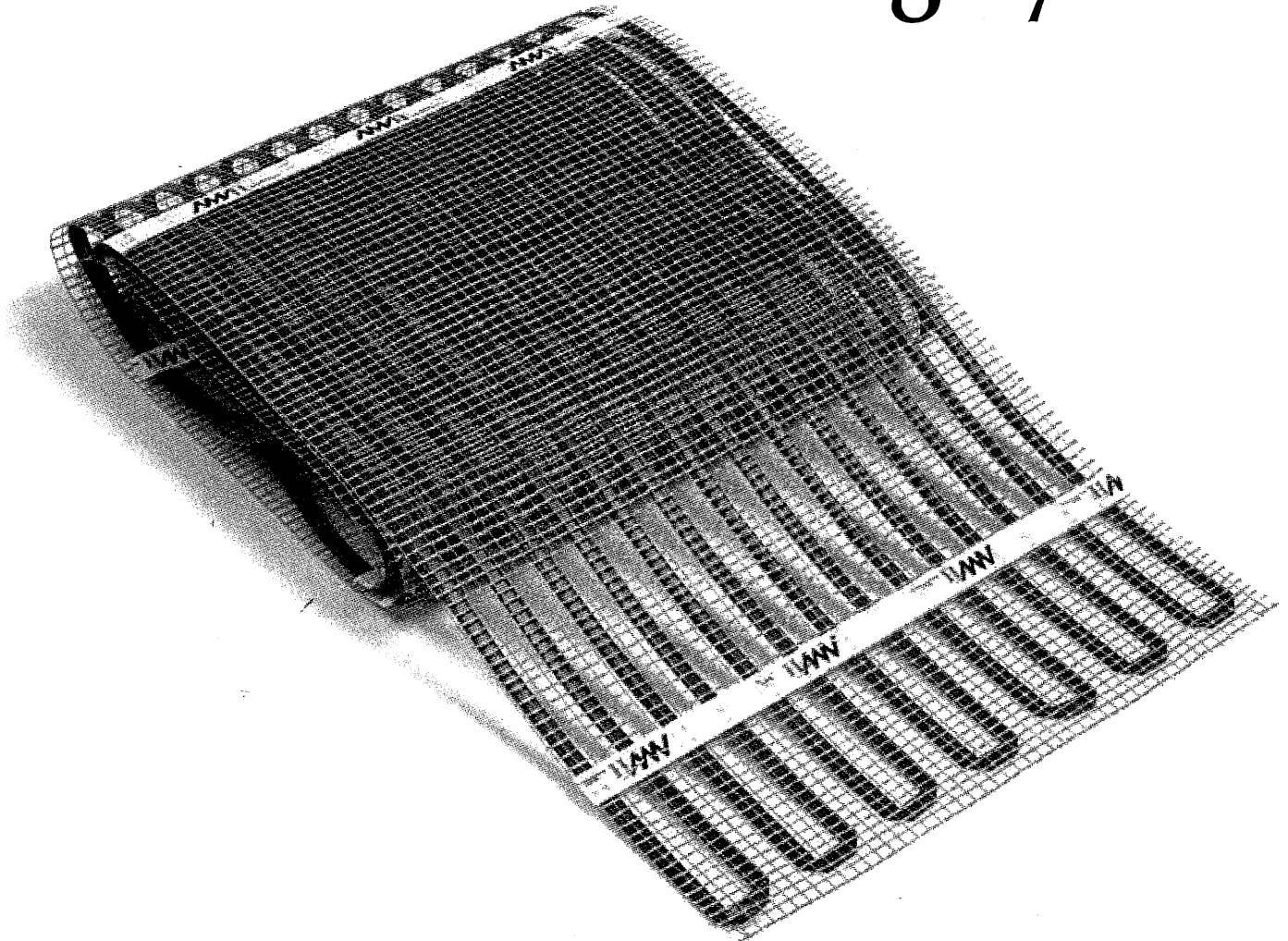


Installation Guide For your AHT Underfloor Heating System



AHT
Advanced Heating Technologies Ltd

Dear AHT Customer,

Thank you for choosing the AHT underfloor heating system. It is designed to be simple to install and cost efficient to operate.

