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# ELEKTRA Snow&Ice Protection



• SnowTec<sup>®</sup> Heating Mats

Installation manual



For the proper installation and operation of the ELEKTRA snow melting system, it is recommended to first read this Installation Manual.

The heating mats should be installed in accordance with NFPA 70, National Electrical Code (NEC), Article 424 and Canadian Electrical Code, Part I (CEC), C22.2-09, Section 62.

# Applications

ELEKTRA SnowTec<sup>®</sup> heating mats are intended for prevention of snow and ice deposition on:

- · driveways, roads, parking spaces and terraces,
- viaducts, bridges, loading ramps.

The installation of the heating mats depends on the type of surface:

- in a layer of sand or dry concrete for the flagstones, paving cobbles or asphalt surfaces,
- directly in concrete for the concrete slabs or reinforced concrete surfaces.



ELEKTRA SnowTec<sup>®</sup> heating mat's cable structure

# Heating Mats

#### ELEKTRA

# Characteristics

Heating mats are manufactured as ready-made units, suitable for direct installation. Composed of single-side power supplied heating cables.

#### Caution:

The heating cable of the mat cannot contact combustible surfaces.

#### **Technical parameters:**

- Dimensions: Width 2.0 ft (60 cm) Length from 6.6 ft (2 m) to 82 ft (25 m) Thickness approx. ~ 1/3" (9 mm)
- Length of the power supply conductor ("cold tail") 13.0 ft (4 m)
- Surface heat output: 32.5 W/ft<sup>2</sup> (350 W/m<sup>2</sup>)
- Min. installation temperature: 23°F (-5°C)
- Power supply: 240 VAC 60 Hz-rated, supplied from an electrical panel with 240 VAC electrical circuit.
- The heating cables are shielded and power supply connection requires GFEP protection so full antishock protection will be provided.



#### Note:

The power output of the heating mat can vary up to +5, -10% from the provided rated speci-



- 1 "cold" power supply conductor
- 2 ELEKTRA heating cable
- 3 connecting joint between the power supply conductor and the heating cable

4 nameplates sticker

#### Cold tail marking

240 V - red outer jacket or red label with 240 V printing

# Heating Mats

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The mats nameplates sticker always show the rated voltage for each heating mat.



Self-adhesive label

The label features the following pictograph:



Single-side powered heating mats

#### Note:

**Never** cut the heating cable. Only the cable connecting tape can be cut, in order to shape the heating mat as desired.

Never bend the joint and end seal.

**Never** trim the heating cable, only the power supply conductor may be trimmed if required.

Never squash the "cold tail".

Do **not ever** undertake on your own any attempts to repair the heating cables, and in case any damage is detected, report the damage to an ELEKTRA authorized installer.

**Never** stretch or strain the cable excessively, nor hit it with sharp tools.

Do **not** install the heating mats when ambient temperature drops below 23°F (-5°C).



#### Note:

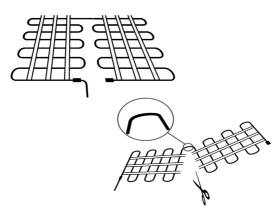
Heating mats must be installed in accordance with the instructions.

Mains connection of the heating mats should be performed by an authorized electrician.

# **General information**

The length of the heating mat should match the dimensions of the surface to be heated. The heating mat can be shaped as desired by cutting the fixing tape (do not cut the heating cable itself) and turning the mat in the required direction.

Applying insulation layer to the surfaces exposed to wind from below can improve the effectiveness of the heating.



After the heating mats has been laid, secure the mat's cables to the surface to prevent from displacement and maintain steady cable spacing.

# Controls

A properly selected control system is required to the proper operation of the system only during snow and freezing rainfall. A temperature controller with a temperature and moisture sensor will automatically recognize the weather conditions. The heating system will be then kept on standby and only switched on when actually necessary. For this purpose, DIN-bus installed controllers ELEKTRA ETO2 can be utilised.

#### Snow & ice protection controls



ELEKTRA ETOG2 controller – max. load up to 3x16 A. For applications in extended heating systems. As standard, equipped with one temperature and moisture sensor and an installation tube. Additional temperature and moisture sensor can be connected to this controller, which will enable protection of two outdoor areas. Enables control of two independent zones, e.g. garage driveway and gutters, with one controller.



