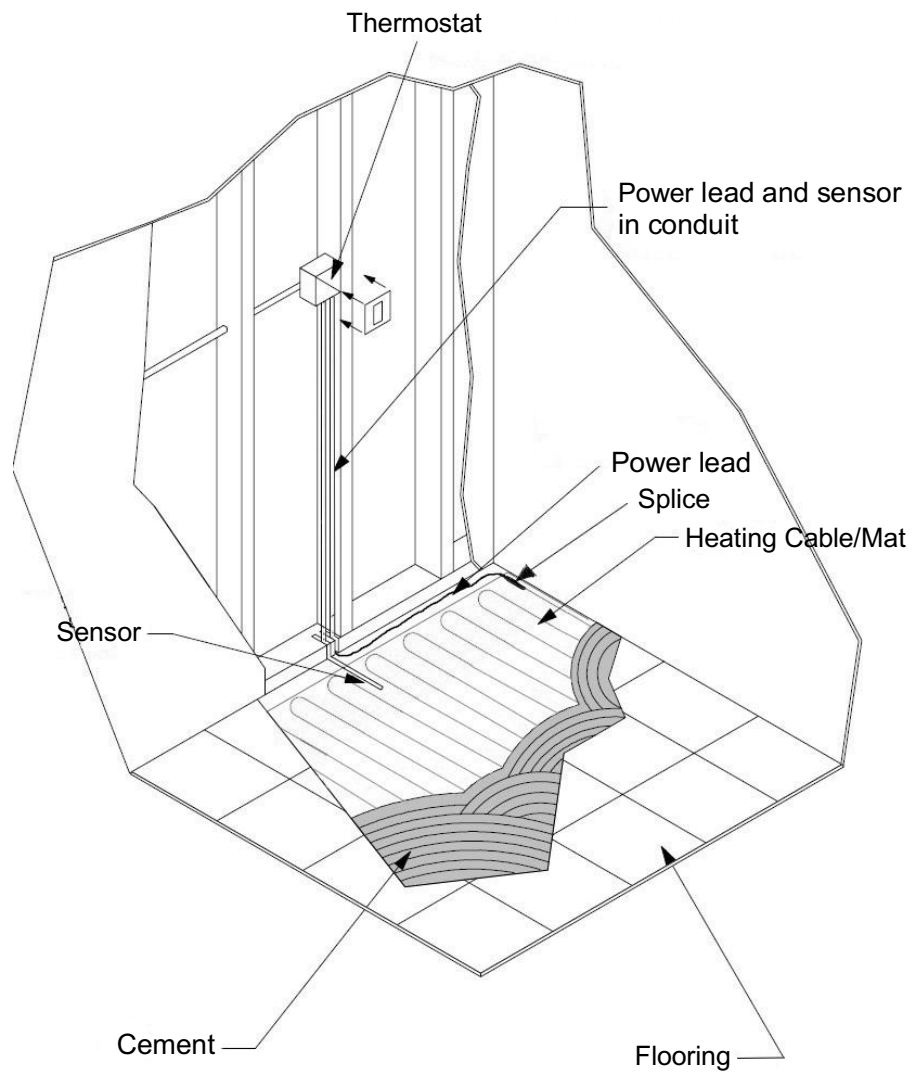



# Heating Cable System Installation Manual



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## Important Safeguards and Warnings

### **WARNING: Shock and fire hazard**

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

Thermostat must be used.

It is important that this equipment is installed only by qualified electricians who are familiar with the proper sizing, installation, construction and operation of floor warming system and the hazards involved. The installation must comply with all national and local electrical codes. If you are unfamiliar with these requirements, contact an electrician.

The HEATING SYSTEM is designed for under floor heating purposes only. Be sure that the floor is not penetrated by nails, screws, or similar devices that can cause damage on first installation or during subsequent floor repairs in the future.