This guide provides the information you need for a successful installation. Please follow all instructions carefully for the best possible installation results and for the long-term effectiveness of the product.

We wish you years of safe, comfortable, cost-efficient heating!

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Important!

Please read carefully before installing your AHT underfloor heating mats.

Do not:

- **Do not** cut parts (Ribbon) of the AHT heating mats in order to change the mat size. **Especially DO NOT cut meter-wide mats in two pieces.**
- **Do not** overlap heating mats.
- **Do not** fold or wrinkle AHT heating mats.
- **Do not** place heavy/sharp tools (or any other potentially damaging object) on top of the heating mats.
- **Do not** walk unnecessarily on the heating mats.
- **Do not** install electrical cables or pipes under the floor together with the heating mats.
- **Do not** use cellulose insulation.
- **Do not** install mats when the room temperature is below -5°C (23°F).
- **Do not** install underfloor heating mats anywhere except inside buildings.
- **Do not** install mats under walls or partitions, or in areas under heavy cabinets, closets, or fixtures (toilets, sinks, tubs, etc.).
- **Do not** install mats within 3 cm (1 inch) of any heat conductive building part, such as cold water pipes.
- **Do not** install mats within 5 cm (2 inches) of one another (ribbon to ribbon), 10 cm (4 inches) of any wall, or 15 cm (6 inches) of a fireplace or hot water pipe.
- **Do not** connect any other electrical appliance on the same electric fused spur or RCD unit of the heating system
- **Do not** install heating mats under wooden floor, if the wooden floor is thicker than 18 mm (3/4 inch).
- **Do not** put acoustic material between the heating mats and the wooden floor, when installing wooden type floor, with R-value of the acoustic material greater than $0.014 \text{ m}^2\text{K/W}$ ($0.08\text{ft}^2\text{h F/Btu}$).
- **Do not** use carpet underlay with thermal resistance greater than 0.8 Tog
- **Do not** install under carpet with thermal resistance greater than 2.0 Tog

Always:

- **Always** cover mats with grounding net in wet areas. Wet areas include saunas, bathrooms, and kitchen areas within 50 cm (20 inches) of sinks or any metallic kitchen appliance.
- **Always** heating ensure that the electric circuit that supplies electricity to the AHT system is equipped with a 30 mA ground fault current interrupter (GFCI) or residual current device (RCD).
- **Always** inside connect all cold wire leads from the AHT heating mats in parallel an electrical junction box or boxes.
- **Always** ensure that the total current needed for all mats connected in parallel is not more than 80% of the listed amperage capacity of the electrical junction box and its power supply line and breaker (For advice consult your recommended installer / supplier).
- **Always** provide each room with an AHT heating system with its own electrical junction box and control thermostat. Each AHT thermostat has a maximum capacity of 16 Amps. If the amount of Amps in the room is greater than 16 Amps, divide the amperage over several thermostats, or add a contactor between the mats and the thermostats. (To calculate the amount of Amps in the room see tables in page 15).
- **Always** use insulation under the mats to reduce running costs and warm-up time. Check with your installer to determine the R value of the sub floor insulation layer. If there is no insulation, or if the R value of the insulation layer is lower than 0.1 m²*°C/W or 1 Tog (0.57 ft²*h*°F/Btu), please read the insulation instructions on page 5 and act accordingly.
- **Always** wait for thin set/grout to dry properly before operating the system. The drying period is generally 2-14 days depending on manufacturer's instructions.

