



## UP TO 88% EFFICIENT, HYDRONIC BOILER WITH MODULATING FIRE 4:1 TURNDOWN

The VF™ Boiler series delivers an exceptionally high thermal efficiency by combining an advanced modulating venturi-mixing gas/air ratio system with a vertical multi-pass copper heat exchanger for outstanding efficiency of up to 88% and low-NOx emissions that meet or exceed the most stringent standards.

The VF™ Boiler is capable of firing from 100% to 25% or a 4:1 turndown ratio of rated input based on the current system demand. The VF's modulating capability is virtually limitless, and the boiler's output is based strictly on the current system demand and the required BTUs needed to maintain the desired system set point temperature.

### ADVANCED HIGH EFFICIENCY, LOW NOx COMBUSTION TECHNOLOGY

- Venturi-mixing gas/air ratio system – Works with variable speed blower to precisely mix gas and air throughout firing range
- 4:1 Turndown – Fully modulating capabilities prevents energy stealing short cycling and provides smooth system operation with higher overall system efficiencies.
- Approved for use in areas with low pressure gas supply services – Provides good operation with 4 inches of water column.

### LOW NOx OPERATION

- Complies with SCAQMD Rule 1146.2 and other Air Quality Management Districts with similar requirements for low NOx emissions

### EMC-5000 MODULATING CONTROL

- Controls every electrical boiler function with on board diagnostics
- Includes remote system loop temperature sensing probe – adjust heating loop temperature at the boiler – modulates the boiler to maintain desired system set point temperature within +/- 1 degree
- iCOMM™ Compatible and can be monitored from remote locations. Call 1.888.WATER02 for more information.



### HIGH EFFICIENCY COPPER FIN TUBE HEAT EXCHANGER

- Vertical straight tube 2 or 4 pass heat exchanger design encircles the burner with a combustion chamber that is a 360° wall of copper fin tubes
- Rust-resistant operation – All internal heat exchanger non copper surfaces are glass lined with A. O. Smith's proprietary porcelain glass coating, which far exceeds competitive coatings.
- Impervious to thermal shock

### OPTIONAL FACTORY MOUNTED AND WIRED PUMP AVAILABLE

- Integral boiler mounted all bronze pump for primary/secondary pumping systems
- Allows for 50 equivalent feet of pipe between boiler and primary loop

### COMPACT, LOW-PROFILE DESIGN

- Zero clearance on sides (500-1000), 4 inches on sides (1500-2000), ideal for multiple boiler installations
- Fits through 30" door (500-1000), 31" door (1500-2000) and elevators for difficult retrofit applications

### STANDARD VENT OR DIRECT VENT FLEXIBILITY

- Standard-vent configuration, vertical or horizontal sidewall
- Two-pipe direct-venting vertical and/or horizontal sidewall, with all combustion makeup air drawn from outside the building

## VB-500 through VB-2000



**ASME**



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**CATEGORY IV LISTED**

- Requires AL29-4C gas tight rust resistant venting material

**FACTORY START-UP INCLUDED**

- Required for activating warranty and assuring maximum operating performance. Contact your local sales representative or Authorized Start-Up Agent to arrange a FREE Certified Start-up.

**MEETS THE THERMAL EFFICIENCY AND STANDBY LOSS REQUIREMENTS OF THE U.S. DEPARTMENT OF ENERGY AND CURRENT EDITION OF ASHRAE/IESNA 90.1**

**10-YEAR HEAT EXCHANGER WARRANTY**

- For complete information, consult written warranty or contact A. O. Smith

**OTHER VF BOILER FEATURES:**

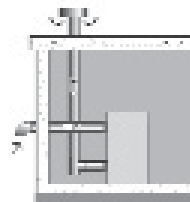
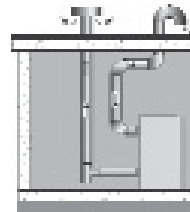
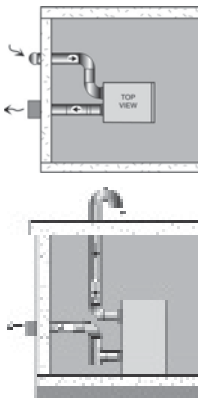
- ASME 160# W.P.
- ASME PRESSURE RELIEF VALVE 50#
- MEETS CSD-1 CODE-FACTORY STANDARD
- FLOW SWITCH MOUNTED
- BRASS DRAIN VALVE
- LOW GAS PRESSURE SWITCH
- DIGITAL INLET/OUTLET TEMPERATURE READ OUT
- MANUAL RESET HI LIMIT

**VF BOILER APPROVED OPTIONS:**

- LOW WATER CUTOFF
- DRY CONTACTS FOR ANY BOILER FAILURE
- ALARM BUZZER
- INTEGRAL BOILER MOUNTED PUMP FOR PRIMARY/SECONDARY PUMPING SYSTEMS
- SEQUENCING PANEL
- THROUGH-THE-WALL VENTING
- DIRECT/SEALED VENT KIT
- SKID-MOUNTED SYSTEM
- LP GAS
- ENERGY MANAGEMENT INTERFACE ADAPTER (BacNet, Lonworks, for others contact the Factory)