# Installation

## Stage 1: Heating mat's installation

The heating mat layout should be commenced from the side of the power supply, in such a way to enable easy reach to the electricity supply. If the cold tail needs to be extended, a heat shrink joint should be used, ensuring that the connection is safely sealed.

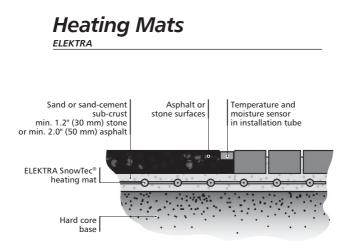
#### The heating mat can be laid:

- in the layer of sand constituting the base for the asphalt, flagstones or paving cobbles surfaces,
- directly in concrete.

#### Asphalt, flagstones or paving cobbles surfaces

Stages of works:

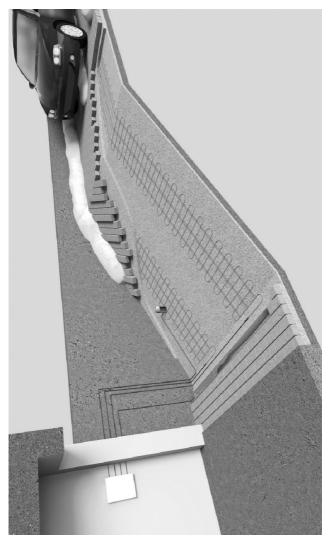
- the hard concrete core base that is covered with a layer of sand or dry concrete of the min. 1.2" (30 mm) thickness (min. 2" (50 mm) for the asphalt surfaces), and then compacted,
- ELEKTRA SnowTec<sup>®</sup> heating mats are installed on the layer of the compacted sand or dry concrete,
- securing the heating mat's cables to the surface,
- the mats are completely covered with a layer of sand or dry concrete,
- the finishing surface works follow stage 4.



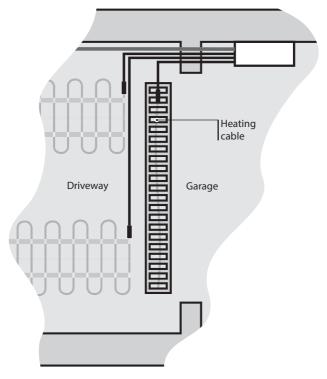
Cross section of driveway made of asphalt or paving blocks (installation in a layer of sand bedding)

When protecting garage driveways against snow and ice, it is not necessary to heat the entire surface, but only the tyre tracks. The temperature and moisture sensor should be placed within the heated area, but not directly in the tyre tracks under the car tyres' path – in order to avoid snow accumulation and unnecessary operation of the heating system.





Example of ELEKTRA SnowTec<sup>®</sup> heating mats as laid in the garage driveway made from paving cobbles



Linear drainage heating

It is also necessary to heat the floor drain (drainage) in order to ensure the outflow of water originating from snow melting. For this, use ELEKTRA VCD25 heating cable.

The heating circuit should be connected to the power source in the electric board of the driveway, so that it is switched on simultaneously with the remaining heating circuits.

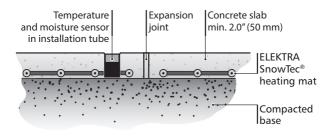


#### **Concrete surfaces**

Concrete surfaces require expansion joints. Unreinforced concrete slabs should be divided into expanded areas of the surface no larger than 100 ft<sup>2</sup> (9 m<sup>2</sup>) reinforced concrete flagstones into areas no larger than 380 ft<sup>2</sup> (35 m<sup>2</sup>). The length of the heating mats should be selected so that they would not cross the expansion joints. Only the power supply conduits ("cold tails") can cross the expansion joints. They are to be placed in a metal protective conduit of the length of approx. 73/4" (50 cm).

Stages of works:

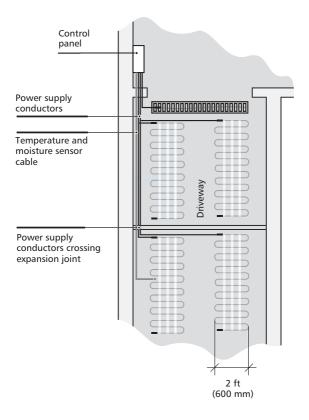
- the compacted base is levelled,
- ELEKTRA SnowTec<sup>®</sup> heating mats are laid on the compacted base,
- securing the heating mat's cables to the surface,
- the concrete slab works follow stage 4.



