

# Foil Mat System Electric Floor Heating

## Installation Manual

### Important Safeguards and Warnings

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 electric shock. The guidelines and instructions contained in this guide are important. Follow them carefully to minimize these risks and to ensure that the Heating Mat system performs reliably.

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

Pay special attention to the following:

Instructions marked **!** IMPORTANT

Safety warnings identified as **!** WARNING

- An appropriate thermostat must be used to control the Heating Mat.
- 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 systems and the hazards involved. The installation must comply with The 18th Edition IET Wiring Regulations (BS 7671:2018) and subsequent amendments. All new electrical installations will need to comply with BS 7671:2018. If you are unfamiliar with these requirements, contact a qualified and authorised electrician.
- The heating cable 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 the initial installation or during subsequent floor repairs in the future.
- If the heating cable system is damaged, it must be replaced or repaired by a specialist company.
- De-energize all power circuits before installation or servicing.
- Keep the ends of heating devices and kit components dry before and during installation:
- The conductive layer of this heating device must be connected to a suitable grounding/earthing terminal. Consult a qualified Electrician for information.
- A ground fault protection device must be used with this heating device. Consult a qualified Electrician for information on appropriate devices.
- Radical Heating Solutions products utilize the constant wattage series resistance heating cables and cannot be shortened in any way.
- The heating portion of the heating device must not touch, cross over, or overlap itself and cannot be used over any combustible material.
- The heating cable must not extend beyond the room or area in which it originates.
- The heating mat is not to be installed in walls.

## 1. General Information

### 1.1 Use of the Manual

This manual describes the foil mat heating floor system and how to design the layout of heating cable, select the product, and install the system. It is important to thoroughly review this manual and the Thermostat Installation and Operation Manual prior to installation.

For additional information regarding any aspect of the heating mat system, please contact your supplier.

**! IMPORTANT**

For the Radical Heating Solutions warranty and agency approvals to apply, the instructions that are included in this manual and product packages must be followed.

## 1.2 25-year Limited Warranty

The floor heating system standard limited warranty is 25 years from the date of purchase. The warranty will only be valid if the warranty document enclosed with the product is correctly filled in and returned to the address shown on the warranty document.

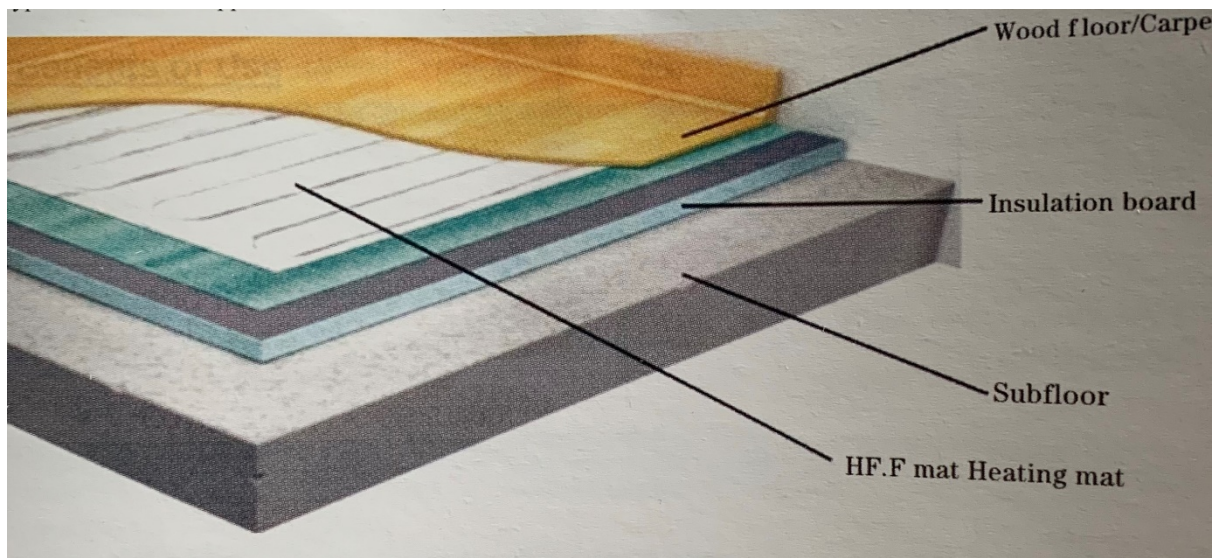
## 2. Heating Mat System

### 2.1 System Description

The heating mat system is design for installation onto a stable substrate with either a cushioned underlay or a non-cement faced XPS insulation board.

