Tempson TTPC-18 heating cable installation Manual

Important safeguards and warnings

WARNING: Shock and fire hazard

If the Tempson floor heating system is damaged or not installed properly, fire or shock could occur resulting in serious personal injuries or damage to property. You must carefully follow the warnings and instructions contained in this manual.

· The listed thermostat must be used.

· It is important that this equipment is installed only by qualified electricians who are familiar with the proper sizing, installation, construction and operation of floor warming system and the hazards involved. The installation must comply with all national and local electrical codes. If you are unfamiliar with these requirements, contact a electrician.

· The Tempson floor heating system is designed for under floor heating purposes only. Be sure that the floor is not penetrated by nails, screws, or similar devices that can cause damage on first installation or during subsequent floor repairs in the future.

· If the Tempson floor heating system is damaged, it must be replaced. Do not attempt to splice or repair any part of the system.

1 General Information

1.1 Use of the manual

This manual describes the Tempson floor heating system — how to design your rooms, select the proper product, and install the system. It is important to thoroughly review this manual and the following document prior to installation:

Tempson Thermostat Installation and Program Manual

For additional information regarding any aspect of the Tempson Floor Heating System, please contact your local distributer or us directly:

Tempson AB

Add.: OAvägen 11, 178 38 Sweden

Tel: 0046 8 56030731

Email: info@tempson.se

www.tempson.se

1.2 Safety guidelines

The safety and reliability of any floor heating system depends on proper design, installation, and testing. Incorrect installation or mishandling of the product can cause damage to the heating cable, system components and property, and can create a risk of fire or shock. The guidelines and instructions contained in this guide are important. Follow them carefully to minimize these risks and to ensure that the Tempson floor heating system performs reliably.

Pay special attention to the following:

·Instructions marked  Important

·Safety warnings identified as  WARNING

1.3 10-years limited warranty

For a period of fifteen (15) years from the date of purchase Tempson warrant the Tempson heating cable is free from defects in material, design and process. The extended warranty is only valid if the warranty certificate has been properly completed and mailed, and the installation is in accordance with the installation instructions.

2 Tempson floor heating system

2.1 System description

It's designed for comfort heating of ceramic tile or natural stone floors. The preassembled cables can be installed over wood, or on concrete. The cable is embedded in mortar and covered with tile or stone.

 **WARNING: But it CAN'T be installed beneath wooden, carpeted, linoleum, or any other type floors and any walls.**

The system includes the following components,
*Heating Cable, with 10ft cold lead each
*Thermostat: UL/cUL or ETL listed
*Temperature sensor, 10ft length

2.2 System specifications

Approval,  E328150

Heating cable

Rating voltage: 120V / 240 AC
Max watt : 3W/ft2 (9.84W/m) +/-10%
Min. bending radius: 1.25inch (30mm)
Max. ambient temperature: 85F (30 ℃)
Min. Installing temperature: 40F (5 ℃)
Heating Cable: 2 wires, grounded, insulation jacket by fluoropolymer plastic
Cold lead: 2 wires 18 AWG with ground braid, length 10ft (3m)

Thermostat

Function: On/off controlling by digital display,
7 day programmable, class A, 5mA GFCI

Rating voltage: 120V/240V AC +/-10%

Max. switch current: 15A

Temperature controlling range: 40~122F (5~50 ℃)

Ambient temperature range: 23~122F (-5~50 ℃)

Temperature sensor: 2 wires, lead wire 10ft (3m)

