

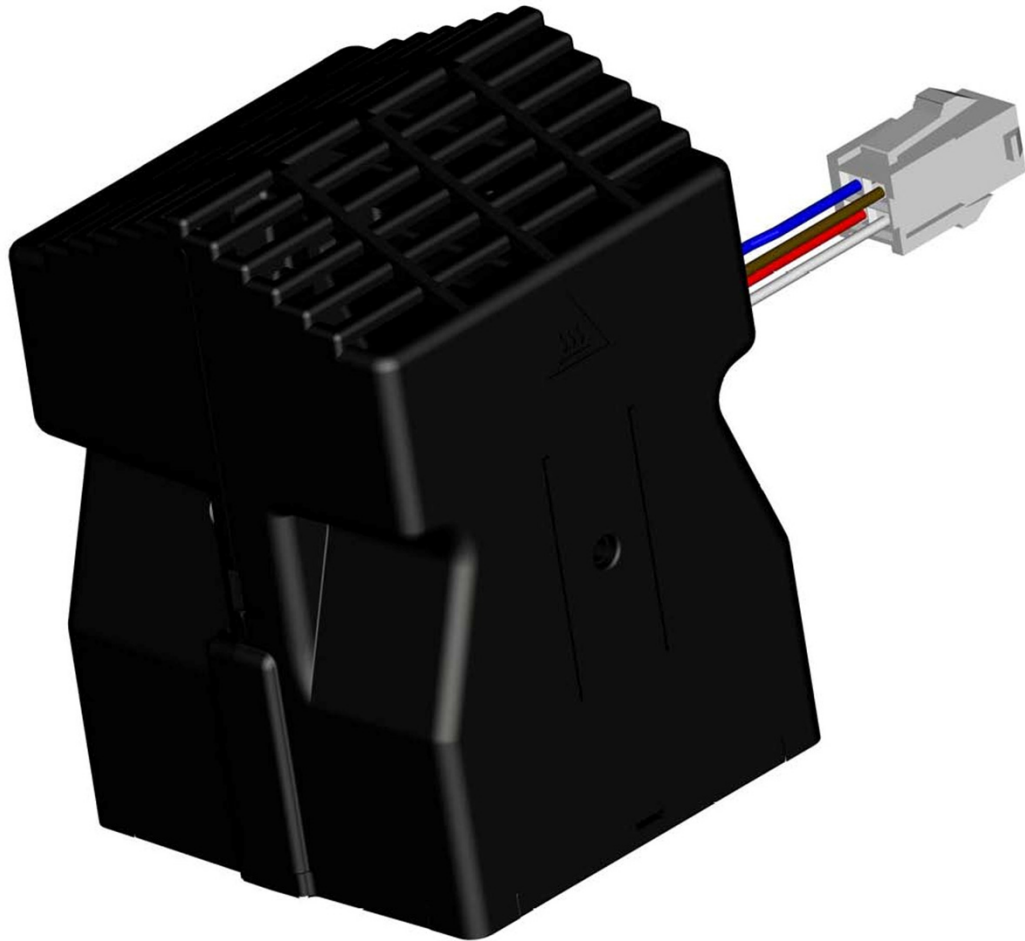


AN SPX BRAND



2nd Generation

PTC2 Heater Manual



PTC2 Heater Systems are distributed by Waukesha Service & Components, a division of Waukesha Electric Systems, Inc.



2nd Generation Positive Temperature Coefficient (PTC2) Heater Manual

GENERAL DESCRIPTION

The Waukesha® Positive Temperature Coefficient (PTC2) Heater improves the reliability of your electrical equipment by maintaining an enclosure temperature slightly higher than the outside ambient temperature. The system offers unparalleled reliability due to the elimination of a thermostat or other controls. In addition, standard PTC2 convection heaters utilize an integrated fan assembly that ensures even heat distribution throughout the enclosure.

