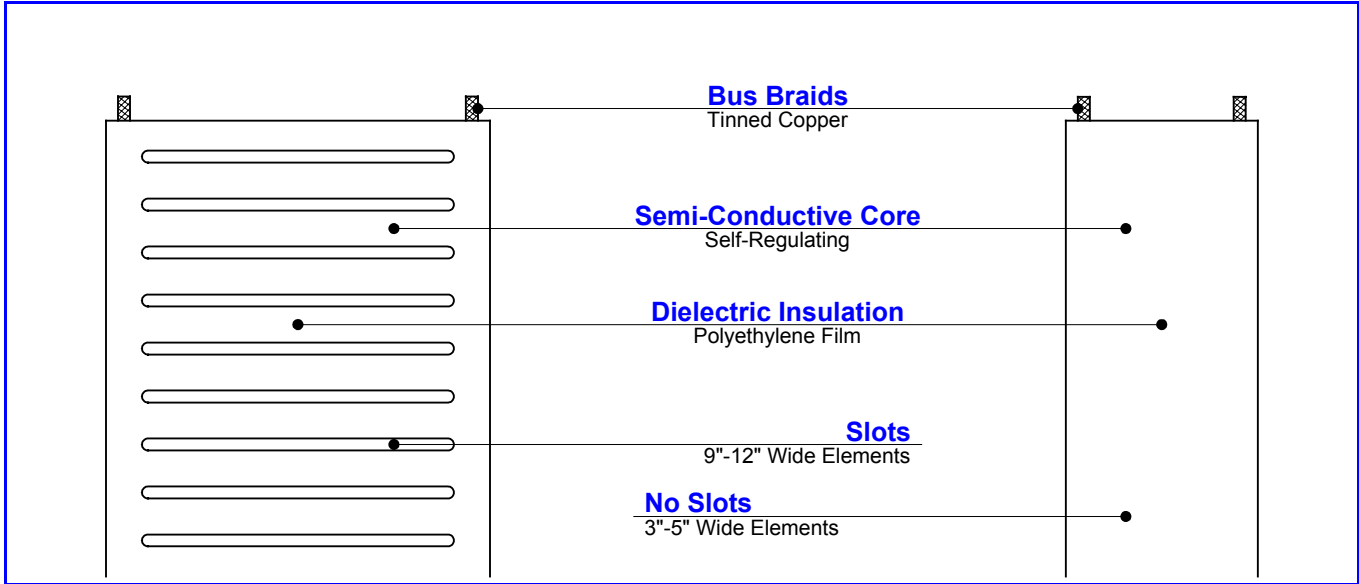


**Construction...**



The STEP Heating Element™ is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element. A polymeric dielectric jacket is applied at the time the

heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate

from thermal cycling or physical flexing.

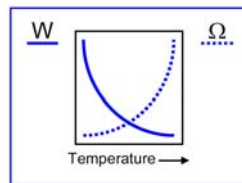
Slots are fabricated into the 9" or wider STEP Heating Element™ to increase flexibility.

**Description...**

The STEP Heating Element™ is a self-regulating, thin, flat and flexible sheet heater that provides even heat with no hot spots. It is ideal for a wide range of applications that includes radiant floor heating (STEP Warmfloor™) and a limitless number of OEM applications found in the transportation, medical, veterinary, horticulture, sports, marine, military and consumer product markets.

Being self-regulating, the element will vary the heat it generates relative to the surrounding temperature. The colder the temperature, the higher the heat-output and inversely, the warmer the temperature, the lower the

heat-output. This self-regulating characteristic allows the STEP Heating Element™ to provide even, gentle heating with no burnout as typical of constant



wattage heating elements. In addition, this even heat-output allows the STEP Heating Element™ to be safely used in conjunction with a wide range of low-temperature materials such as man-made fabrics, vinyl, rubber and wood.

The STEP Heating Element™ has the added safety benefit of being a low voltage device. The heaters can operate using a 5V to 30V AC or DC source. The heaters can even operate from a battery pack or a solar or wind power source.

The STEP Heating Element™ can easily be incorporated into your OEM application as there are numerous widths and wattage outputs to choose from; the heaters are field cut to length to suit the application; and they can be powered from inexpensive low voltage power sources.

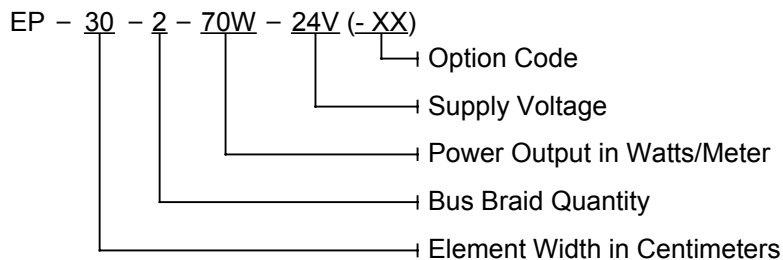
## Product Specifications...

<b>Heating element type</b>	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
<b>Dimensions</b>	Widths available: 3" (7 cm), 5" (13 cm), 8" (20 cm), 9" (23 cm) and 12" (30 cm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 3" Width – 0.08lb/ft (0.12kg/m) 5" Width – 0.11lb/ft (0.17kg/m) 9" Width – 0.18lb/ft (0.27kg/m) 12" Width – 0.23lb/ft (0.34kg/m)
<b>Output wattage</b>	1.0 W/ft (14 W/m) through 85 W/ft (280 W/m) @ 68°F (20°C)
<b>Supply voltages</b>	5V to 30V, AC or DC source
<b>Bus braid</b>	15 AWG tinned copper flat braid
<b>Dielectric jacket</b>	1 mil polyethylene film, thermally bonded to heating element
<b>Minimum bending radius</b>	3/32" (2.5mm) @ 32°F (0°C)
<b>Maximum exposure temperature</b>	176°F (80°C)
<b>Chemical Compatibility</b>	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Approvals / Certifications...

Electro Plastics, Inc. has various approvals and certifications for the finished products it manufacturers such as STEP Warmfloor™ or STEP Marine™ brand of heating systems. It is the responsibility of the OEM to secure the necessary finished product approvals that are market appropriate and industry required for the finished product they are manufacturing using the STEP Heating Element™.

