DEVI

Installation Guide

Heating cables

DEVImat™ for **Thin Floor** Applications

DEVImat™ is for laying in a Tile Glue or Thin Levelling Bed only

Intelligent Electric Floor Heating™

DEVI

Table of Contents

1 Introduction

DEVI® is Europe's leading brand of electrical cable heating systems with over 70 years of experience. DEVI® became a part of the **Danfoss** Group from 1 January 2003. Danfoss is one of the world's leading companies within heating, cooling and air-conditioning with more than 23,000 employees serving customers in over 100 countries. DEVI® is Europe's largest supplier of electrical floor heating; the only global company in the industry that develops, produces and markets complete systems containing both heating elements and thermostats.

The phrase "**heating element**" refers to pre-made lengths of electric heating cables, including heating cables supplied on a mat or mesh.

DEVIflex™ heating elements are used in a wide variety of situations. Applications include direct acting, storage and background floor heating systems. Other uses include ice and snow melting as well as agricultural and industrial applications. They can be suitable for use in concrete slabs, sand/cement screeds, mortar beds, levelling beds and specialist applications. Floor heating element applications are often covered with carpet, tiles, vinyl, timber or other floor finishes.

DEVImat™ heating element are attached to a fibreglass mat and are used in thin floors, such as directly under tiles in a glue bed. They provide a fast heat up and economical operation, particularly with thermal insulation under the heating.

This Installation Guide presents DEVI® recommendations for design and installation of under floor heating element cable systems in thin floors for indoor applications . It provides guidance for heating element positioning, electrical data and system configurations.

For additional information, please refer to

- **Data sheets** - for technical information on the selected heating element.
- **Conduit Installation Guide**
- **Timber floors Installation Guide** - provides details on various installation options with timber floors.
- **In-Slab and In-Screed Installation Guide**.
- **Thermostat Installation and Programming Guide** - for your selected thermostat.
- **Contactor wiring diagram** - for the selected thermostat, required for large area heating zones.
- DEVI® **Application Manual** for Indoor Cable Floor Heating - for broader information.
- DEVI® **Application Manuals** for other applications - e.g. Pipe tracing, Frost protection (Freezers), Ice & Snow (ground incl. roads), Sports grounds, Agriculture.

Brochures, Specification sheets, and Installation & Programming guides are available on the Devex web site http://www.devexsystems.com.au/electric-and-hydronic-floor-heating-documentation.html or directly from Devex Systems.

You are welcome to phone us so that we can assist you with your floor heating design, installation, commissioning – **1800 636 091**. We can provide investigation and repair service, but this is only in Australia where DEVI heating elements have been installed.

2 Cable and Application Overview

This Installation Guide is for Thin Floor installations with a glue bed or levelling bed (often directly under tiles or timber) using the following heating element types

HEATING ELEMENT TYPE DESIGN APPLICATION

DEVImat™ DSVF-150 150W/m² single 2.5mm conductor cable (two cold tails)
DEVImat™ DTIF-150 150W/m² twin 3.5mm conductor cable Low EMF (single cold tail)
DEVImat™ DTIF-100 100W/m² twin 3.5mm conductor cable Low EMF (single cold tail) for Timber floors

APPLICATIONS									
HEATING ELEMENT TYPE	Heating directly under tiles (6-15mm)	Heating in floors with thin levelling bed (6-15mm)	Heating under wooden floors	In-slab (storage) heating in concrete floors	In-screed heating on concrete floors	In-screed heating under timber floors	Freezer (frost heave protection)	Frost protection	Ice and snow melting
DEVImat™ DSVF-150	✓	✓	x	x	x	x	x	x	x
DEVImat™ DTIF-150	✓	✓	x	x	x	x	x	x	x
DEVImat™ DTIF-100	✓*	✓*	✓	x	x	x	x	x	x

** DTIF-100 is not recommended under ceramic tiles or stone (please contact us).* 29-Mar-17

Specification sheets are available for each of these heating element cables.

We have heating elements that are suitable for all these applications and for other under floor heating and specialist purposes. Please contact us regarding your specific application and other heating element cable types that are available.

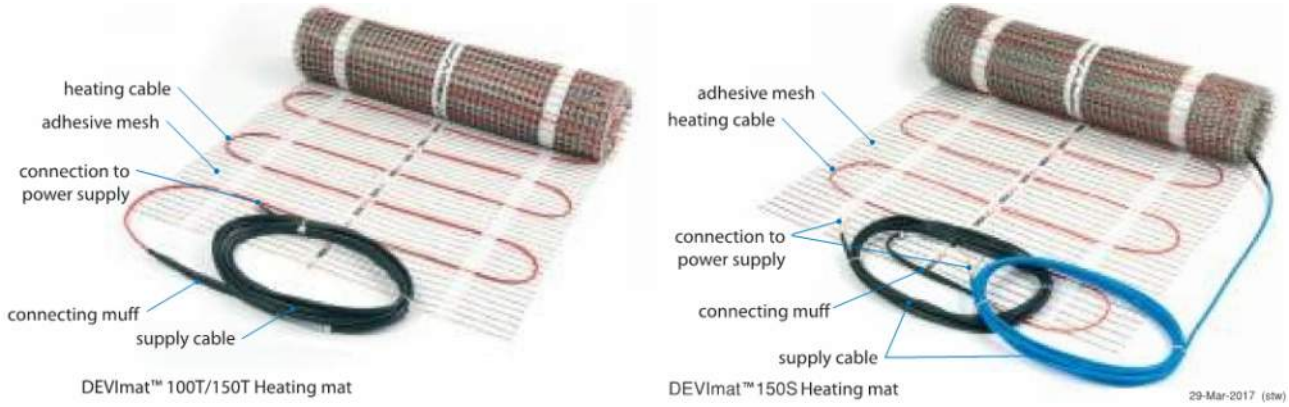
TWIN CABLES – with a SINGLE COLD TAIL and SINGLE CABLES – with TWO COLD TAILS

The number at the end of the element **mat** cable name is the specific output for a square meter of the mat (in W/m² at 230V.

The letter "T" in the cable name refers to a twin conductor element (Twin), with only one two-core cold tail.
The letter "S" in the cable name refers to a single conductor element (Single), with two one-core cold tails.