Note: If you are installing soft type of floor covering (vinyl or linoleum), cover the mats with at least 6mm (1/4 inch) self-leveling flooring cement or latex compound

Note: All electrical connections must be performed by a fully qualified electrician

Note: The installer must verify the conformance to all applicable codes or standards

Getting Started

Before installing your new AHT underfloor heating mats, be sure you have the following additional parts:

- **Electrical junction box** – used as the connecting junction for the cold leads of the heating mats.
 - **Grounding net** – needed only when installing heating mats in wet areas such as bathrooms, kitchens, saunas, etc.
 - **Control thermostat** – allows you to control the temperature of the room. The control thermostat must also have a two terminal manual on/off switch. Control thermostats have one or two of the following sensors:
 - Ambient air temperature safety sensor.
 - Floor temperature safety sensor.
- In bathrooms, use thermostat with only floor temperature sensor. You can use the same kind of thermostat for other wet areas such as kitchen, but it is not a must.
- Use thermostat with air and floor temperature sensors for all other installations.

Note: We recommends AUBE digital fully programmable thermostat, which enables you maximum saving and flexibility in creating your weekly heating plans. See page 14 for a list of recommended thermostats in your country.

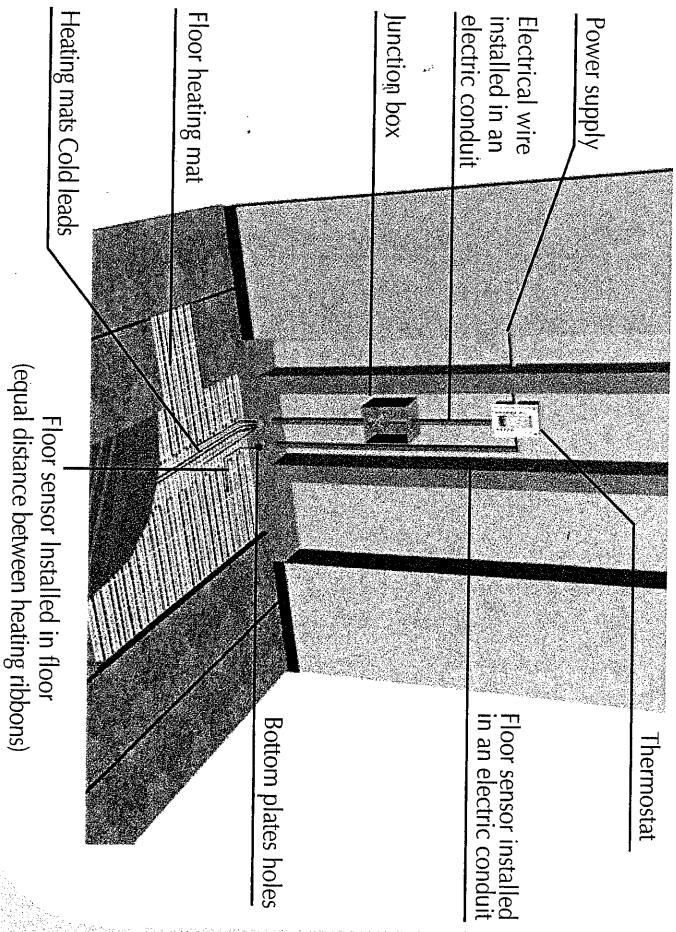
- **Ground Fault Circuit Interrupter or Residual Current Device** - Consult your local dealer regarding the applicable GFCI or RCD. Feel free to contact your AHT representative for additional details regarding the appropriate controls.

Laying Out Your Heating Mats

1. Clean all debris from the floor base.
2. If installing the heating mats under:
 - **Stone type and glued type floors** – Under stone type and glued-type floors (Carpet, wood, vinyl or linoleum - with adhesive) use a flexible tile adhesive to secure a hard insulation material on top of the floor base. (See page 14 for a list of recommended hard insulation materials.)
 - **All other flooring types** – Use a soft insulating material which can simply be placed on the floor or secured with tape or carpet adhesive. (See page 14 for a list of recommended soft insulation materials.)

3. Clean all debris from the surface of the grout or insulating material.

4. Roll out heating mats on top of the insulating material with the heating ribbon facing down and the fiberglass net facing up. It is recommended to leave a gap of about 10 cm (4 inches) from the wall to the heating mats, and a gap of about 5 cm (2 inches) between each mat (ribbon to ribbon). Ensure that each heating mat is completely flat. Make sure that the cold leads of the mats are on the side of the mat that is closest to the location of the electrical junction box (See step 3 – Making the Electrical Connection).