If the heating mat is damaged, it must be replaced. **DO NOT ATTEMPT TO SPLICE OR REPAIR ANY PART OF THE HEATING CABLE.**

## 1 General Information

### 1.1 Use of the Manual

This manual describes the NORTHGATE HEATING SYSTEM — how to design the room, select the product, and install the system. It is important to thoroughly review this manual and Thermostat Installation and Operation Manual prior to installation.

NORTHGATE HEATING SYSTEM includes Heating Cable, Thermostat, Installation Tester.

For additional information regarding any aspect of the HEATING SYSTEM, contact:

The Northgate Trading Inc.

info@thenorthgatetrading.com

www.thenorthgatetrading.com

### 1.2 Safety Guidelines

The safety and reliability of any floor heating system depends on proper design, installation, and testing. Incorrect installation or mishandling of the product can cause damage to the heating cable, system components and property, and can create a risk of fire or shock. The guidelines and instructions contained in this guide are important. Follow them carefully to minimize these risks and to ensure that the HEATING SYSTEM performs reliably.

Pay special attention to the following:

Instructions marked  are Important

Safety warnings identified as  **WARNING**

### 1.3 Remember to measure resistance

The resistance should be measured between the two conductors, blue and brown. Compare this resistance reading to the resistance specified in the Product Selection “Table 1”. The value should be within -10% to +15%. If you get a different reading, contact your supplier.

Also, measure the resistance between the blue, brown and shielding/ground wire. Both should read infinity. If you get a different reading, contact your supplier.

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



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

Remember to always measure, verify and record the actual resistance throughout the installation process (out of the box, after installation, after thin set cement or self-leveler application and after installation of floor tiles).

#### 1.4 25-year Limited Warranty

For a period of twenty-five (25) years from the date of purchase manufacturer warrants that the HEATING CABLE is free from defects in material, design and workmanship. The extended warranty is only valid if the warranty certificate has been properly completed and mailed, and the installation is in accordance with the installation instructions.

