + T	1/60
EFHTK7+T	6418677635908	70 m, 4,6-11,5 m², 690 W + T	1/60
EFHTK8+T	6418677635915	78 m, 5,2-13 m², 780 W + T	1/60
EFHTK10+T	6418677635922	98 m, 6,5-16,3 m², 980 W + T	1/30
EFHTK11+T	6418677635939	110 m, 7,3-18,3 m², 1100 W + T	1/30
EFHTK16+T	6418677635946	165 m, 11,0-27,5 m², 1650 W + T	1/30

Underfloor Heating EFH

ThinKit without thermostat

ThinKit is designed to be used as floor heating in small and cramped areas and it should be installed to thin layer of levelling compound. The cable is round with a diameter of only 4.2 mm. The small diameter enables the use of less casting material during installation. ThinKit may be used together with a wide range of flooring material, but the cable should always be laid upon fireproof material and have to be covered with levelling compound. The sizes of ThinKit cover an area of 1–20.6 m^2. ThinKit contains heating cable, flexible plastic tube and installation tape. The length of the cold lead is 3 m. Power below 80 W/m^2 is for low energy houses.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EFHTK1	6418677636790	13,5 m, 0,9-2,2 m^2, 130 W	1/60
EFHTK1.5	6418677636806	14,5 m, 1,0-2,5 m^2, 150 W	1/60
EFHTK2	6418677636813	22,5 m, 1,5-3,7 m^2, 220 W	1/60
EFHTK3	6418677636820	28,5 m, 1,9-4,7 m^2, 280 W	1/60
EFHTK4	6418677636837	40 m, 2,7-6,7 m^2, 400 W	1/60
EFHTK5	6418677636844	45 m, 3,0-7,5 m^2, 450 W	1/60
EFHTK6	6418677637841	55 m, 3,7-9,2 m^2, 550 W	1/60
EFHTK7	6418677636851	70 m, 4,6-11,5 m^2, 690 W	1/60
EFHTK8	6418677636868	78 m, 5,2-13 m^2, 780 W	1/60
EFHTK10	6418677636875	98 m, 6,5-16,3 m^2, 980 W	1/30
EFHTK11	6418677636882	110 m, 7,3-18,3 m^2, 1100 W	1/30
EFHTK16	6418677636899	165 m, 11,0-27,5 m^2, 1650 W	1/30

Fixing equipment

Cable fixing strip XBC1230 is used for fixing the underfloor heating cable.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
XBC1230	6410013290024	Galvanised attachment ribbon 20 m, installation gap 30 mm	1/10

ThinMat-underfloor heating mat – 100 W/m^2 with thermostat

Lower power per square meter, 100 W/m^2, is sufficient for comfort heating in dry and damp indoor conditions and it should be installed to thin layer of levelling compound. Wood, parquet, laminate, concrete, stone or clinker can be used for surface material. Suitable for installation on top of chipboard, but have to be covered with levelling compound. The package includes a floor heating mat, floor heating thermostat, adhesive aluminium tape, a sensor and a flexible installation tube for the sensor. The temperature range of the thermostat ECO10FSJ+E is 10 - 35 °C, IP31. The rated voltage is 230 V. Lowest installation temperature, + 5 °C. ThinMat width is 48 cm. The length of the cold lead is 4 m.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EFHTM100.1+T	6418677636691	2 m, 1 m^2, 100 W + T	1/40
EFHTM100.15+T	6418677636707	3 m, 1,5 m^2, 150 W + T	1/40
EFHTM100.2+T	6418677636714	4 m, 2 m^2, 200 W + T	1/40
EFHTM100.3+T	6418677636721	6 m, 3 m^2, 300 W + T	1/40
EFHTM100.4+T	6418677636738	8 m, 4 m^2, 400 W + T	1/40
EFHTM100.5+T	6418677636745	10 m, 5 m^2, 500 W + T	1/40
EFHTM100.6+T	6418677636752	12 m, 6 m^2, 600 W + T	1/40
EFHTM100.8+T	6418677636769	16 m, 8 m^2, 800 W + T	1/24
EFHTM100.10+T	6418677636776	20 m, 10 m^2, 1000 W + T	1/24
EFHTM100.12+T	6418677636783	24 m, 12 m^2, 1200 W + T	1/24

