



Intrinsically Safe  
Equipment



## STEP<sup>®</sup> I.S. Heat Trace Instruction Manual

For Use In Hazardous Locations  
Class I, Zone 0, [AEx ia Ga] IIA  
Ex ia IIA T4 Ga  
Class I, Division 1, Group D, T4, Intrinsically Safe



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## STEP® I.S. HEAT TRACE

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### PRODUCT INFORMATION

STEP® I.S. Heat Trace elements are made of an extruded, homogeneous semi-conductive polymer blend, which by nature is self-regulating. This self-regulating, positive temperature coefficient (PTC), Nano-technology allows the elements to heat with maximum power in cold environments and use less electricity as their temperature increases. This minimizes power consumption and eliminates risks of overheating.

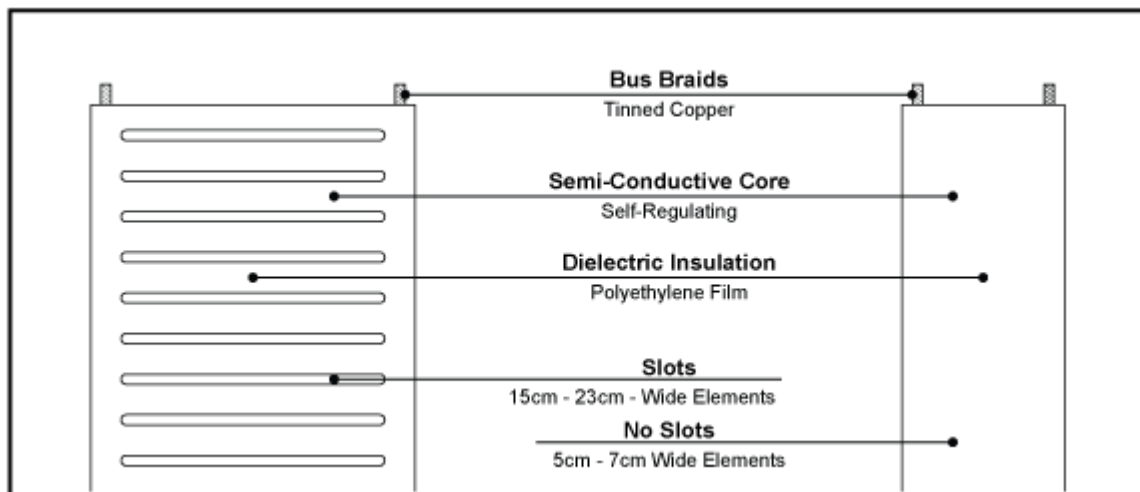
The STEP® I.S. Heat Trace system consists of durable, thin and flexible, heating elements, which operate at extra-low voltage, 15.3VDC. The heating elements are custom designed for each individual application and are available in different widths and heat output.

The STEP® I.S. Heat Trace elements are combined in one overall thermally sealed enclosure. The I.S. Heat Pad is comprised of various polymeric materials and can have up to three individual elements that are each powered from one of the three circuits in the I.S. Controller.

The STEP® I.S. Heat Pad is approved for installation and use in the hazardous location. It is intended to be used together only with the STEP® I.S. Controller.

The STEP® I.S. Controller is located in the non-hazardous area and consists of the power supply, 120V-250V AC, the thermostat, the control system and the intrinsically safe barriers.

