

Date: _____ Engineer: _____
 Job: _____ Contractor: _____
 Model #: _____ End User: _____
 Representative: _____ Prepared By: _____

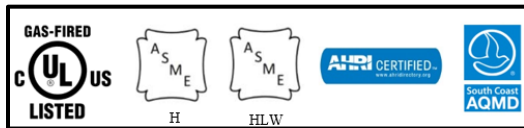


AVENGER

Condensing Boiler

The Avenger is a two-pass counter flow condensing commercial boiler for hydronic heating and hot water supply at working pressures up to 160PSI.

- ANSI Z21.13/CSA 4.9 & ANSI Z21.10.3/CSA 4.3 Certified
- ASME Certified; "H" and "HLW" Stamps / National Board Listed
- Canadian Registration Number (CRN)
- CSD-1 Compliant
- California Code Compliant
- South Coast Air Quality Management District Qualified



Standard Features

- ASME "H" and "HLW" stamped stainless steel heat exchangers
- 160PSI working pressure
- Stainless Steel rifle tubes, designed to optimize flue gas velocity on the first pass
- Stainless steel oblong tubes, designed to maximize condensation on the second pass
- Fully welded construction with stainless steel pressure vessel, tubes, tubesheets and combustion chamber
- Modulating boiler with up to 25:1 turn-down
- Operating water pressure as low as 12PSI
- Natural or propane gas operation
- Radial fired knitted fiber stainless steel burner
- Low gas pressure operation
- Downstream gas test cocks
- Fast closing shutoff gas pressure regulator
- Variable frequency drive (VFD) modulation
- Electronic low air pressure switch
- Blocked flue switch
- Water pressure switch
- Flow Switch
- Low gas pressure switch on all models w/manual reset
- High gas pressure switch on models 3000-4000 w/manual reset
- Low NOx operation (SCAQMD Pending)
- Hot surface ignition
- Ultraviolet flame detection
- Direct ignition for models 1000-2500
- Proven pilot ignition for models 3000-4000
- Sealed combustion
- Adjustable high limit with manual reset
- Return water temperatures as low as 40°F
- Inlet, outlet and stack sensors
- Drain valve
- ASME relief valve
- Single point input adjustment for control of air and gas
- Inherent O2 trim
- Pressure regulated electro-hydraulic proportional air/gas actuator, providing a slow opening and fast closing safety shutoff valve
- 1 to 1 air/gas ratio control for proper combustion across entire modulation range
- Window viewport for combustion chamber
- Water, gas, vent and electric connections on the back
- Low and high voltage terminal strips
- On/Off switch
- Built-in audible alarm
- Flame failure alarm contacts

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- ΔT heat exchanger protection algorithm
- Staging relay to govern operation of low end or high end gas valve
- Local/Remote switch for building management, remote modulation and set-point control
- SOLA Controller featuring cascade controls lead lag up to 8 boilers
- Modbus RTU standard, Protocol Translator available for other communication needs
- Factory test fired and certified
- 10-year warranty on heat exchanger (see warranty details)
- 5-year warranty on burner (see warranty details)
- 1-year warranty on parts (see warranty details)

Optional Features

- CSD-1
- Motorized isolation valves
- Condensate neutralization kit
- BMS gateway – BACnet MSTP/IP, LonWorks or Metasys N2
- Outdoor installation kit (Consult Factory)
- Outdoor sensor for standalone boiler
- Outdoor sensor for cascade
- Outdoor vent kit (Consult Factory)
- Optional high gas pressure switch for models 1000-2500
- Optional low water cutoff w/manual reset
- Spring return air inlet damper with wire harness
- Vent adapter to PVC/CPVC
- Air inlet filter kit for room air installations

Venting Options

- Category II and IV venting
- Direct venting
- Room air
- Horizontal & vertical venting
- Outdoor venting (Consult Factory)

Venting Material

- Stainless steel or AL29-4C for all system applications
- Polypropylene for all system applications
- CPVC for domestic hot water systems and select low temperature heating systems – consult factory
- PVC for domestic hot water systems and select low temperature heating systems – consult factory

Required Vent Sizes and Boiler Connections					
Model	Air inlet \varnothing up to 100 ft. equiv. length (in.)	Category IV, vent \varnothing up to 100 ft. equiv. length (in.)	Category II, vent \varnothing up to 100 ft. equiv. length (in.)	Air inlet connection \varnothing , as shipped (in.)	Vent connection \varnothing , as shipped (in.)
AR(N,P)-1000	6	6	7	6	6
AR(N,P)-3500	10	10	12	7	10
AR(N,P)-4000	10	10	12	7	10

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Input / Output			
Model	Input MBH		Gross Output MBH
	Max	Min	
ARN-1000	1000	47	945
ARP-1000	1000	100	945
ARN-3500	3500	140	3,325
ARP-3500	3500	350	3,325
ARN-4000	4000	160	3,748
ARP-4000	4000	400	3,748

Water Content	
Model	Volume (Gallons)
AR(N,P)-1000	55
AR(N,P)-3500	120
AR(N,P)-4000	120

Absolute Minimum Flow Rate	
Model	Flow (GPM)
AR(N,P)-1000	7.9
AR(N,P)-3500	27.7
AR(N,P)-4000	31.2

Minimum Flow Rate at Max Fire Rate	
Model	Flow (GPM)
AR(N,P)-1000	23.6
AR(N,P)-3500	83.0
AR(N,P)-4000	93.6