CONSTRUCTION

PTC2 heaters feature a heating element constructed with a variable resistance material that automatically reacts to the cabinet (inlet air) temperature. A fan (if equipped) is attached to the heat guard and provides forced conduction of the heat as well as uniform enclosure distribution. Mounting brackets allow easy cabinet or panel installation. A twelve-foot wiring harness (on forced air units) is also included to make installation as easy and flexible as possible.

OPTIONS

PTC2 heaters are available in the following configurations:

20 Watt: 120V or 240V (dual voltage) panel mount convection

30 Watt: 120V or 240V (dual voltage) panel mount convection

40 Watt: 120V or 240V (dual voltage) panel mount convection

60 Watt: 120V or 240V (dual voltage) panel mount convection

200 Watt: 120V or 240V fan forced with or without activating thermostat

300 Watt: 120V or 240V fan forced with or without activating thermostat

400 Watt: 120V or 240V fan forced with or without activating thermostat

200Watt: 120V or 240V fan forced, Thermostat activated

300 Watt: 120V or 240V fan forced, Thermostat activated

400 Watt: 120V or 240V fan forced, Thermostat activated

200 Watt Constant/400 Watt High Recovery: Thermostat actuated, 120V or 240V fan forced

300 Watt Constant/400 Watt High Recovery: Thermostat actuated, 120V or 240V fan forced

SELECTION

Several factors should be considered when selecting the appropriate heater. Primary concerns should include the following:

- Ambient temperature extremes—affects which part of the wattage curve is used to select the heater.
- Rate of ambient temperature change—affects how much time a given wattage requires to return to steady state.
- Enclosure size, insulation rating and exposure to ambient conditions.

For anti-condensation purposes, heaters should be selected according to the calculated power required (watts) to warm the enclosure to a *minimum* temperature difference of 5 degrees Celsius above ambient.



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SELECTION (continued)

TO SELECT A HEATER

1. Calculate the power (watts) needed for your particular enclosure size.

For estimation of enclosure heat needed (based upon natural convection air moving less than 5 m/s), use this equation:

$$\text{Joules/Second} = \text{Watts} = h \times A \times T$$

Where **h** = overall heat transfer coefficient $W/(m^2K)$ – The value of **h** is difficult to calculate and is different for virtually every application; however, for rectangular outdoor enclosures with small amounts of venting and mounted to a vertical support, the typical value is between 5 and 10. Using 10 will represent a “worst case” scenario in a more windy environment.

A = Exposed surface area of enclosure (m^2)

T = Temperature difference desired (**K**) – For anti-condensation purposes, typical value is equal to 5. A higher value may be used for particularly humid applications.

EXAMPLE: A 3.5 foot wide, 4 foot tall and 1 foot deep cabinet mounted to a flat wall would have exposed surfaces equaling 29 ft² or 2.7 m². $\text{Watts} = h \times A \times T = 10 \times 2.7 \times 5 = 135$

2. Draw a corresponding horizontal line on the selection chart (see Chart 1 below) based upon wattage calculated in Step 1 above.
3. Determine the highest ambient temperature condition for the enclosure application and draw a corresponding vertical line at the bottom of the chart.

EXAMPLE: The same cabinet in the example above is in a location where the higher air temperatures often reach 45°C. The vertical line should be drawn at 45°C and intersect with the 135 watt horizontal line in Step 2.

4. Select the closest heater that intersects above and to the right of the drawn intersecting lines.

EXAMPLE: The 200 watt heater would be selected for this application. **NOTE – If high temperature operation would have been 65°C or higher, the 300 watt heater would have been appropriate for the application.**