2.3 Typical installations and applications

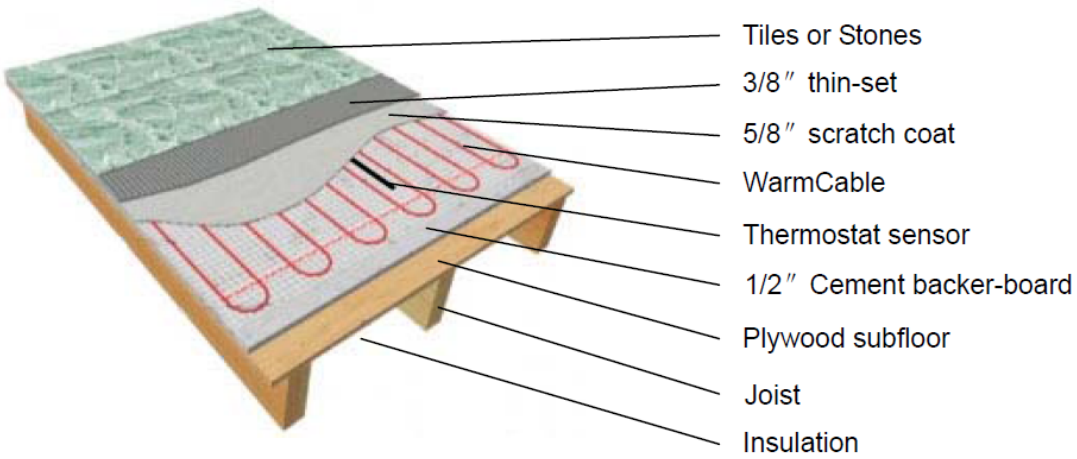


Figure 1: Directly on plywood

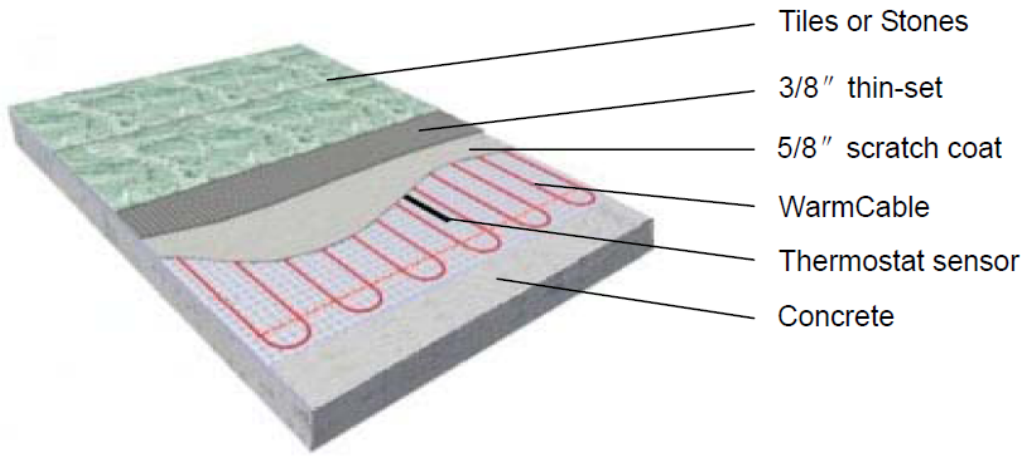


Figure 2: Directly on concrete

3. Floor Heating Design and Product Selection

3.1 Design the Installation

Step 1: Measure the heated area

Determine the heated area of the floor where are no permanent fixtures or furniture such

as showers, toilets, vanities, or cabinets. Measure the heated area of the floor.

For example, in Figure 3, the area of the bathroom is 96 ft². When you subtract the area of the vanity, shower and toilet, the total heated area is only 81 ft².