Typical installation application see below:

**\*\*\*\*\*CAN WE GET THIS REDRAWN AND REMOVE HF.F MAT REFERENCE??\*\*\*\*\***



The system includes a roll of aluminium foil mat with heating cable in between, the heating cable spacing is approximately 50mm.

The cold lead is a black non-heating cable that runs in to the wall and connects the system to the thermostat and electrical supply.

The thermostat is not included in with the mat. For recommend thermostat requirements please refer to Section 6.

Heating Cable:

Cable Construction:	Dual Heaters
Heaters:	CuNi, TR and NiCr
Insulation:	Fluoropolymer
Shield:	Aluminum Foil
Grounding Wire:	Aluminum Foil
Power Output:	150 W/m <sup>2</sup>
Resistance Tolerance:	+10/-5 %

Cold Lead:

Conductor:	3
Length:	2.5m
Colour:	Black

Mat:

Colour:	All
Width:	0.5m

## 2.2 Product Specification

Products technical parameters are listed in the following table,

Items	Data
Operating Voltage:	230 Vac
Power Output:	150 W/m <sup>2</sup> nominal
Cable Spacing:	50 mm
Maximum Ambient Temperature:	30°C
Minimum Installation Temperature:	5°C

## 2.3 Products Types

Mats cover the heated area from 1.0 m<sup>2</sup> to 12.0m<sup>2</sup> or multiple mats to fit the area to be heated. Each Mat is 230 Vac voltage rated.

Naming scheme: RADEF means Foil Mat xx - yy

xx means the output per square meter - 150=150W/m<sup>2</sup>

yy means the heated area - 1.0=1.0 square meter.

CODE	HEATED AREA	MAT DIMENSIONS	WATTS (150w/m <sup>2</sup> )	Rated Voltage/VAC	Resistance (Ohms)
	m <sup>2</sup>	mxm			
RADEF15010	1.0	0.5 x 2	150	230	352.67
RADEF15015	1.5	0.5 x 3	225	230	235.11

RADEF15020	2.0	0.5 x 4	300	230	176.33
RADEF15025	2.5	0.5 x 5	375	230	141.07
RADEF15030	3.0	0.5 x 6	450	230	117.56
RADEF15035	3.5	0.5 x 7	525	230	100.76
RADEF15040	4.0	0.5 x 8	600	230	88.17
RADEF15045	4.5	0.5 x 9	675	230	78.37
RADEF15050	5.0	0.5 x 10	750	230	70.53
RADEF15060	6.0	0.5 x 12	900	230	58.78
RADEF15070	7.0	0.5 x 14	1050	230	50.38
RADEF15080	8.0	0.5 x 16	1200	230	44.08
RADEF15090	9.0	0.5 x 18	1350	230	39.19
RADEF150100	10.0	0.5 x 20	1500	230	35.27
RADEF150120	12.0	0.5 x 24	1800	230	29.39

### 3. Floor Heating Design and Product Selection

#### 3.1 Design the Installation

> Step 1: Confirm the power supply voltage.

Rated supply power voltage includes 230Vac.

> Step 2: Measure the heated area

Determine the area of the floor to be heated. The heated area is the area of the floor where there are no permanent fixtures or furniture such as toilets, vanities, or cabinets. It is recommended that a distance of 50mm be maintained from the edge of the room wall and the heating mat as this allows space for any radiator pipes and other types of obstructions.

> Step3: Plan the design

Determine the optimum floor heating mat layout for your heated area to ensure proper coverage. Select a location for the thermostat on the wall above the heated area where it can be reach the 2.5m cold lead on the Foil Mat, and the 3.0m floor temperature sensor. Thermostats provided by Radical Heating Solutions are supplied with a 3.0m sensor cable. Other suppliers/manufacturers may offer different cable lengths.

#### ! IMPORTANT

The predetermined mat spacing must be maintained to ensure correct floor heating, failure to adhere to this may result in the floor having cold spots.

If the area of the floor is larger than the Foil Mat an additional Foil Mat can be used to provide total coverage.

If the area of the floor is smaller than the Foil Mat **DO NOT CUT THE END OFF**, you may be able to adjust the overall fit of the mat or you may need to replace the mat with a smaller size.

#### 3.2 Electrical Installation

## ⚠ WARNING

The electrical installation must be done by a qualified electrician familiar with generally accepted construction techniques and safe electrical practices.