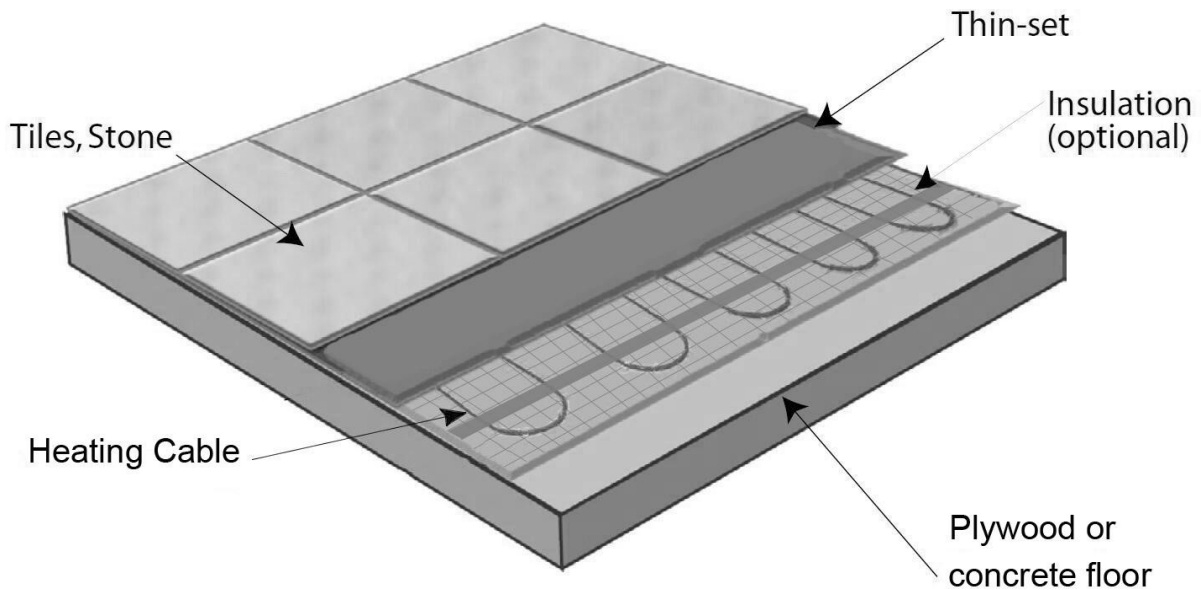
## 2 NORTHGATE HEATING SYSTEM

### 2.1 HEATING CABLE Specifications

Cable Construction:	Twin conductor
Rated Voltage:	120V or 240V
Output:	12W/m, 16W/m, 18W/m, 20W/m
Heating Element Size:	9.6-150.0 m
Bending radius:	25 mm
Cable Diameter:	3.6 mm
Conductor Insulation:	fluoropolymer
Outer Insulation:	PVC
Max. Ambient Temp.:	85°F (30°C)
Min. Installation Temp.:	40°F (5°C)
Cold lead	2.5 m length

### 2.2 THERMOSTAT Specifications


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




**Figure 1: Installing directly on plywood or concrete**

### 2.3 HEATING SYSTEM typical installations and applications

Alternative method: self-leveling cement is recommended for large surfaces and the following floor materials: engineered wood, laminate, floating floors, vinyl, linoleum and carpet.

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

 Read the instructions carefully before installing HEATING SYSTEM.

- Remember to measure the resistance four times.
- Do not install HEATING CABLE under permanent fixtures or furniture such as showers, toilets, vanities, or cabinets. New furniture added in the future on the heated area must have feet or will cause overheat and damage the heating cable.
- If heated area covered by anything, such as carpet, the floor sensor must be there in the hottest area to protect the heating cable or will cause overheat and damage the heating cable.
- The cable (include splice and end seal) must be on the floor and embedded in mortar, thinset, concrete or similar material, or will cause overheat and damage the heating cable.
- The heating cable cannot be cut to length, crossed over itself, or installed too close.
- It is recommended to use copper wire only.
- Remember to check the supply voltage matches the voltage of the HEATING SYSTEM.
- Do not install HEATING CABLE in walls or ceilings.
- Only for indoor installation.
- The minimum installation temperature is 40°F (5°C).

### 3 Floor Heating Design and Product Selection

#### 3.1 Design the Installation

##### Step 1: Measure the heated area


For example, in Figure 2, the area of the bathroom is  $8.75 \text{ m}^2$  (94 sqft). When you subtract the area of the vanity, shower and toilet, the total heated area is only  $6.45 \text{ m}^2$  (69 sqft).

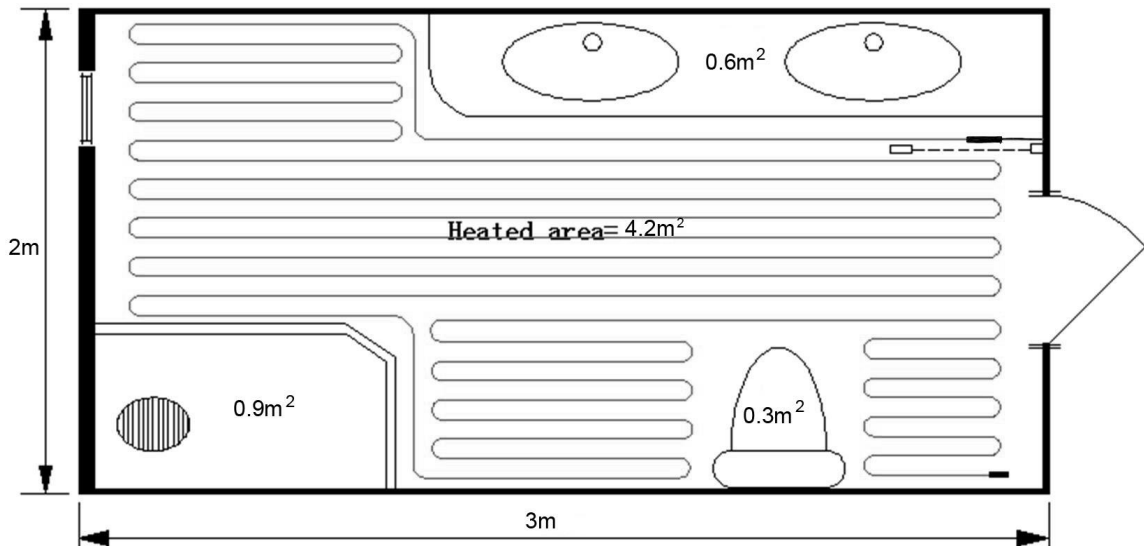
##### Step 2: Determine the power supply voltage

Make sure the supply voltage is 120 V.