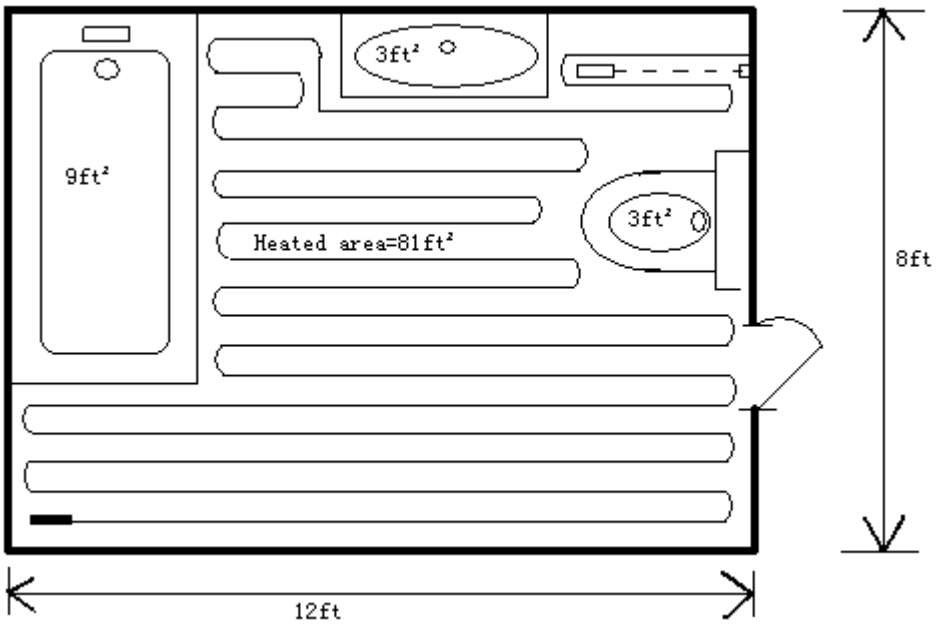


Figure 3: Directly on concrete

Step 2: Plan the design

Determine the optimum floor heating Cable layout for your heated area to ensure coverage. Select a spot for the thermostat in the wall above the heated area where it can be reached by the 10-foot cold lead on the heating cable, and the 10-foot floor temperature sensor. Please refer to Figure 4.

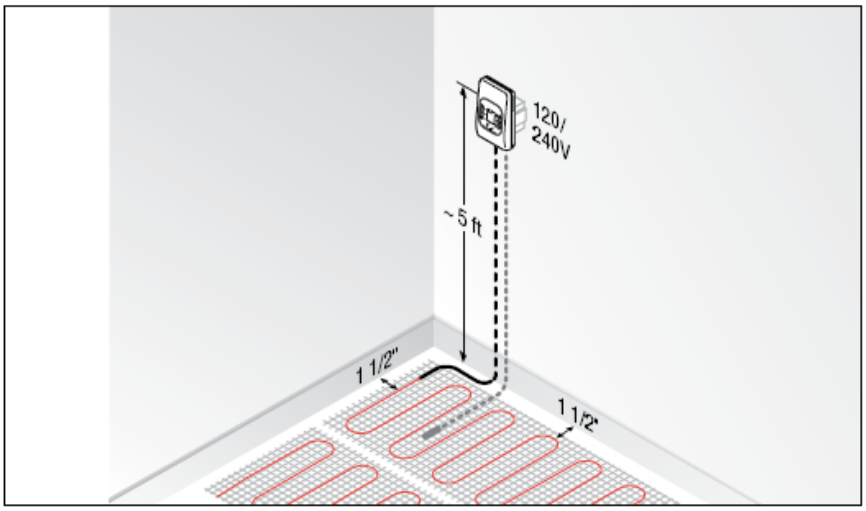


Figure 4: Typical cold lead and temperature sensor example

 **Important:**

I. The predetermined cable space must be maintained to ensure proper floor heating. Do not change or adjust the cable space when you lay out the cable or the floor may have cold spots.

II. The thermostat must be mounted on the wall with free air circulation around it.
It must be located where it is not influenced by any other heating sources (e.g. the sun shining through a window), draught from doors or windows, or by the temperature of an exterior wall.

3.2 Confirm TEMPSON heating cable product selection

Confirm that your heating cable is no larger than the heated area. Following the example fro Figure 3, if the heated area is 81 ft²,select the 80 ft² Tempson floor heating system form the product selection tables.

3.3 Confirm your thermostat selection

A listed thermostat must be used to control TEMPSON heating cable, Tempson thermostat proposed.
If you prefer any other thermostat, please refer section 2.2 thermostat specification for your selection, it should be rated based on your system rating.

For installation and program, please refer to the file “Thermostat Installation and Program Manual”.

4 Installation

 **Important:**

4.1 DO and DON’T for installation

· Do read this manual carefully before installing your Tempson floor heating system.
· Do remember Tempson floor heating system for indoor installation only.
· Do not install Tempson Cable in walls or ceilings.
· Do remember to check that the supply voltage matches the voltage of the TEMPSON Cable.
· Do remember the minimum installation temperature is 40℉(5℃).
· Do remember to measure the resistance three times.
· Do embed heating cables in mortar, thinset, concrete or similar materials.
· Do remember that heating cables can not be cut to length or crossed over itself.
· Do route the cold leads in listed conduit as the leads exit the floor.
· Do remember to place the labels as written in this manual.
· Don’t extend heating cables beyond the room or area in which it originates.
· Don’t place the heating cable closer than 2 inches from combustible materials.