The installation must comply with the 18th Edition IET Wiring Regulations (BS 7671:2018) and subsequent amendments. All new electrical installations will need to comply with BS 7671:2018. If you are unfamiliar with these requirements, contact a qualified and authorized electrician. This is very important to avoid any risk during the installation and using the system.

### Step 1: Confirm the power supply voltage

The heating mat must be connected to an appropriately sized electrical circuit. Confirm the power supply is 230Vac first. All of the Heating Mats as noted in the table in section 2 can be connected to a 13amp RCD/Spur unit and controlled by a Thermostat with a 16A load connection.

If multiple mats are required for the room to be heated and the load exceeds 13 Amps, then a suitably current rated contactor must be used. Where this occurs then seek the advice/service of a qualified electrician.

### Step2: determine the maximum circuit area for the mat

Determine the area of the floor to be heated. The heated area is the area of the floor where there are no permanent fixtures or furniture such as toilets, vanities, or cabinets. It is recommended that a 50mm gap from all perimeter walls/skirtings to the Mat be maintained.

### Step3: Install electrical junction box

Install the Junction box for the thermostat at a suitable height usually 1.5m above the floor and within reach of the cold lead and the floor temperature sensor typically.

### Step4: Chase the wall from the thermostat and connection box

Chase the floor under the electrical junction box location, you will use this to route the cold lead and the temperature sensor wire to the electrical junction box.

## 3.3 Confirm Product Selection

Recheck the voltage, heated area and layout. Ensure the mat you have is correct for your application. Confirm that your Heating mat is not larger than the area to be heated. If you have any questions please contact your supplier.

## 4. Installation

### 4.1 Tools and Materials preparation

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

- Scissors
- Utility knife
- Cable cutter/strippers
- Tape measure
- Screw driver
- Aluminum tape
- Multimeter

You will also need the appropriate tools and materials to install your particular floor. These will likely include products like insulation board, backer board, final floor covering, and any other tools for your specific floor.

Follow these steps to ensure a successful Heating mat installation.

Prior to any installation, consideration should be given to employing a qualified and experienced trades person. This will ensure the Heating Mat is installed correctly and in accordance with Building and Electrical regulations. Our warranty does require confirmation that the Heating Installation has been tested and an industry recognised test certificate prepared by a qualified Electrician.

## 4.2 Installation Step by Step

### Step 1: Plan Layout

Make a sketch layout or a floor plan of the room. Include all permanent furnishings such as toilets, 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 50mm around the edge of the room. Calculate the internal dimensions (skirting board to skirting board) of your room and deduct 50mm 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**

Radical Heating Solutions recommends that the installation be documented with photos to note the location of connections and the sensor.

### Step 2: Prepare subfloor surface

The foil heating mat must NOT be laid in thin set cement, or be in direct contact with a cement or concrete subfloor! 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.

### Step 3: Lay the insulation board

Use XPS insulation board directly underneath the heating mat(s), install in a brick pattern 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 section of the heating mat. The starting point of the cable must be placed within 2.5m from the thermostat.

If using a floor temperature sensing thermostat, install the sensor now in a 16mm flexible conduit. It is recommended that the sensor be installed in conduit. This will allow the sensor to be easily replaced in the unlikely event of failure. The sensor and/or conduit 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 by 2cm wide in the floor and wall, up to the thermostat to countersink the conduit. The conduit needs to run from the thermostat and a minimum of 25cm from the wall towards the middle of the floor. The sensor cable can now be run back to the thermostat and connected in to the correct terminals.

The sensor conduit must be located in the cable loop between two heating wires.

Use duct tape to seal the end of the conduit to protect the sensor.

#### **! IMPORTANT**

Mark the position of the connection point between the power lead and the Heating mat. When using a floor temperature sensing thermostat, mark the sensor position in the middle of 2 heating cables, about 25cm away from the wall (within the heated area), and as close as possible to the thermostat.

#### Step 5: Measure the resistance

Once your insulation has been installed, carry out a resistance test on the Foil mat. Use a digital ohmmeter to measure the resistance of the heating mat and compare it to the table in section 2.3 (Products Types), and record the measured resistance on the warranty card.

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

#### Step 6: Begin Laying the heating mat

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 Heating mat evenly across the floor outside the areas that you marked previously. When you reach the next wall, cut the foil, turn the mat, and resume rolling it out in the desired direction.

Ensure that the Heating mat is in full contact with the insulation board at all times.

Avoid walking on the heating mat, if this is not possible use shoes with soft soles.

Remember to never cut the cable.