- **Hard insulation materials** – used as heat insulator under the heating mats in stone type floors for efficient heating. The material comes in plates, usually made from foamed Polyurethane or Polystyrene and should have Compressive strength of more than 2 Kg/cm² (28 PSI). The R value of the material should be in the range of 0.1 - 0.3 m²*°C/W or 1 - 3 Tog (0.57 - 1.7 ft²*h*°F/Btu). (See page 14 for a list of recommended hard insulation materials.) (*) See also remark below.

- **Soft insulation material** – used as heat insulator under the heating mats in all non-stone type floors for efficient heating. The material comes in rolls and should have Compressive strength of more than 0.02 Kg/cm (0.28 PSI)². The R value of the material should be in the range of 0.1 - 0.3 m²*°C/W or 1 - 3 Tog (0.57 - 1.7 ft²*h*°F/Btu). (See page 14 for a list of recommended soft insulation materials.) (*) See also remark below.

(*) Remark: It is common to find insulation materials that are at least 6mm (1/4 inch) in thickness and have Thermal Conductivity of 0.02-0.06 W/m*°C (0.035-0.1 Btu/h*°F), but you can use other thickness and Thermal conductivity as long as the R Value of the material is in the range of 0.1 - 0.3 m²*°C/W or 1 - 3 Tog (0.57 - 1.7 ft²*h*°F/Btu).

Important Note: When installing insulation material under carpeting, always make sure that the R-Value of the insulation is at least the same or greater than the R-value of the carpet.

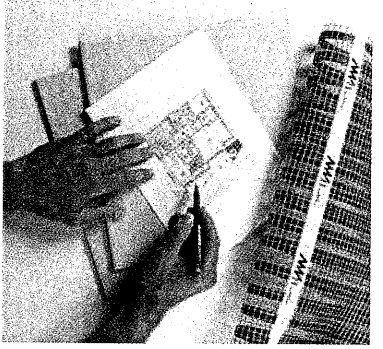
Planning Your Installation

Before installing, draw an installation plan showing the placement of the mats, floor sensor, and junction box or boxes.

The AHT heating mats should cover at least 65%-80% of the floor area of your room to be used as a primary heat source; the more coverage, the less time needed to heat the area. The heating mats are available in several convenient sizes. Choose the combination of heating mats that best enables you to cover the recommended 65% - 80% of your room.

Plan to use the larger heating mats as much as possible and to use smaller mats only as gap fillers.

Note: The mats are supplied with 5 meters (16 feet) of electrical cold leads. If this is not enough, ask your electrician to extend the cold leads.

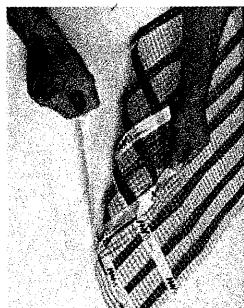


Step 3:

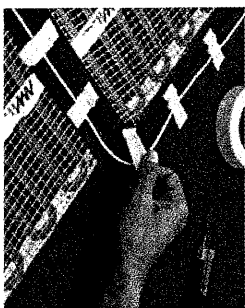
Making the Electrical Connections

5. Your mats have double-sided adhesive tape on the mat edges. Stretch the mats and secure the mats to the floor with the tape. Where required additional tape can be used.

Apply glue between the heating wires (Apply only on the fiberglass net - do not glue the heating wires).



6. Place the cold leads of the mats between the mats toward the junction box. Try to place the cold leads so that they do not cross each other.

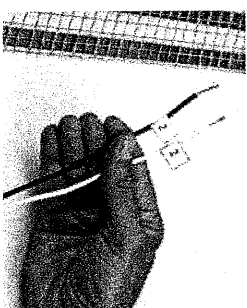


Important! Ensure that the cold leads of the mats do not cross over the mats.

