IQWATT Inc., CANADA

3 W/ft

IQ FLOOR CABLE

INSTALLATION MANUAL
HEATING CABLE

iQWATT

CONTENTS

IMPORTANT SAFEGUARDS AND WARNINGS

WARNING: Shock and Fire Hazard

If the IQ FLOOR CABLE System is damaged or installed improperly, fire or shock could result and serious personal injury or damage could be incurred. You must carefully follow the warnings and instructions in this manual.
Individuals involved in the installation of this product must have ground fault protection.
Never cut or splice the heating cable, cross any length of cable over another part, or space the cable closer than 3" (3 inches) to another part of the cable. Do not cross the heating cable over the cold lead or the sensor cable.
Qualified electricians who are familiar with the planning, materials, installation, construction and operation of this floor heating system and with the hazards involved must install the electrical system.
All national (Canadian Electrical Code or CEC, Part 1, or National Electrical Code or NEC in the U.S.), provincial, state and local electrical codes must be complied with. If you are unfamiliar with this requirements, contact an electrician.
The IQ THERMOSTAT provides ground-wire (GFCI) protection and therefore must be used. The thermostat is to be installed as directed in the IQ THERMOSTAT Instructions. The IQ FLOOR CABLE System, designed solely for underfloor heating, must be used only for the purpose of underfloor heating.
The heating cable must be kept away from nails, screws, or similar objects that can penetrate and cause damage to the cable on initial installation or during potential, subsequent repairs to the floor.
If the IQ FLOOR CABLE system is damaged, do not attempt any repair on your own.

- Instructions marked  Important
- Safety warnings identified as  WARNING

1 GENERAL INFORMATION

Review the IQ FLOOR CABLE Manual and the IQ THERMOSTAT Instructions before you proceed with the installation. Proper functioning and the validity of the warranty depend on it.

1.1 SAFETY GUIDELINES

The safety and reliability of this floor heating system require proper design, layout, product selection, installation and testing. Incorrect installation or mishandling of the product can cause damage to the heating cable system components and create the risk of fire, property damage, shock and injury.

1.2 MEASURE RESISTANCE

Testing in order to show that the system is operating as it has been designed to operate, or "commissioning", includes electrical resistance testing and has three parts. These are done four times throughout the installation process.

1. Insulation Resistance Test: Measure the resistance between the two conductors, which are the white and black wires, and the ground or shielding wire.
2. Heating Cable Resistance Test: Measure the resistance between the two conductors, which are white and black wires. Compare this resistance reading to that specified in the IQ FLOOR CABLE Specifications, 2.1, and the IQ THERMOSTAT Specifications, 2.2. The value should be within ±10%. If you get a different reading, do not proceed.
3. Sensor Resistance Test: Verify the integrity of the floor sensor that comes with the IQ THERMOSTAT.

Please refer to "5 Commissioning" for instructions on measuring resistance.

Important: measure the resistance four times during the installation process and record the results on the commissioning report and the Warranty Card

Measure the resistance, and verify and record results on both the commissioning report and the Warranty Card.

The four times are:

(1) When the product comes of the box (4, step 5);
(2) After the mat has been laid (4, step 8);
(3) After the thin-set cement or mortar has been applied and dried (4, step 10);
(4) After the tile, stone or other flooring material has been laid (4, step 13).

1.3 25-YEAR LIMITED WARRANTY

For a period of twenty-five (25) years from the date of purchase, IQWATT

warrants that the IQ FLOOR CABLE heating cable and cords will be free from defects in material, design and workmanship. The warranty is valid only if the Warranty Card has been properly completed and registered with IQWATT, either electronically or mailed in, and if the installation has been carried out in accordance with the installation instructions and with the Canadian Electrical Code or NEC as well as all provincial, state, and local electrical codes. (See Warranty for complete details.)