	TWIN CABLES		SINGLE CABLES
EXAMPLE	ONE COLD TAIL		TWO COLD TAILS
Heating Element mats:	DTIF-**100** (100 W/m² Twin)	and	DSVF-**150** (150W/m Single)

A twin core heating mat (with a single cold tail) is easier to install than a single core heating mat (which has two cold tails). This is because with two cold tails the end of the heating element must be brought back to the start of the cable run to then both go to the thermostat location.



3 Safety Instructions

Heating elements must always be installed in accordance with local building regulations and the electrical AS/NZS 3000 Wiring Rules, as well as the guidelines in this Installation Guide.

Important safety requirements

- De-energize all related power circuits before installation or servicing the heating system.
- The outer screen around each heating element must be earthed (at both ends for two cold tail heating elements) in accordance with local electricity regulations.
- Supply must be through a Residual Current Device (RCD) that will trip with more than 30 mA earth leakage.
- Heating elements should be connected via a switch providing all pole disconnection.
- The heating elements must be equipped with a correctly sized circuit breaker (or fuse) according to local regulations.
- The switchboard/distribution board must clearly identify the floor heating system.

4 Cable Requirements

- The heating element temperature rating (60°C) must not be exceeded and will not be exceeded if installed correctly with a thermostat so that is would not operate if the ambient temperature is high (refer to the DEVImat™ specification sheets).
- Heating elements should be laid out to the spacing as on the mats. If the mat is cut then maintain the same spacing as best as possible. The heating elements must not be cut or the warranty is void and the cable may not run to specification.
- The heating elements are designed and rated for a nominal 230V supply. They will therefore operate at a higher power and current if your installation supply voltage is higher (by Ohms Law). The single phase installation voltage supply must comply with AS/NZS 60038, being 230V -2% to +10% (222V to 253V). Power cables, thermostats and protective/control equipment must be rated

to allow for this tolerance. E.g a single 1.0kW heating element run at 230V consumes 4.3A, but if the supply voltage is 250V, then it will consume almost 4.7A and operate at 1.2kW.

Refer to separate specification Data Sheets available for each of these element cables for further details.

5 Important

- **To avoid problems with your installation, these instructions must be read prior to commencement.**
- Failure to comply with the Installation Guide will void the warranty.
- Heating element installation must be carried out under the supervision of a licensed electrician.
- A label/marking is to be fixed to the electrical switchboard listing the rooms with heating elements.
- 'As Installed' drawings and/or photographs of each cable installation should show the installed heating element(s) and sensor location(s) and should be kept on file with a copy provided to the customer.
- Heating elements must not be cut or shortened. However, cold tails may be cut or extended in accordance with AS/NZS 3000 Wiring Rules.
- Cold tail termination(s) to the heating elements must be embedded in the floor and not subjected to strain at any time.
- As a minimum requirement, all DEVI floor-heating installations are to be controlled using a DEVIreg™ floor sensing thermostat.
- Thermostat floor sensor cables each need to be in their separate conduit such that they can be easily accessed and replaced at any time in the future.
- Ensure that the client is aware that coverings or objects with a high thermal resistance are NOT to be placed directly on the floor. Also advise them that all large items need to be adequately ventilated underneath.

THIN FLOOR INSTALLER SUMMARY Heating Element Installation Steps

1. Cable heating system
   - DEVImat™ heating mat
   - Thermostat (with floor sensor)
   - Sensor flexible conduit (10mm)

2. **Draw a plan** showing the actual heated area, heating mat, cold tail location, floor sensor position, thermostat and connection box (if any).

3. Glue appropriate **thermal insulation** onto the existing floor (e.g. F-Board). Allow to dry (min 24 hr). Cut a groove for sensor and terminations.

4. Install flexible **sensor conduit** (10mm OD) into the groove. Grooves are also needed for the terminations.
   Clean the floor so there is no dust or sharp protrusions.

5. **Check the heating mat** cable resistance and its insulation resistance values.
   Roll out the mat onto the floor from the thermostat position, sticky side down.

6. The mesh mat can be cut to go around fixtures and to cover the floor area to be heated. **DO NOT CUT the heating element.**

7. **Space** 100 mm from walls. Avoid any obstacles and fixtures. Mats spaced approx. 80mm apart. Minimum spacing 50mm between any two heating elements.

8. **Lay out mat** to entire surface. Check the cable resistance and the insulation resistance values again before laying tiles. Photograph installation layout and meter readings.

9. Apply tile **glue and lay tiles.** Careful not to damage the cables. Check the cable resistance and the insulation resistance values again when installing the thermostat.

Read the installation guides supplied with the heating element cables and thermostats for any specific requirements relating to your selected products applicable to your installation.

Heating elements must be securely attached to the floor before laying tiles so that the elements will not move or vary their spacing. A hot glue gun may be used on the mat. Air pockets around the cables must be prevented. An appropriate thin levelling bed may be laid instead of tile glue. Heating elements must never touch or cross over each other or failure is likely - minimum 50mm cable spacing.

Failure to comply with the Installation Guide will void the warranty.

Please contact Devex Systems (phone **1800 636 091**) if unsure of any aspect of the installation.

Please REFER TO THE INSTALLATION DETAILS IN THESE INSTRUCTIONS

6 Installation Instructions

6.1 GENERAL

1. **Heating element connections** are considered to be electrical wiring and as such must be carried out by a licensed electrical tradesperson in accordance with AS/NZS 3000 Wiring Rules, and any other relevant regulations.

2. Check to ensure that the **heating element selected** is suitable for the area and type of heating required. Verify with the builder the floor construction method, floor heights, and floor surfaces. Refer to the heating element cable specification sheets to verify suitability.

3. Determine the **correct spacing** for the element runs (see *Heating Element Cable Spacing* table, page 9).

4. Care must be taken to ensure that the heating **element operating temperature** does not exceed 60°C. The heating element is to be embedded in thermally conductive flooring material (tile glue or levelling bed) without air pockets or voids, and must be kept clear of any thermal insulation.

