

# Electric floor heating and anti-icing systems

## MATEC

MATEC electric heating mats offer very easy installation of underfloor heating systems. They are used in residential and industrial buildings. They provide a relatively fast warmth with even distribution of temperature in heated rooms. The main products are 150 W/m<sup>2</sup> heating mats, 80 W/m<sup>2</sup> heating foils and temperature controllers which are compatible with electric and water heating systems.

Main advantages of the underfloor heating:

- thermal comfort in the room achieved with even distribution of heat from the floor,
- low temperature of the heating surface while maintaining appropriate thermal comfort,
- easy and effective control for optimal energy use in relation to the current heating needs,
- low installation cost,
- improving the appearance of rooms and increasing their area by removing wall radiators,
- possibility of mounting under dry laminated panels (heating foils).

MATEC de-icing floor systems create an efficient method of preventing the water pipes from freezing and icing of gutters, loading ramps, vehicles, stairs, and other traffic routes that are exposed to adverse winter weather conditions. The gutter protection against snow and icicles should be designed by taking into consideration heating elements with adequate power that operate together with an

appropriate de-icing monitoring and control system. De-icing of various traffic routes or ramps requires specific types of heating cables whose construction guarantees proper operation in various under-surface conditions. MATEC de-icing systems include: heating mats for driveways and other traffic routes, stable resistance heating cables for stairs and ramps, stable resistance heating cables for gutters, heating cables for pipes with a thermostat, self-adjusting cables, one- and dual-zone temperature controllers, ice and snow sensor for open surfaces and gutters, temperature and humidity sensors, and necessary accessories for the installation of the system.

The de-icing systems create an effective protection against:

- icing of drainpipes that forms dangerous icicles and ice covers,
- snow and ice covers on traffic routes, parking lots, driveways, etc.,
- dangerous ice covers on stairs and unloading ramps,
- water freezing in installations.



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- Zinc-coated installation tape TMS-01 438
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  - Kit for montage heating foil ZM-02 439





## Designing and technical aspects useful during floor heating execution

It is necessary to define the rooms' heat demand when designing floor heating. It is done by means of a calculation method including the heat loss through the external barriers such as walls, roofs, windows or by means of a simplified method, in which we follow the below mentioned information, showing the heating power that should be used in specific types of rooms.

The heating power consumption for the following types of rooms is:

- Rooms, halls and kitchens range from 70÷120 W/m<sup>2</sup>,
- Bathrooms range from about 120÷150 W/m<sup>2</sup>,
- Cellars, garages, utility rooms range at a level of ~100 W/m<sup>2</sup>.

With these data we can easily calculate the size of the floor heat source in relation to the size of the heated room. For example, if we want to heat a room in a flat with an area of 25 m<sup>2</sup>, we need to generate up to 3000 W of the total heating power, which heats the room to the adjusted temperature in time that is dependent on the insulation level of barriers of this room. If we know the value of the total heating power necessary to heat the room, we choose the heating mats with a unit power in the MATEC system of 150 W/m<sup>2</sup>. An increased unit power of the mat reduces the heating surface and in this case we can mount four mats with the heating surface of 5 m<sup>2</sup> each, thus achieving a demanded heating surface of 20 m<sup>2</sup> calculated from

the ratio of the total heating power and unit power of the mat. In this case, the heating mats must be put in the middle of the room with free spaces left near walls that are designed for furniture and devices firmly fixed on the floor.

Another important aspect concerning the choice of electric heating mats for unit power is a cooperation with the base. Generally floor heating shall be installed under a base characterized by a low thermal resistance material it was made. The value of such resistance is calculated in [m<sup>2</sup>K/W] and it should not be higher than 0,15 [m<sup>2</sup>K/W]. So, for example, we can define some of the most popular basis under which the floor heating is mounted.

Examples of types flooring with the specified thermal resistance

SURFACE MATERIAL FLOORS	THICKNESS [mm]	COEFFICIENT OF HEAT TRANSFER [W/mK]	THERMAL RESISTANCE [m <sup>2</sup> K/W]
Ceramic tile	9	1,05	0,009
Linoleum	2,5	0,17	0,015
Marble	25	2,15	0,012
PVC lining	2	0,2	0,01
Oak wood flooring	25	0,22	0,114

Choosing floor heating power in relation to the floor, we must remember that the recommended average floor temperature should be about 26°C. Bathrooms and places near windows are exceptions, it means the temperature may be increased up to 29°C.

The heating cables distribution in a room's floor must be carefully planned when constructing floor heating installation. In order to arrange cables on any surface in a quick and correct way, the heating mat system is applied. The system's construction ensures the appropriate distance between the cables and reduces the installation time. The mat's mesh (without a heating cable) can be easily cut, which in turn gives an oppor-

tunity to move it in any direction on the floor. MATEC offers two types of heating mats, one and two-sided power supply. Moving the mat into two parallel and opposite directions, after cutting the mat's mesh, the beginning and the end of the mat meet at one side of the floor. In such situations, the cheaper, two-sided power supply mats can be used as they are equipped in a single-core heating cable, which is thinner than twisted-pair cable used in one-side power supply mats, and two power supply single-core cables. It is a significant advantage in the floor heating installation that allows to use a thinner layer of adhesive under the tiles.





### Heating mats



• Heating mat arrangement. While planning the heating mat arrangement, first of all we must pay attention to construction elements or devices that will be located in the heated room. The mat arrangement must be planned in such a way the heating cables omit these elements and devices. The omitting can be easily done by cutting the mat's mesh (without cutting the heating cable). The layout arrangement of a mat should be done in a physical way, i.e. the mat should be arranged on a dry surface by cutting the mesh in the required places. At this point it is necessary to carry out the first out of two resistance measurements of the heating cable. If the value is in the tol-

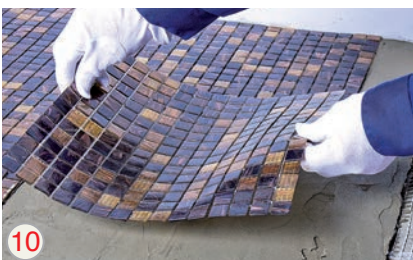
erance value shown on the product label, we are sure that the mat was prepared to be arranged without any damage and the product itself does not have any defects.

• After the mat arrangement has been planned it is necessary to make grooves in the floor and in the wall for protective pipes, where the probe and power supply cables will be led. In order to make the installation connecting the heating mat with the temperature controller junction box it is necessary to put the protective pipes with cables into the grooves.

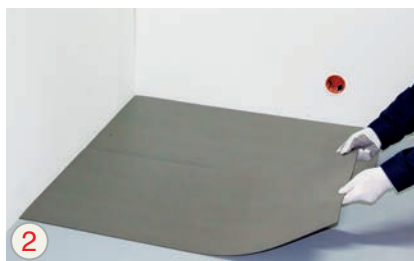
• After the cables have been arranged start to mount the heating mat by placing it in accordance with the previously planned

design. Put regularly the adhesive layer on the mat in order to arrange the tiles. Carry out the second resistance measurement of the heating cable just after laying the tiles in order to compare it with the value on the product label. If the data are equal with the indicated values, we are sure that the mat has not been damaged during tiles' installation.

• Finally, carry out the mat installation with a temperature controller mounted in the electric junction box 120 cm high from the ground. Next plaster the grooves with the previously installed cables.



## Heating foils



- Plan the layout of the heating foil by minding the structural parts of the installation location and the stationary equipment and/or heavy furniture which may obstruct the heat transfer. The heating foil sheets should be laid by avoiding these obstructions; otherwise, these spots will reduce the heating performance while resulting in excess waste of electrical power and a risk of overheating the obstructions. The obstructions will be easy to avoid since the heating foil sheets can be trimmed to any length or purchased in the required dimensions.
- Remove the heating foil sheet from the packaging and tests its electrical resistance. Verify that the test result matches the nameplate resistance value and record the former on the warranty certificate. Spread the heating foil flat on a dry and clean surface with a gap of 4 to 5 cm from the walls before installation, and mark out the power connection points on the substrate for every heating foil module. Underneath the heating foil laid out according to the installation plan, mark out the lines for the furrows which will accommodate the power supply cables, the connectors, and the flexible conduit for the floor temperature probe. Mark the location for the wiring

junction box and the temperature controller box on the wall. Cut furrows deep enough to install the planned system components flush with the substrate at the market locations and along the marked lines.

- With the wall and floor furrows ready, lay the foam underlay on the floor and make openings in it aligned with the floor furrows. Lay the foam underlay in contact with the walls.
- Feed the flexible conduit with the temperature controller's floor probe through the floor furrows. The probe must be at least 50 cm away from the walls. Feed the probe cable in the flexible conduit within the respective wall furrow and into the temperature controller box.
- With the foam underlay level and smooth and the floor temperature probe in place, cover the underlay with the heating foil modules trimmed and aligned according to the installation plan. Feed the power supply cables from the heating foil modules to the junction box. Now, test the electrical resistance of the system against the nameplate ratings.
- If the test result meets the nameplate rating of electrical resistance, join all adjacent heating modules with the insulating tape from the

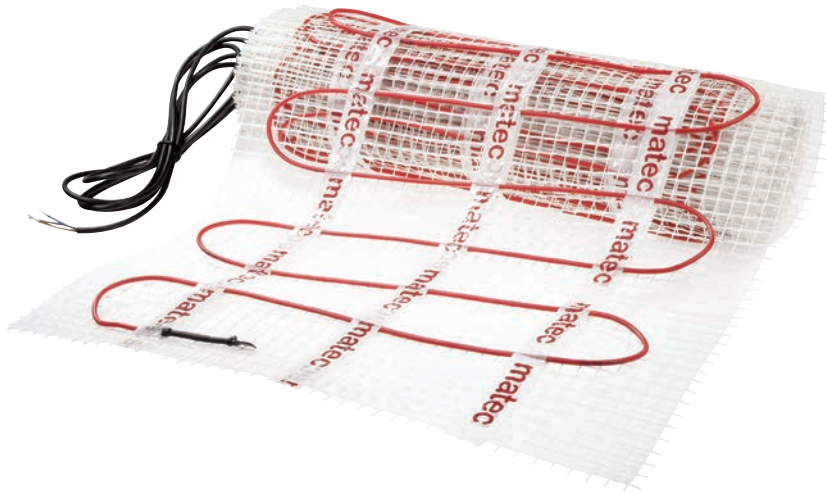
ZM-02 kit. The insulating tape joints will prevent overlapping of the heating foil modules and seal off the gaps in between while laying the insulating foil and flooring panels. Join the heating foil modules with the insulating tape before connecting the power cables to the building power system.

