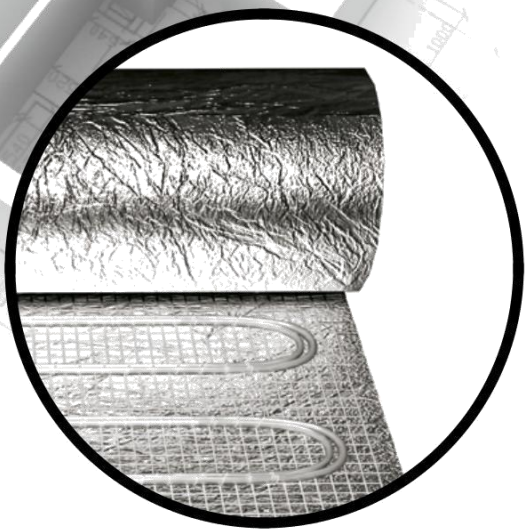
Rayotec

RAYOFLEX UNDERFLOOR HEATING MAT



(Therm)

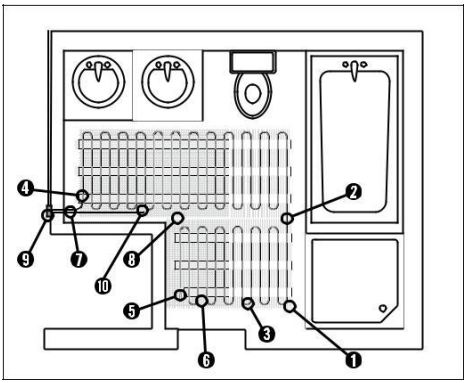
CONTENTS

Thank you for choosing our ultra-thin Rayoflex underfloor heating system. We are pleased to provide you with our product which will bring comfort in your home.

1. GENERAL

Please carefully read this manual before starting the installation of your Rayoflex underfloor heating system. It will ensure a smooth installation process and a correctly installed system. Incorrect installations may damage the system/flooring and will invalidate the product warranty.

This manual gives installation instructions on how to install under common types of wooden floors and carpets. However, as there are so many variations of wooden floors and carpets on the market, it is advised that you contact your flooring manufacturer for advice on installing over underfloor heating. This advice should include suitability of floor covering for underfloor heating, subfloor preparation, insulation, maximum temperature as well as any other general requirements of the manufacturers.



1.1 Heating system terminology

The following terms will appear frequently throughout this manual. Each is graphically illustrated in the diagram below:

❶ **Foil** – Where the heating cable is fixed to.

❷ **Heating Cable** – a specially constructed cable used for heating.

❸ **Heating Mat** – a heating cable fixed to the reinforced foil.

❹ **Coupling Joint** – the connection between the cold cable and the heating cable.

❺ **Cable termination** – the sealed end of the heating cable.

❻ **Distance between cable loops on a heating mat** – the heating cable is fixed to the Foil at set distances ensuring set outputs per m_2.

❼ **Cold cable** – the power cable which feeds the heating cable.

❽ **Heated Area** – the area physically covered by the heating mat.

❾ **Thermostat** – an electronic device which enables the on/off switching of the heating mats. It allows control of the floor temperature and the power supply by means of a temperature sensor.

❿ **Floor Temperature Sensor** – a sensor cable which is connected to the thermostat. It has a temperature-sensitive element for measuring the floor temperature and is laid on the heating mat.

Air Temperature Sensor – an electronic device with a temperature-sensitive element for measuring the air temperature.

2. CAUTIONS

Read these cautions carefully BEFORE you start the installation. You must carefully follow the warnings and instructions in this instruction manual. If the Underfloor Heating System is damaged, not installed properly or has restricted air flow causing thermal blocking then fire or shock could occur resulting in serious personal injuries or damage to property.

