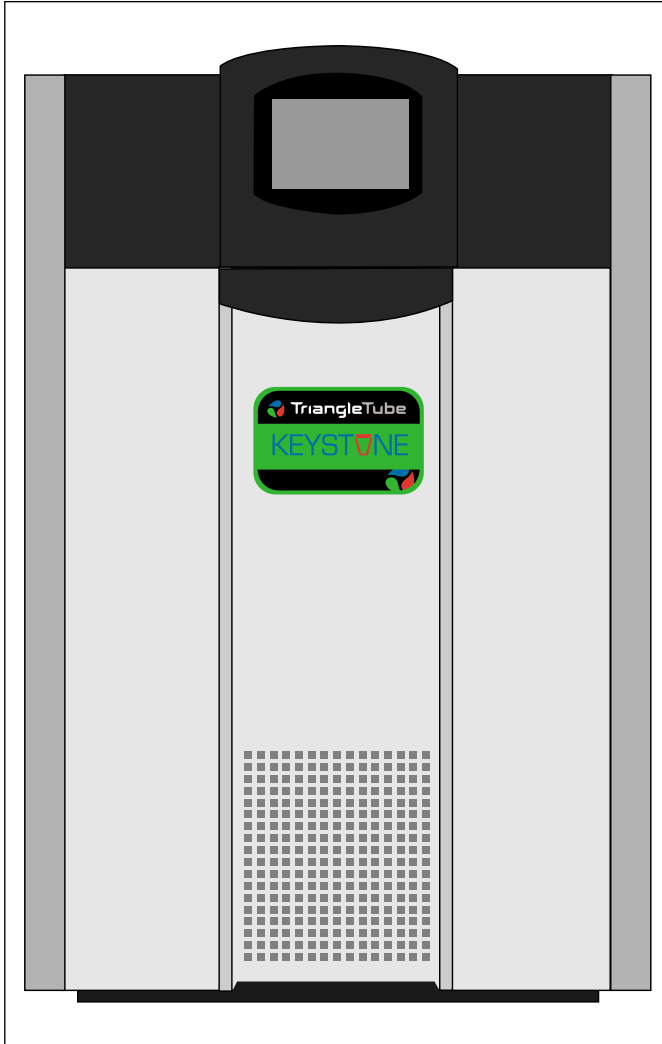


# Engineering Submittal

## Keystone Water Heater KW 199 - 850



### Engineering Submittal Data

- High efficiency condensing water heater
- Electronic PID modulating control with large color touchscreen display
- Displays holds, alerts, and errors in clear text
- Complete diagnostics for analog and digital inputs
- Accepts external analog modulation signal
- Built-in cascade function for up to eight Keystone water heaters
- Modulation down to 20% of full fire (5:1 turndown)
- Sealed combustion chamber
- Pre-mix stainless steel burner
- Low NOx - 2012 SCAQMD certified
- Horizontal or vertical direct vent
- Horizontal vent and air terminals
- Vent and combustion air pipe lengths of up to 100'
- Built-in condensate trap
- Vent temperature cutoff feature
- Direct spark ignition system
- 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
- Water flow switch (KW 399 - 850 only)
- Temperature & pressure gauge
- Drain valve
- Alarm output
- On/off service switch
- Manual reset high temperature limit
- Burner site glass
- Zero clearance to combustible surfaces
- 5 year limited warranty on heat exchanger



<b>Project / Location</b> _____	<b>Date</b> _____
<b>Consulting Engineer/ Architect</b> _____	
<b>Mechanical Contractor</b> _____	
<b>Notes</b> _____	

**Sizing Data**

Model	Input MBH [kW]	Output MBH [kW]	Thermal Efficiency %	Gas Conn. Size Inches	Water Conn. Sizes Inches	Shipping Weight Lbs [Kg]
KW 199	199 [58.3]	193 [56.5]	97	1/2 NPT	1 1/4 NPT	270 [123]
KW 285	285 [83.5]	271 [79.3]	95	3/4 NPT	2 NPT	299 [136]
KW 399	399 [116.9]	383 [112.2]	96	3/4 NPT	2 NPT	364 [165]
KW 500	500 [146.5]	480 [140.6]	96	1 NPT	2 NPT	419 [190]
KW 600	600 [175.8]	582 [170.4]	97	1 NPT	2 NPT	426 [193]
KW 750	750 [219.8]	705 [206.4]	94	1 1/2 NPT	2 NPT	481 [218]
KW 850	850 [249.1]	816 [238.9]	96	1 1/2 NPT	2 NPT	503 [228]

**Vent System Data**

Model	Intake (Air) Pipe	Exhaust (Vent) Pipe	Maximum Allowable Equivalent Length* Ft [m]
KW 199	3"	3"	100 [30]
KW 285	3"	3"	20 [6.1]
	4"	4"	100 [30]
KW 399	4"	4"	100 [30]
KW 500	4"	4"	100 [30]
KW 600	4"	4"	40 [12]
	6"***	6"***	100** [30]**
KW 750	4"	4"	40 [12]
	6"	6"	100 [30]
KW 850	4"	4"	40 [12]
	6"	6"	100 [30]

Installations in the U.S. require exhaust vent pipe that is a combination of PVC & CPVC complying with ANSI/ASTM D1785 F441, polypropylene pipe that complies with ULC S636, or stainless steel complying with UL1738. Installations in Canada require exhaust vent pipe that is certified to ULC S636.