ThinMat-underfloor heating mat – 100 W/m^2 without thermostat

Lower power per square meter, 100 W/m^2, is sufficient for comfort heating in dry and damp indoor conditions and it should be installed to thin layer of levelling compound. Wood, parquet, laminate, concrete, stone or clinker can be used for surface material. Suitable for installation on top of chipboard, but have to be covered with levelling compound. The package includes a floor heating mat, adhesive aluminium tape, and a flexible installation tube for the sensor. The rated voltage is 230 V. Lowest installation temperature, + 5 °C. ThinMat width is 48 cm. The length of the cold lead is 4 m.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EFHTM100.1	6418677635366	2 m, 1 m^2, 100 W	1/40
EFHTM100.15	6418677635373	3 m, 1,5 m^2, 150 W	1/40
EFHTM100.2	6418677635380	4 m, 2 m^2, 200 W	1/40
EFHTM100.3	6418677635397	6 m, 3 m^2, 300 W	1/40
EFHTM100.4	6418677635403	8 m, 4 m^2, 400 W	1/40
EFHTM100.5	6418677635410	10 m, 5 m^2, 500 W	1/40
EFHTM100.6	6418677635427	12 m, 6 m^2, 600 W	1/40
EFHTM100.8	6418677635441	16 m, 8 m^2, 800 W	1/24
EFHTM100.10	6418677636189	20 m, 10 m^2, 1000 W	1/24
EFHTM100.12	6418677636196	24 m, 12 m^2, 1200 W	1/24

Underfloor Heating EFH

ThinMat-underfloor heating mat – 160 W/m² without thermostat

More power, 160 W/m², is required in less insulated premises with concrete, stone or clinker flooring. Installation below wooden, parquet or laminate surfaces or on top of chipboards is not recommended. The package includes a floor heating mat, adhesive aluminium tape and a flexible installation tube for the sensor. The rated voltage is 230 V. Lowest installation temperature, + 5 °C. ThinMat width is 48 cm. The length of the cold lead is 4 m.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EFHTM160.05	6418677637964	1 m, 0,5 m², 80 W	1/40
EFHTM160.1	6418677635458	2 m, 1 m², 160 W	1/40
EFHTM160.15	6418677637186	3 m, 1,5 m², 240 W	1/40
EFHTM160.2	6418677635465	4 m, 2 m², 320 W	1/40
EFHTM160.25	6418677637193	5 m, 2,5 m², 400 W	1/40
EFHTM160.3	6418677635472	6 m, 3 m², 480 W	1/40
EFHTM160.4	6418677635489	8 m, 4 m², 640 W	1/40
EFHTM160.5	6418677635496	10 m, 5 m², 800 W	1/40
EFHTM160.6	6418677637209	12 m, 6 m², 960 W	1/40
EFHTM160.7	6418677637216	14 m, 7 m², 1120 W	1/24
EFHTM160.8	6418677637063	16 m, 8 m², 1280 W	1/24
EFHTM160.10	6418677637070	20 m, 10 m², 1600 W	1/24