7. Since the cold lead connector is slightly thicker than the rest of the mat, create a slight groove in the insulation board under the connector to ensure that the heating mat lays flat. If any cold leads cross, create a groove for the cold leads at the point at which they cross.



8. Mark each pair of cold leads coming from the same mat with a number. Place a small sticker with the number of each pair of leads close to the end of the lead.

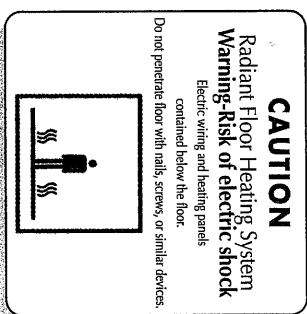


Important! Tightly screw all connections to ensure good electrical contacts.

Note: All electrical connections must be performed by a fully qualified electrician.

1. Install the electrical junction box or boxes above floor level according to local safety and building regulations and codes. Place the following label on the electrical junction box or boxes indicating that an underfloor heating system is installed in the room.

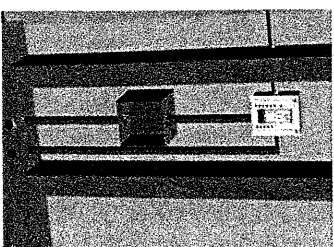
2. Install the control thermostat as far as possible from any heat sources or heat sinks such as fireplaces, direct sunlight, windows, doors, or anything that could possibly affect proper temperature readings. The suggested placement is 1.5 m (5 feet) above floor level.



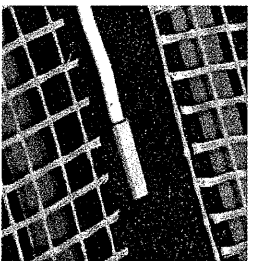
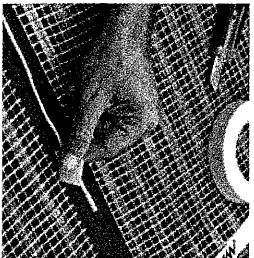
Note:

- In bathrooms only, use a thermostat with only a floor temperature safety sensor. You can use the same kind of thermostat for other wet areas such as kitchen, but it is not a must.
- For all other installations, use a thermostat with both an ambient air temperature sensor and floor temperature safety sensor. See page 14 for a list of recommended thermostats in your country.

3. Install an electric conduit to the junction box and thermostat as in the following diagram.



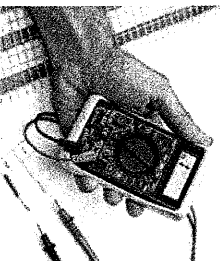
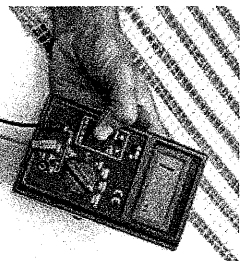
4. Connect the floor temperature safety sensor to the thermostat through a conduit, and install between two heating ribbons, at least 50 cm (20 inches) from the wall.



Note: Make sure that the sensor does not touch any of the heating ribbons.

5. Measure the resistance of the heating system and record the value. Verify that the values you measure are in line with the resistance value that is printed on the specific mat nameplate.

6. Measure the insulation values with a Megger tester and record the value. Make sure there is no insulation problem.



7. If you are installing the heating mats in wet areas (Wet areas include saunas, bathrooms, and kitchen areas within 50 cm (20 inches) of sinks or any metallic kitchen appliance):