- Class I, Zone 0, [AEx ia Ga] IIA
- Ex ia IIA T4 Ga
- Class I, Division 1, Group D, T4, Intrinsically Safe



## **STEP® I.S. HEAT TRACE**

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### **PROPERTIES**

- STEP® I.S. Heat Trace is a flat, flexible and thin heating element made of a unique PTC technology.
- The element is strong and durable, and last as long as the construction it is built into.
- STEP® Heat Trace has the ability to self-regulate - as the material gets warmer, less electricity passes through the polymer - therefore it is extremely energy-efficient.
- The element acts on its whole surface as a sensor and cannot overheat.
- More surface area will yield a more efficient heater.
- The element provides an even heat distribution with no hot spots.
- Convenience of having a complete heating pad that is easy to replace.
- Heating pads can easily be added or moved to where more heat is required.
- Simplicity is very important for remote or unmanned applications.
- An easy and uncomplicated control system will provide less maintenance, fewer parts to fail and less equipment to troubleshoot.
- The STEP® I.S. Heat Pad is factory connected and thermally sealed in an enclosure.
- The heating enclosure is custom sized to fit the application.
- The heat pad can easily be bent 90 degrees, when warm, to fit any contour.
- The heating system is very versatile and can be used in commercial and industrial applications.
- Applications include process heating for valves, manifolds, pipelines, controls and equipment.
- STEP® I.S. Heat Trace Element is intrinsically safe and suitable for hazardous locations.
- The ambient temperature range is  $-25^{\circ}\text{C} \leq T_{\text{AMB}} \leq +40^{\circ}\text{C}$ .

## **DESIGN GUIDELINES**

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### **IMPORTANT GUIDELINES**

- Choose only qualified personnel who are familiar with the STEP® I.S. Heat Trace system.
- Make sure that all materials used are approved for the specific application and have no adverse compatibility with the heating elements.
- Use only components recommended by the manufacturer.
- Follow installation instructions to assure that the calculations and the heating system installed are done according to the specified application.
- The installation shall be made in accordance with local codes, ordinances, trade practices, and manufacturers' instructions.
- To avoid electrostatic charge build-up, the operator must be properly grounded when working on the equipment.
- Electrically check the system and enter the measurements and appropriate information on the labels provided.
- STEP® Warning Labels are affixed to the STEP® I.S. Controller and I.S. Heat Pad.

### **WARNING**

- POTENTIAL ELECTROSTATIC CHARGING HAZARD.
- DO NOT USE A PIERCED OR DAMAGED HEATING PAD.
- DO NOT PUT NAILS, STAPLES OR ANY METALLIC OBJECT THROUGH HEATING PAD.
- IN HAZARDOUS LOCATIONS, DO NOT CUT/SPLICE THE HEATING PAD WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.
- HEATING EQUIPMENT IS REQUIRED TO BE INSTALLED BY QUALIFIED PERSONNEL IN ACCORDANCE WITH LOCAL AND NATIONAL CODES SUCH AS NEC IN U.S., CEC IN CANADA.
- HEATING PAD SHOULD BE TESTED AND MEASURED TO COMPLY WITH DESIGN SPECIFICATIONS.
- READ AND FOLLOW ALL INSTRUCTIONS.

These installation instructions assume that the STEP® I.S. Heat Trace system has been designed by Electro Plastics, Inc. or a distributor of Electro Plastics, Inc. and is being installed according to the proposed Design Specifications, all Terms & Conditions of Sale, and Limited Warranty provided with a STEP® I.S. Heat Trace quotation.

For more information, contact the supplier that originally provided the quotation or Electro Plastics, Inc. at 877-783-7832, or visit [www.electroplastics.com](http://www.electroplastics.com).

## **DESIGN GUIDELINES**

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### **DESIGN AND CALCULATIONS**

- A calculation has to be made for each application.
- It is important to enter the proper information in the I.S. Process Heat Calculator.
- Indicate for each area:
  - Device type:
    - Flow meter
    - Strainer
    - Valve
    - Other
  - Liquid type:
    - LNG
    - Oil
    - Other Fluids
  - Pressure:
    - In
    - Out
  - Temperature of fluid
  - Ambient temperature
  - Flow rate of fluid or
  - Flow coefficient Cv and
  - Specific gravity G
  - Volume of fluid in device
  - Surface area of device
  - Dimensions of device
  - Defreeze temperature of liquid
  - Heat loss from device