- Connect the heating foil modules laid flat and wired together to the power supply source (via the temperature controller or a switchable contactor).
- With all the wiring connected, test the operation of the heating foil modules; if the test is positive, record the electrical resistance test results in the warranty certificate.
- Once the heating foil modules have been tested for operation, cover them with plastic vapour barrier, followed by the remainder of the indoor finish work.
- Cover the plastic vapour barrier (the minimum thickness of which shall be 0,25 mm) with the flooring panels according to their installation instructions. With the flooring panel installation complete, do the last electrical resistance test and record its results in the warranty certificate. If the test results are within the nameplate ratings, the installation is correct and no heating foil module is damaged or has failed.





### Heating mat one-sided power supply MOJ



#### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 150 W/m<sup>2</sup>
- operating temperature: 80°C
- protection degree: IPX7
- constant width of the mat: 50 cm

#### Accessories

- mat with a two-cable, shielded heating cable,
- power supply cables: H03VV-F 3G0,75 mm<sup>2</sup> / H05VV-F 3G1,5 mm<sup>2</sup> (3 m),
- protective pipe for power supply cable,
- flush-mounted electrical junction box Ø60, deepen,
- installation instruction with a Warranty Card.

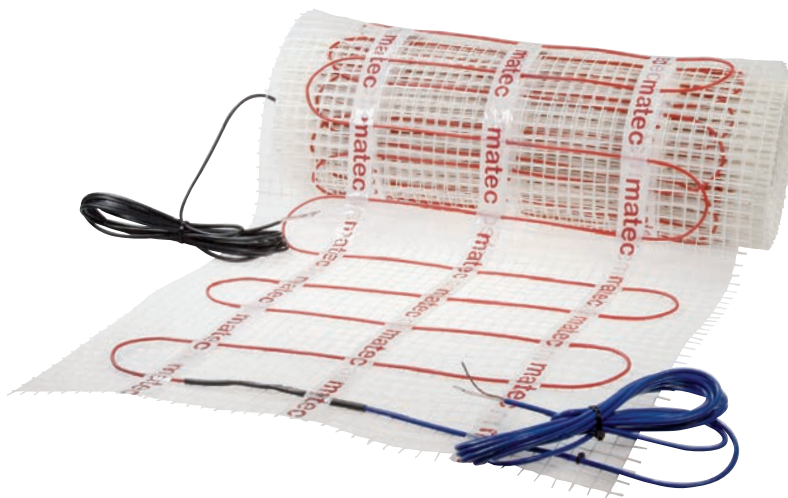
#### Application

For indoor heating installations, in rooms such as bathroom, kitchen, hall and others where the same temperature or warm floor is required. It enables an easier connection way to power supply due to one-sided power supply.

The heating mat must be installed with a temperature regulator.

Product name	Type	Surface	Mat thickness	Power
Heating mat one-sided power supply	MOJ-10	1,0 m <sup>2</sup>	4,08 mm	150 W / 230 V AC
Heating mat one-sided power supply	MOJ-15	1,5 m <sup>2</sup>	4,25 mm	225 W / 230 V AC
Heating mat one-sided power supply	MOJ-20	2,0 m <sup>2</sup>	4,23 mm	300 W / 230 V AC
Heating mat one-sided power supply	MOJ-25	2,5 m <sup>2</sup>	4,48 mm	375 W / 230 V AC
Heating mat one-sided power supply	MOJ-30	3,0 m <sup>2</sup>	4,18 mm	450 W / 230 V AC
Heating mat one-sided power supply	MOJ-40	4,0 m <sup>2</sup>	4,38 mm	600 W / 230 V AC
Heating mat one-sided power supply	MOJ-50	5,0 m <sup>2</sup>	4,58 mm	750 W / 230 V AC
Heating mat one-sided power supply	MOJ-60	6,0 m <sup>2</sup>	4,15 mm	900 W / 230 V AC
Heating mat one-sided power supply	MOJ-70	7,0 m <sup>2</sup>	4,18 mm	1050 W / 230 V AC
Heating mat one-sided power supply	MOJ-80	8,0 m <sup>2</sup>	4,20 mm	1200 W / 230 V AC
Heating mat one-sided power supply	MOJ-105	10,5 m <sup>2</sup>	4,23 mm	1575 W / 230 V AC
Heating mat one-sided power supply	MOJ-125	12,5 m <sup>2</sup>	4,40 mm	1875 W / 230 V AC
Heating mat one-sided power supply	MOJ-150	15,0 m <sup>2</sup>	4,45 mm	2250 W / 230 V AC

## Heating mat two-sided power supply MOD



### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 150 W/m<sup>2</sup>
- operating temperature: 80°C
- protection degree: IPX7
- constant width of the mat: 50 cm

### Accessories

- mat with a single-wire, shielded heating cable,
- power supply cables: YcLXSek 300/500V 1x0,75 mm<sup>2</sup> (2x4 m),
- protective pipe for power supply cables,
- flush-mounted electrical junction box Ø60, deepen,
- installation instruction with a Warranty Card.

### Application

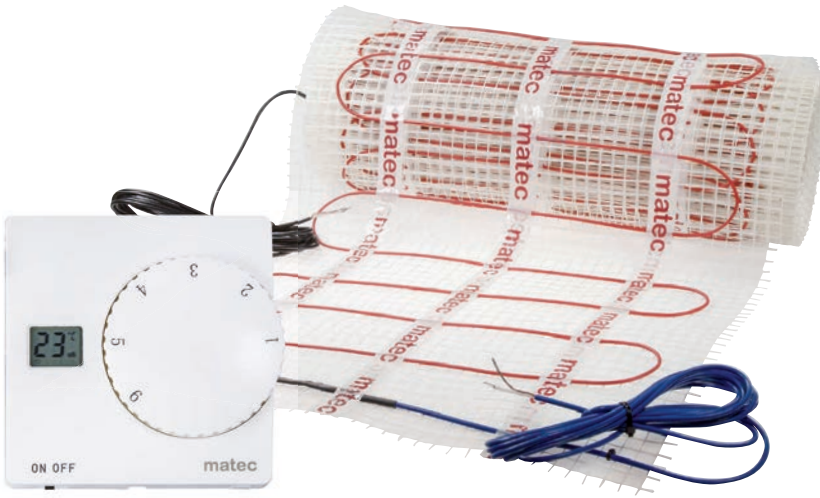
For indoor heating installations in rooms such as bathroom, kitchen, hall and others where the same temperature or warm floor is required. It allows for application of a thinner layer of mortar due to the smaller cross-section of the heating cable.

The heating mat must be installed with a temperature regulator.

Product name	Type	Surface	Mat thickness	Power
Heating mat two-sided power supply	MOD-10	1,0 m <sup>2</sup>	3,09 mm	150 W / 230 V AC
Heating mat two-sided power supply	MOD-15	1,5 m <sup>2</sup>	3,22 mm	225 W / 230 V AC
Heating mat two-sided power supply	MOD-20	2,0 m <sup>2</sup>	3,14 mm	300 W / 230 V AC
Heating mat two-sided power supply	MOD-25	2,5 m <sup>2</sup>	3,34 mm	375 W / 230 V AC
Heating mat two-sided power supply	MOD-30	3,0 m <sup>2</sup>	3,39 mm	450 W / 230 V AC
Heating mat two-sided power supply	MOD-40	4,0 m <sup>2</sup>	3,39 mm	600 W / 230 V AC
Heating mat two-sided power supply	MOD-50	5,0 m <sup>2</sup>	3,46 mm	750 W / 230 V AC



Floor heating set STANDARD



**Technical data**

- power supply voltage: 230 V, 50 Hz
- unit power: 150 W/m<sup>2</sup>
- operating temperature: 80°C
- protection degree: IPX7
- constant width of the mat: 50 cm

**Accessories**

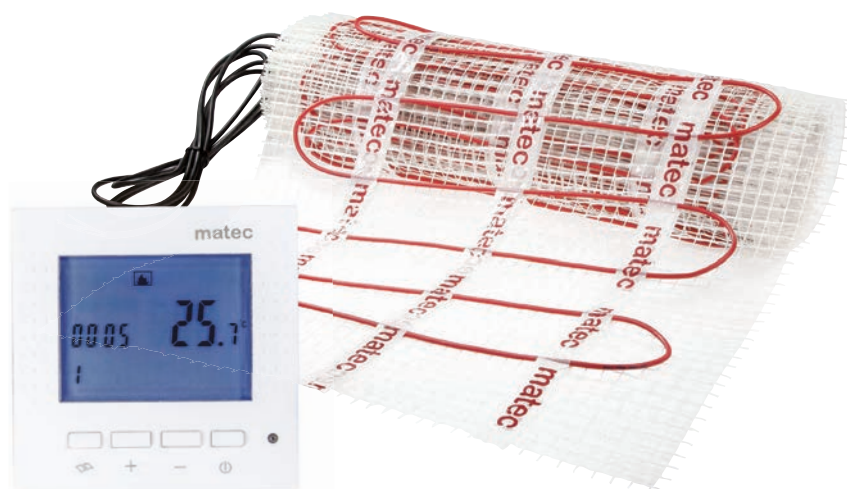
- mat with a single-wire, shielded heating cable,
- temperature regulator: manual RTS-01A with a floor temperature sensor,
- power supply cables: YcLXsek 300/500 V 1x0,75 mm<sup>2</sup> (2x4 m),
- protective pipe for power supply cables,
- protective pipe with a shield for the temperature sensor,
- flush-mounted electrical junction box Ø60, deepen,
- installation instruction with a Warranty Card.

**Application**

For indoor heating installations in rooms such as bathroom, kitchen, hall and others where the same temperature or warm floor is required. It allows for application of a thinner layer of mortar due to the smaller cross-section of the heating cable.

Product name	Type	Surface	Mat thickness	Power
Floor heating set STANDARD	ZOD-10	1,0 m <sup>2</sup>	3,09 mm	150 W / 230 V AC
Floor heating set STANDARD	ZOD-15	1,5 m <sup>2</sup>	3,22 mm	225 W / 230 V AC
Floor heating set STANDARD	ZOD-20	2,0 m <sup>2</sup>	3,34 mm	300 W / 230 V AC
Floor heating set STANDARD	ZOD-25	2,5 m <sup>2</sup>	3,59 mm	375 W / 230 V AC
Floor heating set STANDARD	ZOD-30	3,0 m <sup>2</sup>	3,39 mm	450 W / 230 V AC
Floor heating set STANDARD	ZOD-40	4,0 m <sup>2</sup>	3,39 mm	600 W / 230 V AC
Floor heating set STANDARD	ZOD-50	5,0 m <sup>2</sup>	3,46 mm	750 W / 230 V AC

## Floor heating set STANDARD PLUS



### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 150 W/m<sup>2</sup>
- operating temperature: 80°C
- protection degree: IPX7
- constant width of the mat: 50 cm

### Accessories

- mat with a two-wire, shielded heating cable,
- temperature regulator: programmable RTP-1 device with floor temperature sensor,
- power supply cables: H03VV-F 3G0,75 mm<sup>2</sup> (3 m) ,
- protective pipe with a shield for the temperature sensor,
- protective pipe with a shield for the temperature sensor,
- flush-mounted electrical junction box Ø60, deepen,
- installation instruction with a Warranty Card.

