

# *ARCTIC TRACE*®

## *Installation Information*

### **Horticultural Soil Heating**

**For Type E Series Heating Cable & Accessories**



## DESCRIPTION

**Arctic Trace Horticultural Soil Warming Systems (EL SERIES) heater cables** provide a solution for warming soil used for young plant starts and seed germination. This is most important in areas that have cool spring and short growing seasons. Heating soil is also important in extending the growing season to obtain maximum plant or crop greenhouse production. The cables' temperature limiting feature provides additional benefits:

**Lower Energy Consumption** - the cable reduces its power output as the soil temperature changes due to environmental conditions or watering.

**Safety** - the cable designed to be placed in contact with soil water and other chemicals used in crop and flower production. The outer Tefzel jacking is a food grade material suitable for contact with vegetables and other edible crops.

## COMPONENTS

**206C Water Proof Cord Grip** - provides a 1/2" MNPT watertight entry seal into a junction box (not included). It is recommended that a NEMA 3R, 4 or 4X box be used and mounted under an eave or other protected area. Each cord grip will terminate one heater cable.

**660C Universal Mounting Clips** - are used for all types of installations. Clips come 25 to a box; order one box per eight feet of eave or one box for every 100 feet of cable installed on flat roofs (nails or screws not included).

**305C End Seal Kit** - provides a waterproof seal at the end of each heater cable circuit. Each kit contains 1 seal.

**C14880 Power Connection Kit** - provides a cord type power connection with GFCI safety. Each kit contains 1 GFCI with 32' pig tail, wire pressure connectors and heat shrink.

**C33129SP Junction Box** - provides a 4 gang weather proof power connection junction box. Each kit includes 1 junction box, 1 clear cover, 1 GFCI including on/off switch (Components ship unassembled).

**TRD115 Automatic Thermostatic Control** - General purpose NEMA 4X rain tight junction box with adjustable control range of 0 to 80F. Thermostat is equipped with a 12' flexible capillary and sensing bulb.

## INSTALLATION INSTRUCTIONS

1. Before installing heater cable, allow it to warm up to room temperature.
2. Remove any sharp edges that could damage the heater cable in area of its placement.
3. Terminate heater cable per end seal kit instructions.
4. Thermostatic temperature control should be used to prevent soil from drying our sensitive root zone.
5. It is recommended that the heater cable be megger tested between bus wires and ground braid after installation to verify cable integrity. Heater cable should have a minimum insulation resistance of 20 megohms when tested with at least a 500VDC megger, a 2500VDC megger is preferred.
6. Power supply must always be protected using a suitable GFCI for personal and equipment protection.
7. Soil heating cable should be installed with a suitable protective mat or other barrier used to protect the cable when cultivating the soil.
8. Heating cable should be laid in a serpentine pattern whenever possible and spaced at 4" intervals.
9. All electrical connections shall be done according to State and local codes as may be required.

## WARNINGS

- *Article 426 of the National Electric Code requires that all outdoor electric deicing and snow-melting equipment be provided with branch circuit ground-fault equipment protection.*
- *Moisture must be kept away from the live electrical parts of the cable or electrical faults will develop.*
- *If nuisance tripping of ground-fault breakers occurs due to condensation in the junction box, electrical connections should be moisture proofed by use of a coating or sealant.*
- *The cables ground braid must be connected to electrical ground for proper protection through circuit breakers. All electrical connections should be made by a licensed electrician.*
- *Do not twist bus wires together – this will result in a short circuit and damage the cable.*
- *Damaged heater cables must be repaired or replaced.*



