

Read through this entire manual before starting installation.

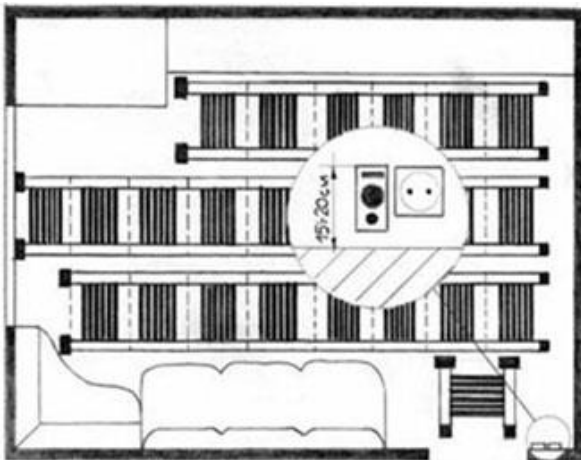
- May be installed under laminate, engineered wood or approved hardwood floors. See flooring manufacturer's specifications and instructions.
- Installation must be performed by a qualified person in accordance with national and local codes and standards.
- Each thermostat requires a dedicated circuit at the breaker box.
- All electrical connections must be made by a licensed electrician.
- Must not be installed in damp or wet areas as defined by the National Electrical Code.
- Do not fold or wrinkle the heating film, walk on it unnecessarily, or drop heavy or sharp objects on it.
- Never overlap the heating film.
- Do not install electrical wires or pipes in the floor with the film.
- Be sure underlayment contains no cellulose.
- Install film only when room temperature is above freezing.
- Leave a 6-inch space between film and fireplaces, chimneys, or hot water pipes.
- Never use any type of insulation material on top of the heating film.

Failure to follow these instructions may result in fire, electrical shock, property damage, personal injury, or death.

Installing Underfloor Heating Film.

1. Layout of electric underfloor heating systems

Sketch a plan showing how the film will be installed. In drawing up a plan, should take into account that the organization of the main floor heating is necessary to cover at list 70% of the usable space. Do not install film under built-in cabinets, stationary design elements, appliances, in small closets (walk-ins are okay), or under other structures that do not have air circulation space under them. To arrange comfortable heating it must be covered for at least 40% of the surface aria.



Leave a space and padding around the perimeter of the room size from 4"-15"(10 to 40 cm) spacing between the strips of film - not more than 2" (5 cm) and no less than 1" (2,5 cm)

Not allowed: overlapping film on a film

When planning the placement, should take into account that the heating film is cut into sections at designated places specially designed for cutting. The length of a single section is 9 5/6" (25 cm).

2. Calculations capacity of the heating system, as well as the definition of the required number of thermostats and electrical power capabilities

The maximum power consumption of infrared heating film is 232 W/m². Given this fact and the amount of space covered by heating film, electrical current can be calculated by the following formula:

$$I=P/U,$$

Where: I - Current;

P - Required heating capacity;

U - Voltage.

The amount of current required for selection of appropriate gauge wiring, and to select the thermostat model.

The cross sections of electric wire	Current Rating, Copper	Current Rating, Aluminum
1.5 sq mm	16A	10A
2.5 sq mm	25A	16A
4.0 sq mm	32A	25A

Consider this calculation on a specific example. For example, the room allocated for installation of floor heating has a total area of 215 sq ft (20 sq m), the type of heating - basic flooring - laminate. Excluding the area cluttered with furniture and other design elements, a useful area or the area of the film coating will be 129 sq ft (12 sq m).

Thus, we determine the maximum capacity of the system as a whole:

$$P = 12 \text{ m}^2 \cdot 232 \text{ W} = 2784 \text{ W},$$

$$I = 2784 \text{ W}/220\text{V} = 12.7 \text{ A}$$

We select on the table above, the necessary cross-section area wires etc. We find copper wire with a cross section of 1.5 sq mm.

For the thermostat selection it should be guided by the following data:

$$3 \text{ kW} = 139.93 \text{ sq ft (13 sq m)};$$

$$3.5 \text{ kW} = 161 \text{ sq ft (15 sq m)};$$

$$4 \text{ kW} = 182 \text{ sq ft (17 sq m)};$$

$$6 \text{ kW} = 269 \text{ sq ft (25 sq m)}.$$

If the area of the floor heating is larger than presented above, it would be necessary to use more powerful thermostat or seek help from qualified professionals.