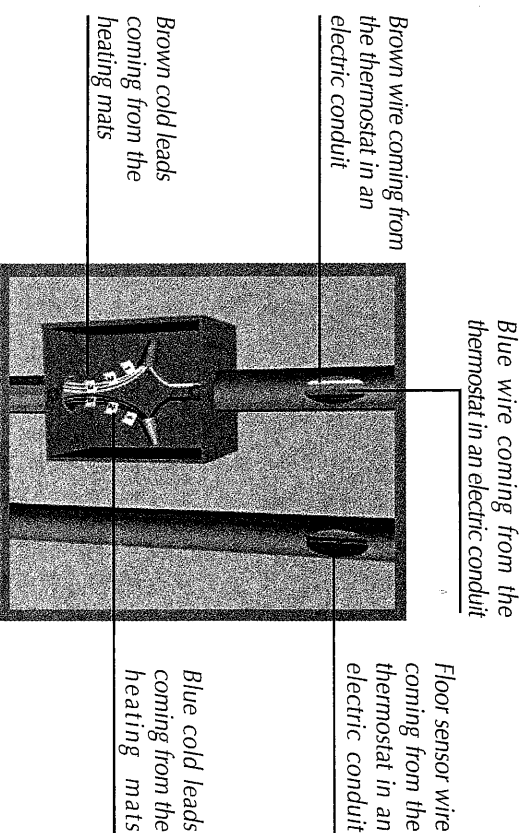
- a. Spread the grounding net on top of the heating mat. The electrical wire of the grounding net should coincide with the heating mat cold lead. If necessary, tape the grounding net to the heating mats to ensure that the net does not move.

- b. Route the electrical wire of the grounding net to the same electrical junction box as the cold leads of the heating mats.

- c. In the electrical junction box, connect the electrical wires of the grounding to the ground lead (green/yellow) of the power supply of the house.

8. In parallel, feed the cold leads of each mat to the electrical junction box. Make sure that you can see the sticker with the numbers of the leads. If necessary, shorten the leads, but make sure the sticker with the leads' numbers are affixed to the shortened lead.

9. Expose the conductor in each lead.
10. Connect all leads of the same colour.
11. Insert each coloured lead to one connector in the junction box.
12. Connect the same colour cold lead between the thermostat and the connector in the junction box.



13. Connect the wires to the control thermostat according to the Typical Wiring Diagram on page 12.

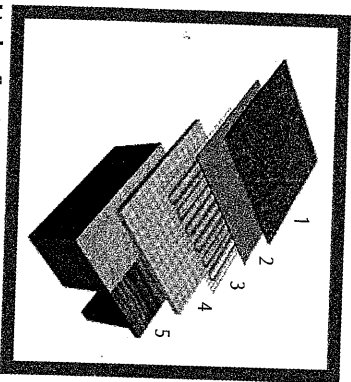
14. Switch on the heating system (see the directions in your thermostat manual) for half an hour to ensure that the system is working properly. It is important to check each entire system to ensure each mat is heating.

15. Switch off the heating system (see the directions in your thermostat manual).

16. When the mats are cool, lay down your floor covering. If you are installing a glued type of floor covering (carpet, wood, vinyl or linoleum), first cover the mats with at least 1/4 inch (6mm) self leveling flooring cement. (You can also use similar materials like Latex based self leveling compound, as long as they have the same or better Thermal conductivity as the self leveling flooring cement). Consult your local construction material dealer regarding the right material for your type of floor.

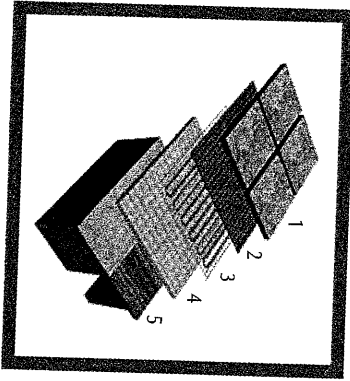
Important! If you are installing a glued type of floor covering, or using thin-set or grout or tile adhesive, do not switch on the heating system again until the glue, thin-set, or grout or tile adhesive is dry. Consult the manufacturer of the material used to determine the amount of drying time needed.

