

# **ThermaWire**™

**FLOOR WARMING CABLES & MATS**

## INSTALLATION MANUAL

**Applicable to the following products only:**

CFW-T-120/4 Floor Warming Cables  
CFW-T-240/4 Floor Warming Cables

MFW-T-120/12 Floor Warming Mats  
MFW-T-240/12 Floor Warming Mats



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**ThermAtlantic**™   
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## **A. Floor Warming Cable & Mat Installation Instructions**

### **A.1 Before you start**

*The following steps must be taken in order to choose which heating cable or mat to use for any particular area. These instructions apply only to in-floor heating or floor warming application. It is recommended that first time installers first read the glossary of technical terms located at the end of this manual so as to better understand this guide.*

#### **Zoning**

*Here is where you will learn how to define individual heating zones.*

Since heating cables are electrical in nature, their zoning requirements are regulated by the electrical code, which requires separate thermostats for each closed room or open area. Because floor-heating thermostats use floor temperature logic to ensure comfort and protect flooring it is also possible to introduce more than one thermostat in a large open area if differing flooring types exist; this is often true for kitchen & dining room areas where ceramics and hardwood may coexist.

Therefore, before you can determine what heating cables are required for a job, you must first determine the size and location of each zone as defined by the electrical code and optionally by finish flooring type. Heating cable or mat sets may not be installed outside the room or zone where the thermostat will be installed.

#### **Choosing the best cable or mat wattage**

*Now you must select the appropriate wattage for a room based on a number of factors including area, heat loss and finish flooring type. You must also choose which voltage series to use.*

After having determined the layout of your room or heating zone, you must determine which of several available wattages or sizes to choose from. Although a heat loss calculation can be completed, floor warming cable sets tend to be over-sized in most instances in order to prevent hot & cold spots, decrease heating response time and ensure the room will heat up even on the coldest days of the year.

First you must calculate the net floor space of a room. Heating cables may not be installed under cabinetry and fixed appliances; therefore you must subtract these objects from a room's overall gross area in order to move onto the next step. Note that it is recommended that you heat toe-kick space under cabinets so ensure you include the extra 4" or 10 cm in your net heating space from the edge of your countertops.

General floor warming guidelines for mid-sized and large areas are 10 W/SF under wood flooring and 12 W/SF under tile and natural stone. In kitchens, bathrooms and laundry rooms where floor space is limited relative to the actual room size, it is common to increase wattage by 2-3 W/SF so as to compensate for reduced heating area. You may increase wattage to a maximum of 15 W/SF in rooms with higher heat losses due to northern exposures, many windows or outside doors.

Once you have a target W/SF in mind, multiply it by the net heating area of your zone and choose the closest cable or mat available from the product selection guide. In some cases it may be desirable to combine two cable and/or mat sets to best achieve the desired wattage for the room. When using mats you must always choose a model equal or slightly smaller than the area to be heated. Cable sets allow more flexibility so you may choose the next highest wattage available.

Finally, make sure you select the best operating voltage for your installation. ThermaWire™ floor warming products are available in 120V and 240V Series.

## Determining thermostat location

*Before you can start laying down cables or mats you will need to know where the thermostat will be located.*

Floor heating and warming cables must be powered and controlled using an appropriate thermostat for your application. Floor warming installations rely only on floor temperature and should use floor warming thermostats which can be located anywhere within the room. However, in cases where heating cables or mats will be used as a primary source of heat it is important to use a space heating thermostat using ambient air temperature control with floor temperature limitation. Proper location of space heating thermostats is critical to ensuring comfort. Locate such thermostats on an interior wall as centrally located to the room as possible but away from direct sunlight, warm appliances or other heat sources in the room.

A super-deep thermostat box or 4-5" utility box with plaster ring will most likely be required to accommodate heating cable cold leads, power feeds and thermostat. When more than one heating cable or power lead is present it is recommended that the larger box be considered to ensure adequate air volume to keep thermostat from overheating and consequently prolonging its expected lifetime.

In large rooms or open areas where the total wattage of heating cables or mats exceeds 15A (1,800 W for 120V & 3,600 W for 240V systems) it will be necessary to install additional thermostat boxes to accommodate more thermostats or slave thermostats. Using slave thermostats will require that you run 2 conductor low voltage wire from the master thermostat to any slave thermostats; consult thermostat manual for details on how to control large areas using master & slave thermostats.