Based on maximum temperature rise of 80°F

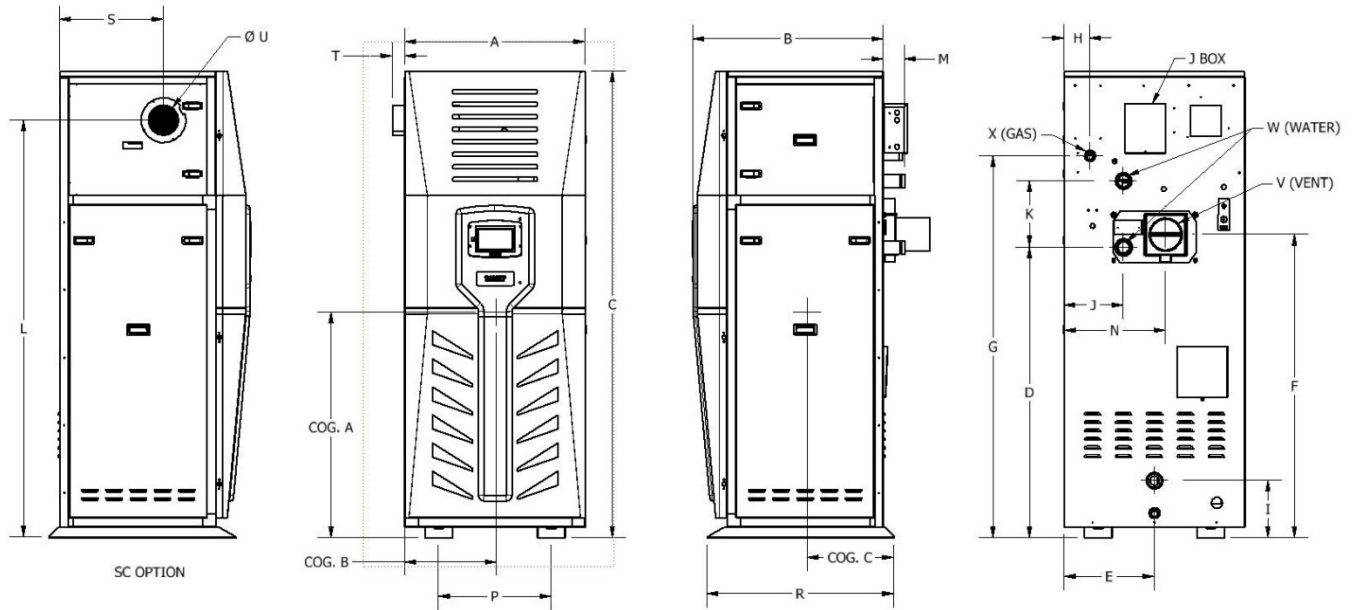
Heat Exchanger Head Loss and Flow						
Model	20°F		40°F		60°F	
	US GPM	ΔP-FT	US GPM	ΔP-FT	US GPM	ΔP-FT
AR(N,P)-1000	94.4	22	47.2	5.8	31.5	3.1
AR(N,P)-3500	332.2	6.9	166.1	1.8	110.7	1.1
AR(N,P)-4000	374.5	9.0	187.2	2.1	124.8	1.2

Recovery Capacity (Water Heater Only - HLW)			
Model	100°F (GPH)	80°F (GPH)	60°F (GPH)
1000	1146	1432	1909
3500	3988	4985	6647
4000	4509	5636	7515

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Dimensional Data



Model	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)	G (in.)	H (in.)	I (in.)	J (in.)	K (in.)
1000	32	34	82 ¾	51 ½	16	54	68	4 ½	10 ¼	10 ½	11 ¾
3500	35	44	99	54 ½	17 ½	60	76	5 ¼	10	8 ½	14 5/8
4000	35	44	99	53 3/8	17 ½	60	76	5 ¼	10	8 ½	16

Model	*L (in)	M (in.)	N (in.)	P (in.)	R (in.)	S (in.)	T (in.)	U (in.)	W (in.) Ø Water	X (in.) Ø Gas	Weight (lbs)
1000	74	19	18	20	33 ¼	18 ½	2	5 3/8	2	1	1180
3500	85 ½	25 ½	20 ½	24 1/8	42 ½	24 ½	4	7 5/16	4	2	2570
4000	85 ½	25 ½	20 ½	24 1/8	42 ½	24 ½	4	7 5/16	4	2	2620

*Direct Vent/Sealed combustion option

*Minimum Clearance to Combustibles				
Model	Top (in.)	Back (in.)	Sides (in.)	Front (in.)
All	12	12	12	12

*Service clearances are different than clearances to combustibles. Refer to IOM.

Voltage Requirement	
Model	Voltage
1000 – 2000	115VAC, 60Hz
1000 – 2000 ^Δ	208/230VAC, 60Hz, 1 Phase*
2500 – 3500	208/230VAC, 60Hz, 1 Phase*
1000 - 3500 ^Δ	208/230VAC, 60Hz, 3 Phase**
4000	208/230VAC, 60Hz, 3 Phase**
1000 - 4000	460VAC, 60Hz, 3 Phase

*This is a 4-wire power supply requiring two (2) lives, a neutral and a ground

**This is a 5-wire power supply requiring three (3) lives, a neutral and a ground

Δ Optional power supply