



# Boiler Product Line Brochure



DESIGNED ★ ENGINEERED ★ ASSEMBLED

**USA**



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**Please contact 877-554-5544**

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**615-889-8900/F: 615-547-1000**

**[www.Lochinvar.com](http://www.Lochinvar.com)**

From the Solution™ to the CREST®, Lochinvar Boilers are noted for their range of benefits and application flexibility. Collectively, they represent the most complete product line in the industry. From a company with a long history of innovation and a reputation for excellence.

You'll find there's a Lochinvar product for any application imaginable – from standard residential units to state-of-the-art commercial products. And with selection, comes opportunity.

In fact, the diversity and performance of our product line is surpassed only by its quality—in design, construction, and training. A commitment that is reinforced by the Lochinvar Tech Center, Lochinvar U, a state-of-the-art testing and training facility equipped with the very latest in CAD/CAM technology and a comprehensive R&D lab.

Quality, efficiency, features, service, and selection. For more than 90 years, these have been the hallmarks of Lochinvar products.

Lochinvar...The innovator in boiler technology.



This emblem means a product has a NOx rating which exceeds the requirements of the South Coast Air Quality Management District and Texas Commission of Environmental Quality.



This emblem means the Stack Frame is available for use with that product. See page 31 for details.

This catalog is designed to provide a convenient, condensed overview of the entire Lochinvar boiler product line. For a complete list of features, specifications and technical data on a particular product, see the full line catalog, your local distributor or contact Lochinvar. Every Lochinvar product is designed and built to meet or exceed the fuel efficiency and safety standards of one or more of these agencies, wherever applicable.



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## 96.2% Thermal Efficiency

With the exclusive “Wave” fire-tube design, advancements in Lochinvar combustion technology and the SMART TOUCH™ control, CREST changed how the industry thinks about fire-tube boilers. Now, six new CREST boilers, with 750,000, 1.0 million, 1.25 million, 1.5 million, 1.75 million and 2.0 million Btu/hr inputs, deliver 96.2% thermal efficiency.

## The Crest Combustion System



CREST boilers are equipped with a top-mounted micro-metal fiber burner, engineered specifically for fire-tube technology. The system is designed to ensure smooth, quiet modulating combustion from as low as 4% of maximum firing rate up to 100% as the heating load increases. And in multi-boiler applications, modulation is an essential element in cascade sequencing, which helps ensure maximum efficiency and long-term reliability.

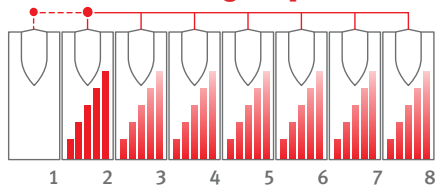
## Reduce Installation Costs with Variable Flow Technology

CREST can operate over a wide range of flow rates with very low pressure drop. This permits installation of a full flow (variable primary) system. Installation is streamlined, without the time and materials cost of primary/secondary piping, and pumps needed to maintain flow in a water-tube boiler. Variable flow also makes CREST more flexible at handling frequent fluctuations in the system flow rate.

## Smooth-Running, Modulating Combustion

With up to 25:1 Modulation Turndown, CREST automatically changes the firing rate as building heat loads vary. An FBN-2001 fires at its maximum 2,000,000 Btu/hr rate when the heat load is highest, and then gradually turns down to as low as 4% (80,000 Btu/hr) as the load decreases. A modulating system runs smoothly and efficiently, without frequent on/off cycling. When the system is zoned, CREST’s high turndown works to match the actual system demand. In return, CREST reduces the customer’s fuel bill and provides better comfort by load-matching the heat loss of the system.

## Built-in Cascading Sequencer



Cascade Redundancy provides peace of mind because it helps ensure that a CREST boiler system will always deliver reliable performance with no downtime. If the lead boiler is turned off for maintenance, Cascade Redundancy automatically shifts the lead role to the second sequenced boiler. Up to eight CREST boilers can be sequenced using a 2-wire daisy chain connection. Cascade sequencing can be programmed for Lead-Lag or Efficiency Optimized operation.

With Lead-Lag operation, one lead boiler modulates to capacity on demand. As the load increases, the system then cascades to additional lag boilers in sequence. The first-on role shifts daily, distributing equal runtimes to each unit.

In an Efficiency Optimized system, all boilers fire and modulate simultaneously at the same Btu/hr input rates, maximizing thermal efficiency.



## Unequaled Control and Monitoring

Crest features the next generation of Lochinvar’s all-in-one SMART TOUCH operating control with the integration of the CON·X·US® advanced technology. SMART TOUCH with CON·X·US provides outstanding functionality and can be integrated directly into building automation systems via Modbus or BACnet MSTP as standard equipment.

And now, the CON·X·US mobile communication platform allows SMART TOUCH to go where no other boiler has gone before. CON·X·US provides the ability to monitor and manage multiple Crest boiler plants without ever stepping into mechanical rooms.



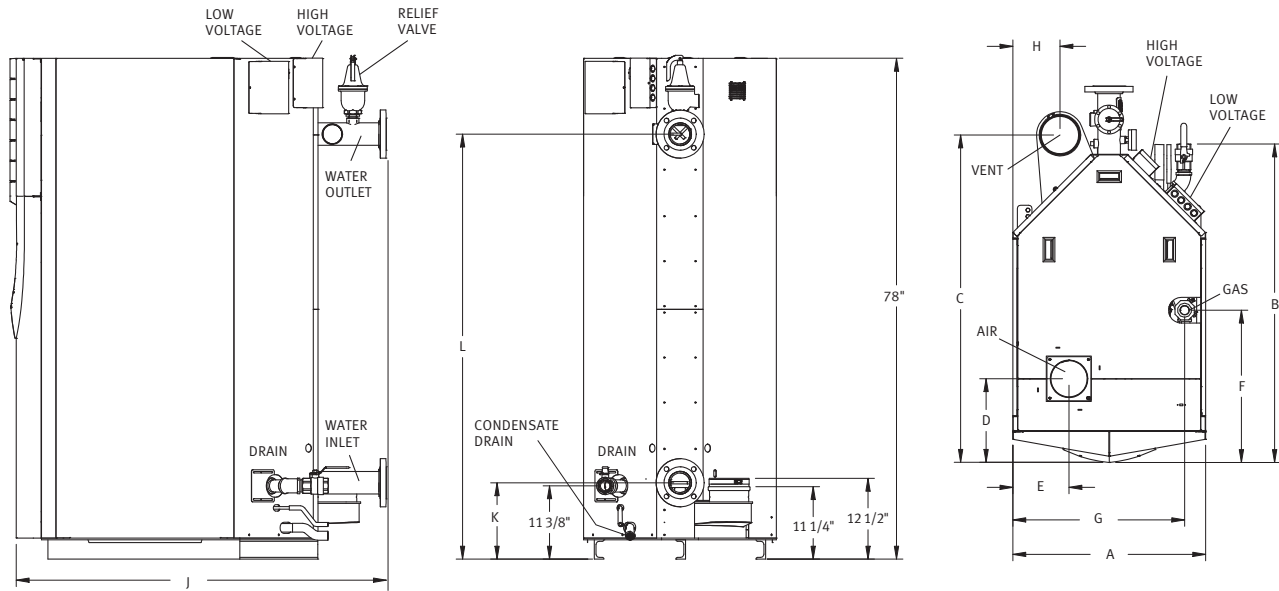
96.2% ARI  
THERMAL EFFICIENCY





# CREST® Boiler Dimensions & Specifications

CONDENSING BOILER  
**CREST**®



Model Number	Input MBH		AHRI Thermal Efficiency	Output MBH	Net AHRI Rating MBH	Turndown	A	B	C	D	E	F	G	H	J	K	L	Water Gas Conn.	Inlet/Outlet	Air Intake	Vent Size	Oper. Weight	Ship. Wt. (lbs)
	Min	Max																					
FBN0751	50	750	96.2%	722	627	15:1	30"	49-1/2"	51"	13"	8-3/4"	23-3/4"	26-3/4"	7-3/8"	57-5/8"	11-7/8"	66-1/8"	1-1/4"	3"	6"	6"	1,768	1,560
FBN1001	50	1,000	96.2%	962	837	20:1	30"	49-1/2"	51"	13"	8-3/4"	23-1/8"	26-3/4"	6-1/2"	57-5/8"	11-7/8"	66-1/8"	1-1/4"	3"	6"	6"	1,838	1,596
FBN1251	63	1,250	96.2%	1,203	1,046	20:1	30"	49-1/2"	51-3/8"	13"	8-3/4"	21-5/8"	26-3/4"	6-1/2"	57-3/4"	11-7/8"	66-1/8"	1-1/4"	3"	6"	8"	1,975	1,648
FBN1501	60	1,500	96.2%	1,443	1,255	25:1	30"	59-1/4"	62-3/8"	15-7/8"	9"	27-7/8"	26-7/8"	5-1/8"	68"	12-3/8"	65-3/8"	1-1/2"	4"	8"	8"	2,307	1,961
FBN1751	70	1,750	96.2%	1,684	1,464	25:1	30"	58-3/4"	61-1/2"	15-7/8"	9"	27-1/8"	27"	5-1/8"	68"	12-3/8"	65-3/8"	1-1/2"	4"	8"	8"	2,458	2,017
FBN2001	80	1,999	96.2%	1,924	1,673	25:1	30"	58-3/4"	61-1/2"	15-7/8"	9"	26-3/4"	27"	5-1/8"	68"	12-3/8"	65-3/8"	1-1/2"	4"	8"	8"	2,570	2,087

NOTES: Change "N" to "L" for LP gas models. Indoor installation only. \*Information subject to change without notice

## SMART TOUCH™ FEATURES

- CON-X-US® Remote Connect
- SMART TOUCH Touchscreen Operating Control
- Full-Color 8" Touchscreen LCD Display
- Built-in Cascading Sequencer for up to 8 Boilers with Built-in Redundancy
  - › Cascade Multiple Sized Boilers
  - › Lead/Lag Cascade
  - › Efficiency Optimized Cascade
- Front-End Loading Capability with Copper-Fin II® and Power-Fin® Boilers
- Building Management System Integration with 0-10 VDC Input
- BACnet MSTP and Modbus Communications
- Outdoor Reset Control with Outdoor Air Sensor
- Password Security
- Domestic Hot Water Prioritization
  - › DHW tank piped with priority in the boiler loop
  - › DHW tank piped as a zone in the system with the pumps controlled by the Smart System
  - › DHW Modulation Limiting
  - › Separately Adjustable SH/DHW Switching Times
- Low Water Flow Safety Control & Indication
- Inlet & Outlet Temperature Readout
- Freeze Protection
- Service Reminder
- Time Clock
- Data Logging
  - › Hours Running, Space Heating
  - › Hours Running, Domestic Hot Water
  - › Hours Running, Modulation Rate
  - › Ignition Attempts
  - › Last 10 Lockouts
- Programmable System Efficiency Optimizers
  - › Night Setback
  - › Anti-Cycling
  - › Outdoor Air Reset Curve
  - › Ramp Delay
  - › Boost Temperature & Time
  - › Modulation Factor Control

## Three Pump Control

- › System Pump
- › Boiler Pump
- › Domestic Hot Water Pump

## High-Voltage Terminal Strip

- › 120 VAC / 60 Hertz / 1 Phase Power Supply
- › System Pump, Boiler Pump and DHW Pump Power

## Low-Voltage Terminal Strip

- › 24 VAC Auxiliary Device Relay
- › Auxiliary Proving Switch Contacts
- › Alarm on Any Failure Contacts
- › Runtime Contacts
- › DHW Thermostat Contacts
- › Unit Enable/Disable Contacts
- › System Sensor Contacts
- › DHW Tank Sensor Contacts
- › Outdoor Air Sensor Contacts
- › Cascade Contacts
- › 0-10 VDC BMS External Control Contact
- › 0-10 VDC Variable Speed Boiler Pump Control Contact

## OPTIONAL EQUIPMENT

- Wireless Outdoor Temperature Sensor
- Alarm Bell
- BMS Gateway - BACnet IP or LonWorks
- Condensate Neutralization Kit
- Common Vent Kits
- Electrical Options (Shipped Loose):
  - › 208V/3Ø/60Hz
  - › 480V/3Ø/60Hz
  - › 600V/3Ø/60Hz
- Motorized Isolation Valve
- Variable Speed Boiler Pump
- Gas Regulator

## CODES & REGISTRATIONS

- ANSI Z21.13/CSA Certified
- ASME Certified, "H" Stamp / National Board
- California Code Compliant
- CSD1 / Factory Mutual / GE Gap Compliant
- AHRI Certified
- Canadian Registration Number (CRN)

## STANDARD FEATURES

- 96.2% Thermal Efficiency (AHRI)
- Up to 99% Thermal Efficiency in Low-Temp. Applications
- Modulating Burner with up to 25:1 Turndown
- Direct-Spark Ignition
- Low-NOx Operation
- Sealed Combustion
- Air Inlet Filter w/Replacement Reminder
- Low Gas Pressure Operation
- Vertical and Horizontal Direct Venting
  - › Direct Vent up to 100 Feet
  - › PVC, CPVC, Polypropylene or AL29-4C
- ASME "H" Stamped Heat Exchanger
- 316L Stainless Steel Fire Tubes
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Low Water Cutoff with Manual Reset & Test
- High & Low Gas Pressure Switches w/Manual Reset
- Low Air Pressure Switches
- Condensate Trap w/Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High-Voltage Terminal Strip
- Low-Voltage Terminal Strip
- Downstream Gas Test Cocks
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

# CREST<sup>®</sup> CONDENSING BOILER

## Up to 93% Thermal Efficiency

Lochinvar<sup>®</sup> has taken the fire-tube concept in an innovative direction with the CREST<sup>®</sup> modulating-condensing boiler. With sizes that range from 2.5 to 5.0 million Btu/hr, you have the opportunity to utilize Lochinvar leading-edge technology in your largest applications. With thermal efficiencies up to 99% in low water temperature applications, CREST is positioned to provide exceptional energy-saving performance.

The advanced CREST introduces a combustion system with a unique burner design with up to 20:1 turndown. The burner fires into an array of 316L stainless steel fire-tubes that transfer the heat to the surrounding water with exceptionally high efficiency.

CREST communicates seamlessly and in real time with building management systems by utilizing an on-board Modbus protocol and BACnet MSTP. The SMART TOUCH control with CON·X·US<sup>®</sup> has a built-in cascading component that communicates with up to eight units, providing total command without an external control or complex and expensive control logic programming by the BMS integrator.

With the added feature of CON·X·US remote connectivity, the CREST boiler can be monitored from anywhere even if your building does not have a building management system. Innovative fire-tube boiler technology integrated with our SMART TOUCH™ operating control makes CREST a genuine game-changer among commercial boilers.

## Advanced Negative Regulation Technology

CREST safely and reliably operates with supply gas pressure as low as 4 inches water column. Because Negative Regulation (Neg/Reg) technology draws fuel gas into a pre-mix combustion system instead of relying on utility pressure through the gas valve, operation is steady in low gas pressure systems or when peak demands occur on supply lines. Plus, Neg/Reg automatic fan speed control fine-tunes the correct fuel/air ratio entering the burner, providing even, consistent combustion for a cleaner burning flame achieving high combustion efficiency.

## Fully Modulating up to 20:1 Turndown

20:1 turndown means the burner can fire at a rate as low as 5% of its maximum input. For example, a 2.5 million Btu/hr CREST unit can modulate from 125,000 up to 2,500,000 Btu/hr depending on demand. High turndown greatly reduces “short cycling” when demand is low. All boiler systems are designed to provide enough heat to maintain a facility’s heat loss on the coldest days. When the system is zoned, the CREST’s high turndown works to match the actual system demand and, in return, reduces the customer’s fuel bill and provides better comfort by load matching the heat loss of the system. Greater seasonal efficiencies will be realized due to the extremely large turndown offered by CREST.

## As Low As 25 GPM\* to Full 350 GPM Flow Rates

CREST allows system designers tremendous flexibility to vary the flow rate through the boiler. It can service systems that operate with widely fluctuating flow rates depending on demand. CREST can be installed with primary/secondary piping or in a full-flow arrangement. Typical design techniques include full-flow systems or variable flow systems using variable frequency drives on the heating water pumps. In either case, CREST excels in these applications and allows the flow through the boiler to vary based on system demand. \* 25 GPM min. flow on FB2500 model, 50 GPM on FB5000 model.

## Built-in Cascading Sequencer

Sequences up to an 8-boiler system using simple 2-wire daisy chain connection, eliminating cost and uncertainty of a separate “third party” sequencer. On demand, one boiler functions as the leader and modulates to capacity. Increasing load then “cascades” to additional “lag” boilers in sequence as needed. Lead-lag rotation shifts “first on” boiler role every 24 hours, distributing equal lead-lag runtimes to each unit.

## Boiler Control from Anywhere

Crest features the next generation of Lochinvar’s all-in-one SMART TOUCH operating control with the integration of the CON·X·US advanced technology. SMART TOUCH with CON·X·US provides outstanding functionality, and can be integrated directly into building automation systems via Modbus and BACnet MSTP as standard equipment.

And now, the CON·X·US mobile communication platform allows the SMART TOUCH to go where no other boiler has gone before. CON·X·US provides the ability to monitor and manage multiple Crest boiler plants without ever stepping into the mechanical rooms.

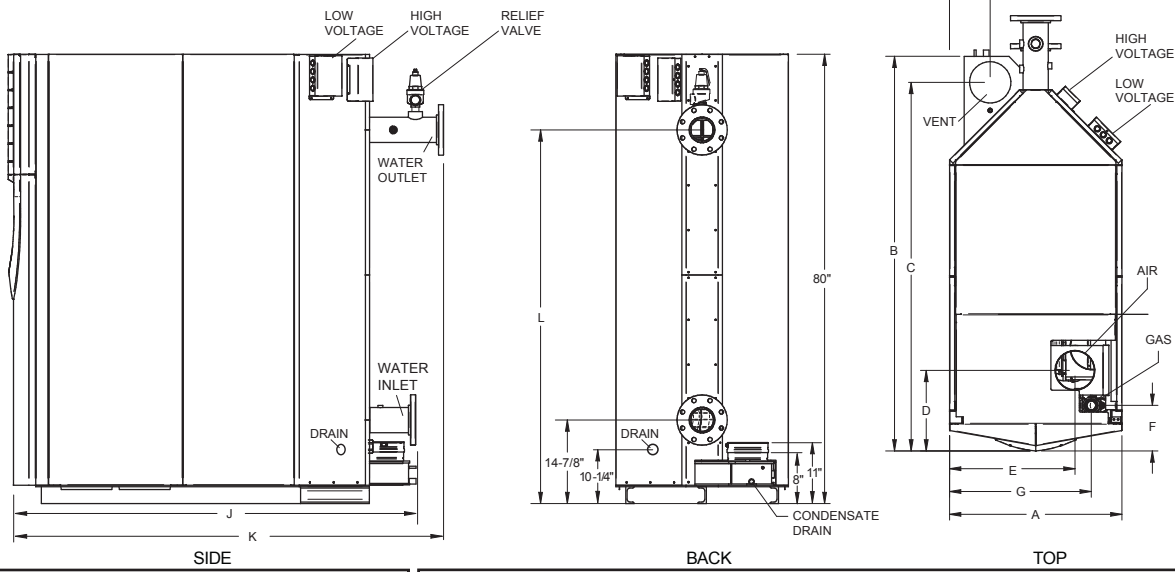


UP TO 93% ARI  
THERMAL EFFICIENCY



# CREST® Boiler Dimensions & Specifications

CONDENSING BOILER  
**CREST**



CREST HEATING BOILER							DIMENSIONS AND SPECIFICATIONS														
Model Number	Input MBH	Input MBH	AHRI Thermal Efficiency	NET AHRI Output MBH	NET AHRI Rating MBH	Turndown	A	B	C	D	E	F	G	H	J	K	Gas Conn.	Air Inlet	Vent Size	Oper. Wt. (lbs)	Ship Wt. (lbs)
FBN2500	125	2,500	92.0%	2,300	2,000	20:1	34-1/4"	76-3/8"	70-1/4"	17-3/4"	26-1/8"	9-3/4"	27-3/8"	11-3/8"	78"	83"	2"	8"	9"	3,652	2,560
FBN3000	150	3,000	92.0%	2,760	2,400	20:1	40-1/2"	83-5/8"	76-3/8"	17-3/8"	31-3/8"	9-7/8"	34-3/4"	11-1/2"	82-1/8"	87-1/8"	2"	10"	10"	4,126	2,920
FBN3500	200	3,500	92.0%	3,220	2,800	18:1*	40-1/2"	83-1/4"	75-5/8"	17-1/4"	31-3/8"	9-7/8"	34-3/4"	12-7/8"	81-1/8"	86-1/8"	2"	10"	10"	4,744	3,225
FBN4000	335	4,000	93.0%	3,720	3,235	12:1	53-1/2"	109"	100-3/4"	31-1/4"	40-3/4"	14-1/2"	45-3/4"	12-3/4"	104-1/2"	108-1/4"	2-1/2"	12"	12"	6,900	4,750
FBN5000	500	5,000	93.0%	4,650	4,043	10:1	53-1/2"	107"	100-3/4"	28"	40-3/4"	11"	45-1/2"	12-3/4"	104"	108-1/4"	2-1/2"	14"	14"	8,000	5,550
FBN6000	600	6,000	92.0%	5,520	4,799	10:1	53-1/2"	107"	100-3/4"	28"	40-3/4"	11"	45-1/2"	9"	104"	108-1/4"	2-1/2"	14"	14"	8,100	5,650

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models. For Low NOx on FB2500 - FB5000 models, consult factory.

\*Turndown rate reduced on LP gas model.