## Important Do's and Don'ts

*Before proceeding with floor warming cable or mat installation, here is a list of best practices and common mistakes to avoid:*

1. ThermaWire™ floor warming CFW and MFW series cables and mats are intended for indoor floor heating applications only as designated by the -X mark on the label.
2. Never cut the heating part of the cable. This is the long portion of the cable set before the black splice and cold lead. You may shorten the length of the cold leads, however, once they have been fished into the thermostat box.
3. 13 W/M floor warming cables should never be laid any closer than 3 3/16" or 8 cm apart.
4. If more than one cable and / or mat set is used in a room, ensure they are connected in parallel and not in series. Also ensure that the total wattage of cable or mats set connected to a thermostat does not exceed 15A (1,800 W for 120V & 3,600 W for 240V systems) or as specified by thermostat manufacturer.
5. Do not install cables when it is colder than -15°C or 5°F in the room.
6. Always clean floor surface properly before laying down heating cables or mats. Thin mortar bed installations require a dust-free surface to guarantee proper bond to the sub-floor surface.
7. Extruded polystyrene insulation board up to a thickness of 3/8" or 10 mm is recommended over un-insulated concrete slabs and optionally under 1/2" or 12.5 mm cement board when used over wooden sub-floors. Alternatively, up to 1/4" or 6 mm of cork underlayment may be used instead of insulation board. Adding insulation board to your installation will reduce response time and increase the energy efficiency of the system.

8. A minimum of ¼” or 6 mm of mortar is required over floor warming cables and mats once they are attached to floor surface. This can be done either by pouring self-leveling underlayment over them or by using a ¼” or 6 mm high notched trowel when installing tile or stone flooring.
9. Do not allow heating cables to cross over each other or touch since this will likely lead to overheating and failure.
10. Never install cable loops any tighter than with a bending radius less than 1” or 25 mm.
11. Heating portion of cables must be embedded in some form of cement mortar mixture and may not be used in applications where they are left un-covered in open air. The heating portion of a cable or mat set is blue in color.
12. Only use Listed electrical conduit from the bottom of the wall where cold splice enters wall cavity to the thermostat or junction box.
13. Always ensure that the black cable splices are located in the floor and not in the wall cavity since this is where the heating cable meets the cold leads; this applies to tail splice as well. It may be necessary to create a narrow recess or depression in the sub-floor to better accommodate the thickness of splices since they are thicker than the heating cable portion.
14. Slide product label on cold lead so that it is enclosed within the thermostat or junction box for future reference purposes. A spare product label is included with each floor warming cable or mat set for you to attach it where it can be seen in the electrical room as a warning that in-floor heating has been installed in a room.
15. Heating cables and mats must be ground fault protected either with a GFCI thermostat or a GFCI breaker at the electrical panel. This requirement is there to protect you from electrical shock or your home from fire in the event of a heating cable fault. 10-35 ma sensitivity is recommended for most applications to avoid nuisance tripping and 5 ma sensitivity for wet areas such as bathrooms or as required by your electrical code.
16. When laying out cables or mats, try to maintain a consistent spacing between cables so as to ensure even floor heating. It is permissible to narrow cable spacing somewhat when covering colder areas in a room such as outside perimeter walls with many windows as long as it does not get any narrower than nominal allowed spacing of 3 3/16” or 8 cm.
17. Do not install heating cables or mats under cabinets, fixed appliances, bathroom fixtures or any other permanent fixtures.
18. Flooring type and thickness must not exceed an insulation R value of 1. This limitation does not affect the use of tile or stone flooring which exhibit very low R-values but does limit carpet to a thickness of ¼” or 6 mm and most wood flooring in thicknesses from 3/8” or 10 mm to ¾” or 20 mm. Check with finish flooring manufacturer for their R-values if you are uncertain.
19. Heating cables should not be installed any closer than 8” or 20 cm from the wax ring of a toilet or of the heated surface of another heating source such as a baseboard heater.
20. Check your local electrical codes or contact your local building authority to qualify whether you can install your own floor warming cables or mats, with or without the supervision of an electrician. In any case, actual hook-up to thermostat must be done by an electrician.
21. If heating cable is damaged during installation it is recommended that it be removed and replaced. ThermAtlantic will accept return of damaged cables and offer repairs, exchanges or credit notes at its own discretion for a nominal fee; shipping costs not included.

22. Walking on heating cables should be avoided wherever possible to minimize chance of damage before they are embedded in cement mortar. They can be covered temporarily with cardboard and / or plywood in traffic areas if necessary. It is recommended that rubber soled footwear be used by installers during installation.
23. It is recommended that cable fault alarms be used when laying down cables or installing tile directly over them. The alarm will sound if cables are damaged but are not a substitute for insulation testing using a megaohm meter or insulation tester.
24. Warranty requires that all heating cables be tested for both heating lead resistance and insulation leakage by an electrician or qualified installer or as dictated by local electrical code. Heating lead resistance should fall within -5% to +10% of the resistance indicated on the label and product selection table. Heating cables should also be checked for insulation leakage using a megaohm meter. Each heating lead should be individually checked to the common ground lead at approximately 4 times the operational voltage of the heating cable or mat set. Any leakage within 5 megaohm range should be a warning that cable has been compromised and that it should be replaced or repaired before continuing with installation.
25. Heating cables may only be repaired by a qualified installer or electrician as dictated by local electrical code or inspection authority. Only ThermaWire™ provided crimp connectors and heat shrink repair kits can be used. All field repairs must be properly tested for both heating lead resistance and insulation leakage to qualify for limited warranty.
26. When used in wet locations, installation shall be in accordance with CAN/CSA-C22.1, Canadian Electrical Code, Part I (CEC) and final acceptance is to be made in the field by the Authority Having Jurisdiction (AHJ).
27. Floor Warming Cable & Mat installations are to be made in accordance with section 62 of the CEC, Part 1.
28. Contact ThermAtlantic Energy Products Inc. technical support for advice and assistance regarding any installation or repair related matters.