It is highly recommended to take photos of the installed Heating mat before installing the flooring. Measure the heating cable resistance once the heating mat installation is complete. The readings



must be identical to those readings taken before installation commenced. If there is a difference then the mat has been damaged during installation and needs to be replaced.

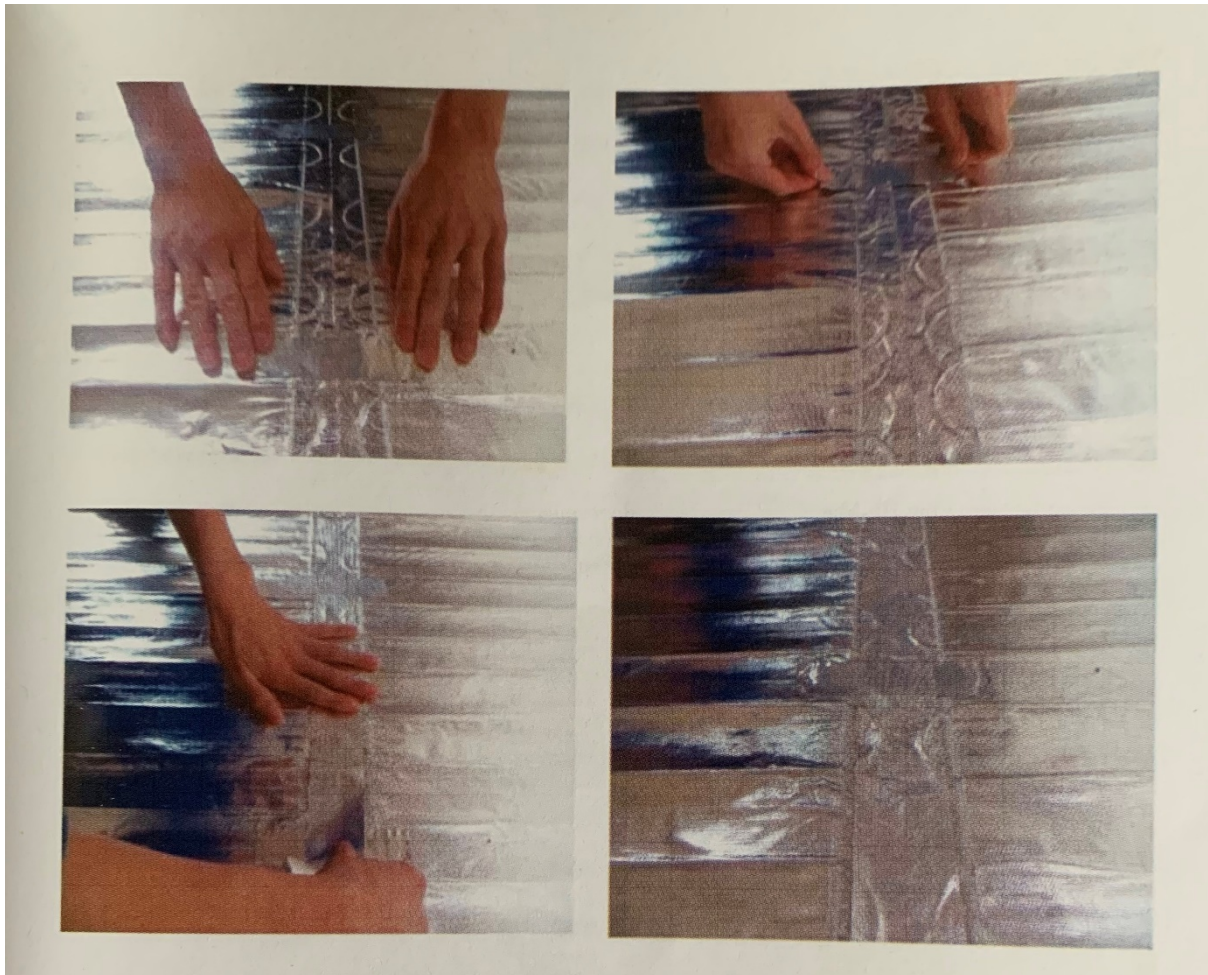
**! IMPORTANT**

**NEVER CUT OR SHORTEN THE HEATING CABLE!**

**Step 7: Stick the connecting tape**

In order to protect the mat from damage, necessary protective measures must be taken. A roll of aluminum tape is required. Firstly cut about 10cm of aluminum foil tape, and stick the tape to both lengths of the foil mat to form an integral part of the earth. Only stick the tape half a metre at a time.

Measure and record the resistance.