2 IQ FLOOR CABLE SYSTEM

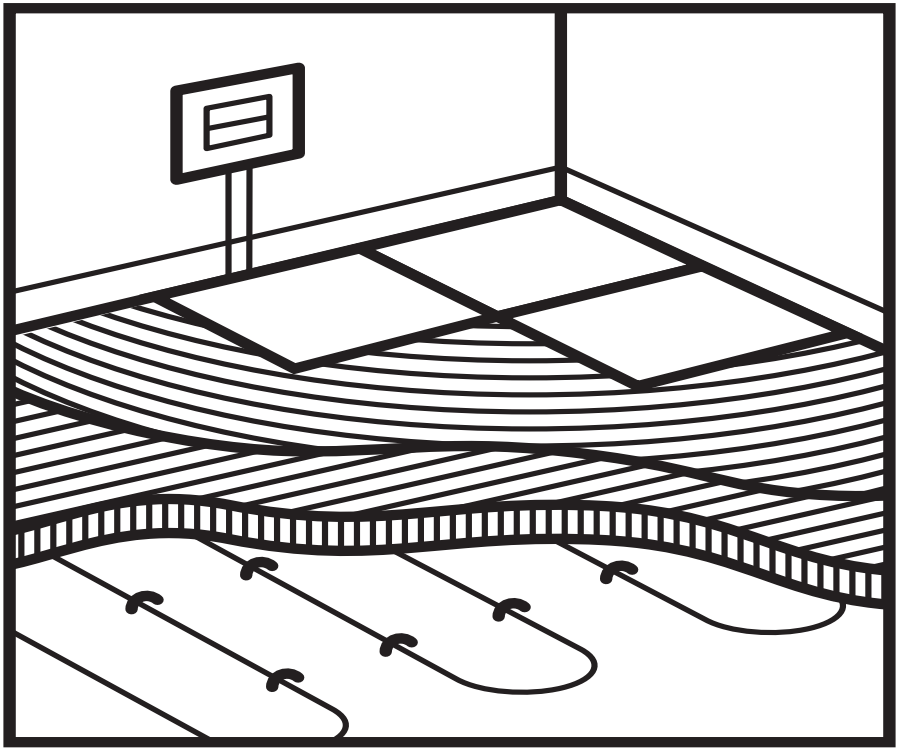
2.1 IQ FLOOR CABLE SPECIFICATIONS

Cable Construction:	Twin conductor
Rated Voltage:	120V,240V
Output:	3W/ft (9.84W/m)±10%
Heating Element Size:	40' (12.2 m) to 800' (243.8 m)
Bending radius:	1" (25.4mm)
Cable Diameter:	1/8"-1/6" (3.2mm-4.2mm)
Conductor Insulation:	fluoropolymer
Outer Insulation:	fluoropolymer or TPE
Max. Ambient Temp.:	85°F(30°C)
Min. Installation Temp.:	40°F(5°C)
Cold lead:	2-wire 16 AWG plus ground braid; 10ft (3m) length

2.2 THERMOSTAT SPECIFICATIONS

Functions:	On/Off control, digital display, built-in GFCI
Supply Voltage :	120/240 V ±10%, 50/60 Hz
Maximum switching current :	15 Amp
Temperature control range :	41 to 104°F (5 to 40°C)
Ambient range :	32 to 77°F (0 to 25°C)
Floor temperature sensor :	2-wire, 10-foot lead wire

2.3 IQ FLOOR CABLE TYPICAL INSTALLATIONS AND APPLICATIONS



Warning

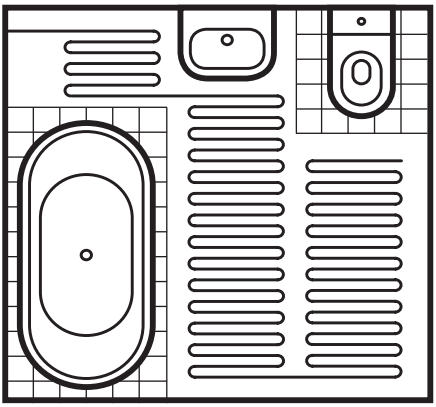
Consult the manufacturer of all floor finishing materials for information on special installation requirements for this exact usage.

Important

- The floor cable must be completely embedded in cement or mortar, thin-set cement or mortar, or similar material.
- The minimum installation temperature is 40 °F (5°C).
- It is recommended that copper wire be used exclusively.
- Recheck that the supply voltage matches the voltage of the IQ FLOOR CABLE.
- All metal structures or materials used for the support of, or on which, the IQ FLOOR CABLE is installed, must be grounded in accordance with the CSA Standard C22.1, section 10, the CEC and the NEC.

