CONDENSING RESIDENTIAL GAS BOILERS

KNIGHT® HEATING BOILER

SMART SYSTEM

CONTROL WITH ADVANCED USER FEATURES

MODELS FROM 80,000 TO 285,000 BTU/HR

5:1 FIRING RATE MODULATION

LESS THAN 20 ppm NOx

DIRECT VENT FLEXIBILITY TO 100 FEET

UP TO 98% EFFICIENCY IN LOW TEMP APPLICATIONS

LOW NOx Certified
PROTECTING OUR ENVIRONMENT

95%
AFUE EFFICIENCY

ENERGY STAR Most Efficient 2014
www.energystar.gov

Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

knightheatingboiler.com

KNIGHT® HEATING BOILERS

95% DOE AFUE Efficiency

The Best You Can Buy Is *Now Even Better!*

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.

KNIGHT® HEATING BOILERS

Floor Standing Models

The KNIGHT Floor-Standing lineup features 5 small footprint models from 80,000 to 285,000 Btu/hr.

*Wall-Mounted Fire Tube Models Available

7 Inputs from 55,000 to 399,999 Btu/hr. See Knight Wall Mount Literature (WHN) for more details.

LOW NOx Certified PROTECTING OUR ENVIRONMENT

All KNIGHT Boilers meet or exceed the most stringent requirements, with less than 20 ppm NOx.

Most Efficient 2014 ENERGY STAR www.energystar.gov

The KNIGHT Boiler has been designated as one of the Most Efficient ENERGY STAR qualified products in 2014.

KNIGHT® COMMERCIAL BOILER XL

Knight XL Commercial

Need more BTU's? KNIGHT XL Commercial Boilers are available in 5 sizes from 399,999 to 800,000 Btu/hr. See KNIGHT XL literature for more details.

SMART SYSTEM Puts More Control and Information at Your Fingertips

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

Larger LCD Screen
Displays more information.

Soft Keys
For simple programming.

Navigation Dial
For fast transitions from screen to screen and easy adjustment of settings.

USB Port
USB port permits connection to a laptop computer. SMART SYSTEM PC software may be used to troubleshoot and program KNIGHT® functions, set date and time, monitor historical data, including faults, trends and energy consumption.

At-a-Glance Color-Coding

Blue Screen
Normal system operation.

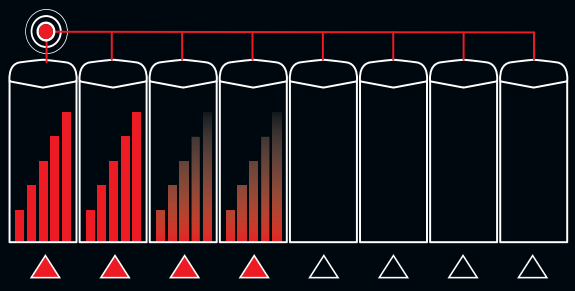
Yellow Screen
Maintenance due - shows the installer's name and number on the display.

Red Screen
Lockout mode - shows active fault and installer's name and number on the display.

Selectable Cascade Options

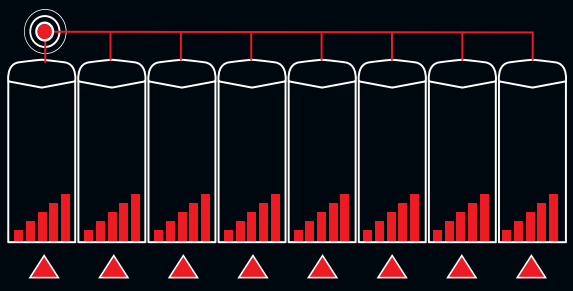
When multiple KNIGHT boilers are installed together, the SMART SYSTEM built-in sequencer can be set for "Lead-Lag" cascade or "Efficiency Optimized" cascade operation.

Lead-Lag Cascade



The "lead" boiler modulates with demand to capacity. As demand increases, additional boilers fire and modulate to capacity. This continues, with additional boilers firing and modulating to capacity until all units are operating. Every 24 hours, the SMART SYSTEM automatically shifts the lead boiler role to the next in the sequence, distributing lead-lag runtimes equally.

Efficiency Optimized Cascade



This feature optimizes the modulation capabilities of the Boiler Plant while evenly distributing run time across all cascaded boilers. Every 24 hours the SMART SYSTEM automatically shifts the 1st boiler on role to the next in the sequence, distributing run time equally.

SMART SYSTEM Cascade option allows 2 - 8 boilers to be sequenced.

Dial in System Performance

NEW!

