

KEYSTONE Water Heater



Suggested Specifications Keystone KW399/500

General Requirements

1. Contractor shall supply and install Qty.: ____ Triangle Tube Model No. KW____ gas fired condensing modulating water heater(s).
2. The heater shall be a Triangle Tube Keystone Model KW____ rated at the input and output and minimum thermal efficiency shown on the schedule. The heater shall modulate 20-100% of full fire. The unit(s) shall be design-certified to comply with the current edition of the Harmonized ANSI Z21.10.3 / CSA 4.3 Standard for Gas Water Heaters. The unit(s) shall be designed and constructed in accordance with the ASME Boiler & Pressure Vessel Code, Section IV requirements for 160 psi (1103 kPa) maximum working pressure, and shall bear the ASME "H" Stamp and be listed by the National Board. The unit(s) shall be constructed to comply with the efficiency requirements of the latest edition of ASHRAE Standard 90.1. The heater shall be equipped with an ASME certified pressure relief valve set at 125 psi (861 kPa). Optional pressure relief valves with settings of 30 psi (207 kPa), 50 psi (345 kPa), 60 psi (413 kPa), 75 psi (517 kPa) or 150 psi (1034 kPa) may be used.
3. The heater shall meet the standards of California's AB-1953 and NSF/ANSI-61 requirements.
4. The water tube heat exchanger shall be 316 stainless steel, rated for 160 psi (1103 kPa) working pressure. The heat exchanger shall be a low water volume design, welded construction, with no gaskets, o-rings or bolts in the header. Heat exchanger shall be accessible for visual inspection and cleaning of all surfaces of the flue side of the heat exchanger. The heater shall be fully condensing design with built-in condensate drain and trap. The heat exchanger shall have a limited five-year warranty.
5. Each heater shall be fully test fired, (with water, gas, and venting connected), and all safety components tested, at the factory.
6. The heater shall be sealed combustion, and removal of jacket panels shall not affect the combustion seal. The heater jacket shall be a unitized shell finished with acrylic thermo-set paint baked at not less than 325°F (163°C). The frame shall be constructed of galvanized steel for strength and protection. Chamber shall include a sight glass for viewing flame. Heater shall be certified for zero clearance to combustible surfaces.
7. All water, gas, vent and air connections shall be on the top of the heater, and the top jacket panels shall be split, such that they are removable without disconnecting the water, gas, vent or air connections.
8. Heater shall operate on 4-13" w.c. supply gas pressure, and shall need no component changes to operate at high altitude, up to 10,000 feet.
9. The heater shall use a premix burner with a stainless steel woven metal fiber wrap, and a negative pressure gas valve to burn cleanly, with NOx emissions not exceeding 10 ppm. The heater shall meet the emissions requirements of SCAQMD 2012.
10. The heater shall be designed for vertical or horizontal Category IV venting, 100 equivalent feet, with 4" diameter PVC, CPVC or stainless steel vent material. Air may be taken from the room, or ducted directly to the heater, using up to 100 equivalent feet of 4" diameter ABS, PVC, CPVC or galvanized pipe. The heater shall be shipped with PVC sidewall vent and air terminals, for use with horizontal systems. The first section of CPVC vent pipe shall be shipped with each heater.

11. Unit shall be 120VAC, single phase, 2 Amps for connection to a 15A breaker. The control circuit shall be 24VAC.
12. The heater control shall be an integrated electronic PID temperature and ignition control with LCD and touchpad and shall control the heater operation and firing rate. The heater display shall be visible without the removal of any jacket panels or control panels.
13. The control shall have the ability to control a pump that is connected to the heater, with delay feature.
14. The control shall have the ability to accept a 4-20 mA or 0-10 VDC (with supplemental kit) input connection from an external control or building automation system, to modulate the flame. The control shall automatically detect the presence of the connection, so the user does not have to program the control to use the feature. The control shall have dry alarm contacts for ignition failure announcement.
15. The control shall monitor flue gas temperature and shall stop heater operation if the flue temperature is excessive.
16. The control shall easily allow the user to force the heater into minimum or maximum firing rate, for heater setup and diagnostic purposes. Control shall have 3 menu structures for user mode, setup mode and diagnostic mode.
17. Allowable control adjustments shall include: Domestic water temperature setpoint; °F or °C display; Anti-short-cycle feature enable/disable.
18. In addition to the adjustable parameters, the control shall display the heater's inlet water temperature, heater temperature rise (delta-T), stack temperature, heater high limit setpoint, domestic water setpoint, flame sense signal, control alerts and control lock-outs.
19. Control diagnostics shall include, at a minimum, the following: Ignition failure; Grounded flame rod; Safety chain interrupt; Heater high limit exceeded; Sensor errors (open or shorted); Fan speed proving rate failure.

Standard features shall include:

- High heat exchanger condensing efficiency
- Modulation down to 20% of full fire (5:1 turn-down)
- Sealed combustion chamber
- Pre-mix stainless steel burner
- Low NOx system exceeds the most stringent regulations for air quality – less than 10 ppm NOx.
- Horizontal or vertical direct vent
- Horizontal vent and air terminals
- Vent and air pipe lengths of up to 100 equivalent feet (each)
- Built-in condensate trap
- Vent temperature cutoff feature
- Direct spark ignition system
- Sensor for domestic water tank
- 160 psi maximum working pressure
- Stainless steel heat exchanger with welded construction (no gaskets)
- ASME "H" stamp
- 125 psi (861 kPa) ASME rated pressure relief valve
- Temperature & pressure gauge
- Drain valve
- Water flow switch
- Electronic PID modulating control
- Large user-interface and display
- Alarm output
- Accepts external (4-20 mA or 0-10 V) modulation signal
- On/off service switch
- Manual reset high limit
- Burner site glass
- Zero clearance to combustible surfaces
- 5 year limited warranty on heat exchanger.

Model Schedule

Model	Maximum Input MBH [kW]	Maximum Output MBH [kW]	Minimum Thermal Efficiency %
KW 399	399 [116.9]	382 [109.6]	96.3
KW 500	500 [147.0]	483 [141.7]	96.7