AFMAT System
Installation Manual

Floor heating System

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Important Safeguards and Warnings

⚠ WARNING: Shock and fire hazard

If the AFMAT 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.

· 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 AFMAT 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 AFMAT 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

Installing AFMAT mats is very easy to do.AFMAT Floor warming mat Systems combine the highest comfort levels with maximum energy efficiency. It's a proven technology that's safe, reliable and energy efficient.This manual describes the AFMAT floor heating system — how to design the room, select the product, and install the system. It is important to thoroughly review this manual.

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 AFMAT system performs reliably.

Pay special attention to the following:

- Instructions marked  Important
- Safety warnings identified as ⚠ WARNING

1.3 Remember to measure resistance

The resistance should be measured between the two conductors, blue and brown. Compare this resistance reading to the resistance specified in the Product Selection "Table 1 or Table 2". The value should be within -5% to +10%.

Also, measure the resistance between the blue , brown and yellow green ground wire. Both should read infinity.

Please refer to "5 Commissioning" for instructions on how to measure the resistance.

 **Important: measure the resistance four times during the installation process**

Remember to always measure, verify and record the actual resistance throughout the installation process (out of the box, after installation and after installation of wood floor).

2 AFMAT System

2.1 AFMAT Specifications

Cable Construction:	Twin conductor
Rated Voltage:	230V
Output:	80W/m^2 & 140W/m^2 & 150W/m^2
Cable spacing:	50mm
Cable Diameter:	1.0mm
Conductor Insulation:	fluoropolymer
Max. Ambient Temp.:	85℉(30℃)
Min. Installation Temp.:	40℉(5℃)
Cold lead	2-wire plus ground braid; 3.0m length

2.2Thermostat Specifications

Functions:	On/Off control, digital display, 7-day programmable
Supply Voltage :	120/240 V ±15%, 50/60 Hz
Maximum switching current :	16 Amp
Temperature control range :	40 to 104°F (5 to 40°C)
Ambient range :	32 to 104°F (0 to 40°C)
Floor temperature sensor :	2-wire, 3.0m lead wire

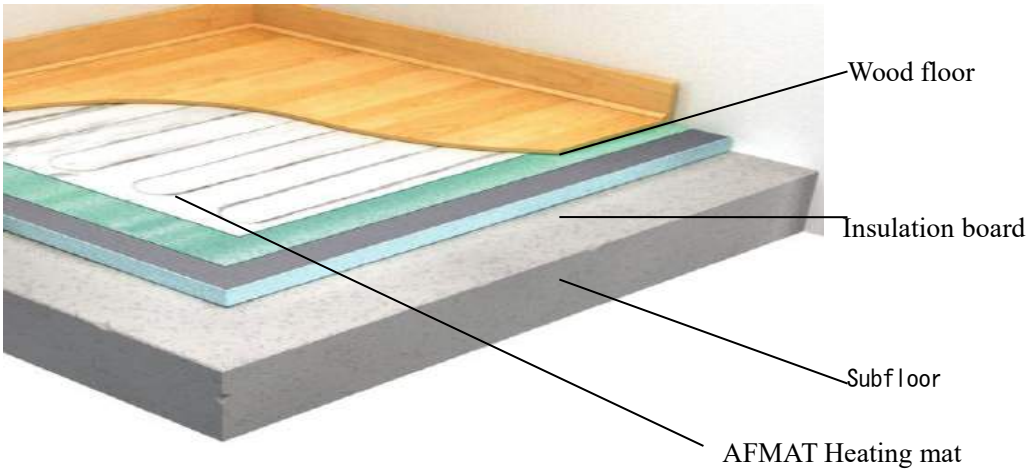
2.3 AFMAT typical installations and applications

Warwarning

Consult the manufacturer for information on special installation requirements for wood, laminate and vinyl or linoleum flooring.

Important

· Read the instructions carefully before installing AFMAT system.



· Remember to measure the resistance three times.
· Only for indoor installation. Do not install AFMAT in walls or ceilings.
· The minimum installation temperature is 5℃.
· The heating cable cannot be cut to length, crossed over itself, or installed too close.
· It is recommended to use copper wire only.
· Remember to check that the supply voltage matches the voltage of the AFMAT.
· Remember to place the labels as written in this instruction.
Please consult the factory for any other questions or advice.

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 there 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 8.75 m^2. When you subtract the area of the vanity, shower and toilet, the total heated area is only 6.45 m^2.