Compatibility with Copper Fin II Non-Condensing Boiler

Allows you to create a front end loading system.

NEW!

Multiple Sized Boiler Cascade Control

KNIGHTS of one or more sizes can be combined into a single cascade to maximize turndown and meet minimum demands.

* Internal Cascading Sequencer with Multiple Programmable System Efficiency Optimizers

Fine-tune installations using Lead-Lag or Efficiency Optimization Cascade features.

* Controls up to Three Setpoint Temperatures

Allows three different temperature inputs to be controlled. Boiler can be run at the lowest temperature demand for optimal efficiency.

* Outdoor Reset for Each Temp Loop

The boiler setpoint temperature responds to changes in outdoor air temperature. Outdoor temperature monitor guides the reset schedule to meet the load.

Night Setback

Program a heating loop temperature setback for any time of the day, each day of the week.

Domestic Hot Water Prioritization w/Pump Control

On DHW call, SMART SYSTEM overrides the outdoor reset and starts the DHW pump to the indirect water heater alternating to meet both heating and hot water demands.

* DHW Night Setback

Resets DHW setpoint to save water-heating energy during times of low or no usage.

* DHW Max Firing Rate

Allows you to limit the maximum percentage of firing rate when in DHW mode.

* Separately Adjustable SH/DHW Mode Switching Times

Allows controls to be tailored to meet system demand. Design system setup for flexibility.

Indirect Water Heater Zone Pump Control

All boilers in cascade can be used to meet DHW demand as well as satisfy building load.

System & Boiler Pump Controls

Provides power to system and boiler pumps on a call for heat. Programmable post purge allows pumps to operate after a call has been satisfied. Option for Continuous System Pump Operation.

* Pump Relay with Freeze Protection

Parameters adjustable by installer for flexibility in low-temperature applications.

* Installer Access to BMS and Ramp Delay Settings

Set up or change these parameters through the control itself on the front of the boiler; no PC software required.

Low-Water Flow Indicator

Uses temperature differential to protect against low flow in heat exchanger by reducing modulation or forcing boiler shutdown.

Password Security

Allows only qualified personnel to access parameters.

* Product Service Indicator

Program reminders for cycle count, operation hours or last service. Installer's name and number may be displayed.

**Exclusive feature, available only from Lochinvar*

Building Management Inputs & Outputs

Optional Modbus Capability

Allows boiler communication through Modbus protocol. Simplifies BMS/boiler interface for status monitoring.

0-10V Building Management System (BMS) Control Input

BMS-driven input for modulation rate or temperature control.

0-10V Cascade Setpoint and Modulation Control

BMS-driven input for modulation rate or temperature control of cascade.

0-10V Heat Demand Input

Enables thermostat or a 0-10V signal to initiate a call for heat. Gives the BMS options on how to enable boiler or cascade.

0-10V Boiler Rate Output

Signal output of modulation rate allows BMS to monitor boiler firing rate.

0-10V Pump Signal Input

Input from variable speed system pump allows faster reaction to changes of flow in system, reducing possibility of temperature over-shoot and cycling.

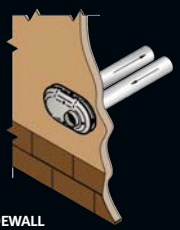
0-10V Signal to Control Variable Speed Boiler Pump

Allows control to maintain a higher ΔT at low firing rates and reduces boiler flow when it responds to lower flow rates in the system loop.

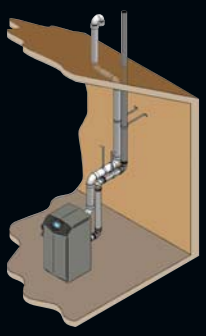
5 Flexible Options for Direct-Venting up to 100 Feet!

Placement of units within a building will never be a problem with KNIGHT. It permits up to 100 feet of air intake and 100 feet of exhaust vent with PVC, CPVC, polypropylene or stainless steel pipe.

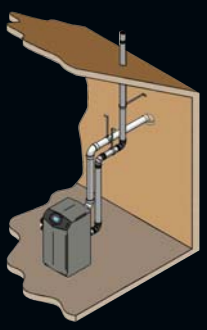
Optional Sidewall Vent Termination



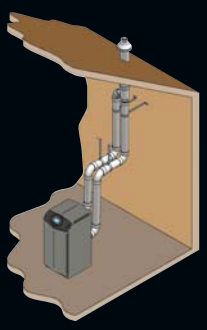
*Optional kit allows for an attractive sidewall termination when using PVC, CPVC or polypropylene vent material.