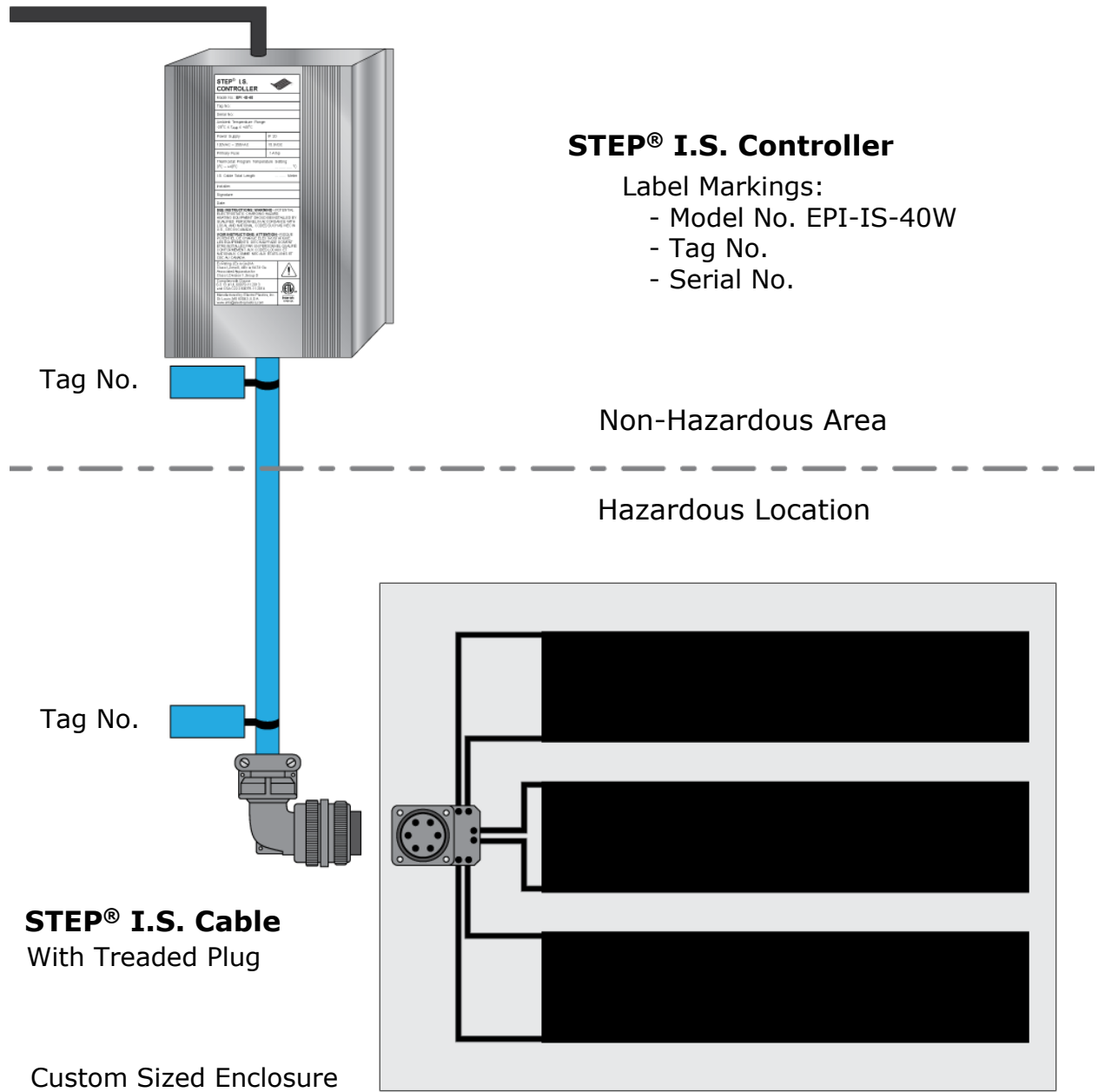
### **SUPPLIED PARTS**

The STEP® I.S. Heat Trace system consists of:

- STEP® I.S. Controller
- STEP® I.S. Cable
- STEP® I.S. Heat Pad

# STEP® I.S. SYSTEM

## GRAPHIC DESIGN



### STEP® I.S. Controller

Label Markings:

- Model No. EPI-IS-40W
- Tag No.
- Serial No.