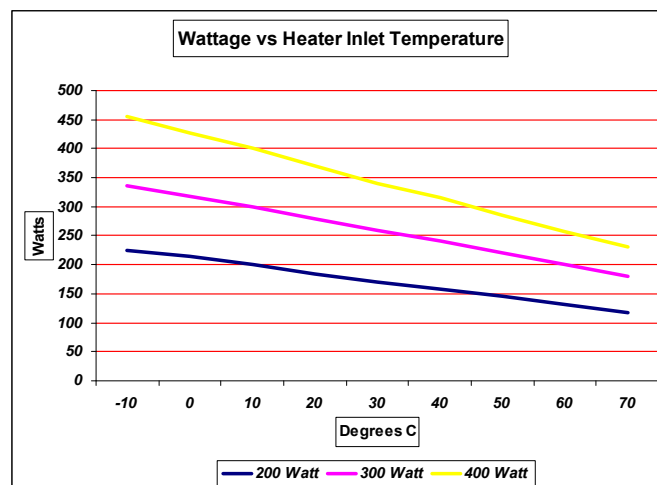


Chart 1 – Heater Output Wattage at Corresponding Ambient Temperatures

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SELECTION (continued)

HIGH RECOVERY MODELS

High recovery heaters operate as standard PTC2 heaters with the addition of a changeover to 400 watt operation at colder temperatures (see Chart 4 on page 8).

TEMPERATURE ACTIVATED MODELS

Temperature activated heaters operate as standard PTC2 heaters except the heater deactivates at higher ambient conditions (see Chart 4 on page 8).

INSTALLATION

Installation of the PTC2 heater requires mounting of the heater body and connection of the power wiring harness. In all heater systems, including the temperature activated and high recovery models, the final connection is two wire.

ELECTRICAL CONNECTIONS

CAUTION - The fan-forced systems are NOT dual voltage devices and must be selected based upon operating voltage. Ensure that the voltage printed on the heater label matches the supply voltage before energizing the heater assembly.

The heater system is provided as a pre-wired heater with a 12 foot, two-wire power harness. On 200 watt through 400 watt models, the heater mates to the power harness with a quick-connect plug (see Figure 1 at right) which simplifies heater mounting and power wire installation. The two-wire harness is connected directly to the 120V or 240V power source. No ground wire is required.

20 watt through 60 watt heaters include a two wire harness that must be connected to the heater via the two terminal blocks integral to the heater.

Electrical Connections	
120V 50 or 60 Hz (PTC2- X0X series)	White = Neutral Black = Live
240V 50 or 60 Hz (PTC2-X1X series)	White = Live Black = Live

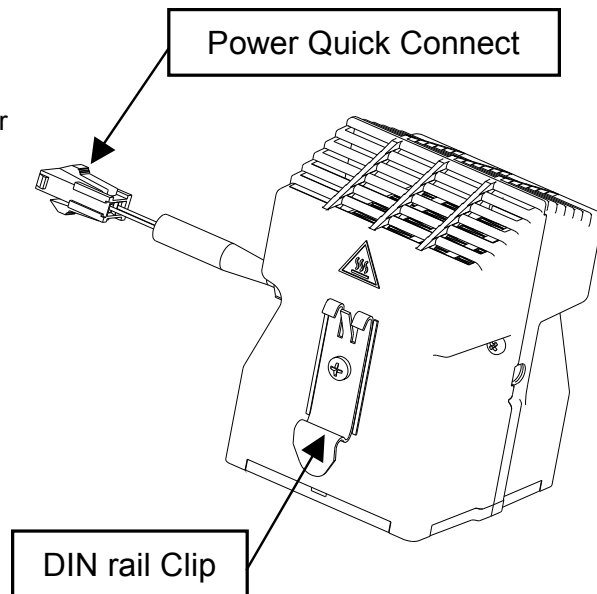


Figure 1 – PTC2 Heater Mounting Clip and Power Plug



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INSTALLATION (continued)

HEATER FUSING

PTC2 heaters do not include fuse protection and should be fused at the wiring supply source. Inrush curves are shown in Charts 2 and 3 below:

Suggested MCB Rating:	6A Type B
Suggested Fuse Rating:	6.3A Type (T) Time Delay

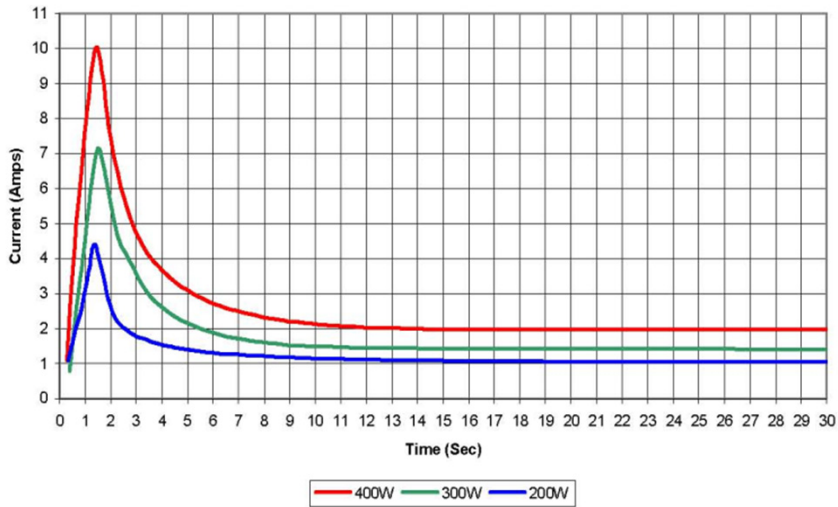


Chart 2 – Inrush Current at 230 VAC

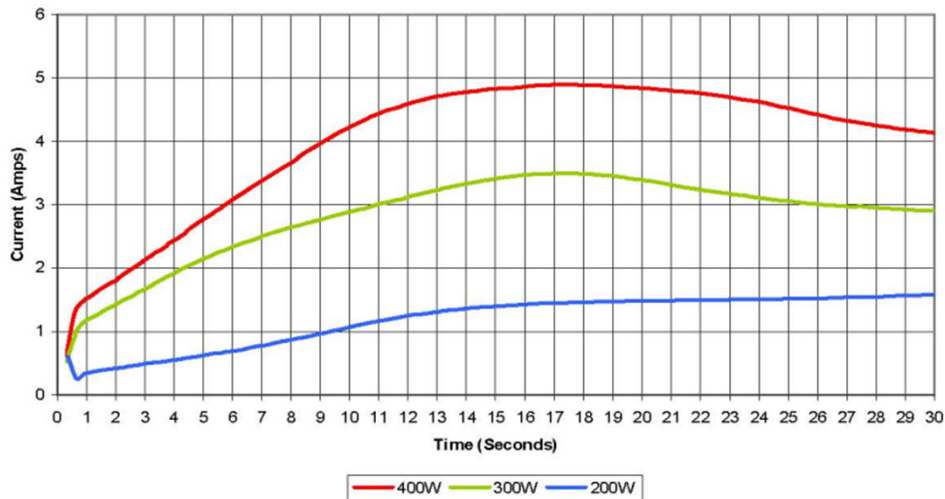


Chart 3 – Inrush Current at 120 VAC

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INSTALLATION (continued)

HEATER MOUNTING

The heater is designed to mount directly to standard 35mm x 7.5mm DIN rail. The DIN rail mounting clip can be installed on either side of the heater to facilitate preferred harness connections. In addition, the heater can be configured to include a short piece of DIN rail for customer mounting or a 4-hole adapter plate for mounting on flat panel applications (see Figure 2 at right). The adapter is also a direct retrofit to the original PTC design.

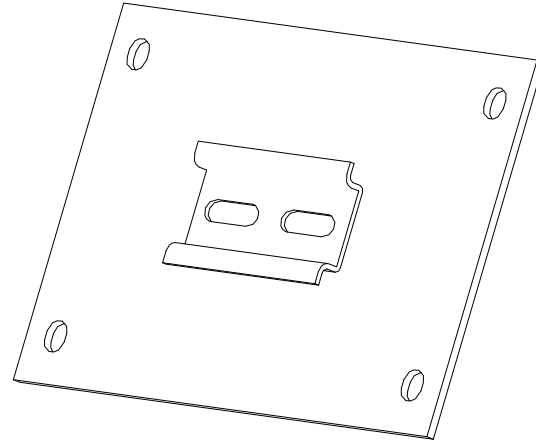


Figure 2 – Flat Panel Adapter

OPERATION

Operation of the heater assembly is automatic and requires no adjustment. As the heat level in the enclosure increases, the resistance of the heater element also increases, resulting in a decrease of the output wattage. In all temperatures, the fan will run constantly to ensure enclosure temperature remains consistent throughout.