Please consult your local distributer or the manufacturer for any other questions or advice.

4.2 Tools and materials needed

You need following items to install and test your floor warming system,

*Scissor

*Utility knife

*Wire stripper

*Tape measure

*Screwdriver

*Multimeter

Also you will need the appropriate tools and materials to install the particular floor, include products like self-leveling mortar, thin-set mortar, backer board, tile, notched trowel, and any others for your specific floor.

 **Important:** The maximum R value of the floor material where the heating cable is installed, shall not exceed R 2.5 SI (R-value per inch of thickness) . There is no limit for the insulation under the sub floor.

4.3. Installation steps

Please follow below steps to ensure a successful installation.

4.3.1 Preparing the subfloor

Make sure that the floor area to be heated is clean, flat and free of debris what can damage the heating cables, like nails, staples or protruding objects.

Drill or cut a hole through the wall sill plate under the electrical junction box location. You will use this hole to route the cold lead and the temperature sensor wire in UL listed conduit to the box.

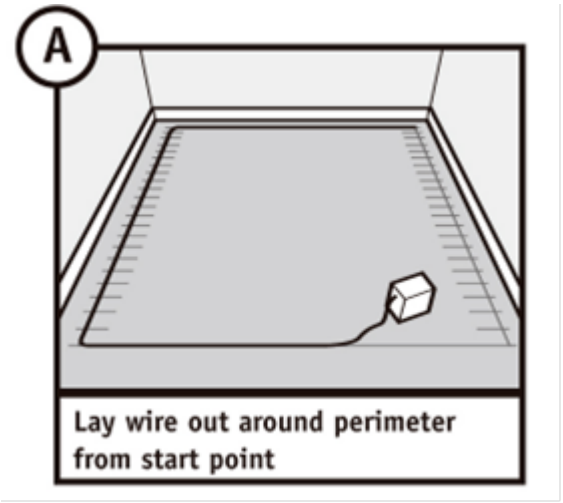
4.3.2 Measure the resistance (the first time)

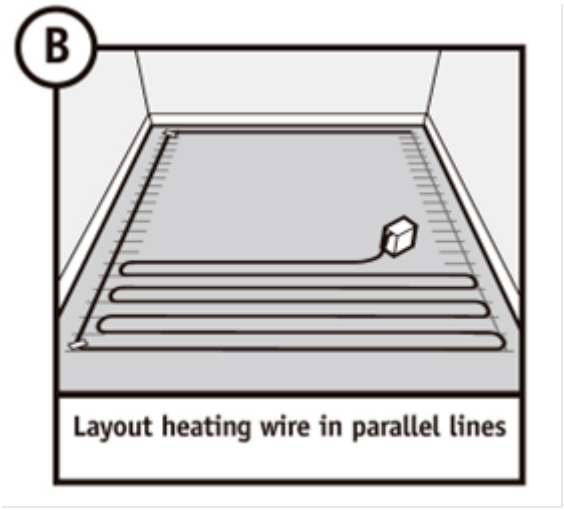
Use a digital ohm meter to measure the resistance of the heating cable and compare it to “Table 1 or Table 2”. Record the measured resistance on the warranty card. Documenting the resistance at each stage of installation is required for warranty purposes. Also, measure the resistance between the white, black and shielding/ground wire. Both should read infinity.
Please refer to “5 Trial run system”