3. Installation.

Underfloor Heating film for use under wood floor heating and laminate heating is very easy to install and does not require any specialist under floor heating labor or tools, except a qualified electrician to make the final connections to the mains power. When fitting heat film underfloor heating a few simple steps must be followed.

Sweep or vacuum floor to remove any foreign material that could damage the underlayment pad or film. Smooth out any imperfections in the sub floor and remove nails protruding above the surface. The underfloor insulations will not make an unsuitable sub floor suitable for the underfloor heating systems to be installed over.

The first task once the sub floor is ready is laying the 6mm insulation underlay. Role the underfloor insulation out over the sub floor making sure to cover the total floor area where the wood or laminate floor covering is to be installed, not just the underfloor heating area. A contact spray adhesive can be used or a double sided tape to hold the under floor insulation in place and aid the installer if required.



4. Mark out Permanent fixtures

If the location of floor mounted permanent fixtures are known, mark these out to ensure the heating film is not installed under these units.

5. Fitting Underfloor Heating Film.

Laying Heating film is quick and easy. Remove shoes and work in stocking feet when installing film. Be careful not to drop objects on the film. Roll out the film with the bright copper strips facing down. Start at one side of the room rolling out the underfloor heating film from the non-connection end of each line (end with no connection tails), ideally towards the wall the underfloor heating thermostat is located. Each heating film line can be held in place by using a suitable adhesion tape such as duct tape along the ends and side of the film.



Cut out the heating film according to the scheme planned and put on the prepared surface, secure with adhesive tape. Each heating film line can be held in place by using a suitable adhesion tape such as duct tape along the ends and side of the film.



The heating film can be butted together but cannot be overlapped at any time.



6. Underfloor Heating Thermostat Floor Sensor Installation.

Cut a small channel into the underfloor insulation layer to allow the thermostat floor sensor / probe to be laid into, so that the sensor and its wires are below the level of the pad. Run the wire from the sensor to the thermostat and tape it to the pad and the floor. The channel should be located under one of the underfloor heating film. Position the floor sensor under the heating film clear area, not under black carbon heating strips. The floor sensor wire can be extended up to 30' if necessary by splicing comparable gauge, multi-stranded, insulated, electrical wire and waterproofing the splice.





7. Connecting the heating film.

Connecting the heating film strips to the thermostat and electrical connections are made only in a parallel manner.

- a) Strip the insulation from one end of a 12 gauge stranded THHN wire. If the wire is double insulated—be sure to strip both layers of insulation.



- b) Insert the barrel of the connector into the crimping tool so that the “W” of the tool presses on the split side of the barrel. The tool will not release until there is sufficient pressure on the crimp. After crimping, test the wires to be sure they are tight in the connector. If only one wire is to be crimped in the connector, strip 1/2 inch

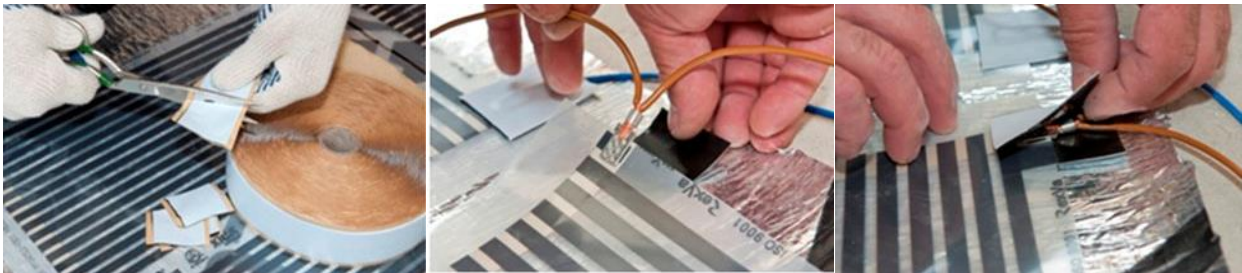
of insulation and double the wire over into a “U” shape before crimping. If two wires are to be crimped together, strip 1/4 inch of insulation from each wire and insert them into the connector together. After crimping, test the wires to be sure they are tight in the connector.