## SMART TOUCH™ FEATURES

- CON-X-US Remote Connect**
- SMART TOUCH Touchscreen Operating Control**
- Full-Color 8" Touchscreen LCD Display**
- Built-in Cascading Sequencer for up to 8 Boilers**
  - Cascade Multiple Sized Boilers
  - Lead/Lag Cascade
  - Efficiency Optimized Cascade
- Front-End Loading Capability with Copper-Fin II and Power-fin Boilers**
- Building Management System Integration with 0-10 VDC Input**
- BACnet MSTP and Modbus Communications**
- Outdoor Reset Control with Outdoor Air Sensor**
- Password Security**
- Domestic Hot Water Prioritization**
  - DHW tank piped with priority in the boiler loop
  - DHW tank piped as a zone in the system with the pumps controlled by the Smart System
  - DHW Modulation Limiting
  - Separately Adjustable SH/DHW Switching Times
  - Low Water Flow Safety Control & Indication
  - Inlet & Outlet Temperature Readout
  - Freeze Protection
  - Service Reminder
  - Time Clock
- Data Logging**
  - Hours Running, Space Heating
  - Hours Running, Domestic Hot Water
  - Hours Running, Modulation Rate
  - Ignition Attempts
  - Last 10 Lockouts
- Programmable System Efficiency Optimizers**
  - Night Setback
  - Anti-Cycling
  - Outdoor Air Reset Curve
  - Ramp Delay
  - Boost Temperature & Time
- Three Pump Control**
  - System Pump
  - Boiler Pump
  - Domestic Hot Water Pump

## High-Voltage Terminal Strip

- > 120 VAC / 60 Hertz / 1 Phase Power Supply (FB2500-3500)
- > 208 VAC / 60 Hertz / 3 Phase Power Supply (FB4000-5000)
- > System Pump, Boiler Pump and DHW Pump Power

## Low-Voltage Terminal Strip

- > 24 VAC Auxiliary Device Relay
- > Auxiliary Proving Switch Contacts
- > Alarm on Any Failure Contacts
- > Runtime Contacts
- > DHW Thermostat Contacts
- > Unit Enable/Disable Contacts
- > System Sensor Contacts
- > DHW Tank Sensor Contacts
- > Outdoor Air Sensor Contacts
- > Cascade Contacts
- > 0-10 VDC BMS External Control Contact

## STANDARD FEATURES

- Up to 93% Thermal Efficiency (AHRI)
- Up to 99% Thermal Efficiency in Low Temperature Applications
- Modulating Burner with up to 20:1 Turndown
- Direct-Spark Ignition
- Sealed Combustion
- Low Gas Pressure Operation
- Vertical or Horizontal Venting
- Category IV Venting up to 100 Feet
- ASME "H" Stamped Heat Exchanger
- 316L Stainless Steel Fire Tubes
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Low Water Cutoff with Manual Reset & Test
- High & Low Gas Pressure Switches w/Manual Reset
- Low Air Pressure Switches
- Condensate Trap w/ Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors

## High Voltage Terminal Strip

- Low Voltage Terminal Strip
- Downstream Gas Test Cocks
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

## OPTIONAL EQUIPMENT

- Alarm Bell
- BMS Gateway - BACnet IP or LonWorks
- Condensate Neutralization Kit
- Common Vent Damper
- Dual Fuel Gas Train
- Electrical Options (Shipped Loose):
  - > 208V/3Ø/60Hz (Models FB2500-3500 only)
  - > 480V/3Ø/60Hz
  - > 600V/3Ø/60Hz
- Motorized Two Way Valve
- Variable Speed Boiler Pump
- Gas Regulator
- Inline Air Filter

## CODES & REGISTRATIONS

- ANSI Z21.13/CSA Certified
- ASME certified, "H" Stamp / National Board
- California Code Compliant
- CSD1 / Factory Mutual / GE Gap Compliant
- Canadian Registration Number (CRN)
- AHRI Certified

U.S. Patent # 8,286,594



# FTXL™ FIRE TUBE BOILER

## The New 98% Standard

Lochinvar re-defined the fire-tube boiler category with its KNIGHT® Wall-Mount and CREST® lines. For residential and light commercial applications, the FTXL™ adds models from 399,999 to 850,000 Btu/hr, and takes Lochinvar's fire-tube technology to the next level. FTXL offers best-in-class AHRI Thermal Efficiency and footprints, plus remote connectivity that puts the SMART SYSTEM™ control at your fingertips, anywhere!

## Reduce Installation Cost with Variable Flow Technology

FTXL can operate over a wide range of flow rates with very low pressure drop. This permits installation of a "full flow" (variable primary) system eliminating the time and materials cost of primary/secondary piping, and pumps needed to maintain flow in a water-tube boiler. Variable flow also makes FTXL more flexible at handling frequent fluctuations in the system flow rate.

## Smooth-Running, Modulating Combustion

FTXL boilers have a top-mounted, micrometal fiber burner, with a blower/gas valve assembly that drives heat energy downward, through stainless steel fire tubes, with exhaust venting through the bottom of the unit. With up to 10:1 modulation turndown, the burner automatically changes its firing rate as building heat loads vary. An FTX500 fires at its maximum 500,000 Btu/hr rate when heat load is highest, then gradually "turns down" to as low as 10% (50,000 Btu/hr) as load decreases. A modulating system runs smoothly and efficiently, without frequent on/off cycling.

## Minimum Supply Pressure, Installer-Friendly

FTXL operates with supply gas pressure as low as 4 inches water column. *Negative Regulation* draws gas into a pre-mix combustion system, instead of relying on utility pressure through the gas valve. The result is steady operation in low gas pressure systems or when peak demand occurs on gas supply. Automatic fan speed control fine-tunes the correct fuel/air ratio entering the burner, providing superior combustion throughout the entire operating range.

## Cascade Sequencing

Up to eight FTXL boilers can be sequenced using a 2-wire daisy chain connection. Cascade sequencing can be programmed for "Lead-Lag" or "Efficiency Optimized" operation. With Lead-Lag operation, one lead boiler modulates to capacity on demand. As load increases, the system then cascades to additional lag boilers in sequence. The first-on role shifts daily, distributing equal runtimes to each unit. In an Efficiency Optimized system, all boilers fire and modulate simultaneously at the same BTU/hr input rates, maximizing thermal efficiency.



UP TO 98% AHRI THERMAL EFFICIENCY



## Boiler Plant Control, from Anywhere



FTXL features the next generation of Lochinvar's all-in-one SMART SYSTEM operating control with a re-designed multi-color LCD interface. SMART SYSTEM provides outstanding functionality, and can be integrated directly into a building automation system via ModBus and other communications protocols. And now, the CON·X·US mobile communication platform allows SMART SYSTEM to go where no other boiler has gone before.†

CON·X·US provides the ability to monitor and manage multiple



FTXL boiler plants without ever stepping into the mechanical room. CON·X·US will send alerts via text or e-mail notifying of changes in system status, and anytime, from anywhere, a user can check system status and re-program any boiler function.

Once downloaded, the free CON·X·US mobile application allows for remote access to all SMART SYSTEM functions using any Internet-capable device.



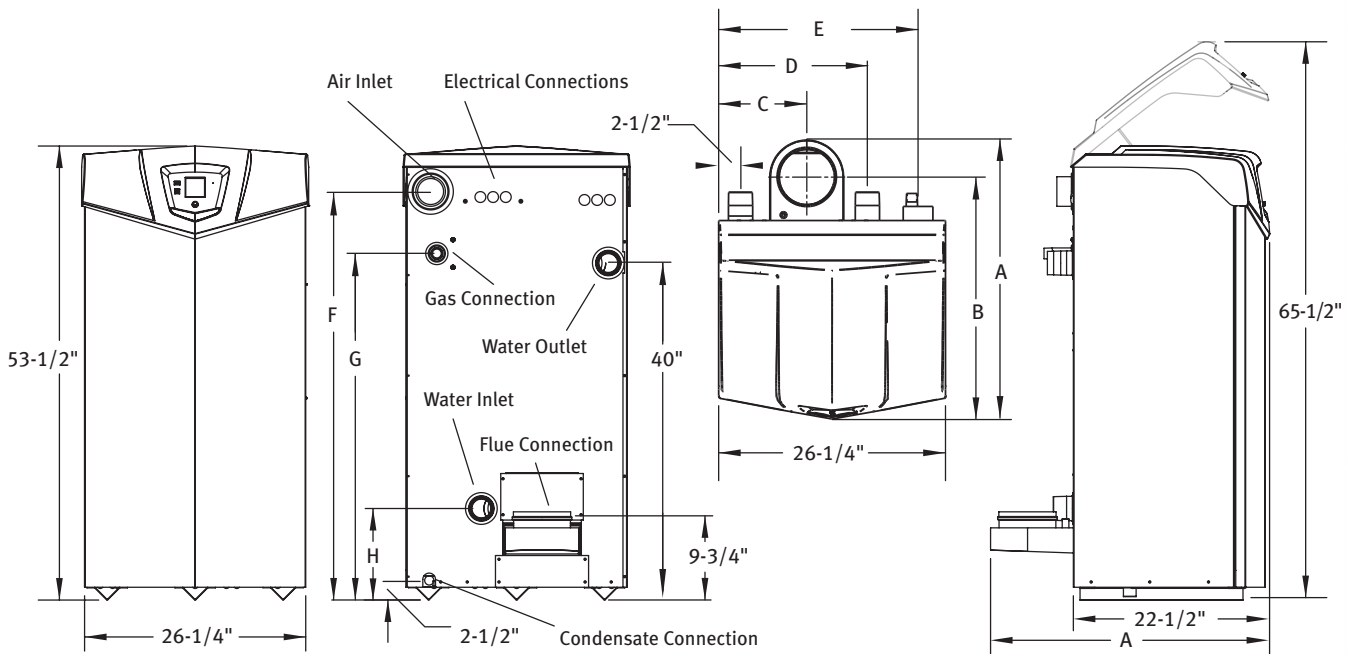
ANDROID APP ON Google play

Download on the App Store

†CON·X·US control board sold separately.



# FTXL™ Boiler Dimensions & Specifications



Model Number	Input Min MBH	Input Max MBH	AHRI Thermal Efficiency	Output MBH	NET AHRI Rating MBH	Turn down	Flow (GPM) Min	Flow (GPM) Max	HEX Water Volume	A	B	C	D	E	F	G	H	Water Conn.	Vent Size	Air Intake	Gas Conn.	Ship Wt. (lbs)
FTX400(N,L)	40.0	399.9	98.0%	392	341	10:1	10	105	13	30-1/2"	27-1/2"	10-1/4"	17"	23-1/4"	46-1/4"	39-1/2"	10-3/4"	2"	4"	4"	1"	435
FTX500(N,L)	50.0	500.0	97.7%	489	425	10:1	15	105	12	30-1/2"	27-1/2"	10-1/4"	17"	23-1/4"	46-1/4"	39-1/2"	10-3/4"	2"	4"	4"	1"	460
FTX600(N,L)	85.0	600.0	97.5%	585	509	7:1	15	105	12	30-1/2"	27-1/2"	10-1/4"	17"	23-1/4"	46-1/4"	39-1/2"	10-3/4"	2"	4"	4"	1"	470
FTX725(N,L)	103.5	725.0	97.2%	705	613	7:1	20	150	17	33"	28-1/2"	10-1/2"	17-1/2"	23-1/2"	48-1/2"	41-1/4"	11"	2-1/2"	6"	4"	1"	510
FTX850(N,L)	121.5	850.0	97.0%	825	717	7:1	25	150	16	33"	28-1/2"	10-1/2"	17-1/2"	23-1/2"	48-1/2"	41-1/4"	11"	2-1/2"	6"	4"	1"	535

\*Information subject to change without notice  
Dimensions are in inches. Select "N" or "L" for Natural or LP gas

## SMART SYSTEM FEATURES

- ▶ **Smart System Digital Operating Control**  
Multi-Color Graphic LCD Display w/Navigation Dial
- ▶ **Loch-N-Load USB Thumb Drive Port for Easy Programming**
- ▶ **Cascading Sequencer with Built-in Redundancy**  
Selectable Cascade Type:  
Lead Lag/Efficiency Optimization  
Multiple Size Boilers  
Front-End Loading
- ▶ **3 Reset Temperatures Inputs w/Independent Outdoor Reset Curves for Each**  
Outdoor Sensor
- ▶ **Four-Pump Control**  
System Pump with Parameter for Continuous Operation  
Boiler Pump with Variable-Speed Control  
Domestic Hot Water Boiler Pump  
Domestic Hot Water Recirculation Pump Control with Sensor
- ▶ **Building Management System Integration**  
0-10 VDC Input to Control Modulation or Setpoint  
0-10 VDC Input from Variable-Speed System Pump  
0-10 VDC Modulation Rate Output Signal  
0-10 VDC Enable/Disable Signal
- ▶ **Programmable System Efficiency Optimizers**  
Space Heating Night Setback  
DHW Night Setback  
Anti-Cycling  
Ramp Delay  
Boost Time and Temperature
- ▶ **High-Voltage Terminal Strip**  
120 VAC/60 Hertz/1 Phase  
Pump Contacts for 3 Pumps

- ▶ **Low-Voltage Terminal Strip**  
Building Recirculation Pump Start/Stop  
Proving Switch Contacts  
Flow Switch Contacts  
Alarm Contacts  
Runtime Contacts  
3 Space Heat Thermostat Contacts  
Tank Thermostat Contacts  
System Sensor Contacts  
Tank Sensor Contacts  
Cascade Contacts  
0-10 VDC BMS Contacts  
0-10 VDC Boiler Rate Output Contacts  
0-10 VDC Boiler Pump Speed Contacts  
0-10 VDC System Pump Speed Contacts  
ModBus Contacts
- ▶ **Time Clock**
- ▶ **Data Logging**  
Ignition Attempts  
Last 10 Lockouts  
Space Heat Run Hours  
Domestic Hot Water Run Hours

## STANDARD FEATURES

- ▶ **97%-98% Thermal Efficiency**
- ▶ **Modulating Burner with up to 10:1 Turndown**  
Direct Spark Ignition  
Low NOx Operation  
Sealed Combustion  
Low Gas Pressure Operation
- ▶ **Stainless Steel Fire-Tube Heat Exchanger**  
ASME-Certified, "H" Stamped  
160 psi Working Pressure  
50 psi Relief Valve  
Combustion Analyzer Test Port  
Fully Welded Design
- ▶ **Vertical and Horizontal Direct Vent**  
Direct Vent up to 100 feet  
PVC, CPVC, Polypropylene or AL29-4C  
Factory Supplied Sidewall Vent Termination

- ▶ **Smart System Control**
- ▶ **Other Features**  
On/Off Switch  
Adjustable High Limit with Manual Reset  
Automatic Reset High Limit  
Manual Reset Low Water Cutoff  
Flue Temperature Sensor  
Low Air Pressure Switch  
Temperature and Pressure Gauge  
Condensate Trap  
Zero Service Clearances  
10-Year Limited Warranty (See Warranty)  
Custom Maintenance Reminder with Contact Info  
Password Security  
Customizable Freeze Protection Parameters

## OPTIONAL EQUIPMENT

- CON-X-US Remote Connect
- Motorized Isolation Valve
- Wireless Outdoor Sensor
- Multi-Temperature Loop Control
- Variable-Speed Boiler Circulator
- Constant-Speed Boiler Circulator
- ModBus Communication
- Alarm Bell
- Condensate Neutralization Kit
- Concentric Vent Kit (FTX400-FTX600)
- BMS Gateway to BACnet or LonWorks
- High and Low Gas Pressure Switches w/Manual Reset(FTX500-FTX850)
- ▶ **Firing Controls**  
M9-Standard Construction  
M13-CSD-1/FM/GE Gap (FTX500-FTX850)



## The Smartest Choice for Condensing Boiler Performance

The KNIGHT® XL, engineered with Lochinvar's exclusive SMART SYSTEM™ control and an array of other innovative features, places it far ahead of any commercial heating boiler in its class. It promises and delivers ultimate ease of installation and maintenance. With up to 94% thermal efficiency, low-NOx emissions and a fully modulating burner, it is the best "green choice" for today's environmentally focused market.

Five modulating/condensing stainless steel KNIGHT XL boilers are available with 399,999–800,000 Btu/hr inputs and remarkably small space-saving footprints. All are equipped for direct-vent installation with air intake and exhaust runs up to 100 feet using PVC, CPVC, Polypropylene or AL29-4C vent materials. This range of choices is ideal for light-duty applications such as small hotels, schools and office buildings. For higher-demand applications, up to eight KNIGHT XL units can be installed utilizing the built-in cascading sequencer to deliver up to 6.4 million Btu/hr heating capacity.



### SMART SYSTEM™ Control

SMART SYSTEM provides unequalled control and monitoring functions that are easy to understand and use.

94% THERMAL EFFICIENCY



STACK FRAME



- Multi-Color Graphic LCD Display
- Navigation Dial
- USB Port
- Modbus Capability (Optional)
- DHW Modulation Limiting
- DHW Night Setback
- Controls up to three different setpoint temperatures
- 0-10V Boiler Rate Output
- 0-10V Signal to control variable speed boiler pump
- 0-10V System Pump Signal Input\*
- Heat Demand from 0-10V Input
- Installer to Program Name and Number into the Boiler
- Freeze Protection Parameters Installer Adjustable
- Separately adjustable SH/DHW Switching times\*
- Installer access to BMS and ramp delay settings

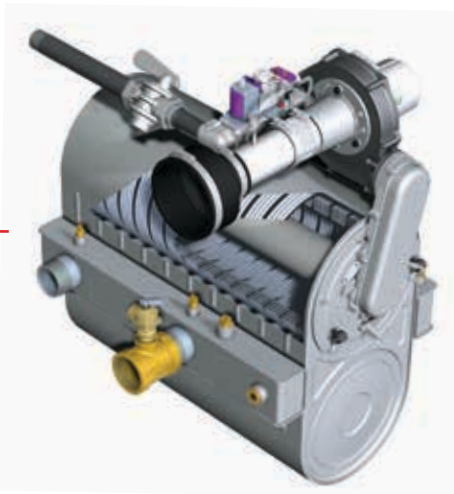
\*Exclusive to Lochinvar Smart System

### Advanced Negative Regulation Technology

KNIGHT XL safely and reliably operates with supply gas pressure as low as 4 inches water column. Negative Regulation (Neg/Reg) technology automatically adjusts fan speed that ensures the correct volume and mix of fuel and air throughout the firing range.

### Two-in-One Stainless Steel Heat Exchanger

A primary heat exchanger combined with a secondary heat exchanger captures flue gas heat and condenses to utilize available latent energy. The stainless steel, pH-tolerant design features a weld-sealed assembly with no O-rings or gaskets and does not require special glycol. ASME Section IV approved and stamped.



### Fully Modulating Burner

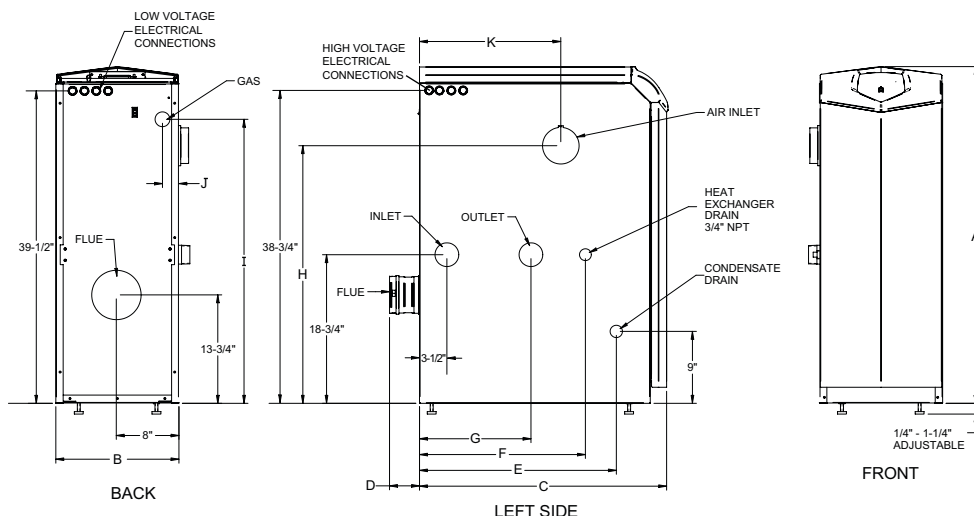
The SMART SYSTEM allows fully modulating combustion with 5:1 turndown. The burner can fire as low as 20% of maximum input and modulates the firing rate up to 100% as demand increases. The burner is a single stainless steel assembly covered with woven steel mesh and fires in a 360° pattern along the entire length of the primary heat exchanger. This allows the compact KNIGHT XL to exceed the capacity of units with larger multiple burners.



### Direct Venting up to 100 Feet

KNIGHT XL offers 7 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. A sidewall vent termination kit is shipped standard with every KNIGHT XL boiler.

# KNIGHT XL® Boiler Dimensions & Specifications



KNIGHT® XL HEATING BOILER						DIMENSIONS AND SPECIFICATIONS															
Model Number	Input Min MBH	Input Max MBH	AHRI Thermal Efficiency	Output MBH	Net AHRI Rating MBH	A	B	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet Size	Vent Size	Ship Wt. (lbs)
KBN400	80	399	94.0%	376	327	42-1/2"	15-1/2"	27-3/4"	3-3/4"	20-3/4"	21"	14"	34"	34"	2"	18-3/4"	1"	1-1/2"	4"	4"	280
KBN501	100	500	94.0%	470	409	42-1/2"	15-1/2"	31-1/2"	3-3/4"	25-1/2"	21"	14"	32-1/2"	36"	2"	18"	1"	1-1/2"	4"	4"	310
KBN601	120	600	94.0%	564	490	42-1/2"	15-1/2"	36-1/4"	3-3/4"	25"	21"	14"	36"	32-3/4"	5-1/2"	19-1/2"	1"	2"	4"	4"	340
KBN701	140	700	94.0%	658	572	42-1/2"	15-1/2"	40-1/4"	3-3/4"	29"	23"	17"	36"	32-3/4"	3-1/4"	23-1/2"	1"	2"	4"	6"	370
KBN801	160	800	94.0%	752	654	42-1/2"	15-1/2"	45-1/4"	3-3/4"	33-1/4"	23"	17"	36"	32-3/4"	3-1/4"	27-3/4"	1"	2"	4"	6"	405

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models.