Intake (air) pipe may be ABS, PVC, CPVC or galvanized material.

Installer must comply fully with manufacturer's installation instructions, including use of minimum exhaust length CPVC, to maintain ANSI Z21.13 safety certification.

Closet and alcove installations do not allow the use of PVC under any circumstances

\* To calculate max equivalent length, measure the linear feet of the pipe, and add 5 feet (1.5m) for each elbow used.

\*\* Allowed only if the vent pipe is no more than 20 equivalent feet longer than the air pipe.

**Recovery Data**

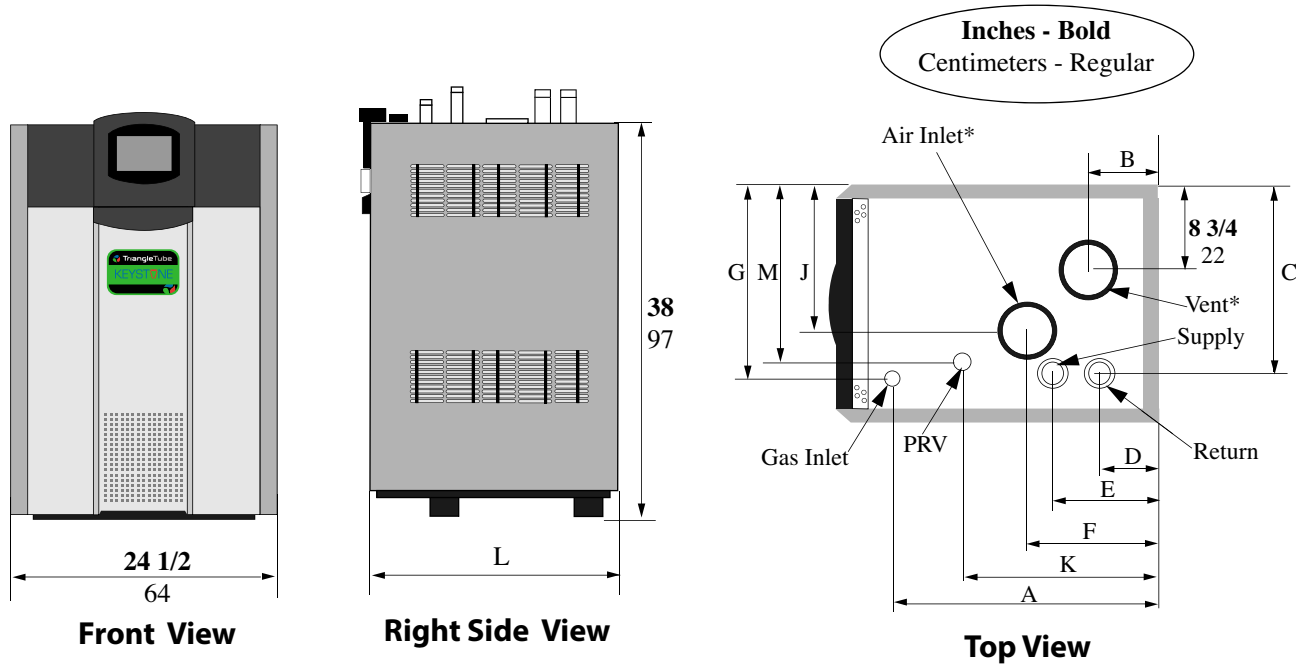
Required Water Temperature Rise GPH Delivered [L/H Delivered]									
Model	40°F [22°C]	50°F [28°C]	60°F [33°C]	70°F [39°C]	80°F [44°C]	90°F [50°C]	100°F [56°C]	120°F [67°C]	140°F [78°C]
	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]	Flow gph [L/h]
KW 199	579 [2190]	463 [1752]	386 [1460]	331 [1251]	290 [1095]	257 [973]	232 [876]	193 [730]	166 [626]
KW 285	818 [3091]	654 [2473]	545 [2061]	467 [1766]	409 [1545]	363 [1374]	327 [1236]	273 [1030]	234 [883]
KW 399	1153 [4359]	923 [3487]	769 [2906]	659 [2491]	577 [2181]	513 [1937]	461 [1744]	384 [1453]	329 [1245]
KW 500	1451 [5485]	1161 [4388]	967 [3657]	829 [3134]	726 [2743]	645 [2438]	580 [2194]	484 [1828]	415 [1567]
KW 600	1729 [6536]	1383 [5288]	1152 [4355]	988 [3735]	864 [3266]	768 [2903]	691 [2612]	576 [2177]	494 [1867]
KW 750	2170 [8203]	1736 [6562]	1447 [5470]	1240 [4687]	1085 [4101]	964 [3644]	868 [3281]	723 [2733]	620 [2344]
KW 850	2434 [9201]	1947 [7360]	1622 [6131]	1391 [5258]	1217 [4600]	1082 [4090]	973 [3678]	811 [3066]	695 [2627]