Non-Hazardous Area

Hazardous Location

### STEP® I.S. Cable With Treaded Plug

Custom Sized Enclosure

### STEP® I.S. Heat Pad

Label Markings:

- Model No.
- Tag No.
- Serial No.

## PRODUCT SPECIFICATIONS

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### HEAT PAD POWER AND SIZES

HEAT PAD	DIMENSIONS		POWER	WATT DENSITY		SIZE	
	Model No.	Inches		Centimeter	Wattage	W/sq.ft.	W/sq.m.
<b>IS 5-1-8</b>	12 x 2.5	30.5 x 6.5	8	48	516	0.21	0.02
<b>IS 5-2-16</b>	12 x 5	30.5 x 13	16	48	516	0.42	0.04
<b>IS 5-3-24</b>	12 x 7	30.5 x 18	24	48	516	0.58	0.05
<b>IS 7-1-8</b>	20 x 4	51 x 10	8	24	258	0.6	0.06
<b>IS 7-2-16</b>	20 x 7	51 x 18	16	24	258	1.0	0.09
<b>IS 7-3-24</b>	20 x 11	51 x 28	24	24	258	1.5	0.14
<b>IS 15-1-8</b>	20 x 7	51 x 18	8	16	172	1.0	0.09
<b>IS 15-2-16</b>	20 x 13	51 x 33	16	16	172	1.8	0.17
<b>IS 15-3-24</b>	20 x 20	51 x 51	24	16	172	2.8	0.26
<b>IS 23-1-8</b>	20 x 10	51 x 26	8	10	107	1.4	0.13
<b>IS 23-2-16</b>	20 x 20	51 x 51	16	10	107	2.8	0.26
<b>IS 23-3-24</b>	20 x 30	51 x 76	24	10	107	4.2	0.39

- STEP® I.S. Heat Trace heating elements come in 4 different widths: 5cm (2"), 7cm (3"), 15cm, (6") and 23cm (9").
- The I.S. Heat Pad come factory connected in a dielectric, thermally sealed enclosure.
- The enclosure is custom sized to fit the application.
- I.S. Heat Pad is thermally insulated on the outer side to maintain the heating elements close to the object to be heated.
- A socket assembly with male contacts is mounted on the STEP® I.S. Heat Pad.
- The plug with female contacts is connected to the STEP® I.S. Cable and secured with a screw lock system.
- The connections are threaded, circular connectors for use in harsh environments and are sealed to withstand moisture, condensation, vibration and flash-over.
- The other end of the I.S. Cable shall be connected by qualified personnel to the terminals on the bottom of the I.S. Controller and the box shall be sealed.



## PRODUCT SPECIFICATIONS

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### APPLICATIONS

Ice Prevention System	Suitable for ice prevention on pipelines, valves, manifolds and equipment
Heat Control System	Suitable for heating and maintaining fluid temperatures in pipelines, tanks and containers
Non-Hazardous Area	The STEP® I.S. Controller is located in the non-hazardous area and consists of the power supply, thermostat, control system and intrinsically safe barriers. <ul style="list-style-type: none"><li>- Class I, Zone 0, [Ex ia Ga] IIA</li></ul>
Hazardous Location	The STEP® I.S. Heat Pad is approved for installation and suitable for use in the hazardous location. It is intended to be used together only with the STEP® I.S. Controller and IS. Cable. <ul style="list-style-type: none"><li>- Ex ia IIA T4 Ga</li><li>- Class I, Division 1, Group D, T4, Intrinsically Safe</li></ul>
Special Condition of Use	Warning – In the case where the STEP® I.S. Heat Pad is mounted in an area where the use of Category 1 Ga apparatus is required, it must be installed such that, even in the event of rare incidents, ignition sources due to impact of reaction sparks are avoided.