*To continue with the installation instructions, skip to the section that applies to the Cable or Mat product you have chosen to use. If combining a mat and cable set, be sure read both sections.*

## **A.2 Floor Warming Cable Installation**

### **Calculating on-center spacing or O.C.**

*The main advantage of using a heating cable is that you can make it fit to almost any room size in order to meet your requirements. In order to accomplish this it is necessary to determine how far apart the cable loops must be in order for the cable to fit properly in the designated space. This distance between cables is called the cable on-center spacing or O.C.*

Making O.C. calculations is easy. Use the following formula to calculate the O.C. spacing:

$$\text{O.C. in Inches} = (\text{Net Heating Area in SF} \times 12) \div \text{Length of Cable(s) in Feet}$$

or

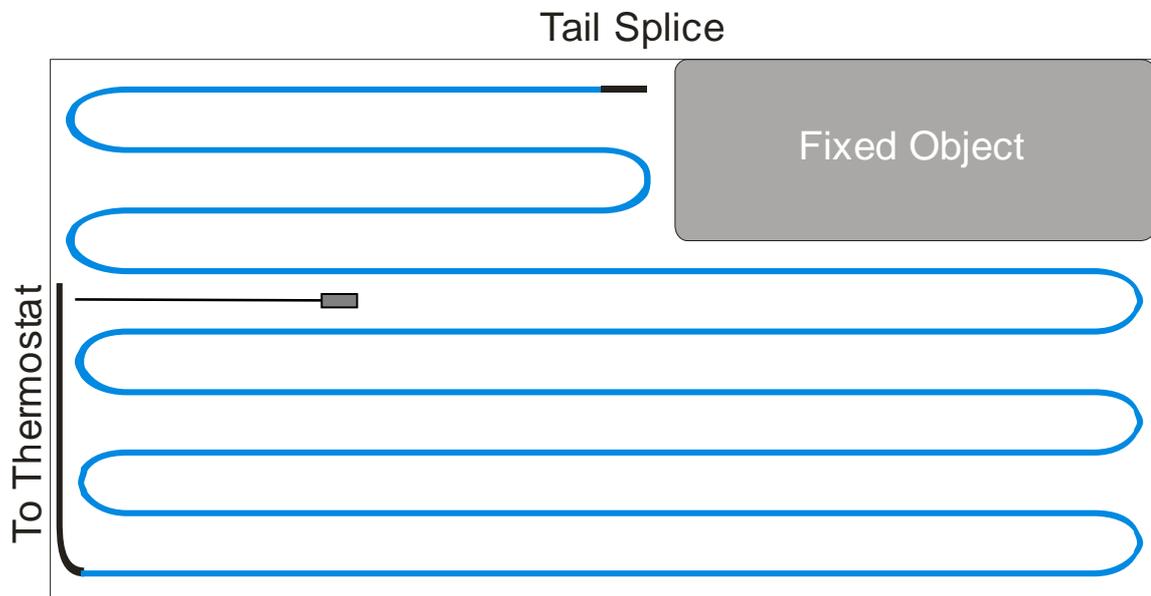
$$\text{O.C. in millimeters} = (\text{Net Heating Area in M}^2 \times 1000) \div \text{Length of Cable(s) in Meters}$$

Each cable's length is listed on its label and in the product selection guide; combine cable lengths if more than one set is being used for a zone. Once you have your O.C. spacing calculated you are ready to begin laying out your cable. The formula assumes that you will use  $\frac{1}{2}$  O.C. spacing around walls and fixed objects and full O.C. spacing between cable runs. It is recommended that you cut out a measuring template out of cardboard representing the O.C. spacing less the thickness of the cable. You will then be able to place this template next to a cable in order to determine where the next run should be placed. Fold the template in half to determine the  $\frac{1}{2}$  O.C. spacing to be used around walls and fixtures.

*Note: O.C. spacing for floor warming cables should never be any less than 3 3/16" or 8 cm apart.*

### Planning cable layout

ThermaWire™ twin conductor cable sets are easy to layout; simply lay out the heating cable starting below the thermostat location with the black splice on the floor and begin laying out cables  $\frac{1}{2}$ " O.C. from walls and objects and full O.C. from each other. The result of a properly calculated O.C. and layout should result in the tail of the heating cable being located near the end of the room.



**Drawing 1: Sample floor warming cable layout**

It is recommended that you plan installations in such a way as to keep buffer areas such as closets or under a movable appliance and less important areas near the end of your cable layout. In the event that you end up with too much cable you will always be able to install the extra cable in these areas.