Installation Examples



Under floating type wood, laminate, parquet flooring in dry surroundings(*)

1. Wood, laminate, parquet (without adhesive)
2. Heating mat
3. Soft insulation material
4. Floor slab (wood or concrete)

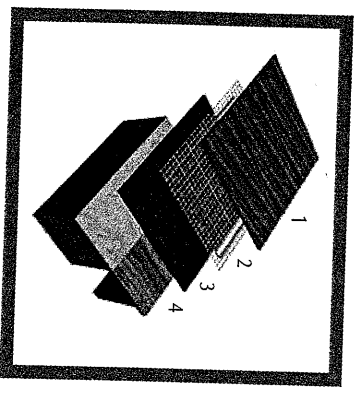


Under tiles in wet surroundings

1. Tiles
2. Thin-set/Grout/Tile adhesive
3. Grounding net
4. Heating mat
5. Hard insulation material
6. Floor slab (wood or concrete)

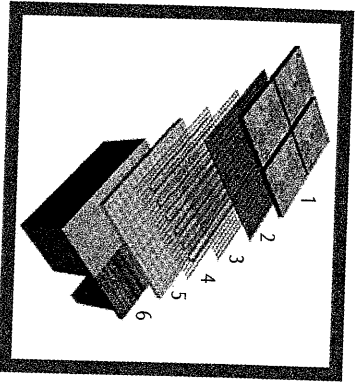
Under glued type carpet, wood, vinyl or linoleum in dry surroundings()**

1. Carpet, wood, vinyl or linoleum (with adhesive)
2. Self leveling flooring-cement or latex compound of at least 1/4 inch (6mm) thickness
3. Heating mat
4. Hard or soft insulation material
5. Floor slab (wood or concrete)

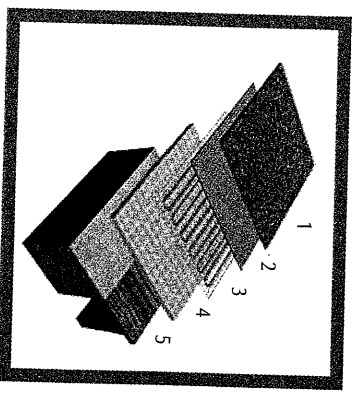


Under tiles in dry surroundings

1. Tiles
2. Thin-set/Grout/Tile adhesive
3. Heating mat
4. Hard insulation material
5. Floor slab (wood or concrete)



Installation Examples



Under non-glued type carpet (without adhesive)()**

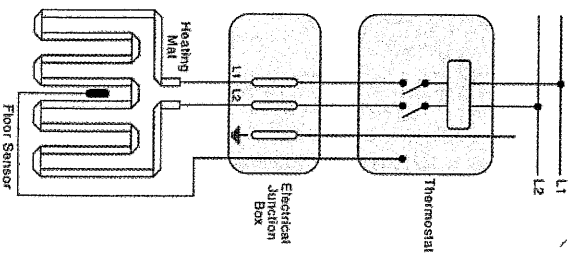
1. Carpet without adhesive
2. Underlay
3. Heating mat
4. Soft insulation material
5. Floor slab (wood or concrete)

Remarks:

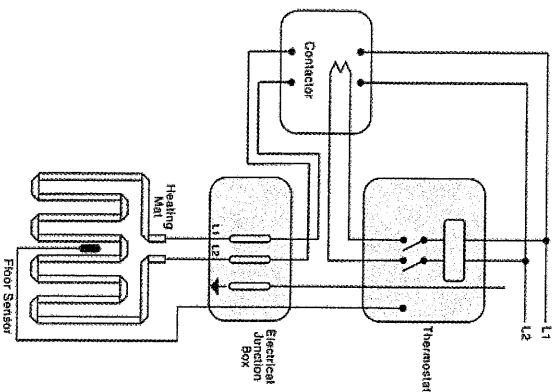
- (*) In wet surroundings, ensure the heating mat has a grounding net installed directly above it.
- (**) Please check local building codes and regulations and act according to them if they contradict the instructions above.
- (***) Do not use carpet underlay with more than 0.8 Tog.
- (****) Use a Hessian backed carpet with a lower than 2.0 Tog. Always ensure that the Tog value of the insulation is at least the same as the carpet.