5. **Thickness of glue or levelling bed** must be at least 5 mm + the tile thickness. Maximum bed thickness is 15 mm. Alternative products and design can be offered if these requirements cannot be met. (refer *Cover over Heating Elements* table, page 14)

6. **Thermal insulation** is recommended under heating element cables to reduce the heat loss downwards away from where the heating is needed. Good thermal insulation is eco-friendly because it increases efficiency. It improves the heating effectiveness, reduces energy consumption, and results in a faster heat up time. Heat losses can mean that the floor heating is less effective and the desired comfort level may not be achievable.
   We recommend extruded polystyrene F-Board (supplied by Devex Systems) to be glued down to the floor prior to any Devimat™ heating element installation. It is available in 6mm and 10mm thicknesses and has a polymer cement finish on both sides reinforced with glass fibre, making it ideal for tiling over. The F-Board data sheet is available at http://www.devexsystems.com.au/files/BROCFBD102.4__F-Board_Insulation_Brochure.pdf.
   Adequate bulk insulation must be installed beneath unenclosed floors s per BCA (Building Code of Australia) requirements.
   Adequate bulk insulation must be installed beneath timber floor structures. Failure to include thermal insulation beneath under-battened timber floor heating will result in unsatisfactory heating.

7. An as **installed quality check** is essential, even though the heating element cables have been quality checked prior to leaving the factory. It is important to check that the resistance values (ohms) are as specified on the cable label (within -5% to +10%) and that this size cable is what is required for the job.
   A 500V insulation resistance tester (e.g. Megger) should also be used to check the cable insulation.

   A continuity tester should be connected to the heating element during the construction phase to monitor for major cable damage. Continuity testers are very low cost and can be supplied with the cable(s), and are normally continually connected to check cable continuity and major earth faults until completion of the installation and tiling phases, but this does not replace the need to check the ohms resistance value and to use a 500V Insulation Tester to verify the heating element integrity. This testing will also ensure that your installation meets this aspect of the required

electrical regulations.
Insulation resistance and cable resistance values should be checked immediately prior to tiling over the cables and these readings should be photographed as a permanent record.

8. Adequate steps must be taken to **avoid mechanical damage** to heating element during cable installation and building construction. It is also important to avoid mechanical strain, twisting, tangles, kinks, tight bends, pinching, crushing, etc. Care must be taken to avoid straining the connection joint or terminations by pulling or stretching the cables.

9. If only the **outer sheath is punctured** or cut causing a loss of insulation resistance between the cable screen and the surrounding area, the damaged area is to be cut and repaired. The repair location should also be clearly marked on the installation layout drawing/photo. If in any doubt, then the damaged area must be repaired using the appropriate repair kit available from Devex Systems.

6.2 HEATING ELEMENT CABLE SELECTION and SPACING

The cable type depends on the floor construction method (refer *Cable and Application Overview* section, page 4). Only select heating elements that are appropriate for the floor construction.

- **In a Thin Floor**, or in a glue bed directly under the tiles (see table below).
- **In-slab** – DTCE-30 heating element (see *Installation Guide for In-Slab and In-Screed cables*)
- **In-screed** – Deviflex 18T or Deviflex 10T (see *Installation Guide for In-Slab and In-Screed cables*)

The following table shows the design watts and **heating element spacing** requirements.
The mats are supplied with the heating element fixed to the mat at 75mm C-C (Centre to Centre) spacing.

HEATING ELEMENT TYPE		SPACING C-C (Centre to Centre)			
	Design Watts	Target Spacing	Maximum Spacing	Spacing from Walls and Fixtures	Minimum spacing permitted
	W/m²	mm	mm	mm	mm
DEVImat™ 150S (DSVF-150) Thin bed	150	**75**	75	100	50*
DEVImat™ 150T (DTIF-150) Thin bed	150	**75**	75	100	50*
DEVImat™ 100T (DTIF-100) Thin bed	100	**75**	75	100	50*

** Minimum element spacing is 50 mm, though a short loop of a heating element may be closer. No part of a heating element may be closer than 30 mm from another part of the heating element.*

17-Mar-17

Why different cable options?

- **DEVImat™ 150S** (**DSVF-150**) is suitable for thin floors for most floor surfaces, particularly hard surfaces (such as tiles). It is the most popular for seasoned installers at only 2.5mm thick.
- **DEVImat™ 150T** (**DTIF-150**) is suitable for thin floors for most floor surfaces, particularly hard surfaces (such as tiles). It is easier to install if you are not familiar with laying out heating element mats because it only has one cold tail and does not need the other end to be routed back to the start of the element runs. It also has a very low EMF for those who are particularly concerned about electromagnetic fields from electric cables, but it is a little more expensive, and is 3.5mm thick.
- **DEVImat™ 100T** (**DTIF-100**) is suitable for thin floors with timber floor or other surfaces that are sensitive to under floor heating because it has a lower heat output. It also has a low EMF. It is 3.5mm thick and should not be used in other applications.

Estimation of heated floor area
The Installation area of a heating element mat must be calculated based on the total area (m²) of the room excluding the area under fixed objects (such as bath, toilet, shower, vanity, cabinet, cupboards, etc.). Special customer preferences may also need to be taken into account. When determining the cable size needed we will design to be clear of any floor level changes, fixtures, drains (including strip drains) and walls (usually with 100 mm separation) to avoid potential damage to the heating system.

The heating element mat is embedded into the floor, so it is advised to exclude from the heated area any furniture or other items that cannot be moved during the life of the premises: e.g. joinery that is fixed in place, such as built-in wardrobes, fixed cabinets, non-movable beds, etc.
Do not allow DEVImat™ to be installed beneath any permanent floor fixture/fitting or furnishings that will sit directly on the heated floor with no air flow beneath them.

Cable spacing C-C (Centre to Centre distance in mm) is the distance from the centre of one heating element to centre of the next heating element laid in the floor. No heating element is to be closer than the minimum spacing and spacing needs to be even so that the floor heating is even (see *Heating Element Cable Selection and Spacing*, page 9).

Cable mat length required
DEVImat™ heating is supplied as 0.5m wide mats from 1m to a maximum 24m length (covering 0.5m² to 12m² area for heating). Determine the area to be heated and select the mat that is adaptable to your requirements. If the area is large then more than one mat may be required and they would be connected in parallel. If the total load is not more than 12A (2700W) they can be connected directly to the thermostat, otherwise a contactor will be required and additional wiring between the switchboard and the floor heating may be required to be run.

Design service
Devex Systems provide an obligation free **design and quoting service** for supply and install as well as supply only of heating element cables and any accessories that may be needed. This saves having to calculate the requirements and provides peace of mind that the correct cables are provided, as long as the drawings and measurements supplied to us are correct and accurate.

Note:
A sketch or photograph record of the installation must show the approximate location of the heating element(s), the sensor conduit(s), and the power connection location. A copy should remain with the installation for the benefit of owners/occupiers. This can be used to locate the heating elements for any future repairs or for later modifications to floor/layout construction.