### Application

For indoor heating installations in rooms such as bathroom, kitchen, hall and others where the same temperature or warm floor is required. It allows for an easier power supply connection due to the one-sided power supply.

Product name	Type	Surface	Mat thickness	Power
Floor heating set STANDARD PLUS	ZOJ-10	1,0 m <sup>2</sup>	4,08 mm	150 W / 230 V AC
Floor heating set STANDARD PLUS	ZOJ-15	1,5 m <sup>2</sup>	4,48 mm	225 W / 230 V AC
Floor heating set STANDARD PLUS	ZOJ-20	2,0 m <sup>2</sup>	4,23 mm	300 W / 230 V AC
Floor heating set STANDARD PLUS	ZOJ-25	2,5 m <sup>2</sup>	4,58 mm	375 W / 230 V AC
Floor heating set STANDARD PLUS	ZOJ-30	3,0 m <sup>2</sup>	4,18 mm	450 W / 230 V AC
Floor heating set STANDARD PLUS	ZOJ-40	4,0 m <sup>2</sup>	4,38 mm	600 W / 230 V AC
Floor heating set STANDARD PLUS	ZOJ-50	5,0 m <sup>2</sup>	4,58 mm	750 W / 230 V AC



### Heating foil use under floor panels FGP



#### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 80 W/m<sup>2</sup>
- protection degree: IPX1
- foil thickness: 0,4 mm
- constant width of the foil: 50 cm

#### Accessories

- heating foil,
- set of connecting cables,
- mounting kit.

#### Application

For underfloor heating installed under dry laminated panels. It functions as an additional or basic heating in flats, cottages, public buildings.

#### Technical data

Product name	Type	Dimensions	Surface of foil	Power
Heating foil use under floor panels	FGP-80/0,5x1	0,5 x 1 m	0,5 m <sup>2</sup>	40 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x2	0,5 x 2 m	1,0 m <sup>2</sup>	80 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x3	0,5 x 3 m	1,5 m <sup>2</sup>	120 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x4	0,5 x 4 m	2,0 m <sup>2</sup>	160 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x5	0,5 x 5 m	2,5 m <sup>2</sup>	200 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x6	0,5 x 6 m	3,0 m <sup>2</sup>	240 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x7	0,5 x 7 m	3,5 m <sup>2</sup>	280 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x8	0,5 x 8 m	4,0 m <sup>2</sup>	320 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x9	0,5 x 9 m	4,5 m <sup>2</sup>	360 W / 230 V AC
Heating foil use under floor panels	FGP-80/0,5x10	0,5 x 10 m	5,0 m <sup>2</sup>	400 W / 230 V AC

## Manual temperature regulator RTS-01A

**Description**

Surface, manual temperature regulator cooperating with water and electric floor heating. It controls the temperature by means of an inner built-in sensor or an external floor sensor. It is mounted on a wall. A possibility of mounting the regulator in a Ø60 electric junction box. The floor sensor is included in the set.

**Accessories**

- floor sensor with NTC probe temperature 100 K for 25°C,
- 2,5 m long sensor cable,
- built-in air temperature sensor.

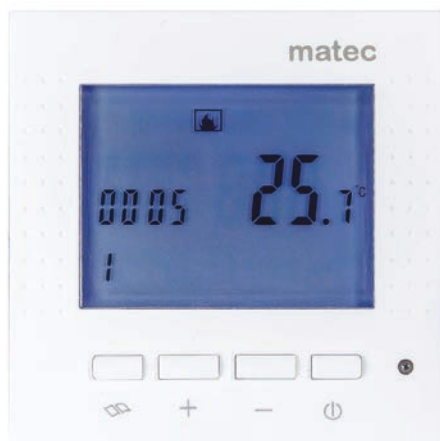
**Features**

- LCD display show the room's current temperature,
- operating modes: economic or comfort,
- easy, intuitive programming.

**Technical data**

Power supply voltage:	100 ÷ 240 V AC
Nominal frequency:	50 / 60 Hz
Room temperature adjustment range:	+5 ÷ 30°C
Floor temperature adjustment range:	+5 ÷ 40°C
Temperature measurement accuracy:	±1°C
Operating temperature:	-5 ÷ +50°C
Output type:	relay 16 A for 230 V AC
Nominal power consumption:	0,35 W – Stand-by
Supply terminals:	L(5); N(6)
NTC sensor terminals:	RT+; RT-
Number of connection terminals:	6
Cross-section of connection cables:	0,5 ÷ 1,5 mm <sup>2</sup>
Casing protection degree:	IP21
Protection class:	II
Overvoltage category:	II
Dimensions height / width / depth:	86 x 86 x 38 mm
Weight:	160 g
Colour:	white



**Programmable temperature regulator RTP-01****Description**

Flush, programmable temperature regulator cooperating with electric floor heating. It controls and regulates the temperature:

- by means of an inner sensor,
- by means of an external sensor (floor),
- by means of an inner sensor including an external sensor limiting the temperature.

Mounting in a Ø60x60 mm electric junction box.

**Accessories**

- floor sensor with NTC probe temperature NTC 5 K for 25°C,
- 2 m long sensor cable,
- built-in air temperature sensor.

**Features**

- LCD display with big, readable signs and blue display backlight,
- indoor or outdoor sensor temperature display,
- time and current operating programme display,
- protection against too high temperature and anti-freezing function
- programming with the use of 4 separate time intervals during a day,
- 7-day programmer.

**Technical data**

Power supply voltage:	85 ÷ 265 V AC
Nominal frequency:	50 / 60 Hz
Room temperature adjustment range:	+5 ÷ 45°C
Floor temperature adjustment range:	+5 ÷ 45°C
Temperature measurement accuracy:	±1°C
Operating temperature:	-5 ÷ +50°C
Casing protection degree:	IP40
Humidity:	<90% without condensation
Protection class:	II
Output type:	1NO-16 A / 250 V AC1 4000 VA - voltage contact
Nominal power consumption:	6 mA / 0,4 W
Supply terminals:	L(1); N(5)
NTC sensor terminals:	(6); (7)
Number of connection terminals:	7
Cross-section of connection cables:	0,5 ÷ 2,5 mm <sup>2</sup>
Overvoltage category:	II
Dimensions height / width / depth:	86 x 86 x 46 mm
Weight:	190 g
Colour:	white

## Touch screen, programmable temperature regulator RTD-01



### Description

Surface, programmable temperature regulator equipped with resistive touch screen.

It controls and regulates the temperature:

- by means of an inner sensor,
- by means of an external sensor (floor),
- by means of an inner sensor including an external sensor limiting the temperature.

Mounting in a Ø60x60 mm electric junction box.

### Accessories

- floor sensor with NTC probe temperature 100 K,
- built-in air temperature sensor.

### Features

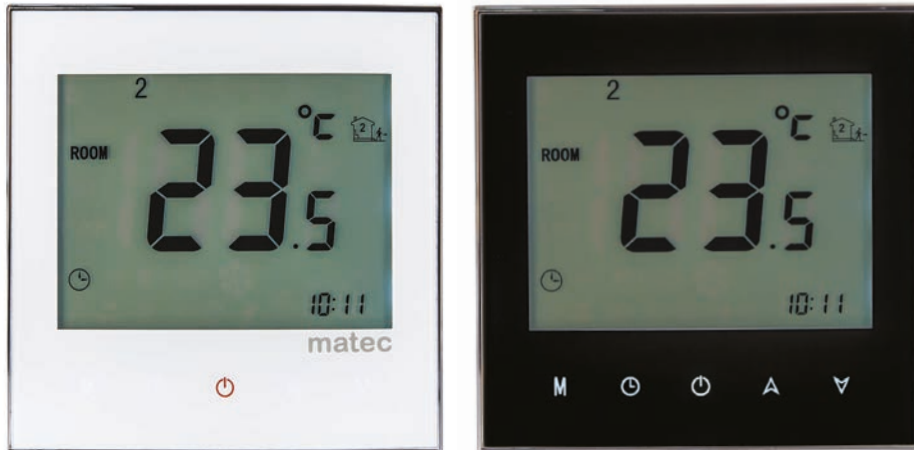
- colour TFT screen with a diagonal of 2,4"
- resistive touch screen,
- consumption of energy monitoring,
- anti-freezing function
- 7-day programmer, 6 presets intervals within day and night,
- language support in Polish, English, German, Russian, Norwegian, Danish, Romanian, French, Swedish,
- cooperates with some floor sensors of other companies.

### Technical data

Power supply voltage:	100 ÷ 240 V AC
Nominal frequency:	50 / 60 Hz
Room temperature adjustment range:	+5 ÷ 35°C
Floor temperature adjustment range:	+5 ÷ 45°C
Temperature measurement accuracy:	±0,5°C
Operating temperature:	0 ÷ +50°C
Casing protection degree:	IP21
Protection class:	II
Output type:	relay 16 A for 230 V AC
Nominal power consumption:	0,73 W – Stand-by
Supply terminals:	L(1); N(2)
NTC sensor terminals:	(6); (7)
Heating element terminals:	(3); (4)
Number of connection terminals:	7
Cross-section of connection cables:	0,5 ÷ 1,5 mm <sup>2</sup>
Overvoltage category:	II
Dimensions height / width / depth:	83,5 x 83,5 x 39,5 mm
Weight:	129 g
Colour:	white



Touch screen, programmable temperature regulator RTD-02



**Description**

Programmable, flush-mounted regulator equipped with a clear screen controlled by touch buttons. It controls and regulates the temperature:

- a) by means of an inner sensor,
- b) by means of an external sensor (floor),
- c) by means of an inner sensor controlling the temperature inside and an external sensor in the floor which acts as over-heating protection of the floor.

**Accessories**

- floor sensor with temperature probe 10 K,
- built-in air temperature sensor,
- probe cable, length 2,5 m.

**Features**

- 3,2" LCD display,
- touch buttons under the screen,
- very clear characters on the screen,
- anti-freezing function;
- 7-day programmer (5+2 or 6+1) with 24 hours temperature and time adjustment,
- easy, intuitive operation in English.

**Technical data**

Power supply voltage:	100 ÷ 240 V AC
Nominal frequency:	50 / 60 Hz
Room temperature adjustment range:	+5 ÷ 35°C
Floor temperature adjustment range:	+5 ÷ 45°C
Temperature measurement accuracy:	±0,5°C
Operating temperature:	+5 ÷ 45°C
Casing protection degree:	IP20
Protection class:	II
Output type:	relay 16 A for 230 V AC
Nominal power consumption:	0,5 W – Stand-by
Supply terminals:	L (4); N (3)
NTC sensor terminals:	(5); (6)
Heating element terminals:	L1 (1); N1 (2)
Number of connection terminals:	6
Cross-section of connection cables:	0,5 ÷ 2,5 mm <sup>2</sup>
Overvoltage category:	II
Dimensions height / width / depth:	86 x 86 x 13,3 x 39 mm
Weight:	290 g
Colour:	white or black

## Wi-Fi, touch screen, programmable temperature regulator RTW-01



### Description

Programmable, flush-mounted temperature controller for control and monitoring of room temperature. The device works with electric floor heating. Flush-mounting in a deep electrical box. The device has backlit touch buttons underneath the screen. It can work as a floor temperature limiter. Wireless Wi-Fi support.