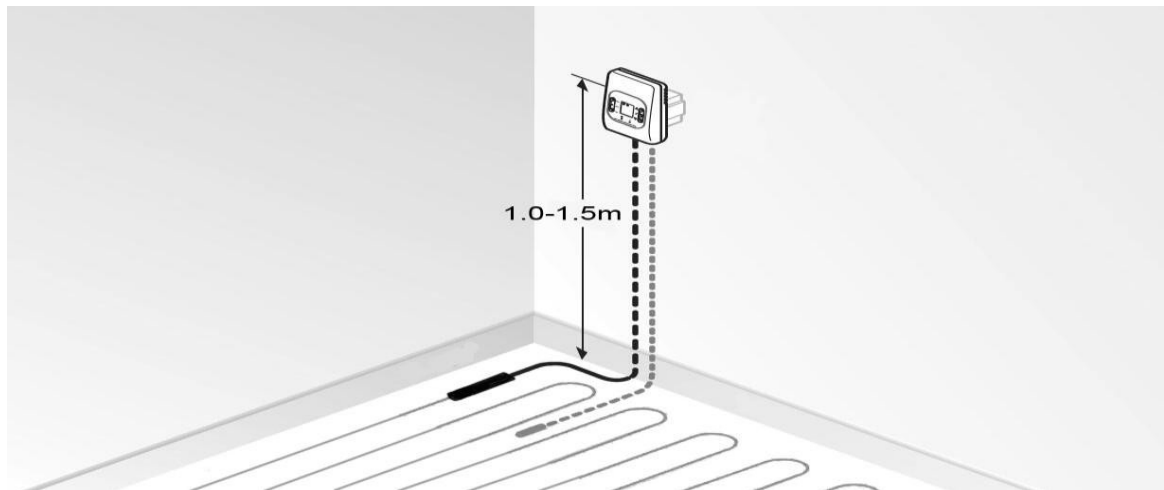
##### Step 3: Plan the design

Determine the optimum floor heating mat layout for your heated area to ensure coverage. Select a spot for the thermostat in the wall above the heated area where it can be reached by the 2.5 m (8.2 ft) cold lead on the HEATING SYSTEM, and the 3.0 m (9.8 ft) floor temperature sensor. Please refer to Figure 3.

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



**Figure 2: Heated area example**



**Figure 3: Typical cold lead and floor sensor layout**

### 3.2 Confirm Your Product Selection

Confirm that your HEATING CABLE is no larger than the heated area. Following the example from Figure 2, if the heated area is 4.2 m<sup>2</sup>, and you prefer heating power 200W/m<sup>2</sup> (18 W/sqft), then 4.2\*200W/m<sup>2</sup>=840W, select FHCT20-800.

**Table 1: Heating Cable Selection**

Catalog number	Cable length m	Power output W	Current A	Resistance Ohms
110V, 20W/m FHCT				
FHCT20-200	10	200	1,8	60,5
FHCT20-300	15	300	2,7	40,3
FHCT20-400	20	400	3,6	30,3
FHCT20-500	25	500	4,5	24,2
FHCT20-600	30	600	5,5	20,2
FHCT20-700	35	700	6,4	17,3
FHCT20-800	40	800	7,3	15,1
FHCT20-900	45	900	8,2	13,4
FHCT20-1000	50	1000	9,1	12,1
FHCT20-1200	60	1200	10,9	10,1
FHCT20-1400	70	1400	12,7	8,6
FHCT20-1600	80	1600	14,5	7,6

