

Installation Guide

Heating cables

Field and seed bed heating



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1 Introduction

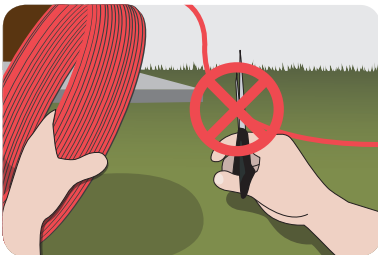
In this installation manual, the word “element” refers to both heating cables and heating mats.

If the words “heating cable” or “heating mat” are used, the instruction in question applies only to this type of element.

The intended uses of the heating elements covered by this installation manual are shown in the following.

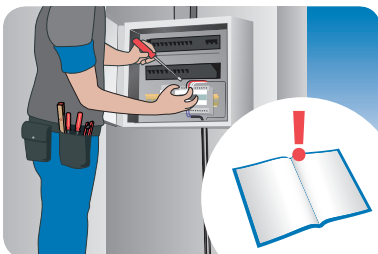
For other applications please contact your local sales office.

1.1 Safety Instructions



Never cut or shorten the heating element

- Cutting the heating element will void the warranty.
- Cold leads can be shortened to suit requirements.

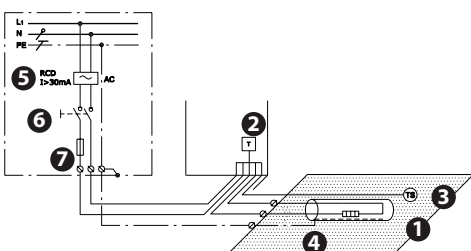


Elements must always be installed according to local building regulations and wiring rules as well as the guidelines in this installation manual.

- Any other installation may hamper element functionality or constitute a safety risk, and will void the warranty.

Elements must always be connected by an authorised electrician using a fixed connection.

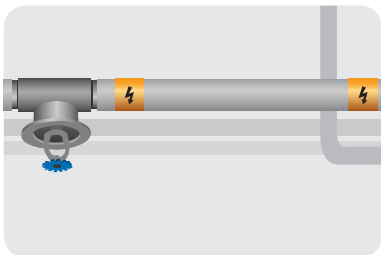
- De-energize all power circuits before installation and service.
- Each heating element screen must be earthed in accordance with local electricity regulations and connected to a residual current device (RCD).
- RCD trip rating is max. 30 mA.
- Heating elements must be connected via a switch providing all pole disconnection.
- The element must be equipped with a correctly sized fuse or circuit breaker according to local regulations.



1. Heating cable
2. Thermostat
3. Sensor
4. Screen
5. RCD
6. All-pole switch
7. Fuse

Connections

- Phase - Brown
- Neutral - Blue
- Earth - Screen



The presence of a heating mat must

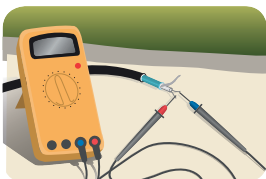
- be made evident by affixing caution signs or markings at the power connection fittings and/or frequently along the circuit line where clearly visible
- be stated in any electrical documentation following the installation.

Never exceed the maximum heat density (W/m^2 or W/m) for the actual application.

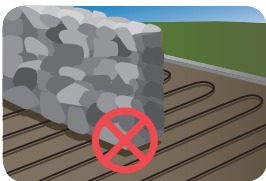
1.2 Installation guidelines



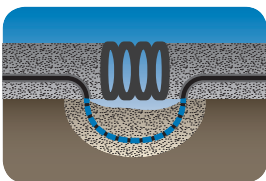
Prepare the installation site properly by removing sharp objects, dirt, etc.



Regularly measure ohmic resistance and insulation resistance before and during installation



Do not lay heating elements under walls and fixed obstacles. Min. 6 cm air is required



Keep elements clear of insulation material, other heating sources and expansion joints



Elements may not touch or cross themselves or other elements and must be evenly distributed on areas.



The elements and especially the connection must be protected from stress and strain.

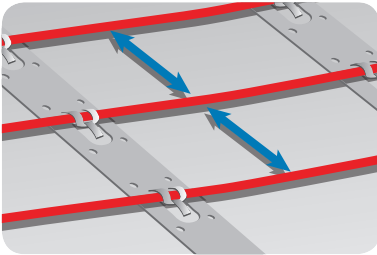


The element should be temperature controlled and not operate at ambient temperature higher than 10°C in outdoor applications.