MAINTENANCE

The PTC heater is essentially maintenance-free with only a few necessary checks to ensure that the unit is operating normally.

ANNUAL INSPECTION

⚠ CAUTION - The surface of the heater element is very hot and can cause burns. Never cut or remove the plastic heat shield.

Visually inspect that the fan is running quietly and that no foreign material has entered the assembly. Verify that heater element shield is warm to the touch.

TROUBLESHOOTING

THE FAN OR HEATER IS NOT OPERATING

- Confirm that the voltage input to the PTC2 assembly is the correct voltage. Check heater assembly terminals at the power harness quick-connect plug.
- Check wiring harness for cuts or bare insulation.
- Confirm fan assembly has not been clogged with debris—clean if necessary.

CONTACT US AT 800-338-5526 FOR REPLACEMENT PARTS AND/OR SERVICE.

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APPENDICES

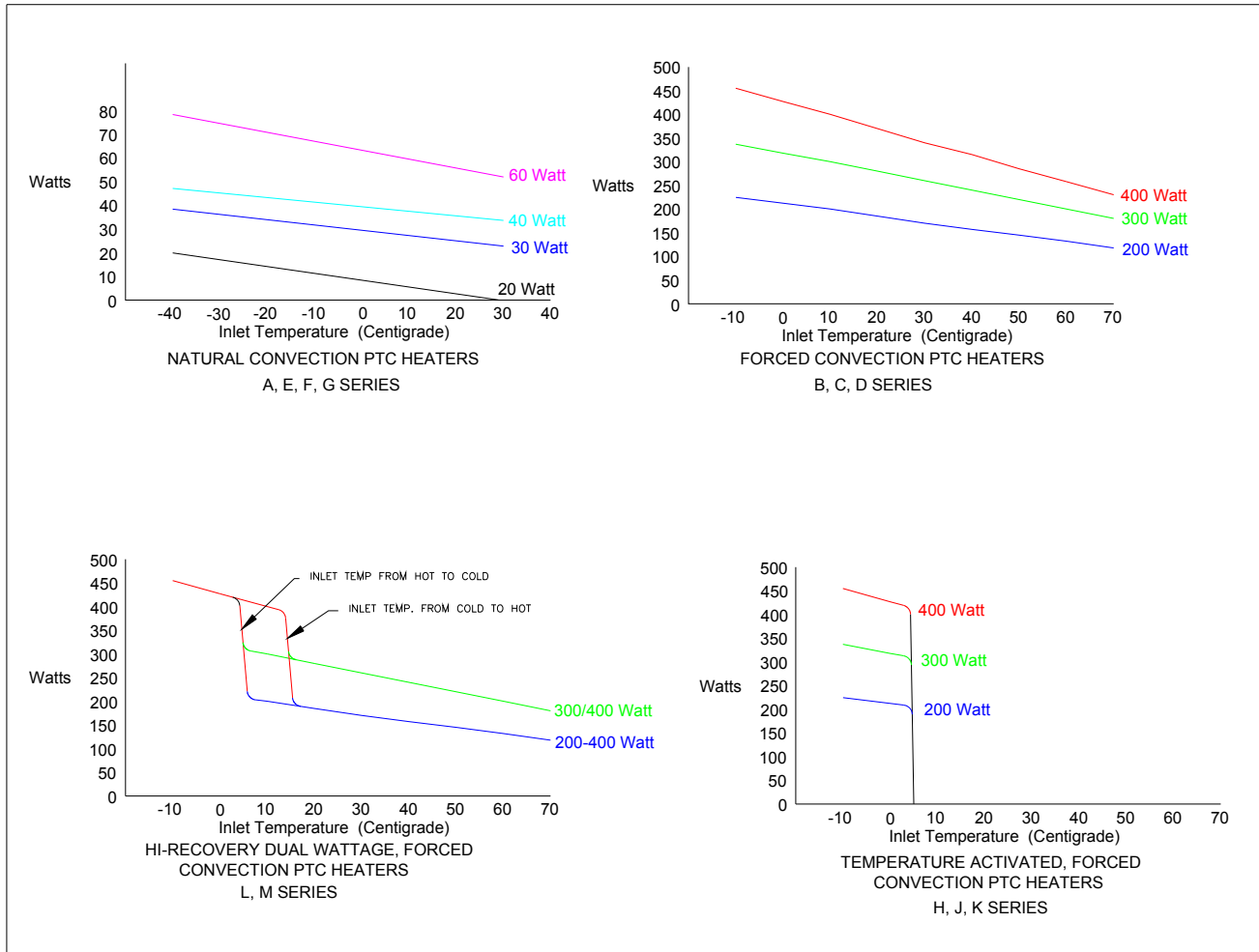


Chart 4 – PTC2 Heater Inlet Temperature vs. Wattage Output

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APPENDICES (continued)