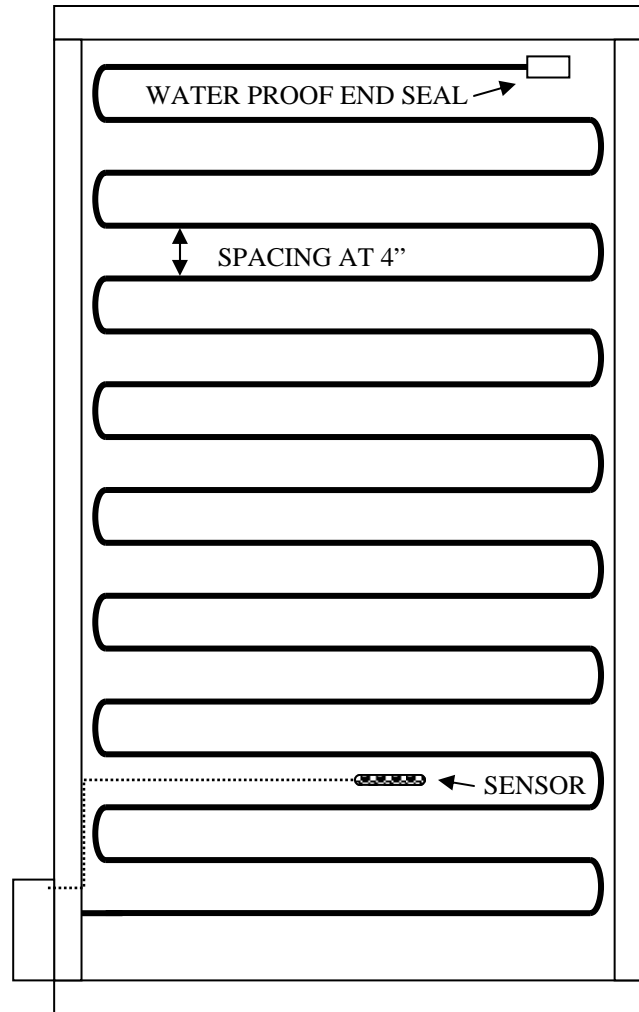
### Heating of soil beds

In order to speed up vegetation and reproduction in greenhouses the soil may be heated so the vegetation starts earlier and the harvest lasts longer. It can also facilitate the cultivation of heat requiring plants which normally only grow in subtropical/tropical latitudes. In order to reach the necessary temperatures soil heating cables are ideal and if they are equipped with electronic thermostats and sensors, the energy consumption will be minimal. Heating of seed beds can be used in greenhouses, cutting beds, seed beds and reproduction boxes.

