

HSI

HSI ELECTRIC BOILERS –



Moderate Watt Density (70 WPSI)
Resistance Element Type

Designed and built to fully utilize the advantages of generating hot water and steam using electricity as the fuel.

for Heating:

HOT WATER BOILERS

30 – 3456 KW

30 – 415 psi

208 – 600 volts

for Heating & Process:

STEAM BOILERS

30 – 4608 KW

15 – 2500 psi

208 – 600 volts



HSI HYDRO STEAM
INDUSTRIES

A Vapor Power International Company

A Vapor Power International Company

MODEL NUMBERS and RATINGS - 480 VOLT

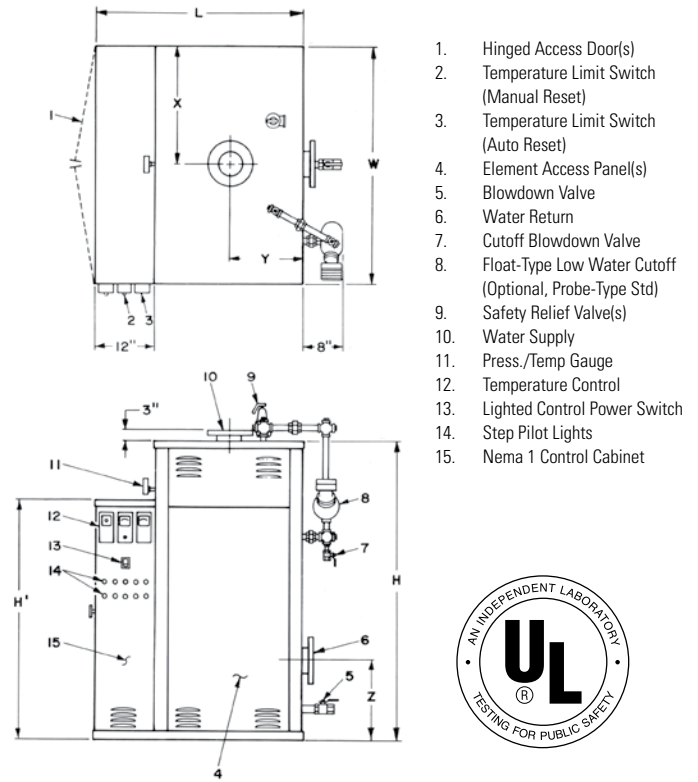
Model Number	Rating **		Elements		Number of:		Amps (480/3)
	KW	MBH	Qty	KW	Circuits	Steps @KW	
HWR1638-30	30	102	6	5	1	1@30	36
HWR1638-36	36	123	6	6	1	1@36	43
HWR1638-45	45	154	9	5	2	1@15,1@30	54
HWR1638-54	54	184	9	6	2	1@18,1@36	65
HWR1638-60	60	205	12	5	2	2@30	72
HWR1638-72	72	246	12	6	2	2@36	87
HWR1638-90	90	307	18	5	3	3@30	108
HWR1638-108	108	368	18	6	3	3@36	130
HWR1638-120	120	409	24	5	4	4@30	144
HWR1638-144	144	491	24	6	4	4@36	173
HWR1654-150	150	512	30	5	5	5@30	180
HWR1654-180	180	614	30	6	5	5@36	217
HWR1654-216	216	737	36	6	6	6@36	260
HWR2438-210	210	717	21	10	7	7@30	253
HWR2438-240	240	819	24	10	8	8@30	289
HWR2438-270	270	921	27	10	9	7@30,1@60	325
HWR2438-300	300	1024	30	10	10	6@30,2@60	361
HWR2438-330	330	1126	33	10	11	5@30,3@60	397
HWR2438-360	360	1228	36	10	12	4@30,4@60	433
HWR2438-390	390	1331	39	10	13	3@30,5@60	469
HWR2438-420	420	1433	42	10	14	2@30,6@60	505
HWR2438-450	450	1535	45	10	15	1@30,7@60	541
HWR2438-480	480	1638	48	10	16	8@60	577
HWR2450-510	510	1740	51	10	17	3@30,7@60	613
HWR2450-540	540	1842	54	10	18	2@30,8@60	650
HWR2450-570	570	1945	57	10	19	1@30,9@60	686
HWR2450-600	600	2047	60	10	20	10@60	722