Cross section of pavement or driveway made of concrete slab

#### Caution:

SnowTec<sup>®</sup> heating mats must never be run through an expansion joint.



Typical layout of ELEKTRA SnowTec® on concrete driveway to garage with expansion joint



# Stage 2: After the heating mat has been laid

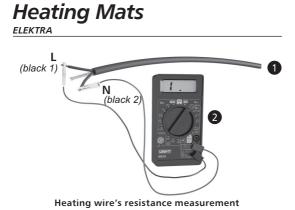
At this stage, it is necessary to undertake the following steps:

- stick into the Warranty Card the self-adhesive label, positioned on the power supply conductor of the heating mat,
- in the Warranty Card, prepare a sketch of the heating mat's layout positioning,
- feed the power supply conductor of the heating mat into the switchboard,
- · perform the measurements of:
  - heating wire resistance,
  - insulation resistance.

The measurement results of the heating core's resistance should not vary from the one given on the label with more than -5% and +10%.

The insulation's resistance for the mat's heating cable, as measured with a tool of the rated voltage 1000 V (e.g. megaohmmeter), should not be below 50 M $\Omega$ . Enter the results into the Warranty Card.

When the surface has been finished, repeat the measurements and compare the results to ensure that the mat has not been damaged while surface installation works.





Insulation resistance measurement

 Power supply conductors 2 Ohmmeter

- B Megaohmmeter



# Stage 3: Temperature and moisture sensor's installation preparation

- Establish the optimal positioning for the temperature and moisture sensor a place which would be especially vulnerable to prolonged low temperatures and increased moisture deposition (e.g. in a shade or exposed to wind)
  place here the installation tube of the sensor on the prepared hardened base.
- Feed the protective conduit with the so called "draw wire" from the planned sensor's positioning to the switchboard (after the surface has been completed, the protective conduit will enable feeding the temperature and moisture sensor's wire).

#### Note:

The protective conduit should be run in such a way to enable the future exchange of the temperature and moisture sensor, if required.

In case of a significant sensor's distance from the switchboard, or bending of the protective conduit, it is necessary to:

- install an additional sealed electric box "on the way" to the board, or
- install the protective conduit with a twisted pair screened control cable, min. 3-pair.
  - the sensor's wire with the control cable is to be connected with a heat shrink connecting joint.

## Stage 4: Finishing surface works

During surface works, level the installation tube, so that it is positioned  $\frac{1}{5}$ " (5 mm) below the level of the surface. Due to this, the water will be deposited on the temperature and moisture sensor.

## Stage 5: Temperature and moisture sensor's installation

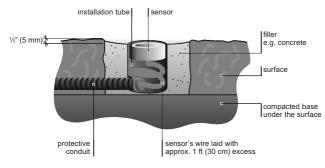
The temperature and moisture sensor should be installed in the installation tube after the sur-face has been completed. Then, the sensor's wire should be fed into the protective conduit installed before the surface has been completed, with the so called "draw wire". Under the sensor, the wire excess should be deposited min. 1 ft (30 cm) for the future sensor replacement, if required.

The sensor should be positioned approx. <sup>1</sup>/s" (5 mm) below the surface level to enable water deposition on the sensor. After the sensor has been levelled, fill the vacant space e.g. with concrete.





Ground temperature and moisture sensor ETOG-56T with installation tube (for soil, concrete flagstones, paving cobbles etc.) can be used for heating control of driveways, traffic routes, etc.



Example of temperature and moisture sensor's installation in the surface

### Stage 6: Temperature controller's installation

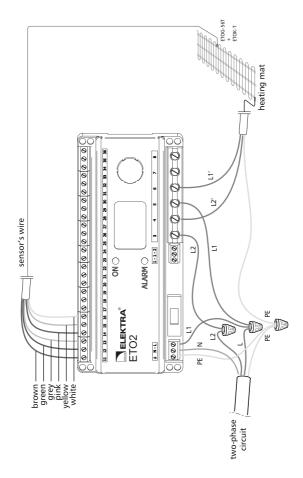
The heating mat connection to the domestic electric circuit should be performed by an authorised electrician.