2 Installation step by step

2.1 Calculating C-C distance

The C-C distance is the distance in centimetres from the centre of one cable to the centre of the next.



$$C - C [cm] = \frac{\text{Area [m}^2\text{]}}{\text{Cable length [m]}} \times 100 \text{ cm}$$

or

$$C - C [cm] = \frac{\text{Cable output [W/m]}}{\text{Heat density [W/m}^2\text{]}} \times 100 \text{ cm}$$

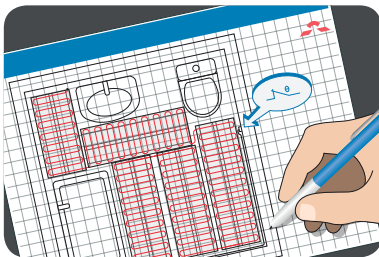
- Max. C-C distance in field / seed bed heating is 25 cm.
- Heating cable bending diameter must be at least 6 times cable diameter.
- The actual cable length may vary +/- 2 %.

230V/400V			
C-C [cm]	W/m ² @ 20 W/m	W/m ² @ 25 W/m	W/m ² @ 30 W/m
5	400	500	-
7,5	267	333	400
10	200	250	300
12,5	160	200	240
15	133	167	200
20	100	125	150
25	80	100	120

2.2 Planning the installation

Draw a sketch of the installation showing

- element layout
- cold leads and connections
- junction box/cable well (if applicable)
- sensor
- connection box
- thermostat



Save the sketch

- Knowing the exact location of these components makes subsequent troubleshooting and repair of faulty elements easier.

Please the following:

- Observe all guidelines - see section 1.2 .
- Observe correct C-C distance (heating cables only) - see section 2.1.
- Observe required installation depth and possible mechanical protection of cold leads according to local regulations.
- When installing more than one element, never wire elements in series but route all cold leads in parallel to the connection box.
 - Two or more elements may be installed in the same room but a single element is not to be installed across two or more rooms.
 - All heating elements in the same room must have the same heat density (W/m^2) unless they are connected to separate floor sensors and thermostats.
- For single conductor cables, both cold leads must be connected to the connection box.

2.3 Preparing the installation area



- Remove all traces of old installations, if applicable.
- Ensure that the installation surface is even, stable, smooth, dry and clean.
 - If necessary, fill out gaps around pipes, drains and walls.
- There must be no sharp edges, dirt or foreign objects.

3 Installing elements

It is not recommended to install elements at temperatures below $-5\text{ }^{\circ}\text{C}$.

At low temperatures, heating cables can become rigid. After rolling out the element, briefly connect it to the mains supply to soften the cable before fastening.

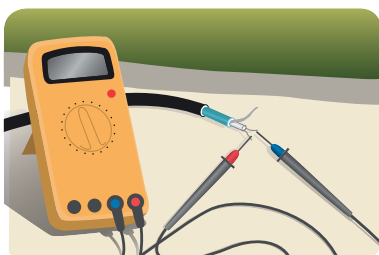
Measuring Resistance

Measure, verify and record element resistance during installation.

- After unpacking
- After fastening the elements
- After the installation is finalized

If ohmic resistance and insulation resistance are not as labelled, the element must be replaced.

- The ohmic resistance must be within -5 to +10 % of the value labelled.
- The insulation resistance should read >20 MΩ after one minute at min. 500V DC.

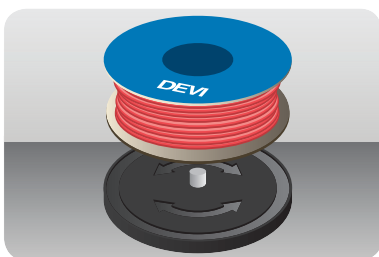


3.1 Installing heating elements

Observe all instructions and guidelines in section 1.1 and 1.2.

Heating elements

- Position the heating element so that it is at least half the C-C distance from obstacles.
- Elements must always be in good contact with the heat distributor (e.g. concrete).



Heating mats

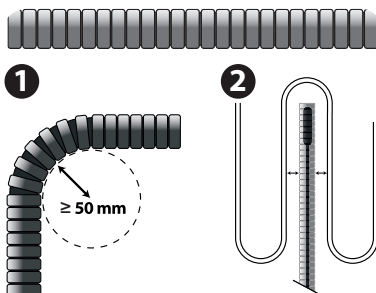
- Always roll out heating mats with the heating cables facing up.
- When the heating mat reaches the area boundary, cut the liner/net and turn the mat before rolling it back.