eWoodMat heating cable mat - 70W / m² without a thermostat

Low power per square meter, 70 W / m², suitable for dry areas of low-energy houses as the primary source of heat and sufficient for comfort heating in well insulated older houses. For the surface material can be used for parquet and laminate. Suitable for installation on concrete, wood or other flat, single-floor structure if minimum thickness of 6mm XPS insulation is used beneath the heating mat. Package includes a floor heating mat, aluminum tape and a flexible conduit for the sensor. Rated voltage is 230 V. The cold cable length is 4 m. The lowest installation temperature is +5 ° C. eWoodMat width is 50 cm.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EFHWM70.2	6418677637520	4 m, 2 m², 140 W	1/40
EFHWM70.3	6418677637544	6 m, 3 m², 210 W	1/40
EFHWM70.4	6418677637568	8 m, 4 m², 280 W	1/40
EFHWM70.5	6418677637582	10 m, 5 m², 350 W	1/24
EFHWM70.6	6418677637605	12 m, 6 m², 420 W	1/24
EFHWM70.7	6418677637629	14 m, 7 m², 490 W	1/24
EFHWM70.8	6418677637643	16 m, 8 m², 560 W	1/24
EFHWM70.10	6418677637667	20 m, 10 m², 700 W	1/12
EFHWM70.13	6418677637681	26 m, 13 m², 910 W	1/12
EFHWM70.16	6418677637704	32 m, 16 m², 1120 W	1/12
EFHIP6	6418677637728	For eWoodMat,10 pcs 0,5mx1,2m	1/6

Panel Heaters EPH

Taso

A pleasant combination heater designed for homes and holiday homes. The surface temperature of the heaters is less than 70 °C. The heater is equipped with an electronic thermostat (6 – 30 °C) with a possibility of stepless temperature reduction control (2 – 20 °C) from the set value. Max load 1900 W (master + slave). The heaters are double-insulated, class II, separate earthing is not required. IP20.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
TASO2	6410081272403	200 W, 400x300 mm	1/72
TASO3	6410081272410	350 W, 400x500 mm	1/48
TASO5	6410081272427	550 W, 400x800 mm	1/28
TASO8	6410081272434	800 W, 400x1100 mm	1/24
TASO10	6410081272441	1000 W, 400x1370 mm	1/28
TASO12	6410081272458	1200 W, 400x1670 mm	1/28
Taso-slave heaters			
TASO2.0	6410081272496	200 W/o, 400x300 mm	1/12
TASO3.0	6410081272502	350 W/o, 400x500 mm	1/24
TASO5.0	6410081272519	550 W/o, 400x800 mm	1/28
TASO8.0	6410081272526	800 W/o, 400x1100 mm	1/24
TASO10.0	6410081272533	1000 W/o, 400x1370 mm	1/28
TASO12.0	6410081272540	1200 W/o, 400x1670 mm	1/28

Lista

A pleasant combination heater designed for homes and holiday homes. The surface temperature of the heaters is less than 70 °C. The heater is equipped with an electronic thermostat (6 – 30 °C) with a possibility of stepless temperature reduction control (2 – 20 °C) from the set value. Max load 2300 W (control unit + slave). The heaters are double-insulated, class II, separate earthing is not required. Height 200 mm. Surface 80 mm from the wall. IP20.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
LISTA2	6410081222453	200 W, 200x500 mm	1/44
LISTA3	6410081222460	350 W, 200x800 mm	1/43
LISTA5	6410081222477	500 W, 200x1100 mm	1/44
LISTA7	6410081222484	700 W, 200x1370 mm	1/54
LISTA9	6410081222491	900 W, 200x1670 mm	1/54
Lista-slave heaters			
LISTA2.0	6410081222156	200 W/o, 200x500 mm	1/26
LISTA3.0	6410081222163	350 W/o, 200x800 mm	1/27
LISTA5.0	6410081222170	500 W/o, 200x1100 mm	1/44
LISTA7.0	6410081222187	700 W/o, 200x1370 mm	1/27
LISTA9.0	6410081222194	900 W/o, 200x1670 mm	1/27

Peta

A cover-up protected heater, for instance for clothes closets. Surface temperature less than 70 °C. The heater is equipped with an electronic thermostat (6 – 30 °C) with a possibility of stepless temperature reduction control (2 – 20 °C) from the set value. Max load 1900 W (control unit + slave). The heaters are double-insulated, class II, separate earthing is not required. Height 200 or 400 mm. Surface 80 mm from the wall. IP20.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
PETA2	6410081222606	200 W, 200x500 mm	1/56
PETA3	6410081222613	350 W, 400x500 mm	1/48