HWR2450-630	630	2150	63	10	21	3@30,9@60	758
HWR2450-660	660	2252	66	10	22	2@30,10@60	794
HWR2450-690	690	2354	69	10	23	1@30,11@60	830
HWR2450-720	720	2457	72	10	24	12@60	866
HWR2462-750	750	2559	75	10	25	11@60,1@90	902
HWR2462-780	780	2661	78	10	26	10@60,2@90	938
HWR2462-810	810	2764	81	10	27	9@60,3@90	974
HWR2462-840	840	2866	84	10	28	8@60,4@90	1010
HWR2462-870	870	2968	87	10	29	7@60,5@90	1046
HWR2462-900	900	3071	90	10	30	6@60,6@90	1083
HWR2462-930	930	3173	93	10	31	5@60,7@90	1119
HWR2462-960	960	3276	96	10	32	4@60,8@90	1155
HWR3656-936	936	3194	78	12	26	10@72,2@108	1126
HWR3656-1008	1008	3439	84	12	28	8@72,4@108	1212
HWR3656-1080	1080	3685	90	12	30	6@72,6@108	1299
HWR3668-1152	1152	3931	96	12	32	4@72,8@108	1386
HWR3668-1224	1224	4176	102	12	34	2@72,10@108	1472
HWR3668-1296	1296	4422	108	12	36	12@108	1559
HWR3668-1368	1368	4668	114	12	38	10@72,6@108	1645
HWR3668-1440	1440	4913	120	12	40	8@72,8@108	1732
HWR3668-1512	1512	5159	126	12	42	6@72,10@108	1819
HWR3668-1584	1584	5405	132	12	44	4@72,12@108	1905
HWR3668-1656	1656	5650	138	12	46	2@72,14@108	1992
HWR3668-1728	1728	5896	144	12	48	16@108	2079
HWR3680-1800	1800	6142	150	12	50	14@108,2@144	2165
HWR3680-1944	1944	6633	162	12	54	10@108,6@144	2338
HWR3680-2016	2016	6879	168	12	56	8@108,8@144	2425
HWR3680-2160	2160	7370	180	12	60	4@108,12@144	2598
HWR3680-2304	2304	7861	192	12	64	16@144	2771
HWR4274-2520	2520	8598	210	12	70	10@108,10@144	3031
HWR4274-2664	2664	9090	222	12	74	6@108,14@144	3204
HWR4274-2880	2880	9827	240	12	80	20@144	3464
HWR4274-3024	3024	10318	252	12	84	12@108,12@144	3637
HWR4274-3240	3240	11055	270	12	90	6@108,18@144	3897
HWR4274-3456	3456	11792	288	12	96	24@144	4157