Extending cold leads

- Avoid extending cold leads if possible. Wire cold leads to e.g. junction boxes or cable wells.
- Be aware of power loss in the cable according to local regulations.

3.2 Sensor Installation

- The floor sensor should be mounted in an insulating conduit, sealed at the floor end, for easy replacement of the sensor if required.
- The floor sensor must be considered a LIVE cable; therefore any extension made to the sensor wiring should be treated in the same way as normal mains voltage cabling.
- The sensor can be extended up to a total of 50 m using 1.5 mm² installation cable.
- The minimum bending radius for the pipe is 50 mm (1).



- The sensor cable must be placed between two loops of the heating cable (2).
- Route the conduit to the connection box.

4 Applications

4.1 Field/seed bed heating

A heated field is considered a workplace e.g

- football pitches
- golf greens
- greenhouses

Safety instruction, see section 1.1.

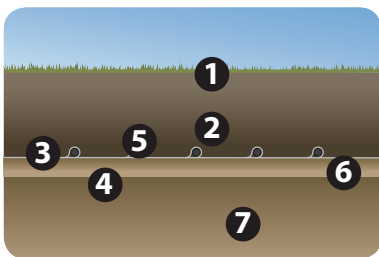
The installation depth must always be considered carefully

- Agree with local electrical and safety authorities before installing the cables.
- Observe local requirements for installation depth, possible mechanical protection for cold leads and markings.
- Observe insertion depth of objects like lawn aerators, vertidrain, spades, javelins, pegs, anchor bolts etc.
- For efficient heating the installation depth should be max. 25-30 cm.
- Any work in the soil after installation must be done by instructed personnel only.

Field/seed bed heating should be established with multiple zones, depending on field size, sun and shadow. Each zone must be provided with

- 2 x sensors or 1 sensor probe for measuring average top soil temperature.
- Sealed junction box or cable well for connecting cold leads to power supply.
- Max distance to junction box or cable well 20 m from each zone.

Field / seed bed heating

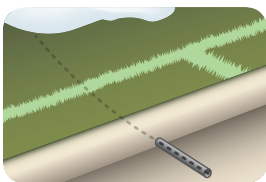


1. Grass.
2. Topsoil.
3. Sensor in steel conduit.
4. Sand/soil.
5. Heating cable.
6. Fitting band (for installation on new constructions).
7. Ground with drainage system.

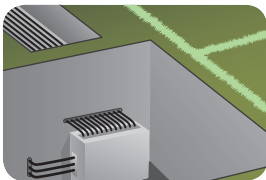
Installation summary



Roll out and fix elements on base construction. For retrofit installation cables can be plowed into the soil.



Fix conduit as high as possible for sensor cables or sensor probe in each zone.



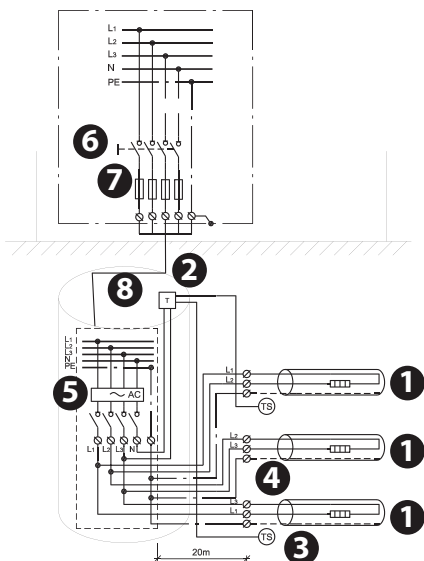
Wire cold leads in cable trench in 1 layer only (no bundling, no pipes). Apply caution tape above cold leads and cover with sand. Connect cold leads and sensors to sealed junction boxes or cable wells max. 20 m from each zone.

5 Optional settings

If the element is connected to a thermostat such as a ECtemp, configure basic settings according to the table below and as described in the thermostat installation manual.

If applicable, adjust the temperature limit in accordance with the manufacturer's recommendations in order to prevent damage to e.g. the floor or the pipe.

Thermostat	Max. load	Floor heating in general
ECtemp 316	16A	
ECtemp 330	16A	Defrosting +3° C Growing +7° C
ECtemp 610	10A	
ECtemp 850	2 x15A	



1. Heating cable
2. Thermostat
3. Sensor
4. Screen
5. RCD
6. All-pole switch
7. Fuse
8. Junction box