Dear Customer,

Thank you for choosing our 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 underfloor heating mats.

Do not:

- Do not overlap heating mats.
- Do not fold or wrinkle the 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 23°F (-5°C).
- 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 1 inch (3 cm) of any heat conductive building part, such as cold water pipes.
- Do not install mats within 2 inches (5 cm) of one another, 4 inches (10 cm) of any wall, or 6 inches (15 cm) of a fireplace or hot water pipe.
- Do not connect any other electrical appliance on the same electric circuit or GFCI unit of the heating system.
- Do not install heating mats under wooden floor, if the wooden floor is thicker than 3/4 inch (18 mm).
- Do not install heating mats under carpet, if the R-value of the carpet is more than 0.34 ft²*h*°F/Btu (0.06 m²*K/W).
- 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 0.08 ft²*h*°F/Btu (0.014 m²*K/W).
- Do Not Use grout scrapers or utility knives to clean grout joints or lines as sharp tools may damage the heating mat. Clean grout lines with a wet soft sponge or soft tool instead.
**Always:**

- **Always** ensure that the electric circuit that supplies electricity to the underfloor heating system is equipped with a 30 mA ground fault current interrupter (GFCI) or Residual Current Device (RCD). For wet areas ensure that the electric circuit that supplies electricity to the heating system is equipped with a 5 mA ground fault current interrupter (GFCI) or Residual Current Device (RCD). Our thermostats include a built-in GFCI. See page 14 for a list of recommended thermostats.

- **Always** connect all cold wire leads from the heating mats in parallel inside 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 individual heating systems in each room with its own electrical junction box and control thermostat. Each thermostat has a maximum capacity of 15 amps. If the amount of amps in the room is greater than 15 amps, use master and slave units (see page 14), or add a contactor between the mats and the thermostats. (To calculate the amount of amps in the room see tables on 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 0.57 ft²·h·°F/Btu (0.1 m²·°C/W or 1 Tog), please read the insulation instructions on page 5 and act accordingly.

- **Always** Clean grout lines and joints with soft sponge rather than grout scrapers or utility knives. Cleaning grout joints with sharp tools may damage the mat.

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**Note:** If you are installing any type of glued-down floor covering, cover the mats with at least 1/4 inch (6mm) self-leveling flooring cement. Plywood sheathing can be used instead of self leveling flooring cement.

**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 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** – In wet surroundings, it is recommended to lay a grounding net especially if electrical appliances are present.

**Note:** We recommend using an AHTGN family of grounding net.

- **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.
Use thermostat with air and floor temperature sensors for all other installations.

**Note:** We recommend our digital fully programmable thermostats and master thermostats, which allows you maximum flexibility in creating your weekly heating plans. See page 14 for a list of recommended thermostats. Feel free to contact our representative for additional details regarding the appropriate controls.
Insulation

- **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 and should have Compressive strength of more than 28 PSI (2 Kg/cm²). The R value of the material should be in the range of 0.57 - 1.7 ft²*°F/Btu (0.1 - 0.3 m²*°C/W or 1 - 3 Tog). (Ask your dealer 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 0.28 PSI (0.02 Kg/cm²). The R value of the material should be in the range of 0.57 - 1.7 ft²*°F/Btu (0.1 - 0.3 m²*°C/W or 1 - 3 Tog). (Ask your dealer for a list of recommended soft insulation materials.) (*) See also remark below.

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

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**Step 1:** Planning Your Installation

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

The 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. Our 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.

To help plan the layout of your heating mats, go to mohawk.aht-heating.com and click the installation planner link.

**Note:** The mats are supplied with 16 feet (5 meters) of electrical cold leads. If this is not enough, ask your electrician to extend the cold leads.
Step 2:

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.
   - **All other flooring types** – Use a soft insulating material which can simply be placed on the floor or secured with tape or carpet adhesive.

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 4 inches (10 cm) from the wall to the heating mats, and a gap of about 2 inches (5 cm) between each mat. 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).
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. You can also use hot glue or plastic staples to hold the fiberglass net to the insulation material or the sub-floor. In both cases ensure that you do not staple or apply hot glue to the heating elements – only the fiberglass net.