Step 2: Determine the power supply voltage

Make sure the supply voltage was 230 V.

Step 3: Plan the design

Determine the optimum floor heating mat 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 3.0m cold lead on the AFMAT, and the 3.0m floor temperature sensor. Please refer to Figure 4.

Important

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

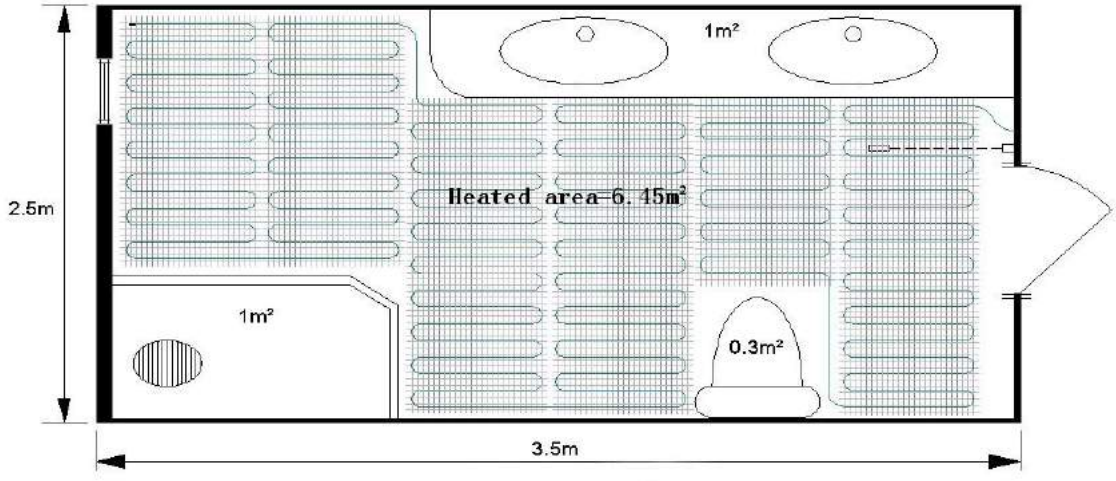


Figure 3: Heated area example

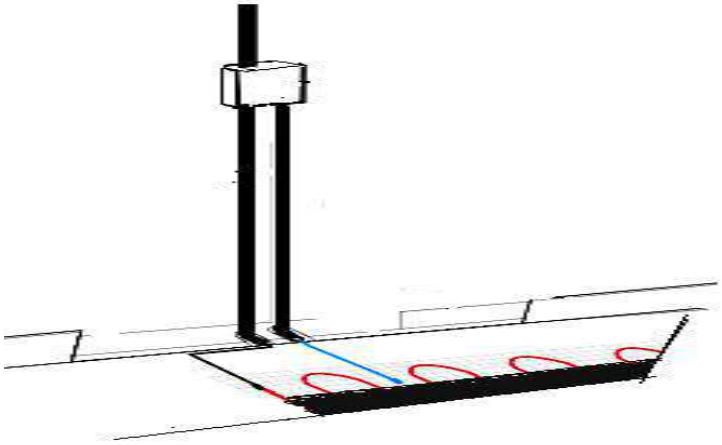


Figure 4: Typical cold lead and floor

3.2 Confirm Your Product Selection

Confirm that your AFMAT is no larger than the heated area. Following the example from Figure 3, if the heated area is 6.45 m^2, select the 6.0 m^2 AFMAT system.