Typical Wiring Diagram

Option A - for circuits less than 16 amps



Option B - for circuits greater than 16 amps



List of Recommended Materials

Recommended Thermostats

All of AUBE thermostats are programmable. There are 2 types of thermostats to cover all various types of installation surrounding possibilities:

- **Thermostats with Floor only Temperature Safety Sensor for use in bathrooms (can also be used in other wet areas):**
We recommend our ATPRT132 thermostat - This programmable thermostat includes LCD screen and only Floor Temperature Safety Sensor.

- **Thermostats with Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor for use in dry areas (can also be used in wet areas other than bathrooms):**

We recommend our ATPRAF32 thermostat - This programmable thermostat includes LCD screen, Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor.

Recommended Hard Insulation Material

When hard insulation material needed, you can use *Polyurethane foam panels*. The Compressive strength and Thermal conductivity of this material are in line with the recommendations for hard insulation material. You can also use at least 6 mm thick (1/4 inch) Marmox® or similar construction boards (See page 5 for hard insulation material recommendation).

For other insulation material please consult with your local construction material dealer.

Recommended Soft Insulation Material

When soft insulation material needed, you can use *plastic foam layer*. The Compressive strength and Thermal conductivity of this material are in line with the recommendations for soft insulation material. (See page 5 for soft insulation material recommendation).

For other insulation material please consult with your local construction material dealer.

Standard sizes of heating mats and their values

220-240 Volts, 120 watts per sqm family:

Catalog Number	Width(m)	Length(m)	Area (sqm)	Nominal power (Watts/Mat)	Nominal current (Amp/Mat)	Resistance Range (Ohm/mat)
AT101E01121505	0.5	1.5	0.75	94	0.54	534-619
AT101E11122005	0.5	2.0	1.00	123	0.53	386-471
AT101E21123005	0.5	3.0	1.50	177	0.76	270-330
AT101E41124005	0.5	4.0	2.00	264	1.15	183-220
AT101E51125005	0.5	5.0	2.50	305	1.33	161-191
AT101E61126005	0.5	6.0	3.00	354	1.54	141-165
AT101E11121010	1.0	1.0	1.00	123	0.53	386-471
AT101E21121510	1.0	1.5	1.50	176	0.76	143-165
AT101E41122010	1.0	2.0	2.00	264	1.15	183-220
AT101E51122510	1.0	2.5	2.50	305	1.33	161-191
AT101E61123010	1.0	3.0	3.00	354	1.54	141-165
AT101E81124010	1.0	4.0	4.00	440	1.91	105-121

220-240 Volts, 150 watts per sqm family:

Catalog Number	Width(m)	Length(m)	Area (sqm)	Nominal power (Watts/Mat)	Nominal current (Amp/Mat)	Resistance Range (Ohm/mat)
AT101E01131205	0.5	1.2	0.60	99	0.40	534-618
AT101E01131505	0.5	1.5	0.75	113	0.49	445-516
AT101E11132005	0.5	2.0	1.00	148	0.64	321-393
AT101E21132505	0.5	2.5	1.25	189	0.81	253-309
AT101E31133005	0.5	3.0	1.50	241	1.04	199-240
AT101E41133505	0.5	3.5	1.75	259	1.12	187-224
AT101E41134005	0.5	4.0	2.00	318	1.38	154-183
AT101E51134505	0.5	4.5	2.25	339	1.47	146-172
AT101E51135005	0.5	5.0	2.50	383	1.66	131-153
AT101E61135505	0.5	5.5	2.75	385	1.67	130-151
AT101E61136005	0.5	6.0	3.00	471	2.04	107-123
AT101E71136505	0.5	6.5	3.25	542	2.37	92-107
AT101E71137005	0.5	7.0	3.50	504	2.19	100-115
AT101E11131010	1.0	1.0	1.00	148	0.64	321-393
AT101E31131510	1.0	1.5	1.50	242	1.05	207-241
AT101E41132010	1.0	2.0	2.00	318	1.38	155-183
AT101E51132510	1.0	2.5	2.50	383	1.66	131-153
AT101E61133010	1.0	3.0	3.00	471	2.04	107-124
AT101E71133510	1.0	3.5	3.50	504	2.19	100-115

Note: Power is calculated based on an average 230 Volts



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