## STANDARD FEATURES

### 94% AHRI Certified Thermal Efficiency

### Modulating Burner with 5:1 Turndown

- > Direct-Spark Ignition
- > Low NOx Operation
- > Sealed Combustion
- > Low Gas Pressure Operation

### ASME Stainless Steel Heat Exchanger

- > ASME Certified, "H" Stamped Gasketless Heat Exchanger
- > 160 psi Working Pressure
- > 50 psi ASME Relief Valve
- > Highly efficient, condensing design

### Vertical & Horizontal Direct-Vent

- > Category IV venting up to 100 feet
- > PVC, CPVC, Polypropylene or AL29-4C Venting up to 100 Feet
- > Factory Supplied Sidewall Vent Termination

### Smart System™ Control

#### Other Features

- On/Off Switch
- Adjustable High Limit w/ Manual Reset
- Automatic Reset High Limit
- Flow Switch
- Flue Temperature Sensor
- Low Air Pressure Switch
- Temperature & Pressure Gauge
- Adjustable Leveling Legs
- Condensate Trap
- Zero Clearances to Combustible Material
- 10 Year Limited Warranty (See Warranty)

## SMART SYSTEM FEATURES

### SMART SYSTEM Digital Operating Control

- > Multi-Colored Graphic LCD Display w/ Navigation Dial
- > Three Reset Temperature Inputs with curves for three set point temperature inputs

### Built in Cascading Sequencer for up to 8 Boilers

- Multiple Size Boiler Cascade
- Lead Lag
- Efficiency Optimization
- Front End Loading with Copper-Fin II®

### Outdoor Reset Control with Outdoor Air Sensor Programmable System Efficiency Optimizers

- > Night Setback
- > DHW Night Setback
- > Anti-Cycling
- > Outdoor Air Reset Curve
- > Ramp Delay
- > Boost Temperature & Time

### Three Pump Control

- > System Pump With Parameter for Continuous Operation
- > Boiler Pump With Variable Speed Pump Control
- > Domestic Hot Water Pump

### Domestic Hot Water Prioritization

- > DHW tank piped with priority in the boiler loop
- > DHW tank piped as a zone in the system with the pumps controlled by the Smart System
- > DHW Modulation Limiting
- > Separately Adjustable SH/DHW Switching Times\*

### Building Management System Integration

- > 0-10 VDC Input to Control Modulation or Set Point
- > 0-10 VDC Input Signal from Variable Speed System Pump\*
- > 0-10 VDC Modulation Rate Output
- > 0-10 VDC Input to Enable/Disable call for heat
- > Access to BMS Settings through Display

### High Voltage Terminal Strip

- > 120 VAC / 60 Hertz / 1 Phase Power Supply
- > Three sets of Pump Contacts with Pump Relays

### Low Voltage Terminal Strip

- 24 VAC Device Relay
- Proving Switch Contacts
- Flow Switch Contacts
- Alarm on Any Failure Contacts
- Runtime Contacts
- DHW Thermostat Contacts
- 3 Space Heat Thermostat Contacts
- System Sensor Contacts
- DHW Tank Sensor Contacts

### Outdoor Air Sensor Contacts

- Cascade Contacts
- 0-10 VDC BMS External Control Contact
- 0-10 VDC Boiler Rate Output Contacts
- 0-10 VDC Variable Speed System Pump Signal Input
- 0-10 VDC Signal to Control Variable Speed Boiler Pump
- Modbus Contacts

### Time Clock

#### Data Logging

- > Hours Running, Space Heating
- > Hours Running, Domestic Hot Water
- > Ignition Attempts
- > Last 10 Lockouts

### Other Features

- Low Water Flow Safety Control & Indication
- Password Security
- Inlet & Outlet Temperature Readout
- Customizable Freeze Protection Parameters
- Custom Maintenance Reminder with Contractor Info

\*Exclusive feature, available only from Lochinvar

## OPTIONAL EQUIPMENT

- CON-X-US Remote Connect
- Alarm Bell
- Condensate Neutralization Kit
- Concentric Vent Kit (KB400-KB601)
- BMS Gateway - BACnet or LonWorks
- High & Low Gas Pressure Switches w/ Manual Reset (KB501-KB801)
- Modbus Communication
- Multi Temperature Loop Control
- Low Water Cutoff w/Manual Reset & Test
- Boiler Circulation Pump
- Stainless Steel Vent Kits (KB701-KB801)
- Stack Frame
- Variable Speed Boiler Pump
- Wireless Outdoor Sensor

## FIRING CONTROL SYSTEMS

- M9 Standard Construction
- M7 California Code
- M13 CSD1 / FM / GE Gap (KB501-KB801)

Registered under U.S. Patent # 7,824,178



## 2,500,000 to 5,000,000 Btu/hr models

### A Legendary Boiler Has More Than Doubled Its Output



Starting with the introduction of Power-Fin product line in 1986, we were able to provide something that other companies weren't focused on, efficiency and footprint. Now, 30 years later, we are proud to continue that tradition and provide some of the most efficient products on the market.

In 1986, Power-Fin® redefined the industry with its space-saving design, groundbreaking efficiency and venting flexibility. Now we're raising the bar again by more than doubling its maximum input capacity from 2 to 5 million BTU/hr. The Power-Fin's new heat exchanger features an innovative double row of swept fins that

delivers 2.5 times the output of the original model. The Power-Fin continues to offer a space-saving footprint and all models will pass through a 36" wide door.\*



### Enhanced Operating Control

The Power-Fin now offers the industry-best Smart Touch™ 8" LCD full color touchscreen with easy-to-understand infographics. It is equipped with CON·X·US® connectivity that lets you remotely monitor and optimize the performance of the entire boiler plant.



### Burner Modulation Boosts Efficiency and Lowers Costs

With thermal efficiencies up to 87%, Power-Fin boilers feature a 5:1 turndown ratio that will precisely match the firing rates to heating load requirements—at any point from 20% to full firing rate. This results in less equipment cycling for greater efficiency and cost savings.

### Ready for Outdoor Installation

In warm-weather sites where the mechanical room is overcrowded, the Power-Fin can be easily installed either outdoors or on a rooftop. Its optional hood and screen protector make outdoor installation fast and trouble free.

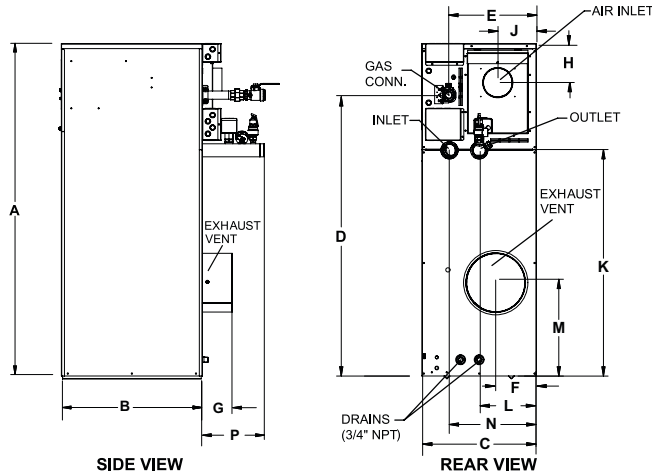
### Venting Solutions

The Power-Fin offers seven venting options for ease of installation and venting flexibility to meet the most challenging installation requirements. The Power-Fin permits air intake and exhaust lengths up to 100 ft, allowing terminations to be horizontal through a sidewall or vertical through a roof. If floor space is limited, the Power-Fin can be installed outdoors with the addition of the outdoor kit.

UP TO 87% THERMAL EFFICIENCY



# Power-Fin® Boiler Dimensions & Specifications



POWER-FIN BOILER					DIMENSIONS AND SPECIFICATIONS						
Model Number	Input MBH	AHRI Thermal Efficiency	Output MBH	Net AHRI Rating MBH	A	B	C	D	E	F	G
PBN2500	2,500	87.0%	2,175	1,891	59"	44-1/2"	29-3/4"	49-3/4"	4"	15"	16"
PBN3000	3,000	87.0%	2,610	2,270	65"	44-1/2"	29-3/4"	55-3/4"	4"	15"	16-1/4"
PBN3500	3,500	87.0%	3,045	2,648	70-1/4"	47-1/4"	29-3/4"	62-1/2"	8-1/4"	15"	16-1/4"
PBN4000	4,000	87.0%	3,480	3,026	79-3/4"	47-1/4"	29-3/4"	68-3/4"	8-1/4"	15"	16-1/4"
PBN5000	5,000	87.0%	4,350	3,783	93-1/4"	46-3/4"	32-3/4"	82-1/4"	10"	17-3/4"	17-1/2"

Model Number	H	J	K	L	M	N	P	Q	Gas Conn.	Air Inlet	Vent Outlet	Ship Wt. (lbs)
PBN2500	9"	20-1/4"	37"	8-3/4"	23"	21-1/4"	12"	N/A	2"	9"	9"	1,470"
PBN3000	9"	20-1/4"	43"	8-3/4"	23"	21-1/4"	12"	N/A	2"	9"	10"	1,550"
PBN3500	9"	20-1/4"	48-1/2"	9"	23"	21-1/4"	12"	N/A	2"	10"	10"	1,696"
PBN4000	10-1/2"	20"	54"	8-3/4"	22-1/4"	21-1/4"	12"	58-1/2"	2-1/2"	10"	12"	1,841"
PBN5000	11"	23-1/2"	65-1/2"	11-1/2"	22"	24"	13-1/4"	69-1/2"	2-1/2"	12"	14"	2,152"

Notes: Change 'N' to 'L' for LP Gas Model. No deration on LP models. All water connections are 2-1/2" \*w/CAT II conversion kit

## STANDARD FEATURES

- 87% Thermal Efficiency (AHRI)
- Modulating Burner with 5:1 Turndown
- Outdoor Ready
- CSD-1 Compliant
- Direct-Spark Ignition
- Low NOx Operation
- Sealed Combustion
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Condensate Trap w/Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High-Voltage Terminal Strip
- Low-Voltage Terminal Strip
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- Low & High Manual Reset Gas Pressure Switches
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

## SMART TOUCH™ FEATURES

- CON-X-US Remote Connect Full-Color 8" Touchscreen LCD Display**
- Built-in Cascading Sequencer for up to 8 Boilers**
  - > Built-in Redundancy
  - > Cascade Multiple Sized Boilers
  - > Lead/Lag Cascade
  - > Efficiency Optimized Cascade
- Front-End Loading Capability with Crest Boilers**
- Building Management System Integration with 0-10 VDC Input**
- Outdoor Reset Control**
- Password Security**
- Domestic Hot Water Prioritization**
  - > DHW tank piped with priority in the boiler loop
  - > DHW tank piped as a zone in the system with the pumps controlled by the Smart System
  - > DHW Modulation Limiting
  - > Separately Adjustable SH/DHW Switching Times
- Low Water Flow Safety Control & Indication**
- Inlet & Outlet Temperature Readout**
- Freeze Protection**
- Service Reminder**
- Time Clock**
- Data Logging**
  - > Hours Running, SH
  - > Hours Running, DHW
  - > Hours Running, Modulation Rate
  - > Ignition Attempts
  - > Last 10 Lockouts

## Programmable System Efficiency Optimizers

- > Night Setback
- > Anti-Cycling
- > Outdoor Air Reset Curve
- > Ramp Delay
- > Boost Temperature & Time
- > Modulation Factor Control
- Three Pump Control**
  - > System Pump
  - > Boiler Pump
  - > Domestic Hot Water Pump
- High-Voltage Terminal Strip**
  - > 240V/60 Hertz/1 Phase Power Supply (PB2500-PB3000)
  - > 208V/60 Hertz/3 Phase Power Supply (PB3500-PB4000)
  - > 480V/60 Hertz/3 Phase Power Supply (PB5000)
  - > System Pump, Boiler Pump and DHW Pump Power
- Low-Voltage Terminal Strip**
  - > 24 VAC Auxiliary Device Relay
  - > Auxiliary Proving Switch Contacts
  - > Alarm on Any Failure Contacts
  - > Runtime Contacts
  - > DHW Thermostat Contacts
  - > Unit Enable/Disable Contacts
  - > System Sensor Contacts
  - > DHW Tank Sensor Contacts
  - > Outdoor Air Sensor Contacts
  - > Cascade Contacts
  - > 0-10V DC BMS External Control Contact
  - > 3 Way Valve Contacts

## OPTIONAL EQUIPMENT

- Alarm Bell
- Outdoor Kit
- Low Temperature Valve
- Motorized Mixing Valve
- BMS Gateway to LON or BACnet IP
- BACnet MSTP Communications
- Modbus Communications
- Cupro-Nickel Heat Exchanger
- Wireless Outdoor Sensor
- Low Water Cutoff w/ Manual Reset & Test
- Electrical Options (shipped loose)
  - > 208V/3PH/60 Hz (PB5000)
  - > 480V/3PH/60 Hz (PB3500-4000)
  - > 600V/3PH/60 Hz (PB3500-4000)

Registered under U.S. Patent # 7,506,617

**POWER-FIN®**  
 2,500,000 - 5,000,000 Btu/hr models

### The Original Boiler Continues to Set the Standard

In 1986, Power-Fin® redefined the industry with its space-saving design, groundbreaking efficiency and venting flexibility. Now, over 30 years later, we continue to raise the standard with an easy-to-operate touchscreen user interface, remote boiler control and enhanced communications. The advanced SMART TOUCH™ color display includes CON·X·US remote connectivity via WiFi or Ethernet for easy control at your fingertips, from anywhere. And a simple drop-in Modbus or BACnet card allows for easy integration into a Building Management System.



Starting with the introduction of Power-Fin product line in 1986, we were able to provide something that other companies weren't focused on, efficiency and footprint. Now, 30 years later, we are proud to continue that tradition and provide some of the most efficient products on the market.



UP TO 87% THERMAL EFFICIENCY

### Enhanced Operating Control

The Power-Fin now offers the industry-best SMART TOUCH™ 8" LCD full color touchscreen with easy-to-understand infographics. It is equipped with CON·X·US® connectivity that lets you remotely monitor and optimize the performance of the entire boiler plant.



### Burner Modulation Boosts Efficiency and Lowers Costs

With thermal efficiency of 85%, Power-Fin boilers feature a 5:1 turndown ratio that will precisely match the firing rates to heating load requirements—at any point from 20% to full firing rate. This results in less equipment cycling for greater efficiency and cost savings.

### Ready for Outdoor Installation

In warm-weather sites where the mechanical room is overcrowded, the Power-Fin can be easily installed either outdoors or on a rooftop. Its optional hood and screen protector make outdoor installation fast and trouble free.

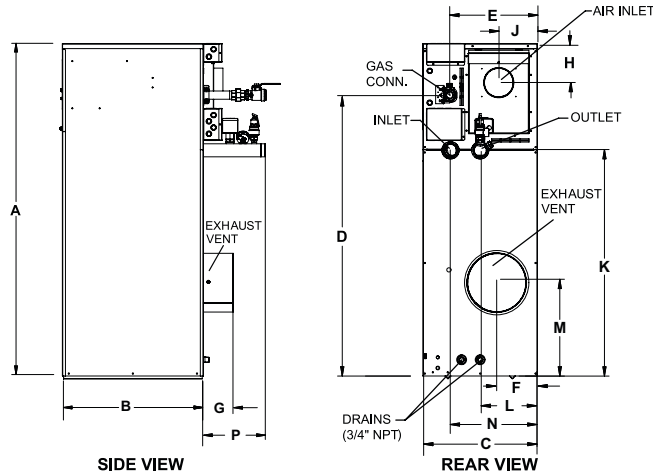
### Venting Solutions

The Power-Fin offers seven venting options for ease of installation and venting flexibility to meet the most challenging installation requirements. The Power-Fin permits air intake and exhaust lengths up to 100 ft, allowing terminations to be horizontal through a sidewall or vertical through a roof. Consult the installation and operation manual for detailed venting guidelines.





# Power-Fin® Boiler Dimensions & Specifications



POWER-FIN BOILER							DIMENSIONS AND SPECIFICATIONS								
Model Number	Input MBH	B9/F9 Thermal Efficiency	Output MBH	Net AHRI Rating MBH	M9 Thermal Efficiency	Output MBH	Net AHRI Rating MBH	A	B	C	D	B9/F9 E	M9 E	F	G
PBN0502	500	85.0%	425	370	85.0%	425	370	44-1/2"	28-1/2"	23-1/4"	34"	17-3/4"	19-1/2"	6-1/2"	6"
PBN0752	750	85.0%	638	554	85.0%	638	554	52"	28-1/2"	23-1/4"	41-1/2"	17-3/4"	19-1/2"	6-3/4"	6"
PBN1002	999	85.0%	850	739	85.0%	850	739	59-1/4"	28-1/2"	23-1/4"	48-3/4"	17-3/4"	19-1/2"	7-1/4"	6"
PBN1302	1,300	85.0%	1,105	961	85.0%	1,105	961	67-3/4"	28-1/2"	23-1/4"	57-1/4"	17-3/4"	19-1/2"	8-1/4"	6"
PBN1501	1,500	84.0%	1,260	1,096	85.0%	1,275	1,109	65-1/2"	29-3/4"	27-1/4"	58-3/4"	21"	21"	13-1/2"	8"
PBN1701	1,700	84.0%	1,428	1,242	85.0%	1,445	1,257	70"	29-3/4"	27-1/4"	63-1/4"	21"	21"	13-1/2"	8"
PBN2001	2,000	84.0%	1,680	1,461	85.0%	1,700	1,478	76-3/4"	29-3/4"	27-1/4"	70"	21"	21"	13-1/2"	8"

Model Number	H	J	K	L	M	N	B9/F9 P	M9 P	Gas Conn.	Air Inlet	B9/F9 Cat I	M9* Cat II	M9 Cat IV	Ship Wt. (lbs)
PBN0502	8"	7-3/4"	23"	11-1/2"	11-1/4"	17-1/2"	15-1/4"	15-1/4"	1"	5"	7"	7"	4"	505
PBN0752	8"	7-3/4"	30-1/2"	11-1/2"	11-1/4"	17-1/2"	15-1/4"	15-1/4"	1-1/4"	5"	9"	9"	5"	554
PBN1002	8"	7-3/4"	37-3/4"	11-1/2"	11-1/4"	17-1/2"	15-1/4"	15-1/4"	1-1/4"	6"	10"	10"	6"	603
PBN1302	8"	7-3/4"	46-1/4"	11-1/2"	19-1/2"	17-1/2"	15-1/4"	15-1/4"	1-1/4"	6"	12"	12"	8"	652
PBN1501	10"	9-1/2"	43-1/2"	5-3/4"	22-1/4"	21-1/2"	24-1/2"	19-1/2"	1-1/2"	6"	12"	8"	6"	1,065
PBN1701	10"	9-1/2"	48"	5-3/4"	25"	21-1/2"	24-1/2"	19-1/2"	1-1/2"	7"	14"	9"	7"	1,100
PBN2001	10"	9-1/2"	54-3/4"	5-3/4"	27-1/2"	21-1/2"	24-1/2"	19-1/2"	1-1/2"	8"	14"	10"	8"	1,127

Notes: Change 'N' to 'L' for LP Gas Model. No deration on LP models. All water connections are 2-1/2" \*w/CAT II conversion kit

## STANDARD FEATURES

- 85% Thermal Efficiency**
- Modulating Burner with 5:1 Turndown**
  - Hot Surface Ignition
  - Low NOx Operation
  - Sealed Combustion
  - Low Gas Pressure Operation
- Vertical & Horizontal Venting**
  - Venting up to 50 Feet
  - Category I or Category IV Venting
  - Cat IV converts to Cat II w/ optional vent kit
- ASME Copper-Finned Tube Heat Exchanger**
  - ASME Certified, "H" Stamped
  - Gasketless design
  - 160 psi working pressure
- On/Off Switch
- Adjustable High Limit w/ Manual Reset
- Flow Switch
- Low Air Pressure Switch
- Downstream Test Cocks
- 50 psi ASME Relief Valve
- Combustion Air Filtration
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Material
- 1 Year Warranty on Parts
- 10 Year Limited Warranty
- (See Warranties for Details)

## SMART SYSTEM FEATURES

- SMART SYSTEM Operating Control**
  - 2 line, 16 Character Display
  - Dual Level Password Security
  - Domestic Hot Water Prioritization
  - Built in Cascading Sequencer for up to 8 Boilers
  - Building Management System Integration with 0-10 VDC Input
  - Outdoor Reset Control with Outdoor Air Sensor
  - Low Water Flow Safety Control & Indication
  - Inlet & Outlet Temperature Readout
  - Freeze Protection
  - Service Reminder
  - Time Clock
- Data Logging**
  - Hours Running, Space Heating
  - Hours Running, Domestic Hot Water
  - Ignition Attempts
  - Last 10 Lockouts
- Programmable System Efficiency Optimizers**
  - Night Setback
  - Anti-Cycling
  - Outdoor Air Reset Curve
  - Ramp Delay
  - Boost Temperature & Time

## Three Pump Control

- System Pump
- Boiler Pump
- Domestic Hot Water Pump

## High Voltage Terminal Strip

- 120 VAC / 60 Hertz / 1 Phase Power Supply
- Three sets of Pump Contacts with Pump Relays

## Low Voltage Terminal Strip

- 24 VAC Auxiliary Device Relay
- Auxiliary Proving Switch Contacts
- Flow Switch Contacts
- Alarm on Any Failure Contacts
- Runtime Contacts
- DHW Thermostat Contacts
- Room Thermostat Contacts
- System Sensor Contacts
- DHW Tank Sensor Contacts
- Outdoor Air Sensor Contacts
- Cascade Contacts
- 0-10 VDC BMS External Control Contact

## FIRING CONTROL SYSTEMS

- M Indicates 5:1 Turndown, Category IV
- B Indicates 2:1 Turndown, Category I
- F Indicates 100% On/Off Fire, Category I

## OPTIONAL EQUIPMENT

- Alarm Bell
- Wireless Outdoor Sensor
- Cupro-Nickel Heat Exchanger
- High & Low Gas Pressure Switches w/ Manual Reset (Req. for CSD-1/FM/GE Gas)
- Low Water Cutoff w/ Manual Reset & Test (Req. for California Code)
- Modbus Communication
- BMS Gateway - BACnet or LonWorks
- Vent Kits:
  - Horizontal Exhaust Cap
  - Horizontal Air Intake Cap
  - Horizontal Direct Vent Kit
  - Category IV to Category II Conversion Kit
- Smart System PC Kit

Registered under U.S. Patent # 7,506,617

**POWER-FIN®**  
 500,000 - 2,000,000 Btu/hr models

# COPPER-FIN II<sup>®</sup>

## The Foundation of Lochinvar Becomes Stronger

Copper-finned tube, non-condensing appliances are the foundation of Lochinvar's success. In 1993, Lochinvar introduced the Copper-Fin II, the first horizontal chassis copper-finned tube boiler to operate with fan-assisted combustion. Now, the Copper-fin II is even better. Along with high thermal efficiency, gasketless heat exchangers and multiple venting options we have added Lochinvar's exclusive SMART SYSTEM™ control.



Nine models from 399,999 to 2,070,000 Btu/hr input provide you with exceptional products with a long list of new features in addition to the established features which redefined the industry. The Copper-fin II was the first proportional fired, fan-assisted boiler on the market. Every model features a small footprint for easy passage through a 36" door, low NOx – third party tested to less than 20 PPM, Stack Frames that can put twice the Btu/hr input in the same space and vent diameters up to 8" smaller than conventional atmospheric boilers.

## SMART SYSTEM Puts More Control and Information at Your Fingertips

The most exciting addition to the Copper-Fin II is the SMART SYSTEM control. The SMART SYSTEM is an advanced, state of the art integrated operating control. We introduced the SMART SYSTEM control in 2005 and it has delivered proven operation in thousands of demanding commercial applications. The control provides the installer, owners and operators with precise temperature control and diagnostic information.



### Advanced features include:

- 2-Line, 16 character LCD display of setup, system status and diagnostic data in words, not codes
- Built-in cascade sequencer controlling up to 8 boilers
- Outdoor reset adjusts setpoint based on reset curve
- Domestic hot water prioritization allows the boiler to provide space heating and produce domestic hot water all in one system
- 0-10 VDC BMS input to control boiler operation
- Modbus protocol - optional

## Proportional Firing

Proportional firing divides a single manifold of multiple burners into smaller, independent stages.

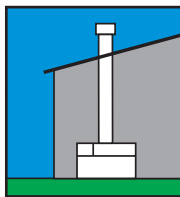
With up to four stages of individual operation, the Smart System control can reduce the firing rate down to approximately 25% Btu/hr input. This simple but effective design matches the boiler's firing capacity to the constantly changing system demand. Full Fire or On/Off combustion systems often fire the entire gas train in short, inefficient bursts. Stage firing delivers the Btu's required in smoother and longer burn cycles which will improve operation and reduce component fatigue.

## Gasketless Heat Exchanger

In 1989, Lochinvar was the first water heater manufacturer to offer gasketless cast iron & copper-finned tube heat exchangers. Our unique gasketless design enhances reliability by eliminating O-rings and gaskets found on other brands. The heat exchanger features glass lined headers and copper-finned tubes with extruded integral fins spaced 7-fins per inch for exceptional heat transfer. The heat exchanger is built to ASME construction standards for 160 psi working pressure and is backed by a ten year limited warranty.