Table 2:AFMAT Product Selection

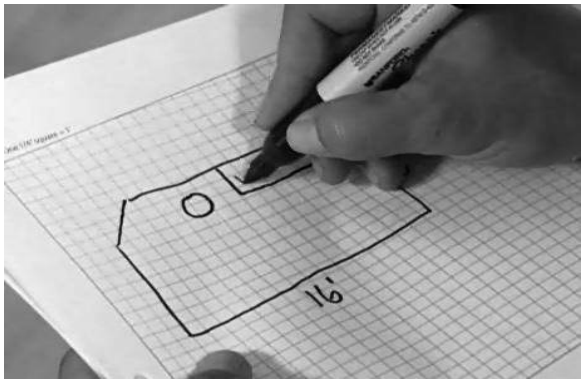
230V	Heated Area		Mat Dimensions		Watts (140W/m^2)	Amps	ohms
Catalog Number	m^2	sq.ft.	M*m	in.*ft.			
AFMAT/140-140-1.0	1.0	10.8	0.5*2	20*6.6	140	0.61	377.9
AFMAT/140-210-1.5	1.5	16.1	0.5*3	20*9.9	210	0.91	251.9
AFMAT/140-280-2.0	2.0	21.5	0.5*4	20*13.1	280	1.22	188.9
AFMAT/140-350-2.5	2.5	26.9	0.5*5	20*16.4	350	1.52	151.1
AFMAT/140-420-3.0	3.0	32.3	0.5*6	20*19.7	420	1.83	126.0
AFMAT/140-490-3.5	3.5	37.7	0.5*7	20*23.0	490	2.13	108.0
AFMAT/140-560-4.0	4.0	43.1	0.5*8	20*26.3	560	2.43	94.5
AFMAT/140-630-4.5	4.5	48.4	0.5*9	20*29.5	630	2.74	84.0
AFMAT/140-700-5.0	5.0	53.8	0.5*10	20*32.8	700	3.04	75.6
AFMAT/140-840-6.0	6.0	64.6	0.5*12	20*39.4	840	3.65	63.0
AFMAT/140-980-7.0	7.0	75.3	0.5*14	20*45.9	980	4.26	54.0
AFMAT/140-1120-8.0	8.0	86.1	0.5*16	20*52.5	1120	4.87	47.2
AFMAT/140-1260-9.0	9.0	96.9	0.5*18	20*59.1	1260	5.48	42.0
AFMAT/140-1400-10	10	107.6	0.5*20	20*65.6	1400	6.09	37.8
AFMAT/140-1540-11	11	118.4	0.5*22	20*72.2	1540	6.70	34.4
AFMAT/140-1680-12	12	129.2	0.5*24	20*78.8	1680	7.30	31.5

4 installation

Important: Tools and materials required

You will require the following items to install and test the floor heating system:

- Scissors
- Utility knife
- Wire strippers
- Tape measure
- Screwdriver
- Multimeter
- Aluminum tape
- Aluminum foil glass fiber tape



You will also need the appropriate tools and materials to install your particular floor. These will likely include products like self-leveling mortar, thin-set mortar, backer board, a notched trowel, wood flooring， and any other tools for your specific floor.

Follow these steps to ensure a successful AFMAT installation.

Step 1: PLAN LAYOUT

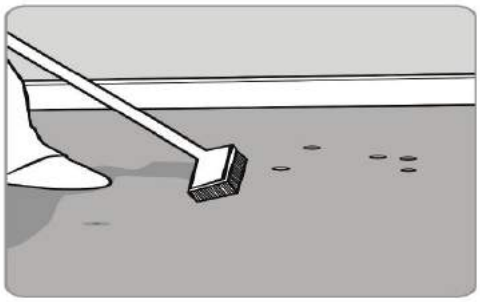
Make a sketch layout or a floor plan of the room; include all permanent furnishings such as toilets, bathtubs, appliances, cabinetry, etc. The first step is to calculate the coverage of heating mat that you require. Although 100% coverage is achievable we would recommend allowing a border of between 2 and 4cm around the edge of the room. Calculate the internal dimensions (skirting board to skirting board) of your room and deduct 2cm from these. Using these amended dimensions sketch out a diagram of your room and calculate the total area that you have. Indicate all dimensions required to determine the available floor area and the position of the thermostat. We would recommend spending ten minutes sketching this out as it can save you a lot of time during the installation process if you have a plan.

Important

We recommends that the installation is documented with photos to note the location of connections and the sensor.

Step 2: PREPARE SUBFLOOR SURFACE

The Foil heater must not be installed in thinset cement, or in direct contact with a cement or concrete sub-floor. There must always be a soft insulation / underlay beneath the aluminum heating mat/s. Carefully inspect the subfloor and make sure it is clean, free of sharp edges, protruding nails and any other materials that may damage the heating mat. Clean and vacuum the floor thoroughly and remove dust and debris from the floor that may damage the heating cable. Ensure that the subfloor is



secure and stable. Carefully fill in all cracks .

Step 3: LAY THE INSULATION BOARD

Use XPS insulation board directly underneath the heating mat/s, install the boards in a brick pattern below and tape the edges to prevent movement of the underlay during installation.

Step 4: TRANSFER LAYOUT TO FLOOR

Draw an outline of the layout on the room floor including a foot print of all furnishings that are not yet installed. Unroll the first few feet of the AFMAT. The starting point of the cable must be placed within 2.5m from the thermostat.