6.3 MAT LAYOUT METHOD

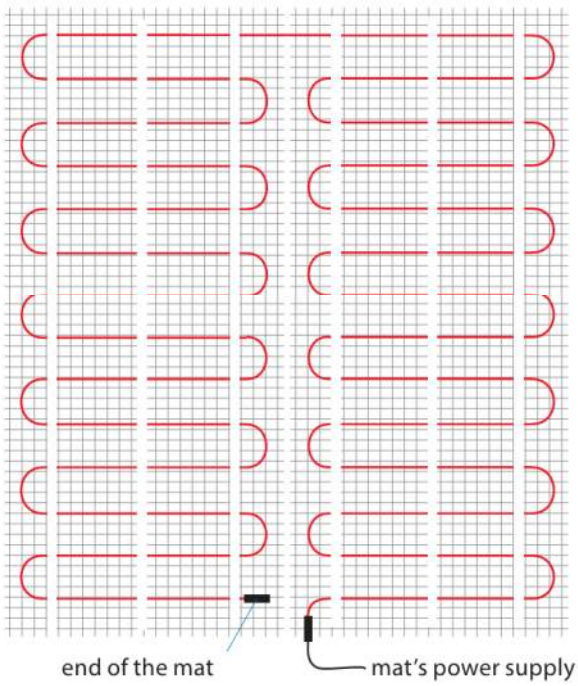
DEVImat™ heating elements have a fixed spacing which is appropriate for under floor heating, however, it may be necessary to run the mat around corners or to allow for obstacles, such as drain pipes and fixtures. In these cases, the mat may need to be cut but DO NOT CUT THE HEATING ELEMENT. If the DEVImat™ you have purchased will not fit into the “free” floor space available, then you have selected a heating element that is too large and a smaller area DEVImat™ must be used.

A small DEVImat™ may be added to a space if the selected DEVImat™ is too small for the area.
DEVImats™ that have been partially or fully installed on the floor cannot be returned.
If installing more than one DEVImat™ heating element into an area, remember that ALL cold tails must be located at the connection point (usually directly below the thermostat location). Allow for this when planning.

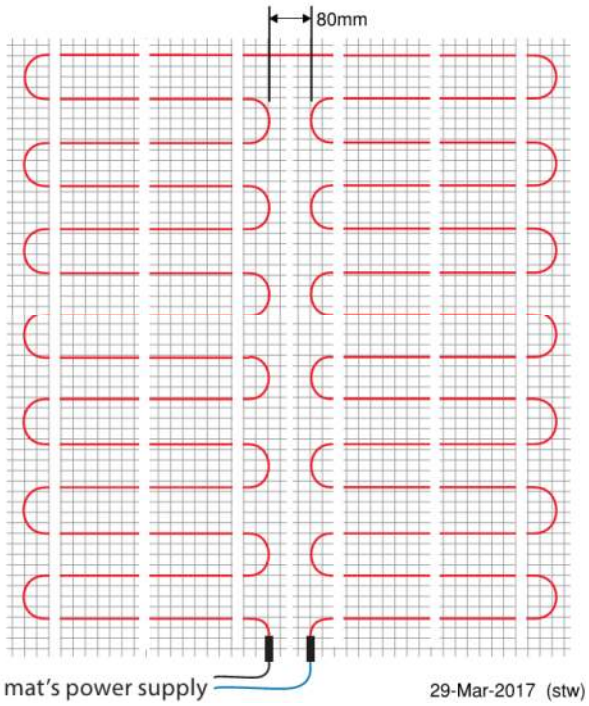
Note that the heating elements should be at 75mm spacing and are not permitted to be closer to each other than 30mm (refer table in the *Heating Element Cable Selection and Spacing* section, page 9).

HOW TO LAY OUT THE HEATING ELEMENTS

DEVImat™ 150T (DTIF-150) &
DEVImat™ 100T (DTIF-100)

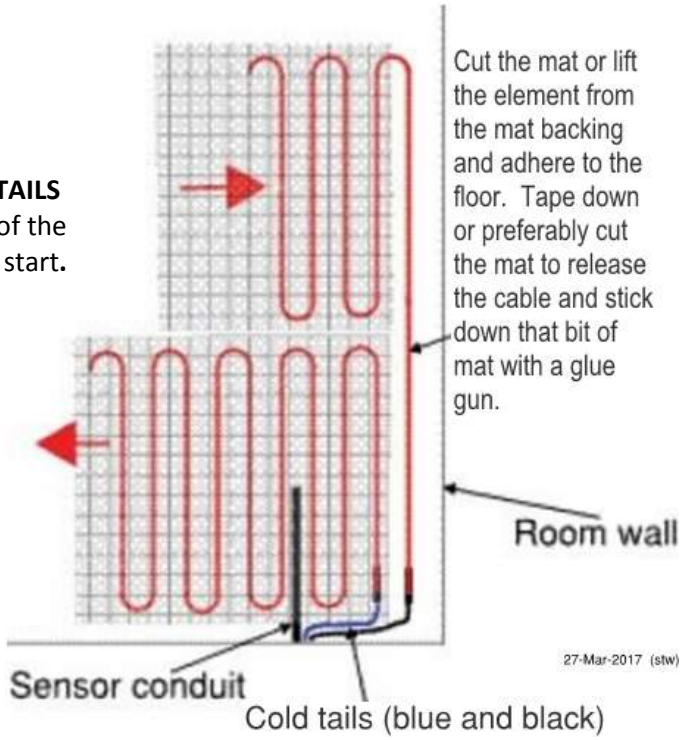


DEVImat™ 150S (DSVF-150)