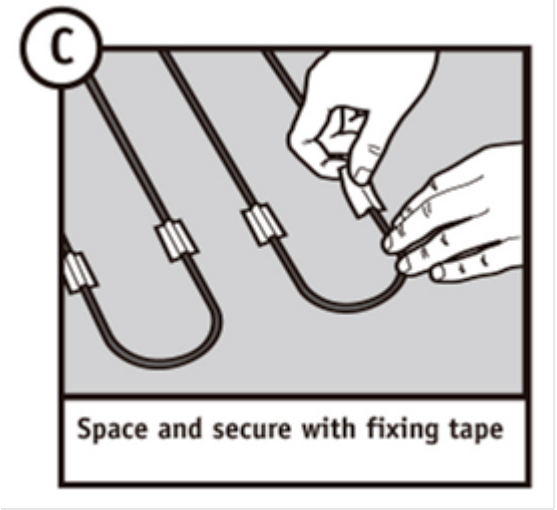
4.3.3 Laying the heating cable

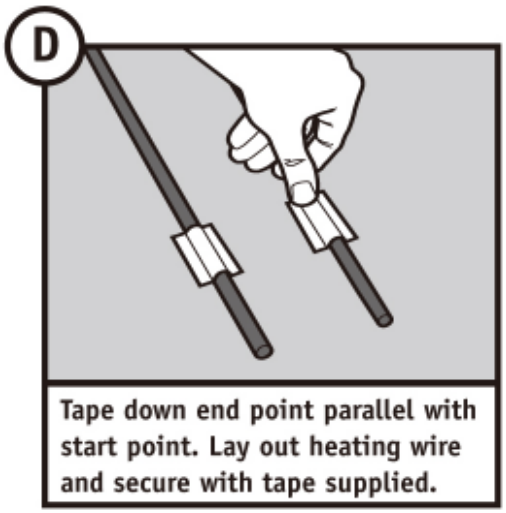
After marking up, lay out heating cable by taping down at each corner, it should run in a U shape. Please be sure the heating cables spacing correctly and never cross each other.

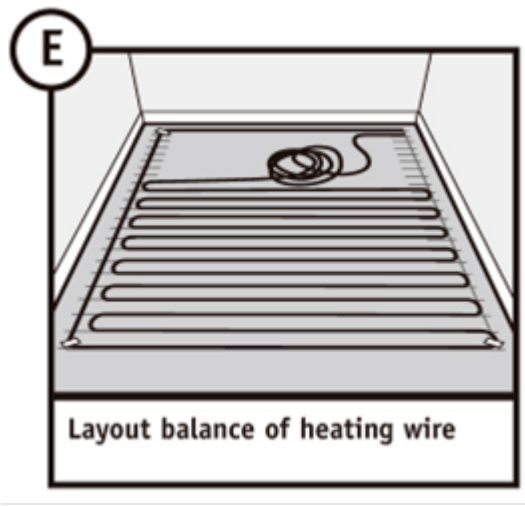
After 10ft of cable has been removed, you will reach the point at which the unheated lead joins the space heating cables. The joint should be taped to the floor at the start point. The joint should not be bent at the point of entry into the conduit as this may damage both the factory joint and/or the heating element within.

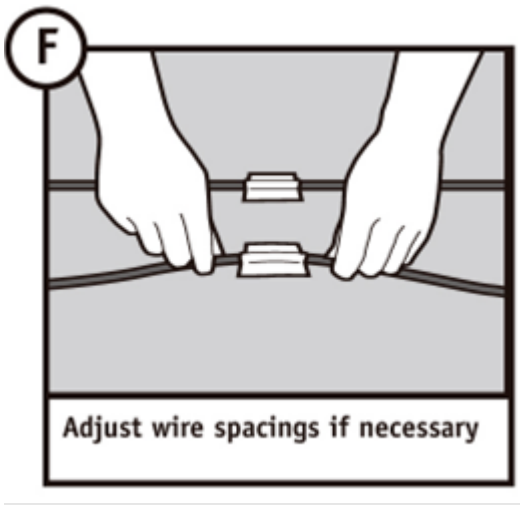










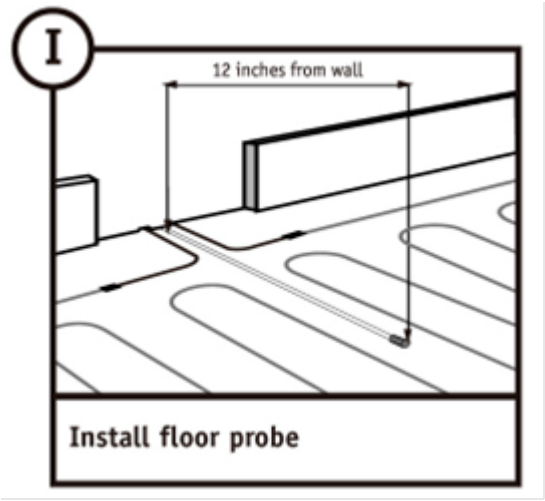


Important: Don’t cut or shorten the heating cables. And do not expose it to any mechanical stress. Avoid walking on the heating cable. If it’s necessary to shorten

the cold lead, be sure to store the cord label in the junction box.