## Model Number Matrix...



## Product Options...

Option Code	Description
NS	No slots, only applicable to the 9" – 12" wide STEP Heating Element™

**Please Note:** color coding of the dielectric jacket is available for orders over 5,000 ft (1,525 M), contact the factory for available colors

## Product Performance...

STEP Heating Element™ Power Output in Watts per Foot at the Stated Supply Voltage								
STEP Heating Element™ Model No.	Heater Width	Ohm/Ft @ 68°F (20°C)	W/sqft @ 68°F (20°C)	Power Output (W/ft) (1)				
				32°F (0°C)	50°F (10°C)	68°F (20°C)	86°F (30°C)	104°F (40°C)
<b>12V(2) STEP Heating Element™ with 2 Bus braids</b>								
EP-7-2-17W-12V	3"	26	20.8	6.3	5.8	5.2	4.6	4.0
EP-7-2-23W-12V	3"	21	28.0	8.2	7.7	7.0	6.2	5.3
EP-7-2-40W-12V	3"	12	48.0	14.0	13.0	12.0	10.0	9.0
EP-13-2-16W-12V	5"	28	12.0	6.0	5.5	5.0	4.4	3.9
EP-13-2-70W-12V*	5"	7	50.4	25.0	23.5	21.0	18.5	15.7
<b>24V(2) STEP Heating Element™ with 2 Bus braids</b>								
EP-13-2-55W-24V*	5"	35	58.5	28.8	27.2	24.4	21.6	18.8
EP-23-2-22W-24V	9"	85	9.7	7.8	7.4	6.6	5.8	5.0
EP-23-2-36W-24V	9"	50	14.6	13.0	12.3	11.0	9.6	8.3
EP-23-2-80W-24V*	9"	24	32.0	28.0	26.8	24.0	20.8	17.8
EP-30-2-24W-24V	12"	74	7.5	9.0	8.4	7.5	6.6	5.7
EP-30-2-29W-24V	12"	64	8.8	10.7	10.0	8.8	7.8	6.8
EP-30-2-32W-24V	12"	55	9.8	11.6	11.0	9.8	8.6	7.4
EP-30-2-44W-24V	12"	41	13.4	16.3	15.0	13.5	11.7	10.0
EP-30-2-70W-24V*	12"	27	21.0	25.0	23.5	21.0	18.5	15.7
<b>24V(2) STEP Heating Element™ with 3 Bus braids</b>								
EP-30-3-96W-24V*	12"	19	29.0	36.0	34.0	29.0	26.0	23.0
EP-30-3-116W-24V*	12"	16	35.0	43.0	40.0	35.0	31.0	27.0
EP-30-3-128W-24V*	12"	14	39.0	46.0	44.0	39.0	34.0	30.0
EP-30-3-176W-24V	12"	10	54.0	65.0	60.0	54.0	47.0	40.0
EP-30-3-280W-24V*	12"	7	85.0	100.0	94.0	85.0	74.0	63.0

### Notes:

1. To determine a power output in Watts per Meter, multiply the Watts per Foot power output by 3.28.
2. Power outputs listed above are based upon the stated supply voltages. The use of other supply voltages will provide a variation in the power output. Consult the factory for your application specific values.
3. Power outputs at temperatures other than those listed above can be estimated by extrapolating between the listed values. Consult the factory for temperatures that are higher or lower than listed above.

### Product Availability:

Electro Plastics, Inc. maintains an inventory only of selected heating elements. Available quantities of those standard inventoried elements will vary with production schedules and receipt of orders. The elements marked above with an asterisk (\*) are not inventoried and will be manufactured only upon demand. A minimum 5,000 ft. (1,525 M) order is required for production of those elements.

## STEP Heating Element™ OEM Application Suggestions by Market...

### Automotive

- Seat heater
- Floor board heater
- Exterior mirror heater

### Aviation

- Cabin radiant heat
- Cockpit heel plate comfort heat
- Jetway snow melting
- Helicopter deck snow-melting

### Marine

- Ship deck anti-icing
- Ship superstructure de-icing
- Living/work space radiant heat

### Trucking

- Shipping container heat
- Loading dock snow melting
- Truck trailer heat
- Truck comfort cab radiant heat
- Seat heater
- Floor board heater
- Exterior mirror heater
- Dump truck bed heater

### Offshore Petrochemical

- Oil rig deck and walkway anti-icing
- Oil rig structure de-icing
- Living/work space radiant heat

### Medical

- Hospital bed heater
- Operating table heater
- IV Fluid heater
- Body wrap for localized heat
- Ambulance radiant heat
- Ambulance pharmaceutical storage heat

### Military

- Casualty warmer
- Torso warmer
- Gurney heater
- IV Fluid heater

### Recreation Vehicle

- Radiant heat
- Tank frost prevention

### Communications

- Satellite dish anti-icing and snow melting

### Consumer products

- Heating pads
- Under rug heater
- Heated bedding

### Food Service

- Heated food transport containers for caterers (bags, cases, trays)
- Heated pizza delivery bags
- Freezer frost heave prevention

### Sports

- Stadium bench/seat heat
- Portable cushion heat
- Sleeping bag heat
- Body comfort heat

### Horticulture

- All weather starting bed heater

### Veterinary & Pet care

- Aquarium heater
- Reptile cage heater
- Heated blankets
- Transport trailer radiant heat
- Dog house radiant heat
- Operating table heater
- Animal pen comfort heat

### Research

- Telemetry box heater
- Electronics heater
- Laboratory heater
- Product curing heater

### Residential / Commercial Construction

- Radiant heat
- Floor warming
- Walkway snow-melting
- Stair and step snow-melting
- Roof snow-melting
- Gutter anti-icing
- Pool heat
- Work station comfort heat
- Septic tank heater

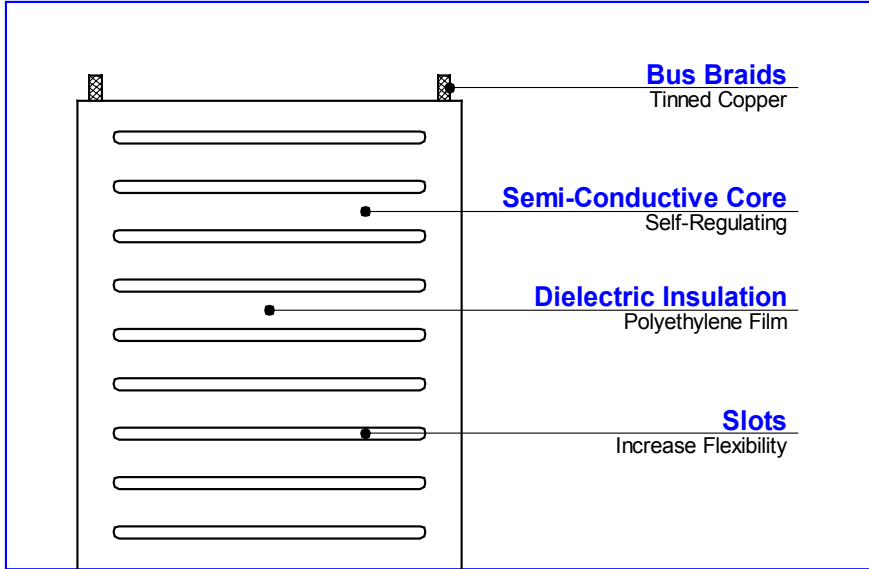


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EP5013 Rev. 2 07/26/04

# MAR-23-2-36W-24V Self-Regulating Heating Element For Marine Radiant Heat Systems

## Construction...



The MAR-23-2-36W-24V STEP Marine™ heating element is designed for floor radiant heat systems in both floor warming and room heating for marine applications. The heating element is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element.