Where two cable sets are used in the same room, plan your cable layout in advance so that all heating wires are full O.C. apart and that a return path has been planned for the extra cold lead(s).

### Attaching heating cables to sub-floor

Once cable layout and on-center spacing has been determined it is time to begin installing the heating cable. Heating cables may be installed using tape, clip strips, hot glue or low-impact T18A staplers over wood flooring. Non-approved fasteners which have the potential to damage heating cables are not permitted and will void the warranty.

Installing heating cables with tape or plastic clip strip is especially recommended for rooms with long straight runs and for installations over existing concrete slabs. Using clip strip will require you to clip the cable through the closest interval “fingers” and pass the cable through. The strips can be cut to desired length and attached to sub-floor using metal fasteners or hot glue.

Once cables are installed it is important to check cable resistance and the presence of earth leakage. The best way to detect problems when they occur is to use a cable fault alarm.

*You are now ready to skip to the cable and underlayment installation section suited for your application and cable type. Read the following section on floor warming mat installation only if you will be using one in your installation.*

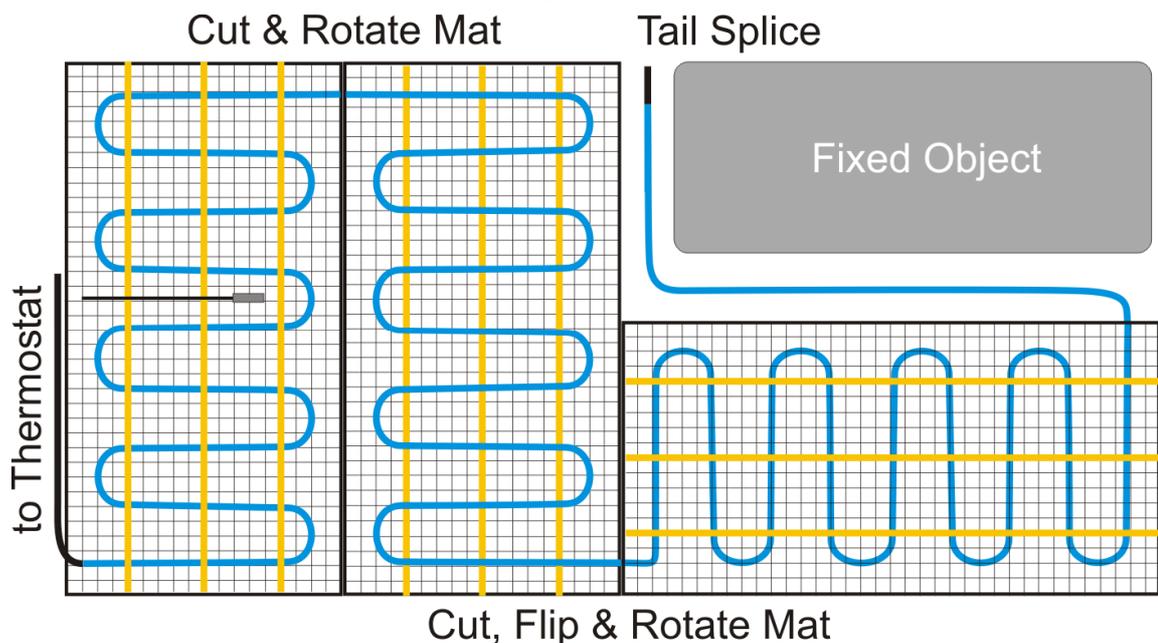
### A.3 Floor Warming Mat Installation

*Heating mats are intended to save on installation time and are best suited for straightforward, rectangular areas and DIY installations. It is possible to combine heating mats with heating cables if required. It is also permissible to detach heating cable from part of the mat where required as a means of filling in odd shaped areas.*

#### Planning heating mat layout

*Here are some general guidelines to help you determine the best way to lay out a floor warming mat. Planning will be required before the best approach is found.*

Heating mats start with their cold leads and unroll until the end of the mat has been reached. It is therefore important to ensure that you start each mat close enough to the thermostat or junction box so that the 16’ or 5 m cold lead will reach it. Mats may be laid in any direction; however, it is recommended that the width of the room be measured first to determine whether the width of the mat plus 4” or 10 cm between runs will fit evenly. If not then it is recommended that mats be run perpendicular to the width of the room and turned 180° as the best means of filling-in the area. Mat mesh must be cut without damaging wire in order to make a turn and will need to be flipped over when going perpendicular. When installing more than one mat, cold leads may be taped or glued down between mats and / or perimeter of the room in order to reach thermostat or junction box. Ensure that cold leads never touch blue heating cables.