- c) Place the connector over the copper strip on a corner of the film and crimp it so that the teeth on the connector bite into the copper strip.





- d) The contact points, clamp connectors and free ends of the film insulated by an insulation tape.
- e) Cut 2-inch-wide mastic insulating tape into 2-inch squares. Apply a square of tape to both the top and bottom side of each wire connection and press them together firmly to form a tight seal.

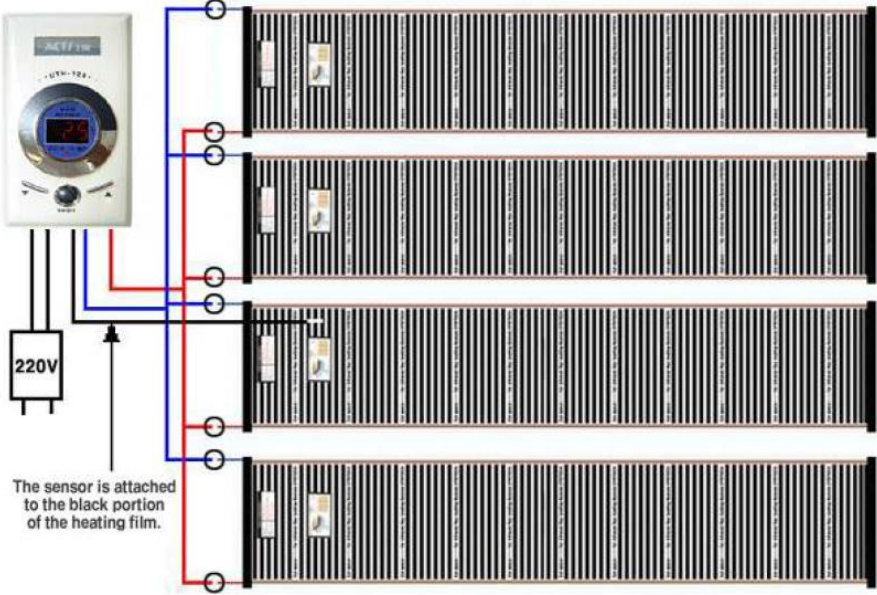


- f) In the same way, use the mastic tape to cover all of the bare ends of each copper strip that do not have wire connections.

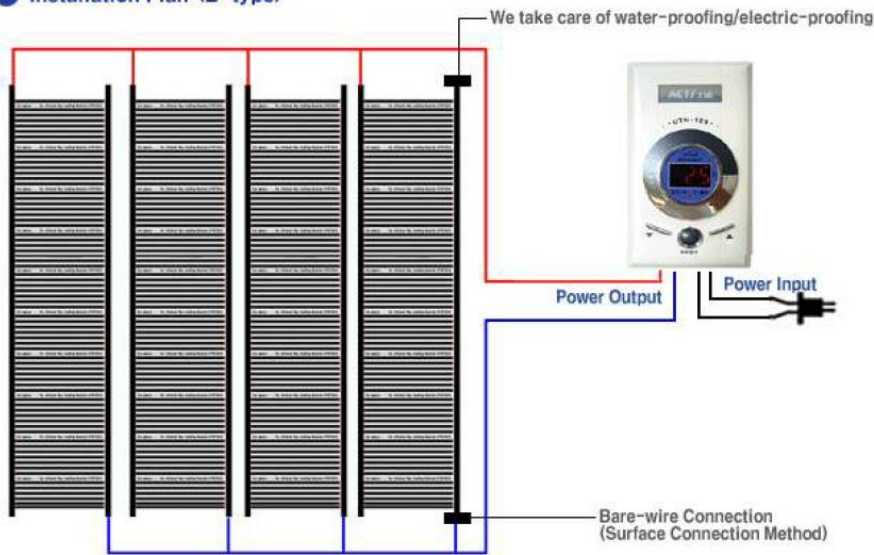


8. Once the underfloor heating mats have been laid and fixed in place over the floor the connection tails should be run back to the underfloor heating thermostat or junction box location. The diagram below shows the two ways underfloor heating mats can be connected back to the underfloor heating thermostat. (Underfloor heating mats must always be connected in parallel never in series).