A polymeric dielectric jacket is applied at the time the heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate from thermal cycling or physical flexing.

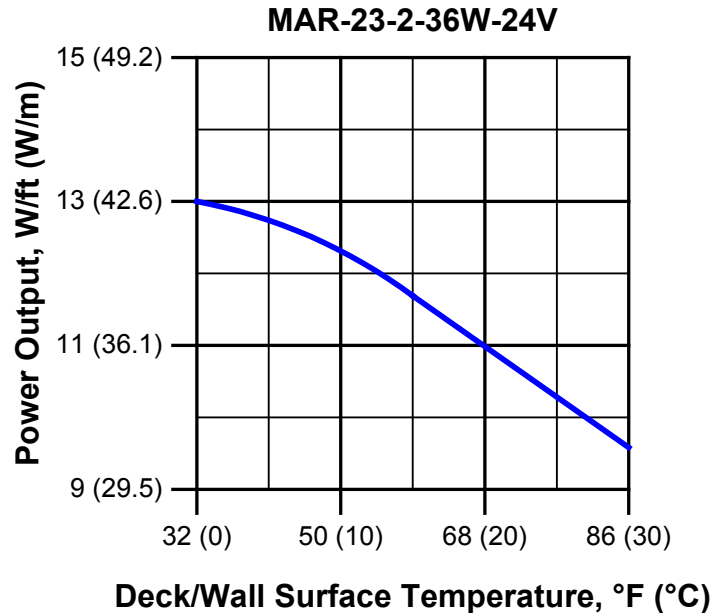
## Applications...

Radiant Heat Systems	Suitable for floor warming and total heat applications in living quarters and work spaces.
Finished Floor Compatibility	Ceramic and Porcelain Tile & Natural Stone
Subfloor Compatibility	Plywood – consult Electro Plastics, Inc. for other options

## Product Specifications...

Heating element type	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
Dimensions	Width: 9" (230 mm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 0.18 lb/ft (0.27 kg/m)
Output wattage	11.0 W/ft (36 W/m) @ 68°F (20°C) – see power output curve
Supply voltage	24Vac
Bus braid	15 AWG tinned copper flat braid
Dielectric jacket	1 mil polyethylene film, thermally bonded to heating element
Minimum bending radius	3/32" (2.5mm) @ 32°F (0°C)
Maximum exposure temperature	176°F (80°C)
Chemical Compatibility	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Power Output Curve...



## Electrical Data...

Amperage draw @ 68°F (20°C) when powered at 24Vac	0.46 A/ft (1.5 A/m)
Nominal resistance @ 68°F (20°C)	50 Ω/ft (15 Ω/m)

### Terminal Board connection lengths:

Maximum continuous element length when connected to a single (5A) fused terminal:	10 Ft (3.0m)
Max. cont. element length when connected to a pair of jumpered (2x5A) fused terminals:	17 Ft (5.2m)
Maximum continuous element length (requires a single 15A fuse minimum):	25 Ft (7.6m)

### 12 AWG (4mm<sup>2</sup>) extension wire lengths:

Heater element length:	4 Ft	8 Ft	12 Ft	16 Ft	17 Ft	25 Ft
	(1.2m)	(2.4m)	(3.7m)	(4.9m)	(5.2m)	(7.6m)
Maximum extension wire length:	93 Ft	47 Ft	31 Ft	24 Ft	22 Ft	13 Ft
	(28.6m)	(14.4m)	(9.5m)	(7.3m)	(6.7m)	(4.0m)

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
 Certified to CAN/CSA-C22.2 No. 217



EN60335-1: 1995  
 EN60355-2-30: 1997

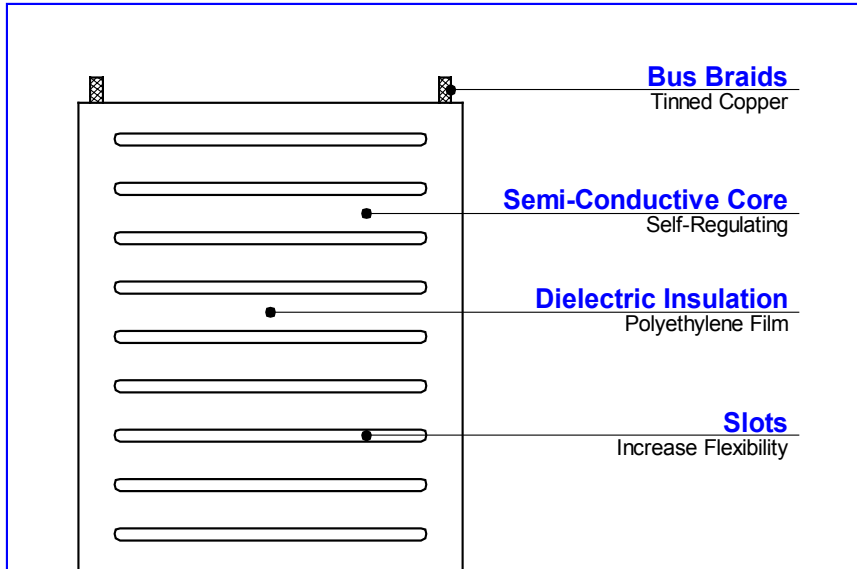


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 EP5038 Rev. A 05/20/04

## Self-Regulating Heating Element For Icing Prevention Systems

### Construction...



The MAR-23-2-36W-24V STEP Marine™ heating element is designed to provide icing prevention for marine applications. The heating element is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element.

A polymeric dielectric jacket is applied at the time the heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate from thermal cycling or physical flexing.

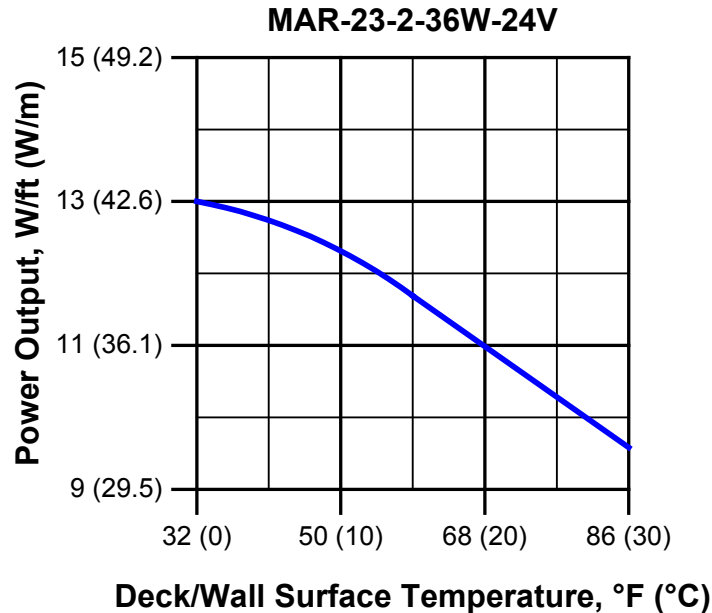
### Applications...