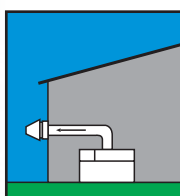
## Venting Options

### Conventional



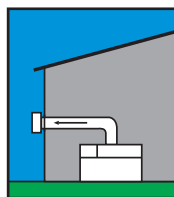
Vents into conventional flue or vent breaching using Type B double wall vent.

### Powered Sidewall



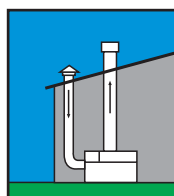
Vents directly through the outside wall using an optional powered sidewall cap. Ideal when a vent stack is not practical.

### Sidewall



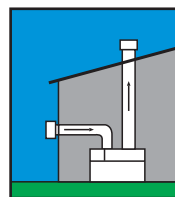
Draws fresh air from inside the room. Vents up to 50 equivalent feet directly through the outside wall without the need for a powered sidewall cap.

### DirectAire Vertical



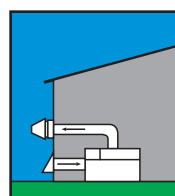
Draws fresh air from outside and vents through conventional vertical flue.

### DirectAire Vertical w/ Sidewall



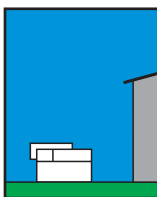
Draws fresh air from outside and vents through conventional vertical flue.

### Power DirectAire Horizontal



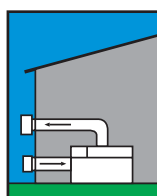
Draws fresh air from outside and vents through sidewall using optional powered vent cap.

### Outdoor



Requires optional outdoor vent cap. Use when indoor space is a problem or if outdoor location gives better access.

### Aire-Lock Direct Vent

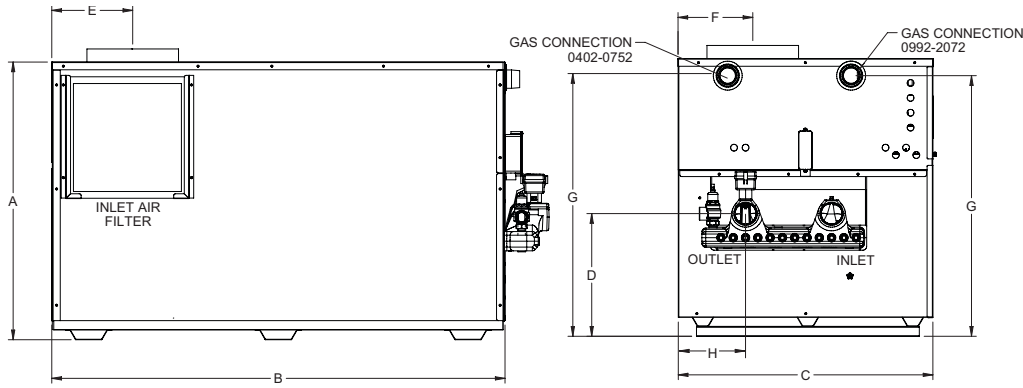


Draws fresh air 50 equivalent feet from a sidewall. Vents horizontally up to 50 equivalent feet through the sidewall.

85% THERMAL EFFICIENCY



STACK FRAME



Copper-Fin II Heating Boiler					Dimensions & Specifications											
Model Number	Input MBH	Thermal Efficiency	Output MBH	Net AHRI Rating MBH	A	B	C	D	E	F	G	H	Vent Size	Air Inlet	Gas Conn.	Ship Wt. (lbs)
CHN0402	399	85%	339	295	31-1/2"	37-3/4"	22-1/4"	12-1/2"	7"	7"	29"	6-1/2"	6"	6"	1-1/4"	378
CHN0502	500	85%	425	370	31-1/2"	45-1/2"	22-1/4"	12-1/2"	7"	7"	29"	6-1/2"	6"	6"	1-1/4"	414
CHN0652	650	85%	553	481	31-1/2"	56-3/4"	22-1/4"	12-1/2"	8-1/2"	8-1/4"	29"	6-1/2"	8"	8"	1-1/4"	500
CHN0752	750	85%	638	555	31-1/2"	64"	22-1/4"	12-1/2"	8-1/2"	8-1/4"	29"	6-1/2"	8"	8"	1-1/4"	543
CHN0992	990	85%	842	732	36"	48-1/4"	33-1/2"	15-3/4"	8-1/2"	8-1/2"	33-3/4"	8-3/4"	10"	10"	2"	773
CHN1262	1,260	85%	1,071	931	36"	58-1/2"	33-1/2"	15-3/4"	10-1/2"	9-1/2"	33-3/4"	8-3/4"	12"	12"	2"	863
CHN1442	1,440	85%	1,224	1,064	36"	68-3/4"	33-1/2"	15-3/4"	10-1/2"	10-1/2"	33-3/4"	8-3/4"	12"	12"	2"	965
CHN1802	1,800	85%	1,530	1,330	36"	82-1/4"	33-1/2"	15-3/4"	11"	11"	33-3/4"	8-3/4"	14"	12"	2"	1,100
CHN2072	2,070	85%	1,760	1,530	36"	92-1/2"	33-1/2"	15-3/4"	11"	11"	33-3/4"	8-3/4"	14"	12"	2"	1,219

Notes: Change 'N' to 'L' for LP gas models. No deration on LP models. Water connections for models CH 0402-0752 are 2" NPT on 6-1/2" centers. Header increases "B" dimension 3-1/2" for models CH 0402-0752 and 6-1/4" for models CH 0992-2072. Water connections for models CH 0992-2072 are 2-1/2" NPT on 11-1/4" centers.

**STANDARD FEATURES**

- 85% Thermal Efficiency
- Proportional Firing up to 4:1 Turndown
- Hot Surface Ignition
- Low NOx Operation
- Sealed Combustion
- Low Gas Pressure Operation
- Vertical & Horizontal Venting
  - Category I Venting
    - Double Wall "B" Vent Material
  - Category IV Venting
    - AL29-4C Stainless Steel Vent Material
- ASME Copper Finned Tube Heat Exchanger
  - ASME Certified, "H" Stamped
  - Gasketless design
  - 160 psi working pressure
- On/Off Switch
- Combustible Floor Rated (0992 - 2072)
- Adjustable High Limit w/ Manual Reset
- Flow Switch
- Low Air Pressure Switch
- Inlet & Outlet Temperature Sensors
- Easy Access Terminal Strips
- Downstream Test Cocks
- 50 psi ASME Pressure Relief Valve
- Temperature & Pressure Gauge
- 1 Year Warranty on Parts (See Warranty for Details)
- 10 Year Limited Warranty (See Warranty for Details)
- 0-10 VDC Rate Contacts

**OPTIONAL EQUIPMENT**

- Alarm Bell
- High & Low Gas Pressure Switches w/ Manual Reset
- Cupro-Nickel Heat Exchanger
- Low Water Cut Off, Probe Type w/ Manual Reset & Test
- Modbus Communications
- BMS Gateway - BACnet or LonWorks
- Combustible Floor Kit (0402-0752)
- Stack Frame
- Thermal Static Low Temperature Protection Valve
- Outdoor Vent Cap

**SMART SYSTEM™ FEATURES**

- SMART SYSTEM™ Operating Control
  - 2 Line/16 Character LCD Display
  - Built in Cascading Sequencer for up to 8 boilers
  - Front End Loading with Crest or KNIGHT boilers
  - Building Management System Integration
    - with 0-10 VDC Input
  - Outdoor Reset Control with Outdoor Air Sensor
  - Password Security
  - Domestic Hot Water Prioritization
  - Low Water Flow Control & Indication
  - Inlet & Outlet Temperature Readout
  - Freeze Protection
  - Service Reminder
  - Time Clock
  - 0-10 VDC Rate Output
  - Condensing Protection
  - 0-10 VDC System Pump Speed Input
- Data Logging
  - Hours Running, Space Heating
  - Hours Running, Domestic Hot Water
  - Ignition Attempts
  - Last 10 Lockouts
- Programmable System Efficiency Optimizers
  - Night Setback
  - Anti-Cycling
  - Outdoor Air Reset Curve
  - Boost Temperature & Time

**FIRING CODES**

- M7 Firing Code - California Code
- M9 Firing Code - Hot Surface Ignition with Electronic Supervision
- M13 Firing Code - CSD1 / Factory Mutual / GE Gap

**CERTIFICATIONS**

- ANSI Z21.13/CSA 4.9 certified
- South Coast Air Quality Management District registered
- Texas Commission on Environmental Quality
- Three Pump Control
  - System Pump
  - Boiler Pump
  - Domestic Hot Water Pump
- High Voltage Terminal Strip
  - 120 VAC / 60 Hertz / 1 Phase Power Supply
  - Pump Contacts with Pump Relay
- Low Voltage Terminal Strip
  - 24 VAC Auxiliary Device Relay Output - Louvers
  - Auxiliary Proving Switch Contacts - Louvers
  - 3-way Valve Contacts for Low Temperature Protection
  - Alarm on Any Failure Contacts
  - 0-10 VDC System Pump Speed Contacts
  - Runtime Contacts
  - DHW Thermostat Contacts
  - DHW Tank Sensor Contacts
  - Unit Enable/Disable Contacts
  - System Sensor Contacts - Supply and Return
  - Outdoor Air Sensor Contacts
  - Contacts for Air Louvers
  - Contacts on Any Failure
  - Cascade Contacts
  - 0-10 VDC BMS External Control Contact

Registered under U.S. Patent # 5,989,020



## Energy Efficient, Cost Effective Boilers

Lochinvar first introduced Copper-Fin technology to the boiler industry some 50 years ago. Since then, we've continued to refine and perfect it - adding advanced fan-assisted combustion, hot surface ignition, a unique gasketless copper finned tube heat exchanger and highly efficient insulating materials.



## Installation Flexibility and Cost-Savings

With compact sizes that use less floor space than ever before, all Copper-Fin units are narrow enough to fit through a standard 36" doorway – an advantage most commercial boilers can't provide. Plus, thanks to special insulating materials, Copper-Fin units require only 3" clearance from combustible walls. What's more, our Stack Frame allows you to install two units in the area normally required for one. This makes it easier to fit multiple Copper-Fin boilers into cramped mechanical rooms. And you can even use a smaller diameter vent stack - up to 8" smaller than typically required for comparable atmospheric boilers - so it saves money as well as valuable mechanical room space.



## Unique Copper-Fin Heat Exchanger

The Lochinvar Copper-Fin boiler design uses a two pass heat exchanger. Water is circulated through a row of highly-efficient, finned copper tubes. The high rate of water flow creates a scouring action that prevents sediment and lime-scale buildup, common in conventional boilers, and the finned copper tubes allow maximum heat transfer efficiency. To create this special heat transfer capability, Lochinvar extrudes the fins from thick wall copper tubing to precise specifications - exactly 7 fins per inch. The result is an integrally-finned tube with a heat transfer ratio 9 times greater than a plain copper tube.

## Heavy-Duty Gasketless Design

What's more, advanced casting processes allowed Lochinvar to develop a unique one-piece header system. This gasketless design provides enhanced reliability, improved durability and optimum performance - without the problems or failures common with O-rings and gaskets.

## Meets the Toughest Air Quality Standards

Because of our unique fan-assisted combustion process, the Copper-Fin exceeds today's toughest NO<sub>x</sub> emissions requirements. An independent certification laboratory test gave us a rating of less than 20 ppm - corrected to 3% O<sub>2</sub>. And less NO<sub>x</sub> means a cleaner environment.

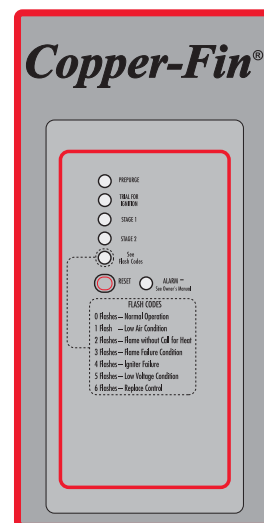
## Enhanced to Provide Performance and Serviceability

Our enhanced Copper-Fin models offer the same reliable operation, and feature a more service friendly design. The down stream test valves and referenced gas valves are now in the upper deck for easier access, and the electrical and BMS connections have been repositioned to the front of the unit for easier installation.

The gas valves, which are referenced to the sealed combustion chamber, improve operational performance by monitoring the pressure in the sealed combustion chamber and adjusting gas flow to maintain the optimum air/fuel mixture. And the built-in air inlet filter reduces maintenance and improves performance by trapping dust and airborne particulates that can foul the burners and blowers.

With dual sight glasses (one on each end), you can easily monitor burner performance and flame characteristics throughout the entire combustion chamber.

The operator interface panel provides two-stage electronic temperature control and comprehensive diagnostic status without opening the control panel. Its user friendly design simplifies service while providing additional diagnostic information through a series of LEDs.



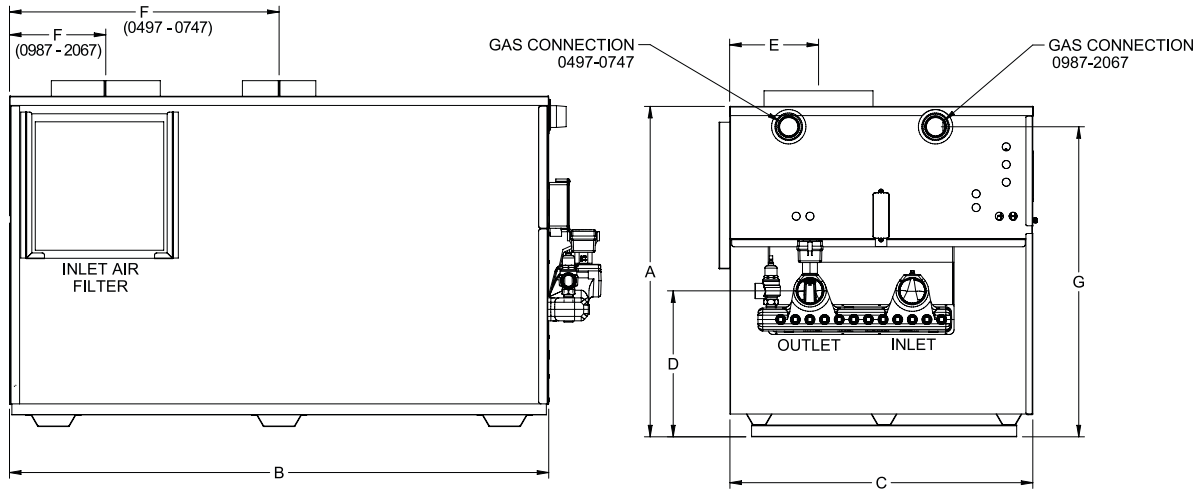
UP TO 81% THERMAL EFFICIENCY



STACK FRAME

# Copper-Fin® Boiler Dimensions & Specifications

Copper-Fin®



Copper-Fin Heating Boiler					Dimensions & Specifications									
Model Number	Input		Heating Net AHRI		A	B	C	D	E	F	G	Gas Conn.	Vent Size	Ship Wt.(lbs)
	Max MBH	Thermal Efficiency	Capacity MBH	Rating MBH										
CBN0497	495	81%	401	349	31-1/2"	45-1/4"	22-1/4"	12-1/2"	9-1/2"	22-3/4"	29-1/2"	1-1/4"	6"	440
CBN0647	645	81%	522	454	31-1/2"	56-3/4"	22-1/4"	12-1/2"	9-1/2"	28-1/2"	29-1/2"	1-1/4"	8"	510
CBN0747	745	81%	603	524	31-1/2"	64"	22-1/4"	12-1/2"	9-1/2"	32"	29-1/2"	1-1/4"	8"	550
CBN0987	985	81%	798	694	36"	48-1/4"	33-1/2"	15-3/4"	8-1/2"	8-1/2"	33-3/4"	2"	10"	845
CBN1257	1255	81%	1,017	884	36"	58-1/2"	33-1/2"	15-3/4"	9-1/2"	10-1/2"	33-3/4"	2"	12"	905
CBN1437	1435	81%	1,162	1,010	36"	68-3/4"	33-1/2"	15-3/4"	10-1/2"	10-1/2"	33-3/4"	2"	12"	1050
CBN1797	1795	81%	1,454	1,264	36"	82-1/4"	33-1/2"	15-3/4"	11"	11"	33-3/4"	2"	14"	1193
CBN2067	2065	81%	1,673	1,455	36"	92-1/2"	33-1/2"	15-3/4"	11"	11"	33-3/4"	2"	14"	1350

Notes: Change 'N' to 'L' for LP gas models.  
No deration on LP models.

Water connections for models CB 0497-747 are 2" NPT on 6-1/2" centers.  
Water connections for models CB 0987-2067 are 2-1/2" NPT on 11-1/4" centers.

## STANDARD FEATURES

- 81% Thermal Efficiency
- Electronic Temperature Control
- Fan Assisted Combustion
- Sealed Combustion Chamber
- Stainless Steel Burners
- Low NOx Operation Exceeds the most Stringent Air Quality Requirements
- ASME Copper Finned Tube Heat Exchanger
- 160 psi Working Pressure
- Gasketless Heat Exchanger Design
- Pump Relay w/ Delay
- Down Stream Test Valve
- Referenced Gas Valves
- Loch-Heat Ceramic Tile Combustion Chamber
- Hot Surface Ignition
- Adjustable High Limit w/ Manual Reset
- ASME Pressure Relief Valve
- Temperature & Pressure Gauge
- Flow Switch
- 24 Volt Control System
- BMS Terminal Strip
- Combustion Air Filter
- Freeze Protection
- 10 Year Limited Warranty on Heat Exchanger (See warranty for details)

## OPTIONAL EQUIPMENT

- Alarm Bell
- Contacts on any Failure & Runtime
- Contacts for Air Louvers
- Cupro-Nickel Heat Exchanger
- High & Low Gas Pressure Switch w/ Manual Reset
- Outdoor Reset Control
- Manual Reset Low Water Cut-Off w/ test
- Stack Frame
- MP<sup>2</sup> Sequencer
- Outdoor Vent Cap

## AVAILABLE FIRING SYSTEMS

- M9 Hot Surface Ignition with Electronic Supervision (Standard)
- M13 GE GAP/FM/CSD1
- M7 California Code

Registered under U.S. Patent # 5,989,020

UP TO 82% THERMAL EFFICIENCY

STACK FRAME

## Lightweight, Flexible and Energy Efficient

Copper-Fin® gas-fired atmospheric boilers are high-efficiency boilers that save space, save money, are lightweight, and are simple to service and install. Copper-Fin boilers are equipped with a built-in draft hood, a highly efficient copper finned tube heat exchanger, our own specially designed two-stage electronic control system, and they are approved for installation on combustible floors. Models are available with inputs from 315,000 to 500,000 Btu/hr.



## Two-Stage Control System



The boiler's two-stage electronic temperature control provides flexibility and saves fuel by closely matching heat output to system demand. On colder days the boiler fires at full output, and in warmer conditions the boiler reduces heat output to save energy and reduce boiler cycling.

During the majority of the heating season, less than full boiler output is required to satisfy the heat load. For this reason, Lochinvar has developed a two-stage firing system. Two-stage firing - standard equipment on all Copper-Fin boilers, provides dramatic fuel savings by reducing the firing rate 50%. And the two-stage firing control is ideal for applications utilizing indoor/outdoor reset.\* *\*I/O reset is available as an option.*

## Copper Finned Tube Heat Transfer

The heart of the Copper-Fin boiler is its copper finned-tube heat exchanger. With this unique gasketless design, we've combined the best of both worlds: cast iron headers for long-lasting durability, and a copper finned-tube heat exchanger for high efficiencies and fast heat transfer. The gasketless heat exchanger design reduces the risk of leaks or system failures that are common with conventional boilers. Plus, the unit's low-mass design means that water gets heated quickly. Not only is heat up time nearly instantaneous with these boilers, the energy consumption and operating costs are lower too.



## Intermittent Ignition Device

The Intermittent Ignition Device is a solid-state electronic spark-to-pilot ignition system that reduces fuel consumption. Its electronic circuitry continuously monitors the system and provides pilot gas only when there is a call for heat, eliminating the need for a continuously burning pilot, and providing an additional measure of operational safety.

## Built-In Draft Hood

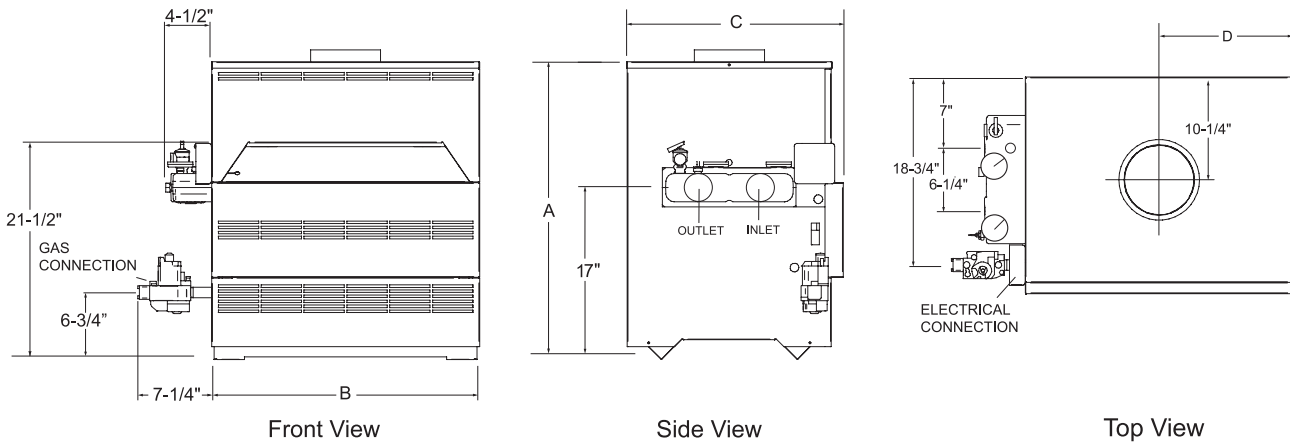
The lower overall height of the draft hood makes it easier to install the Copper-Fin boiler in all applications, especially in those instances where overhead space is limited and headroom restrictions exist.

## Serviceability

This boiler is as flexible and convenient to install and service as it is efficient and compact. The heavy-duty stainless steel burners can easily be adapted for use with either natural or liquefied petroleum (LP) gas, and the boiler's design allows for easy access to all major components for servicing. The heat exchanger is designed to slide out the front of the boiler for faster maintenance, and Lochinvar backs it up with an exclusive 10-year Limited Warranty. For more information, call your Lochinvar dealer today.