## 4 Installation



### Tools and materials required

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

- Scissors
- Utility knife
- Wire strippers
- Tape measure
- Screwdriver
- Multimeter

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

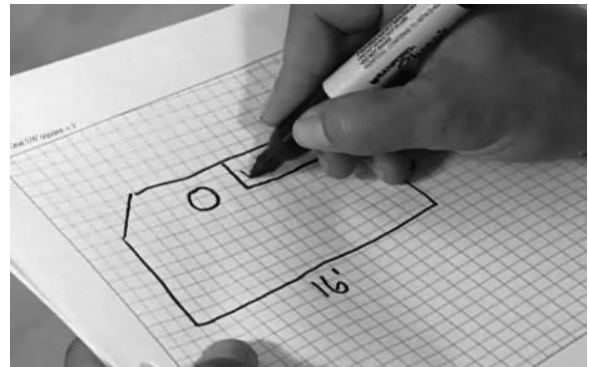
Follow these steps to ensure a successful HEATING SYSTEM installation.

### Step 1: PLAN LAYOUT

Make a sketch layout or a floor plan of the room; include all permanent furnishings such as toilets, bathtubs, appliances, cabinetry, etc. Indicate all dimensions required to determine the available floor area and the position of the Thermostat.



It is recommended that the installation is documented with photos to note the location of connections and the sensor.



### Step 2: TRANSFER LAYOUT TO FLOOR

Draw an outline of the layout on the room floor including a footprint of all furnishings that are not yet installed. Unroll the first few feet of the Heating Cable. The starting point of the cable must be placed within 2.5 m (8.2 ft) from the thermostat. Using your floor plan determine your desired spacing of cable and strapping (recommended 0.5-1 m (1.5-3 ft) apart).

**Minimum distance between cables must be 50 mm (2 in) or greater.** Recommended distance is 100 mm (4 in), this will give you power 18W/sqft. Mark the position of the connection point between the power lead and the Heating Cable. **This connection must be concealed in thinset or self-leveling cement.** When using a floor temperature sensing thermostat, mark the sensor position in the middle of 2 heating cables, about 25 cm (10 in) away from the wall (within the heated area), as close as possible to the thermostat.

### Step 3: INSTALL SENSOR

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



The sensor and/or tube needs to be installed between the thermostat wall box and the sensor position. The conduit tube must be partially countersunk into the subfloor. Cut a channel approximately 8 cm (3 in) deep x 8 cm (3 in) wide in the floor and wall up to the thermostat for the sensor conduit. The conduit has to go from the



thermostat and minimum of 25 cm (10 in) away from the wall towards the middle of the floor.



The sensor conduit must be centered in the cable loop (between two heating wires). Use duct tape to close the end of the conduit so that thinset can't penetrate the conduit.

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

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

**Step 4: PREPARE SUBFLOOR SURFACE**

Clean and vacuum the floor thoroughly and remove dust and debris from the floor that may damage the heating cable.

Ensure that the subfloor is secure and stable. Carefully fill in all cracks to prevent any potential damage to the new tiles resulting from shifts in the subfloor.



**Step 5: MEASURE THE RESISTANCE (THE FIRST TIME)**

Use a digital ohm meter to measure the resistance of the Heating Cable and compare it to "Table 1". Record the measured resistance on the warranty card. Documenting the resistance at each stage of installation is required for warranty purposes. Also, measure the resistance between the white, black and shielding/ground wire. Both should read infinity.

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

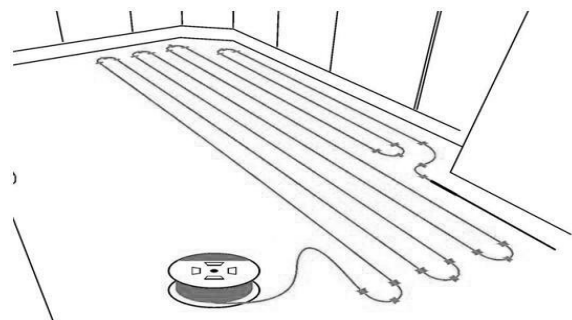
**Step 6: BEGIN LAYING THE HEATING CABLE**

Place the cable so that the connection point and the temperature sensor are in their intended positions and bring the power lead cable to the thermostat or connection box.