* KW ratings for 3600 & 4200 Series can be further subdivided by increments of 36KW.
 ** Larger sizes available upon request.

HSI RESISTO-FLO

ELECTRIC HOT WATER BOILER

HSI 'Resisto-Flo' Hot Water Boilers are designed to provide fast, efficient and economical hot water for heating through the use of electric resistance elements. The boiler controls automatically energize/de-energize steps of elements to maintain the desired water temperature. All HSI Hot Water Boilers utilize ASME pressure vessels (Section IV up to 160 psi; Section VIII above 160 psi) and all electrical components are U/L listed and are wired in accordance with the current National Electrical Code requirements. Each boiler is insulated with 3-1/2" fiberglass secured to the vessel, and is housed in an enameled heavy-gauge sheet metal cabinet mounted on a full-size structural steel base. All HSI 'Resisto-Flo' boilers utilize 70 wpsi Incoloy-sheathed elements configured in conservatively-sized circuits to allow for overvoltage conditions as great as 10% without adversely affecting the integrity of circuit components.



1. Hinged Access Door(s)
2. Temperature Limit Switch (Manual Reset)
3. Temperature Limit Switch (Auto Reset)
4. Element Access Panel(s)
5. Blowdown Valve
6. Water Return
7. Cutoff Blowdown Valve
8. Float-Type Low Water Cutoff (Optional, Probe-Type Std)
9. Safety Relief Valve(s)
10. Water Supply
11. Press./Temp Gauge
12. Temperature Control
13. Lighted Control Power Switch
14. Step Pilot Lights
15. Nema 1 Control Cabinet



Std Voltages:
 208, 220-240, 380, 415,
 440-480, 550-600

Std Design Pressures:
 "H" Code: 30, 125, 160
 "S" Code: 175, 230, 415

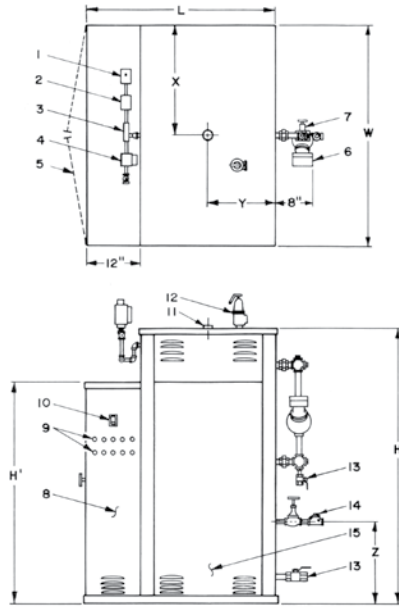
DIMENSIONAL DATA

Model & Series	Max KW	Dimensions (inches)								Min Flow Rate (gpm)	Max Flow Rate (gpm)	Max Flow Size (in.)	Approx Shipping Weight (lbs)
		L	W	H	H'max	X	Y	Z	R*				
HWR1638	144	32	30	48	45	11	11	14	18	10	100	2 NPT	700
HWR1654	216	32	30	64	63	11	11	14	18	15	150	3 NPT	900
HWR2438	480	42	48	48	51	24	15	17	22	30	300	4 FLG	1300
HWR2450	720	42	48	60	63	24	15	17	22	50	500	4 FLG	1600
HWR2462	960	42	48	72	75	24	15	19	22	65	650	6 FLG	1900
HWR3656	1152	58	60	66	75	30	21	22	30	90	900	6 FLG	2800
HWR3668	1728	58	60	78	81	30	21	22	30	120	1200	6 FLG	3500
HWR3680	2304	58	60	90	93	30	21	22	30	150	1500	6 FLG	4200
HWR4274	3456	64	66	84	87	33	24	24	30	240	2400	8 FLG	5000

* Element Removal Clearance - Addition to width per side required for removal of elements. Exception: 1600 Series right side only.

ELECTRIC STEAM BOILER

HSI Resistance-Type Steam Boilers are built to the same high-quality standards to which our Hot Water Boilers comply. Low Pressure Boilers (0-15 psi) are constructed under Section IV of the ASME Code; High Pressure Boilers are built per Section I of the ASME Code. Quality components, such as McDonnell & Miller water level controls, Bussmann "Class T" fuses, and solid state step controllers, provide years of low-maintenance service. The long-lived 70 watt density Incoloy-sheathed elements are individually replaceable, greatly reducing the cost of element replacement. HSI 'Resisto-Flo' steam boilers listed herein are of the vertical tank configuration with ample steam chest height to minimize moisture carry-over. The Model STR 4200 and 4800 series for low pressure steam applications have internal moisture separators. Most models are available with integral condensate return/feedwater systems.