# Copper-Fin® Boiler Dimensions & Specifications



Copper-Fin Boiler					Dimensions & Specifications						
Model Number	Input MBH	Thermal Efficiency	Output MBH	Net AHRI	A	B	C	D	Gas Conn.	Vent Size	Ship. Wt.(lbs)
				Rating MBH							
CBN315	315	82.0%	258	224	29-1/2"	32-1/4"	21-1/2"	16-1/4"	3/4"	8"	245
CBN360	360	82.0%	295	257	29-1/2"	35-1/4"	21-1/2"	17-3/4"	1"	9"	255
CBN399	399	82.0%	328	285	29-1/2"	44-1/2"	22"	22-1/4"	1"	10"	320
CBN500	500	82.0%	410	357	34-1/2"	52-1/2"	22"	26-1/4"	1"	10"	345

**Notes:** Change 'N' to 'L' to denote L.P. gas models  
 No deration for L.P. models.  
 Water Connections are 2" NPT on 6-1/4" centers.  
 Performance data is based on manufacturer test results.

## STANDARD FEATURES

- 82% Thermal Efficiency
- ASME Copper Finned Tube Heat Exchanger
- Gasketless Heat Exchanger Design
- Two Stage Intermittent Electronic Ignition
- 160 PSI Working Pressure
- Pump Relay
- Two Stage Solid State Temperature Control
- Two Stage Gas Valve with Built-In Manual Shut-Off
- Automatic Reset High Limit
- ASME Pressure Relief Valve
- Temperature & Pressure Gauge
- Diagnostic Flash Codes
- Built-In Draft Diverter
- CSA Design Certified for Alcove Installation
- CSA Design Certified for Installation on Combustible Floor
- Stainless Steel Burners
- Loch-Heat Ceramic Tile Combustion Chamber
- 24 Volt Control System
- 10 Year Limited Warranty on Heat Exchanger (See warranty for details)

## OPTIONAL EQUIPMENT

- Adjustable High Limit w/ Manual Reset
- Contacts on any Failure
- Contacts for Air Louvers
- Flow Switch
- Outdoor Air Reset Control
- Low Water Cut-Off
- Stack Frame
- Pump Delay/Freeze Protection
- MP<sup>2</sup> Sequencer
- 3-Way Low Temperature Valve

## FIRING CONTROLS

- M9 - Two-Stage Intermittent Spark Ignition (Standard)
- M13 - GE GAP/FM/IRI
- M7 - California Code

Copper-Fin®



## The Best You Can Buy



KNIGHT® is recognized for its reliable, proven performance and high quality standards. Its award winning design assures contractors and home owners peace of mind and long term savings in operating costs.

Lochinvar has raised the KNIGHT standard to even greater heights. The SMART SYSTEM™ control with color display gives installers and maintenance personnel a greater level of control than ever before. It's easy to access all the information they need to setup, troubleshoot and monitor all boiler functions. Additionally, two cascading options allow the installer to fine-tune sequencing of multiple boiler installations.

More than ever, KNIGHT is the best choice for traditional hydronic space heating, radiant floor heating and indirect domestic hot water applications.

### SMART SYSTEM™ Control



The SMART SYSTEM™ is the most advanced integrated boiler control on the market today.

Now the CON·X·US® mobile communication platform allows SMART SYSTEM to go where no other boiler has gone before.†

† CON·X·US control board sold separately

95% AFUE



STACK FRAME



CON·X·US provides the ability to monitor and manage multiple KNIGHT heating boilers without ever stepping into the mechanical rooms. CON·X·US will send alerts via text or e-mail notifying of changes in system status, and anytime, from anywhere, a user can check system status and re-program any boiler function. Once downloaded, the free CON·X·US mobile application allows for remote access to all SMART SYSTEM functions using an internet-capable device.

### Built-in Cascading Sequencer

When multiple KNIGHT boilers are installed together, the SMART SYSTEM built-in sequencer can be set for "Lead-Lag" cascade or "Efficiency Optimized" cascade operation.

### Advanced Negative Regulation Technology

KNIGHT safely and reliably operates with supply gas pressures as low as 4 inches water column. Plus "Neg/Reg" technology automatically adjusts gas pressure to ensure the correct volume of fuel and air entering the burner.

### Direct-Spark Ignition

With each call for heat, two electrodes ignite the fuel/air mixture. A third electrode then senses for flame. The SMART SYSTEM will generate a soft lockout and display a fault if ignition does not occur.

### Fully Modulating Burner with 5:1 Turndown

The SMART SYSTEM allows fully modulating combustion with 5:1 turndown. The burner can fire as low as 20% of maximum input and modulates the firing rate up to 100% as demand increases. A woven stainless steel mesh enclosed burner tube fires in a 360° pattern along the entire length of the primary heat exchanger.

### Two-in-One Stainless Heat Exchanger

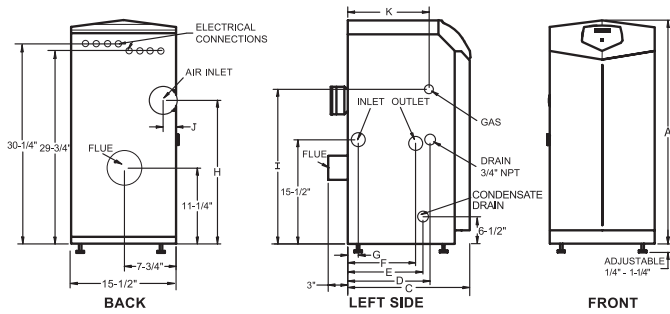
A primary heat exchanger combined with a secondary heat exchanger captures flue gas heat and condenses to utilize available latent energy. The stainless steel, pH-tolerant design features a weld-sealed assembly with no O-rings or gaskets and does not require special glycol. ASME Section IV approved and stamped.



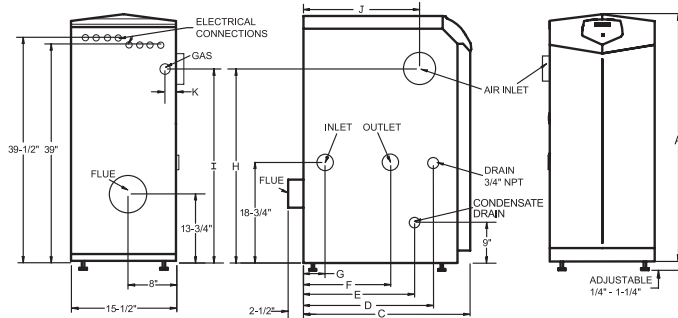
# KNIGHT® Boiler Dimensions & Specifications



Models:  
KBN 081-211



Model:  
KBN286



KNIGHT HEATING BOILER						DIMENSIONS AND SPECIFICATIONS														
Model Number	Input Min. MBH	Input Max. MBH	AFUE	Heating Capacity MBH	NET AHRI Rating MBH	A	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Ship Wt. (lbs)
KBN081	16	80	95.0%	74	64	33-1/4"	14"	7"	5-3/4"	5"	3"	20-1/2"	22"	1-3/4"	6-1/2"	1/2"	1"	3"	3"	125
KBN106	21	105	95.0%	97	84	33-1/4"	14"	6-1/2"	5-3/4"	4-1/2"	1-1/2"	20-1/2"	22"	1-3/4"	6-1/2"	1/2"	1"	3"	3"	129
KBN151	30	150	95.0%	139	121	33-1/4"	18"	12-1/4"	11-1/2"	10"	1-1/2"	21-1/4"	23"	1-3/4"	12"	1/2"	1"	3"	3"	157
KBN211	42	210	95.0%	196	170	33-1/4"	22-1/4"	16-1/2"	15-3/4"	14-1/4"	5-1/4"	21-1/4"	23"	1-3/4"	16-1/4"	1/2"	1"	3"	3"	172
KBN286	57	285	95.0%	267	232	42-1/4"	19-3/4"	12-3/4"	13-1/2"	6"	2"	34"	31"	11-3/4"	4-1/4"	3/4"	1-1/4"	4"	4"	224

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models.  
Net ratings based on piping and pick-up allowance of 1.15

## SMART SYSTEM™ FEATURES

### SMART SYSTEM Digital Operating Control

- Multi-Color Graphic LCD Display with Navigation Dial and Soft Keys

### Three Setpoint Temperature Inputs

#### Built-in Cascading Sequencer for up to 8 Boilers

- Cascade Multiple Sized Boilers
- Lead Lag
- Efficiency Optimization
- Front End Loading Capability with Copper Fin II

### Outdoor Reset Control with Outdoor Air Sensor

- Programmable for Three Reset Temperature Inputs

### Programmable System Efficiency Optimizers

- Night Setback w/Override Function
- DHW Night Setback w/Override Function
- Anti-Cycling
- Outdoor Air Reset Curve
- Ramp Delay
- Boost Temperature & Time

### Three Pump Control

- System Pump with Parameter for Continuous Operation
- Boiler Pump with Variable Speed Pump Control
- Domestic Hot Water Pump

### Domestic Hot Water Prioritization

- DHW tank piped with priority in the boiler loop
- DHW tank piped as a zone in the system with the pumps controlled by the Smart System
- DHW Modulation Limiting
- Separately Adjustable SH/DHW Switching Times\*

### Building Management System Integration

- 0-10 VDC Input to Control Modulation or Set Point
- 0-10 VDC Modulation Rate Output
- 0-10 VDC Input Signal from Variable Speed System Pump\*
- 0-10 VDC Input to Enable/Disable call for heat

### High-Voltage Terminal Strip

- 120 VAC / 60 Hertz / 1 Phase Power Supply
- Three Sets of Pump Contacts

### Low Voltage Terminal Strip

- 24 VAC Device Relay
- Proving Switch Contacts
- Flow Switch Contacts
- Alarm on Any Failure Contacts
- Runtime Contacts
- DHW Thermostat Contacts
- 3 Space Heat Thermostat Contacts
- System Sensor Contacts
- DHW Tank Sensor Contacts
- Outdoor Air Sensor Contacts
- Cascade Contacts
- 0-10 VDC BMS External Control Contact
- 0-10 VDC Boiler Rate Output Contacts
- 0-10 VDC Variable Speed System Pump Signal Input
- 0-10 VDC Signal to Control Variable Speed Boiler Pump
- Modbus Contacts

### Time Clock

### Data Logging

- Hours Running, Space Heating
- Hours Running, Domestic Hot Water
- Ignition Attempts
- Last 10 Lockouts

### Access to BMS Settings through Graphic LCD Display

### Maintenance Reminder

- Custom Maintenance Reminder with Contractor Info
- Installer Ability to De-activate Service Reminder

### Low-Water Flow Safety Control & Indication

### Dual Level Password Security

### Customizable Freeze Protection Parameters

## STANDARD FEATURES

### Energy Star™ Qualified

### 95% DOE AFUE Efficiency

### Modulating Burner with 5:1 Turndown

- Direct-Spark Ignition
- Low-NOx Operation
- Field Convertible from Natural to LP Gas

### ASME Stainless Steel Heat Exchanger

- 30 psi ASME Relief Valve

### Vertical & Horizontal Direct-Vent

- PVC, CPVC, Polypropylene or SS Venting up to 100 feet

### Smart System Control

### Condensate Trap

### Other Features

- Automatic Reset High Limit
- Adjustable High Limit w/Manual Reset
- Boiler Circulating Pump
- Adjustable Leveling Legs
- Zero Clearances to Combustible Materials
- 5-Year Parts Warranty
- 12-Year Limited Warranty (See Warranty for Details)

## OPTIONAL EQUIPMENT

- CON-X-US Remote Connect
- Modbus Communication
- Condensate Neutralization Kit
- Multi Temperature Loop Control
- Flow Switch
- Low-Water Cutoff w/Manual Reset & Test
- Alarm Bell
- Concentric Vent Kit
- Stack Frame
- BMS Gateway - BACnet or LonWorks
- Sidewall Vent Termination
- Wireless Outdoor Sensor

## FIRING CODES

- M9 Standard Construction
- M7 California Code

\*Exclusive feature available only from Lochinvar



## Money-Saving 95% Efficiency and Easier than Ever to Install

The KNIGHT floor standing fire tube boiler features reduced installation footprint for flexibility in boiler placement. Plus, all connections are on the top and left side, so KNIGHT is an easy drop in replacement for older, less efficient boilers. Six models offer inputs from 55,000 to 285,000 Btu/hr.

### Use Existing Piping to Reduce Costs

The KNIGHT fire tube boiler operates with low pressure drop. The design incorporates a small volume of water in the heat exchanger. This allows the boiler to be installed in a primary/secondary or a full-flow piped system. There is no need to change the piping to accommodate the boiler. The boiler adapts to the system. This flexibility allows for a faster, more cost-effective boiler upgrade.

### 10:1 Turndown Ratio Optimizes Performance

Modulation turndown up to 10:1 means the firing rate automatically changes as the heat load varies. A KHN110 KNIGHT boiler fires at its maximum 110,000 Btu/hr rate when load is highest, then “turns down” to as low as 10% (11,000 Btu/hr) as load decreases. A modulating boiler runs smoothly and efficiently, without frequent on/off cycling

### Safe, Reliable NEG/REG Technology

KNIGHT boilers can operate with low gas supply pressure. *Negative Regulation* uses a pre-mix gas system instead of relying on utility pressure through the gas valve. The result is steady operation in low gas pressure systems or when gas demand is highest. Automatic fan control fine-tunes the air/fuel ratio, providing superior combustion throughout the operating range.

### Superior Direct Venting Flexibility

KNIGHT boilers can be installed with direct-vent air intake and exhaust runs up to 100 equivalent feet, using PVC, CPVC, polypropylene or AL29-4C stainless steel vent pipe.



95% AFUE



STACK FRAME

Most Efficient 2017 ENERGY STAR



SMART SYSTEM™

CON·X·US®

BOILER CONTROL, FROM ANYWHERE.

From wherever you are, the CON·X·US® option lets you use any internet-capable device to link up with the SMART SYSTEM™ on an unlimited number of KNIGHT boilers.

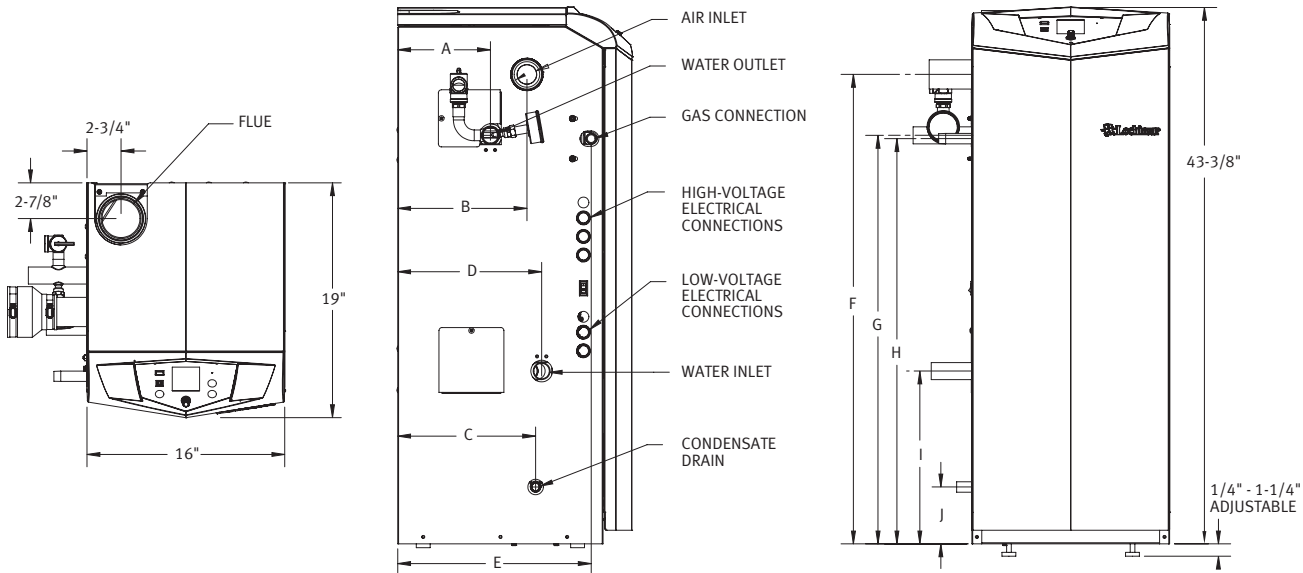
- › Do regular CON·X·US checks for all your KNIGHT customers, and let them know you're monitoring their boiler's performance.
- › Adjust setpoints, domestic hot water, reset curves, pump delays and more, using the CON·X·US interactive display.
- › Status alerts via text or e-mail let you know when a KNIGHT boiler needs attention.

With CON·X·US, you're always in touch and in control.

Optional CON·X·US control board is sold separately.



# KNIGHT® Boiler Dimensions & Specifications



KNIGHT HEATING BOILER						DIMENSIONS AND SPECIFICATIONS														
Model Number	Input MBH		AFUE	Heating Capacity MBH	Net MBH	A	B	C	D	E	F	G	H	I	J	Gas Connect.	Water Connect.	Air Inlet	Vent Size	Ship. Wt. (lbs)
	Min	Max																		
KHN055	8.2	55	95%	51	44	6"	8-3/8"	11-1/8"	10-1/2"	13-1/4"	37-1/2"	32-5/8"	32-1/4"	13-1/4"	3-3/8"	1/2"	1"	2"	2"	160
KHN085	8.5	85	95%	79	69	6"	8-3/8"	11-1/8"	10-1/2"	13-1/4"	37-1/2"	32-5/8"	32-1/4"	13-1/4"	3-3/8"	1/2"	1"	2"	2"	165
KHN110	11	110	95%	102	89	7-3/8"	9-3/4"	11-1/8"	10-5/8"	14-5/8"	37-3/4"	33"	32-1/2"	14"	4-5/8"	1/2"	1"	3"	3"	170
KHN155	15.5	155	95%	144	125	7-3/8"	9-3/4"	11-1/8"	10-5/8"	14-5/8"	37-3/4"	33"	32-1/2"	14"	4-5/8"	1/2"	1"	3"	3"	175
KHN199	19.9	199.9	95%	185	161	7-1/2"	10-1/2"	11-1/8"	11-5/8"	15-3/8"	38"	33"	32-3/4"	14"	4-5/8"	1/2"	1-1/4"	3"	3"	195
KHN285	28.5	285	95%	264	229	7-1/2"	10-1/2"	11-1/8"	11-5/8"	15-3/8"	38"	33"	32-3/4"	14"	4-5/8"	1/2"	1-1/4"	3"	3"	205

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models. Net ratings based on piping and pick-up allowance of 1.15

## SMART SYSTEM™ FEATURES

- ▶ **Smart System Digital Operating Control**  
Multi-Color Graphic LCD Display w/Navigation Dial, Soft Keys and Loch-N-Link™ USB programming
- ▶ **Three Boiler Setpoint Temperature Inputs**  
Plus Domestic Hot Water Prioritization
- ▶ **Built-in Cascading Sequencer for up to 8 Boilers, with Cascade Redundancy**  
Multiple Size Boiler Cascade  
Lead Lag  
Efficiency Optimization  
Front End Loading Capability
- ▶ **Outdoor Reset Control with Outdoor Air Sensor**  
Programmable for Three Reset Temperature Inputs
- ▶ **Programmable System Efficiency Optimizers**  
SH Night Setback  
DHW Night Setback  
Anti-Cycling  
Outdoor Air Reset Curve  
Ramp Delay  
Modulation Factor Control  
Boost Temperature & Time
- ▶ **Four Pump Control**  
System Pump with Parameter for Continuous Operation  
Boiler Pump with Variable Speed Control  
Domestic Hot Water Pump  
Domestic Hot Water Recirculation
- ▶ **Domestic Hot Water Prioritization**  
DHW tank piped with priority in the boiler loop  
DHW tank piped as a zone in the system with the pumps controlled by the SMART SYSTEM  
DHW Modulation Limiting  
Separately Adjustable Space Heat/DHW Switching Times
- ▶ **Building Management System Integration**  
0-10 VDC Input to Control Modulation or Setpoint  
0-10 VDC Modulation Rate Output  
0-10 VDC Input to Enable/Disable Call for Heat

- ▶ **Access to BMS Settings through Graphic LCD Display**
- ▶ **High-Voltage Terminal Strip**  
120 VAC / 60 Hertz / 1 Phase Power Supply  
Three Sets of Pump Contacts
- ▶ **Low-Voltage Terminal Strip**  
DHW Recirculation Pump Start/Stop  
24 VAC Device Relay  
Proving Switch Contacts  
Flow Switch Contacts  
Alarm on Any Failure Contacts  
Runtime Contacts  
DHW Thermostat Contacts  
3 Space Heat Thermostat Contacts  
System Sensor Contacts  
DHW Tank Sensor Contacts  
Outdoor Air Sensor Contacts  
Cascade Contacts  
0-10 VDC BMS External Control Contact  
0-10 VDC Boiler Rate Output Contacts  
0-10 VDC Variable Speed System Pump Signal Input  
0-10 VDC Signal to Control Variable Speed Boiler Pump  
Modbus Contacts
- ▶ **Time Clock**
- ▶ **Data Logging**  
Hours Running, Space Heating  
Hours Running, Domestic Hot Water  
Ignition Attempts  
Last 10 Lockouts
- ▶ **Maintenance Reminder**  
Custom Maintenance Reminder with Contractor Contact Information  
Installer Ability to De-activate Service Reminder
- ▶ **Low-Water Flow Safety Control & Indication**
- ▶ **Password Security**
- ▶ **Customizable Freeze Protection Parameters**

## STANDARD FEATURES

- ▶ **ENERGY STAR Most Efficient Product**
- ▶ **95% DOE AFUE Efficiency**
- ▶ **Modulating Burner with up to 10:1 Turndown**  
Direct Spark Ignition  
Low NOx Operation
- ▶ **ASME Stainless Steel Heat Exchanger**  
30 PSI ASME Relief Valve
- ▶ **Vertical & Horizontal Direct Vent**  
PVC, CPVC, Polypropylene or SS Venting up to 100 feet
- ▶ **Smart System Control**
- ▶ **Condensate Trap**
- ▶ **Other Features**  
Automatic Reset High Limit  
Adjustable High Limit w/Manual Reset  
Boiler Circulating Pump  
Zero Clearances to Combustible Materials  
12-Year Limited Warranty (See Warranty for Details)  
5-Year Limited Parts Warranty

## OPTIONAL EQUIPMENT

- CON-X-US® Remote Connect
- Modbus Communication
- BACnet MSTP
- Flow Switch
- Low-Water Cutoff w/Manual Reset & Test
- Alarm Bell
- Concentric Vent Kit
- Condensate Neutralization Kit
- BMS Gateway to LON or BACnet IP
- Multi-Temperature Loop Control
- Sidewall Vent Termination
- Wireless Outdoor Sensor
- LP Gas Conversion Kit
- ▶ **Firing Codes**  
M9 Standard Construction  
M7 California Code



## Money-Saving 95% Efficiency and Easier Than Ever to Install

The KNIGHT® fire tube wall mount boiler allows for a more flexible installation with top and bottom water connections\*\*. Multiple water connection locations add flexibility by allowing boiler connections as close as possible to the system piping, reducing installation cost, complexity and the amount of piping needed for a job.

The KNIGHT fire tube boiler operates with low pressure drop. The design incorporates a small volume of water in the heat exchanger allowing the boiler to be installed in a primary/secondary or a full-flow piped system. There is no need to change the piping to accommodate the boiler. The boiler adapts to the system. This flexibility allows for a faster, more cost-effective boiler upgrade.