STEP® I.S. Heat Trace is a system used to protect equipment, piping and instruments from the effects of low ambient temperature that may cause operational failures and interruption of production.

The STEP® I.S. Heat Pad may be used to protect pipes and valves from freezing, to maintain a constant flow temperature in hot water systems, or to maintain process temperatures for piping that must transport substances that solidify at ambient temperatures.

Electric heat tracing is often recommended for use with temperature sensitive products that must be maintained within a narrow temperature range. It is equipped with temperature control to maintain precise consistent temperatures to keep process temperatures within specification limits and to conserve energy.

The STEP® I.S. Heat Trace system includes the STEP® I.S. Controller, the STEP® I.S. Cable and the STEP® I.S. Heat Pad.

# **INSTALLATION**

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## **1. PLAN SYSTEM**

- Each system has to be calculated for its specific application.
- Get as much information as possible:
  - Equipment to be heated
  - Measurements, dimensions and volume
  - Temperatures to be obtained or maintained
  - Ambient temperatures outdoor and/or indoor
  - Heat up time depending on temperature and/or flow
  - If liquids are involved, fluid flow in gallons per hour
  - Location and type of environment (hazardous, corrosive, etc.)
  - Available power
- Locate the STEP® I.S. Controller in the non-hazardous area and calculate the distance to the equipment in the hazardous location, max. length is 45m (150ft).
- Have qualified personnel to check that there is the proper power to connect the STEP® I.S. Heat Trace system.
- Before handling the equipment and to avoid electrostatic charge build-up, the operator must be properly grounded by one of the following:
  - Wearing a wrist strap connected to earth ground.
  - Wearing 2 heel grounders and have both feet on a static dissipative floor surface.
- Installation should conform to local codes, ordinances, and trade practices.
- The apparatus complies with Clause 6.3.13 of UL 60079-11:2014 and CSA C22.4 60079-11-2014.
- For guidance, read and follow manufacturer's instructions.

## **2. INSTALL HEAT PAD**

- Heating pads should not be installed at temperatures below 4°C (40°F).
- Each STEP® I.S. Heat Pad is custom made for the application and come factory connected in a thermally sealed enclosure.
- The STEP® I.S. Heat Pad is wrapped along the pipe or around the valve or manifold.
- I.S. Heat Pad is installed in close contact with the equipment to be heated, with the flat side of the heater against the area that needs heating.
- On the opposite side, a socket assembly with male contacts is embedded in the bag and has to be accessible.
- STEP® I.S. Heat Pad is held in place with straps.

## **INSTALLATION**

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### **3. CONNECT CABLE**

- The intrinsically safe STEP® I.S. Cable is identified on both cable entries with alternatively, a light blue ring label or blue cable.
- In one end, the STEP® I.S. Cable has a factory connected plug with female contacts which has to be secured to the socket on the I.S. Heat Pad with the lock nut.
- The other end of the STEP® I.S. Cable has three shielded pairs of wires, 16 AWG, which have to be connected to the terminals located in the bottom of the I.S. Controller. Fold the shields back over the cable insulation in such a way that the cable clamp provides bonding to the controller housing.
- The maximum length of the cable shall be 45m (150ft).
- Follow color code; gray is neutral:
  - Pair 1 – white and white/gray
  - Pair 2 – black and black/gray
  - Pair 3 – red and red/gray
- After the connections are made, cover and seal the compartment with the terminals and barriers.
- Only qualified personnel knowledgeable of the system can access the sealed area.