### Accessories

- floor sensor with NTC probe temperature 10 K,
- built-in air temperature sensor,
- probe cable, length 3 m.

### Features

- 3" LCD display,
- operation with touch buttons,
- anti-freeze protection,
- protection against floor overheating,
- programmable temperature controller works with internal or floor sensors or with both sensors simultaneously (the floor sensor works here as a floor temperature limiter)
- Wi-Fi works with an Android and iOS application (application in English and Polish). It works only in the cloud.

### Technical data

Power supply voltage:	85 ÷ 265 V AC
Nominal frequency:	50 / 60 Hz
Room temperature adjustment range:	+5 ÷ 40°C
Floor temperature adjustment range:	+5 ÷ 40°C
Temperature measurement accuracy:	±0,5°C
Operating temperature:	-5 ÷ +45°C
Casing protection degree:	IP21
Protection class:	II
Output type:	15 A / 230 V
Nominal power consumption:	< 2 W (of Wi-Fi)
Supply terminals:	L, N
NTC sensor terminals:	SENSOR
Heating element terminals:	L1, N1
Number of connection terminals:	6
Cross-section of connection cables:	0,5 ÷ 2,5 mm <sup>2</sup>
Overvoltage category:	II
Dimensions height / width / depth:	96 x 96 x 15/41 mm
Weight:	160 g
Colour:	white or black



**Temperature regulator GKN-01****Description**

Programmable, flush-mounted temperature regulator cooperating with electric floor heating. It controls and regulates the temperature:

- by means of an inner sensor,
- by means of an external sensor (floor),
- by means of an inner sensor including an external sensor limiting the temperature.

Mounting in a deep Ø60 mm electric junction box.

**Accessories**

- temperature regulator module – 2 built-in temperature sensors: air temperature measurement, correction
- power supply module 230 V with relay output 16 A and input to the NTC probe, equipped with w mounting frame
- floor sensor with NTC temperature probe– cable, length 3 m.

**Features**

- clear 16x16 LED display with automatic brightness adjustment
- intuitive menu allowing quick change of timer programmes,
- 5 touch, backlit buttons,
- 9 operation modes: manual, night, day, work, home, holidays, anti-freezing, OFF
- 7-day timer programmes with hourly intervals,
- protection against too high temperature and anti-freezing function,
- screensaver with possibility to display: temperature, hour, mode,
- alarm clock function.

**Technical data**

Power supply voltage:	230 V AC
Nominal frequency:	50 / 60 Hz
Clock power supply:	battery CR1220 3V
Temperature adjustment range:	+5 ÷ 50°C
Temperature measurement accuracy:	±0,5°C
Display:	matrix LED 16x16
Control:	5 backlit capacitive buttons
Indication of communication /status:	2 LEDs red/blue
Number of connection terminals:	4
Floor probe connector:	T1, T2
Supply terminals:	L, N
Output voltage terminals:	L', N
Output type:	relay 1 NO 16 A / 250 V AC1 4000 VA – voltage contact
Ingress protection rating of the casing:	IP21
Operating temperature range:	-10 ± 55°C
Protection class:	II
Surge protection category:	II
Dimensions height / width / depth:	90 x 90 x 45 mm
Weight:	0,156 kg

## Modular temperature regulator RTM-01 / RTM-02 / RTM-03



### Description

Temperature regulators are used to control heaters, floor heating depending on the ambient temperature close to the external NTC sensor. The devices has a possibility to control the adjusted temperature by means of a potentiometer placed on its front panel. RTM-03 additionally has the option of adjusting the hysteresis value in the range  $0,25 \div 2,5$  °C.

### Accessories

- NTC-03 temperature sensor with 3 m long cable – not included in the set – the sensor can be purchased separately,
- NTS-01 temperature sensor, surface mounted – not included in the set – the sensor can be purchased separately.

### Features

- supply voltage signalling,
- relay status signalling.

### Technical data

	RTM-01	RTM-02	RTM-03
Power supply voltage:		230 V AC	
Nominal frequency:		50 / 60 Hz	
Nominal current consumption:		33 mA	26 mA
Temperature adjustment range:	+5 ÷ 40°C	-10 ÷ +40°C	-10 ÷ +90°C
Hysteresis:		±1 °C	0,25 ÷ 2,5°C
Regulator operation temperature range:		-20 ÷ +60°C	
Relay current:		16 A	
Casing protection degree:		IP20	
Casing mounting:		TH-35 rail	
Cross-section of connection cables:		0,5 ÷ 2,5 mm <sup>2</sup>	
Casing type:		monomodular	
Dimensions height / width / depth:		90 x 17,5 x 66 mm	
Overvoltage category:		II	
Protection class:		II	
Weight:		80 g	
Colour:		white	

## Modular temperature regulator RTM-20



### Description

The RTM-20 digital temperature regulator is used to control heaters, floor heating depending on the ambient temperature close to the external NTC-3 sensor.

### Accessories

- NTC-03 temperature sensor with 3 m long cable – not included in the set – the sensor can be purchased separately,
- NTS-01 temperature sensor, surface mounted – not included in the set – the sensor can be purchased separately. .

### Features

- 10 operating modes in a day and week cycle,
- LCD display,
- the display shows the adjusted and room ambient temperature close to the sensor,
- maintaining the heating temperature depending on the ambient temperature,
- maintaining the ambient temperature depending on the temperature difference.

### Technical data

Power supply voltage:	230 V AC
Nominal frequency:	50 / 60 Hz
Nominal power consumption:	2 W / 14 VA
Temperature adjustment range:	+5 ÷ 60°C
Regulator operation temperature range:	-20 ÷ +60°C
Sensor operating temperature:	-20 ÷ +90°C
Relay current:	16 A
Casing protection degree:	IP20
Casing mounting:	TH-35 rail
Cross-section of connection cables:	0,5 ÷ 2,5 mm <sup>2</sup>
Casing type:	double-modular construction with a cover
Dimensions height / width / depth:	90 x 35 x 66 mm
Overvoltage category:	II
Protection class:	II
Weight:	140 g
Colour:	white



## Modular temperature regulator RTM-30/S



### Description

The RTM-30/S regulator's operation is based on a heating / regulation curve. The regulator keeps the temperature of the heat source corresponding to the reference point. The regulation algorithm helps to reduce heating costs to a great extent but giving a full comfort of room and weather regulation.

### Accessories

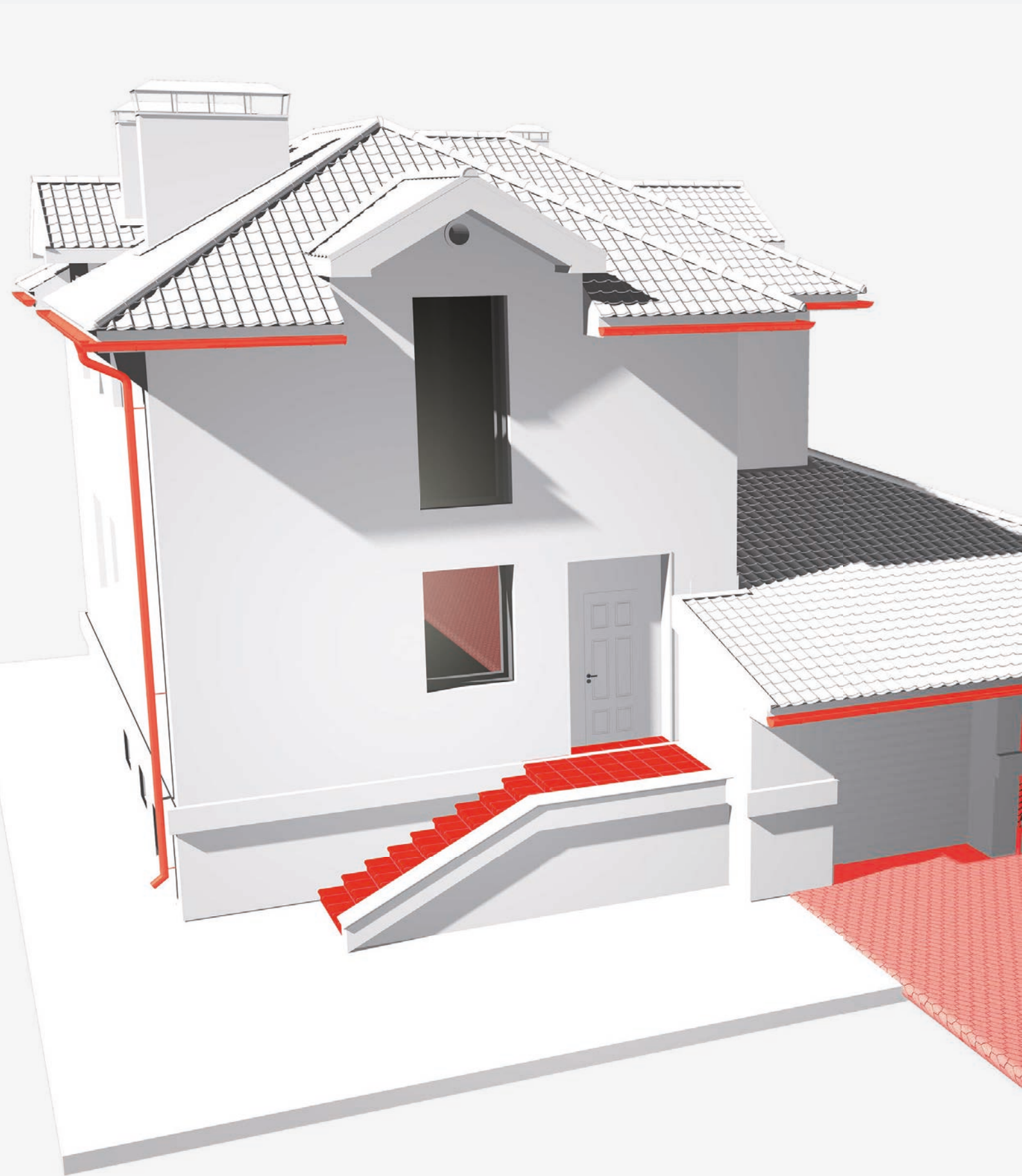
- temperature sensor STZ-01 (RTM-30/S),
- temperature sensor STZ-02 (RTM-30/S).