Start laying the Heating Cable according to the layout developed in Step 1.

**DO NOT CUT OR SHORTEN THE HEATING CABLE!**

Do not expose it to any mechanical stress. Avoid walking on the Heating Cable. If this is not possible, use shoes with soft soles. Use metal strapping tape to secure the cable to the subfloor. Attach the metal strapping tape with adhesive, nails, staples, or double-sided tape. Please refer to Step 8 for instructions on how to use the metal strapping tape.



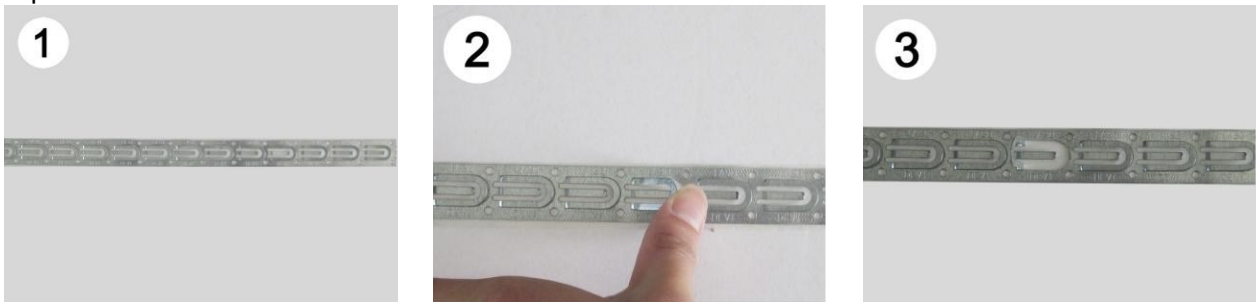
**ENSURE THAT THE SENSOR CONDUIT HAS BEEN PROPERLY INSTALLED BEFORE PROCEEDING** (refer to Step 3).

It is highly recommended take photographs of the installed FHCT before installing the flooring.

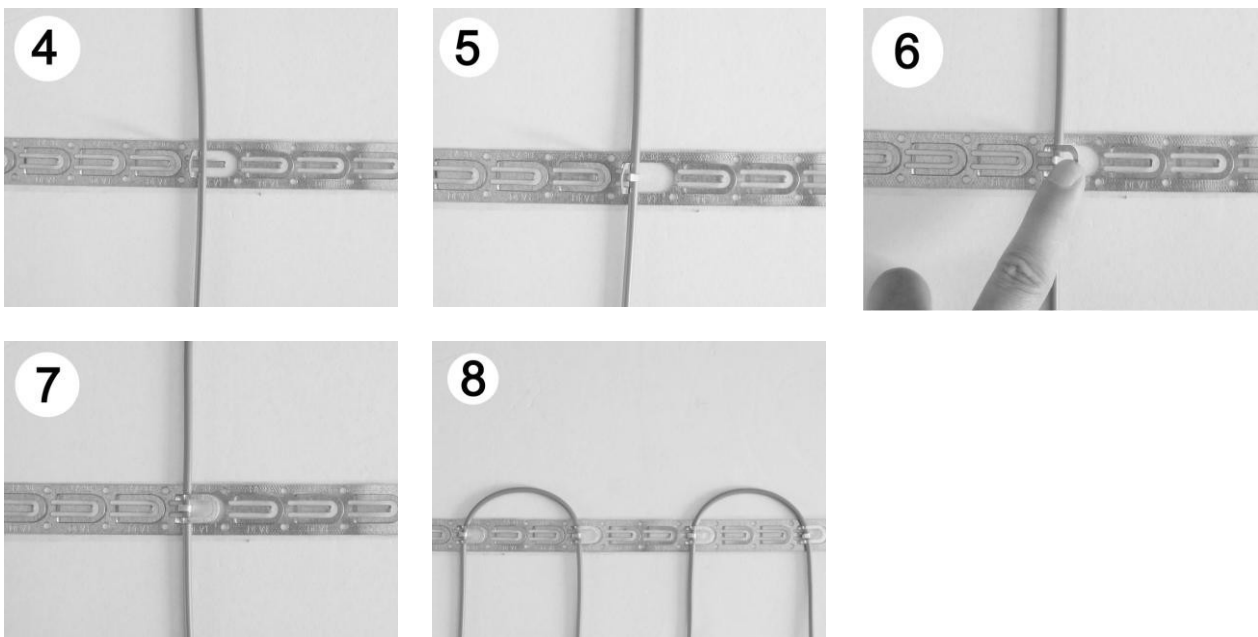
**Step 7: MEASURE THE RESISTANCE (THE SECOND TIME)** Refer to Step 5.