### **4. MOUNT CONTROLLER**

- STEP® I.S. Controller is for indoor use and shall be installed in the non-hazardous area.
- Wiring should be done in accordance with the local and national electrical code, NEC in US and CEC in Canada.
- The STEP® I.S. Controller comprises:
  - Power rocker switch with 1A fuse and a heavy duty plug-in power cord
  - Power supply: 120VAC-250VAC on the primary and 15.3VDC on the secondary
  - Thermostat with software controlled temperature setting: 0°C - +40°C
  - Control system with three channels
  - Terminals and barriers in the sealed compartment
- The chassis of the STEP® I.S. Controller is secured with screws.
- Chassis dimensions are:
  - Height 3.5" (8.89cm) x Wide 6" (15,24cm) x Length 19" (48.26)
- For operation refer to thermostat settings.

## OPERATION

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### SETTINGS

- Installation Settings:
  - For proper operation of the STEP® I.S. Heat Trace system, the controller must be told the length of the cable and the heat pad model being used.
  - To enter this mode, press both the UP and DN switches simultaneously.
  - At this point the first digit decimal point will begin to flash and the user must enter, in meters, the length of the cable connecting the heat pad to the controller.
  - Pressing the UP and DN switches a second time will cause the 2<sup>nd</sup> digit decimal point to flash and the user will now enter the width of the heat pad.
  - This should be noted on the STEP® I.S. Heat Pad label and is selectable between 5, 7, 15 and 23 cm.
  - A third pressing of the UP and DN switches will cause the unit to resume normal operation.
- Specifications:
  - Heat Pad temperature range:                    0 – 40°C
  - Set temperature range:                            4 – 37°C
  - Power:    120VAC or 230V AC
- Normal Operation:
  - STEP® I.S. Controller display indicates the measured heat pad temperature during normal operation.
  - The thermostat in the controller is calibrated at the factory.
  - Should the STEP® I.S. Cable length between the heat pad and the controller be altered, the thermostat shall be recalibrated.
- Changing the Set-Point:
  - The set-point is modified using the “UP” and “DN” switches located on the controller PCB.
  - The first press of the switches will cause the display to flash the current set temperature.
  - Subsequent pressing of the switches will allow you to change the set temperature to the desired setting.
  - After a few seconds of inactivity, the digital display will stop flashing and will return to displaying the measured heat pad temperature.

## MARKING

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### LABELS

- STEP® I.S. Controller shall have:
  - Model No., Tag No. and Serial No.
  - Programed thermostat temperature setting
  - Cable total length in meters
  - Installer name and date installed
  - Warnings and Ex ratings
- STEP® I.S. Heat Pad shall have:
  - Model No., Tag No. and Serial No.
  - Warnings and Ex ratings
- STEP® I.S. Cable shall have:
  - On both extremities, alternatively blue ring labels or a blue cable may be used
  - Cable total length from heat pad to controller

For each system a Warranty Registration form has to be completed and returned to the distributor or to the manufacturer.

### ERROR CODES

Code	Channel	Fault	Code	Channel	Fault
E1: CH1	1	Current low	E7: CH1	1	Malfunction
E2: CH1	1	Voltage low	E8: CH2	2	Malfunction
E3: CH2	2	Current low	E9: CH3	3	Malfunction
E4: CH2	2	Voltage low	EA: CH1	1	Malfunction
E5: CH3	3	Current low	Eb: CH2	2	Malfunction
E6: CH3	3	Voltage low	EC: CH3	3	Malfunction

- If the current is low, the element is not properly connected. If the voltage is low, the channel is overloaded. Check the connections.
- For a malfunction error, return the equipment to the manufacturer.

**NOTE:** Read and follow manufacturer's instructions. These installation guidelines are general in nature. Specific project information is provided by the distributor or dealer.