\*\*Not included on WHN400



95% AFUE

The CON·X·US® mobile communication platform allows SMART SYSTEM to go where no other boiler has gone before.†



STACK FRAME



CON·X·US provides the ability to monitor and manage multiple KNIGHT heating boilers without ever stepping into the mechanical rooms. CON·X·US will send alerts via text or e-mail notifying of changes in system status, and anytime, from anywhere, a user can check system status and re-program any boiler function. Once downloaded, the free CON·X·US mobile application allows for remote access to all SMART SYSTEM functions using an internet-capable device.



## Updated SMART SYSTEM Control

Newest version of the SMART SYSTEM allows for easier setup and navigation of parameters. New features include DHW recirculation pump control, LOCK-N-LINK® USB programming, larger user interface, cascade leader redundancy and modulation factor for fine tuning aggressiveness.

## 10:1 Turndown Ratio Optimizes Performance

Modulation turndown up to 10:1 means the firing rate automatically changes as the heat load varies. A WHN111 KNIGHT boiler fires at its maximum 110,000 Btu/hr rate when load is highest, then “turns down” to as low as 10% (11,000 Btu/hr) as load decreases. A modulating boiler runs smoothly and efficiently, without frequent on/off cycling. \*\*Not included on WHN400

## Safe, Reliable NEG/REG Technology

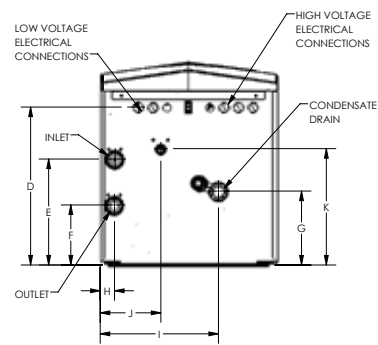
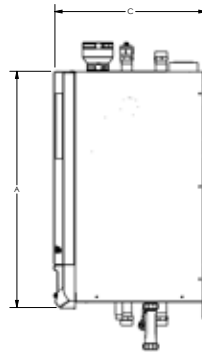
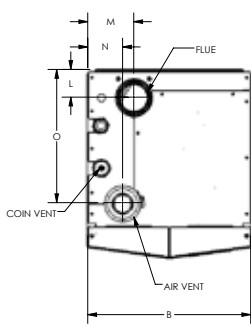
KNIGHT boilers can operate with low gas supply pressure. Negative Regulation uses a pre-mix gas system instead of relying on utility pressure through the gas valve. The result is steady operation in low gas pressure systems or when gas demand is highest. Automatic fan control fine-tunes the air/fuel ratio, providing superior combustion throughout the operating range.

## Superior Direct-Venting Flexibility

KNIGHT boilers can be installed with direct-vent air intake and exhaust runs up to 100 equivalent feet, using PVC, CPVC, polypropylene or AL29-4C stainless steel vent pipe.



# KNIGHT® Boiler Dimensions & Specifications



KNIGHT HEATING BOILER <small>AHRI CERTIFIED</small>						DIMENSIONS AND SPECIFICATIONS																			
Model Number	Input Max. MBH	Input Min. MBH	AFUE	Heating Capacity MBH	NET AHRI Rating MBH	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Ship Wt. (lbs)
WHN056	55	8.3	95%	51	44	33-1/4"	18-1/2"	16"	11-3/4"	9"	3-1/2"	3-3/4"	1-1/2"	3"	6-1/8"	7-1/4"	3-3/4"	6-1/2"	4-1/2"	8-1/2"	1/2"	1"	2"	2"	139
WHN086	85	8.5	95%	79	69	33-1/4"	18-1/2"	16"	11-3/4"	9"	3-1/2"	3-3/4"	1-1/2"	3"	6-1/8"	7-1/4"	3-3/4"	8-1/2"	4-1/2"	8-1/2"	1/2"	1"	2"	2"	142
WHN111	110	11	95%	102	89	33-1/4"	18-1/2"	19"	14-1/2"	8-3/2"	5"	7-3/4"	1-1/8"	12-3/8"	4-1/4"	11-1/4"	3"	5-1/4"	5-1/8"	10"	1/2"	1"	3"	3"	159
WHN156	155	15.5	95%	144	125	33-1/4"	18-1/2"	19"	14-1/2"	8-1/2"	5"	7-3/4"	1-1/8"	12-3/8"	4-1/4"	11-1/4"	3"	5-1/4"	5-1/8"	10"	1/2"	1"	3"	3"	166
WHN200	199.9	19.9	95%	185	161	33-1/4"	18-1/2"	19"	14-1/2"	11"	6-1/4"	7-3/4"	1-1/2"	12-3/8"	4-1/4"	9-1/2"	3"	5-1/4"	5-1/2"	10-3/4"	1/2"	1-1/4"	3"	3"	175
WHN286	285	28.5	95%	264	229	33-1/4"	18-1/2"	21-3/4"	16-1/2"	11-1/8"	6-1/4"	7-3/4"	1-1/2"	12-3/8"	16-3/8"	12-1/4"	3-1/8"	5-1/4"	4"	15-1/8"	1/2"	1-1/4"	3"	3"	184
WHN400	399	80	94.4%*	377#	328	35-1/2"	25"	21-3/4"	17-1/2"	12-1/2"	9-1/4"	9-1/2"	2-1/4"	13-1/4"	21-1/2"	9"	4-3/4"	4"	22-1/2"	3-3/4"	3/4"	1-1/2"	4"	4"	213

\*Thermal Efficiency%  
# Gross Output MBH

\*\*10:1 Turndown ratio and top and bottom water connections are not included on WHN400. WHN400 operates with a 5:1 turndown.

Information subject to change without notice. Change "N" to "L" for LP gas models. The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. The ratings have been determined under the provisions governing forced draft burners.

## SMART SYSTEM™ FEATURES

- ▶ **Smart System Digital Operating Control**  
Multi-Color Graphic LCD Display w/Navigation Dial,  
Soft Keys and Loch-N-Link USB programming
- ▶ **Three Boiler Setpoint Temperature Inputs**  
Plus Domestic Hot Water Prioritization
- ▶ **Built-in Cascading Sequencer for up to 8 Boilers, with Cascade Redundancy**  
Multiple Size Boiler Cascade  
Lead Lag  
Efficiency Optimization  
Front End Loading Capability
- ▶ **Outdoor Reset Control with Outdoor Air Sensor**  
Programmable for Three Reset Temperature Inputs
- ▶ **Programmable System Efficiency Optimizers**  
SH Night Setback  
DHW Night Setback  
Anti-Cycling  
Outdoor Air Reset Curve  
Ramp Delay  
Modulation Factor Control  
Boost Temperature & Time
- ▶ **Four Pump Control**  
System Pump with Parameter for Continuous Operation  
Boiler Pump with Variable Speed Control  
Domestic Hot Water Pump  
Domestic Hot Water Recirculation
- ▶ **Domestic Hot Water Prioritization**  
DHW tank piped with priority in the boiler loop  
DHW tank piped as a zone in the system with the pumps controlled by the SMART SYSTEM  
DHW Modulation Limiting  
Separately Adjustable Space Heat/DHW Switching Times
- ▶ **Building Management System Integration**  
0-10 VDC Input to Control Modulation or Setpoint  
0-10 VDC Modulation Rate Output  
0-10 VDC Input to Enable/Disable Call for Heat
- ▶ **Access to BMS Settings through Graphic LCD Display**

- ▶ **High-Voltage Terminal Strip**  
120 VAC / 60 Hertz / 1 Phase Power Supply  
Three Sets of Pump Contacts
- ▶ **Low-Voltage Terminal Strip**  
DHW Recirculation Pump Start/Stop  
24 VAC Device Relay  
Proving Switch Contacts  
Flow Switch Contacts  
Alarm on Any Failure Contacts  
Runtime Contacts  
DHW Thermostat Contacts  
3 Space Heat Thermostat Contacts  
System Sensor Contacts  
DHW Tank Sensor Contacts  
Outdoor Air Sensor Contacts  
Cascade Contacts  
0-10 VDC BMS External Control Contact  
0-10 VDC Boiler Rate Output Contacts  
0-10 VDC Variable Speed System Pump Signal Input  
0-10 VDC Signal to Control Variable Speed Boiler Pump  
Modbus Contacts
- ▶ **Time Clock**
- ▶ **Data Logging**  
Hours Running, Space Heating  
Hours Running, Domestic Hot Water  
Ignition Attempts  
Last 10 Lockouts
- ▶ **Maintenance Reminder**  
Custom Maintenance Reminder with Contractor Contact Information  
Installer Ability to De-activate Service Reminder
- ▶ **Low-Water Flow Safety Control & Indication**
- ▶ **Password Security**
- ▶ **Customizable Freeze Protection Parameters**

## STANDARD FEATURES

- ▶ **95% DOE AFUE Efficiency (56-286)**
- ▶ **Modulating Burner with up to 10:1 Turndown\*\***  
Direct Spark Ignition  
Low NOx Operation
- ▶ **ASME Stainless Steel Heat Exchanger**  
30 PSI ASME Relief Valve
- ▶ **Top and bottom water connections (MNPT)\*\***
- ▶ **Vertical & Horizontal Direct Vent**  
PVC, CPVC, Polypropylene or SS Venting up to 100 feet
- ▶ **SMART SYSTEM Control**
- ▶ **Condensate Trap**
- ▶ **Other Features**  
Automatic Reset High Limit  
Adjustable High Limit w/Manual Reset  
Boiler Circulating Pump  
Zero Clearances to Combustible Materials  
15-Year Limited Warranty (See Warranty for Details)  
5-Year Limited Parts Warranty

## OPTIONAL EQUIPMENT

- CON-X-US Remote Connectivity
- Modbus Communication
- BACnet MSTP
- Flow Switch
- Low-Water Cutoff w/Manual Reset & Test Alarm Bell
- Concentric Vent Kit
- Condensate Neutralization Kit
- BMS Gateway to LON or BACnet IP
- Multi-Temperature Loop Control
- Sidewall Vent Termination
- Wireless Outdoor Sensor
- LP Gas Conversion Kit
- ▶ **Firing Codes**  
M9 Standard Construction  
M7 California Code

# NOBLE™ FIRE TUBE COMBI

## A Game-Changer In Combi Water Heating

Lochinvar has long been the innovation leader in commercial boilers - and now it's bringing that engineering excellence to residential combi boilers. Lochinvar's legendary reliability and performance are now available for apartments and homes, where the combi boiler's next-generation fire tube design can provide hot water supply and space heating faster and more efficiently than ever before.

The NOBLE™ combi boiler provides a space-saving choice for builders and specifiers, lowering installation costs by reducing the mechanical equipment needed to provide rapid, reliable hot water supply and efficient space heating. It also gives plumbing contractors a money-saving alternative for single-family housing with 1 or 2 bathrooms.



95% AFUE

Lochinvar  
SMART CONTROL™



### Advanced Electronic Control

The backlit, user-friendly LCD display provides diagnostic information and system status in *real words, not codes*. The Set-Up Wizard display makes it simple to set system parameters in just minutes.

### What makes the NOBLE The Best Combi Boiler?

#### DELIVERS MORE HOT WATER

It's sized large enough to quickly meet domestic hot water (DHW) load. Provides DHW from 2.6 (NKC110) to 4.8 gpm (NKC199) at a 77°F temperature rise.

#### FASTER DHW RESPONSE TIME

With many combi boilers, when you turn on a hot water faucet, you initially get hot water and then a brief burst of cold water before the hot water resumes. Thanks to its patent-ending control technology, this combi boiler eliminates this cold water "sandwich".

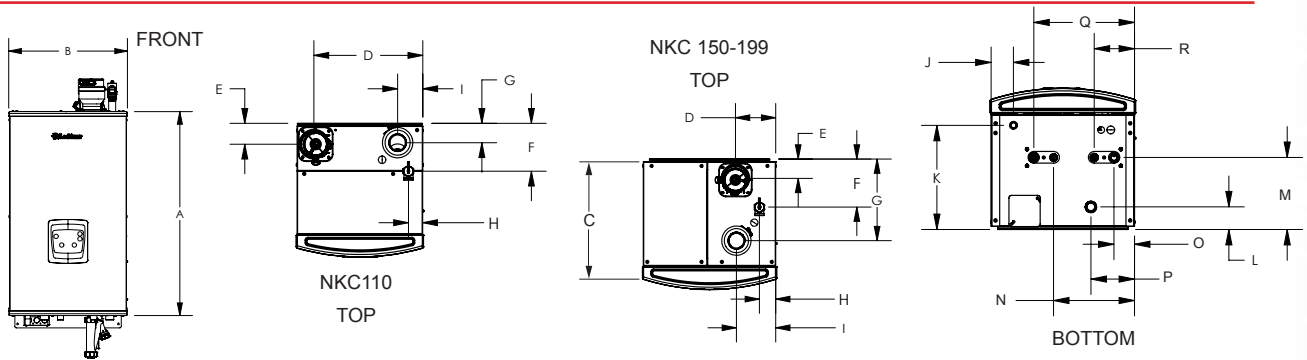
#### 10:1 TURNDOWN RATIO

Operates as low as 10% of the maximum firing rate, preventing on/off short cycling at the lowest DHW demands or small heating demands.



# NOBLE™ Combi Boiler Dimensions & Specifications

NOBLE™  
FIRE TUBE COMBI



NOBLE COMBI BOILER						DIMENSIONS AND SPECIFICATIONS						
Model Number	Input Max. MBH	Input Min. MBH	AFUE	Heating Capacity MBH	NET AHRI Rating MBH	A	B	C	D	E	F	G
NKC110N	110	11	95.0%	102	89	32-1/2"	17-1/4"	18"	14-3/4"	2-3/4"	6-1/2"	2-3/4"
NKC150N	150	15	95.0%	139	121	32-1/2"	18-3/4"	18"	6-3/4"	2-3/4"	6-3/4"	11-3/4"
NKC199N	199	20	95.0%	185	161	32-1/2"	18-3/4"	18"	5-1/2"	2-3/4"	6-3/4"	11-1/2"

Model Number	H	I	J	K	L	M	N	O	P	Q	R	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Ship Wt. (lbs)
NKC110N	2"	3-1/2"	8-3/4"	13-1/2"	2-3/4"	9"	10-1/2"	5"	14-1/2"	12-3/4"	5"	1/2"	1"	3"	3"	139
NKC150N	2-1/2"	6-1/4"	2-3/4"	13-1/2"	3"	9"	11-1/2"	5"	6-1/4"	13-3/4"	6"	1/2"	1"	3"	3"	142
NKC199N	2-1/4"	5-1/2"	2-3/4"	13-1/2"	2-3/4"	9 1/2"	10-1/2"	2-3/4"	5-1/2"	13"	5-1/4"	1/2"	1"	3"	3"	159

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models. \*The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.

## SMART SYSTEM™ FEATURES

- › Smart System Digital Operating Control
- › SMART CONTROL Digital Operating Control  
LCD Display with words not codes
- › Outdoor Reset Control with Outdoor Air Sensor
- › Programmable System Efficiency Optimizers  
DHW Response Time  
DHW Pre Heat  
Outdoor Air Reset Curve
- › Two Pump Control  
System Pump  
Boiler Pump
- › High-Voltage Junction Box  
120 VAC / 60 Hertz / 1 Phase Power Supply
- › Low Voltage Terminal Strip  
Air Handler Interlock  
Flow Switch Contacts  
Low-Water Cutoff Connection  
System Sensor Contacts  
Outdoor Air Sensor Contacts  
Cascade Contacts
- › Time Clock for Data Logging  
Last 10 Lockouts
- › Low-Water Flow Safety Control & Indication
- › Password Security
- › Built-in Cascading Sequencer for up to 8 units

## STANDARD FEATURES

- › ENERGY STAR Most Efficient Recognition
- › 95% DOE AFUE Efficiency
- › Modulating Burner with 10:1 Turndown  
Direct-Spark Ignition  
Low-NOx Operation
- › ASME Stainless Steel Heat Exchanger  
50 psi Working Pressure w/ASME Relief Valve
- › Vertical & Horizontal Direct-Vent  
PVC, CPVC, Polypropylene or SS Venting up to 100 feet
- › Condensate Trap
- › Other Features  
Automatic Reset High Limit  
Adjustable High Limit w/Manual Reset  
Built-in Circulating Pump  
Wall-Mount Bracket  
Zero Clearances to Combustible Materials  
10-Year Warranty  
(See Warranty for Details)  
5-Year Parts Warranty

## OPTIONAL EQUIPMENT

- Low-Water Cutoff w/Manual Reset & Test
- Concentric Vent Kit
- Condensate Neutralization Kit
- Sidewall Vent Termination
- Floor Stand
- Wireless Outdoor Sensor
- Nat to LP Gas Conversion Kit
- Isolation/Flush Valves

## FIRING CODES

- › M9 Standard Construction/California Code

\*Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.  
\*The ratings have been determined under the provisions governing forced draft burners.



## The Best All-Around Value in Today's Home Heating Market

This modulating/condensing residential heating boiler offers fuel cost savings and outstanding quality at lower cost than other high-efficiency designs. With gas inputs from 40,000 to 120,000 Btu/hr, these wall-mount boilers can handle the heating load for almost any home.

### Stainless Steel Heat Exchanger with ASME 'H' Stamp

A commercial-grade ASME certified heat exchanger exemplifies the highest standards for design, materials and manufacturing.

### Fully Modulating Burner

Modulation adjusts the firing rate of the boiler to match the heat loss of the home, reducing burner cycling and increasing overall system efficiency.

### Outdoor Reset with Sensor

Monitors outdoor temperature to help CADET maintain a steady, consistent indoor comfort level year-round. Allows boiler control to "reset" indoor water temperature as needed when outdoor temperatures fluctuate.



### Push-Button Digital Control

Constant display of actual output temperature, and easy adjustment of setpoint.

### Venting Versatility

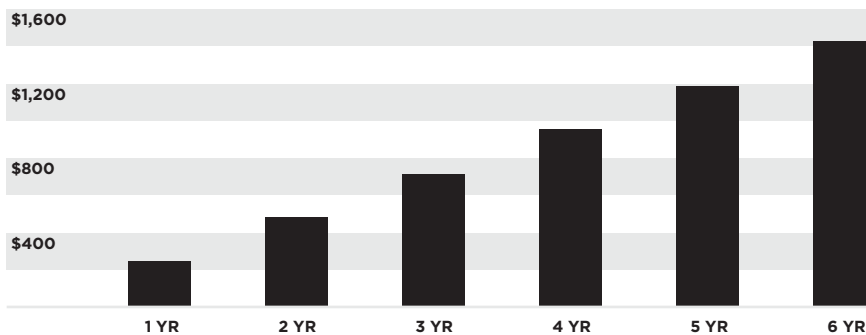
CADET can be installed with a variety of venting configurations, including vertical or sidewall direct venting. Air intake and exhaust vent runs up to 100 feet can be utilized to meet the most challenging installation requirements. 3" polypropylene, PVC, CPVC or stainless steel pipe can be used. This venting flexibility is ideal for projects that will require new vent material when a non-condensing boiler is being replaced.

### Expanded Polypropylene (EPP) Jacket

Lightweight for easier handling. Deadens sound for quieter operation. Highly dent and scratch-resistant.

### 94% AFUE Efficiency Reduces Heating Bills

For example, over 6 years, CADET could save over \$1,400 in fuel costs.\* Depending on where it is installed, CADET may qualify for Energy Tax Credits.



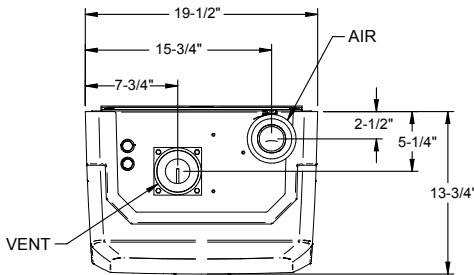
\*Fuel savings are compared to an 80% AFUE boiler and based on a 70,000 Btu heating load with 2,000 hours of operation with a fuel cost of \$1.13 per therm.



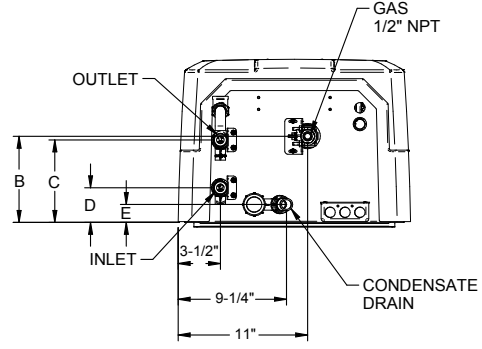
# CADET® Boiler Dimensions & Specifications

**CADET**  
 HEATING BOILER

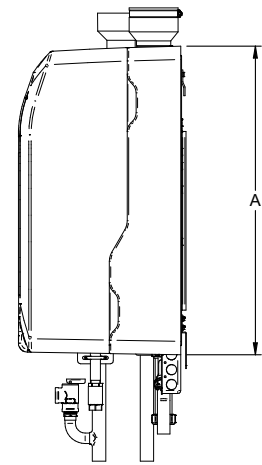
**Top View**



**Bottom View**



**Side View**



Model Number	Input Max. MBH	Input Min. MBH	AFUE	Heating Capacity MBH	Net AHRI RATING MBH	A	B	C	D	E	Water Conn.	Air Inlet	Vent Size	Ship Wt. (lbs)
CDN040	40	9	94%	37	32	26"	4-1/4"	5-1/4"	4"	2-1/2"	3/4"	2"	2"	94
CDN070	70	14	94%	65	57	26"	4-1/2"	5-3/4"	3"	1-1/2"	1"	2"	2"	98
CDN100	100	20	94%	93	81	26"	6"	5-3/4"	3"	1-1/2"	1"	2"	2"	102
CDN120	120	24	94%	112	97	26"	7-1/4"	7"	3"	1-1/2"	1"	3"	3"	108

**STANDARD FEATURES**

- 94% AFUE Efficiency
- Modulating Burner
- Direct-Spark Ignition
- Low-NOx Operation
- Field Convertible from Natural to LP Gas
- ASME Heat Exchanger
- 30 psi ASME Relief Valve
- Freeze Protection
- Vertical & Horizontal Direct-Vent
- PVC, CPVC, Polypropylene or SS Venting up to 100 feet
- Push-Button Digital Control
- Outdoor Temperature Reset (sensor included)
- Boiler Pump Control
- DHW Pump Control
- Expanded Polypropylene Jacket
- 10-Year Limited Warranty
- 5-Year Parts Warranty

**OPTIONAL EQUIPMENT**

- Concentric Vent Kit
- Sidewall Vent Termination
- 2" to 3" CPVC Vent Connection Kit
- Flow Switch
- Condensate Neutralization Kit
- Floor Stand
- Low Water Cut-off w/ Manual Reset and Test

## Flexibility is the Solution™

What could be better than a high-efficiency boiler that saves space, saves money and helps resolve all your heating problems? How about one that's lightweight and simple to install too! That's the Solution™ boiler by Lochinvar®. From the highly efficient copper finned tube heat exchanger, to our own specially designed two-stage electronic control system, the Solution boiler offers these features and many more in models up to 260,000 Btu/hr. Plus, all Solution boilers are equipped with top water connections, a built-in draft hood, and are approved for installation on combustible floors.