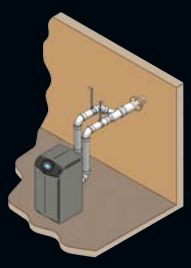
Direct-Vent Vertical



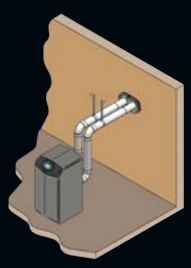
Vertical with Sidewall Air



Direct-Vent Vertical*



Direct-Vent Sidewall*



Direct-Vent Sidewall

**An optional concentric vent kit is sold separately to allow a single penetration for both combustion air and vent pipes.*

State-of-the-Art Modulating Combustion System

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 modulate 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 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.

Field Connection Versatility

User-friendly terminal strip allows for 44 low-voltage field connections. Four-line voltage connections supply power to the unit and up to three pumps operated by the SMART SYSTEM.

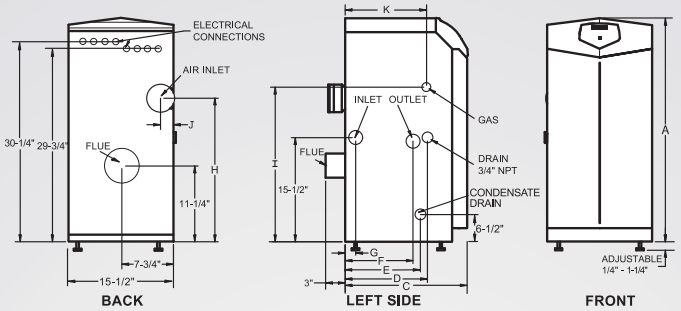
KBN286 Shown

Team KNIGHT with SQUIRE for Low-Cost Domestic Hot Water!

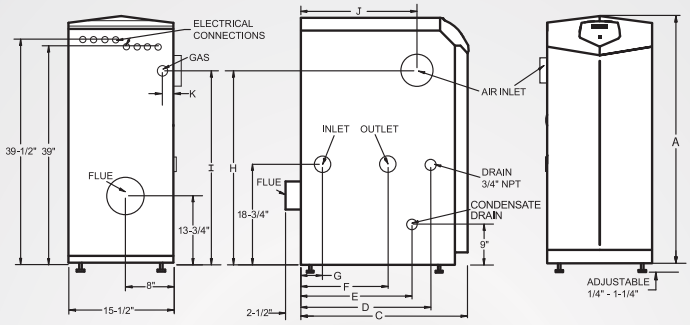
KNIGHT’s Domestic Hot Water Prioritization feature means you can easily install it with Lochinvar’s SQUIRE® indirect water heater, available in 30, 40, 50, 65, 80 and 119 gallons. This combination will give homeowners high-efficiency space heating from KNIGHT, and abundant domestic hot water from SQUIRE. With a stainless steel tank and heat exchanger, SQUIRE provides more hot water and lower water heating costs than standard gas or electric water heaters.

Knight® Boiler Dimensions and Specifications - Floor-Standing Models

Models:
KBN 081-211



Model:
KBN286



Knight Heating Boiler

Model Number	Input Min. MBH	Input Max. MBH	AFUE %	Heating Capacity MBH	NET AHRI MBH
KBN081	16	80	95.0	74	64
KBN106	21	105	95.0	97	84
KBN151	30	150	95.0	139	121
KBN211	42	210	95.0	196	170
KBN286	57	285	95.0	267	232

Dimensions and Specifications

Model Number	A	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
KBN081	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	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	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	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	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/Overide Function
  - DHW Night Setback w/Overide 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**

**Exclusive feature, available only from Lochinvar*

Standard Features

- **ENERGY STAR Most Efficient Recognition**
- **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
  - 12-Year Limited Warranty (See Warranty for Details)
  - 2-Year Parts Warranty

Optional Equipment

- Modbus Communication
- Condensate Neutralization Kit
- Multi Temperature Loop Control
- Flow Switch
- Low-Water Cutoff w/Manual Reset & Test
- Alarm Bell
- Concentric Vent Kit
- SMART SYSTEM PC Software
- Stack Frame
- BMS Gateway to LON or BacNet
- Sidewall Vent Termination

Firing Codes

- M9 Standard Construction
- M7 California Code

Lochinvar® HIGH EFFICIENCY BOILERS & WATER HEATERS

Lochinvar, LLC
300 Maddox Simpson Parkway
Lebanon, Tennessee 37090
P: 615-889-8900 / F: 615-547-1000
www.Lochinvar.com

Patent Pending

FO-10M-1/14 Printed in U.S.A.