Important

Mark the position of the connection point between the power lead and the AFMAT heating cable. This connection must be concealed in thin set or self-leveling cement. When using a floor temperature sensing thermostat, mark the sensor position in the middle of heating cables, about 25cm away from the wall (within the heated area), as close as possible to the thermostat.

Step 4: INSTALL SENSOR

If using a floor temperature sensing thermostat, install the sensor now, either in conduit tube, or directly to the subfloor. It is recommended that the sensor be installed in conduit tube. This will allow the sensor to be easily replaced in the unlikely event of failure.

The tube needs to be installed between the thermostat wall box and the sensor position. The conduit tube must be partially countersunk into the insulation board. Run the probe wire down inside the conduit until it just appears from the end of the conduit. Cut a channel approximately 2cm deep × 2cm wide in the floor and wall up to the thermostat for the sensor conduit. The conduit has to go from the thermostat and minimum of 25cm away from the wall towards the middle of the floor. The sensor cable should run back up to the thermostat position, the 2 core cable should be connected to the thermostat in the correct terminals.

Important

The sensor conduit must be centered in the cable loop (between two heating wires).

Use duct tape to close the end of the conduit so that thinset can't penetrate the conduit.

Use duct tape to hold the sensor conduit into the groove to prevent it from floating up when the mortar or thinset is poured.

If the sensor is installed directly in the mortar bed, use duct tape to secure to subfloor.

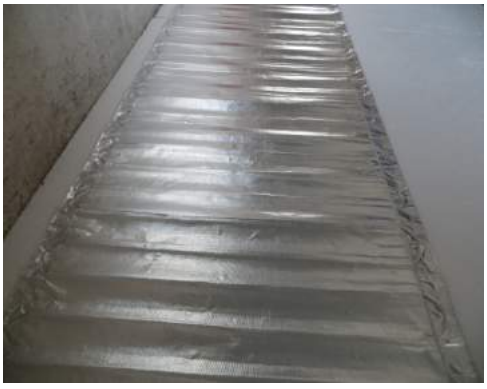
Step 5: MEASURE THE RESISTANCE (THE FIRST TIME)

Once the insulation has been installed, remove your AFMAT from the packaging box, carry out a resistance test. Use a digital ohm meter to measure the resistance of the AFMAT and compare it to “Table1 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 blue , brown and yellow green ground wire. Both should read infinity.

Step 6: BEGIN LAYING THE AFMAT

An adhesive has been added to the bottom of the mat which will prevent the mat from moving during installation. Start by placing the mat such that the connection point and the temperature sensor are in their intended positions and bring the power cable to the thermostat or connection box.

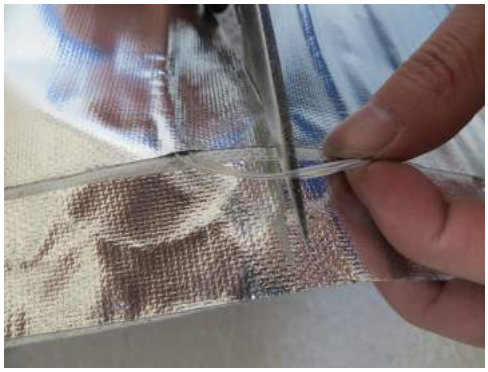


Begin unrolling the AFMAT evenly across the floor outside the areas that you marked previously. When you reach the next wall, cut the mesh, turn the mat, and begin rolling in the desired direction.

Ensure that the AFMAT is in full contact with the insulation borad at all times. Avoid walking on the heating mat. If this is not possible,

use shoes with soft soles.

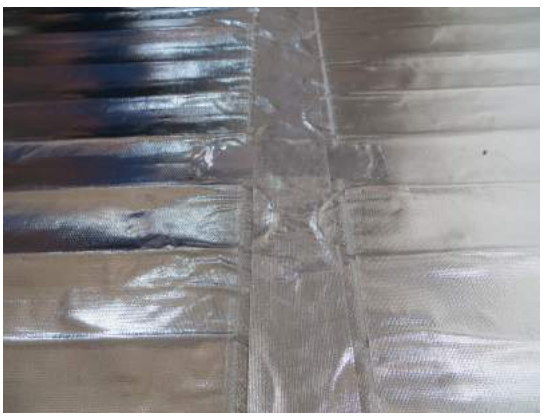
When approaching obstacles (toilets, cabinets, etc.) carefully remove some of the heating cable from the mat and lead the cable around the obstacle. In some cases pieces of the mesh will be cut away entirely. **Remember to never cut the cable.** Use hot melt glue or a thin strip of tape to secure the loose cable to the floor. **It is highly recommend to take photographs of the installed AFMAT before installing the flooring.**



NEVER CUT THE HEATING CABLE!