### **Drawing 2: Sample floor warming mat layout**

It may be necessary to detach a portion of the heating cable from the mat material in order to reach odd shaped places or areas narrower than the mat at the end of the installation area. To do this, simply cut the mat material and pull apart the tape holding it to the heating cables. You may then attach the heating cable to the sub-floor using the installation methods described in the previous section on installing floor warming cables. Make sure that manually spaced heating loops are approximately the same 4" or 10 cm apart as used in the heating mat if uniform heating is desired. Note that floor warming cables may not be installed any closer to each other than 3 3/16" or 8 cm.

### **Attaching floor heating mats to sub-floor**

*Depending on which ThermaWire™ Floor Warming Mats you purchased there will be different methods to attach them to your sub-floor.*

If you purchased a floor warming mat with a "sticky" back then you will be able to adhere the mat to the sub-floor using the sticky back of the mat as long as the sub-floor is dry and free of dirt. However, when the mat is turned 90° you will need to flip it over and peel the backing of the double sided tape and use this instead to hold the mat down. Tape, hot glue or general purpose flooring adhesive may be used to hold mats down securely to concrete or wooden sub-floors. You will want to ensure that the surface of the mats is even and level before proceeding to embed them in cement mortar.

### **A.4 Thin Mortar Bed Installations**

*Installing cement mortar based underlayment over floor warming cables and mats is the most critical part of an installation. It is recommended that flooring installer or an experienced cement finisher be contracted or consulted before attempting this part of the installation.*

### **Determining requirement for sub-floor reinforcement**

For installations over wooden sub-floors it is important to determine whether they need to be reinforced before heating cable or mat installation can commence. Reinforcement is normally accomplished by screwing-down a 2<sup>nd</sup> layer of plywood or cement board to an existing wooden sub-floor, installing a decoupling or anti-fracture membrane and is done to prevent thinset mortar and grout from cracking. It is also convenient to raise a sub-floor so that the heights of finish flooring will be the same.

Heating cable mortar underlayment is also prone to cracking if the sub-floor is not properly reinforced. It is therefore very important to determine if, how and when reinforcement will be accomplished before installation commences.

*Disclaimer: Check with your builder, flooring installer and mortar manufacturer's installation instructions before proceeding. The aforementioned guidelines are not to be used solely on their own and need to be qualified by professionals for your particular project. ThermAtlantic Energy Products Inc. will not be held responsible for finish flooring or underlayment problems caused by excessive deflection or improper mortar bed installation.*

### **Installing floor sensor**

Floor sensors should be installed in-between two heating cable runs somewhere within 1-5' or 33-165 cm away from the bottom of the thermostat or termination box. It is important to choose a location that will not be covered by a rug, furniture or other object since this will likely cause the sensor to overheat and consequently send the thermostat the wrong average floor temperature.

Install the sensor using heating cable tape or hot glue. Ensure there is an adequate length of sensor wire to reach the thermostat or junction box.

### **Installing cold leads**

*Once the heating portion of the cable has been installed it is necessary to bring cold lead(s) and floor sensor wire up to the thermostat or to an accessible electrical box for termination.*

The standard practice for installing cold leads and floor sensor wire is to notch the interior wall partition's base plate to its center and then to "fish" wires up through listed electrical conduit through the center of any blocking to thermostat box. It is recommended that electricians feed power from the top of the thermostat box, allowing the heating cable to enter through the bottom of the box. Using conduit within a wall cavity is optional unless required by local electrical or building code and will help prevent damage from wall fasteners. When installing cold leads and floor sensor through a notched base plate it is important to protect the area surrounding the entry of the cables with a thin metal plate. This will prevent possible damage from fasteners when baseboard moldings are installed.

Alternatively, when doing installations in wood frame construction over an unfinished basement it is possible for cold leads and floor sensor wire to be dropped through small holes in the sub-floor and then be pulled up through a larger hole drilled through the center of the wall's base plate before entering conduit. This method is preferable when possible because it allows access to cold leads and sensor wire from below without having to remove flooring, moldings or wall sections.

### **Priming sub-floor**

It is important to take every precaution to ensure that the cement underlayment is installed properly. It is therefore recommended that the appropriate primer be sprayed or rolled on at this stage. Before applying primer it is essential that the sub-floor be free of dust, debris and dirt. Primer will seal the sub-floor so that it does not absorb moisture from the mortar and will also increase the bond between the sub-floor and mortar. Make sure that adequate time is allowed for primer to dry before covering with cement mortar.

### **Installing thin mortar bed**

*Now that heating cables and / or mats are installed and floor is primed it is time to install the thin-bed mortar underlayment.*

For thin-bed mortar installations, it is recommended that self-leveling cement be used. Prepare the mixture as per the manufacturer's instructions and pour or pump it over the heating cables and mesh to a depth covering the floor warming cables & mats. When using self-leveling cement it is recommended a plastic spiked pin roller be used in order to obtain an even depth and remove air bubbles. If it is available in your area, our ThermaFlow™ Self-Leveling Cement underlayment is recommended because of its superior strength, better thermal heat transfer and acoustical dampening properties. It is also recommended that a plastic pin roller be purchased when using ThermaFlow™ to guarantee an even, smooth finish.