Always…
Ensure that all electrical work is executed by a qualified and registered person in accordance with the local building and electrical codes.
Record the mat and sensor resistance readings and location in the Log before and after the installation. This log, illustration and warranty certificate must be returned to validate the warranty. If installed by Rayotec the warranty is automatically valid
Wear soft elastic sole shoes or cover the mat surface with plywood boards or other material to protect the matting from damage.
Pay close attention to the voltage and amperage requirements of the breaker, the control, and the heating mat. See Section 11
Avoid heating mat contact with corrosive, hygroscopic, or flammable material. The heating mat must not be exposed to oil, lubricant, solvent etc or similar substance influence.
Connect the heating mat earth conductor to the earth terminal in the junction box or to the appropriate thermostat terminal.
Install the floor temperature sensor. The sensor must be set at the temperature limitation recommended by the flooring company.
Seek help if a problem arises. If ever in doubt about the correct installation procedure, or if the product appears to be damaged, you must contact the official representative of the Company before you proceed with the installation.
Use casters on furniture where there is little/no air gap between the final floor covering and furniture. This will stop the build up of heat.
Aim to cover at least 80% floor area to achieve primary heating. Please note, high heat loss rooms may require additional heating regardless of high floor area coverage.
Use the foil strip provided to bridge over the heating mat once the Heating Mat has been cut. This will ensure continuation of the earth.
Install Palziv or depron underneath this heating system. It can not be laid directly onto the sub-floor.
Check Suitability of the underfloor heating with the flooring manufacturer.

Never…
Install the mat directly under any flooring that requires latex based self leveling compound, screed or flexible tile adhesive. It can only be used under carpets (not stuck down) and floating wood flooring which are suitable with underfloor heating.
Cut the heating cable. The cold cables may be cut shorter if necessary, but not removed completely.
Attempt to repair the heating cable if damaged. Contact the Company representatives for instructions before you proceed.
Splice one mat heating cable to another to extend the mat. Multiple mats must be connected in parallel via a junction box.
Install one mat on top of another one, or overlap the mat on itself. This will cause dangerous overheating.
Remove the name plate label of the mat power leads.
Install Rayoflex mats in any walls or to heat outdoor areas and stairs.
Put the system ON when the mats are still rolled.
Cover the floor surface where heating cable is installed with any high thermal insulation materials (high tog carpets, rugs, flat based furniture, bean bags, blankets etc) this will cause thermal blocking
Hammer nails, dowels or screws into the floor surface where the heating mat is installed.
Replace the cold leads, breaking sealed coupling connections, made by the manufacturer.
Plug the heating mats to a power supply of a voltage that is different from the operating voltage which is stipulated in the heating mat specification, marking or packaging.
Perform the thermostat installation and/or repairs with the power supply ON.
Do not install the heating cable beyond an expansion joint. If necessary the heating cable should be installed right up to the joint, but do not bridge the joint.
Never bend the heating cables to a radius less than 30mm at the turnings

3. SCOPE OF SUPPLY

This installation manual supports every Rayoflex heating mat for indoor applications only. For a complete system, a thermostat and floor temperature sensor must be installed in addition to the Rayoflex heating mat.

3.1 The Rayoflex Heating Mat

The Rayoflex heating mat consists of a two layers of reinforced aluminium foil and fabric mesh in which the heating conductors are woven into. The heating conductors are electrically insulated by high-quality fluoropolymer insulation.

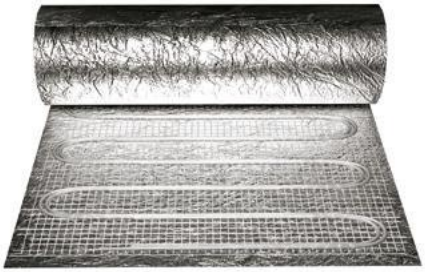
A double core cold lead connects to the heating conductors and is wrapped with a metallic braid. This is connected to the aluminium foil itself and is to be connected to the earth.