**Step 8: Install the floor covering**

**! IMPORTANT**

**ENSURE THAT THE SENSOR CONDUIT HAS BEEN PROPERLY INSTALLED BEFORE PROCEEDING.**



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 screws into the floor or cut the floor panels on top of the heater. When installing carpet select an underlay and carpet that has a total tog rating not exceeding 2.5.

### **! IMPORTANT**

If the floor is not being laid immediately, all heating mats must not 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 the power wires to 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.

#### Note:

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

#### Step 10: Test resistance as described in section 5 of this manual and record.

#### Step 11: Record information and affix labels

It is important for the warranty document to be sent in immediately after installing the system (both the cable and thermostat).

The warranty is subject to the guarantee conditions listed on the warranty certificate. Please keep a copy of the warranty document for your reference.

#### Step 12: Enjoy the comfortable warm of heating mat

The Heating mat 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.

### **! IMPORTANT**

For the 25-year limited warranty to apply, you must perform these tests, record the results the on the warranty document, 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 section 4 installation) during the installation process.

## 5. Commissioning:

### 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.

Connect the ground wire to the black lead and both power wires to the red lead of the multimeter.

Measure the insulation resistance.

Record these readings on the warranty card.

### 5.2 Heating Cable Resistance Test

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

Set multimeter to the 200 or 2000 ohm range. Connect the multimeter leads to the brown and blue cold lead wires

The value should be within -5% to + 10% of table in section 2.3.

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.

Set multimeter to the 200K ohm range.

Connect the mutimeter leads to the sensor lead wires.

Make sure the meter reads between 9-25K ohms. Record these readings on the warranty card.

## 6. Thermostat Guide

### 6.1 Recommended Thermostat's Technical

Class A, 5-mA GFCI is required

Supply Voltage: 230Vac,50Hz

Maximum Switching Circuit: 16A

Ambient Set point Range: 5-30 deg. C

Floor Limit Set point Range: 5-40 deg. C

Floor Set point Range: 5-40 deg.C. \*

Floor Temperature Sensor: 2-wire, 2.5m or longer lead wires

Floor Set point Range:

\*For wood floor installations, the maximum set point temperature should be 28 deg. C unless specified otherwise by the wood flooring supplier/manufacturer.

## 7. Troubleshooting

Symptom	Probable Causes	Corrective Action
Floor is not warm	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 Heating mat may require a dedicated circuit
	Ground-fault tripped in the thermostat	Refer to Thermostat Installation and Operation Manual
	Thermostat not turned on	Refer to the thermostat Installation and operation Manual
	Cable not connected to thermostat	Refer to the thermostat Installation and operation Manual
	Floor temperature sensor not connected	Refer to the thermostat Installation and operation Manual
Floor is always warm	Clock not set correctly	Refer to the thermostat Installation and operation Manual
Floor is not warm enough	Thermostat setting not set correctly	Refer to the thermostat Installation and operation Manual

## Warranty

For a period of 25 years from the date of purchase Radical Heating Solutions warrants that the heating mat heating cable is free from defects in material, design and workmanship, The extended

warranty is only valid if the warranty document has been properly completed and posted, and the installation is in accordance with the installation instructions.

The defective heating mat heating cable has to be inspected by or submitted to Radical Heating Solutions or an authorized heating mat dealer. Failure to comply with all of the foregoing will void this extended warranty. Radical Heating Solutions will, when the customer has documented that a defect in the Heating mat was present at the date of delivery, repair or supply a new heating mat at Radical Heating Solutions discretion. All claims shall be made within the extended warranty period. Radical Heating Solutions shall not be liable for any claims made later than twenty five years from date of purchase.

Radical Heating Solutions shall not be liable for any consequential and secondary costs or damages linked to the defect or replacement of the Heating mat. Radical Heating Solutions will be liable for any costs related to the dismantling of defective product and the installation of a new product, however such liability is limited to the amount of five times the initial product costs for each damage/case.

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How to claim this warranty

Contact the company's Customer Service department and provide the following information:

- 1) Nature of the manufacturing defect
- 2) Date of purchase and, if already installed, date of installation
- 3) If Installed, name of electrician and flooring installer
- 4) Resistance readings taken by installer
- 5) Proof of purchase and serial number from product label

Our Customers Services department will provide you with an authorisation number and advise you on the next steps to complete your warranty claim.

Disclaimer:

This warranty gives you specific legal rights and you may also have some legal rights which may vary. Radical Heating Solutions disclaims, and it is as a condition of the sale, that there are no implied warranties.

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