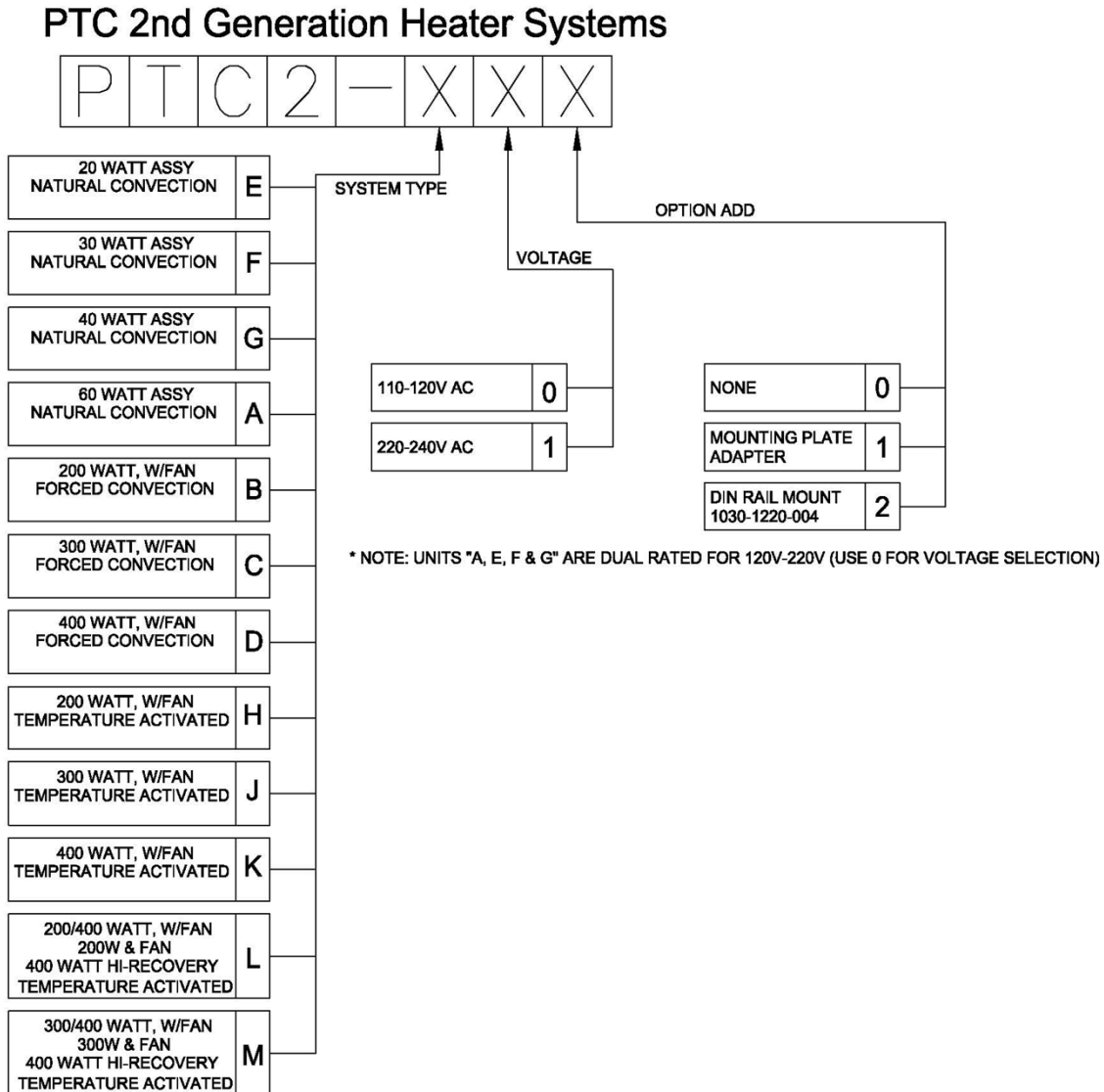


Figure 3 – PTC2 Part Number Configuration

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APPENDICES (continued)