The Rayoflex system is suitable for the following final floor coverings:

Laminate	• Max thickness 18mm • Maximum moisture content 8% • **Vinyl laminate must not be used**
Engineered Flooring	• Max thickness 18mm • Maximum moisture content 8%
Hard wood Flooring	• Max thickness 18mm • Maximum moisture content 8%
Hessian Backed Carpet with Carpet Underlay	Max Tog 1.7 – Carpet Max Tog 0.8 - Underlay

Please refer to Section 11.0 for specifications of the heating mats.

The heating mats are manufactured and tested in full accordance with the IEC (International Electro-technical Commission) Global Quality Standards.



4. ELECTRICAL SAFETY & WALL PREPARATION

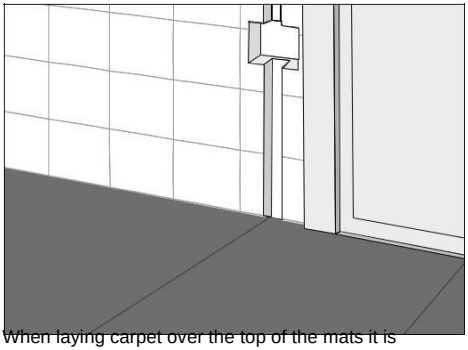
All electrical work must be executed by qualified and registered persons in accordance with the local building and electrical codes.

The Rayoflex system must be connected via a RCD (Residual Current Device) where the actuating rated current does not exceed 30mA. In all instances the earth wire must be connected.

It is important to check that the existing electrical wiring allows sufficient power to the Rayoflex system. Take into consideration additional electrical appliances which are powered by the same circuit. Furthermore, specify the amperage load of your safety device.

4.1 Electrical Boxes and Trunking

- Choose the thermostat location carefully. It should be installed in the most convenient place, so it will not interfere with furniture or be located in an area where an unfair reading may be obtained. Thermostats which are intended to control the heating in damp premises (bathrooms, toilets, saunas, swimming pools) must be installed outside of such premises.
- Prepare the space for the thermostat mounting and junction box (if required) before laying your underfloor heating system. By doing this first, will ensure that the mats are clear from wall waste and potential damage.
- A 35-40mm back box is required for the fuse spur and a deep back box for the thermostat. Prepare channels in the wall for power supply wires, mat cold leads and temperature sensor in the wall.



When laying carpet over the top of the mats it is advisable to lay a 6mm baton around the edges for the grippers

5. INSTALLATION PROCESS

Before opening the packaging of your underfloor heating mat, in all cases, you must re-measure the room to ensure all specified mats will fit and that no errors have been made during the process of room measurement. If a design has been provided, thoroughly check it - mats in opened packaging can not be returned unless faulty.

If you have multiple mats for the same zone then these will be wired in parallel into the thermostat providing they do not exceed the maximum loading. Please ensure you base your layout on the cables being able to return to the thermostat.

5.1 Floor preparation

Palziv or Depron must be used directly under the Rayoflex heating system.

- Prepare your floor by making sure the area is dry, level, free from dust/dirt, secure and has an appropriate bearing capacity.
- Use double sided tape to fix the Palziv or Depron to the sub- floor. Ensure the whole floor area is covered.

5.2 Testing the Mats

Throughout the installation process, it is essential that an insulation test of the mat and resistance readings of the mat and floor temperature sensor are recorded to ensure they have not been damaged. Use an appropriate tester capable of measuring 2,000 Ohms

Required Measurements

Take and record in the Mat Resistance Log the resistance and insulation readings:

- Before beginning the installation
- After the mat and sensor are fastened to the floor

If the resistance differs from the readings in Section 11.0, contact Rayotec Ltd for further instructions. If the heating cable has been cut/sliced or damaged in anyway, clean the damaged area quickly and contact Rayotec Ltd for further instructions.

To validate the Warranty, send a copy of the floor heating mats resistance log, Warranty Certificate and mat layout diagram to Rayotec Ltd Ltd. Not required if Rayotec install the system.

Mat leads resistance check - Measuring between the blue and brown leads of the cold lead.

Mat insulation resistance - Measuring between the two conductors (blue and brown wires) and shielding.