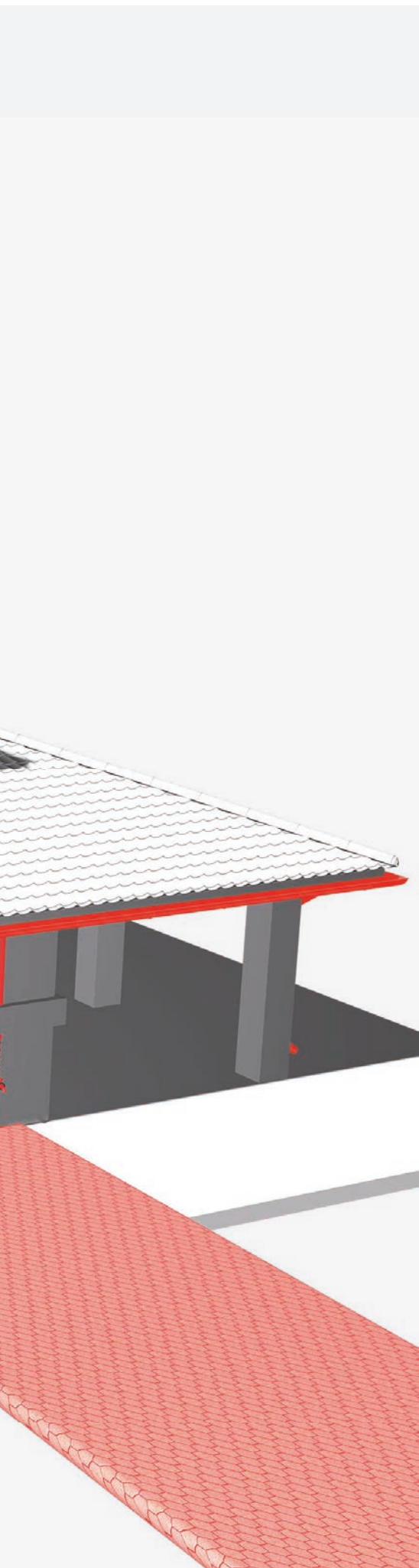
### Features

- 10 operating modes in a day and week cycle,
- LCD display,
- the display shows the adjusted and room ambient temperature close to the sensor,
- maintaining the heating temperature depending on the ambient temperature,
- maintaining the ambient temperature depending on the temperature difference,
- economic regulation of heat sources giving big savings during heating.

### Technical data

Power supply voltage:	230 V AC
Nominal frequency:	50 / 60 Hz
Nominal power consumption:	1,5 W
Temperature adjustment range:	+5 ÷ 60°C
Regulator operation temperature range:	-20 ÷ +60°C
Sensor operating temperature:	-20 ÷ +90°C
Relay current:	2x 16 A
Casing protection degree:	IP20
Casing mounting:	TH-35 rail
Cross-section of connection cables:	0,5 ÷ 2,5 mm <sup>2</sup>
Casing type:	double-modular construction with a cover
Dimensions height / width / depth:	90 x 35 x 66 mm
Overvoltage category:	II
Protection class:	II
Weight:	180 g
Colour:	white





## Anti-icing systems

MATEC anti-icing systems include typical heating systems protecting against the icing of gutters, roofs, ramps, driveways, stairs and other used transport routes exposed to winter weather conditions. Each of these elements requires an individual approach and the application of the most efficient and effective systems protecting against freezing.

When designing the protections for gutters and roofs against lingering snow and the formation of dangerous icicles we need to use heating cables with specified power cooperating with a properly constructed control system verifying the icing. The protection of broadly understood transport routes and ramps requires the application of specific types of heating cables which

by their structure ensure correct operation under various subsurface conditions.

The anti-icing system is an effective protection against:

- the icing of gutters as a consequence leading to the formation of heavy and dangerous icicles and snow covers
- covering transport routes, car parks, vehicle driveways, etc. with snow or their icing
- dangerous icing of stairs and unloading ramps
- freezing of water in water supply systems.



## The protection for driveways and other transport routes (non-asphalt ones) against icing

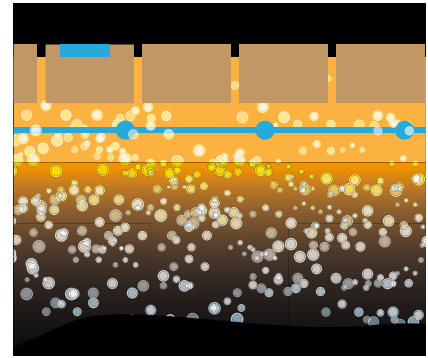
Driveways, exits, in general all inclined road or sidewalk sections, should be protected against the effects of unfavourable winter weather conditions such as icing or covering with snow generating the danger of vehicle slides or pedestrian slips. This type of transport routes vary among themselves with the surface structure and the regional location including the weather zone. These two parameters need to be taken into account when planning and installing the anti-icing system, e.g. to use a proper heat source power. In order to simplify and minimize the problem of selecting the system, MATEC defined one universal power to be used in such places as sidewalks, access road sections, driveways, car parks or ramps, on the basis of experience and calculations. Taking into account the weather zone and the surface material, the power necessary to keep the surface free from ice ranges within  $250\div 320 \text{ W/m}^2$ . The optimum power proposed by MATEC to keep the surface free from ice is  $300 \text{ W/m}^2$ . In this situation, we do not need to debate what power to choose. If we decide to invest, we do not have problems with placing the heating cable in terms of maintaining relevant distances between the routes; the structure coupling the cable into a heating mat ensures a correct placing of the heat source guaranteeing a uniform temperature distribution on the surface.

What remains is the aspect of a proper placement of the mat under the driveway's or the sidewalk's surface. The laminar struc-

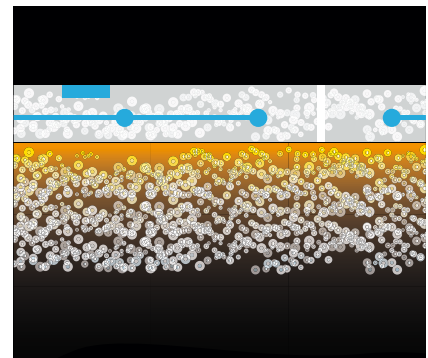
ture of such places most often is such that the structural layer, namely the hardened base, is laid from the bottom, then a layer of sand or dry concrete and the highest part is concrete or cobblestone. With such structure of the transport route, the heating cables (heating mat) are laid in the layer of sand, or dry concrete, at the top part of its height. When installing heating, thermal insulation should be placed under the layer of sand directly on the hardened layer. The insulation will reduce losses of generated heat penetrating the ground. Styrodur may be used as thermal insulation. It is characterized by appropriate mechanical strength and low water absorbability and, what is the most important, a very small thermal conductivity rate. A temperature sensor is installed in the last upper layer. The sensor will inform about the temperature on the surface of the sidewalk.

The heating mats may also be installed in the concrete. Then, the heating cable are laid directly on the hardened base with thermal insulation unfolded and is poured over with a layer of concrete. The temperature sensor is placed permanently in a drilled trench on the surface of the concrete. The power supply cable with the temperature sensor (probe) wire is conducted in protective pipes directly to the power supply point with the temperature controller.

In places with numerous bends or barriers, MATEC stairway heating cable may be used. They fit perfectly in such situations.



Layer cross-section of a sett driveway



Layer cross-section of a concrete driveway



## Heating mats for driveways and other transport routes GMPD



### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 300 W/m<sup>2</sup>
- operating temperature: max. 80°C
- protection degree: IPX7
- one-sided power supply
- constant width of the mat: 45 cm

### Accessories

- mat with a two-wire, shielded heating cable and a power supply cable: H05VV-F 3G1,5 mm<sup>2</sup>, 5 m long,
- installation instruction with a Warranty Card.

### Application

For outdoor installation under driveway, drive, ramp and other surfaces. Arrangement under concrete or sett. It must not be used with asphalt.

Product name	Type	Surface	Wire diameter	Power
Heating mat for driveways and ramps	GMPD-20 / 300	2,0 m <sup>2</sup>	5,98 mm	600 W / 230 V AC
Heating mat for driveways and ramps	GMPD-30 / 300	3,0 m <sup>2</sup>	5,63 mm	900 W / 230 V AC
Heating mat for driveways and ramps	GMPD-40 / 300	4,0 m <sup>2</sup>	5,88 mm	1200 W / 230 V AC
Heating mat for driveways and ramps	GMPD-50 / 300	5,0 m <sup>2</sup>	6,18 mm	1500 W / 230 V AC
Heating mat for driveways and ramps	GMPD-60 / 300	6,0 m <sup>2</sup>	6,38 mm	1800 W / 230 V AC
Heating mat for driveways and ramps	GMPD-70 / 300	7,0 m <sup>2</sup>	7,20 mm	2100 W / 230 V AC
Heating mat for driveways and ramps	GMPD-80 / 300	8,0 m <sup>2</sup>	7,40 mm	2400 W / 230 V AC
Heating mat for driveways and ramps	GMPD-100 / 300	10,0 m <sup>2</sup>	8,10 mm	3000 W / 230 V AC



## Protection of stairs and ramps against icing

Stairs are one of the elements of transport routes. Because this element is located outside, this results in the probability of the formation of icing as a result of winter weather conditions. To prevent this, MATEC offers heating cables unilaterally powered with power 20 W/m intended for installation on stairs or ramps.

Just like the mats for driveways, the heating cables installed under the step surface should be a heat source with surface thermal power of 300 W/m<sup>2</sup>. Distances between the laid cables should be precisely calculated to obtain this value.

The distance value may be easily calculated from a simple formula:

$$A_{odl} = \frac{20 \text{ W/m} \cdot 100 \text{ cm/m}}{300 \text{ W/m}^2}$$

Where:

A<sub>odl</sub> - distance between laid wires

In this manner, the calculated distance for the case above is approx. 6,5 cm. However, that is not all. Each step of the stairs is a limited, strictly defined area, for which an appropriate length of the heating cable should be calculated. For instance, if there are steps to be "managed", dimensions 0,28x1,0 m, the cable length for one step S<sub>ind</sub> is calculated by multiplying the ratio of the surface thermal power and power assigned to 1 m of the cable by the area of one step.

$$S_{ind} = \frac{300 \text{ W/m}^2}{20 \text{ W/m}} \cdot 0,28 \text{ m} \cdot 1,0 \text{ m}$$

In this manner, the value S<sub>ind</sub> = 4,2 m is obtained on one step. In order to determine the total cable length to be placed on all steps S<sub>ck</sub> this length is multiplied by the

number of steps, e.g. 3, at the same time adding the height of each step increased by the distance of laid cables from the edge of the steps, e.g.

$$0,14 \text{ m} + 0,085 \text{ m} = 0,225 \text{ m}$$

The distance of cables from the edge may be assumed approximately as the difference between the sum of distances between cables placed on the step, in this case equal to 19,5 cm (3x6,5 cm), and the total step depth 28 cm, which gives the result 8,5 cm. This result is also the sum of two cable distances placed on the step from its two edges, the front and the rear one (4,25 + 4,25 cm). However, in practice it is recommended that the cable distance from the external step edge is smaller than the distance from its internal edge. Such a solution provides better protection for the step edge which is more exposed to icing.

$$S_{ck} = 3 \cdot 0,225 \text{ m} + 3 \cdot 4,2 \text{ m} = 13,275 \text{ m}$$

If the stairs have a landing (platform) with sample dimensions 1,0 x 0,85, the cable length needed for its heating amounts to:

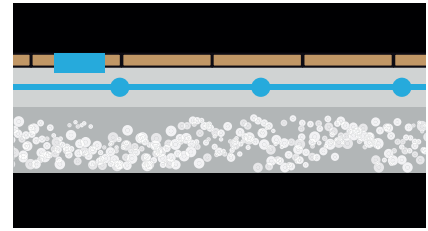
$$P_{ck} = 0,85 \text{ m} \cdot 1,0 \text{ m} \cdot \frac{300 \text{ W/m}^2}{20 \text{ W/m}} = 12,75 \text{ m}$$

Having both values, i.e. S<sub>ck</sub> and P<sub>ck</sub>, we determine the total cable length DP<sub>sum</sub> needed for heating the full stair element in the transport route.