3 FLOOR HEATING DESIGN AND PRODUCT SELECTION

3.1 DESIGN THE INSTALLATION.



Step 1: Measure the heated area

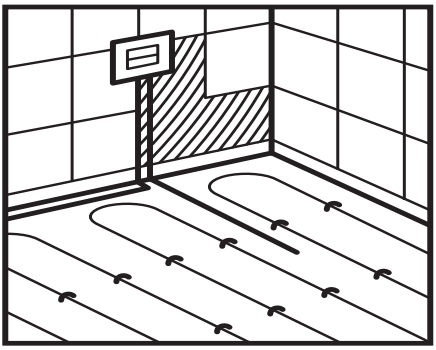
Determine the heated area of the floor where there are no permanent fixtures or furniture, such as showers, toilets, vanities, or cabinets. Measure the heated area.
For example, in the illustration the area of the bathroom is 96 ft^2. When you subtract the area of the vanity, shower and toilet, the total heated area is only 74 ft^2.

Step 2: Determine the power supply voltage

The available supply voltages include 120 V, 208 V or 240 V.

Important

Operating the 240V cable at 208V reduces the power output to approximately 2.25W/ft. (25% reduction)



Step 3: Plan the design

To ensure coverage, determine the most suitable floor heating cable and strapping layout for your heated area. Select a place both for your IQ THERMOSTAT, on the wall above the heated area where it can be reached by the cold lead cable of the IQ FLOOR CABLE, and for the floor temperature sensor. Consult the IQ THERMOSTAT instructions.

Important

The predetermined IQ FLOOR CABLE spacing (3" standard, cable to cable, 4" also available) must be maintained to ensure proper floor heating. Do not change the IQ FLOOR CABLE spacing when you lay out the cable. This will ensure that there are no cold spots on the floor. Never cut the cable, cross any length over another, or position parts of the cable closer than recommended.

3.2 CONFIRM YOUR PRODUCT SELECTION

Confirm that your IQ FLOOR CABLE is no larger than what you need for your heated area. Following the example from Step 1, if the heated area is 74 ft^2, select the 70 ft^2 IQ FLOOR CABLE product.

TABLE 1:120V PRODUCT SELECTION

Model Number	Length (ft)	Heated Area (sq ft)		Output (W)	Amperage (A)	Resistance (Ohm)
		3 in	4 in			
IQ FLOOR CABLE-120-40	40	10	15	120	1.0	120.0
IQ FLOOR CABLE-180-60	60	15	20	180	1.5	80.0
IQ FLOOR CABLE-240-80	80	20	25	240	2.0	60.0
IQ FLOOR CABLE-300-100	100	25	35	300	2.5	48.0
IQ FLOOR CABLE-360-120	120	30	40	360	3.0	40.0
IQ FLOOR CABLE-420-140	140	35	50	420	3.5	34.3
IQ FLOOR CABLE-480-160	160	40	55	480	4.0	30.0
IQ FLOOR CABLE-540-180	180	45	60	540	4.5	26.7
IQ FLOOR CABLE-600-200	200	50	65	600	5.0	24.0
IQ FLOOR CABLE-720-240	240	60	80	720	6.0	20.0
IQ FLOOR CABLE-840-280	280	70	95	840	7.0	17.1
IQ FLOOR CABLE-960-320	320	80	105	960	8.0	15.0
IQ FLOOR CABLE-1080-360	360	90	120	1080	9.0	13.3
IQ FLOOR CABLE-1200-400	400	100	135	1200	10.0	12.0

TABLE 2:240V PRODUCT SELECTION

Model Number	Length (ft)	Heated Area (sq ft)		Output (W)	Amperage (A)	Resistance (Ohm)
		3 in	4 in			
IQ FLOOR CABLE-240-80	80	20	25	240	1.0	240.0
IQ FLOOR CABLE-360-120	120	25	30	360	1.5	160.0
IQ FLOOR CABLE-420-140	140	30	40	420	1.8	137.2
IQ FLOOR CABLE-480-160	160	40	55	480	2.0	120.0
IQ FLOOR CABLE-600-200	200	50	65	600	2.5	96.0
IQ FLOOR CABLE-720-240	240	60	80	720	3.0	80.0
IQ FLOOR CABLE-840-280	280	70	95	840	3.5	68.6
IQ FLOOR CABLE-960-320	320	80	105	960	4.0	60.0
IQ FLOOR CABLE-1080-360	360	90	120	1080	4.5	53.3
IQ FLOOR CABLE-1200-400	400	100	135	1200	5.0	48.0
IQ FLOOR CABLE-1320-440	440	110	145	1320	5.5	43.6
IQ FLOOR CABLE-1440-480	480	120	160	1440	6.0	40.0
IQ FLOOR CABLE-1680-560	560	140	190	1680	7.0	34.3
IQ FLOOR CABLE-1920-640	640	160	210	1920	8.0	30.0
IQ FLOOR CABLE-2160-720	720	180	240	2160	9.0	26.7
IQ FLOOR CABLE-2400-800	800	200	265	2400	10.0	24.0