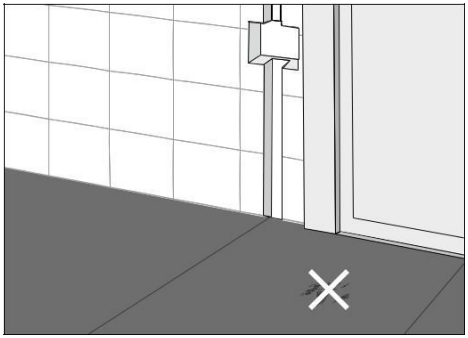
Pease Note:
The Blue wire is neutral and the Black wire is live

*Analog meters are not accurate enough.

5.3 Important information before laying the mats

Any competent person can lay the Rayoflex heating mats using this manual. All electrical work / wiring however, must be completed by a certified electrician who will do the works in accordance with the local building and electrical codes.

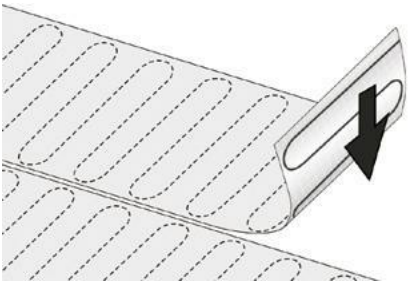
- Before laying the mats, check there is no dust or sharp objects on the floor that could potentially damage the heating cable.



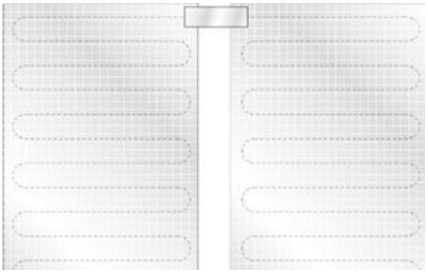
- The mat must be installed sticky side down.
- Lay the heating mat on areas free of fixed furniture (i.e. kitchen units, toilets, baths etc).
- Install the mat 10-15 cm away from showers, tubs, and wax toilet rings. You can install right up to vanities and counter areas. The heat will radiate only about 4-5 cm from the heating cable.
- Install the heating mat at a minimum of 10cm away from other heating appliances, e.g. risers and tubes of the water heating system.
- To fit the mat into the heating area, it may be necessary to cut the foil into fragments. Take care to not cut or damage the heating cable and always use the foil strip to bridge between the cut mat.
- Please note, it is not recommended to use the same mat for heating different types of rooms (e.g. bathroom, hallway or kitchen). It is also not recommended to use the same mat for the heating of rooms with different floor coverings. For this purpose independent mats and corresponding thermostats should be installed.
- You may require underfloor heating cloth tape to keep the heating mat down, The tape should be installed on the edges and/or across the heating mat.

5.4 Laying the mats

- Start laying the heating mat close to the thermostat onto the insulation.



- To allow continuous earth current, each time the mat is turned, you must use the aluminium strips provided to bridge the gap and cover the exposed cable. If there is no gap, you must still use the aluminium strip in case there is any future movement.



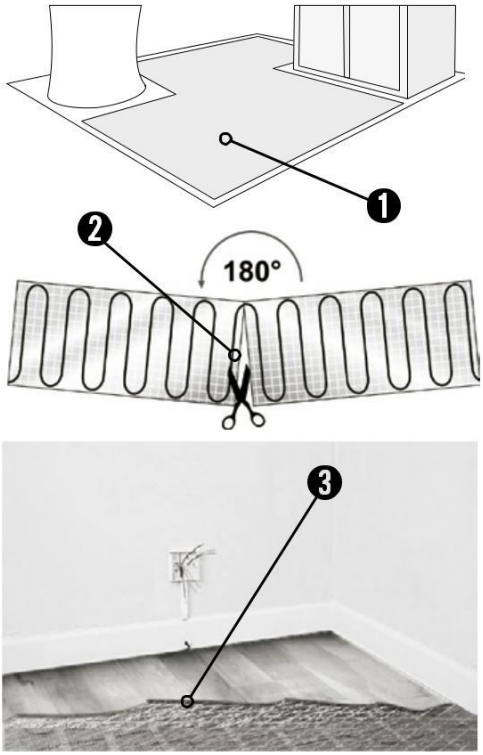
- Once you have completed laying the mats, sketch a diagram of the heating mat in Section 13.0 and show the location of the coupling joint and temperature sensor location into the premises plan found at the back of this manual. If multiple mats were used, ensure that the mat cold cables are labeled with their mat size so you are able to refer back to them at a later date. This is not required if installed by Rayotec.