## **WARRANTY COVERAGE**

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### **LIMITED WARRANTY**

Electro Plastics' limited warranty is valid from date of original purchase, as follows (not included in this warranty are OEM and specialty products):

- 3 years for the STEP® I.S. Heat Pad
- 3 years for the Interface Electronics in the STEP® I.S. Controller

Electro Plastics sole obligation under its warranty shall be, at its option, to either issue a credit for the purchase price, or repair or replace any article or part thereof, which is proved to be other than as warranted. For this warranty to be valid, a copy of the STEP® I.S. Labels shall be delivered to ELECTRO PLASTICS, INC., with a diagram indicating to which branch circuit the system is connected, the location of the controller and the heat pad, the length of the multi-cable, the voltage and amperage. Electro Plastics warrants the products to be free from defects in material or manufacturing and to perform under normal use. For the warranty to be valid, qualified personnel who are familiar with the construction and operation of the system must install the equipment and a certified electrician has to verify and measure the STEP® I.S. Heat Trace system at the time of the installation.

#### **Exclusions**

Electro Plastics shall not be responsible for any loss or damage that may arise due to:

- Non-compliance with installation and/or usage of the STEP® I.S. Heat Trace system as recommended. It shall be Buyer's and End User's duty to read and follow carefully the STEP® I.S. Heat Trace Installation Manual. Technical assistance services, e.g. design and calculations are to be used as GUIDELINES ONLY, as each application is specific to local conditions and construction.
- Dissatisfaction due to improper installation of the STEP® I.S. Heat Trace system. All heat pads and controllers shall be installed in conformance with the manufacturer's instructions and shall conform to all applicable trade practices, local codes and manufacturer's specifications.
- Usage of inadequate or non-specified materials with the STEP® I.S. Heat Trace system.
- Any and all defects, deficiencies or failures resulting from improper handling of the product; e.g., cuts made to the STEP® I.S. Heat Pad or to the wires, etc.
- Tampering with the STEP® I.S. Heat Trace system or products; e.g., removing, altering or overloading the circuit breakers, overcurrent protectors, etc.
- Installation of merchandise with obvious visible defects.

#### **How to claim this warranty**

In order to obtain warranty service, Buyer shall return the unit to the dealer from whom the unit was originally purchased, with a dated sales receipt. The dealer will forward the unit to Electro Plastics. Upon receipt of the defective unit, paperwork and explanation of application, Electro Plastics will inspect and test the unit in order to determine the reason for the alleged failure. If it is determined that the unit was properly installed and failed during normal use, as a result of a manufacturing defect, Electro Plastic will repair or replace the unit, or issue a credit or refund of the purchase price, at its sole discretion. The warranty period for any replacement unit will fulfill the warranty of the original unit and will not be extended.

#### **Limitations**

Under no circumstances will Electro Plastics be liable for labor or other charges related to the installation and use of the STEP® I.S. Heat Trace system or products. This warranty does not cover labor or removal or reinstallation of the product and is void on any product installed improperly, or in an improper environment, overloaded, misused, abused or altered in any manner. THE WARRANTIES STATED HEREIN ARE EXCLUSIVE OF ALL OTHER WARRANTIES, WRITTEN OR ORAL, STATUTORY EXPRESS OR IMPLIED, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, NONE OF WHICH SHALL APPLY TO THE SALE OF THE COMPANY'S PRODUCTS HEREUNDER. THIS WARRANTY ALSO EXCLUDES INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR BREACH OF ANY WARRANTY ON THE PRODUCTS. Products which are replaced by Electro Plastics in accordance with the foregoing shall become the property of Electro Plastics and shall be returned to it by the purchaser f.o.b. point of shipment. The maximum liability of this warranty is limited to the replacement or repair or purchase price of the defective unit. If a unit is returned and found that no defect exists, or that the user misused the unit, Electro Plastics will inform the user. If the user chooses to have the unit repaired (if possible), labor and shipping charges will apply.