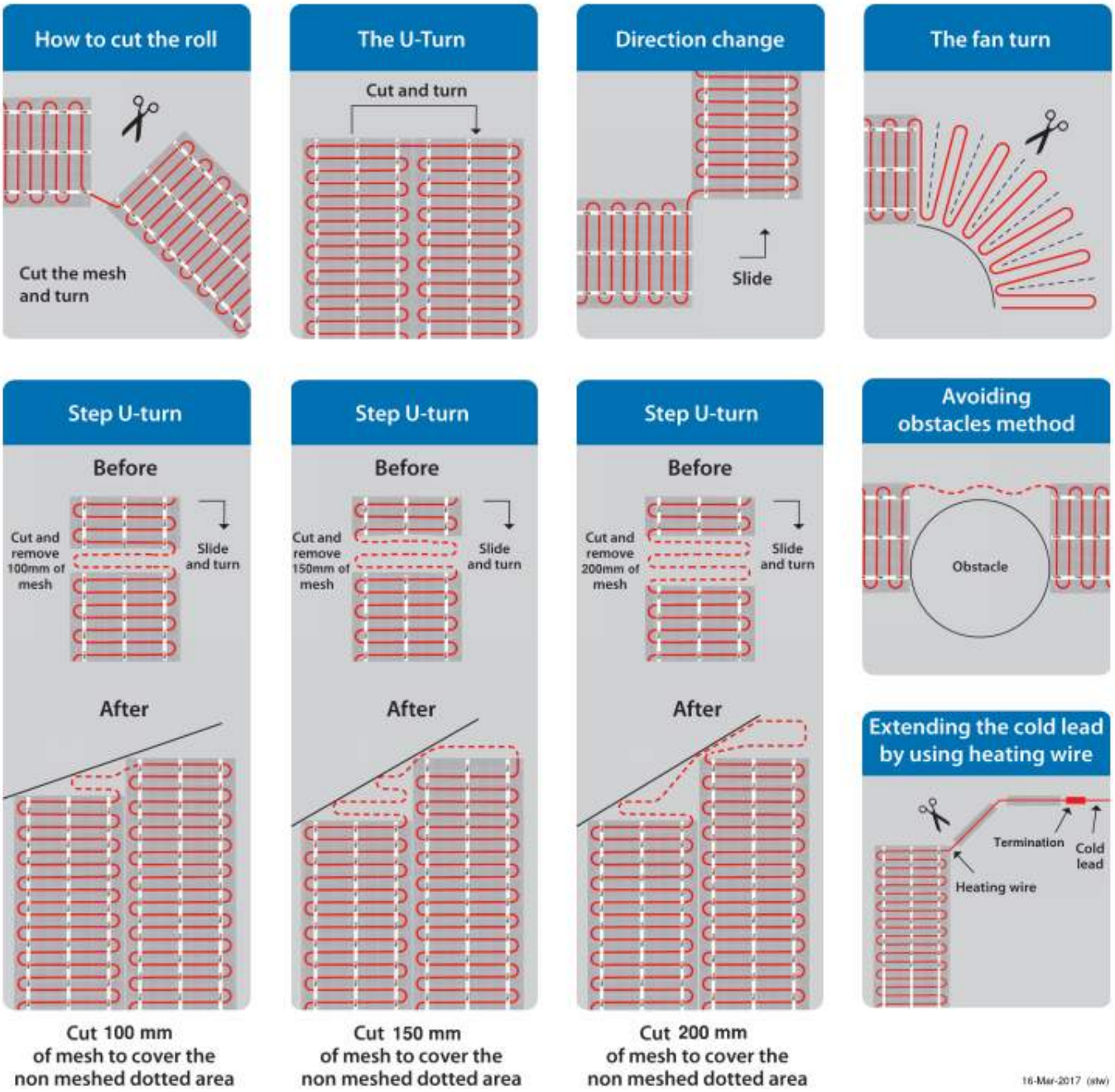


EXAMPLES of a **simple heating layout** where the mat is cut and then run next to the first mat but back the other way, keeping the sticky side down to the floor.

DEVImat™ DSVF-150 – COLD TAILS
Showing an option for return of the second cold tail back to the start**.**



Layout Tips for installing DEVImat™



Only the mat can be cut but the **HEATING ELEMENT CABLE MUST NOT BE CUT** or it may not be unsuitable for 230V operation and the warranty will be void.

The cold tails may be cut shorter or extended in accordance with the AS/NZS 3000 Wiring Rules.

6.4 LAYING THE MAT

1. **Draw up a plan** for the room you are installing the under floor heating into. Mark the permanent fixed items that will eventually be installed into the room e.g. toilet, bath, vanity, benches, cupboards, etc.

   From the plan, calculate the actual "free" floor area that will have heating. Do not put heating under any object that is going to be floor mounted, and there is little gain by heating under wall hung items that are close to the floor e.g. vanity, toilet, bidet, etc.

   Mark the floor to clearly show the positions of the items that will be installed later (vanity, shower, WC, etc.). The builder should be asked to verify the markings and agree that this is what they require.

2. **Check that your DEVImat™ is the correct size**. It MUST be equal to or less than the free floor area, otherwise it will not fit. A DEVImat™ that has been partly installed cannot be returned.

   If the element size exactly matches the free floor area, particular care must be taken when installing as there will be little opportunity to "lose" any "excess" element. If you have wall hung items, them some element may be placed beneath them to assist with fitting the element to the floor.

3. The **recommended cable spacing, floor thicknesses and thermal insulation** are important to achieve a warm floor with even distribution of heat, and to economically provide comfortable temperature on the floor surface. The floor surface temperature variation should not exceed 1.5°C over the entire heated floor area of the one heating zone.

4. **Different floor surfaces** should be installed as different heating zones with their own thermostats.

5. If **installing onto new concrete,** you need to make sure that the floor is fully cured before affixing the DEVImat™.

6. The **floor surface must be clean, dry, flat, smooth and oil free**. Any holes may be filled with a 1:3 sand/cement mixture or appropriate floor grout or levelling bed. Dusty surfaces should be cleaned or have a liquid sealer applied. The DEVImat™ has a sticky surface which adheres to the existing floor, however, difficult surfaces can have a spray-on contact adhesive applied for improved adhesion, if necessary.

7. **Avoid walls, water pipes, drains, baths, toilets, vanities, wardrobes, built-ins, fixtures, etc.** when laying out the heating elements. Also avoid where it is known that permanent structures are to be installed above the finished floor, or where the floor is likely to be penetrated by nails, door stops, or other fixings.

8. **Spacing to a wall or fixed item** is usually 100mm, but generally, cables should be no closer than 50 mm to any wall or fixed item (refer table in the *Heating Element Selection and Spacing* section, page 9).

9. **Heating element spacing** shall be as even as practical across the entire heated area.

10. When **rolling out the mat**, place the Cold Tail end of the mat at the connection point and start to roll the mat out with the contact adhesive side to the floor. Ensure that the sensor conduit is positioned midway between an element loop (see "*Conduits…*" section page 15).