Icing Prevention Systems	Suitable for icing prevention on ship decks, bulkheads and hulls
Interior Surface Mount	Heating elements are sandwiched between two layers of STEP Heat Retention Membrane. This assembly is placed inside the frame and attached to the steel or aluminum deck or wall. Thermal insulation is installed behind the assembly.

### Product Specifications...

Heating element type	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
Dimensions	Width: 9" (230 mm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 0.18 lb/ft (0.27 kg/m)
Output wattage	12.3 W/ft (40.3 W/m) @ 50°F (10°C) – see power output curve
Supply voltage	24Vac
Bus braid	15 AWG tinned copper flat braid
Dielectric jacket	1 mil polyethylene film, thermally bonded to heating element
Minimum bending radius	3/32" (2.5mm) @ 32°F (0°C)
Maximum exposure temperature	176°F (80°C)
Chemical Compatibility	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Power Output Curve...



## Electrical Data...

Amperage draw @ 50°F (10°C) when powered at 24Vac	0.51 A/ft (1.7 A/m)
Nominal resistance @ 50°F (10°C)	47 Ω/ft (14 Ω/m)

### Terminal Board connection lengths:

Maximum continuous element length when connected to a single (5A) fused terminal:	10 Ft (3.0m)
Max. cont. element length when connected to a pair of jumpered (2x5A) fused terminals:	17 Ft (5.2m)
Maximum continuous element length (requires a single 20A fuse minimum):	25 Ft (7.6m)

### 12 AWG (4mm<sup>2</sup>) extension wire lengths:

Heater element length:	4 Ft	8 Ft	9 Ft	12 Ft	15 Ft	25 Ft
	(1.2m)	(2.4m)	(2.8m)	(3.7m)	(4.6m)	(7.6m)
Maximum extension wire length:	84 Ft	42 Ft	37 Ft	28 Ft	23 Ft	14 Ft
	(25.9m)	(12.9m)	(11.4m)	(8.6m)	(7.1m)	(4.3m)

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
 Certified to CAN/CSA-C22.2 No. 217



EN60335-1: 1995  
 EN60355-2-30: 1997

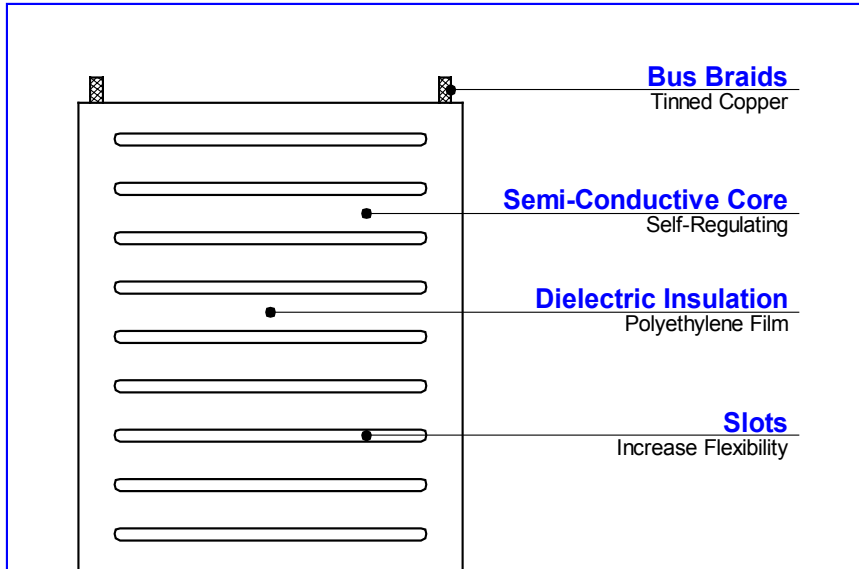


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 EP5035 Rev. B 05/20/04

# MAR-30-2-32W-24V Self-Regulating Heating Element For Marine Radiant Heat Systems

## Construction...



The MAR-30-2-32W-24V STEP Marine™ heating element is designed for floor radiant heat systems in both floor warming and room heating for marine applications. The heating element is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element.

A polymeric dielectric jacket is applied at the time the heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate from thermal cycling or physical flexing.

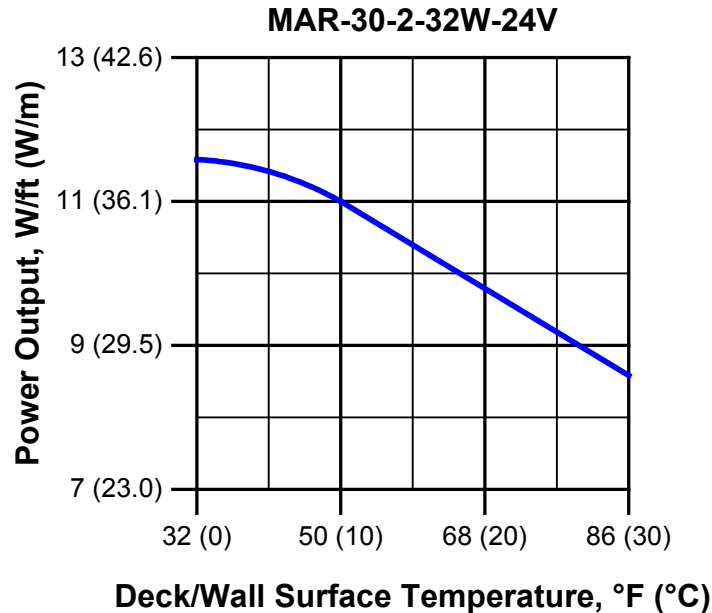
## Applications...

Radiant Heat Systems	Suitable for floor warming and total heat applications in living quarters and work spaces.
Finished Floor Compatibility	Ceramic and Porcelain Tile, Natural Stone, Hardwood & Carpet
Subfloor Compatibility	Plywood – consult Electro Plastics, Inc. for other options

## Product Specifications...

Heating element type	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
Dimensions	Width: 12" (305 mm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 0.23 lb/ft (0.34 kg/m)
Output wattage	9.8 W/ft (32 W/m) @ 68°F (20°C) – see power output curve
Supply voltage	24Vac
Bus braid	15 AWG tinned copper flat braid
Dielectric jacket	1 mil polyethylene film, thermally bonded to heating element
Minimum bending radius	3/32" (2.5mm) @ 32°F (0°C)
Maximum exposure temperature	176°F (80°C)
Chemical Compatibility	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Power Output Curve...