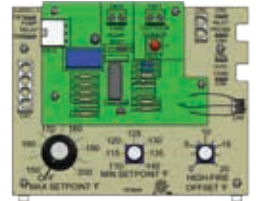


### Copper Finned Tube Heat Transfer

The heart of the Solution boiler is its copper finned-tube heat exchanger. With this unique gasketless design, we've combined the best of both worlds: cast iron headers for long-lasting durability, and a copper finned-tube heat exchanger for high efficiencies and fast heat transfer. The gasketless design reduces the risk of leaks or system failures that are common with conventional boilers. Plus, the unit's low-mass design means that water gets heated quickly. Not only is heat up time nearly instantaneous with the Solution boiler, the energy consumption and operating costs are lower too, with a rating of 84% AFUE.

### Two-Stage Control

The Solution boiler's two-stage electronic temperature control with built-in outdoor reset provides flexibility and saves fuel by closely matching heat output to system demand. On colder days the boiler fires at full output, and in warmer conditions the Solution boiler reduces the setpoint heat output to save energy and reduce boiler cycling.



During the majority of the heating season, less than full boiler output is required to satisfy the heat load. For this reason Lochinvar has developed a two-stage firing system. Two-stage firing - standard equipment on all Solution boilers, provides dramatic fuel savings by reducing the firing rate 50%. Two-stage firing is ideal for applications utilizing indoor/outdoor reset and is advantageous in systems where the Solution boiler is used with an Squire indirect water heater to produce domestic hot water.

### PVC/CPVC Vent Kit (optional)



Vent up to 25' out a sidewall or rooftop with PVC/CPVC (CB 45-135).

### Simple To Service

The Solution boiler is as flexible and convenient as it is efficient and compact. For example, the heavy-duty stainless steel burners can easily be adapted for use with either natural or liquefied petroleum (LP) gas. What's more, Solution boilers allow easy access to all major components for servicing. We even designed the heat exchanger to slide out the front of the boiler for faster maintenance, and we back it all up with our exclusive 20-year Limited Warranty.

### Built-In Piping Solutions

Other boilers often require system piping upgrades which are cumbersome and expensive. The Solution boiler eliminates this problem with its built-in, performance loop. The loop maintains constant flow through the boiler when only a single zone of the system is calling for heat. This helps maintain peak system performance by keeping the copper heat transfer surface clean and operating at top efficiency. And the top water connections make replacements a snap by fitting into existing piping arrangements without additional elbows and connections.

You can depend on Lochinvar, and you can depend on the Solution boiler to deliver the comfort, convenience, and reliability you need. For more information, call your Lochinvar dealer today.

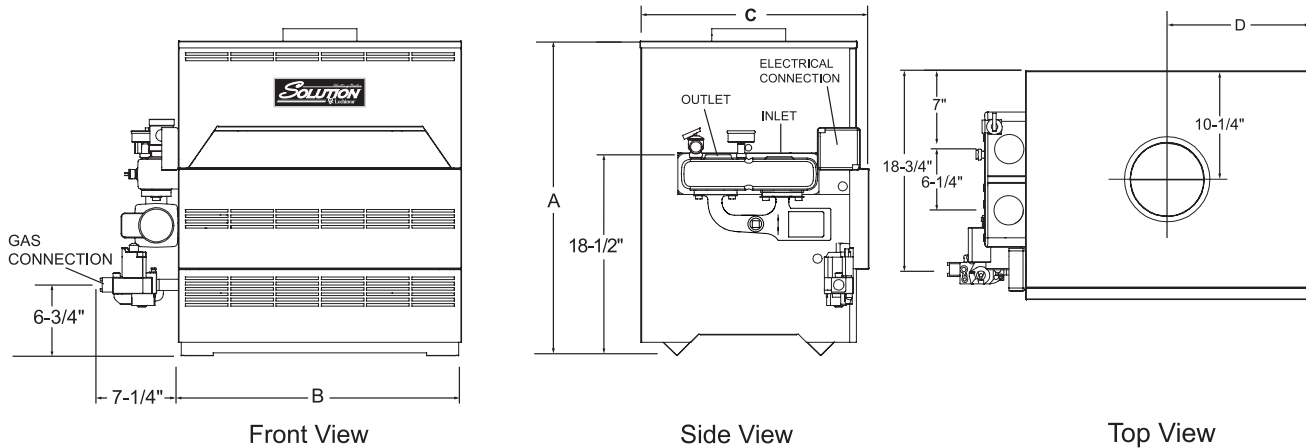


**84% AFUE**

**STACK FRAME**



# Solution® Boiler Dimensions & Specifications



Solution Heating Boiler					Dimensions & Specifications						
Model Number	Input Max MBH	AFUE	Heating Capacity MBH	Net AHRI Rating MBH	A	B	C	D	Gas Conn.	Vent Size	Ship Wt.(lbs)
CBN045	45	84.0%	37	32	29-1/2"	11-1/2"	21-1/2"	5-3/4"	1/2"	4"	145
CBN075	75	84.0%	62	54	29-1/2"	15-1/2"	21-1/2"	7-3/4"	1/2"	5"	155
CBN090	90	84.0%	75	65	29-1/2"	15-1/2"	21-1/2"	7-3/4"	1/2"	5"	155
CBN135	135	84.0%	112	97	29-1/2"	19-1/2"	21-1/2"	9-3/4"	1/2"	6"	175
CBN180	180	84.0%	149	130	29-1/2"	23-1/2"	21-1/2"	11-3/4"	3/4"	7"	195
CBN215	215	84.0%	178	155	29-1/2"	26-1/2"	21-1/2"	13-1/4"	3/4"	7"	220
CBN260	260	84.0%	216	188	29-1/2"	29-1/2"	21-1/2"	14-3/4"	3/4"	8"	225

**Notes:** Change 'N' to 'L' to denote L.P. gas models  
 Net ratings based on piping and pick-up allowance of 1.15  
 Electrical Requirements: 120 VAC / 2 AMP  
 Approved for indoor installation only  
 Water connections are 1-1/2" NPT  
 Performance data based on manufacturer test results.

## STANDARD FEATURES

- ASME Copper Finned Tube Heat Exchanger
- Gasketless Heat Exchanger Design
- Built-In Performance Loop
- Top Water Connections
- 24 Volt Control System
- Self Diagnostic Ignition Control
- Terminal Strip
- Intermittent Electronic Ignition
- Two Stage Solid State Temperature Control
- Outdoor Reset with Outdoor Sensor
- System Sensor
- Two Stage Gas Valve w/ Built In Manual Shut-Off
- Domestic Hot Water Priority
- 160 PSI Working Pressure
- Pump Relay
- Automatic Reset High Limit
- ASME Pressure Relief Valve
- Temperature & Pressure Gauge
- Automatic Vent Damper
- Built-In Draft Diverter
- Stainless Steel Burners
- Loch-Heat Ceramic Tile Combustion Chamber
- CSA Design Certified for Installation on Combustible Floors
- CSA Design Certified for Alcove Installation
- 20 Year Limited Warranty on the Heat Exchanger (see warranty for details)
- 2-Year Parts Warranty

## OPTIONAL EQUIPMENT

- Adjustable High Limit w/ Manual Reset
- Flow Switch
- Low Water Cut-Off
- Stack Frame
- Pump Delay w/ Freeze Protection
- MP<sup>2</sup> Sequencer
- PVC/CPVC Venting Kit (CB 45-135)
- O<sup>2</sup> Barrier

## FIRING CONTROL SYSTEMS

- M9 Two Stage, Intermittent Spark Ignition
- M7 California Code (CB215-260 only)

## What is a Buffer Tank/Hydraulic Separator?

A Buffer Tank/Hydraulic Separator is designed to maximize the runtime and limit the on/off cycling of a boiler while separating the boiler flow from the system flow. In applications where the minimum system load is less than the minimum output of the boiler, there is a high propensity for the boiler to excessively cycle on and off due to the fact that the boiler is delivering more BTU's than the system is requiring. In this case the Buffer Tank is designed to act as a battery for BTU's. The system demand is met by using BTU's that are already stored in the tank and thus delaying the boiler from initiating a heating cycle until a minimum run time can be accomplished.

The Hydraulic Separator aspect of the tank is designed to de-couple the hydronic heating system flow from the boiler flow by acting as a "separator" so that the two independent flows do not affect one another. When the system flow is less than the minimum required boiler flow there will likely be erratic system delivery temperatures and excessive boiler cycling. These adverse affects can cause premature component failure, and in most cases, boiler efficiency will be adversely affected.

## When Should a Buffer Tank/Hydraulic Separator be Applied?

A Buffer Tank/Hydraulic Separator can be applied to keep the boiler from short cycling in situations where the smallest building demand is less than the minimum rated output of the boiler and/or in situations where system flow is less than the flow required by the boiler.



## How is a Buffer Tank/Hydraulic Separator Sized?

A Buffer Tank/Hydraulic Separator is sized to provide a minimum runtime for the boiler plant. Use the equation below to find the properly sized tank for your specific application. Tank connection diameters should be sized to meet the maximum flow requirements of the application.

$$\text{Buffer Tank Capacity} = \frac{\text{Desired Run Time} \times (\text{Minimum Boiler Output} - \text{Minimum System Load})}{\text{System } \Delta T \times 8.33 \times 60}$$

- Desired Runtime- The Minimum period of time that the boiler should run before cycling off.
- Lochinvar recommends a minimum boiler runtime of no less than 10 minutes.
- Minimum Boiler Output- The amount of BTU's that will be delivered at the minimum firing rate of the smallest boiler in the plant.
- Minimum System Load- The absolute smallest heat demand of the building.
- System Delta T- The difference between the system supply temperature and system return temperature.
- 8.33- The weight of one gallon of water.
- 60- The number of minutes in 1 hour

## Buffer Tank / Hydraulic Separator Dimensions and Specifications

Model Number	Gallon Capacity	A	B	C	D	E	Standard Conn. Size	Ship. Wt. (lbs)
BVU120	120	59-1/2"	32"	32"	43-3/4"	13-3/4"	3" NPT	500
BVU200	200	89-1/2"	32"	32"	73-3/4"	13-3/4"	3" NPT	900
BVU300	300	80"	40"	50"	57-1/2"	26-1/2"	4" Flange	1,290
BVU400	400	80"	46"	56"	55"	29"	6" Flange	1,626
BVU500	500	91"	46"	56"	66"	29"	6" Flange	1,765
BVU750	750	104"	52"	62"	77"	31"	6" Flange	2,330
BVU1000	1000	128"	52"	62"	101"	31"	6" Flange	3,010

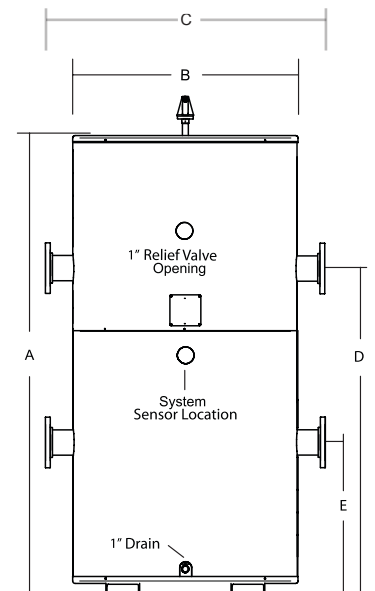
*Notes: Custom Sizes and Configurations are Available, consult Factory for details.  
Additional Recirculation & Supply/Return Connections Sizes Available, consult Factory for details.*

### STANDARD FEATURES

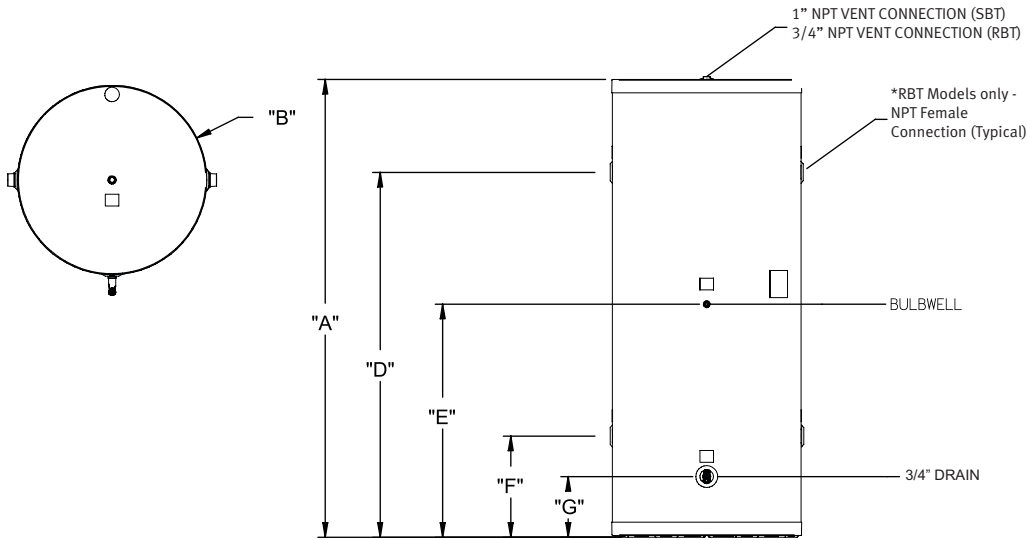
- ASME Sec. VIII U Stamp
- 125psi (Max. Allowable Working Pressure)
- Automatic Air Vent
- 5 Year Limited Warranty
- Pre-painted Jacket
- 2" HCFC Free Foam Insulation

### OPTIONAL EQUIPMENT

- Temperature and Pressure Gauge
- Handhole
- Manway (300 gallons and larger)
- Custom Tapping Locations
- Custom Tapping Diameters
- Extra Tappings
- Custom Tank Sizes
- Flange or NPT Connections
- Relief Valve (Shipped Loose)



## Hydronic Stainless Steel Buffer Tank Dimensions and Specifications



**Squire**<sup>®</sup>  
Stainless Steel Buffer Tanks  
**BUFFER TANK**

Model Number	Gallon Capacity	A	B	D	E	F	G	Supply/Return Conn.	Ship Wt. (lbs)
SBT030	30	39-1/2"	20	28-3/4"	20-1/4"	11-3/4"	7-3/4"	1-1/2" NPT	70
SBT050	50	47	24	33-3/4"	24-1/4"	14-3/4"	8-3/4"	1-1/2" NPT	120
SBT080	80	69-1/2"	24	55-3/4"	35-1/4"	14-3/4"	8-3/4"	2" NPT	153
SBT119	119	68-1/4"	28	54-3/4"	34-1/4"	15"	9"	2" NPT	198

### STANDARD FEATURES

- R-13.4 HCFC free foam insulation for minimal heat loss
- Textured, impact resistant polymer jacket
- Light-weight 316L stainless steel tank construction
- Bulbwell
- Drain and air vent connections
- 5 year tank warranty

## Hydronic Buffer Tank Dimensions and Specifications

Model Number	Gallon Capacity	A	B	D	E	F	G	Supply/Return Conn.	Ship Wt.(lbs)
RBT030	30	34-1/2"	20-1/2"	24-1/4"	17-1/8"	9-1/2"	4"	1-1/2" NPT	70
RBT050	50	53-7/8"	20-1/2"	41-5/8"	25-3/4"	9-1/2"	3-3/4"	1-1/2" NPT	120
RBT080	80	58-3/8"	24"	46-1/4"	29"	11-3/4"	3-3/4"	2" NPT	153
RBT119	119	61-5/8"	29-1/2"	48-1/2"	30-1/8"	11-3/4"	3-3/4"	2" NPT	198

### STANDARD FEATURES

- Glass-lined Steel Tank
- High Density Foam Insulation
- Drain Valve
- Air Vent Connection
- Bulbwell
- 3-Year Tank Warranty



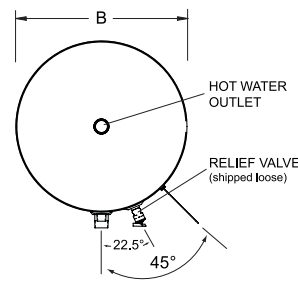
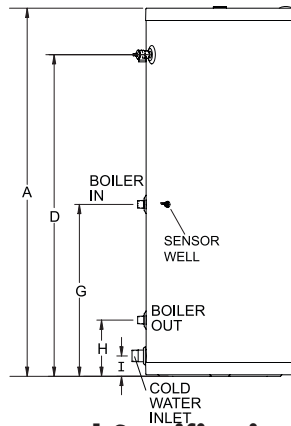


## A New Class of Water Heater

- 17 Total Squire Models
  - 6 Standard models from 30 to 119 Gallons
  - 3 Dual Coil Models for Dual Source or High Capacity 65 to 119 Gallons
  - 3 Electric Back-up Models 65 to 119 Gallons
  - 5 Double Wall Models 40 to 119 Gallons
- 316L Passivated Stainless Steel Tank
- 316L High Capacity Stainless Steel Coil
- Fully Welded Construction
- HCFC Free Foam Insulation
- Limited Lifetime Warranty



## Stainless Steel Indirect SIT Models Dimensions and Specifications



## SIT Models SIT\*\*\* (DW) Double Wall Models

### SIT Models Dimensions and Specifications

Model Number	A	B	D	G	H	I	Domestic Water Conn.	Coil Conn. Size	Ship. Wt. (lbs)
SIT030	39-1/2"	20"	32-1/4"	21-3/4"	8-1/4"	3"	1"	1"	79
SIT040(DW)*	55-1/2"	20"	48-1/2"	25-1/4"	8-1/4"	3"	1"	1"	105
SIT050(DW)	47"	24"	39-3/4"	24-1/2"	9-1/4"	3-3/4"	1"	1"	131
SIT065(DW)	60"	24"	52-1/4"	28"	9-1/4"	3-1/4"	1-1/2"	1"	147
SIT080(DW)	69-1/2"	24"	61-3/4"	28"	9-1/4"	3-1/4"	1-1/2"	1"	177
SIT119(DW)	68-1/4"	28"	60-1/4"	31-3/4"	9-1/4"	3-1/4"	1-1/2"	1"	213

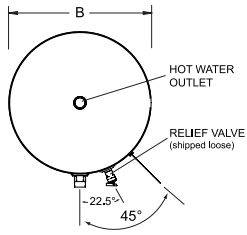
\*SIT040(DW) "A" = 38-1/4" and "B" = 24", All other model dimensions are same for single and double wall models

Model Number	Capacity (Gallons)	Heat Source Water Volume (Gallons)	Standby Loss (°F/Hr)	Continuous Delivery (GPH)	1st Hour Delivery (Gallons)	Min. Coil Load (Btu/Hr)	Flow Rate (GPM)	Friction Loss (Ft. Hd.)
SIT030	27	1.1	1.5	160	183	99,000	14.0	3.9
SIT040	40	1.6	0.9	181	208	115,000	14.0	4.5
SIT050	52	1.7	0.9	209	255	133,000	14.0	5.3
SIT065	67	1.9	0.7	263	327	154,000	14.0	5.7
SIT080	82	2.1	0.6	266	347	160,000	14.0	5.7
SIT119	113	3.2	0.5	349	459	199,999	14.0	6.5

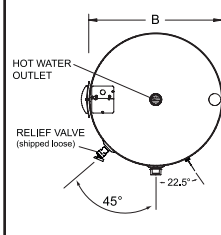
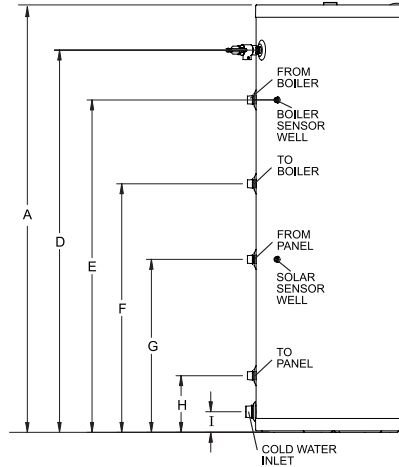
Performance data is based on I=B=R test results. All ratings are based on 180°F boiler water temperature. Ratings for Double Wall models are decreased. Please reference sales literature (SDW-02). Includes tank sensor for use with KNIGHT Heating Boiler.

Optional thermostat available for use with other boiler models.

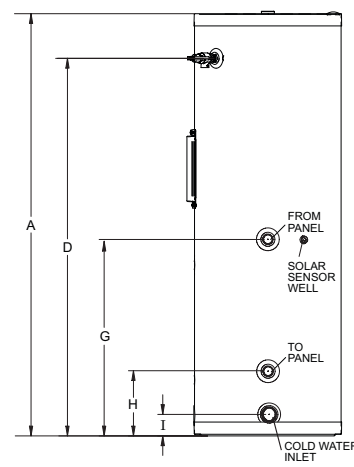
## Stainless Steel Indirect SDT & SET Models Dimensions and Specifications



### SDT Models



### SET Models



### SDT Models Dimensions and Specifications

Model Number	A	B	D	E	F	G	H	I	Domestic Water Conn.	Coil Connection Size	Ship Wt. (lbs)
SDT065	60"	24"	52-1/4"	47-1/4"	33-3/4"	28"	9-1/4"	3-1/4"	1-1/2"	1"	158
SDT080	69-1/4"	24"	61-3/4"	53-3/4"	40-1/4"	28"	9-1/4"	3-1/4"	1-1/2"	1"	188
SDT119	68"	28"	60-1/4"	54-1/2"	37-1/2"	31-3/4"	9-1/4"	3-1/4"	1-1/2"	1"	224

Model Number	Capacity (Gallons)	Solar Heat Source Water Volume (Gals.)	Boiler Heat Source Water Volume (Gals.)	Standby Loss (°F/Hr)	Continuous Delivery (GPH)	1st Hour Delivery (Gallons)	Min. Coil Load (Btu/Hr)	Flow Rate (GPM)	Friction Loss (Ft. Hd.)
SDT065	65.5	2.1	1.7	0.7	174.6	204.7	128,000	14.0	3.4
SDT080	78.4	2.1	1.7	0.6	174.6	207.1	128,000	14.0	3.4
SDT119	109.8	3.2	2.6	0.5	250.2	300.5	181,000	14.0	4.9

*Performance data based on incoming cold water at 50°F and a Delta T of 77°F. Delivery ratings for boiler coil only. Includes tank sensor for use w/ KNIGHT Heating Boiler.*

### SET Models Dimensions and Specifications

Model Number	A	B	D	F	H	I	Domestic Water Conn.	Coil Conn. Size	Ship Wt. (lbs)
SET065	60"	24"	52-1/4"	28"	9-1/4"	3-1/4"	1-1/2"	1"	149
SET080	69-1/2"	24"	61-3/4"	28"	9-1/4"	3-1/4"	1-1/2"	1"	179
SET119	68-1/4"	28"	60-1/4"	31-3/4"	9-1/4"	3-1/4"	1-1/2"	1"	215

Model Number	Capacity (Gallons)	Solar Heat Source Water Volume (Gallons)	Standby Loss (°F/Hr)	Electric Continuous Delivery (GPH)	Electric 1st Hour Delivery (Gallons)
SET065	67.0	1.9	0.7	23.9	54.0
SET080	80.9	2.1	0.6	23.9	56.4
SET119	112.4	3.2	0.5	23.9	74.2

*All SET models: 4500w 240v 1 phase.*

## Another Space-Saving Idea

Lochinvar's technology not only makes our water heaters and boilers more efficient, they also have a smaller footprint. So they save space, as well as operating costs.