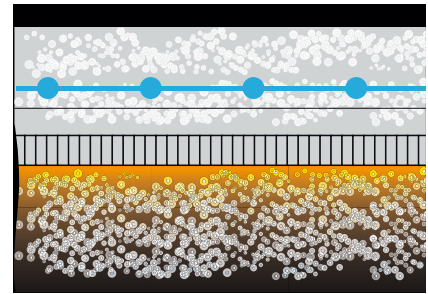
$$DP_{sum} = S_{ck} + P_{ck} = 25,95 \text{ m}$$

In this case, specifically, the heating cable MATEC GPSY-26/20 may be used.

In the same manner, the distribution of the heating cable under the ramp surface is

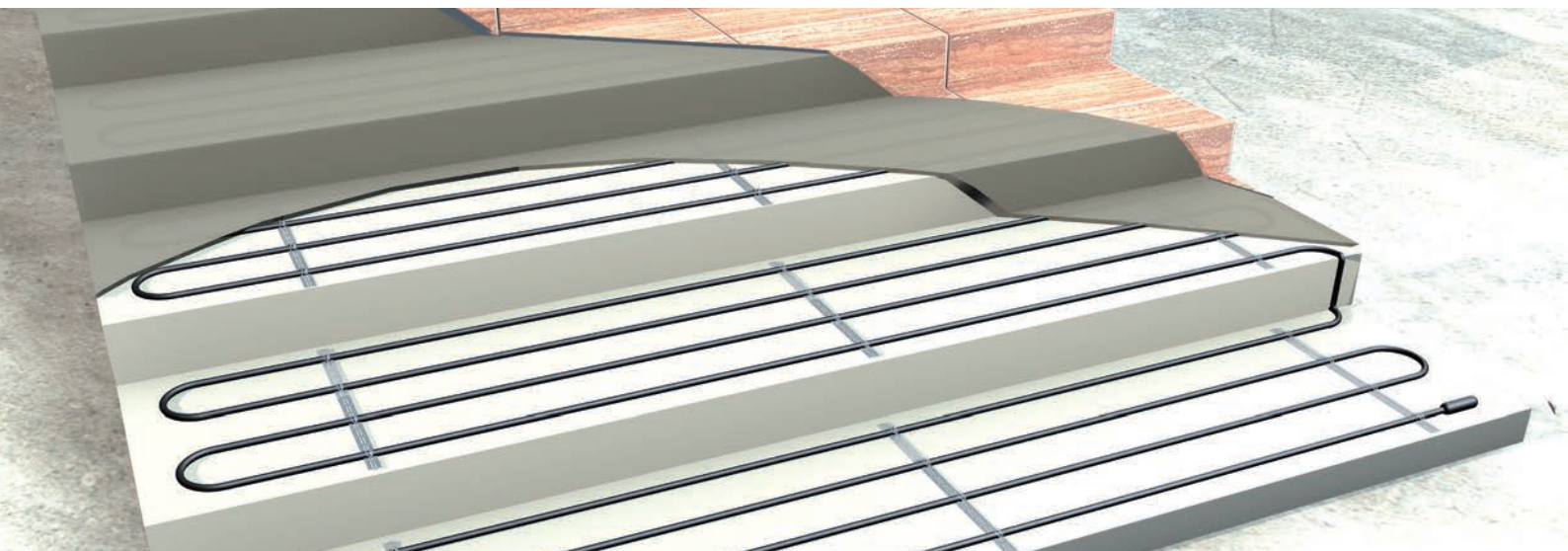


Layer cross-section of stair's surface



Layer cross-section of a concrete ramp

calculated. However, a different pavement structure may occur here. The structural layer is most often made from a reinforced concrete slab, which should be laid on thermal insulation. A layer of concrete is laid on the slab. In this case, the heating cable is laid directly on the slab and poured over with a layer of concrete. The heating cables should be placed between the expansion joints, namely gaps between structural, reinforced concrete slabs. In other words, one cable module is laid on one ramp slab. Then, without any problems, the power supply cables from all laid modules may be connected in parallel in one place (beyond the slabs).





## Heating mats for staircases and ramps GPSY



### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 20 W/m
- operating temperature: max. 80°C
- protection degree: IPX7
- one-sided power supply

### Accessories

- mat with a two-wire, shielded heating cable and a power supply cable: H05VV-F 3G1 mm<sup>2</sup>, 3 m long,
- installation instruction with a Warranty Card.

### Application

For outdoor installation under the surface of stairs, ramp and other surfaces. Arrangement under concrete or sett. It must not be used with asphalt.

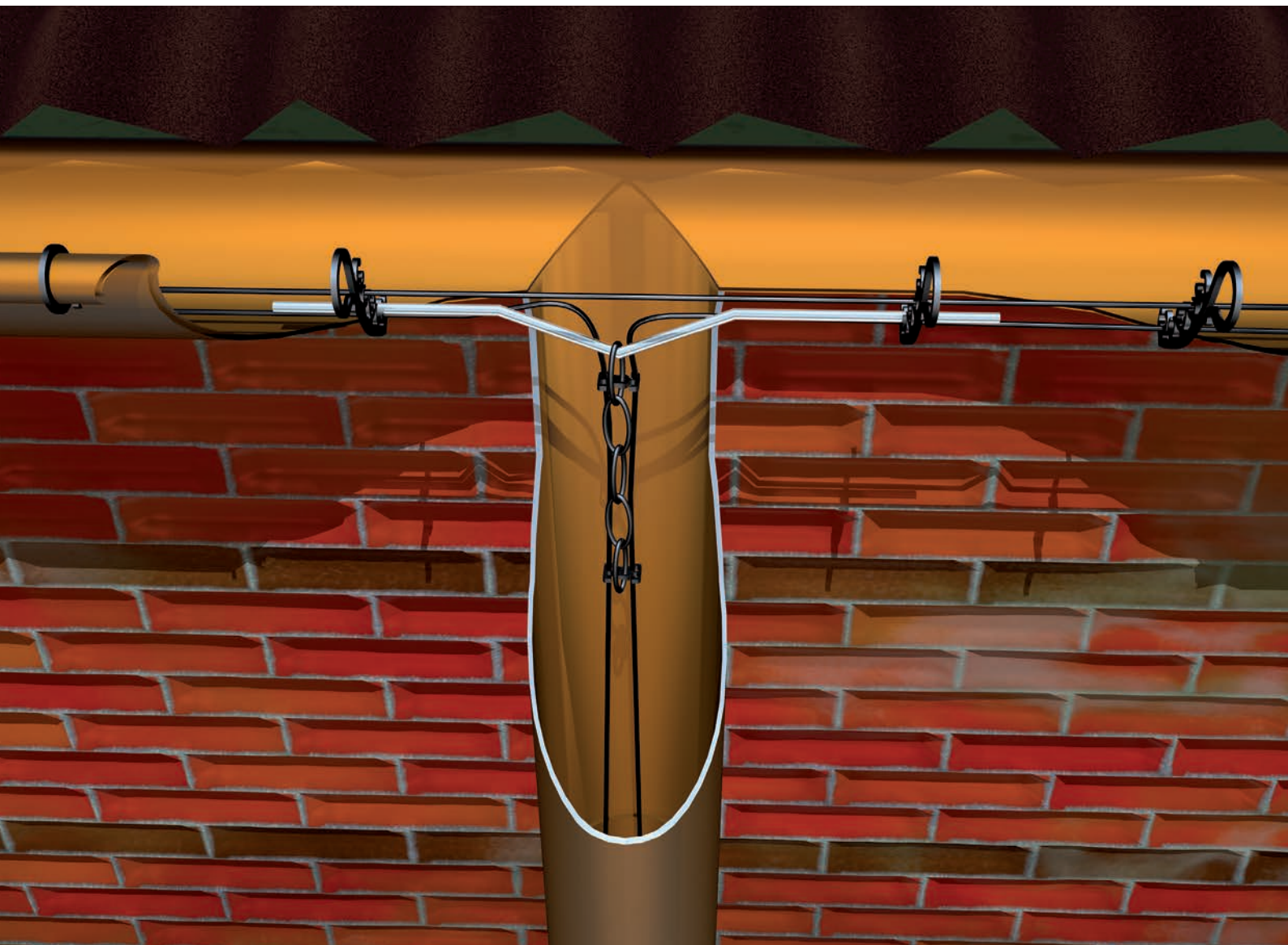
Product name	Type	Length	Wire diameter	Power
Heating mat for stairs and ramps	GPSY-9,5 / 20	9,5 m	5,88 mm	190 W / 230 V AC
Heating mat for stairs and ramps	GPSY-15 / 20	15 m	5,95 mm	300 W / 230 V AC
Heating mat for stairs and ramps	GPSY-22 / 20	22 m	6,20 mm	440 W / 230 V AC
Heating mat for stairs and ramps	GPSY-26,5 / 20	26,5 m	6,18 mm	530 W / 230 V AC
Heating mat for stairs and ramps	GPSY-40,5 / 20	40,5 m	6,30 mm	810 W / 230 V AC
Heating mat for stairs and ramps	GPSY-51 / 20	51 m	6,05 mm	1020 W / 230 V AC
Heating mat for stairs and ramps	GPSY-60 / 20	60 m	6,20 mm	1200 W / 230 V AC
Heating mat for stairs and ramps	GPSY-70 / 20	70 m	6,30 mm	1400 W / 230 V AC
Heating mat for stairs and ramps	GPSY-80 / 20	80 m	6,25 mm	1600 W / 230 V AC
Heating mat for stairs and ramps	GPSY-90 / 20	90 m	6,30 mm	1800 W / 230 V AC
Heating mat for stairs and ramps	GPSY-100 / 20	100 m	6,35 mm	2000 W / 230 V AC

### Constant resistance heating cables for gutters

Heating cables for gutters and for the roof need to be equipped with external insulation resistant to UV radiation because of the place where they operate. On the one hand, they may not crumble away after one or two summer seasons, on the other hand, they may not get stuck to the roofing material. Due to their open installation, i.e. on the surface of protected elements, these cables do not need to have very high heating power. However, the minimum power which should be maintained at anti-icing protection for gutters should not be smaller than 15W/m. A similar planning and calculation system as with subsurface cables applies here.