## Electrical Data...

Amperage draw @ 68°F (20°C) when powered at 24Vac	0.41 A/ft (1.3 A/m)
Nominal resistance @ 68°F (20°C)	55 Ω/ft (17 Ω/m)
<b>Terminal Board connection lengths:</b>	
Maximum continuous element length when connected to a single (5A) fused terminal:	12 Ft (3.7m)
Max. cont. element length when connected to a pair of jumpered (2x5A) fused terminals:	19 Ft (5.8m)
Maximum continuous element length (requires a single 15A fuse minimum):	25 Ft (7.6m)
<b>12 AWG (4mm<sup>2</sup>) extension wire lengths:</b>	
Heater element length:	4 Ft (1.2m)    8 Ft (2.4m)    12 Ft (3.7m)    16 Ft (4.9m)    19 Ft (5.8m)    25 Ft (7.6m)
Maximum extension wire length:	104 Ft (32.0m)    52 Ft (16.0m)    35 Ft (10.7m)    26 Ft (8.0m)    22 Ft (6.7m)    17 Ft (5.2m)

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
 Certified to CAN/CSA-C22.2 No. 217



EN60335-1: 1995  
 EN60355-2-30: 1997

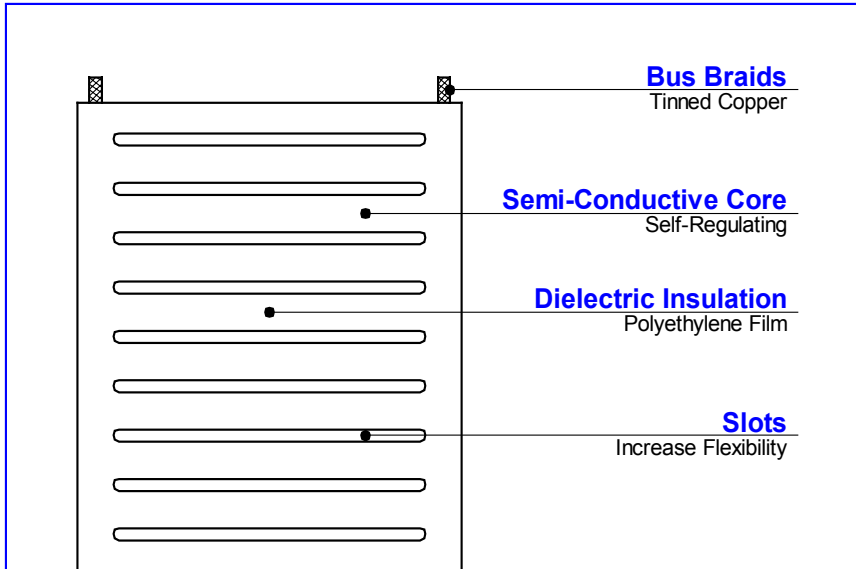


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 EP5039 Rev. A 05/20/04

## Self-Regulating Heating Element For Icing Prevention Systems

### Construction...



The MAR-30-2-32W-24V STEP Marine™ heating element is designed to provide icing prevention for marine applications. The heating element is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element.

A polymeric dielectric jacket is applied at the time the heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate from thermal cycling or physical flexing.

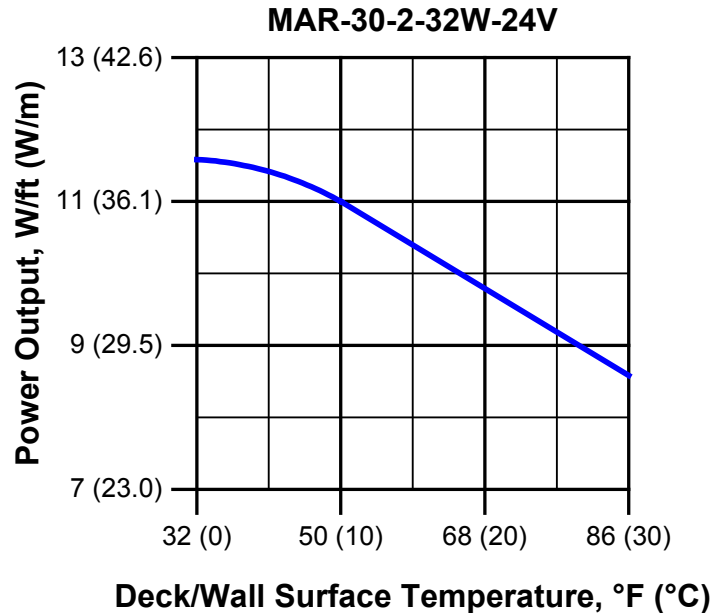
### Applications...

Icing Prevention Systems	Suitable for icing prevention on ship decks, bulkheads and hulls
Interior Surface Mount	Heating elements are sandwiched between two layers of STEP Heat Retention Membrane. This assembly is placed inside the frame and attached to the steel or aluminum deck or wall. Thermal insulation is installed behind the assembly.

### Product Specifications...

Heating element type	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
Dimensions	Width: 12" (305 mm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 0.23 lb/ft (0.34 kg/m)
Output wattage	11.0 W/ft (36.1 W/m) @ 50°F (10°C) – see power output curve
Supply voltage	24Vac
Bus braid	15 AWG tinned copper flat braid
Dielectric jacket	1 mil polyethylene film, thermally bonded to heating element
Minimum bending radius	3/32" (2.5mm) @ 32°F (0°C)
Maximum exposure temperature	176°F (80°C)
Chemical Compatibility	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Power Output Curve...



## Electrical Data...

Amperage draw @ 50°F (10°C) when powered at 24Vac	0.46 A/ft (1.5 A/m)
Nominal resistance @ 50°F (10°C)	52 Ω/ft (11 Ω/m)

### Terminal Board connection lengths:

Maximum continuous element length when connected to a single (5A) fused terminal:	12 Ft (3.7m)
Max. cont. element length when connected to a pair of jumpered (2x5A) fused terminals:	19 Ft (5.8m)
Maximum continuous element length (requires a single 15A fuse minimum):	25 Ft (7.6m)

### 12 AWG (4mm<sup>2</sup>) extension wire lengths:

Heater element length:	4 Ft	8 Ft	12 Ft	16 Ft	19 Ft	25 Ft
	(1.2m)	(2.4m)	(3.7m)	(4.9m)	(5.8m)	(7.6m)
Maximum extension wire length:	93 Ft	47 Ft	31 Ft	23 Ft	20 Ft	15 Ft
	(28.6m)	(14.5m)	(9.5m)	(7.0m)	(6.1m)	(4.6m)

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
Certified to CAN/CSA-C22.2 No. 217