Roti

The splashproof ROTI heaters are designed for damp and wet conditions. Surface temperature less than 70 °C. The heater is equipped with an electronic thermostat (6 – 30 °C) with a possibility of stepless temperature reduction control (2 – 20 °C) from the set value. Max load 1400 W (control unit + slave). The heaters are double-insulated, class II, separate earthing is not required. In the range there are suitable heaters for bathrooms and washing rooms, saunas, basements and garages. Height 400 mm. Surface 80 mm from the wall. IP24.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ROTI1	6410081222750	150 W, 400x300 mm	1/36
ROTI3	6410081222767	350 W, 400x500 mm	1/48
ROTI5	6410081222774	500 W, 400x810 mm	1/28
ROTI7	6410081222781	700 W, 400x1100 mm	1/24

Panel Heaters EPH

Tupa-equipment

Equipment for Taso, Lista, Peta and Roti-heaters. ELTE4 -thermostat is fixed to the heater with four screws. The connection cable with strain relief is equipped with Euro-plug.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ELTE4	6410081222866	Thermostat ELTE4	1/14
ELTE3	6410081222859	Thermostat to Tupa-heaters manufctured before 1996	1/14
LJOH	6418677631757	Connection cable kit to Tupa heaters, 1.5 meter	1/25

Beta with electronic thermostat and connection box

Beta convector heater with a electronic thermostat (5 – 30 °C) and a connection box. The electronic thermostat ensures a silent and smooth operation of the heater. A fixed temperature reduction of 5 °C from the set temperature is possible. The accuracy of the thermostat is +/- 0.1 °C. Thanks to the control wheel and a simple scale, adjusting the temperature is easy. The surface temperature is less than 60 °C. Height of the heater is 389 mm. Nominal voltage 230 V + 10%, -15%. Protection class IP21.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBE02B	6418677635359	250 W, 389x451 mm	1/40
EPHBE05B	6418677632020	500 W, 389x585 mm	1/30
EPHBE07B	6418677632037	750 W, 389x719 mm	1/30
EPHBE10B	6418677632044	1000 W, 389x853 mm	1/20
EPHBE15B	6418677632051	1500 W, 389x1121 mm	1/20
EPHBE20B	6418677632068	2000 W, 389x1523 mm	1/26

Beta with electronic thermostat and Euro plug

Beta convector heater with a electronic thermostat (5 – 30 °C) and a plug. The electronic thermostat ensures a silent and smooth operation of the heater. The accuracy of the thermostat is +/- 0.1 °C. Thanks to the control wheel and a simple scale, adjusting the temperature is easy. The surface temperature is less than 60 °C. Height of the heater is 389 mm. Nominal voltage 230 V + 10%, -15%. Protection class IP21.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBE02P	6418677636943	250 W, 389x451 mm	1/40
EPHBE05P	6418677636950	500 W, 389x585 mm	1/30
EPHBE07P	6418677636967	750 W, 389x719 mm	1/30
EPHBE10P	6418677636974	1000 W, 389x853 mm	1/20
EPHBE15P	6418677636981	1500 W, 389x1121 mm	1/20
EPHBE20P	6418677636998	2000 W, 389x1523 mm	1/26

Beta with mechanical thermostat and Euro plug

Beta convector heater with a mechanical thermostat (6 – 36 °C) and Euro plug are durable and reliable. The accuracy of the thermostat is +/- 0.5 °C. Thanks to the control wheel and a simple scale, adjusting the temperature is easy. Height of the heater is 389 mm. Nominal voltage 230 V +10%, -15%. Protection class IP21.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBM02P	6418677635786	250 W, 389x451 mm	1/40
EPHBM05P	6418677631832	500 W, 389x585 mm	1/30
EPHBM07P	6418677631849	750 W, 389x719 mm	1/30
EPHBM10P	6418677631856	1000 W, 389x853 mm	1/20
EPHBM15P	6418677631863	1500 W, 389x1121 mm	1/20
EPHBM20P	6418677631870	2000 W, 389x1523 mm	1/26