Heating cables for gutters, type GPRN, are equipped with a thermostat controlling the cable's operation depending on the temperature or the degree of icing. They are laid in gutters in pairs or individually depending on the gutter's diameter. If it is smaller than 8 cm, a single cable distribution system

may be used, for larger diameters, pairs are recommended. The heating cables are clipped into a clip installed inside the gutter. The clips ensure a parallel and unchanged distribution of two working cables with respect to each other.





## Heating cable for gutters GPRN



### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 18 W/m
- operating temperature: max. 80°C
- protection degree: IPX7
- one-sided power supply

### Accessories

- mat with a two-wire, shielded heating cable and a power supply cable: H05VV-F 3G1 mm<sup>2</sup>, 5 m long,
- installation instruction with a Warranty Card.

### Application

Outdoor, for gutters, etc.

Product name	Type	Length	Wire diameter	Power
Heating cable for gutters	GPRN-12 / 18	12 m	5,80 mm	216 W / 230 V AC
Heating cable for gutters	GPRN-18 / 18	18 m	5,98 mm	324 W / 230 V AC
Heating cable for gutters	GPRN-24 / 18	24 m	5,90 mm	432 W / 230 V AC
Heating cable for gutters	GPRN-29 / 18	29 m	5,95 mm	522 W / 230 V AC
Heating cable for gutters	GPRN-36 / 18	36 m	6,25 mm	648 W / 230 V AC
Heating cable for gutters	GPRN-43 / 18	43 m	6,30 mm	774 W / 230 V AC
Heating cable for gutters	GPRN-50 / 18	50 m	6,20 mm	900 W / 230 V AC
Heating cable for gutters	GPRN-60 / 18	60 m	6,30 mm	1080 W / 230 V AC
Heating cable for gutters	GPRN-70 / 18	70 m	6,10 mm	1260 W / 230 V AC
Heating cable for gutters	GPRN-80 / 18	80 m	6,10 mm	1440 W / 230 V AC
Heating cable for gutters	GPRN-90 / 18	90 m	6,30 mm	1620 W / 230 V AC
Heating cable for gutters	GPRN-100 / 18	100 m	6,35 mm	1800 W / 230 V AC

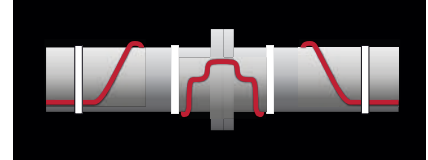
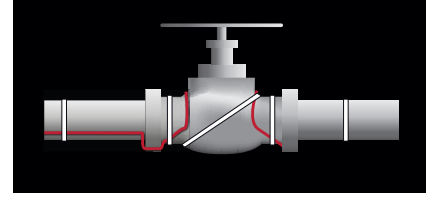


### Heating cables with thermostat

The anti-icing systems for pipes are the perfect idea for the protection of water supply systems, sewage pipes and other elements carrying water in places exposed to low temperatures. The heating cables are conducted on a pipe in a manner parallel or coiled towards its axis. In both cases, the cable is fixed with plastic strips or with adhesive tape included in MATEC product offer. The pipe coiling method is suggested due to better heat distribution on the thermally protected element.

The cables cannot cross or touch by their surface with each other. The heating cables for protecting pipes against water freezing are usually equipped with a thermostat automatically controlling the heating element. The thermostat is installed between the heating cable and the power supply cable. A device constructed in such a manner does not require the use of temperature regulators. The thermostat switches the heating on and off depending on the ambient temperature. At  $+3^{\circ}\text{C}$  temperature, the heating cable is switched on, at  $11^{\circ}\text{C}$  temperature, it is switched off. The entire device, namely the cable with the thermostat, is connected to the voltage of 230V using

a plug installed at the end of power supply cable. In order to ensure the correctness of the device's response, it is very important for the thermostat's flat surface to be exactly adjacent to the heated surface.



## Heating cables with thermostat for pipes GPRU



### Technical data

- power supply voltage: 230 V, 50 Hz
- unit power: 18 W/m
- operating temperature: max. 80°C
- protection degree: IPX7
- temperature adjustment: +3°C switched on, +11°C switched off

### Accessories

- mat with a two-wire, shielded heating cable and a power supply cable: H05VV-F 3G0,75 mm<sup>2</sup>, 2 m long with Unischuko plug,
- installation instruction with a Warranty Card.

### Application

For protection of pipes, valves against freeze.

Product name	Type	Length	Wire diameter	Power
Heating cables with thermostat for pipes	GPRU-2 / 15	2 m	9,1 x 6,5 mm	30 W / 230 V AC
Heating cables with thermostat for pipes	GPRU-4 / 18	4 m	5,06 mm	72 W / 230 V AC
Heating cables with thermostat for pipes	GPRU-6 / 18	6 m	5,22 mm	108 W / 230 V AC
Heating cables with thermostat for pipes	GPRU-10 / 18	10 m	5,48 mm	180 W / 230 V AC
Heating cables with thermostat for pipes	GPRU-14,5 / 18	14,5 m	5,78 mm	261 W / 230 V AC
Heating cables with thermostat for pipes	GPRU-20,5 / 18	20,5 m	5,63 mm	369 W / 230 V AC

## Self-regulating heating cables

Self-regulating heating cables type GP-SR/17 are used to protect gutters, drain pipes, roofs against icing and in de-icing systems on pipes. These cables are resistant to UV radiation. The cables are laid inside gutters or drain pipes individually or in parallel. They can also be laid on roofs or pipes with liquid. These cables do not require installation with temperature controllers. Due to the fact that even at high temperatures a small current can appear, it is recommended to connect self-regulating and supply cables to the temperature controller, which in turn, disconnects power consumption. These cables can be installed with a temperature controller equipped with a temperature sensor, humidity sensor as well as ice and snow sensors.

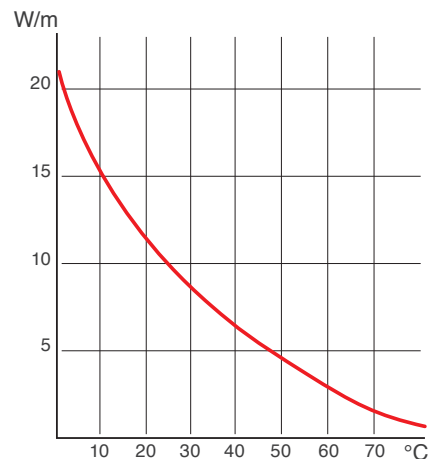
The main advantages of self-regulating cables include:

- ensuring an optimal high temperature on any, independent wire operation section,
- no need to use temperature regulators.
- the possibility of cutting the cable at any place without the loss of operation efficiency.

Self-regulating cables are considered one of the most effective and economic heat sources

in anti-icing systems. The semi-conductor material used in them is responsible for the self-regulation process.

Due to the material's characteristic properties, namely the variability of resistance in proportion to ambient temperature, the cable automatically collects electricity necessary for heating and, as a result, prevents the formation of ice deposits around. The consumed electricity changes its value in terms of resistance present in the semi-conductor cable core located between the strands conducting electricity. Resistance decreases at low external temperature, increasing its power. When power in the wire's core (between its strands) increases, more and more paths conducting electricity form, thus generating heat. The cable's temperature raised in this manner increases the core's resistance, as a result reducing the power and temperature.



Dependency of output power and cable temperature GP-RS/17 230 V AC on a pipe

Minimum start-up temperature	GP-SR/17 230 V AC	Current
10°C	110 m	10 A
	143 m	16 A
	167 m	20 A
	167 m	30 A
0°C	101 m	10 A
	140 m	16 A
	158 m	20 A
	159 m	30 A
-20°C	80 m	10 A
	125 m	16 A
	139 m	20 A
	140 m	30 A
-40°C	69 m	10 A
	108 m	16 A
	110 m	20 A
	118 m	30 A

Maximum length of self-regulating wire section and minimum start-up temperature.

## Self-regulating heating cables for gutters, roofs, pipes GP-SR / 17



### Technical data

- power supply voltage: 230 V, 50 Hz
- operating temperature: 65°C
- supply type: one-sided

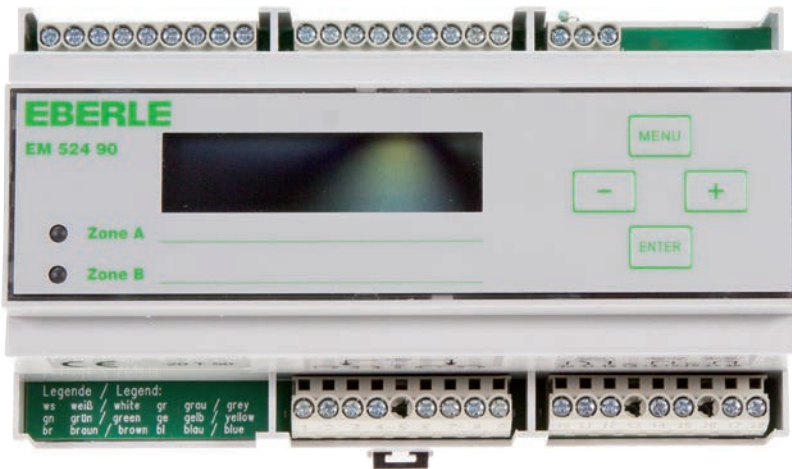
### Application

For protection gutters, drain pipes, roofs against icing and in de-icing systems on pipes.

Product name	Type	Wire diameter	Power
Self-regulating heating cable for gutters, roofs, pipes	GP-SR / 17	6,0 x 10,6 mm	17 W/m for 10°C



Two-zone temperature regulator EM 524 90 EBERLE



**Application**

Ice controller (detector) for electric heating elements. Intended for controlling the de-frosting of gutters, driveways, ramps, stairs. Temperature sensors, an ice and snow sensor or a temperature and humidity sensor should be used along with the detector.

**Additional accessories**

- ice and snow sensor ESF 524 001 (for open spaces)
- ice and snow sensor ESD 524 003 (for roof gutters)
- temperature and humidity sensor TFF 524 002 (for open spaces)
- surface and air temperature sensor TFD 524 004 (for roof gutters)
- \*ice and snow sensor ESF 524 011 (for open spaces and for large loads, e.g. trucks). To be used only with sensor casing, type FAG 524 111
- \*temperature and humidity sensor TFF 524 012 (for open spaces and for large loads, e.g. trucks). To be used only with sensor casing, type FAG 524 111
- \*sensor casing, type FAG 524 111

**Features**

- LCD display,
- easy, manual service,
- automatic detection and control of connected sensors,
- meter of operation hours for heating system,
- easy and fast installation on rail,
- two-zone; a possibility to be used for two independent zones (e.g. roof and driveway).