If the element size is a close fit to the free floor area, start laying the mat within 50mm of the wall. You can leave a larger gap if the element is smaller than the free floor area. We recommend that you do not exceed 100mm from the wall as the start distance.

If you are using an element with a Cold Tail at each end of the mat, you must leave a gap equal to the pre-set element spacing on the mat (approx. 75mm) on the side opposite of the connection point to enable you to bring the other Cold Tail back to the start position (see "*Mat Layout Method*" section page 11.

11. **Gently but securely fix heating mats** in place so that there is no possibility of the cable being moved, deformed, or the outer sheath being indented in any way during installation or construction. Particular care must be taken when laying tiles if heating elements are to be in the glue bed. Spot areas can be held down with a hot glue gun to the mat (should not be on the heating element) if lifting occurs prior to embedding.

12. **Flexible tile adhesive** suitable for electric floor heating must be used. Always ensure that you purchase a suitable adhesive (cement based and not solvent based).

13. **Embed the entire length of heating element** evenly spaced, including the heating element termination(s). All heat ed cable must be embedded in a glue bed or levelling bed, with the heating element joins to the cold tail(s).

14. The **cables should be embedded as soon as possible** to avoid the possibility of accidental damage. If large tiles are being used then it is wise to cover them with a thin layer of glue bed or levelling bed first to protect the heating element, let it dry/cure, then lay the tiles on the glue bed layer used for tiling.
    The cover over the heating elements needs to ensure that there are no air pocket voids near the cables. It must not contain any sharp stones or other objects.

6.5 COVER over HEATING ELEMENTS

The following table shows the recommended depth or thickness of a glue bed or levelling bed for installed DEVImat™ element cables.

INSTALLATION and (ELEMENT CABLE TYPE)	**DEPTH**		
	Target Depth	**Maximum Depth**	Minimum Depth
	mm	mm	mm
Levelling bed (DEVImat™)	**10**	15	5
Glue bed (DEVImat™)	**8**	10	6

Thermal insulation is recommended to be under all floor heating areas. 24-Mar-17

6.6 CONDUITS installed by the Site Electrician

Conduits for the power cabling and for the sensor probe(s) must be installed before beginning your DEVI® under floor heating system installation.

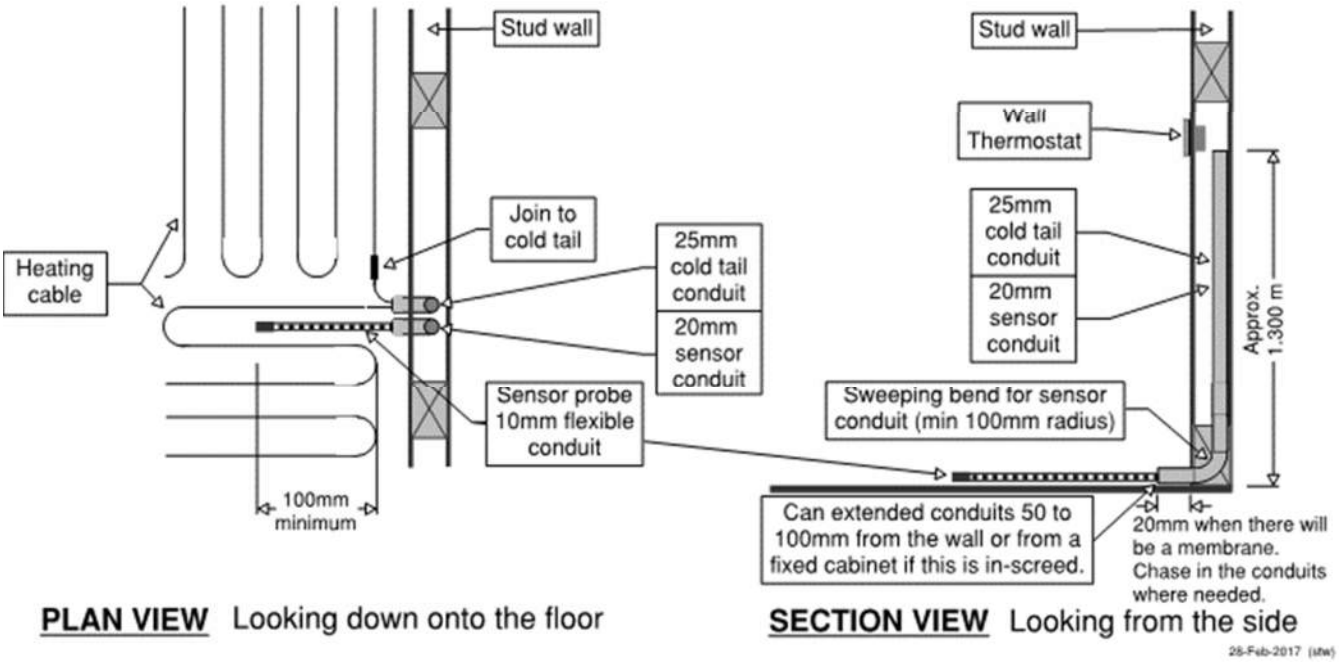
1. **Each heating element cable requires a 20mm empty conduit** for larger areas. This conduit is for the power cable cold tails, and it is to run from the top of the finished floor level to the switch or thermostat position. A draw wire is essential if any conduit fittings or couplings are used. Up to three heating DEVImat™ cold tail sets may be included in one 20mm conduit provided that their cold tails all terminate at the same floor location.

2. **Cut an area in the floor or thermal insulation where the heating element terminations will be** and also **a narrow groove** for the thermostat sensor conduit (typically 10mm diameter) from the position on the floor which is normally directly beneath the position for the thermostat and running out from the wall to extend at least 100mm into the heated floor area. This groove is to allow the sensor conduit to be almost flush (you can allow some of the conduit to be in the glue bed) with the floor and located at the position where the conduits have been pre-installed that run in the wall cavity from the floor to the thermostat position.

3. The **floor Sensor Probe** must be installed to ensure that the floor will not over-heat when being heated. Each floor sensor requires a 16 or 20mm conduit with no more than two wide radius bends from the thermostat/connection point. A 10 mm OD flexible conduit (with a minimum 7 mm ID) is recommended to then be run inside each sensor conduit and sealed at the end with electrician's tape so as to prevent ingress of water/ glue/ levelling bed materials. This 10 mm conduit is available from Devex Systems. Sensor probes must each be installed in their own separate conduit so they can be replaced at any time in the future.