The connection of the:

1. mains,

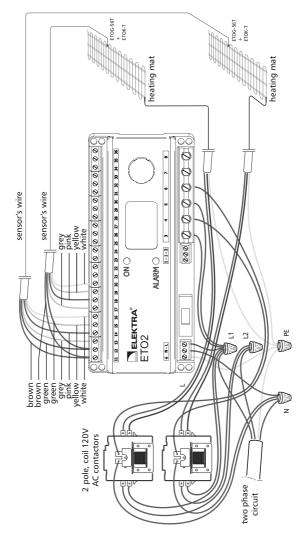
- 2. power supply conductors of the heating mat,
- 3. temperature sensor,

should be executed according to the diagram included in the temperature controller's Instructions.



Two phase electric circuit Connection diagram of ETO2-4550 controller with ETOG-56T sensor. Protection of external surfaces - one zone.





Two phase electric circuit Connection diagram of ETO2-4550 controller with ETOG-56T sensor. Protection of external surfaces - two zones.

#### **Caution:**

It is not allowed to apply different voltage than indicated on the rated nameplates to the heating mat.

If several heating mats were installed, connect them in parallel, i.e. cables with the same markings should lead to the same terminals on the thermostat.

The electrician should mark the cold leads of each heating circuit and should place a warning label in the panelboard.

The label is included with the heating mat.

# Stage 7: Surface finishing

Special care must be taken when using power tools (such as drills) on the heated surface when installing the surface finish, so as not to damage the heating mat's.

Sand or concrete surface levelling with sharp tools or power tools is not allowed as it may permanently damage the heating mat's.

#### **Caution**:

Provide ground fault equipment protection (GFEP) for the snow melting system. This maybe at the circuit breaker or the control.

#### Note for the System Owner

Make sure the person doing the electrical work has:

- properly completed the Warranty Card,
- labeled the electrical circuit that supplies the ELEKTRA snow melting system.



#### Operation

Holes can be drilled in the heated surface after the exact arrangement of the heating mats has been determined (based on the as-built documentation or measurements taken with a special detector).

#### Caution:

Make sure 240 VAC is supplied to 240 VAC heating cable.

All electrical work must be done by a qualified licensed electrician in accordance with local building and electrical codes, and the National Electrical Code (NEC), especially Article 424, Part IX of the NEC, ANSI/NFPA70 and Section 62 of CEC Part1.

Pay careful attention to the amps to make sure your controls, circuit breaker panel, and wiring will have the proper capacity. Design everything to handle 125 percent of heating mat load (complete product listening table).

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	Solution	Re-measure with a digital Ohmmeter.	Contact the Manufacturer's Representati- ve.	If possible, place the mat in a room, ensure that the room temperature stays around 68°F (20°C). Take the measurement after 1 hour.
	Possible cause	An analog type meter with a needle to in- dicate reading was used for measurement.	If the measurement is significantly diffe- rent from the value on the nameplate la- bel, this indicates an open or short-circuit, and the cable has been damaged.	If the measurement is slightly different from the value on the nameplate label, room temperature stays around room temperature might have affected the form. Take the measurement after resistance.
Troubleshooting	Problem		Cable resistance measurement is different than the nameplate label.	

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	The thermostat is off.	Check if the thermostat's switch is on.
The thermostat is not working.	No power is supplied.	Measure power supply conductor's voltage at the thermostat.
	The thermostat is defective.	Return the thermostat to the local Dealer for replacement.



# Heating Mats

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	The sensor's wires have become loose at the thermostat's terminals, or have been incorrect installed	Check that all connections are placed cor- rectly, and that cables are fastened in the clamps.
Snow and ice doesn't melt.	The cables have been wired in series.	In case more than one heating mat is to be used, the mats must be connected in pa- rallel (i.e. power supply conductors of the same color must be connected to the same thermostat's terminal).
	The heating cable has been damaged.	Measure heating mat's resistance (as de- tailed in this Manual) and compare to the value given on the nameplate label. If the measured values differ significantly, con- tact the local Representative.

	The thermostat is off.	Check if the thermostat's switch is on.
GFEP is tripped.	No power is supplied.	Measure power supply conductor's voltage at the thermostat.
	The thermostat is defective.	Return the thermostat to the local Dealer for replacement.



# Heating Mats

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	Incorrect programming.	Carefully read the thermostat's manual.
The thermostat is not working correctly.	Incorrect voltage supplied.	Measure the voltage of the heating system's power supply conductor at the thermostat and make sure it matches the thermostat's rating.