**Technical data**

Power supply voltage:	230 V AC ±10%
Nominal frequency:	50 / 60 Hz
Nominal power consumption:	<25 VA
Temperature adjustment range:	-45 ÷ +78°C
Ambient temperature range:	-20 ÷ +50°C
Relay current:	inductive: 4 A, resistant 16 A
Casing protection degree:	IP20
Casing mounting:	TH-35 rail
Casing dimensions:	159 / 90 / 58 mm (45 mm at the front)
Weight:	780 g
Value adjustment:	0 ÷ +6°C (for the ground and roof)
Heating:	two-zone
Protection class:	II
Colour:	grey
Menu language:	Polish, German, English, French, Finnish, Swedish, Czech, Dutch, Turkish, Hungarian

## One-zone temperature regulator EM 524 89 EBERLE



### Application

One-zone ice controller (detector) for electric heating elements. Intended for controlling the defrosting of gutters, driveways, ramps, etc. One of these sensors should be used with the detector: temperature or humidity.

### Additional accessories

- ice and snow sensor ESF 524 001 (for open spaces)
- ice and snow sensor ESD 524 003 (for roof gutters)
- temperature and humidity sensor TFF 524 002 (for open spaces)
- surface and air temperature sensor TFD 524 004 (for roof gutters)
- \*ice and snow sensor ESF 524 011 (for open spaces and for large loads, e.g. trucks). To be used only with sensor casing, type FAG 524 111
- \*temperature and humidity sensor TFF 524 012 (for open spaces and for large loads, e.g. trucks). To be used only with sensor casing, type FAG 524 111
- \*sensor casing, type FAG 524 111

### Features

- LCD display,
- easy, manual service,
- automatic detection and control of connected sensors,
- meter of operation hours for heating system,
- easy and fast installation on rail,
- operates only in the case of snowfall, freezing rain or ice risk.
- operation in mode "Measured values" or "Menu".

### Technical data

Power supply voltage:	230 V AC $\pm$ 10%
Nominal frequency:	50 / 60 Hz
Nominal power consumption:	<15 VA
Temperature adjustment range:	-45 $\div$ +78°C
Ambient temperature range:	-20 $\div$ +50°C
Relay current:	inductive 4 A, resistant 16 A
Casing protection degree:	IP20
Casing mounting:	TH-35 rail
Casing dimensions:	106 / 90 / 58 mm (45 mm at the front)
Weight:	480 g
Value adjustment:	0 $\div$ +6°C (for the ground and roof)
Heating:	relay
Protection class:	II
Colour:	grey
Menu language:	Polish, German, English, French, Finnish, Swedish, Czech, Dutch, Turkish, Hungarian

\* On customer's request

Universal temperature regulator UTR-20 EBERLE



**Application**

Temperature controller is used to control the floor heating systems, open spaces.

**Accessories**

- PTC temperature sensor,
- input for F891000 temperature sensor.

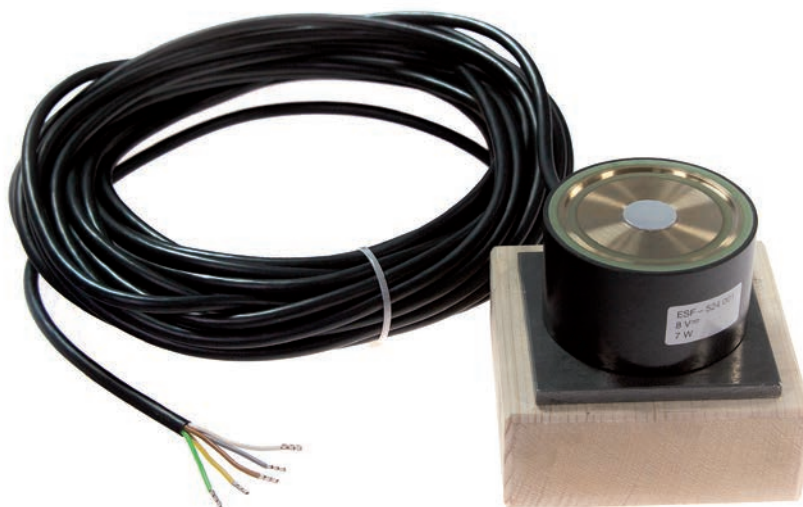
**Features**

- easy, manual service.

**Technical data**

Power supply voltage:	207 ÷ 244 V AC
Nominal frequency:	50 / 60 Hz
Nominal power consumption:	<4 VA
Temperature adjustment range:	-40 ÷ +20°C
Ambient temperature range:	-20 ÷ +50°C
Relay current:	inductive 4 A , resistant 16 A
Casing protection degree:	IP65
Mounting:	surface
Casing dimensions:	122 / 120 / 56 mm
Protection class:	II
Weight:	440 g
Colour:	grey

## Ice and snow sensor (for open spaces) ESF 524 001 EBERLE



### Application

For use in open areas such as ramps and stairs. The sensor has a measuring element NTC for measuring the surface temperature, it has a sensor heater and two metal rings that allow to detect humidity.

### Features

- connected to EM 524 90 or EM 524 89 thermoregulator,
- closed casing.

### Technical data

Power supply voltage:	8 V AC
Nominal power consumption:	app. 7 W
Casing surface temperature:	app. 40°C
Connection cable:	5 x 0,5 mm <sup>2</sup> , 15 m long
Ambient temperature range:	-30 ÷ +80°C
Identifying ring colour:	yellow
Mounting:	flat
Casing dimensions:	80 / 80 / 50 mm (Ø70 x 40 mm)
Weight:	1450 g
Resistance for 20°C:	12,7 kΩ
Weight:	440 g
Colour:	grey

Caution: alternatively, upon the customer's request, temperature and humidity sensor TFF 524 012 (for open spaces and for large loads, e.g. trucks). To be used only with sensor casing, type FAG 524 111.



Temperature and humidity sensor (in open areas) TFF 524 002 EBERLE



**Application**

For use in open areas such as ramps and stairs. The sensor has a measuring element NTC for measuring the surface temperature.

**Features**

- connected to EM 524 90 or EM 524 89 thermoregulator,
- closed casing.

**Technical data**

Connection cable:	4 x 0,5 mm <sup>2</sup> , 15 m long
Ambient temperature range:	-30 ÷ +80°C
Identifying ring colour:	blue
Connection cable:	5 x 0,25 mm <sup>2</sup> , 4 m long
Mounting:	flat
Casing dimensions:	80 / 80 / 50 mm (Ø70 x 40 mm)
Weight:	1450 g
Resistance for 20°C:	3,4 kΩ

Caution: alternatively, upon the customer's request, temperature and humidity sensor TFF 524 012 (for open spaces and for large loads, e.g. trucks). To be used only with sensor casing, type FAG 524 111.

## Ice and snow sensor (for roof gutters) ESD 524 003 EBERLE

**Application**

For use in roof gutters.

The sensor has a two-wire cable and a built-in NTC measuring element.

**Features**

- connected to EM 524 90 or EM 524 89 thermoregulator,
- closed casing.

**Technical data**

Power supply voltage:	8 V AC
Ambient temperature range:	-30 ÷ +80°C
Nominal power consumption:	app.3 W
Casing surface temperature:	app.40°C
Connection cable:	5 x 0,25 mm <sup>2</sup> , 4 m long
Ambient temperature range:	-30 ÷ +80°C
Mounting:	in roof gutters
Dimensions:	225 / 108 / 13 mm
Weight:	230 g
Resistance for 20°C:	12,7 kΩ

**Temperature sensor (for roof gutters) TFD 524 004 EBERLE****Application**

For use in roof gutters. The sensor has a two-wire cable and a built-in NTC measuring element.

**Features**

- connected to EM 524 90 or EM 524 89 thermoregulator,
- easy to place.

**Technical data**

Connection cable:	2 x 0,5 mm <sup>2</sup> , 4 m long
Ambient temperature range:	-30 ÷ +80°C
Weight:	145 g
Resistance for 20°C:	3,4 kΩ

## Temperature sensor (for UTR-20) F891000 EBERLE



### Application

For use with UTR-20. The sensor includes two-wire cable and a built-in NTC measurement element.

### Features

- connected to EM 524 90 or EM 524 89 thermoregulator,
- easy to place.

### Technical data

Connection cable:	2 x 0,5 mm <sup>2</sup> , 4 m long
Ambient temperature range:	-25 ÷ +70°C
Weight:	160 g
Resistance for 20°C:	962 kΩ



**Zinc-coated installation tape TMS-01**



**Application**

Zinc-coated installation tape, width 21 mm and thickness 0,5 mm. It is used to mount heating cables in surface heating systems. Take care not to damage the installed heating cable during the installation. The tape in the roll is 7,5 m long.

**Reinforced installation tape TMW-01**



**Application**

Tape fixing the heating cable for water supply pipes. The tape is made of reinforced material guaranteeing a firm fixing of the cable to the pipe.

**Self-adhesive aluminium tape TAS-01**



**Application**

For installation of heating cables on piping. Tape width: 50 mm. Tape length in reel: 50 m.

**Clip for gutters KRU-01**



**Application**

KRU-01 clips for gutters are used to install resistance heating cables in horizontal gutters with a diameter up to 120 mm. They ensure distance between the heating cable when it is laid in the gutter in pairs. The recommended distance between the clips in the gutter is 25 cm. One packaging contains 25 pcs.

**Clip for outlet pipes KRS-01**



**Application**

KRS-01 clips for outlet pipes are used to install resistance heating cables in outlet pipes. They are clipped into a chain. It ensures a distance between the heating cable when it is laid in the outlet pipe in pairs. The recommended distance between the clips on the chain is 25 cm. One packaging contains 25 pcs.

**Application**

Chain for suspension is used in anti-icing systems. It is a load-carrying element for clips for outlet pipes. In the outlet pipe, it is suspended on a suspension to outlet pipes. One meter of the chain contains 22 links. The packaging contains links for 10 m of the chain.

**Chain for outlet suspension LS-01****Application**

The suspension is used to suspend the chain with the heating cable in the outlet pipe. It is made of acid-resistant stainless steel.

**Suspension for outlet pipe ZW-01****Application**

It consists of elements ensuring a hermetic connection of the self-regulating heating cable GP-SR/17 with the power supply cable and the termination of the heating cable. They are used for the operating temperature:  $-20 \div +60$  °C, power supply voltage 230 V AC and maximum current intensity: 16 A.

**Installation set ZM-01****Application**

Mounting kit for electrical heating foil connection for underfloor heating. Contains two connecting wires, connectors and insulating tape. Components of the kit:

- brown wire 2,5 mm<sup>2</sup> – 5 m,
- blue wire 2,5 mm<sup>2</sup> – 5 m,
- yellow/green wire 2,5 mm<sup>2</sup> – 5 m,
- clips – 3 szt,
- sealing tape – 0,3 m.

**Kit for montage heating foil ZM-02**