Heating mat placement example:

❶ Heating area size estimation - check the size of the heating area and use the appropriately sized heating mat.

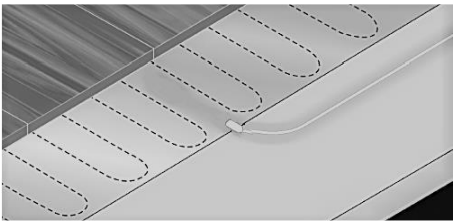
❷ Cut the Foil only of the heating mat and turn when required.

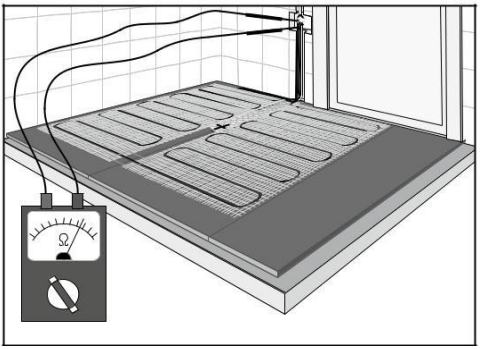
❸ Heating mat after installation.



3. Place the cold cable and floor sensor in their appropriate channel.

4. Check that the heating mat and temperature sensor cable were not damaged during the install by performing an insulation test of the heating mat and resistance reading of the heating mat and temperature sensor. This reading should conform to Section 11.0 and logged in Section 12.0.





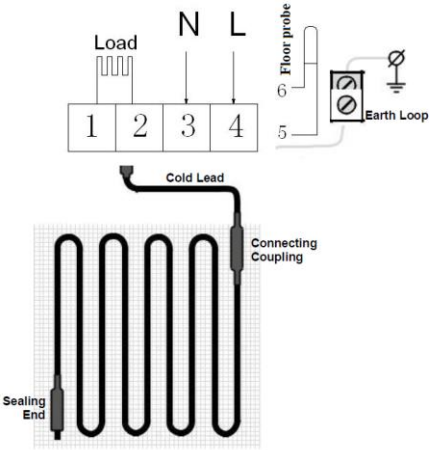
5.5 Installing the floor sensor (provided with the thermostat) & heating mat cold cable.

1. At this stage you should have already appropriately positioned the thermostat, installed the back box and trunking. If not –please refer to section 4.1-Electrical boxes and trunking.

2. Cut a channel in the insulation for the cold cable/s. The floor temperature sensor should be placed inside the conduit cable and then placed underneath the foil towards the edge of the heating mat as per picture. The sensor cable must be a minimum of 2cm from either heating cable. It can not touch or cross over the heating cable at any point. from the heating elements. It can not touch or cross over the heating cable at any point.

6. WIRING THE RAYOFLEX HEATING SYSTEM

WARNING! It is essential that the power from the fuse box or electrical source is switched off before beginning to work.



For the correct connection of the Rayoflex mat, please, pay attention to the colours of the installation wires. The blue and brown installation wires are connected with the heating conductor and are to be connected to the thermostat. The earth wire must be connected to the earth.

1. Connect the floor temperature sensor and cold cable of the heating mat directly to the thermostat. If multiple mats are used, the cold cables must be connected in parallel to the thermostat via the junction box. (All junction boxes must be placed where they are accessible after the installation is finished.)

Please consult your electrician to calculate how much can be connected to any one thermostat. If the total amperage of the system is greater than the amperage of the single thermostat, the system will either require a separate thermostat or a contactor to break the current. (See section 6.1 for further information on contactors).