4 INSTALLATION STEPS

Important: Tools and materials required

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

- Scissors or shears
- Utility knife
- Wire strippers
- Tape measure
- Screwdriver
- Multi meter

You will most likely need other tools and materials for the installation of your particular floor finishing type. These might include products like backer board, self-leveling cement or mortar, thin-set cement or mortar, and tile, and tools like a notched trowel. Consult the manufacturer of the floor finishing material you choose for instructions on how to install their product, for this exact purpose.

Step 1: PLAN LAYOUT

Sketch a layout or a floor plan of the room: include all permanent furnishings such as toilets, cabinetry, etc. Indicate all dimensions required to determine the available floor area and the position of the IQ THERMOSTAT. Cable must be 3" away from any wall in the heated area. Strapping must be placed a maximum of 5' to 6' apart.

Important

Include in your floor plan the dimensions of any future, planned furniture additions.

Step 2: TRANSFER LAYOUT TO FLOOR

Draw an outline of the layout on the room floor, including a "foot print" of all furnishings not yet installed. Unroll the first few feet of the IQ FLOOR CABLE. The starting point of the cable must be placed at a sufficient distance from the IQ THERMOSTAT. Use your floor plan to determine the desired spacing of cable (standard 3"or 4", cable to cable, as in Table 1 and 2) and strapping, to be spaced a maximum of 5' to 6' apart.

Important

The minimum distance between the cables must be 3”standard, or 4”, cable centre to cable centre (see Tables 1 and 2). Mark the position of the connection point, later to be covered in cement, between the power lead and the IQ FLOOR CABLE heating cable. The sensor position will be in the middle of 2 heating cables, 4” from the cable loop and 10” from any wall in the heated area, towards the middle of the room but close enough to the IQ THERMOSTAT.

Step 3: INSTALL SENSOR

It is recommended that you place the sensor cable, with the sensor at the end, in conduit, for easy removal in the rare event of failure. The sensor cable and sensor can also be applied directly to the subfloor. The sensor cable is installed between the IQ THERMOSTAT wall box and chosen sensor position. Since conduit must be partially countersunk into the subfloor, cut a channel approximately 5/16" deep × 5/16" wide in the floor and wall, up to the IQ THERMOSTAT. The sensor cable, in conduit or plain, goes down from the thermostat to the sensor position.

It is recommended that you take photos to document your installation process.

Important

For the sensor conduit, use duct tape to close the end of the conduit so that thin-set can't penetrate. Also use duct tape to hold the sensor conduit into the groove and to prevent the conduit from floating up when the cement, mortar or thin-set is poured.

If the sensor is to be installed directly onto the subfloor, use duct tape to secure it before the cement, mortar of thin-set is applied.

Step 4: PREPARE SUBFLOOR SURFACE

Clean and vacuum the floor thoroughly. Remove any dust and debris that could damage the heating cable on initial installation or later in the installation process.

Ensure that the subfloor is secure and stable. Carefully fill in all cracks to prevent any potential damage to the new tile or other flooring material caused by shifting of the subfloor. Thermal insulation for the subfloor is always an option.

Step 5: MEASURE THE RESISTANCE (THE FIRST TIME)

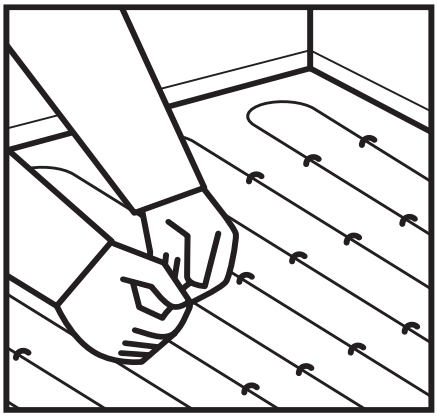
Measure the resistance between the white, black and ground/shielding wire, setting your multi meter to the highest range. Both should read infinity. Then, measure the resistance of the IQ FLOOR CABLE and compare it to "Table1 or Table 2". Record the measured resistance on the Warranty Card. Finally, change ohm range and measure sensor resistance (see 5 Commissioning).