### Step 8: STRAPPING INSTRUCTIONS

Space the strapping at a distance of 0.5 m (1.6 ft) to 1 m (3.3 ft) (maximum recommended spacing is 1 m (3.3 ft)). Secure the strapping to the subfloor with adhesive, staples, nails, or double-sided tape.




### Step 9: Embed the floor heating cable in mortar



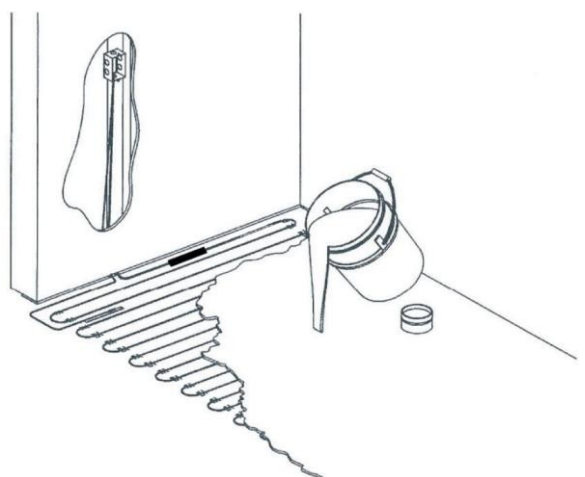
For tiling applications, proceed with the installation of the tiles by covering the heating cables with a layer of thinset cement as directed by the tile manufacturer. Ensure that the thinset mortar covers the entire heating cable as the tiles are installed.

For engineered wood or laminate floor coverings, it is recommended to consult the flooring manufacturer for maximum temperature allowance (use a thermostat with a floor temperature limiter). For wooden floors, self-leveling cement over the heating cable is recommended. Ensure that all moisture in the self-leveling cement has been fully eliminated in

accordance with the drying times recommended by the cement manufacturer (consult the manufacturer for exact drying time).

 The system must not be turned on until the thinset cement has fully dried. A minimum of two weeks is recommended.

### Step 10: MEASURE THE RESISTANCE (THE THIRD TIME) Refer to Step 5.



**Step 11: INSTALL THE TILE**

To install the tile, apply a layer of acrylic or latex modified thin-set using the ridged side of your 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 thermostat must be done by a qualified electrician in accordance with the National Electrical Code (NEC) and the Canadian Electrical Code (CEC). The electrician should connect the floor sensor to the thermostat, take the final resistance reading and record it on the warranty card, see Step 13.

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

**Step 13: MEASURE THE RESISTANCE (THE FOURTH TIME)** Refer to Step 5.

**Step 14: RECORD INFORMATION AND AFFIX LABELS**

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

Keep a copy of the warranty card for your reference.

**Step 15: ENJOY THE COMFORT OF THE NORTHGATE HEATING SYSTEM**

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

**5 Commissioning**



**For the extended 25-year limited warranty to apply, you must perform these tests, record the results on the warranty card, and retain a copy of the record.**

You must perform the Insulation Resistance Test, the Heating Cable Resistance Test, and the Sensor Resistance Test four times (Please refer to 4 installation) during the installation process.