4.3.4 Place the temperature sensor

Center the sensor between two runs of the heating cable, 4 inches form the end of heating cable loop (see image I). Run the sensor inside the wall to the electrical junction box location. It's recommended that the sensor be installed in conduit tube. This will allow the sensor to be easily replaced in the unlikely event of failure.



Important: Don't allow heating cable, cold lead or temperature sensor to cross themselves or each other. And the sensor must be placed at least 20 inches (50cm) away from radiator/water pipes, drains and electrical wirings.

4.3.5 Measure the resistance (The second time)

Please refer to 4.3.2

Perform insulation resistance test, heating cable resistance test, and the sensor resistance test with multimeter before embedding in mortar.

Important: You must perform the above 3 test before embed the mat in mortar to confirm that the heating cable and temperature sensor haven't been damaged. If it's damaged, please stop installation and ask for repairing by professional electrician or replacing it.

4.3.6 Embed the heating cable in mortar

After laying out the heating cable, and the temperature sensor to the electrical junction box, apply a 5/8 inch acrylic or latex modified thin-set over the cable. Be sure to use the flat side of the trowel to avoid any damage to cable.

Spread the mortar evenly over the cable filling in all voids between the floors. Once the surface is smooth and even, allow it to cure to hard surface before installing the tile or stone.

 **Important: The system must not be turned on until the thinset cement has fully dried. A minimum of two weeks is recommended.**
If directly on plywood, install a 1/2 inch thick fiber cement backer-board over the subfloor. Then install the cable and lay the tile.
There can't be any insulation above the heating element or tile/stone.

4.3.7 Measure the resistance (The third time)
Repeat the insulation resistance test, heating cable resistance test and the sensor resistance test after embedding in mortar.

 **Important: You MUST repeat the above 3.2.6 test to ensure that the heating cable and temperature sensor have not been damaged. If it's damaged, please stop installation and ask for repairing by professional electrician or replacing it.**

4.3.8 Install tile or stone
To install tile or stone, apply a layer of acrylic or latex modified thin-set using the ridged side of your trowel. Tile and grout the floor using best industry practices and in accordance with instructions provided by the manufacturer of the tile or stone.

 **Important: Don't power the floor warming system until the thin-set and grout are fully cured.**

4.3.9 Measure the resistance (The fourth time)
Note: You MUST repeat the above 3 test to ensure that the heating cable and temperature sensor have not been damaged.

4.3.10 Install the thermostat

The installation of the thermostat must be done by a qualified electrician in accordance with the national electrical regulation. The electrician should connect the floor sensor to the thermostat, take the final resistance reading and record it on the warranty card.

All work MUST conform to the current national and local rule, always follow the manual, for any doubt, please consult an electrician qualified.

4.3.11 Program the thermostat
You may program thermostat to obtain the best comfort as well as the optimal energy consumption, following our advice for your reference.

*In bathrooms, a thermostat with a floor sensor is most commonly used and set the desired floor temperature, the comfort temperature can be set in range 86F to 104F(30-40℃).

*In living rooms or similar, and air thermostat will bring the best control of heat output. Proportional regulators give a very constant and even temperature in the room and on the floor surface. Normally the floor temperature is restricted to 79F (26℃) approx. by design for direct acting systems, and somewhat higher for short periods for storage systems.

*With experience you should be able to reduce the room temperature a few degrees compared to conventional convective heating systems, without reducing the comfort feelings

Important: Please refer Tempson Thermostat Installation & Program Manual for the description of step 4.3.11 and 4.3.12.