#### Product Listing 240 V 32.5 W/ft<sup>2</sup> (350 W/m<sup>2</sup>)

	Dime	nsions	Cove	erage	Amps	Power
240V model	ft x ft	m x m	ft²	m²	А	w
SnowTec <sup>®</sup> 350/2	2x6.5	0.6x2.0	13	1.2	1.8	440
SnowTec <sup>®</sup> 350/4	2x13.0	0.6x4.0	26	2.4	3.7	880
SnowTec <sup>®</sup> 350/5	2x16.5	0.6x5.0	33	3.0	4.5	1090
SnowTec <sup>®</sup> 350/7	2x23.0	0.6x7.0	46	4.2	6.3	1520
SnowTec <sup>®</sup> 350/10	2x33.0	0.6x10.0	66	6.0	8.8	2100
SnowTec <sup>®</sup> 350/13	2x42.5	0.6x13.0	85	7.8	11.5	2770
SnowTec <sup>®</sup> 350/16	2x52.5	0.6x16.0	105	9.6	14.0	3350
SnowTec <sup>®</sup> 350/20	2x65.5	0.6x20.0	131	12.0	17.9	4300
SnowTec <sup>®</sup> 350/25	2x82.0	0.6x25.0	164	15.0	21.9	5250

# Heating Mats

#### ELEKTRA

# Warranty Conditions

ELEKTRA company grants a 10 year-long warranty (from the date of purchase) for the ELEKTRA SnowTec<sup>®</sup> heating mats.

- 1. Warranty claims requires:
  - a. that the heating system has been executed in full accordance with the Installation Instructions herein, by a certified electrician,
  - b. presentation of the properly completed Warranty Card,
  - c. presentation of the proof of purchase of the heating mat under complaint.
- The Warranty loses validity if any attempt at repair has been undertaken by an unauthorised installer.
- 3. The Warranty does not cover the damages inflicted as a result of:
  - a. mechanical fault,
  - b. incompatible power supply or temperature control,
  - c. lack of adequate overload and differential protection measures,
  - d. discord of the domestic heating circuit with the current regulations in force.
- 4. Within the Warranty herein, ELEKTRA company undertakes to bear exclusively the costs required to cover the necessary repairs to the heating mat's itself, or to exchange the mat.

#### Note:

The Warranty claims must be registered with the Warranty Card and proof of purchase, in the place of purchase or the offices of ELEKTRA company.



5. The Warranty covering the purchased commercial goods does not exclude, limit or suspend other Buyer's rights resulting from the incompatibility of the goods purchased with the agreement of purchase.

Before returning the Product recognized to be defective in materials and workmanship, and not damaged as a result of misuse, misapplication or improper installation, to the Manufacturer's local Representative's office for repairs, you **MUST** contact the Representative in order to obtain the dedicated Returned Authorization number (Returned Authorization RA), otherwise the shipment will not be accepted and subsequently returned to the sender.

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Customer shall keep this Warranty Card throughout the entire warranty period of 10 years. The warranty period starts from the date of product purchase

Heating Mats

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# the retail sale receipt must be included Warranty Card and Warranty claims with filled with the dealer. City INSTALLATION SITE Zip code Address

TO BE FILLED BY INSTALLER			
Name		Electrician's Co. name and licence no:	
Address		e-mail	
Zip code	City	 phone no:	fax



# ELEKTRA heating mat's layout diagram

Note: The installer is obliged to provide the user with the post-realisation documentation.

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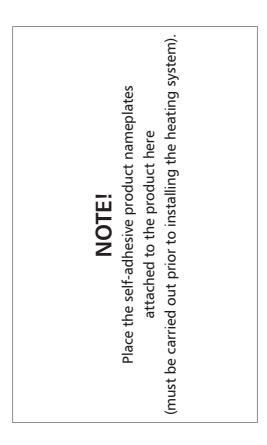
Square footage of the heated area	Date	
Heating mat model	Installer's legible signature	

# Heating wire and insulation's resistance

Before you start the installation	C WD
After securing the heating mat	Ω
to the surface	MΩ
When the surface is	Ω
connected and powered up	ΩM

**Caution:** The measurement results of the heating core's resistance should not vary from the one given on the nameplate with more than -5% and +10%. Resistance of the heating wire insulation should be at least 50 M $\Omega$  when measured with a mega- ohmmeter (Insulation Resistance Tester) with a rated voltage of 1000 V.





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