1. Pressure Limit Switch (Manual Reset)
2. Pressure Limit Switch (Auto Reset)
3. Pressure Gauge
4. Pressure Control
5. Hinged Access Doors
6. Low Water Cutoff/Pump Control
7. Sight Gauge
8. Control Cabinet
9. Pilot Lights
10. Control Power Switch
11. Steam Outlet
12. Safety Valve(s)
13. Blowdown Valves
14. Feedwater Valves
15. Element Access Panel(s)

DIMENSIONAL DATA

Model & Series	Max KW	Dimensions (inches)									Connection Sizes (inches NPT)						Approx Shipping Weight (lbs)
		L	W	H	H' max	X	Y	Z	R*	Feed-water	Steam Outlet			Bottom Blowdown			
											15 PSI	50 PSI	150 PSI	15 PSI	50 & 150 PSI		
STR1638	72	32	30	48	39	11	11	14	18	1/2	1-1/4	1	3/4	3/4	3/4	700	
STR1654	144	32	30	64	45	11	11	14	18	1/2	1-1/2	1-1/4	1	1	3/4	900	
STR2438	180	42	48	48	45	24	15	16	22	3/4	2	1-1/4	1	1	1	1200	
STR2450	240	42	48	60	51	24	15	16	22	3/4	2-1/2	1-1/2	1-1/4	1	1	1400	
STR2456	360	42	48	66	57	24	15	16	22	3/4	3	2	1-1/2	1-1/4	1	1600	
STR2474	480	42	48	84	75	24	15	16	22	3/4	4 FLG	2-1/2	1-1/2	1-1/4	1	1800	
STR3054	480	48	54	64	63	27	18	18	22	3/4	4 FLG	2-1/2	1-1/2	1-1/4	1	2100	
STR3066	720	48	54	76	69	27	18	18	22	3/4	4 FLG	3	2	1-1/2	1	2300	
STR3656	864	54	60	66	69	30	21	20	30	3/4	6 FLG	3	2	1-1/2	1	2500	
STR3680	1152	54	60	90	75	30	21	20	30	3/4	6 FLG	4 FLG	2-1/2	1-1/2	1	2800	
STR4274	1296	64	66	84	75	33	24	22	30	1	6 FLG	4 FLG	3 FLG	1-1/2	1	3500	
STR4290	1584	64	66	100	87	33	24	22	30	1	6 FLG	4 FLG	3 FLG	1-1/2	1	4000	
STR4890	1944	70	72	100	87	36	27	24	30	1	8 FLG	6 FLG	3 FLG	2	1-1/4	4800	

* Element Removal Clearance - Addition to width per side required for removal of elements. Exception: 1600 Series right side only.

