

Heatworks MODEL 1 Electrical installation reference guide

Electrical Service:

The Heatworks MODEL 1 tankless water heater is considered a **non-continuous heating appliance** according to the Definitions in the National Electric Code. An appliance load that is not continuous for 3 hours or more is considered non-continuous. Therefore, the MODEL 1 heater, when used for standard domestic hot water applications, is considered a non-continuous heating appliance. Due to the diversity of water heating in a home, the load (amps) contribution of the MODEL 1 heater to the overall service load of the home or building can be calculated using the optional methods of National Electrical Code, sections NEC 220-82 or 220-83.

For new dwellings, the service load should be calculated using NEC 220-82. For existing dwellings, the service load should be calculated using NEC 220-83. By both calculation methods, the Heatworks MODEL 1 load is generally added to the service load at 40% of its maximum nameplate rating. For instance, the maximum current (amp) rating of the Heatworks MODEL 1 is 48 amps and 40% of this rating is about 20 amps. The 20 amps is typically the load added to the overall service load of the dwelling when using the optional calculation methods as described in NEC 220-82 and 220-83, not the maximum current rating, 48 amps. (Note that a conventional electric water heater rated at 30 amps load will be rated at 30 amps as is it considered a continuous device.) So, **two** Heatworks MODEL 1s will actually **only add** 10 amps to the service load. As a result, one or more Heatworks MODEL 1s will fit in most homes that have a 150 or 200 amp whole-house electrical service, or can be installed using one or more sub-panels with a breaker that is sized accordingly.

Power/Voltage Modulation:

During operation, the Heatworks MODEL 1 is designed to use only the power necessary to heat the water for various combinations of temperature rise and flow rate.

Disconnects and Sub-panels:

Electrical **disconnect devices** do not contain circuit breakers and are

not required by the National Electrical Code (NEC) for residential appliances such as the Heatworks MODEL 1 water heater or any appliance rated less than 300 volts. However, disconnects may be required by the NEC for motor loads and for appliances with multiple circuits in commercial applications.

Electrical **sub-panels**, containing circuit breakers, may be used with appliances such as the Heatworks MODEL 1 water heater in residential and commercial applications.

In new, and in some existing residential construction, there is generally enough breaker spaces in the main electrical panel to accommodate several additional circuit breakers, for the Heatworks MODEL 1 water heater. However, in some existing homes, the main electrical panel may be nearly full with circuit breakers serving existing load. In these cases, one or more sub panels, each with a single large breaker rated for the entire load of the water heater, can be installed off the main panel. The boxes for a 50 or 60 amp subpanel can be purchased for about \$15 each, and the breaker for about \$12. Smaller boxes and breakers are slightly less expensive.

Branch Circuits and Breakers:

As a non-continuous heating appliance, the branch circuit wires and breakers must be sized to at least 100% of the maximum ampere rating of the appliance. This is particularly important to avoid over heating of the wires at the connections to the breakers. Over heating at the breaker connections may cause nuisance or premature breaker trips. It is recommended that the wire for the branch circuits and sub-feeds be rated for at least 75 degrees C. If you use THHN, which is rated for 90C, the wire gauge is smaller than standard 75C wire, and the nylon covering makes it much easier to pull. It also costs about the same.

<u>Current draw (amps)</u>	<u>Wire gauge (75C)</u>	<u>Wire gauge (90C – THHN)</u>
15	14	14
20	12	12
30	10	10
40	8	8
50	6	8