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 (You can use the stickers supplied as part of the package of the mat).
Step 3:

Making the Electrical Connections

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

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

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 5 feet (1.5 m) 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, however it is not required.
- 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.

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 20 inches (50 cm) 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. Make sure there is no insulation problem.

7. In wet areas, which include saunas, bathrooms and utility rooms, it is recommended to lay a grounding net especially if electrical appliances are present. (e.g. in kitchen areas within 20 inches - 50 cm - of sinks or electrical appliances):
   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) 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 color.
11. Insert each colored lead to one connector in the Junction box.
12. Connect the same color 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 pages 12 and 13, depending on whether you are using less than or more than 15 amps.
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.
17. If you are installing a glued type of floor covering, or using thin-set or grout, do not switch on the heating system again until the glue, thin-set, or grout is dry. Consult the manufacturer of the material used to determine the amount of drying time needed.

**WARNING!** Beware of damaging mats with a grout line cleaning blade after installation. It is recommended to clean grout lines only with a wet sponge or soft tool as you work.
Installation Examples

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 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)

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 insulation material
5. Floor slab (wood or concrete)

Under floating type wood, laminate, parquet flooring in dry surroundings(*)
1. Wood, laminate, parquet (with out adhesive)
2. Heating mat
3. Soft insulation material
4. Floor slab (wood or concrete)

(*) In wet surroundings, it is recommended to lay a grounding net especially if electrical appliances are present. The grounding net should be installed directly above the heating mat.
Typical Wiring Diagrams

For circuits less than 15 amps
Typical Wiring Diagram

For circuits greater than 15 amps
List of Recommended Materials

Recommended Thermostats – For applications of less than 15 amps.

All our thermostats are programmable and include a built-in GFCI. There are 3 types of thermostats to cover all various types of installation surrounding possibilities:

- **Thermostat with Floor only Temperature Safety Sensor for use in bathrooms:**
  We recommend our bathroom thermostat. This programmable thermostat includes LCD screen, 5mA GFCI and only Floor Temperature Safety Sensor.

- **Thermostat with Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor for use in dry areas:**
  We recommend our basic thermostat. This programmable thermostat includes LCD screen, 30mA GFCI, Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor.

- **Thermostat with Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor for use in wet areas other than bathrooms:**
  We recommend our thermostat for wet/damp areas. This programmable thermostat includes LCD screen, 5mA GFCI, Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor.

Recommended Thermostats – For applications greater than 15 amps.

Our master thermostat/slave unit system is specially designed for large floor heating applications exceeding 15 amps. It works as follows:

1. A floor heating area exceeding 15 A is separated into zones, with a slave unit responsible for heating each zone.
2. All slave units are “linked” with a master thermostat that controls temperature settings/programming for the entire floor.
3. Each slave unit must be provided with its own electrical junction box and separate circuit and circuit breaker in the main circuit board. The master thermostat gets its power (12V) from the first slave unit.

**Master Thermostat:**

- **Master thermostat with Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor for use in areas all areas except bathrooms:** We recommend our master thermostat for dry/wet/damp areas. This programmable master thermostat includes LCD screen, Ambient Air Temperature Safety Sensor and Floor Temperature Safety Sensor and can control up to 10 slave units.

- **Master thermostat with Floor only Temperature Safety Sensor for use in bathrooms:**
  We recommend our master thermostat for bathroom areas. This programmable master thermostat includes LCD screen, Floor Temperature Safety Sensor and can control up to 10 slave units.

**Slave Unit:**

- **For use in Dry areas**
  Use our basic slave unit. It should be connected to the master thermostat only in Dry areas. its working power is 120V and the unit includes 30mA GFCI.

- **For use in Wet/Damp/Bathroom areas**
  Use our slave unit for Wet/Damp/Bathroom areas. It should be connected to the master thermostat only in Dry areas. its working power is 120V and the unit includes 5mA GFCI.
### Standard sizes of heating mats and their values

110 - 120 Volts 12 watts per sq ft family:

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**Note:** Power is calculated based on an average 115 Volts