Model Number	Rating */**		Elements		Number of:		Amps (480/3)
	KW	PPH***	Qty	KW	Circuits	Steps @KW	
STR1638-30	30	102	6	5	1	1@30	36
STR1638-36	36	123	6	6	1	1@36	43
STR1638-45	45	154	9	5	2	1@15,1@30	54
STR1638-54	54	184	9	6	2	1@18,1@36	65
STR1638-60	60	205	12	5	2	2@30	72
STR1638-72	72	246	12	6	2	2@36	87
STR1654-75	75	256	15	5	3	1@15,2@30	90
STR1654-90	90	307	18	5	3	3@30	108
STR1654-108	108	368	18	6	3	3@36	130
STR1654-120	120	409	24	5	4	4@30	144
STR1654-144	144	491	24	6	4	4@36	173
STR2438-150	150	512	15	10	5	5@30	180
STR2438-180	180	614	18	10	6	6@30	217
STR2450-210	210	717	21	10	7	7@30	253
STR2450-240	240	819	24	10	8	8@30	289
STR2456-270	270	921	27	10	9	7@30,1@60	325
STR2456-300	300	1024	30	10	10	6@30,2@60	361
STR2456-330	330	1126	33	10	11	5@30,3@60	397
STR2456-360	360	1228	36	10	12	4@30,4@60	433
STR2474-390	390	1331	39	10	13	3@30,5@60	469
STR2474-420	420	1433	42	10	14	2@30,6@60	505
STR2474-450	450	1535	45	10	15	1@30,7@60	541
STR2474-480	480	1638	48	10	16	8@60	577
STR3054-480	480	1638	48	10	16	8@60	577
STR3066-510	510	1740	51	10	17	3@30,7@60	613
STR3066-540	540	1842	54	10	18	2@30,8@60	650
STR3066-570	570	1945	57	10	19	1@30,9@60	686
STR3066-600	600	2047	60	10	20	10@60	722
STR3066-630	630	2150	63	10	21	3@30,9@60	758
STR3066-660	660	2252	66	10	22	2@30,10@60	794
STR3066-690	690	2354	69	10	23	1@30,11@60	830
STR3066-720	720	2457	72	10	24	12@60	866
STR3656-756	756	2579	63	12	21	3@36,9@72	909
STR3656-792	792	2702	66	12	22	2@36,10@72	953
STR3656-828	828	2825	69	12	23	1@36,11@72	996
STR3656-864	864	2948	72	12	24	12@72	1039
STR3680-900	900	3071	75	12	25	11@72,1@108	1083
STR3680-1008	1008	3439	84	12	28	8@72,4@108	1212
STR3680-1080	1080	3685	90	12	30	6@72,6@108	1299
STR3680-1152	1152	3931	96	12	32	4@72,8@108	1386
STR4274-1224	1224	4176	102	12	34	2@72,10@108	1472
STR4274-1296	1296	4422	108	12	36	12@108	1559
STR4290-1368	1368	4668	114	12	38	10@72,6@108	1645
STR4290-1440	1440	4913	120	12	40	8@72,8@108	1732
STR4290-1512	1512	5159	126	12	42	6@72,10@108	1819
STR4290-1584	1584	5405	132	12	44	4@72,12@108	1905
STR4890-1728	1728	5896	144	12	48	16@108	2079
STR4890-1800	1800	6142	150	12	50	14@108,2@144	2165
STR4890-1872	1872	6387	156	12	52	12@108,4@144	2252
STR4890-1944	1944	6633	162	12	54	10@108,6@144	2338

* KW ratings for 3600, 4200 & 4800 Series can be further subdivided by increments of 36KW.
 ** Larger sizes available; see STRH Series.
 *** From and at 212F. # Not available for low pressure service (<15psi).

Std Voltages:

208, 220-240, 380, 415, 440-480, 550-600

Std Design Pressures

"H" Code: 15
 "S" Code: 50, 100, 125, 150, 205, 250, 300, 605, 900,
 1135, 1500, 1635, 1750, 2000, 2500



HSI ELECTRIC BOILERS OFFER

THESE ADVANTAGES... NO FLAME | NO SOOT | NO FLUES | NO STACKS | NO FUEL PUMPS

- CLEAN** – No air pollution
- AUTOMATIC** – Require little supervision or maintenance
- SAFE** – Completely insulated, no flame
- COMPACT** – No boiler house required, take less space
- EFFICIENT** – 99% regardless of output

FOR THESE APPLICATIONS...