Step 6: IQ FLOOR STRAPPING

Cut the strapping to the lengths planned in the layout. Strapping will be perpendicular to the cable runs. In smaller areas of the room the strapping will be at the sides of the cable runs, just inside the cable loops: in larger areas there will be additional strapping at 5'to 6' intervals. Attach strapping to the subfloor using glue, double-sided tape, nails or staples.

Important

When cutting the strapping make sure that no metal protrusions capable of puncturing the heating cable are created.



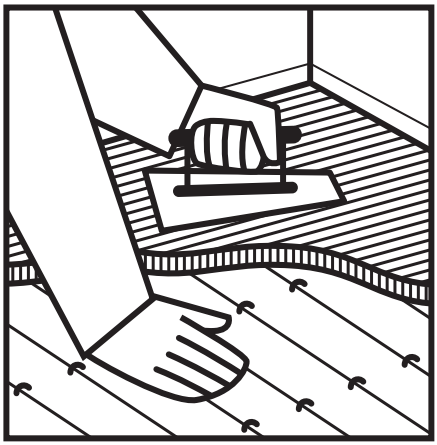
Step 7: BEGIN LAYING THE IQ FLOOR CABLE

Place the heating cable so that both the connection point between the cold lead cable and the heating cable, and the temperature sensor, are in their intended positions and bring the cold lead cable to the IQ THERMOSTAT (see IQ THERMOSTAT Instructions). Begin laying the heating cable according to your layout (developed in 4, Steps 1 and 2).
Never cut the heating cable, shorten it, cross one part over the other or space it closer than 3" or 4".
Pry up the 'tongues' of the strapping. Insert the cable and gently reclose the 'tongues'.
In order not to put stress on the cable, avoid walking on it. Wear shoes with soft soles when this is unavoidable.
Check again that the sensor has been properly installed (4, step 3).

Step 8: MEASURE THE RESISTANCE (THE SECOND TIME)

Please refer to 5 Commissioning, 4.5.

Step 9: EMBED THE FLOOR HEATING CABLE IN CEMENT OR MORTAR.



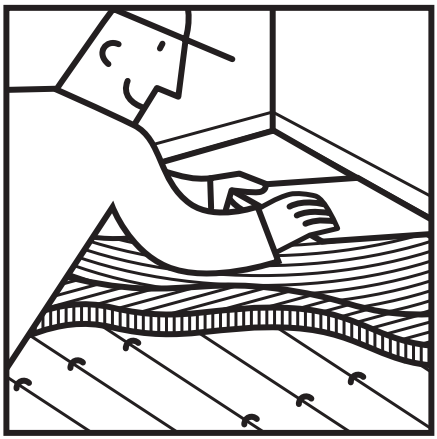
Cover the heating cable with a layer of thin-set cement or mortar. Ensure that the thin-set cement or mortar covers the entire heating cable network including the connector and the sensor cable, either in conduit or applied directly to the subfloor. For tile, being applied in the illustration and detailed in 4.11 below, or any other floor finishing material, consult the manufacturer for instructions in the use of their products for this exact purpose. As well, for engineered wood, laminate floor coverings, or other floor finishing options, you should consult the manufacturer for instructions, temperature allowances and other requirements.

Ensure that all moisture in the self-leveling cement has been fully eliminated by complying with the drying times recommended by the cement or other materials' manufacturers.

Carpet and vinyl are prohibited as floor finishing materials.

Important

The IQ FLOOR CABLE system must not be turned on until the thin-set cement or mortar has fully dried. A minimum of two weeks is recommended.



Step 10: MEASURE THE RESISTANCE (THE THIRD TIME)

See Safety Guidelines, 1.3, 4.5, and 5 commissioning.

Step 11: INSTALLING TILE

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

Step 12: CONNECT POWER SUPPLY AND THERMOSTAT

The connection of the power supply and the IQ THERMOSTAT must be done by a qualified electrician, in accordance with the Canadian Electrical Code and the National Electrical Code in the U.S. The electrician will connect the floor sensor to the thermostat, take the final resistance reading and record it on the commissioning document (see 4, Step 13). Refer also to the IQ THERMOSTAT Instructions. The electrician will also ensure that the cold lead is in place in the thermostat, mark the appropriate circuit breaker reference label, indicating which branch circuit supplies power to the IQ FLOOR CABLE heating cables, and turn on the IQ FLOOR CABLE system.
Check that provincial, state and local electrical codes have been complied with.