**5.1 Insulation Resistance Test**

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

1. Connect the ground wire to the black lead and both power wires to the red lead of the multimeter.
2. Make sure the meter reads "Open" or "OL." If you get a different reading, contact your supplier.
3. Record these readings on the warranty card.



## 5.2 Heating Cable Resistance Test

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

1. Set your multimeter to the 200 or 2000 ohm range.
2. Connect the multimeter leads to the brown and blue 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% to +15%. If you get a different reading, contact supplier.
4. Record these readings on the warranty card.



## 5.3 Sensor Resistance Test

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

1. Set your multimeter to the 200K ohm range.
2. Connect the multimeter leads to the red and green lead wires.
3. Make sure the meter reads between 9-25K ohms. If you get a different reading, contact supplier.
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 on the same circuit. The HEATING SYSTEM may require a dedicated circuit. See the Product Selection "Table 1 or Table 2" of this manual.
	Ground-fault tripped in the thermostat.	Refer to Thermostat Installation and Operation Manual.
	Thermostat not turned on.	Refer to Section 4 of this manual, and the Thermostat Installation and Operation Manual.
	Cable not connected to thermostat.	Refer to Thermostat Installation and Operation Manual.
	Floor temperature sensor not connected.	Refer to Thermostat Installation and Operation Manual.
	Faulty sensor.	Contact your supplier.
Floor warm all the time	Clock not set correctly.	Refer to Thermostat Installation and Operation Manual.
Floor not warm enough	Thermostat setting not set correctly.	Refer to Thermostat Installation and Operation Manual.
Installation instructions not available		Download the latest version of HEATING SYSTEM Installation Instructions from <a href="http://www.thenorthgatetrading.com">www.thenorthgatetrading.com</a>

 **EXTENDED WARRANTY**

For a period of twenty-five (25) years from the date of purchase MANUFACTURER warrants that the HEATING CABLE is free from defects in material, design and workmanship. The extended warranty is only valid if the commissioning record has been properly completed and kept, and the installation is in accordance with the installation instructions.

The defective HEATING CABLE has to be inspected by or submitted to MANUFACTURER. Failure to comply with all of the foregoing will void this extended warranty. MANUFACTURER will, when the customer has documented that a defect in the HEATING CABLE was present at the date of delivery, repair or supply a new HEATING CABLE at MANUFACTURER's option. All claims shall be made within the extended warranty period. MANUFACTURER shall not be liable for any claims made later than twenty-five years from date of purchase.

MANUFACTURER shall not be liable for any consequential and secondary costs or damages linked to the defect or replacement of the HEATING SYSTEM. MANUFACTURER will be liable for any costs related to the dismantling of defective product and the installation of a new product; however, such liability is limited to the amount of five (5) times the initial product costs for each damage/case.

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THE FOREGOING WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ON THE PART OF MANUFACTURER. MANUFACTURER DISCLAIMS ANY WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. MANUFACTURER NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON, FIRM OR CORPORATION TO ASSUME FOR IT ANY OTHER LIABILITY IN CONNECTION WITH SALE OR PRODUCT. MANUFACTURER 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).

**Commissioning Record. Retain this record.**

Date of commissioning			
Company		Address	
		Phone	
Installer		Phone	
		Mat 1	Mat 2
Heating cable/mat	Catalog Number		
	Batch Date (from box or cord label)		
Insulation Resistance	Out of the box		
	Before embedding in mortar		
	After embedding in mortar		
	After floor covering		
Heating Cable Resistance	Out of the box		
	Before embedding in mortar		
	After embedding in mortar		
	After floor covering		
Sensor Resistance	Out of the box		
	Before embedding in mortar		
	After embedding in mortar		
	After floor covering		

INSTALLER: please leave this record with homeowner.

HOMEOWNER: you must keep a copy of the completed Commissioning Record in order for the 25-year limited warranty extension to apply.