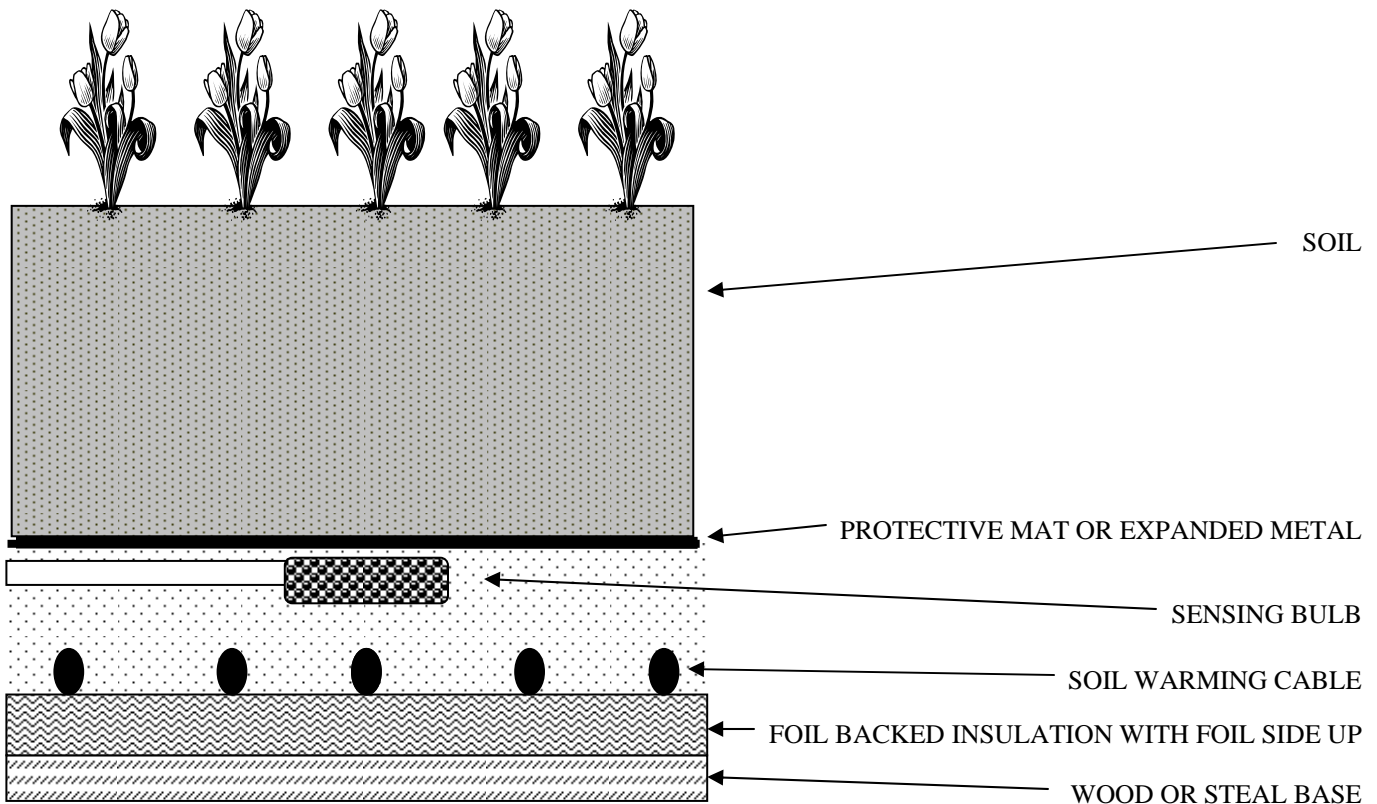
### Installed output

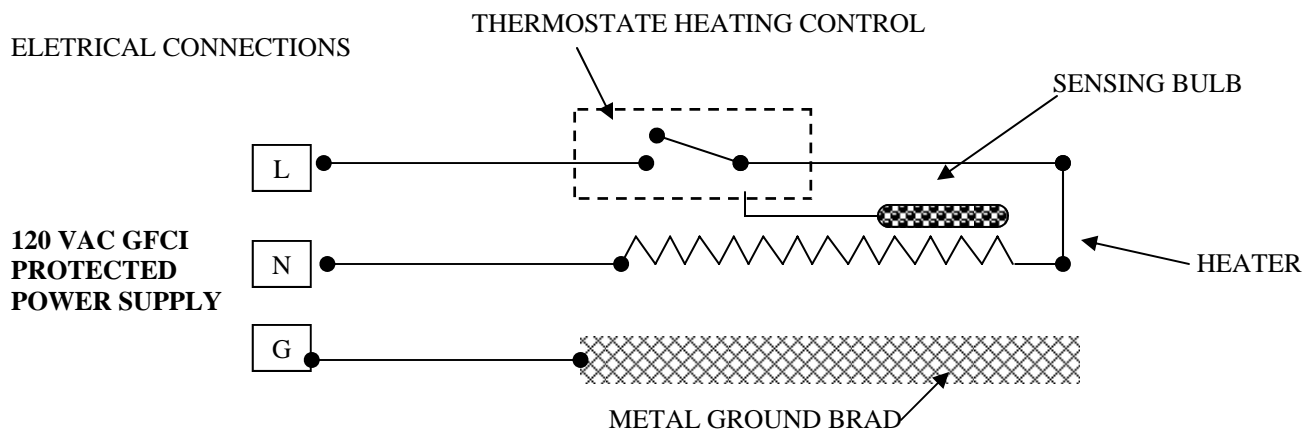
In order to obtain a sufficient temperature in the soil, an output of 75-100 W/m<sup>2</sup> should be used. The output of the cable should not exceed 18 W/m, though, as there is a risk of drying the roots if the temperature is too high.

To prevent the heat from going downwards, it is necessary to use insulation sheets with a low water absorbing capacity (e.g. styrophor). The sheets must then be covered with 0.2 mm of PE foil to protect against soakage. The foil should then be covered with 10 cm of sand (not gravel), in which the heating cables should be placed so there is 5 cm of sand both under and above the cable. The distance between the cables must be approx. 15 cm. On top of the sand a net or mat should be placed to protect the cable against damages from spits and other tools. Finally, the sand layer should be topped with soil or seed beds, pots, etc..



Cable layout





### Guide to Optimum Temperatures

Results obtained in practice show that the following root zone temperatures will yield the most effective growing performance.

#### Hotbed Salad Crops

- Lettuce, Celery, Carrots, Radish, Chicory, Endive 10 - 15 C

#### Vegetable Seeds (Germination)

- Cabbage, Spinach 10 C
- Cauliflower, Lettuce, Parsnip, Broccoli, Celery, Carrot, Tomato, Chicory, Sweet pepper 15 - 20 C
- Cucumber, Sweet corn, Melon 20 - 25 C

#### Flower Seeds (Germination)

- Cineraria, Delphinium, Larkspur, Antirrhinum 10 - 15 C
- Aster, Carnation, Cyclamen, Dahlia, Lupine, Stocks, Gypsophila, Sweet Pea 20 C
- Pansy, Iceland Poppy, Foxglove, Lobelia 20 - 25 C

#### Vegetable Seedlings

- Lettuce, Celery 18 - 20 C
- Tomato, Sweet Pepper 20 - 25 C

#### Bedding Plants (All species) 20 - 25 C

#### Root cuttings

- Geraniums, Begonias 20 C
- Chrysanthemums 25 C
- All others 20 - 25 C



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