Alternatively, thinset mortar or latex reinforced scratch mixture can be troweled on over heating cables if desired. Cables and mats may be covered first by a mortar bed layer before flooring is installed or more experienced tile and stone installers may choose to embed cables / mats and install flooring in one step. Note that when using a trowel around floor warming cables that it is important not to strike them in any way with the edge of the trowel.

## Installing optional de-coupling or anti-fracture membranes

De-coupling or anti-fracture membranes are alternate means of addressing possible sub-floor deflection, movement or cracking problems. Should one be used in your installation, follow the membrane manufacturer's installation instructions; especially as it applies to whether the mortar embedded heating cables should be installed under or over the membrane and what type of thinset to use.

## Installing finish flooring

*Once cement underlayment has been installed and has had a chance to harden you are ready to install your finish flooring. This section is only meant as a guideline. Read the instructions provided with your flooring materials before proceeding with the installation of your flooring.*

It is recommended that ceramic tile, porcelain and natural stone installations use floor heating approved thinset mortar; synthetic flooring adhesives are not recommended as they may release an odor when used over heated floors.

Floating floors can be installed as soon as indicated by the self-leveling cement manufacturer's instructions; typically 3-5 days assuming sufficient heat and ventilation is provided. Always check your flooring manufacturer's recommended humidity testing procedures before proceeding and whether a vapour barrier is required under wood flooring.

Before gluing-down wood flooring, check to ensure that you will be using adhesives designed for radiant heating applications and your flooring type. Usually Urethane flooring adhesive is recommended for engineered wood flooring since it does not contain any water and remains flexible throughout its lifetime - thereby allowing wood flooring to move without cracking or breaking the bond to the sub-floor.

*Disclaimer: ThermAtlantic Energy Products Inc. will not be held responsible or liable for improper use or installation of mortars, adhesives or finish flooring.*

## A.5 Thermostat Installation

*This section is an overview of how to install ThermaWire™, Honeywell or Aube floor heating thermostats only but may be used as a general guideline for most line voltage thermostats. You are required to use thermostats approved for use in Canada by UL, CSA or other certification agency.*

### Connecting Power & Heating Cable Leads

*Your Electrician must connect thermostat to line voltage and heating cable leads.*

Power connections are made to the red L1 & black L2 / N wires off the thermostat. Floor warming cable red & black cold lead wires are connected to the load connections off the thermostat and the green wire is connected to ground in the thermostat box.

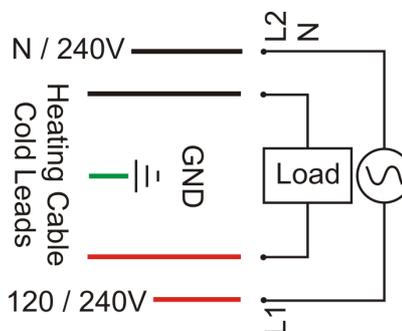


Figure 1: Thermostat power & heating cable connections

It is important that correct voltage model thermostats be used and that each thermostat's load is not exceeded. For 120V models you may connect up to 1,800 Watts and up to 3,600 Watts for 240V models.

### Connecting Floor Sensor

*Floor sensors are used to maintain specified floor temperature or ensure that floor doesn't get too cold or too hot depending on flooring type.*

Next you must fish the thinner floor sensor lead through one of the small holes on the bottom of the thermostat and screw them into the floor sensor connection terminals 1 & 2 as shown below:

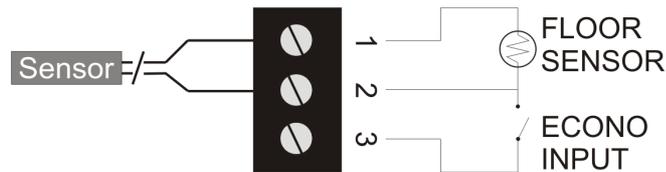


Figure 2: TH115-AF Floor Sensor Connection

### Selecting Operating Mode & Settings

*Here you will set the thermostat for floor warming or primary heating modes along with some other settings using the DIP switches on the back of the removable face plate.*

ThermaWire floor warming & heating thermostats can be setup to maintain floor temperature only (F mode) or air temperature with floor temperature limitation (AF Mode). It is recommended that floor warming mode be used in situations where the floor warming system is a secondary heat source. Air-floor mode should be used when the floor warming system is the only heat source in a room – with the exception of bathrooms where floor warming mode may be preferable. To select the mode simply set the 3rd dip switch on the back of the removable cover to either F or AF mode; the factory default is for floor warming or F mode.

Next you may enable Early-Start or ES mode using the 2<sup>nd</sup> dip switch. Early-start mode enables the thermostat to estimate how long it takes to reach the desired temperature when scheduling is used based on past usage. The factory default is OFF but it is recommended that it be turned ON.

Lastly you may select whether to use imperial or metric time and temperature settings using the 1<sup>st</sup> dip switch. C/24h is the factory default and will use Celsius and a 24 hour clock; F/12h will use Fahrenheit and a 12 hour clock.



