



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

VB-500  
through  
VB-1000

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

- Meets or exceeds Texas and California SCAQMD Rule 1146.2 air quality standards

#### 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

#### HIGH EFFICIENCY COPPER FIN TUBE HEAT EXCHANGER

- Vertical straight tube 2 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, ideal for multiple boiler installations
- Fits through 30" doors 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



**ASME**

**A.O. Smith**



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### CATEGORY IV LISTED

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

### PROFESSIONAL START-UP SERVICE FURNISHED

- Assures optimum performance for each installation

### MEETS ASHRAE/IESNA 90.1-1999

### 10 YEAR HEAT EXCHANGER WARRANTY

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

### OTHER VF BOILER FEATURES:

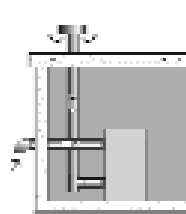
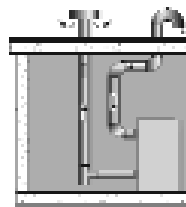
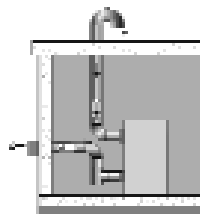
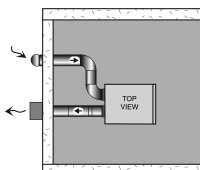
- ASME 160# W.P.
- ASME PRESSURE RELIEF VALVE 50#
- MEETS CSD-1 CODE-FACTORY STANDARD
- FLOW SWITCH MOUNTED
- BRASS DRAIN VALVE
- LOW GAS PRESSURE SWITCH
- DIGITAL INLET/OUTLET TEMPERATURE READ OUT
- MANUAL RESET HI LIMIT

### VF BOILER APPROVED OPTIONS:

- LOW WATER CUTOFF
- DRY CONTACTS FOR ANY BOILER FAILURE
- ALARM BELL
- INTEGRAL BOILER MOUNTED PUMP FOR PRIMARY/SECONDARY PUMPING SYSTEMS
- SEQUENCING PANEL
- THROUGH-THE-WALL VENTING
- DIRECT/SEALED VENT KIT
- SKID-MOUNTED SYSTEM
- LP GAS

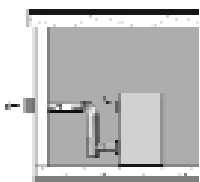
## VERSATILE MULTI-VENTING CONFIGURATIONS

### DIRECT-VENTING

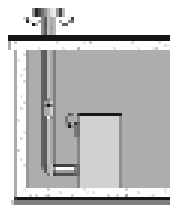


70 Equivalent Feet Exhaust  
70 Equivalent Feet Intake  
90 Degree Elbows = 10 Feet  
45 Degree Elbows = 5 Feet  
Boot Tee = 5 Feet