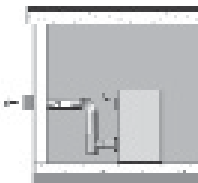
**VERSATILE MULTI-VENTING CONFIGURATIONS**

**DIRECT-VENTING**

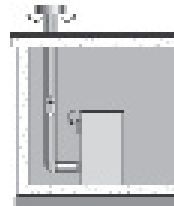


70 Equivalent Feet Exhaust  
70 Equivalent Feet Intake  
90 Degree Elbows = 10 Feet  
45 Degree Elbows = 5 Feet  
Boot Tee = 5 Feet

**SIDEWALL VENTING**



**CONVENTIONAL VENTING**



100 Equivalent Feet Max  
90 Degree Elbows = 10 Feet  
45 Degree Elbows = 5 Feet  
Boot Tee = 5 Feet

Please consult latest edition of the Installation Manual for detail venting information and maximum/minimum venting distances.

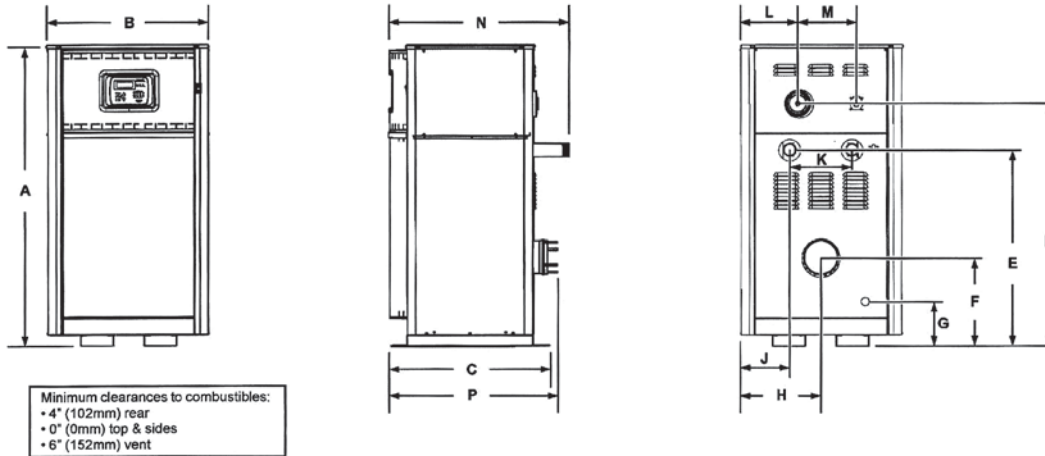
### VB MODELS - FLOW, HEAD AND TEMPERATURE RISE

Model	Input Rating Btu/hr	Output Rating Btu/hr	20°F (11°C) Δt				30°F (17°C) Δt				Maximum Flow Rate				Minimum Flow Rate			
			GPM	LPM	ΔP FT	ΔPm	GPM	LPM	ΔP FT	ΔPm	GPM	LPM	ΔP FT	ΔPm	GPM	LPM	ΔP FT	ΔPm
VB-500	500,000	421,500	42	159	1.8	0.5	28	106	1.3	0.4	42	159	1.8	0.5	28	106	1.3	0.4
VB-750	750,000	633,750	63	238	2.9	0.9	42	159	2.1	0.6	63	238	2.9	0.9	42	159	2.1	0.6
VB-1000	1,000,000	845,000	85	322	3.9	1.2	56	212	2.8	0.9	85	322	3.9	1.2	56	212	2.8	0.9
VB-1500	1,500,000	1,260,000	126	477	13	4	84	318	7	2	126	477	13	4	84	318	7	2
VB-2000	2,000,000	1,680,000	168	636	44	13	112	424	18	5	168	636	44	13	112	424	18	5

**NOTE:** Head loss shown is through boiler only and allows for no additional piping

Maximum gas supply pressure: 11" W.C. natural gas, 13.8" propane. Minimum gas supply pressure: 4" W.C. natural gas, 8" propane

Electrical Power: 120 Volts, 60 Hertz, 30 Amps.



### ROUGH-IN DIMENSIONS

Models	VB-500		VB-750		VB-1000		VB-1500		VB-2000	
	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
Flue Outlet Diameter	6	152	6	152	6	152	7	178	7	178
Air Intake Diameter	4	102	4	102	4	102	6	152	6	152
Water Inlet	2 inch NPT				2-1/2 inch NPT					
Water Outlet	2 inch NPT				2-1/2 inch NPT					
Gas Inlet	1 inch NPT				1-1/4 inch NPT					
A	56	1422	62	1575	71	1803	67	1702	72	1829
B	30	762	30	762	30	762	30.5	775	30.5	775
C	30	762	30	762	30	762	37	940	37	940
D	45	1143	51	1295	59	1499	57	1448	62	1575
E	36	914	42	1067	48	1219	43	1092	48	1219
F	16.5	419	16.5	419	16.5	419	16.5	419	16.5	419
G	8	203	8	203	8	203	8.5	216	8.5	216
H	15	381	15	381	15	381	15	381	15	381
J	9	229	9	229	9	229	5	127	5	127
K	11.5	292	11.5	292	11.5	292	15	381	15	381
L	11	279	11	279	11	279	8	203	8	203
M	10.5	267	10.5	267	10.5	267	21	533	21	533
N	33	838	33	838	33	838	42	1067	42	1067
P	31	787	31	787	31	787	40	1016	40	1016
Approx. Ship. Weight (lbs.)	450		575		750		925		1025	

Please note this product specification sheet is intended to assist with product selection. For the most current product installation and design instructions, please see the latest edition of the Instruction Manual available at [www.hotwater.com](http://www.hotwater.com) or call your local A. O. Smith Sales Representative for assistance.