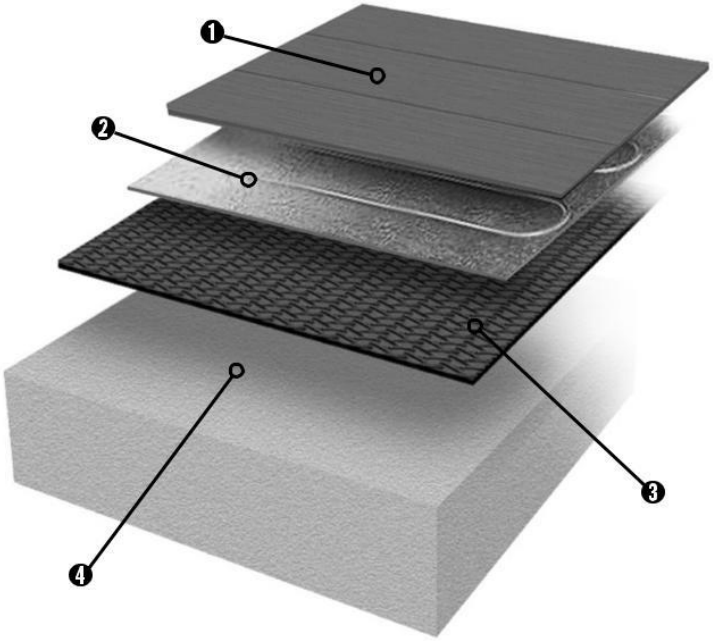
2. Connect the earth wire to the earth.
3. Connect the electric power to the thermostat and perform earthing. Please refer to the thermostat installation manual of how it should be connected.
4. Fill the chiseled channels in the wall, which lead the connection wires, earth circuit, cold leads and the temperature sensor wires in the corrugated tube.
5. Lay your final floor covering according to its own instruction manual.

6.1 Use of Contactors

If the total amperage of the system exceeds the amperage on the thermostat, then either an additional thermostat or a contactor must be installed. Using a contactor will enable you to break the current and use a single thermostat. A contactor can be supplied and installed by your local electrician *e.g. If your heating system requires 16.5 amps, the system will require either an additional thermostat or a contactor as a thermostat normally works up to a maximum of 16amps (please check with the thermostat manual what your maximum amperage is).*

7. FLOORING TYPES

Installation under Carpet, laminate or engineered wood



1. ***Hessian Backed Carpet with Underlay or Floating Wooden Floor. Maximum Carpet tog 1.7, Underlay tog 0.8. Ideal wood thickness up to 18mm***
   Wood or carpet cannot be nailed or stuck down.
2. **Rayoflex Foil Heating Mat**
3. **6mm Palziv or Depron Insulation**
4. **Floor Slab / Suspended Wooden Floor**

Important note for carpeted floors: Do not install under furniture with very high point loading. For items with reasonably high point loading, please ensure that casters are used otherwise the mats could be damaged.

8. SWITCHING THE SYSTEM ON AND MAINTENANCE

The heating should be turned up by 1°C every 2 days to allow the flooring to acclimatise and avoid damage.

When the temperature reaches the comfort level, you can reduce the heating level as desired. When the system is turned on for the first time, the “warm floor” feeling will appear after some time.

If you vacate your premises during the cold season, do not switch the system off. Set the thermostat on the minimal level so that the power consumption is minimal and the room will not be cooled down completely.

9. TROUBLESHOOTING TIPS

If the overall floor surface feels unusually cool after the system has been energized for more than 8 hours, verify that the heating controller is correctly installed and functioning properly; check with the associated heating controller’s operating manual and/or contact the manufacturer. If the overall floor surface feels unusually hot when the system is energized, or if the circuit breaker trips when the system is energized, the cable may be damaged. Turn-off the system immediately and contact the manufacturer for assistance.