● Installation Plan <A-type>



Installation Plan <B-type>

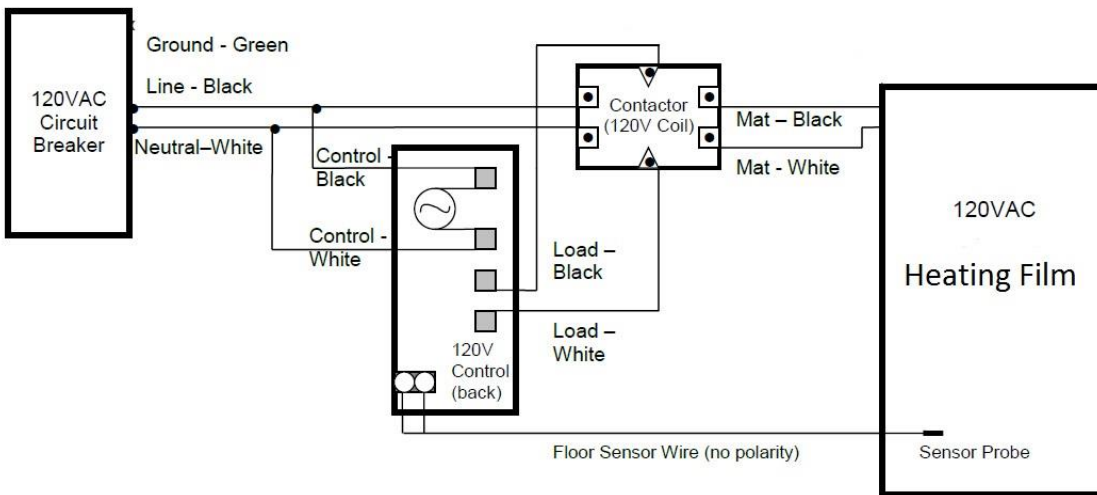


9. Installing a Relay (Contactor)

Depending on the Amperage requirements of multiple **Heating Film lines**, a contactor / relay may be required. Consult with an electrician to determine the type and size of contactor / relay required.

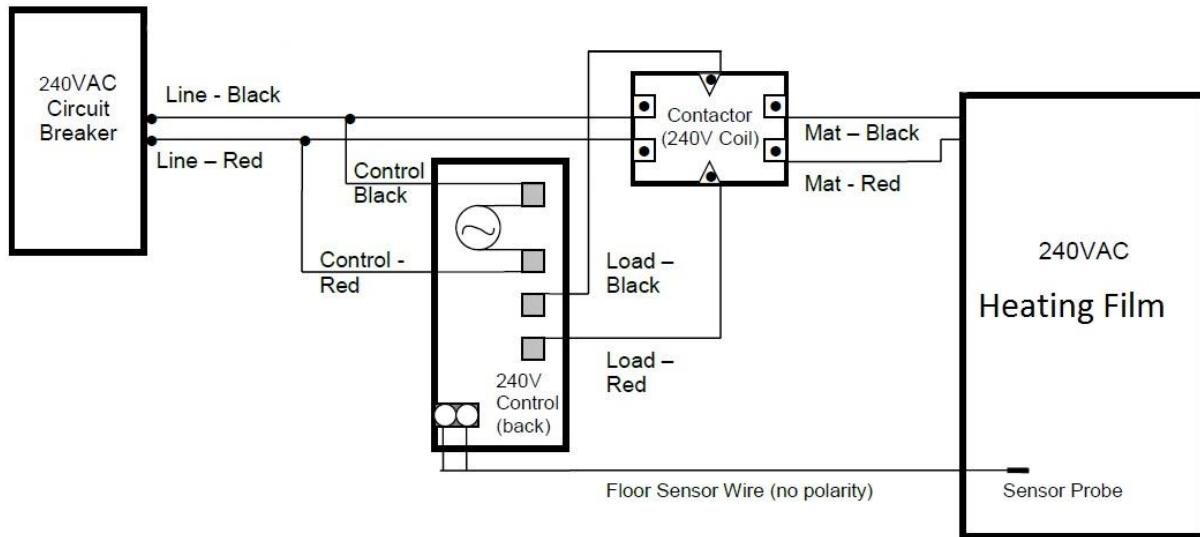
The total Amp load of the **Heating Film Lines** must not exceed the thermostat's 18 Amp limit or the Amperage rating of the circuit or other control switch without using an appropriately rated contactor / relay - see (120V contactor circuit) or (240V contactor circuit).