Figure 3: TH115-AF Thermostat DIP Switches

Once all DIP switch settings have been made you may connect the cover to the power base of the thermostat and tighten the bottom screw to hold it in place. Please refer to Thermostat User Guide for instructions on how to program and use thermostats.

## **Testing GFCI**

*Ground fault circuit interrupters or GFCI's are devices which protect you from electrical shock or your home from fire in the event of a cable fault.*

Once thermostat is installed it is important to verify that its GFCI Test function is working properly. To do this you will need to turn its breaker on, take the thermostat off standby mode, temporarily raise the target temperature until heating mode clicks on and heating waves show up on the LCD screen. Now that heating is engaged, press down on the plastic tab on the very top of the thermostat to test the GFCI. If it is working properly then the tab will turn red and the message GFI will show on the LCD. To reset the thermostat, merely switch it on standby mode and then back ON. This test should be repeated at least once a month to verify that the GFCI circuitry is working properly. Should this safety feature cease to work correctly, contact your electrician and be prepared to replace the thermostat.

## **Detecting GFI Problems**

Once your floor warming system is running it is possible that you may experience a GFI error. If after resetting the thermostat once it happens again immediately or shortly after the heat goes on, contact your electrician so they can determine if you have a faulty thermostat or a cable fault.

In the event of a GFI error, floor warming cables must be checked for insulation leakage and resistance by an electrician or qualified installer. See Page 3, tip number 17 for details regarding proper testing procedures.

## B. Glossary of Terms

*Below is a list of technical terms used throughout the installation instructions and in product specifications.*

- Cold Lead:** Non-heating, 16' or 5m long, white cable ends that are joined to the heating portion of the cable with a visible black splice. Cold leads are used to supply power to the heating portion of the cable set and are intended to be fished up to a wall mounted thermostat.
- Hot Lead:** Variable length, colored heating portion of the cable which is joined to the cold lead with a visible black splice. This is the part of the cable set which heats up and must therefore always be in the floor section of the installation.
- Splice:** Black, 4" or 10 cm long heat shrink section of the cable set where cold & hot leads are joined. Note that splice must always be located in the floor section, not in the wall. The splice is the weakest part of the cable set so try not to bend it. It is advisable to always leave at least a little bit of cold lead in the floor before entering the wall cavity.
- Tail Splice:** Twin conductor cable sets have a visible, black tail at the end of the hot lead. The tail must be located in the floor and embedded in cement mortar since it heats up.
- Resistance:** The heating cable's nominal resistance in Ohms is printed on the cable set and included in the product matrix and specifications. This resistance must be checked before and after installation to ensure the cable has not been damaged. Resistance is measured between both cold lead primary conductors and must fall within -5% / +10% of nominal resistance printed on the label and product selection guide.
- Voltage:** Each cable set is designed for specific voltages. The voltage is included as part of the product specification. 240V cable sets may be utilized at 208V; however this will lower their wattage or heat output by 25% so make sure you size floor warming cables & mats accordingly.
- Wattage:** This is the measure of energy that will be transferred into heat. Wattage is specified in the suffix of product code for the cable's design voltage. Note that the wattage will change if a different voltage than the one specified is used.
- Earth Leakage:** Earth leakage occurs when the internal insulation, outer jacket or splice has been compromised during or after installation. It is therefore important to test for insulation leakage for each heating cable set before, during and after installation using a megaohm meter or "Megger". Testing insulation leakage requires measuring the resistance between one primary cold lead conductor and the grounding sheath at a minimum of four times the operating voltage. For example, use 500V for 120V & 1000V for 240V systems. The meter should show zero leakage in the < 20 gigaohm range; however it is acceptable to experience over, but not less than 5 gigaohms of insulation leakage.