EN60335-1: 1995  
EN60355-2-30: 1997

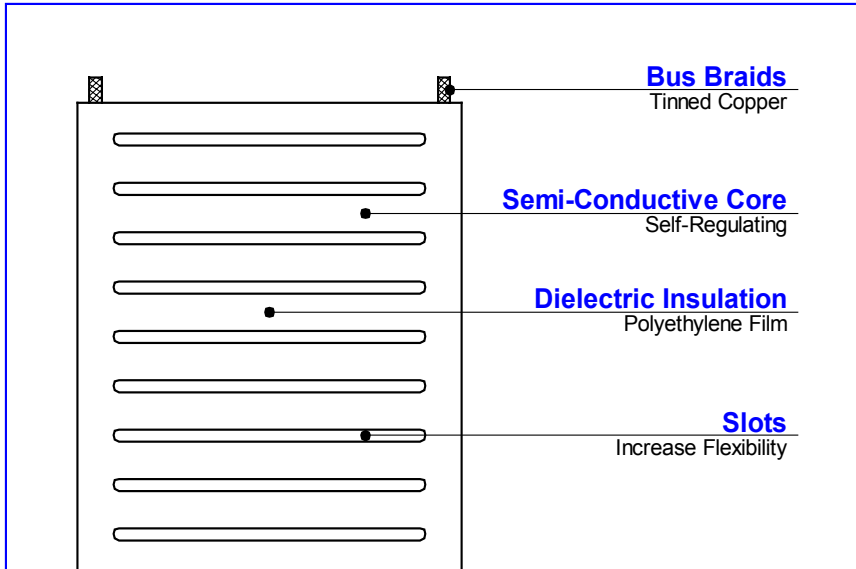


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EP5036 Rev. B 05/20/04

## Self-Regulating Heating Element For Marine Radiant Heat Systems

### Construction...



The MAR-30-2-44W-24V STEP Marine™ heating element is designed for floor radiant heat systems in both floor warming and room heating for marine applications. The heating element is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element.

A polymeric dielectric jacket is applied at the time the heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate from thermal cycling or physical flexing.

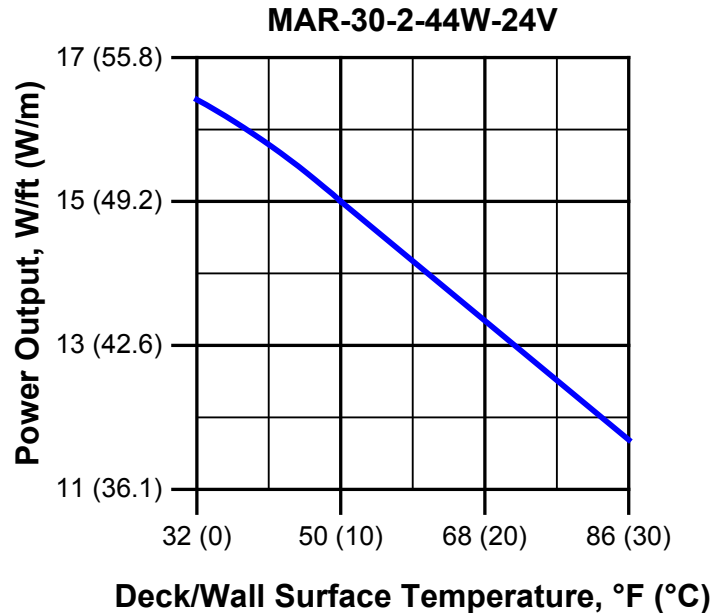
### Applications...

Radiant Heat Systems	Suitable for floor warming and total heat applications in living quarters and work spaces.
Finished Floor Compatibility	Ceramic and Porcelain Tile & Natural Stone
Subfloor Compatibility	Plywood – consult Electro Plastics, Inc. for other options

### Product Specifications...

Heating element type	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
Dimensions	Width: 12" (305 mm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 0.23 lb/ft (0.34 kg/m)
Output wattage	13.4 W/ft (44 W/m) @ 68°F (20°C) – see power output curve
Supply voltage	24Vac
Bus braid	15 AWG tinned copper flat braid
Dielectric jacket	1 mil polyethylene film, thermally bonded to heating element
Minimum bending radius	3/32" (2.5mm) @ 32°F (0°C)
Maximum exposure temperature	176°F (80°C)
Chemical Compatibility	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Power Output Curve...



## Electrical Data...

Amperage draw @ 68°F (20°C) when powered at 24Vac	0.56 A/ft (1.8 A/m)
Nominal resistance @ 68°F (20°C)	41 Ω/ft (12.5 Ω/m)

### Terminal Board connection lengths:

Maximum continuous element length when connected to a single (5A) fused terminal:	8 Ft (2.4m)
Max. cont. element length when connected to a pair of jumpered (2x5A) fused terminals:	14 Ft (4.3m)
Maximum continuous element length (requires a single 20A fuse minimum):	25 Ft (7.6m)

### 12 AWG (4mm<sup>2</sup>) extension wire lengths:

Heater element length:	4 Ft	8 Ft	12 Ft	14 Ft	25 Ft
	(1.2m)	(2.4m)	(3.7m)	(4.3m)	(7.6m)
Maximum extension wire length:	76 Ft	38 Ft	26 Ft	22 Ft	15 Ft
	(23.4m)	(11.7m)	(8.0m)	(6.7m)	(4.6m)

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
 Certified to CAN/CSA-C22.2 No. 217



EN60335-1: 1995  
 EN60355-2-30: 1997

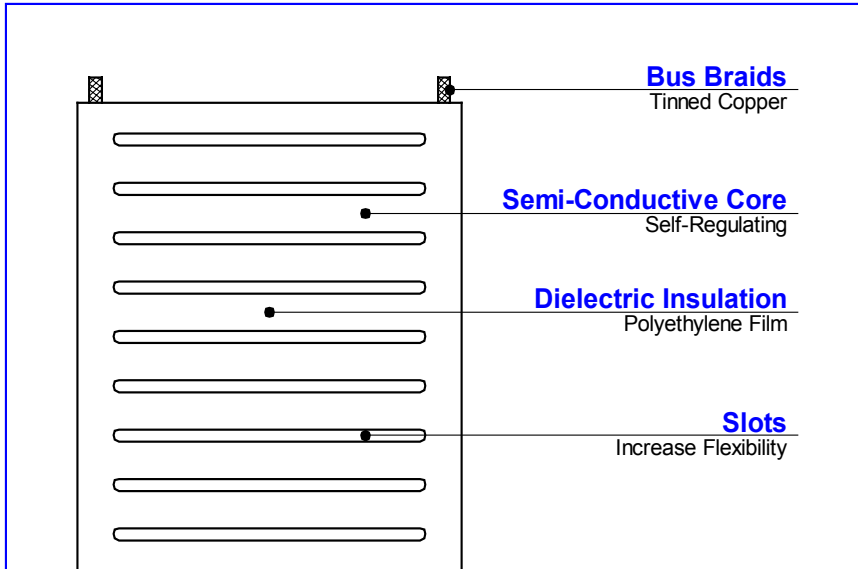


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 EP5040 Rev. A 05/20/04

# MAR-30-2-44W-24V Self-Regulating Heating Element For Icing Prevention Systems

## Construction...



The MAR-30-2-44W-24V STEP Marine™ heating element is designed to provide icing prevention for marine applications. The heating element is constructed of two parallel bus braids embedded in a semi-conductive polymeric heating element.