Beta Mini with electronic thermostat and connection box

Beta Mini convector heater with a electronic thermostat (5 – 30 °C) and a connection box. The electronic thermostat ensures a silent and smooth operation of the heater. A fixed temperature reduction of 5 °C from the set temperature is possible. The accuracy of the thermostat is +/- 0.1 °C. Thanks to the control wheel and a simple scale, adjusting the temperature is easy. The surface temperature is less than 60 °C. Height of the heater is 235 mm. Nominal voltage 230 V + 10%, -15%. Protection class IP21.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBEM02B	6418677637322	250 W, 235x585 mm	1/28
EPHBEM05B	6418677637339	500 W, 235x853 mm	1/30
EPHBEM07B	6418677637346	750 W, 235x986 mm	1/30
EPHBEM10B	6418677637353	1000 W, 235x1121 mm	1/30
EPHBEM13B	6418677637360	1300 W, 235x1523 mm	1/28

Panel Heaters EPH

Beta Mini with electronic thermostat and Euro plug

Beta Mini convector heater with a electronic thermostat (5 – 30 °C) and a plug. The electronic thermostat ensures a silent and smooth operation of the heater. The accuracy of the thermostat is +/- 0.1 °C. Thanks to the control wheel and a simple scale, adjusting the temperature is easy. The surface temperature is less than 60 °C. Height of the heater is 235 mm. Nominal voltage 230 V + 10%, -15%. Protection class IP21.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBEM02P	6418677637421	250 W, 235x585 mm	1/28
EPHBEM05P	6418677637438	500 W, 235x853 mm	1/30
EPHBEM07P	6418677637445	750 W, 235x986 mm	1/30
EPHBEM10P	6418677637452	1000 W, 235x1121 mm	1/30
EPHBEM13P	6418677637469	1300 W, 235x1523 mm	1/28

Beta Mini with mechanical thermostat and Euro plug

Beta Mini convector heater with a mechanical thermostat (6 – 36 °C) and Euro plug are durable and reliable. The accuracy of the thermostat is +/- 0.5 °C. Thanks to the control wheel and a simple scale, adjusting the temperature is easy. Height of the heater is 235 mm. Nominal voltage 230 V +10%, -15%. Protection class IP21.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBMM02P	6418677637476	250 W, 235x585 mm	1/28
EPHBMM05P	6418677637483	500 W, 235x853 mm	1/30
EPHBMM07P	6418677637490	750 W, 235x986 mm	1/30
EPHBMM10P	6418677637506	1000 W, 235x1121 mm	1/30
EPHBMM13P	6418677637513	1300 W, 235x1523 mm	1/28

Beta-accessory

Plastic feet for Beta-heaters with plug. Material polypropylene.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
EPHBAC1	6418677637001	Feet for Beta-heaters	1/10

ECO Heating Control

Room thermostats

Room heating thermostats for temperature control in individual rooms.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ECO10RJ	6418677630798	Room thermostat 10A, with Jussi electrical fittings	1/12
ECO10RJ+E	6418677630859	Room heating thermostat 10A, Jussi + Elko fittings	1/12