Step 7: STICK THE CONNECTING TAPE.

In order to protect the mat from damage, we need some necessary protective measures. A roll of Aluminum tape and Aluminum foil glass fiber tape is necessary. Firstly, we shearing about 10 cm long aluminum foil tape, as shown in figure ,Stick the aluminum foil tape connection cut open the net effect is to form an integral part of the earth. About stick tape half a meter at a time. Secondly ,along the direction of the aluminum foil mesh stick the aluminum foil glass fiber tape. Pay attention to, keep flatness, stick outside too. The role is to protect hot line damaged in the installation process.

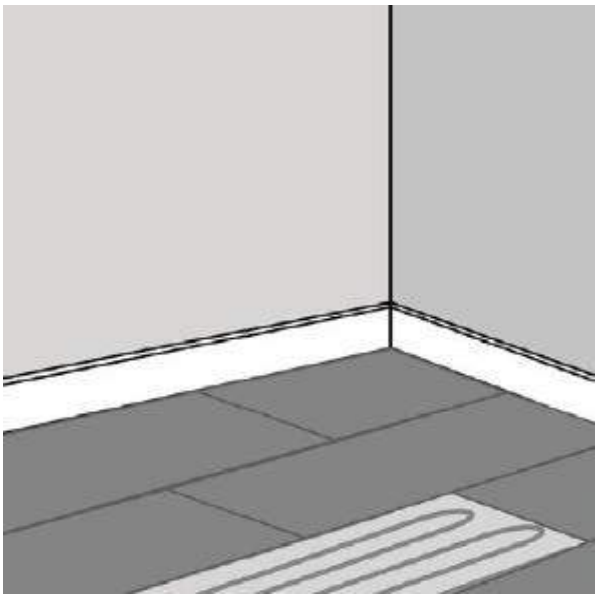


Step 7:MEASURE THE RESISTANCE (THE SECOND TIME)

Please refer to Step 5.

Step 8: INSTALL WOOD FLOOR COVERING

ENSURE THAT THE SENSOR CONDUIT HAS BEEN PROPERLY INSTALLED BEFORE PROCEEDING (see Step 3).



Before fitting the floor covering switch on the heating mat to check that it is working - warmth should be noticeable on the surface of the heating mat within minutes. You are now ready to lay the final floor finish. Take care not to damage the heating mats. Do not drive nails or screws into the floor or cut the floor panels on top of the heater.

Important

If the floor is not being laid immediately, all heating mats must be protected with cardboard to prevent damage. Immediately prior to the floor being laid, test the heating mat to ensure it has not been damaged.

Step 9: CONNECT POWER SUPPLY AND THERMOSTAT

The connection of the power supply and the thermostat must be done by a qualified electrician. The electrician should connect the floor sensor to the thermostat, take the final resistance reading and record it on the warranty card, see Step 11.

Note: You need to mark the appropriate circuit breaker reference label indicating which branch circuit supplies the circuits to those electric space heating cables.

Step 10: MEASURE THE RESISTANCE (THE FOURTH TIME)

Please refer to Step 5.

Step 11: RECORD INFORMATION AND AFFIX LABELS

It is important for the homeowner to mail in the certificate immediately after installing the system (cable and thermostat). Failure to do so could void the manufacturer's warranty. The warranty is subject to the guarantee conditions listed on the warranty certificate.

Keep a copy of the warranty card for your reference.

Step 12: ENJOY THE COMFORT OF AFMAT

The AFMAT heating system is now ready to use. Increase the floor temperature gradually and adjust it until it reaches a comfortable level depending on the type of room and your personal preferences.

5 Commissioning

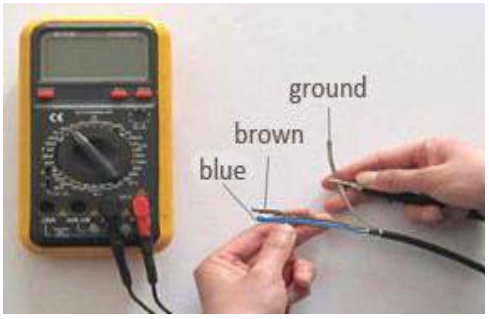
Important

For the extended 15-year limited warranty to apply, you must perform these 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 four times (Please refer to 4 installation) during the installation process.