## UP TO 88% EFFICIENT, HYDRONIC BOILER WITH MODULATING FIRE 4:1 TURNDOWN

### SUGGESTED SPECIFICATION

The gas-fired hydronic heating boiler(s) shall be A. O. Smith VF Boiler model VB\_\_\_\_\_ having an input rating of \_\_\_\_\_BTU/hr and capable of supplying no less than \_\_\_\_\_ GPH at a 100°F temperature rise when fired with (Natural/Propane) gas. 1) The boiler shall bear the ASME "H" stamp and shall be National Board registered (CRN in Canada) for 160 PSI working pressure. 2) The boiler(s) shall be equipped with a factory-installed 50 PSIG CSA Certified and ASME Rated Pressure Relief Valve. 3) The boiler(s) shall be design-tested and certified to the ANSI Z21.13 - CSA 4.9 standards and approved by CSA International. 4) Complies with SCAQMD Rule 1146.2 and other Air Quality Management districts with similar requirements for low NOx.

**The heat exchanger shall:** 1) Incorporate a vertical straight tube 2 or 4 pass copper fin tube heat exchanger design. 2) Be circular, encompassing the entire burner and forming the combustion chamber. 3) The tubes shall be rolled into ASME grade steel glass lined tube sheets. 4) The headers shall be ASME 160 psi welded glass lined steel. 5) For ease of service and access, headers shall be bolted and sealed to the tube sheets with silicone "O" rings, having a temperature rating of over 400°F. Tube access plugs are not acceptable. 6) To provide rust-resistant operation, all internal heat exchanger water contact surfaces shall be copper or glass-lined steel. 7) The heat exchanger shall be immune to thermal shock. 8) All non-heating surface heat exchanger components (headers, tube sheets, header bolts and gaskets) shall be outside and away from the combustion and flue collection areas, only the copper fin tubes shall be exposed to the products of combustion. 9) The sealed heat exchanger flue collection system shall be constructed of high grade stainless steel that is immune to corrosive flue gases. 10) The heat exchanger shall be approved for inlet water temperatures down to 120°F. 10) The entire heat exchanger shall carry a five (5) year warranty.

**Burner:** 1) The gas burner shall be constructed of high temperature stainless steel and utilize a woven metal fiber mesh covering, be warranted for 5 years, and fire in a radial 360-degree flame pattern. 2) The burner shall be capable of infinitely modulating between 25% and 100% fire (4:1 turndown) with smooth starts and clean combustion.

**Boiler Controls:** 1) All electrical boiler functions shall be controlled, operated, and monitored by a microprocessor-based control. 2) The microprocessor shall control and modulate the burner based on current system output requirements to maintain the boiler set point temperature and be accurate to within plus or minus 1°F. 3) The hot surface ignition system shall employ a separate flame sensor for maximum reliability. 4) The boiler control shall provide on board diagnostics with digital fault code read outs in plain English and help screens for additional troubleshooting assistance if needed. 5) The boiler shall be supplied with a remote loop thermistor for sensing and controlling the hydronic heating loop temperature up to 1,000 feet away. 6) Provisions for connecting a remote thermistor, alarm bell, and alternate temperature controller must be provided. 7) Factory mounted and wired flow switch, blower prover, and blocked flue switches shall be provided. 8) The gas train shall meet or exceed the requirements of ANSI Z21.13 - CSA 4.9 Standards and include gas pressure regulator, manual gas cock, redundant safety gas valve, operating control valve, and plugged pressure test tapings. 9) CSA Certified and ASME Rated Pressure Relief Valve shall be factory installed.

**Venting:** 1) The boiler shall be certified for direct horizontal through-the-wall venting or direct vertical venting; in addition to sidewall or conventional vertical venting. 2) The boiler shall be capable of horizontal sidewall or direct venting up to 70 equivalent feet without the aid of any optional sidewall vent fans or blowers.

**Factory Start-Up Included:** Required for activating warranty and assuring maximum operating performance.

The boiler shall meet the thermal efficiency and standby loss requirements of the U.S. Department of Energy and Current Edition of ASHRAE/IESNA 90.1.

Boilers should incorporate the iCOMM™ system connection for remote monitoring, leak detection and fault alert.

**Optional Boiler Pump:** 1) The boiler(s) shall be supplied with a factory sized and wired all bronze secondary boiler pump. 2) The pump shall be interfaced with and managed by the boiler's control and cycled as needed for most efficient operation.