- Office Buildings • Hospitals and Schools
- Apartments, Hotels and Motels • Industrial Plants
- Restaurants and Food Processing • Laboratories
- Clothing and Textiles • Auxiliary Steam Supply

ALL HSI 'RESISTO-FLO' HOT WATER AND STEAM BOILERS ARE CONSTRUCTED TO THE LATEST ASME, NEC AND U/L STANDARDS, COMBINING THE BETTER IDEAS FOUND IN COMPETITIVE MODELS WITH SEVERAL NEW AND UNIQUE FEATURES AS DESCRIBED BELOW:

CONTROLS:

A proportioning step control is provided as standard on boilers of 3 or more steps. A proportional temperature sensor (hot water) or pressure sensor (steam) provides input to the modulating solid-state step control which, in turn, energizes the required heating circuits via magnetic contactors. The step controls are field selectable between linear sequence and progressive sequence (first-on/first-off) and automatically recycle to zero output upon startup and restart. These state-of-the-art controls also include adjustable interstage time delays, as well as the capability to slave vernier SCR stages.

OPTIONAL FEATURES:

- | | |
|------------------------|-------------------------|
| Auxiliary LWCO | Auto Blowdown (Steam) |
| Load Limiter | Conductivity Control |
| Outdoor Reset | Alarm Circuit |
| Door Interlock | Ammeter |
| Disconnect Switch | Voltmeter |
| Circuit Breaker | Flow Switch (Hot Water) |
| Ground Fault Detection | BAS/DCS Interface |

HEATING ELEMENTS:



The Incoloy-sheathed immersion resistance-type heating elements used for boilers in this bulletin have moderate watt densities (70 wpsi) to insure long life. The elements are constructed of high grade resistance wire (80% nickel, 20% chromium) surrounded by compacted magnesium oxide in Incoloy 800 (SS 332) sheathing. HSI hairpin elements have unique fold-back design with repressed bends. This configuration affords ideal spacing between sections of individual elements and between adjacent elements thus allowing maximum water flow and heat dissipation. Special compression fittings permit elements to be individually replaced with standard tools.

REFERENCE DATA

- 10KW = 1.02 BHP = 34 Lbs. Stm/Hr = 34,120 BTU/hr
- 1 Gal Water at 62° F = 8.34 Lbs.
- 1 Cu Ft Water at 62° F = 62.4 Lbs.
- 1 Cu Ft = 7.48 Gal
- 1 Ft Water = 0.435 psi
- KW = GPH x ΔT (°F)/410 = LPH x ΔT (°C)/862
- Amps (3ph) = Watts/(Volts x 1.73)
- Enthalpy of water = Temp (°F) -32 BTU/LB

Saturated Steam: Pressure vs Temperature

0 psig = 0 KPa = 212°F	125 psig = 862 KPa = 353°F
8 psig = 55 KPa = 235°F	150 psig = 1034 KPa = 366°F
15 psig = 103 KPa = 250°F	200 psig = 1379 KPa = 388°F
30 psig = 207 KPa = 274°F	225 psig = 1551 KPa = 397°F
50 psig = 345 KPa = 298°F	250 psig = 1724 KPa = 406°F
80 psig = 552 KPa = 324°F	300 psig = 2068 KPa = 422°F
100 psig = 690 KPa = 338°F	350 psig = 2413 KPa = 436°F

NOTE: In pursuing our policy of continuous development, we reserve the right to vary any detail shown in this bulletin without notice.

NOTE: Consult local representative or Factory for other Vapor/HSI products, including: Electric (resistance element) steam and hot water boilers
Condensate return systems
Thermal fluid heaters
Circulation heaters
Superheaters

GUARANTEE

Vapor/HSI guarantees all components, except pilot lights, fuses, gaskets and mechanical seals, if found defective in workmanship or material while under normal use and service within the first year of operation or until 18 months after shipment from the Factory, whichever occurs first, after authorized return by purchaser to Vapor/HSI (at purchaser's expense) and after examination discloses to Vapor/HSI's reasonable satisfaction to be defective. The repair or replacement of defective parts will be made by HSI without charge. The pressure vessel, however, is guaranteed for 5 years after shipment. Vapor/HSI shall not be held responsible for any field charges in connection with the removal or replacement of allegedly defective parts, nor for incidental or consequential damages. This guarantee does not include failure resulting from unsuitable water.

Manufactured by:



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