Note: In the event that the heating cable has been damaged, the fault may typically be located and field repaired with minimal flooring removal.

10. WARRANTY DETAILS

The manufacturers provide a 16-year warranty for the heating mats for the first and documented installation. Any removal, modification of the floor, secondary installation will invalid the warranty. They guarantee that the Products are free from defects in materials and workmanship.

During the warranty period we are obligated to repair the heating mat or the heating cable or to deliver a new one to the customer free of charge. **We are not obligated to cover the indirect costs, which are connected to the repair works or replacement of the heating mat or the heating cable.**

Terms of Warranty:

The heating sections (mats and cables) are to be used strictly in accordance with the appropriate Installation Manual. For the warranty to be valid, both the Resistance Log Data and Warranty Certificate must be sent back to Rayotec Ltd Ltd within 30 days from date of purchase. If the appropriate information has not been sent, the warranty will automatically become null and void. In any case that the mat must be returned, the following information is required:

- The reason of the dissatisfaction of the customer in written form, a written description of the Product installation works and the history of operation.
- The customer has also to provide a retail sales receipt or another proof of purchase of the heating system.

The company retains the right to decide on the basis of the submitted documentation or after the preliminary diagnostics of the heating systems by the Company specialists.

The following are not covered by this Warranty:

- Any incidental or consequential damage, including inconvenience, loss of time or loss of income.
- Any labor or materials required to remove, repair or replace flooring materials.
- Any freight or delivery costs related to the Product, the control, or any related flooring or electrical products.

There are no warranties which extend beyond the face of this document. Our Company further disclaims any responsibility for special, indirect, secondary, incidental or consequential damages which arise from the ownership or use of this product, including inconvenience or loss of use. No agent or representative of our Company has any authority to extend or modify this Warranty unless such extension or modification is made in writing by a Company officer. Due to differences in building and floor insulation, climate and floor coverings, our Company makes no representation that the floor temperature will achieve any particular temperature, or temperature rise. But our Company does warrant that all Products will produce rated output listed in the Heating Mat Specification (Section 11).

Products that have been damaged due to mechanical breakdown, due to incorrect connection or due to disregard of the terms of operating rules and servicing are not a subject to the warranty repairs, replacement or return.

The thermostats have a 1 year warranty where the same Terms and Conditions stated above apply.

All claims are to be sent to the following address:

Rayotec Ltd Ltd. Unit 5 Trade City Sunbury, Brooklands Close, Sunbury-on-Thames TW16 7FD

11. RAYOFLEX HEATING MAT SPECIFICATION

Double-conductor heating mats -150W/m²

Type	Power W (230V)	Testing Resistance Range Ohms
Rayoflex – 1.0m2	150	335.03 – 387.93
Rayoflex – 1.5m2	225	223.36 – 258.62
Rayoflex – 2.0m2	300	167.52 – 193.97
Rayoflex – 3.0m2	450	111.68 – 129.31
Rayoflex – 4.0m2	600	83.76 – 96.98
Rayoflex – 5.0m2	750	67.01 – 77.59
Rayoflex – 6.0m2	900	55.84 – 64.66
Rayoflex – 7.0m2	1050	47.86 – 55.42
Rayoflex – 8.0m2	1200	41.88 – 48.49
Rayoflex – 9.0m2	1350	37.23 – 43.10
Rayoflex – 10.0m2	1500	33.50 – 38.79
Rayoflex -12.0 m2	1800	27.92 - 32.33

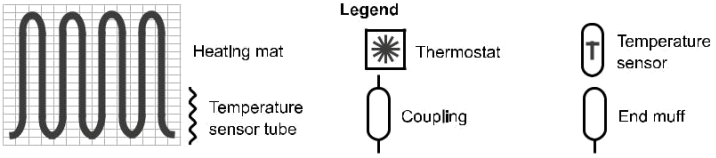
Minimum subfloor temperature should be +5°C. The minimum mat installation temperature is -10°C.
FloorTemperature sensor cable 8 -15kohms.