Step 13: MEASURE THE RESISTANCE (THE FOURTH TIME)

Please refer to 5 Commissioning.

Step 14: RECORD INFORMATION AND AFFIX LABELS

The homeowner must electronically submit or mail in the Warranty Card immediately after installing the IQ FLOOR CABLE system (cable and IQ THERMOSTAT). Failure to do so can void the warranty. Keep a copy of or the original Installation Manual, Warranty Card and proof of purchase for your reference. Apply the marked labels to the appropriate breaker in the electrical panel.

Step 15: ENJOY THE COMFORT OF IQ FLOOR CABLE

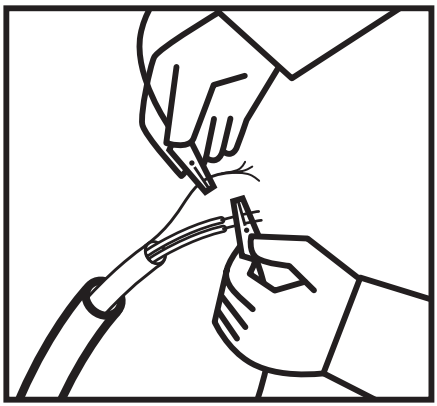
The IQ FLOOR CABLE heating system is now ready to use. Consult your IQ THERMOSTAT Instructions, to ensure correct use.
Increase the floor temperature gradually and adjust it until it reaches a comfortable level, depending on your personal preferences. Be assured that your durable, system will provide you with comfortable, economical, and reliable underfloor heating.

5 COMMISSIONING

Important

For the 25-year limited warranty to apply, you must perform these tests, record the results on the Warranty Card, submit the Warranty Card electronically or by mail, and retain copies for your records.
The following are the resistance tests, which must be carried out four times during the installation process. See Guidelines, 1.2, and Installation, Step 5.

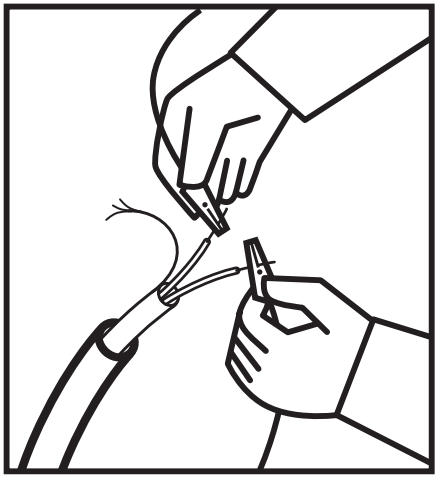
5.1 INSULATION RESISTANCE TEST



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 multi meter.
2. Make sure the meter reads "Open" or "OL." If you get a different reading, do not proceed.
3. Record these readings on the Warranty Card.

5.2 HEATING CABLE RESISTANCE TEST



This test measures the resistance of the IQ FLOOR CABLE and is used to determine circuit integrity.

1. Set your multi meter to the 200 or 2000 Ohm range.
2. Connect the multi meter 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 ±10%. If you get a different reading, do not proceed before contacting your IQ FLOOR CABLE representative.
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 multi meter to the 200K ohm range.
2. Connect the multi meter leads to the red and green lead wires.
3. Make sure the meter reads between 9-25K ohms. If you get a different reading, do not proceed before contacting your IQ FLOOR CABLE representative.
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 cables or other appliances connected to the same circuit. The IQ FLOOR 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 to IQ THERMOSTAT Instruction Manual.
	Thermostat not turned on.	Refer to Section 4 of this manual, and the IQ THERMOSTAT Instruction Manual.
	Cable not connected to IQ THERMOSTAT	Refer to IQ THERMOSTAT Instruction Manual.
	Floor temperature sensor not connected.	Refer to IQ THERMOSTAT Instruction Manual.
	Faulty sensor.	Contact IQWATT representative.
Floor warm all the time	Clock not set correctly.	Refer to IQ THERMOSTAT Instruction Manual.
Floor not warm enough	IQ THERMOSTAT setting not set correctly.	Refer to IQ THERMOSTAT Instruction Manual.
Installation instructions not available		Download the latest version of the IQ FLOOR CABLE system Installation Instructions from www. IQWATT.ca.