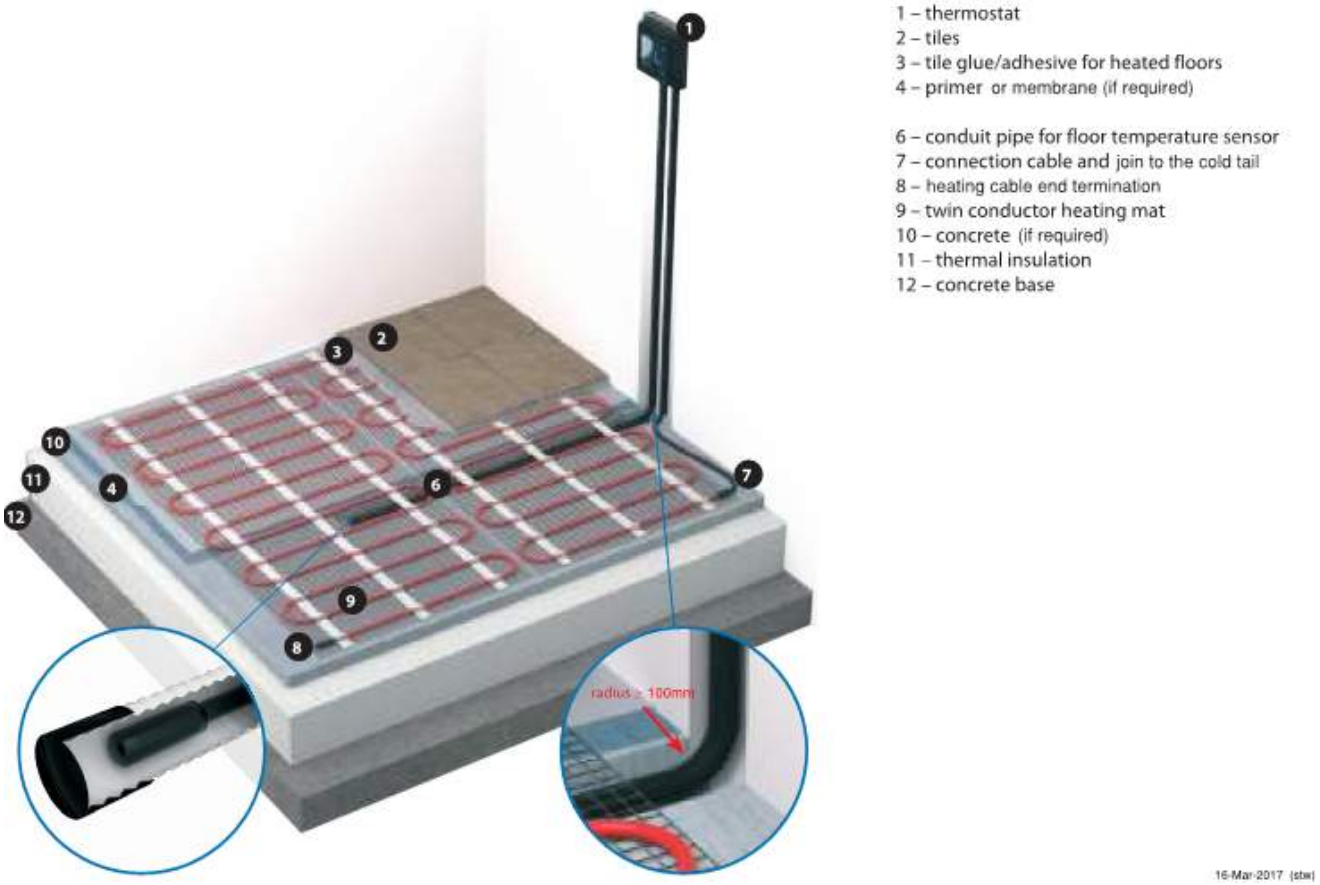
RECOMMENDED CONDUIT INSTALLATION METHOD

This EXAMPLE shows a typical installation for a twin heating cable (with one cold tail).
Conduits are shown for an in-screed installation with a waterproof membrane.



For further details, please refer to the "*Conduit Installation Guide*".

EXAMPLE of Conduit and Sensor Installation Method - for DEVImat™



6.7 IN-SLAB and IN-SCREED CABLING

The cables in this Installation Guide are not suitable for heating installations in a slab or laid in a screed bed. Please refer to the *Installation Guide for In-Slab and In-Screed cables*.

6.8 HEATING OF TIMBER FLOORS

Heating can be installed under timber floors but it is important to determine the specification requirements for the particular timber to be installed. As a rule-of-thumb guide, the surface temperature of a timber floor must not exceed 27°C but timber floors vary in their requirements and a few timber floors do not like being heated at all because they can dry out, crack or warp where there is underfloor heating. It is necessary to obtain timber floor specifications from your timber supplier.

The lower heating power rating for this floor heating, and because timber usually does not radiate heating as effectively as a tiled floor surface, means that it is usually regarded as providing background heating rather than a comfort heat level. The DEVImat™ 100T (DTIF-100) heating element cables are designed specifically where there will be timber floor or other sensitive floor surfaces, because they have the lower heat output of 100W/m².

Timber floors must have a thermostat that will limit the maximum temperature that the floor is permitted to heat to, regardless of what the user may select as a comfort level. The DEVIreg™ Touch, DEVIreg™ Smart, and DEVIreg™ 532 incorporate this function but they must be correctly configured to ensure that the limit is set. The DEVIRreg™ 532 is a manual thermostat (often used with Home Automation

systems) whereas the others are programmable thermostats for setting different times for the heating to operate.

There are a number of methods for heating timber floors, but the most common method is by incorporating the heating in a levelling bed (or screed or slab with an appropriate element cable) with the timber then laid on top of this in thermal contact with the heated surface.

Adequate bulk insulation must be installed beneath timber floor structures. Failure to include thermal insulation beneath under-battened timber floor heating will result in unsatisfactory heating.

Please contact us if you need further information for heating under timber floors.

6.9 CONNECTION of HEATING ELEMENT CABLES

1. All power connections to floor heating elements must be by permanent wiring (i.e. no plug/socket connections) and the connection must be done by a licensed electrician. The cables have an earth braid/shield and all cold tails must be connected to the installation Earth (including both ends of a single cable that has two cold tails).
   While the DEVImat™ element is not polarity sensitive the two cold tails of the DSVF-150 mat are blue and black in colour. International and Australian standards advise for wiring colour coding that a BLUE wire must be Neutral so the BLACK wire would then be Active (Line or Phase).