### SIDEWALL VENTING



### CONVENTIONAL VENTING



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

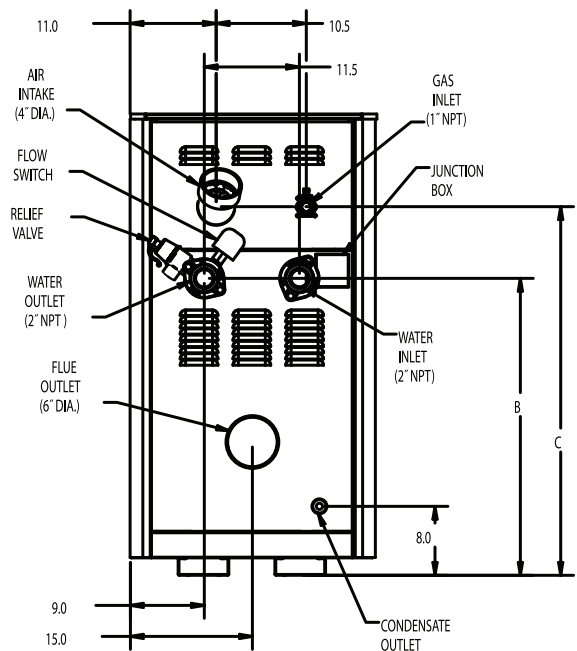
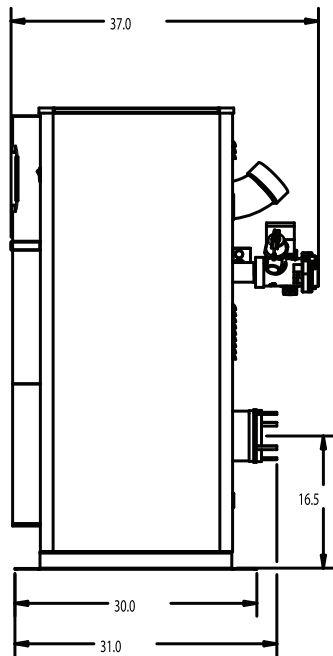
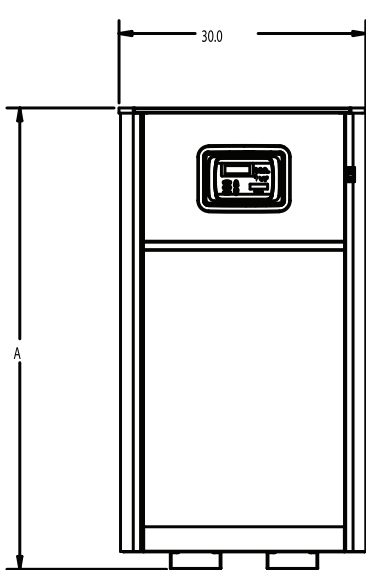
Please consult latest edition of the Installation Manual for detail venting information and maximum/minimum venting distances.

# Commercial Gas Boilers

VB MODELS - FLOW, HEAD LOSS AND TEMPERATURE RISE																										
Model	Input Rating Btu/hr	Output Rating Btu/hr	20F° (11°C) $\Delta T$				30F° (17°C) $\Delta T$				40F° (22°C) $\Delta T$				Maximum Flow Rate					Minimum Flow Rate						
			GPM	LPH	$\Delta P$ FT	$\Delta P$ M	GPM	LPH	$\Delta P$ FT	$\Delta P$ M	GPM	LPH	$\Delta P$ FT	$\Delta P$ M	GPM	LPH	$\Delta P$ FT	$\Delta P$ M	$\Delta T$ °F	$\Delta P_m$	GPM	LPH	$\Delta P$ FT	$\Delta P$ M	$\Delta T$ °F	$\Delta P_m$
VB-500	500,000	421,500	42	159	1.8	0.5	28	106	1.3	0.4	21	79	1	0.3	100	379	3.8	1.2	8	4	21	79	1	0.3	40	22
VB-750	750,000	633,750	63	238	2.9	0.9	42	159	2.1	0.6	32	121	1.8	0.5	110	416	4.3	1.3	12	7	32	121	1.8	0.5	40	22
VB-1000	1,000,000	845,000	85	322	3.9	1.2	56	212	2.8	0.9	42	159	2.3	0.7	120	454	4.9	1.5	14	8	42	159	2.3	0.4	40	22

**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.

Dimensions and Shipping Weights				
Model #	A	B	C	Approx. Shipping Weight (Lbs.)
VB-500	56	36	45	450
VB-750	62	42	51	575
VB-1000	71	48	59	750



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.



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### 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 ASME Pressure Relief Valve. 3) The boiler(s) shall be design-tested and certified to the ANSI Z21.13 standard and approved by CSA International. 4) Meet or exceed the SCAQMD Rule 1146.2 for low-NOx emissions and air quality standards.

The heat exchanger shall: 1) Incorporate a vertical straight tube 2 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 AL29-4C 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 and include gas pressure regulator, manual gas cock, redundant safety gas valve, operating control valve, and plugged pressure test tapings. 9) The ASME rated pressure relief 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: 1) The boiler manufacturer must supply complete factory start-up by a factory approved start-up agent.

The boiler shall comply with ASHRAE/IESNA 90.1-1999 standards.

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.

**For Technical Information and Automated Fax Service, call 800-527-1953.**

A. O. Smith reserves the right to make product changes or improvements without prior notice.