5.1 Insulation Resistance Test

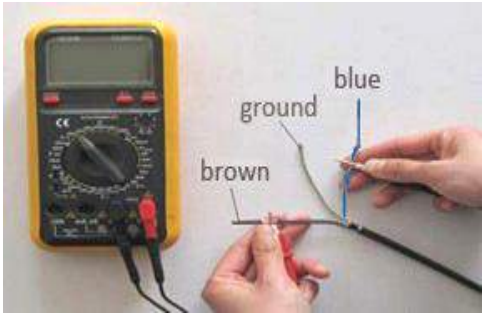
This test ensures that the insulating jackets of the mat are not damaged. A low value indicates the cable has been damaged and must be replaced.



1. Connect the ground wire to the black lead and both power wires to the red lead of the multimeter.
2. Make sure the meter reads “Open” or “OL.” Record these readings on the warranty card.

5.2 Heating Cable Resistance Test

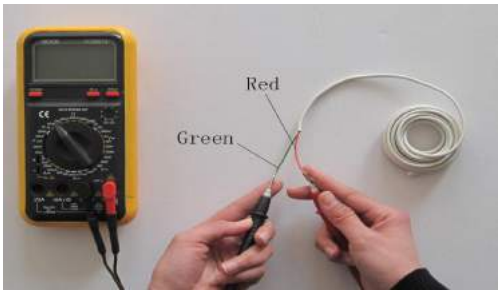
This test measures the resistance of the MinimatD and is used to determine circuit integrity.



1. Set your multimeter to the 200 or 2000 ohm range.
2. Connect the multimeter leads to the black and white cold lead wires.
3. Compare this resistance reading to the resistance specified in the Product Selection “Table 1 or Table 2”. The value should be within -5% to +10%.
4. Record these readings on the warranty card.

5.3 Sensor Resistance Test

This test measures the resistance of the floor sensor and is used to verify the sensor integrity.



1. Set your multimeter to the 200K ohm range.
2. Connect the mutimeter leads to the red and green lead wires.
3. Make sure the meter reads between 9-25K ohms.
4. Record these readings on the warranty card.

6 Troubleshooting

Symptom	Probable Causes	Corrective Action
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 AFMAT may require a dedicated circuit. See the Product Selection "Table 1 or Table 2" of this manual.
	Ground-fault tripped in the thermostat.	Refer to Thermostat Installation and Operation Manual.
	Thermostat not turned on.	Refer to Section 4 of this manual, and the Thermostat Installation and Operation Manual.
	Cable not connected to thermostat.	Refer to Thermostat Installation and Operation Manual.
	Floor temperature sensor not connected.	Refer to Thermostat Installation and Operation Manual.
	Faulty sensor.	
Floor warm all the time	Clock not set correctly.	Refer to Thermostat Installation and Operation Manual
Floor not warm enough	thermostat setting not set correctly.	Refer to Thermostat Installation and Operation Manual.
Installation instructions not available		

7 Installation Plan Layout

To ensure the validity of your guarantee and the compliance to the 17th Edition wiring (BS7671:2008) please provide a plan layout of your underfloor heating installation. This sketch should be left next to the distribution board of the heating system together with thermostat user instructions,

Part 1 - To be completed by the cable mat installer

What is the product code(s) of the heating mat installed? ----------
What are the room dimensions? ----------
What is the heated area? ----------
Have you marked the position of the junction box on the sketch? ----------
Have you marked the position of the thermostat box on the sketch? ----------
Have you marked the position of the floor probe on the sketch? ----------
Have you marked the position of the cable turns? ----------

Part 2 - To be completed by the Electrician

What is the measured resistance of the installed heating mats (Ohms)?
Mat 1 ---------- Mat 2 ---------- Mat 3----------
What is the total measured resistance of the mats connected in parallel (Ohms)?----------
What is the RCD rating (ma)? ---------- (30Ma)
What is the rated voltage (V)? ----------
What is the total power of the installation (W)? ----------
What is the insulation resistance (ohms)? ----------
What was the test voltage used (V)? ----------(30mA 230V)