## C. Product Selection & Specifications

ThermaWire™ Floor Warming Cable Selection Chart									
On-Centre Spacing in inches:							4 3/4	4	3 3/16
Floor Warming Cable 4 W/F Series	Design Voltage	Cable Power Output			Length Feet	Resist. Ohms	Target Floor Warming Area		
		W/F	Watts	Amps			Wood 10W/SF	Tile 12W/SF	Max 15W/SF
CFW-T-120/4-200	120	4.0	200	1.7	50	72	20	17	13
CFW-T-120/4-250	120	4.0	250	2.1	63	58	25	21	17
CFW-T-120/4-310	120	4.0	310	2.6	78	46	31	26	21
CFW-T-120/4-385	120	4.0	385	3.2	97	37	39	32	26
CFW-T-120/4-480	120	4.0	480	4.0	121	30	48	40	32
CFW-T-120/4-600	120	4.0	600	5.0	151	24	60	50	40
CFW-T-120/4-750	120	4.0	750	6.3	189	19	75	63	50
CFW-T-120/4-940	120	4.0	940	7.8	237	15	94	78	63
CFW-T-120/4-1175	120	4.0	1175	9.8	296	12	118	98	78
CFW-T-120/4-1430	120	4.0	1430	11.9	361	10	143	119	95
CFW-T-240/4-200	240	4.0	200	0.8	50	288	20	17	13
CFW-T-240/4-250	240	4.0	250	1.0	63	230	25	21	17
CFW-T-240/4-310	240	4.0	310	1.3	78	186	31	26	21
CFW-T-240/4-385	240	4.0	385	1.6	97	150	39	32	26
CFW-T-240/4-480	240	4.0	480	2.0	121	120	48	40	32
CFW-T-240/4-600	240	4.0	600	2.5	151	96	60	50	40
CFW-T-240/4-750	240	4.0	750	3.1	189	77	75	63	50
CFW-T-240/4-940	240	4.0	940	3.9	237	61	94	78	63
CFW-T-240/4-1175	240	4.0	1175	4.9	296	49	118	98	78
CFW-T-240/4-1430	240	4.0	1430	6.0	361	40	143	119	95
CFW-T-240/4-1800	240	4.0	1800	7.5	454	32	180	150	120
CFW-T-240/4-2295	240	4.0	2295	9.6	579	25	230	191	153
CFW-T-240/4-2865	240	4.0	2865	11.9	723	20	287	239	191

ThermaWire™ Floor Warming Mat Selection Chart									
Floor Warming Mats 12 W/SF Series	Design Voltage	Mat Power Output			Mat Size		Resist. Ohms	Coverage SF	
		W/SF	Watts	Amps	Len '	Width "			
MFW-T-120/12-200	120	12	200	1.7	11	18	72	17	
MFW-T-120/12-250	120	12	250	2.1	14	18	58	21	
MFW-T-120/12-310	120	12	310	2.6	17	18	46	26	
MFW-T-120/12-385	120	12	385	3.2	21	18	37	32	
MFW-T-120/12-480	120	12	480	4.0	27	18	30	40	
MFW-T-120/12-600	120	12	600	5.0	33	18	24	50	
MFW-T-120/12-750	120	12	750	6.3	42	18	19	63	
MFW-T-120/12-940	120	12	940	7.8	52	18	15	78	
MFW-T-120/12-1175	120	12	1175	9.8	65	18	12	98	
MFW-T-120/12-1430	120	12	1430	11.9	79	18	10	119	
MFW-T-240/12-200	240	12	200	0.8	11	18	288	17	
MFW-T-240/12-250	240	12	250	1.0	14	18	230	21	
MFW-T-240/12-310	240	12	310	1.3	17	18	186	26	
MFW-T-240/12-385	240	12	385	1.6	21	18	150	32	
MFW-T-240/12-480	240	12	480	2.0	27	18	120	40	
MFW-T-240/12-600	240	12	600	2.5	33	18	96	50	
MFW-T-240/12-750	240	12	750	3.1	42	18	77	63	
MFW-T-240/12-940	240	12	940	3.9	52	18	61	78	
MFW-T-240/12-1175	240	12	1175	4.9	65	18	49	98	
MFW-T-240/12-1470	240	12	1470	6.1	82	18	39	123	
MFW-T-240/12-1800	240	12	1800	7.5	100	18	32	150	
MFW-T-240/12-2295	240	12	2295	9.6	128	18	25	191	
MFW-T-240/12-2865	240	12	2865	11.9	159	18	20	239	

For areas larger than that shown per single floor warming cable or mat, consider using more than one 240V set to a maximum of 3,600W or 15A per thermostat. For areas larger than this you will need to use more than one thermostat or a master / slave thermostat combination.



## **E. Product Warranty**

ThermAtlantic Energy Products Inc. warrants the ThermaWire™ floor warming system ("the Product") to be free from defects in materials and workmanship for ten years from the date of purchase, provided that the Product is installed in accordance with the accompanying Installation and Homeowner's Manual, and any special written design or installation guidelines provided by ThermAtlantic Energy Products Inc. for this project, the applicable Electric Code, and all applicable local building and electrical codes.

ThermAtlantic Energy Products Inc. assumes no responsibility under this warranty for any damage to the product caused by any trades people, or visitor on the job site, or damage caused as a result of post installation work.

Contact us if you have any questions about your installation.

Under this Limited Warranty, ThermAtlantic Energy Products Inc. will provide the following remedy:

If the Product is determined to be defective in materials and workmanship, and has not been damaged as a result of misuse or misapplication, ThermAtlantic Energy Products Inc. will reimburse the costs for location of the fault, repair of Product, as well as labor and materials required to perform the repair.

If the repair of the product is not feasible, ThermAtlantic Energy Products Inc. will replace the Product or refund the original cost of the Product.

The Limited Warranty is null and void if the project owner or his representative attempts to repair the Product without receiving authorization. Upon notification of a real or possible problem, ThermAtlantic Energy Products Inc. will issue an Authorization to Proceed under the terms of the Limited Warranty.

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