WARRANTY - IQ FLOOR CABLE

For a period of twenty-five (25) years from the date of purchase IQWATT warrants that the IQ FLOOR CABLE heating cable and cord will be free from defects in material, design and workmanship. The warranty is only valid if the Warranty Card has been properly completed on the website and mailed in to an IQWATT location when the installation of the IQ FLOOR CABLE system has been completed. For the purchaser's convenience, an image or copy of the proof of purchase can be submitted with the Warranty Card. A copy or the original of the Warranty Card, along with the Installation Manual and proof of purchase, should be retained by the purchaser. It is mandatory that the installation be completed as instructed by the Installation Manual, as well as in accordance with the Canadian Electrical Code or NEC and with provincial or state and local regulations.
In the rare event of a purchaser experiencing a problem with the IQ FLOOR CABLE cable or cord, an IQWATT representative must be contacted. After verifying the proof of purchase, date of installation if completed, the attending electrician, the recorded resistance readings, the product, and the nature of the defect, the representative will determine whether the product should be delivered to an IQWATT location, with charges being the responsibility of the purchaser. A replacement product will be sent to the purchaser by IQWATT when a defect is identified.
IQWATT shall not be liable for any consequential and secondary costs or damages linked to any defect or replacement of the IQ FLOOR CABLE.

THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ON THE PART OF IQ FLOOR CABLE. IQWATT DISCLAIMS ANY WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IQWATT NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SALE OR PRODUCT. IQWATT SHALL NOT BE HELD RESPONSIBLE FOR DAMAGE TO PERSON OR PROPERTY, CONSEQUENTIAL LOSS, LOSS OF PROFIT, LOSSES ON GOODS IN STORE, OR THE LIKE WHICH MIGHT ARISE OUT OF THE FAILURE OF THE EQUIPMENT DELIVERED, IRRESPECTIVE OF THE CAUSE (INCLUDING FAULTY MANUFACTURE)

How to claim this warranty

1. Contact a company representative. Information on the product and its installation will have been registered with IQWATT.
2. Provide information on the nature of the manufacturing defect, and confirm proof of purchase, date of installation, name of electrician, resistance readings taken, and product model.
3. The IQWATT representative will determine whether the product should be submitted for a warranty claim.
4. In the event that a product is determined to be defective, the product will be delivered to an IQWATT location at the purchaser's expense. A replacement product will be sent by IQWATT to the purchaser when the defect is confirmed.

Disclaimer:

This warranty gives you specific legal rights and you may also have some legal rights, which may vary from province to province or state to state. IQWATT hereby disclaims, and it is as a condition of the sale, that there are implied warranties. Some provinces and states do not allow limitations on an implied warranty so the above limitation may not apply to your claim.

WARRANTY -IQ THERMOSTAT

IQWATT warrants that the IQ THERMOSTAT will be free of defects for a period of three (3) years from the date of purchase. In the rare event that the thermostat experiences a failure IQWATT will supply a replacement IQ THERMOSTAT in a timely manner.

How to claim the IQ THERMOSTAT warranty

1. Contact an IQWATT representative.
2. Send the defective product to an IQWATT administrative facility.
3. IQWATT will send the purchaser a replacement IQ THERMOSTAT quickly.

iQWATT
Electrical Heating Systems
www.iqwatt.ca
info@iqwatt.ca

WARRANTY CARD

Name of purchaser _____

Address of purchaser _____

Location of installation _____

Date of completion of installation _____

Product purchased _____ Date of purchase /___ /___ /_____/

Proof of purchase (optional) _____

Name of electrician completing electrical resistance tests

_____

Record of Commissioning:

	First test	Second test	Third test
Result of cable resistance test (out of box)			
Result of sensor resistance test (after the mat has been laid)			
Result of sensor resistance test (after the thin-set or mortar has been applied and dried)			
Result of sensor resistance test (after the finishing flooring material has been laid)			

Steps for using the Warranty

In the rare event of a failure of the IQ FLOOR MAT system, the following steps must be taken.

1. The purchaser must first contact an IQWATT representative at www.iqwatt.ca, to discuss the problem.
2. At the representative's discretion, the defective product will be submitted to the IQWATT facility by the purchaser, who will assume any delivery charges.
3. If not already registered with IQWATT with the original Warranty Card, proof of purchase must be presented.
4. A replacement product will be delivered to the purchaser when a defect in the original product is confirmed.


iQWATT