A polymeric dielectric jacket is applied at the time the heating element is manufactured so that the jacket is thermally joined to the heating element. This creates a heating element that features a solid, or homogeneous, construction that will not separate from thermal cycling or physical flexing.

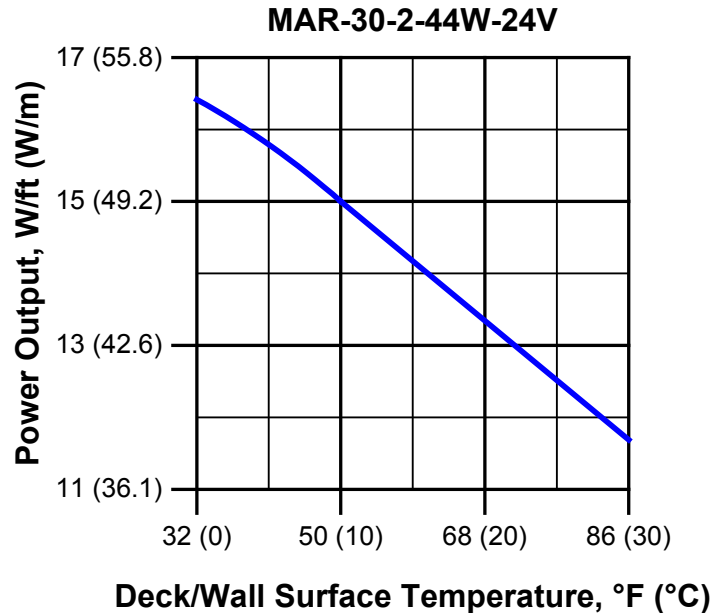
## Applications...

Icing Prevention Systems	Suitable for icing prevention on ship decks, bulkheads and hulls
Interior Surface Mount	Heating elements are sandwiched between two layers of STEP Heat Retention Membrane. This assembly is placed inside the frame and attached to the steel or aluminum deck or wall. Thermal insulation is installed behind the assembly.
Top Surface Mount	If interior surface mounting is not possible, the heating elements may be sandwiched between insulating and top coat layers of epoxy on top of the steel or aluminum deck or wall.

## Product Specifications...

Heating element type	Positive Temperature Coefficient (PTC) semi-conductive polyethylene
Dimensions	Width: 12" (305 mm) Thickness: 3/64" (1.2 mm) Length: cut to order with a 180 ft (55 m) maximum shipping spool length Weight: 0.23 lb/ft (0.34 kg/m)
Output wattage	15.0 W/ft (49.2 W/m) @ 50°F (10°C) – see power output curve
Supply voltage	24Vac
Bus braid	15 AWG tinned copper flat braid
Dielectric jacket	1 mil polyethylene film, thermally bonded to heating element
Minimum bending radius	3/32" (2.5mm) @ 32°F (0°C)
Maximum exposure temperature	176°F (80°C)
Chemical Compatibility	Do not use in conjunction with aggressive construction glues and adhesives or with asphalt or butyl sealants / membranes

## Power Output Curve...



## Electrical Data...

Amperage draw @ 50°F (10°C) when powered at 24Vac	0.63 A/ft (2.1 A/m)
Nominal resistance @ 50°F (10°C)	38 Ω/ft (11.7 Ω/m)

### Terminal Board connection lengths:

Maximum continuous element length when connected to a single (5A) fused terminal:	7 Ft (2.1m)
Max. cont. element length when connected to a pair of jumpered (2x5A) fused terminals:	12 Ft (3.7m)
Maximum continuous element length (requires a single 20A fuse minimum):	25 Ft (7.6m)

### 12 AWG (4mm<sup>2</sup>) extension wire lengths:

Heater element length:	4 Ft	7 Ft	8 Ft	12 Ft	25 Ft
	(1.2m)	(2.1m)	(2.4m)	(3.7m)	(7.6m)
Maximum extension wire length:	68 Ft	39 Ft	34 Ft	23 Ft	14 Ft
	(20.7m)	(11.9m)	(10.4m)	(7.0m)	(4.3m)

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
 Certified to CAN/CSA-C22.2 No. 217

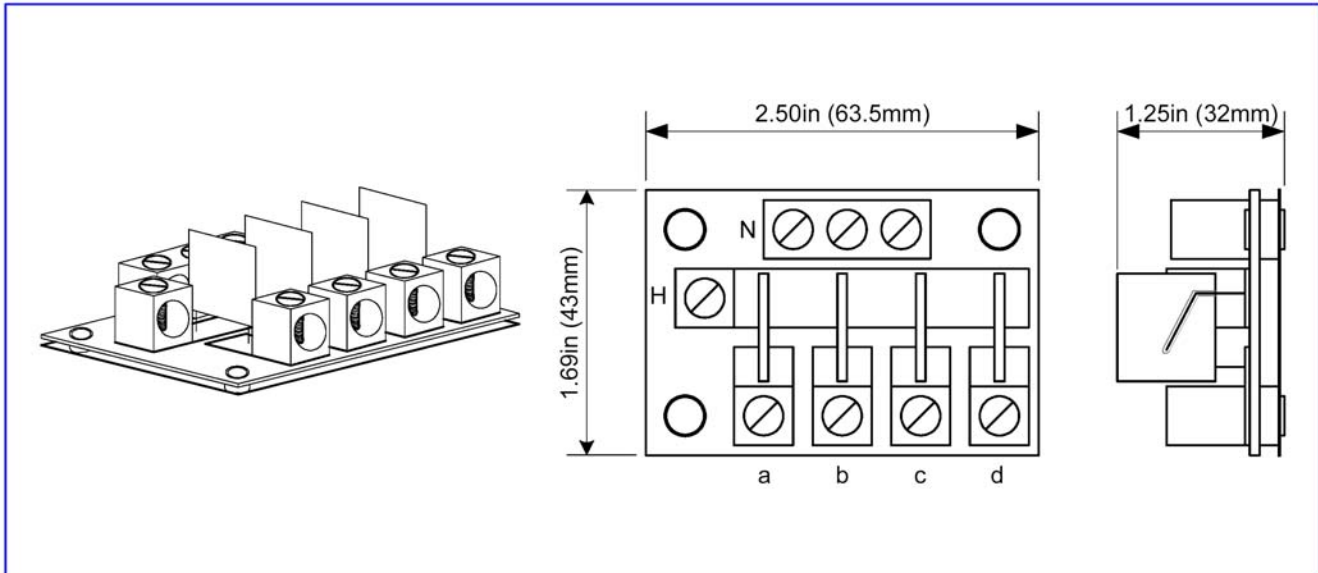


EN60335-1: 1995  
 EN60355-2-30: 1997



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 EP5037 Rev. A 05/19/04



### Description...

The TB-4X5A Terminal Board is a fused terminal board for marshalling STEP Marine™ heating element extension wires together for connection to the low voltage safety isolation transformer. The terminal board contains four 5 amp Positive Temperature Coefficient (PTC) fuses. The terminals are a set screw lug type and can terminate a large range of wire sizes. All the components are mounted on a phenolic circuit board. Three holes are provided for mounting into an installer supplied junction box.