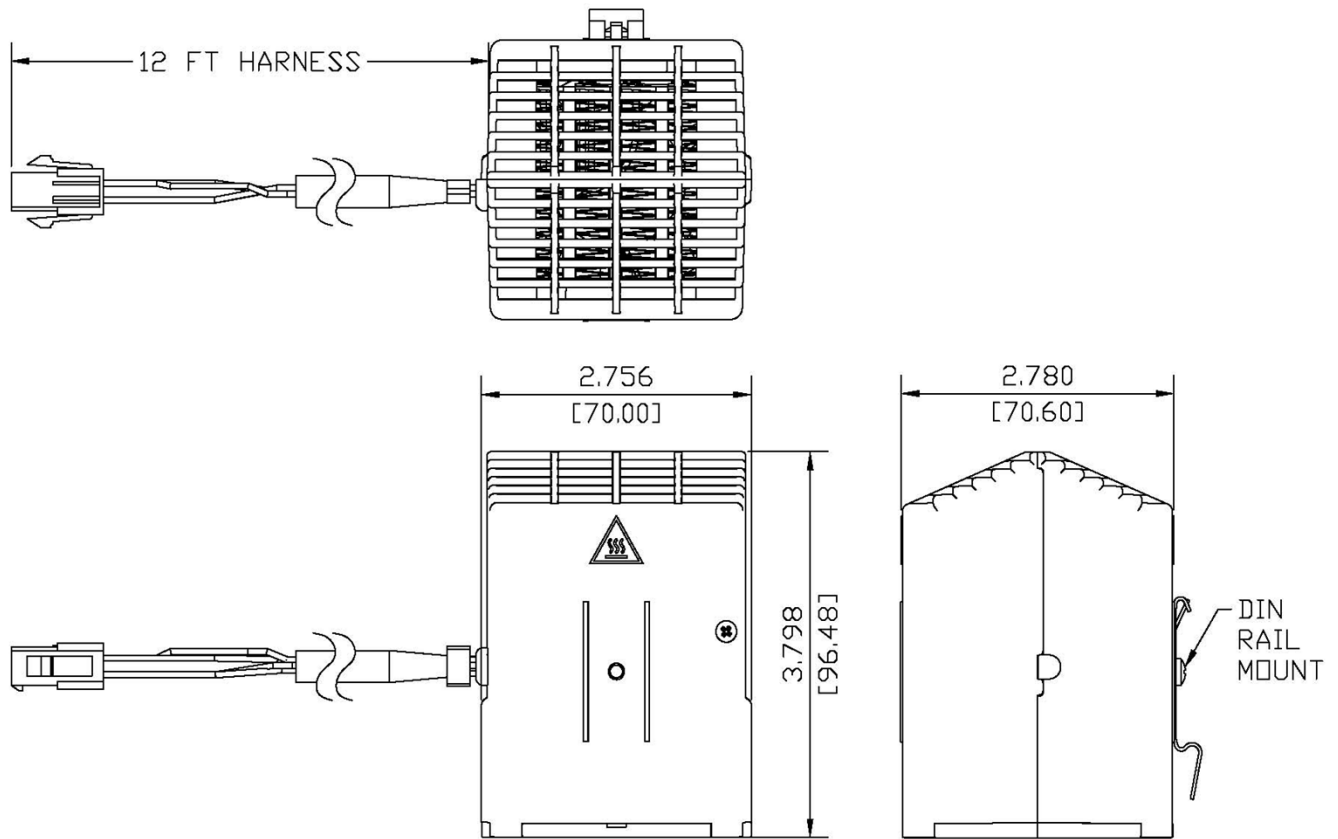


Figure 4 – Fan Forced PTC2 Dimensions

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APPENDICES (continued)

Figure 5 – 30 to 60 Watt Convection PTC2 Dimensions

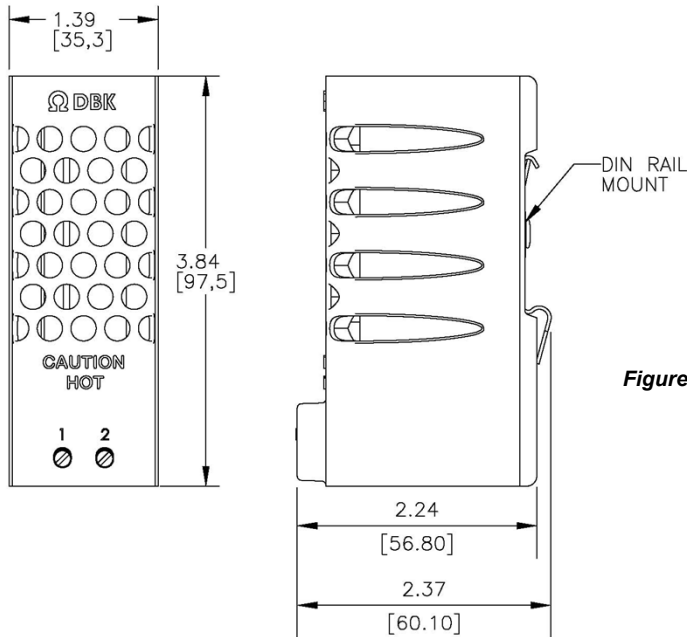
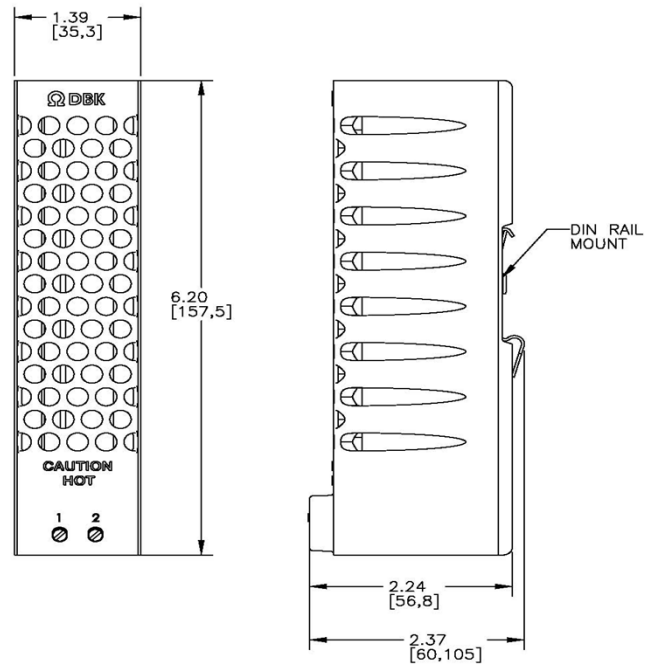


Figure 6 – 20 to 40 Watt Convection PTC2 Dimensions



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REPLACEMENT PARTS AND SERVICE

Please contact us at **800-338-5526** for replacement parts and/or service.

Or visit us online at **www.WaukeshaElectric.com**.

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