12. MAT AND TEMPERATURE SENSOR RESISTANCE LOG

	Mat 1	**Mat 2**	**Mat 3**
Mat Serial Number			
Floor temperature sensor cable resistance			
Values of mat lead resistance			
Values of mat insulation resistance			
Values of mat leads resistance			
Values of mat insulation resistance			

13. MAT PREMISES PLAN

The plan of the premise where the location of the thermostat, the heating mat, the couplings, the end muffs and floor temperature sensor are indicated.



14. WARRANTY CERTIFICATE

Full Name.....

Street.....

City..... Post Code ..... Telephone .....

Country.....

E- Mail.....

Purchased from..... Invoice No.....

City.....

Installer name..... Date of Purchase.....

Please state the rooms Rayoflex is heating: Rm1..... Rm2..... Rm3.....

Total floor area in each room: Rm1..... m_2 Rm2..... m_2 Rm3..... m_2

Total area of matting installed in each room: Rm1..... m_2 Rm2..... m_2 Rm3..... m^2

If there are more than 3 rooms please copy this page and record the other rooms.

Please state the mat sizes along with their serial number which is found on the plastic packaging of the mat:

Room 1: Mat size/s:..... m_2 Rayoflex Heating Mat - Mat Serial Number /s:.....

Room 2: Mat size/s:..... m_2 Rayoflex Heating Mat - Mat Serial Number /s:.....

Room 3: Mat size/s:..... m^2 Rayoflex Heating Mat - Mat Serial Number /s:.....

If there are more than 3 rooms please copy this page and record the other rooms.

Thermostat (Digital or Dial) .....

Thermostat ..... (Model Number)

Corrugated tube Installed? Yes..... No..... (Please tick appropriate box)

Insulation Installed? Yes..... No..... (Please tick appropriate box)

I have fully read and understood all stated in the installation manual:

Customer ..... (signature)

The installation was performed by..... Date..... 20.....(signature)

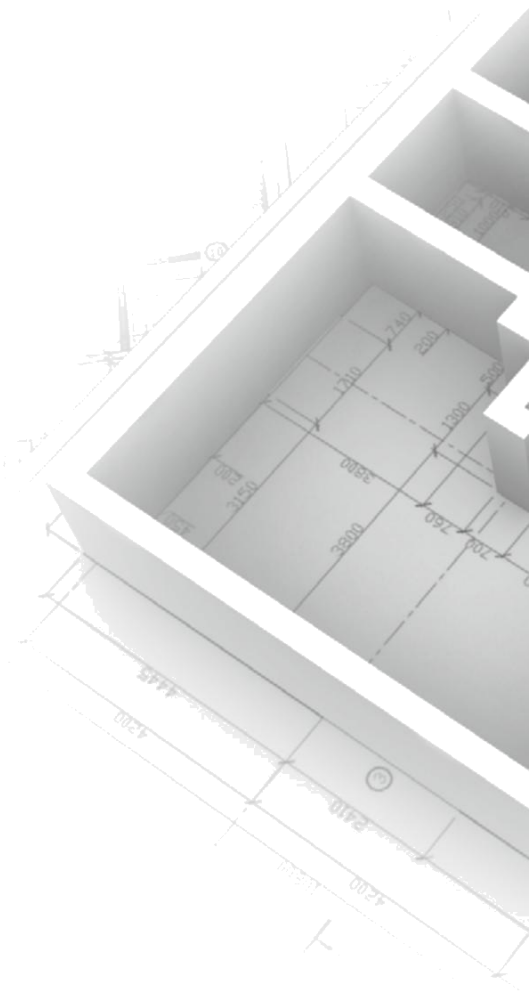
Part P Number of Electrcian.....

Please complete & send/fax/email back with the Mat And Temperature Sensor Resistance Log (section 12.0) to:

Rayotec Ltd • Unit 5 • Trade City Sunbury • Brooklands Close Sunbury-on-Thames • TW16 7FD
Fax : 01932 784 849 • Email: info@rayotec.com

NOTES:

NOTES:



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