The power feed from a transformer is terminated on the HOT lug (H) and one of the lugs on the

NEUTRAL bar (N). The heating element extension wires are terminated on one of the four fused HOT lugs (a, b, c or d) and one of the lugs on the NEUTRAL bar.

The integral PTC fuses provide protection for the heating elements in cases of mis-installation or physical damage. Under a fault condition, I<sup>2</sup>R heating of the semi-conductive material in the fuse causes the resistance of the material to increase sharply, thereby stopping any current flow. The PTC fuse will remain in this condition until the fault in the field is cleared. The PTC fuse will automatically reset itself when the power is cycled off, which allows

the fuse to cool down. If the fault condition still exists when the power is cycled on, the fuse will disconnect or "open" again until the fault is cleared.

The terminal board is normally mounted in an installer supplied standard 2-gang junction box with a blank cover plate. This box is typically mounted in the wall at receptacle height or it can be mounted below the floor on a joist in a crawl space or basement ceiling, or it can be mounted above in an attic space. Multiple terminal boards can be located in the same junction box but the box size will need to be increased by one gang per additional terminal board.

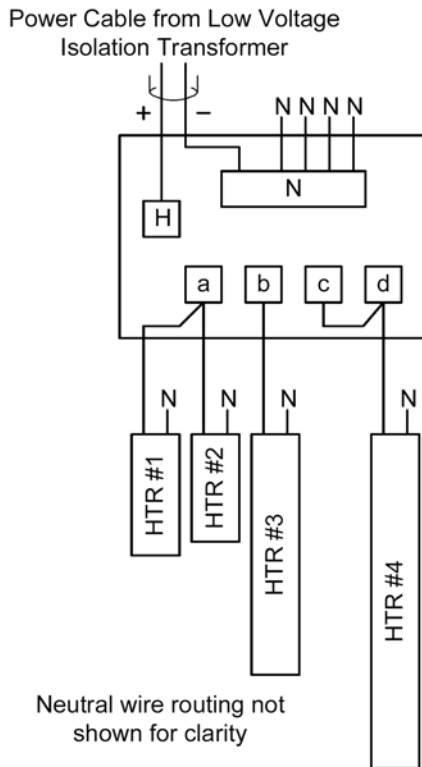
### Product Specifications...

<b>Dimensions</b>	2-1/2" Long X 1-11/16" Wide X 1-1/4" High (63.5mm X 43mm X 32mm)
<b>Supply voltage</b>	24Vac to 30Vac
<b>Fuse Type</b>	(4) 5A 24Vac Positive Temperature Coefficient (PTC) Fuses
<b>Lug Wire Range</b>	#14 - #4 AWG copper or aluminum
<b>Lug maximum fill</b>	(1) #4 AWG or (2) #10 AWG or (3) #12 AWG or (4) #14 AWG

## Ordering Information...

Description	Model Number	Approx. Wt.
Fused Terminal Board, 24Vac, four 5A PTC fuses, set screw lug terminals sized for #14 - #4 AWG wires, terminal assignments – 1 primary hot, 4 fused secondary hot and 3 neutrals	TB-4X5A	0.15 lb (68 g)

## Wiring Diagram...



## Load Connection Data...

- Multiple short elements can be connected to a single fuse as shown with HTR #1 & 2 in the wiring diagram. Do not exceed the single fuse maximum element connection length as noted on the heating element data sheet.
- A single element can be connected to a single fuse as shown with HTR #3 in the wiring diagram. Do not exceed the single fuse maximum element connection length as noted on the heating element data sheet.
- A long element can be connected to a pair of jumpered fuses as shown with HTR #4 in the wiring diagram. Do not exceed the jumpered fuse maximum element connection length as noted on the heating element data sheet.
- Do not exceed the maximum extension wire length between the terminal board and heater strip as noted on the heating element data sheet.

## Approvals / Certifications...



Conforms to ANSI/UL STD 1693  
Certified to CAN/CSA-C22.2 No. 217



EN60335-1: 1995  
EN60355-2-30: 1997

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EP5041 Rev. A 05/20/04



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## Connectors & Sealant Tapes...

<b>C&amp;T-10</b>	Connector and Sealant Tape kit. Contains (10) CON-DB Crimp Connectors, (1) 15" long piece of TAPE-R Sealant Tape, (1) Label-1, (1) Label-2, and an installation brochure. Contains material to connect and seal 5 STEP heating element strips to the extension wires.
<b>CON-DB</b>	Crimp Connector. Single piece. Tinned copper construction (TCu). Used to connect Extension Wires to the heating element bus braids. Specially made for crimping the heating element flat bus braid to the round extension wires.
<b>TAPE-R</b>	Sealant Tape. 2.5 inch X 10 foot (6.3 cm X 305 cm) roll. Insulating and moisture-sealing mastic with vinyl backing. Used to insulate and seal the CON-DB crimp connector. Requires a 1.5 inch x 2.5 inch (3.8 cm X 6.3 cm) piece at each crimp connection.

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## Extension Wires...

<b>TCu12-XXX-B</b> <b>TCu12-XXX-W</b>	#12 AWG stranded tinned copper (TCu) PVC insulated wire, 600V, 105°C. Used to extend the STEP heating element bus wires to the transformer when the elements are directly embedded in a concrete slab. Color Code: -B indicates black; -W indicates white. Spool length: XXX = 250 or 500 feet.
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## Labels...

<b>Label-1</b>	Caution label for mounting at the TB-4X5A Terminal Board. Includes a Terminal Board connection chart. Self adhesive, 2 inch X 3.25 inch (5.0 cm X 8.3 cm).
<b>Label-2</b>	Warning label for mounting at the service panel. Includes a chart to record which rooms have floor heating installed and which branch circuit feeds which room(s). 5.5 inch X 4.25 inch (14.0 cm X 10.8 cm).

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## Tools...

<b>TOOL-PRO</b>	Crimp Tool. Used to crimp the CON-DB crimp connector. Another crimp tool cannot be used in the place of a TOOL-PRO to properly crimp a CON-DB. Tool may be purchased or rented.
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