Typical Electrical Wiring Diagram w/contactor & thermostat control (120V)



All electrical work must be done by a qualified, licensed electrician in accordance with local building and electrical codes, and the National Electrical Code (NEC), especially Article 424, Part IX of the NEC, ANSI/NFPA 70 and Section 62 of CEC Part I.

Typical Electrical Wiring Diagram w/contactor & thermostat control (240V)



All electrical work must be done by a qualified, licensed electrician in accordance with local building and electrical codes, and the National Electrical Code (NEC), especially Article 424, Part IX of the NEC, ANSI/NFPA 70 and Section 62 of CEC Part I.

10. The cold ends can be laid in grooves cut in to the insulation for convenience and ease of fitting, the cold ends should not cross under or over the heating film. It is advisable to label and identify the individual cold tails to the heating film for ease of wiring (the heating film do not have a polarity).



The connection ends and cold tails can be pressed into the underfloor insulation by scoring the underfloor insulation and firmly pressing the tails /ends into the scored underfloor insulation. It

is advisable to tape over the connection tails and cold ends to keep the underfloor heating mats held in place during the installation of your wood / laminate floor.



11. Once the underfloor heating film have been laid and fixed in place the vapor barrier is ready to be laid over the top of all the under floor heating film mats. The vapor barrier must fully cover all under floor heating mats. It is not a necessity to cover the whole floor area only the actual underfloor heating film themselves. If necessary the vapor barrier can be taped around the edges to hold it in place.



An electrical test of the adjusted heating film must be carried out by an electrician. All mats must be connected in parallel.



General Information

The cold ends can be shortened or extended if required, all wiring extensions must be carried out by a qualified electrician in accordance with current legislation.

The heating film can be shortened by cutting the film at the cut end using scissors or a sharp knife, taking care not to expose the carbon element at any point. Suitable insulation tape must then be placed over the exposed copper conductor to avoid electrical shock and fully insulate the modified heating film. Heating film size reduction must be carried out prior to final fitting, and the Heating Film must be disconnected from the power source. An electrical test of the adjusted heating film must be carried out by an electrician. All mats must be connected in parallel.

When installing carpet a low tog underlay should be installed followed by a good quality hessian backed carpet.

The heating film must be connected in parallel ONLY.

The cold ends can be laid in grooves cut in to the insulation for convenience and ease of fitting, the cold ends should not cross under or over the heating film. It is advisable to label and identify the individual cold tails to the heating film for ease of wiring (the heating film do not have a polarity).

The temperature sensor should now be fitted to lay under the heating film into the floor and secured, a groove can be cut into the insulation for the temperature sensor.

The heating film should be connected and tested to ensure they are fully functional and not damaged in any way before laying the floor. The vapor barrier is then laid over the heating film (it is not necessary to cover the whole floor area with vapor barrier, only the heating film).

The final floor covering should now be laid to minimize the time the heating film are exposed as this will minimize the chance of damage to the heating film. The mats should be continued to be tested during and after the floor installation process.

Do's and Don'ts

1. Never fold the healing film.
2. The healing film has to be spread on a smooth and even surface and can be held in place by a suitable adhesive tape if required.
3. Do not install the heating film at a distance of less than 6 in (150mm) from wall, fireplace or hot water pipe.
4. Do not install the heating film in areas where zero clearance furniture is planned to be placed on the floor.
5. Do not power up the heating film when they are folded or rolled up.
6. Do not install two heating film lines one on another.
7. No other electrical cables or pipes should be installed directly under or above the heating film.
8. Under floor heating film are designed for indoor use only.
9. Do not exceed the recommended max temperature of the floor covering installed over the heating.
10. Make sure to accurately install the floor probe and when installing wood, laminate or carpet flooring always run the thermostat using only the floor sensor to regulate the heating so not to overheat the floor covering.
11. Make sure to monitor the whole heated area to make sure there are no areas with excessive heat buildup.

12. Always make sure to check the heating film before, during, and after installation of the floor covering.
13. Do not install the heating mats directly over a foil backed insulation material.
15. Always join multiple heating film lines in parallel (never in series).