#### **Limitation of Liability**

ELECTRO PLASTICS SHALL NOT BE LIABLE FOR ANY LOSS, CLAIM, EXPENSE OR DAMAGE CAUSED BY, CONTRIBUTED TO OR ARISING OUT OF THE ACTS OR OMISSIONS OF BUYER OR THIRD PARTIES, WHETHER NEGLIGENT OR OTHERWISE, IN NO EVENT SHALL ELECTRO PLASTICS' LIABILITY FOR ANY CAUSE OF ACTION WHATSOEVER EXCEED THE COST OF THE PRODUCT GIVING RISE TO THE CLAIM, WHETHER BASED IN CONTRACT, WARRANTY, INDEMNITY OR TORT (INCLUDING NEGLIGENCE AND STRICT LIABILITY) OR OTHERWISE. IN NO EVENT SHALL ELECTRO PLASTICS BE LIABLE OR ANY SPECIAL, INCIDENTAL, CONSEQUENTIAL OR OTHER SUCH INDIRECT DAMAGES (INCLUDING, WITH-OUT LIMITATION, LOSS OF REVENUES, PROFITS OR OPPORTUNITIES), WHETHER ARISING OUT OF OR AS A RESULT OF BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE), STRICT LIABILITY OR OTHERWISE.

# WARRANTY REGISTRATION

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**REFERENCE:** Invoice No. \_\_\_\_\_ Tag No. \_\_\_\_\_

**CUSTOMER INFORMATION:**

Owner's Name: \_\_\_\_\_

Address: \_\_\_\_\_

City / State / Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Email: \_\_\_\_\_

**PURCHASED FROM:** Date: \_\_\_\_\_

Company: \_\_\_\_\_ Name: \_\_\_\_\_

Address: \_\_\_\_\_

Product Purchased: \_\_\_\_\_  Ice Prevention  Heat Control

Location Installed: \_\_\_\_\_  Pipeline  Tank  
 Valve  Vessel  
 Equipment  Other

STEP® I.S. Controller Serial No.: \_\_\_\_\_

STEP® I.S. Heat Pad Model No.: \_\_\_\_\_

- |                                    |                                     |                                     |
|------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> IS 5-1-8  | <input type="checkbox"/> IS 5-2-16  | <input type="checkbox"/> IS 5-3-24  |
| <input type="checkbox"/> IS 7-1-8  | <input type="checkbox"/> IS 7-2-16  | <input type="checkbox"/> IS 7-3-24  |
| <input type="checkbox"/> IS 15-1-8 | <input type="checkbox"/> IS 15-2-16 | <input type="checkbox"/> IS 15-3-24 |
| <input type="checkbox"/> IS 23-1-8 | <input type="checkbox"/> IS 23-2-16 | <input type="checkbox"/> IS 23-3-24 |

STEP® I.S. Heat Pad Serial No.: \_\_\_\_\_

STEP® I.S. Cable total length from pad to controller: \_\_\_\_\_ meters

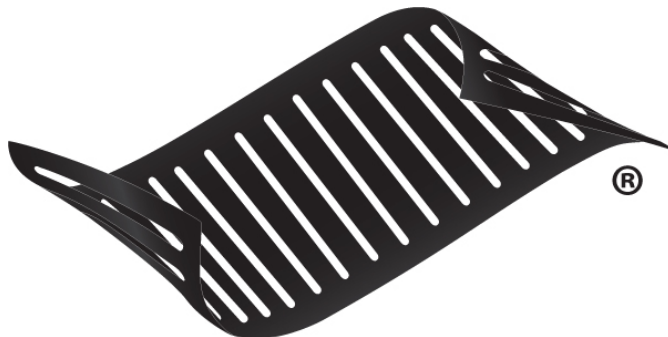
Temperature setting: \_\_\_\_\_ °C

To activate warranty complete and return this warranty registration card signed showing the system distribution as installed to:

Electro Plastics, Inc., 11147 Dorsett Road, St. Louis, MO 63043, U.S.A.

Installed/measured by: \_\_\_\_\_ Date: \_\_\_\_\_

Name: \_\_\_\_\_ Signature: \_\_\_\_\_



## APPROVALS AND CERTIFICATIONS



UL 60079-0  
UL 60079-11  
CSA C22.2 60079-0  
CSA C22.2 60079-11



IEC 60079-0  
IEC 60079-11



ISO 9001  
Registered Firm