Underfloor heating thermostats

Underfloor heating thermostats for temperature control in individual rooms. Nominal current 10 A res. Maximum load 10 A. Temperature reduction of 4 °C with 230 V control voltage. Nominal voltage 230 V. Control range +10 °C…+60 °C. The NTC-sensor cable is 4 meter long, max Ø 7.5 mm, and can be extended up to 10 meter. Sensor 47 kohm / 25ºC. Ambient temperature -20ºC...+30ºC. The thermostats has a two-pole switch. The termostats are compatible with JUSSI- and ELKO - electrical fittings. IP31.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ECO10FJ	6418677630774	Underfloor heating thermostat 10A, Jussi	1/12
ECO10FE	6418677630781	Underfloor heating thermostat 10A, Elko	1/12
ECO10FJ+E	6418677630835	Underfloor heating thermostat 10A, Jussi + Elko	1/12
ECO10FJMP	6418677630828	Multipack, 6 pcs. ECO10FJ underfloor heating thermostat, Jussi electrical fittings, 230V	1/80
ECO16FD	6418677636158	Underfloor heating thermostat 16 A, DIN-rail mounted	1/12
ECOAC44	6410035300909	Protective casing for ECO10F thermostat, IP44	1/12
Floor thermostat with residual circuit breaker			
ECO16FJW	6418677637308	Underfloor heating thermostat, 16A, with residual circuit breaker	1/12
Impressivo underfloor heating thermostat			
ECO10FI.00	6418677635564	Floor heating thermostat 10 A, Impressivo	1/12
ECO10FI-81	6418677635601	Cover plate, Impressivo, anthracite	1/10
ECO10FI-83	6418677635618	Cover plate, Impressivo, aluminium	1/10
ECO10FI-84	6418677635588	Cover plate, Impressivo, white	1/10
ECO10FI-85	6418677635595	Cover plate, Impressivo, grey	1/10

Combination thermostats

Combination thermostat can be used as a combination thermostat or only either as a room thermostat or floor heating thermostat. Combination thermostat for room-specific temperature adjustment. Nominal current 16 A res. Max 3600 W. 230 V, +10 %...-15 %. 50 Hz. Control voltage 230 V. Regulation range floor +10 °C...+50 °C, room +5 °C...+35 °C. Temperature drop 0...-15 °C. Temperature increase 0...+5 °C. Floor min temperature limit +5-40 °C. Floor max temperature limit +25-50 °C. NTC sensor 4 m, max diameter 7,5 mm, can be extended 10 m MMJ 2 x 1,5 mm^2. Sensor 47 kohm / 25 °C. Operating temperature range -20 °C...+30 °C. 2-pole switch mechanism, IP30.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ECO16FRJ	6418677630804	Combination thermostat, 16A, with Jussi electrical fittings, 230V	1/12
ECO16FRE	6418677630811	Combination thermostat, 16A, with Elko electrical fittings, 230V	1/12
ECO16FRJ+E	6418677630842	Combination thermostat, 16A, with Jussi + Elko electrical fittings, 230V	1/12
Combination thermostat with display			
ECO16LCDJ+E	6418677637261	Combination thermostat, 16A, with Jussi + Elko electrical fittings, 230V	1/12

Control and Monitoring

ECO601 control device

ECO601 is an easy to use device for surveillance and control of new or existing premises. The control of the device depends on the occupants' presence (Away, Arriving and Present). The device can be controlled locally using the local control button or remotely through phone calls or text messages. Different alarm systems can be connected to the device e.g. power cut, burglar, fire and humidity alarms. The device can only be controlled from numbers in the user catalogue (max 5 pcs). ECO601 is an updated version of ECO600 remote control unit. ECO601 includes a control unit, a transformer, a GSM-antenna and sensors for inside and outside temperatures. ECO605 reserve power supply is available as an accessory.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ECO601	6418677637285	Control device	1/10
ECO605	6418677637087	Reserve power supply	1/10

Ensto eGuard ECO602

Ensto eGuard is an easy to use energy meter. The device measures in real time the energy-, water- and district heating's total consumption, as well as indoor and outdoor temperature. Measured values are stored to memory and can be found from the menu and they can be tracked over the hour, day, week, month and year. Data can be transferred to a computer from a memory card or with a separate USB cable. The device screen is clear: the circle is divided into color-coded green and red, and the arrow shows the electricity consumption relative to average consumption. Electricity consumption currently is showed in numerical values in the center of the circle. Compared with the color code it's showed if it's less (green) or more (red) relative to the last seven days of average consumption. ECO691 communicates with wirelessly (2.4 GHz IEEE802.15.4) with ECO602 measuring device.

TYPE	EAN CODE	DESCRIPTION	PACKAGE
ECO602.1	6418677638190	eGuard	1/252

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