And now there's a way to get greater flexibility and reliability, save even more space, and get a system that's perfectly matched to a facility—thanks to the Stack Frame from Lochinvar.

## Match Load And Capacity

With this versatile frame, you can stack almost any combination of our ARMOR™, KNIGHT®, Copper-Fin®, Copper-Fin II®, and Solution™ water heaters and boilers so you can achieve the perfect Btu/hr capacity for each application.

For example, a facility needs a Copper-Fin II boiler with a total capacity of 1.6 million Btu/hr. Instead of installing an oversized CHN1802 unit or a smaller CHN1442 model, now you can combine two units – CHN0992 and CHN0652 models— to exactly match the facility's needs.

Plus, the total footprint of this combined system is just over 10 inches wider than the CHN0652 unit alone, making it smaller than either the CHN1802 or CHN1442 model. All thanks to the Lochinvar Stack Frame.



*Our compact KNIGHT® requires even less space when stacked on a Stack Frame.*

## No Assembly Required

Lochinvar's Stack Frame is fully factory assembled and shipped in one piece. The frame is welded using square steel tubing by certified welders. Each frame is designed and tested for each specific application.

## Added System Benefits

This modular design provides two other important benefits. First, it allows for system turndown for greater efficiency when demand is lower. And second, it ensures against system failure by utilizing two independent but complimentary units.

For residential and light commercial needs or commercial applications of up to 4 million Btu/hr the Stack Frame gives greater flexibility without a significant increase in stack size or overall system dimensions.

Once you've determined a facility's requirements and the exact models needed, utilize the charts provided to calculate total system dimensions.

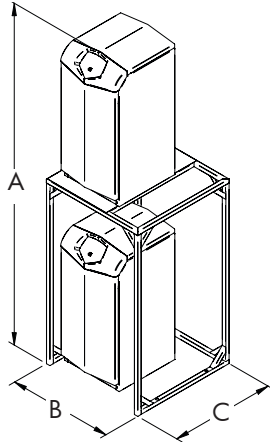
**NOTE: Stack Frames are for indoor applications only.**

## KNIGHT® Heating Boilers (Models 081-801)

## Solution™ Boilers (Models 045-500)

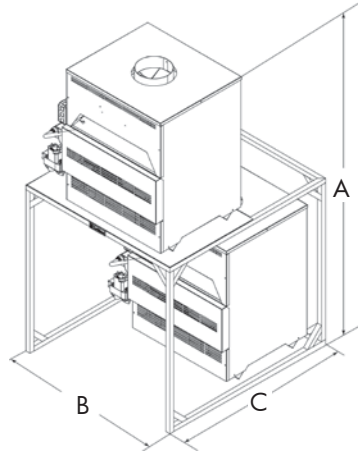
## Knight® Wall Mount Boilers (Models 55-399)

## Cadet™ Boilers (Models 40-120)



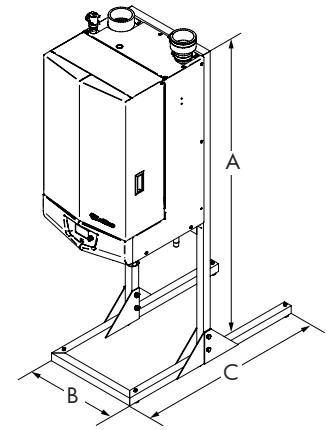
MODEL #	PART #	A*	B**	C	Wt. (lbs)
KB 081-211	MSF3043	90-1/2"	26"	26"	60
KB 286-501	MSF3044	109"	26"	34"	72
KB 601-801	MSF3052	109"	26"	43"	94

**Note:** Heater height is 33-1/4" KB 81-121  
Heater height is 42-1/2" KB 286-501



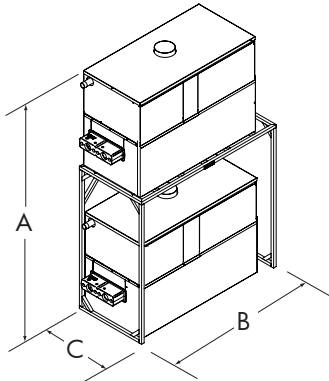
MODEL #	PART #	A*	B**	C	Wt. (lbs)
CB 045	MSF 3034	65-1/2"	36"	39"	73
CB 075	MSF 3034	65-1/2"	36"	39"	73
CB 090	MSF 3034	65-1/2"	36"	39"	73
CB 135	MSF 3034	65-1/2"	36"	39"	73
CB 180	MSF 3034	65-1/2"	36"	39"	73
CB 215	MSF 3035	65-1/2"	48"	39"	84
CB 260	MSF 3035	65-1/2"	48"	39"	84
CB 315	MSF 3035	65-1/2"	48"	39"	84
CB 360	MSF 3035	65-1/2"	48"	39"	84
CB 399	MSF 3036	65-1/2"	65"	39"	147
CB 500	MSF 3036	70-1/2"	65"	39"	147

**Note:** Heater height is 29-1/2" (45 - 399) and 34-1/2" (500).



PART #	A*	B**	C	Wt. (lbs)
MSF30018	60-1/4"	17-1/2"	36"	50

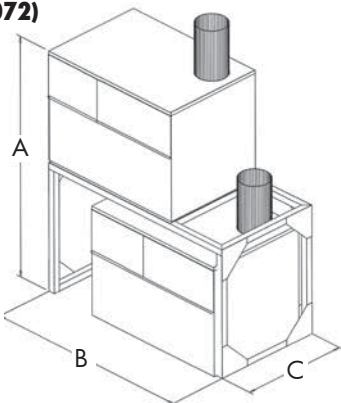
## Copper-Fin® Boilers (Models 0497-0747)



MODEL #	PART #	A*	B**	C	Wt. (lbs)
CB 0497	MSF3002	81-1/2"	51"	24-1/2"	70
CB 0647	MSF3003	84-1/2"	70"	26"	128
CB 0747	MSF3003	84-1/2"	70"	26"	128

**Note:** Heater Height is 33-1/4" (0497-0747)

## Copper-Fin II® Boilers (Models 0402-2072)



MODEL #	PART #	A*	B**	C	Wt. (lbs)
CH 0402	MSF3022	67-1/2"	59"	24-1/2"	83
CH 0502	MSF3022	67-1/2"	59"	24-1/2"	83
CH 0652	MSF3023	67-1/2"	80"	24-1/2"	132
CH 0752	MSF3023	67-1/2"	80"	24-1/2"	132
CH 0992	MSF3007	80"	75"	36"	170
CH 1262	MSF3008	80"	95"	36"	214
CH 1442	MSF3008	80"	95"	36"	214
CH 1802	MSF3009	80"	119"	36"	251
CH 2072	MSF3009	80"	119"	36"	251

**Note:** Heater height is 31-1/2" (0402-0752) & 36" (0992-2072)

\* To vent connection  
\*\* Allow space for plumbing connections



# COMMERCIAL ELECTRIC COMPACT BOILERS

## STANDARD FEATURES

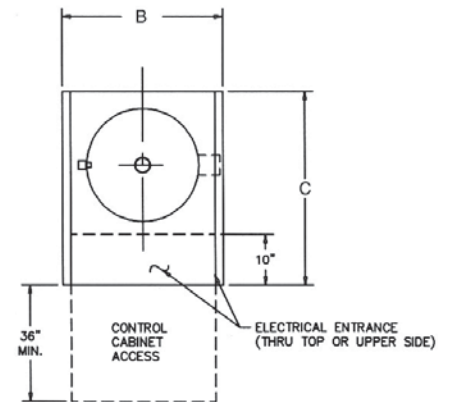
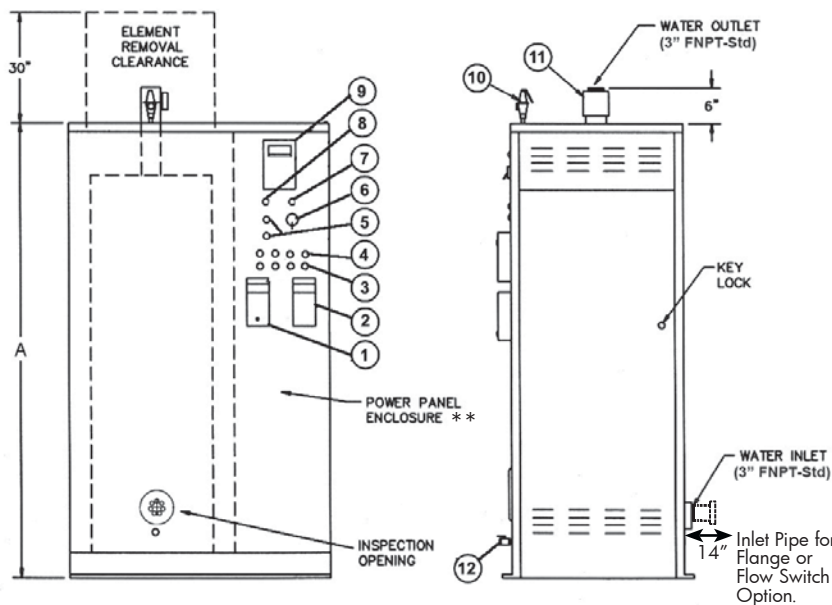
- ASME National Board Registered Pressure Vessel
- Heavy Duty Steel Boiler Vessel Housing
- 4" Fiberglass Insulation
- 3" NPT Inlet and Outlet Connection
- ASME Pressure Relief Valve
- Pressure Gauge with Cock
- Drain Valve
- Adjustable High Limit with Automatic Reset
- Adjustable High Limit with Manual Reset (units with more than 2 stages)
- Low Water Cut-Off
- Incoloy-Sheathed Elements
- Internal Branch Circuit Fusing
- Magnetic Contactors
- Main Supply Circuit Lugs
- 120 Volt Fused Control Transformer
- On/Off Switch with Pilot Light
- Manual Limit Toggle Switches (1 per step)
- Integral Electric Control Panel with key locked door
- Electronic Multi-Stage Control
- Status Pilot Light for each Step
- Electric Digital Temperature Readout (except 1 & 2 step models)
- Listed by the Underwriters Laboratories
- 3 Year Limited Tank Warranty
- 1 Year Parts Warranty (See warranty for details)

## OPTIONAL EQUIPMENT

- Alarm Buzzes with Silencing Switch
- Automatic Breaker
- Flow Switch
- ABB Fused Disconnect
- Non-Fused Disconnect
- Ground Fault Detection system
- Low Temperature Switch
- Kilowatt/Hour Meter
- Flanged Water Connections
- Amp Meter
- Volt Meter
- High Pressure limit switch
- Control Panel door solenoid interlock
- Low water cutoff-float type
- BMS alarm interface
- BMS remote set point control
- BMS remote step control (remote enable)
- BMS 120V interface to limit boiler power demand
- BMS 24V interface to limit boiler power demand
- Time clock
- 304 stainless steel vessel & non ferrous trim
- 3" connections
- 4" connections



## Commercial Electric Compact Boiler Dimensions & Specifications



### Components

1. Temperature Limit, Auto Reset
2. Temperature Limit, Manual Reset
3. Manual Limit Switches
4. Pilot Lights, Amber (Steps "On")
5. PB Switches (Low Water Cutoff "Test"/"Reset")
6. Toggle Switch (Control Power)
7. Pilot Light, Amber (Control Power "On")
8. Pilot Light, Red (Low Water)
9. Temperature Setpoint / Control / Readout
10. Safety Relief Valve
11. Temperature & Pressure Gauges
12. Drain Valve

Model Number	Max. Flow (gpm)	Connection Sizes (NPT)	Dia (In)	Vol (Gal)	Dimensions			Ship Wt.(lbs)
					A	B	C	
BW*1-**C	230	3"	12"	22	52"	24"	30"	600
BW*2-**C	230	3"	16"	36	52"	28"	34"	800
BW*3-**C	230	3"	20"	56	52"	32"	38"	1,100

\*4"/300 GPM is Optional \*\* Power Panel will be taller or wider for ABB Disconnect option. Consult factory.

**STANDARD FEATURES**

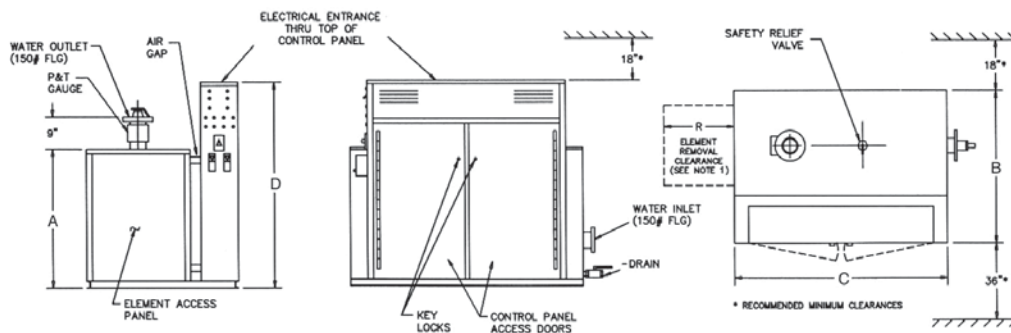
- ASME National Board Registered Pressure Vessel
- Heavy Duty Steel Boiler Vessel Housing
- Full Sized Structural Steel Base
- 3” Fiberglass Insulation
- Flanged Inlet and Outlet Connection (above 3”)
- ASME Pressure Relief Valve
- Pressure Gauge with Cock
- Full Port Drain Valve
- Low Water Cut-Off with Manual Reset
- Manual Limit Toggle Switches (one per step)
- Adjustable High Limit with Automatic Reset
- Adjustable High Limit with Manual Reset
- Incoloy Sheathed Elements
- Internal Branch Circuit Fusing
- Magnetic Contactors
- Main Supply Circuit Lugs
- 120 Volt Fused Control Transformer
- On/Off Switch with Pilot Light
- Integral Electric Control Panel with Key Locked Door(s)
- Electronic Multi-Stage Control
- Status Pilot Light for each Step
- Digital Electronic Readout
- Listed by the Underwriters Laboratories
- 3 Year Limited Tank Warranty / 1 Year Parts Warranty (See warranty for details)



**OPTIONAL EQUIPMENT**

- Alarm Buzzer w/silencing switch
- Automatic Breaker
- Flow Switch
- Non Fused Disconnect
- Fused Disconnect
- Ground Fault Detection System
- Low Temperature Switch
- Main Power Disconnect
- Manual Limit Toggle Switches (1 per step)
- Kilowatt/Hour Meter
- Amp Meter
- Volt Meter
- High Pressure limit switch
- Control Panel door solenoid interlock
- Low water cutoff-float type
- BMS alarm interface
- BMS remote set point control
- BMS remote step control (remote enable)
- BMS 120V interface to limit boiler power demand
- BMS 24V interface to limit boiler power demand
- Time clock
- 304 stainless steel vessel & non ferrous trim
- 3” connections
- 4” connections
- BACnet Communications
- Modbus Communications

**Commercial Electric Hot Water Boiler Dimensions & Specifications**



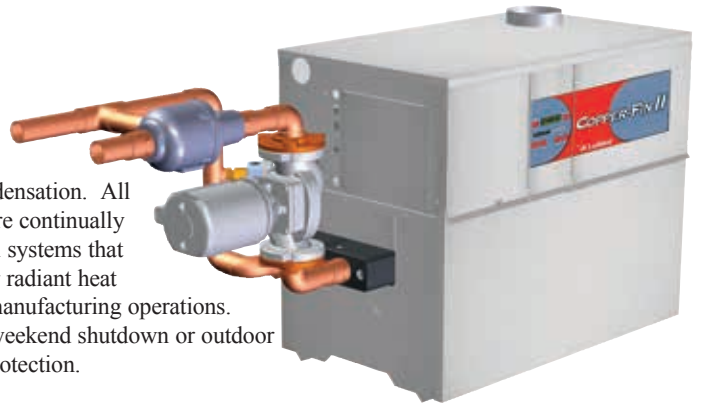
*Note 1: Element removal clearance (R) is equal to 2 times the element kW.*

*Note 2: Optional equipment may change overall boiler dimensions. Please consult factory for dimensional information.*

Model Number	Max Input kW	MBH Per Hour	Max # of Elements	Connection Sizes (NPT)		Max. Flow GPM	Tank Dims (In)	Data Vol (Gal)	Dimensions (Inches)				Weight (lbs)	
				In/Out	Drain				A	B	C	D	Ship	Oper.
BW*24	600	2047	30	4" FLG	1-1/4"	470	24x44	70	34"	40"	52"	51"	1,300	1,860
BW*24	1076	3673	46	6" FLG	1-1/2"	680	24x44	70	34"	40"	56"	63"	1,500	2,060
BW*30	1825	6228	78	6" FLG	1-1/2"	900	30x48	125	40"	50"	60"	75"	1,900	2,900
BW*36	2246	7665	100	8" FLG	2"	1,170	36x48	165	46"	56"	62"	87"	2,400	3,720
BW*42	3089	10539	150	10" FLG	2"	1,840	42x50	260	54"	76"	64"	77"	3,600	5,760

## Ideal for Use with Copper-Fin, Copper-Fin II and Power-Fin Boilers

When designing a boiler system with return water temperatures below 130°F, it is necessary to protect the boiler from flue gas condensation. All non-condensing boilers will develop operational problems if they are continually exposed to system return water temperatures below 130°F. Typical systems that require this protection are water source heat pump systems, in-floor radiant heat systems, greenhouse heating, soil heating, process operations and manufacturing operations. Additionally, heating systems that utilize nighttime setback, night/weekend shutdown or outdoor reset control strategies should incorporate low water temperature protection.

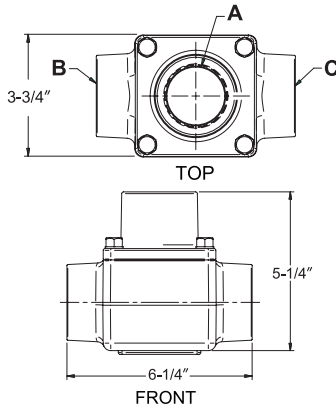


To prevent low return water temperatures to the boiler and combat operational problems, the system should be piped in a primary secondary piping arrangement with a low temperature bypass. Manual bypass systems however are not the ideal solution due to varying flow rates and firing rate of the boiler. A better alternative is Lochinvar's Low Temperature Valve, which is a self-contained automatic thermostatic 3-way valve that ensures temperatures entering the boiler remain above 140°F.

### LTV Valve Dimensions & Specifications

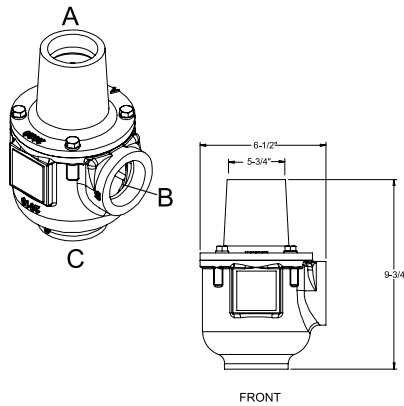
#### 1-1/2" LTV Valve

Up to 55 GPM flow rate  
Part Number - 100171919



#### 2" LTV Valve

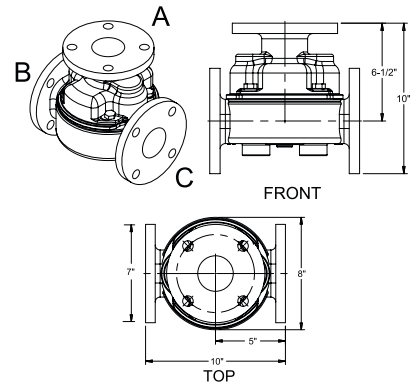
Up to 55 GPM flow rate  
Part Number - 100172001



#### 2-1/2" LTV Valve

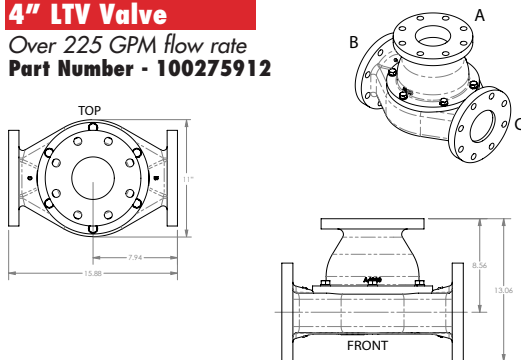
Over 55 GPM flow rate  
Part Number - 100172000

**Note:** Mounting flange Included with valves.



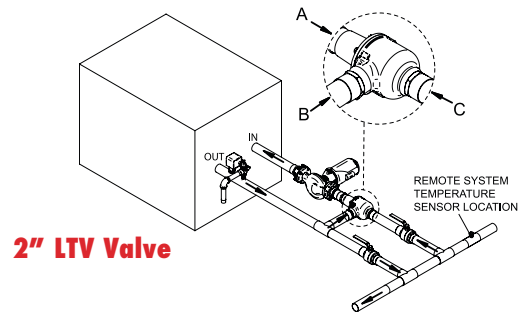
#### 4" LTV Valve

Over 225 GPM flow rate  
Part Number - 100275912

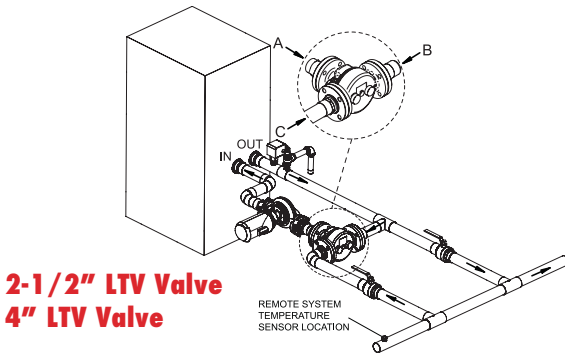


#### TYPICAL PIPING

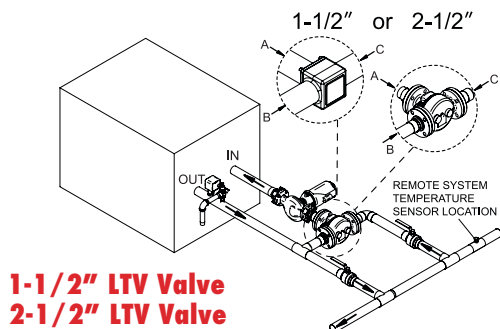
All boilers must use optional remote sensor.  
Minimum high limit setting is 205°F.  
Pump supplied by installer.



2" LTV Valve



2-1/2" LTV Valve  
4" LTV Valve



1-1/2" LTV Valve  
2-1/2" LTV Valve







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