**Water Flow Requirements**

Model	Flow gpm [lpm]	H/L feet [m]	Temp Rise °F [°C]
KW 199	25 [95]	28 [8.5]	15 [8]
KW 285	36 [98]	33 [10.1]	15 [8]
KW 399	50 [189]	35 [10.7]	15 [8]
KW 500	63 [239]	28 [8.5]	15 [8]
KW 600	60 [227]	24 [7.3]	19 [11]
KW 750	68 [257]	35 [10.7]	21 [12]
KW 850	68 [257]	26 [7.9]	24 [13]

**Note:** Maximum allowed Water Hardness of 10 grains per gallon

Dimensional Data



Model	A		B		C		D		E		F		G		J		K		L		M	
	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm	in	cm
KW199	20 <sup>1</sup> / <sub>2</sub>	52	5 <sup>1</sup> / <sub>4</sub>	13	19	48	3 <sup>1</sup> / <sub>4</sub>	8	17 <sup>3</sup> / <sub>4</sub>	45	7 <sup>1</sup> / <sub>2</sub>	19	14 <sup>1</sup> / <sub>4</sub>	36	19 <sup>1</sup> / <sub>2</sub>	49	11 <sup>3</sup> / <sub>4</sub>	30	26 <sup>3</sup> / <sub>4</sub>	68	15 <sup>1</sup> / <sub>4</sub>	39
KW285	20 <sup>1</sup> / <sub>4</sub>	52	7 <sup>1</sup> / <sub>4</sub>	19	19 <sup>3</sup> / <sub>4</sub>	50	6 <sup>1</sup> / <sub>4</sub>	16	11 <sup>1</sup> / <sub>4</sub>	29	13 <sup>1</sup> / <sub>2</sub>	34	14	36	15	38	17	43	26 <sup>3</sup> / <sub>4</sub>	68	18 <sup>3</sup> / <sub>4</sub>	48
KW399	25	64	5 <sup>1</sup> / <sub>4</sub>	13	19 <sup>3</sup> / <sub>4</sub>	50	4 <sup>1</sup> / <sub>4</sub>	11	14 <sup>3</sup> / <sub>4</sub>	37	18 <sup>1</sup> / <sub>2</sub>	47	19 <sup>1</sup> / <sub>4</sub>	49	16 <sup>1</sup> / <sub>2</sub>	42	21 <sup>3</sup> / <sub>4</sub>	55	31 <sup>1</sup> / <sub>2</sub>	80	18 <sup>3</sup> / <sub>4</sub>	48
KW500	30 <sup>1</sup> / <sub>4</sub>	77	5 <sup>1</sup> / <sub>4</sub>	13	19 <sup>3</sup> / <sub>4</sub>	50	4 <sup>1</sup> / <sub>4</sub>	11	15 <sup>1</sup> / <sub>4</sub>	38	20	51	20 <sup>1</sup> / <sub>2</sub>	52	19	48	26	66	37 <sup>3</sup> / <sub>4</sub>	96	18 <sup>3</sup> / <sub>4</sub>	48
KW600	29 <sup>3</sup> / <sub>4</sub>	76	5	13	19 <sup>1</sup> / <sub>2</sub>	50	4 <sup>1</sup> / <sub>4</sub>	11	15	38	20	51	3	8	19	48	26	66	37 <sup>3</sup> / <sub>4</sub>	96	18 <sup>3</sup> / <sub>4</sub>	48
KW750	35 <sup>1</sup> / <sub>2</sub>	90	6	15	19 <sup>1</sup> / <sub>2</sub>	50	5 <sup>1</sup> / <sub>4</sub>	13	19	48	40 <sup>1</sup> / <sub>2</sub>	103	3 <sup>1</sup> / <sub>4</sub>	8	19	48	30 <sup>3</sup> / <sub>4</sub>	78	51	130	18 <sup>3</sup> / <sub>4</sub>	48
KW850	39 <sup>3</sup> / <sub>4</sub>	101	6	15	19 <sup>1</sup> / <sub>2</sub>	50	5 <sup>1</sup> / <sub>4</sub>	13	19	48	44 <sup>3</sup> / <sub>4</sub>	114	3 <sup>1</sup> / <sub>2</sub>	9	19	48	35	89	55 <sup>1</sup> / <sub>4</sub>	140	18 <sup>3</sup> / <sub>4</sub>	48

\* Keystone is shipped with adapters for the air and vent connections that accept standard pipe of the proper size and type.

Clearance and Electrical Data

Appliance Surface	Suggested Service Access Clearance inches [cm]
Left Side	1 [2.5]
Right Side	12 [31]
Top	24 [61]
Back	6 [15]
Closet, Front	6 [15]
Alcove, Front	24 [61]
Vent	N/A

Models	Volts	Phase	Amps	Pump Connections Ratings
KW 199-850	120	Single	2*	Max 7.4A FLA

\*Minimum 15A circuit required

Certified by CSA for zero clearance to combustible materials on all sides