5 Commissioning your system

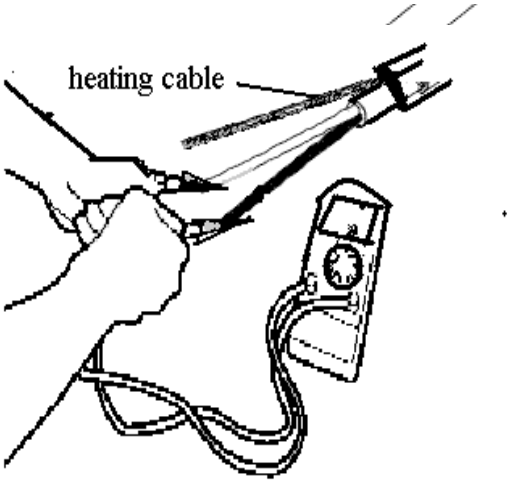
Important: For the extended 10-year limited warranty to apply, you must perform the following tests, record the results on the warranty card, and retain a copy of the record.

You must perform the Insulation Resistance Test, the Heating Cable Resistance Test, and the Sensor Resistance Test three times (Please refer to section 4 Installation) during the installation process.

5.1 Insulation Resistance Test

This test ensures that the insulating jackets of the cable are not damaged. A low value indicates the cable has been damaged and must be replaced.

1. Connect the power wires and the ground wire (twisted copper) to each lead of the multimeter.
2. Make sure the meter reads “Open” or “OL.” The reading should be 10% (plus or minus) of the value in the table. If you get a different reading, contact TEMPSON at 800-868-8680.
3. Record these readings on the warranty card.



5.2 Heating Cable Resistance Test

This test measures the resistance of the Tempson heating cable and is used to determine circuit integrity.

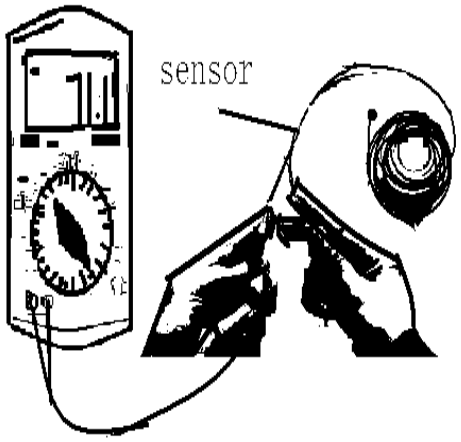
1. Set your multimeter to the 200 or 2000 ohm range.
2. Place one of the meter’s leads on each of the cable’s conductors.

3. Compare this resistance reading to the resistance specified in the Product Selection ‘Table 1 or Table2’’. The value should be within ±10%. If you get a different reading, contact TEMPSON at 800-868-8680.
5. Record these readings on the warranty card.

5.3 Sensor Resistance Test

If the sensor is disconnected or short-circuited, the heating system is turned off. So measure the resistance of the floor sensor to verify the sensor integrity.

1. Set your multimeter to the 200K ohm range.
2. Connect the mutimeter leads to each of the lead wires.
3. Make sure the meter reads between 9-25K ohms. If you get a different reading, contact Temspon AB.
4. Record these readings on the warranty card.



6. Troubleshooting

Symptom	Probable Causes	Corrective Actions
Floor doesn’t heat	No voltage.	Check circuit breaker.
	Circuit breaker tripped.	Ensure that there are not too many mats or other appliances connected on the same circuit. The TEMPSON Cable may require a dedicated circuit. See the Product Selection “Table 1 or Table 2” of this manual.
	Ground-fault tripped in the thermostat.	Refer Tempson Thermostat Installation and Program Manual
	Thermostat not turned	Refer the manual section 4, and Tempson Thermostat Installation and Program Manual.
	Cable not connected to Thermostat	Refer Tempson Thermostat Installation and Program Manual
	Floor temperature sensor not connected	Refer Tempson Thermostat Installation and Program Manual

Floor doesn’t heat	No voltage.	Check circuit breaker.
	Circuit breaker tripped.	Ensure that there are not too many mats or other appliances connected on the same circuit. The TEMPSON Cable may require a dedicated circuit. See the Product Selection “Table 1 or Table 2” of this manual.
	Ground-fault tripped in the thermostat.	Refer Tempson Thermostat Installation and Program Manual