2. All heating elements must be protected by a Residual Current Device (RCD).

3. For loads where Contactors are required, the cold tails should terminate in a wall box above the floor level and in reasonable close proximity to where they exit from the floor. However, if the thermostats supplied are capable of switching the load, the cold tails should be taken directly to the thermostat position.

   Note: It is important to check the type and rating of the thermostat being used to determine if a contactor requires control wiring back to the switchboard. All DEVIreg™ thermostats require a contactor if the load is greater than 2,700 watts or 12A (75% of 16 Amps). Contactors are usually located in a switchboard so additional wiring runs may be required.

4. Do not turn on your floor heating until the tile adhesive/grout has fully cured. Check with your tile adhesive supplier for curing times.

7 Thermostats

There is a range of programmable and manual thermostats available to choose from. Most installations have the programmable type wall-mounted in-room thermostats. The manual thermostats are for simpler installations and are recommended to be installed where a Home Automation / Building Management System controls when the heating is required.

Both of the fully programmable **DEVIreg™ Touch** and **DEVIreg™ Smart** thermostats have a 5-year warranty. They are intuitive, wall mounted semi-recessed, floor/ceiling and room sensing thermostats with intelligent timer functions that are simple to use.

- DEVIreg™ Touch is programmed through its backlit touch-sensitive screen
- DEVIreg™ Smart uses Wi-Fi access with the DEVIsmart App (iOS and Android) for programming, and can be controlled remotely from anywhere that the mobile device has Wi-Fi or data access. This thermostat also has a touch screen for basic in-room functions.

We would like to assist you to determine which thermostat is the most appropriate for your installation. You can give us a call, or Information on the range of thermostats can be seen on our web site at http://www.devexsystems.com.au/shop/category/thermostats-floor--air-sensing .

7.1 THERMOSTAT SETTING

A comfortable floor temperature is described in International Standard ISO/ TS 13732-2. The generally regarded maximum long-term comfort floor surface temperature is defined as 29.5°C but the following table may be a better guide for the thermostat comfort setting. Programmable thermostats (above) default to the settings in this table when set up using the installer wizard.

TYPE OF INSTALLATION	TEMPERATURE	
	Suggested Initial Thermostat Setting	NOTES
	°C	
Tiles - Bathroom	31	
Tiles - Living area	27-29	
Hardwood	25-27 *	Must not exceed timber specification.
Timber Laminate	24-27 *	Must not exceed timber specification.
Carpet	23-25	Setting determined by carpet type.
** Requirements vary for different timber floors. Installed thermostats must limit user temperature setting.*		
Refer also to the DEVIreg™ Smart Installation Guide (Section 7 "Settings" pages 20-21).		
Inactive people often prefer temperatures to be 1 or 2°C warmer.		
Some users may prefer just to take the edge of the cold floor (economy), or may like it to be very warm.		
		27-Mar-17

The type of floor surfaces during the life-time of a dwelling can often change, just as the comfort temperature perception differs with different individuals. It is therefore advised to install the heating system for a maximum comfort floor temperature level so that it can satisfy future possible options, though often a floor temperature which is just a few degrees above the current room temperature can satisfy the needs of many users.

Refer to *Heating of Timber Floors* section, page 16, for these requirements.
We would like to assist you to determine which thermostat is the most appropriate for your installation.

Thermostat installation and programming guides are available on the Devex web site or directly from Devex Systems - http://www.devexsystems.com.au/electric-and-hydronic-floor-heating-documentation.html .

7.2 WIRING of THERMOSTATS

Power supply and all connections to the heating system must be in accordance with AS/NZS 3000 Wiring Rules. The supply must be through a RCD (Residual Current Device). The power supply is connected to the thermostat “L” and “N” terminals, with the heating element cables connected directly to the thermostat “L-load” and “N-load” terminals. However, if the power consumption is greater than 2,700W (12A) then a contactor must be used. The contactor is usually located in an electrical switchboard. Power needs to run

from the switchboard RCD to the thermostat, then return to the contactor location, then from the contactor back to the floor heating element cable.

The floor sensor thermostat probe connects to the terminals marked “NTC” (Negative Temperature Coefficient). The DEVI® sensors measure 15K ohms when at 25°C (22K at 15°C; 18K at 20°C; 12.5K at 30°C).

Our thermostats include a wiring diagram on the thermostat. Please contact us if you need further details for connecting thermostats or contactors.

8 Warranty

20-year DEVI Warranty™ is valid for most of DEVI® heating mats and heating element cables. DEVI® support Full service warranty for cables and mats installed indoor for floor heating, provided the Installation Guide has been followed – including costs for installation and floor materials such as damage to bricklaying and tiles. Full Service 20-year warranty implies that when there is a warranty case DEVI® undertakes a responsibility to correct the defect free of charge or offer product replacement during the warranty period. This means that DEVI® covers all reasonable costs associated with the repair/replacement of any heating system element and floor cover restoration costs where this is caused by a manufacturing fault in the cable.

Please refer to our Warranty statement for full details.

9 Other Heating Applications

There are many applications for heating element cables of various types that we can supply, for example,

- Heating of seats in spas and outdoor areas with cold climates;
- Heating of playing fields with natural or artificial grass;
- Soil warming in greenhouses;
- Heating of agricultural premises;
- Frost protection of floors and foundations of freezers and ice stadiums, including threshold and door heating;
- Condensation protection under cold store floors;
- Ice protection and snow melting for roofs, gutters and drainage systems;
- Ice and snow melting on ground – e.g. roads, pavements, pedestrian walkways, bridges;
- Protection against freezing and for temperature maintenance of pipelines, tanks and other industrial applications;

as well as many other heating solutions.

Apart from electric under floor heating solutions, Devex Systems supplies and installs hydronic (water based) under floor heating. We also have a range of overhead electric and gas radiant heating products and HVAC solutions.

Devex® systems

heating & cooling excellence

Devex Systems specialises in heating & cooling solutions for new and existing buildings in residential, commercial and industrial environments.

For more information on any of our product lines, please contact us at:
1800 636 091 or **info@devexsystems.com.au**
www.devexsystems.com.au