CONDENSING RESIDENTIAL GAS BOILERS

KNIGHT®
HEATING BOILER

CONXUS™
REMOTE CONNECT CAPABLE

SMART SYSTEM
CONTROL WITH ADVANCED USER FEATURES

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

5:1 TURNDOWN RATIO

LESS THAN 20 ppm NOx

DIRECT VENT FLEXIBILITY TO 100 FEET

Lochinvar
HIGH EFFICIENCY BOILERS & WATER HEATERS

95% AFUE EFFICIENCY

Most Efficient 2016
www.energystar.gov

USA
DESIGNED ★ ENGINEERED ★ ASSEMBLED

knightheatingboiler.com
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.*

**The Best You Can Buy**

**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.

**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.
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.
### Compatibility with Copper Fin II Non-Condensing Boiler
Allows you to create a front end loading system.

### 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 Cassading 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.

*Exclusive feature, available only from Lochinvar*

### 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.

### Dial in System Performance

#### 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 panel guides the reset schedule to meet the load.

#### 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.

### 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
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 AT at low firing rates and reduces boiler flow when it responds to lower flow rates in the system loop.

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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 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.

† CON·X·US control board sold separately.
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.

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.
System Pump with Parameter for
Three Pump Control

Multi-Color Graphic LCD Display
Boost Temperature & Time
Smart System™ Features

Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation.

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**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
  - 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
- DWH 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
  - *Exclusive feature, available only from Lochinvar
- High-Voltage Terminal Strip
  - 120 VAC / 60 Hz / 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
  - DWH Thermostat Contacts
  - 3 Space Heat Thermostat Contacts
  - System Sensor Contacts
  - DWH Tank Sensor Contacts
  - Outdoor Air Sensor Contacts
  - Cascade Contacts
  - 0-10 VDC BMS External Control Contact
  - 0-10 VDC Rate Output Contacts
  - 0-10 VDC Variable Speed 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

**Dimensions and Specifications**

<table>
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<th>Model Number</th>
<th>Min. MBH</th>
<th>Max. MBH</th>
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<th>Heating Capacity MBH</th>
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**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)
  - 5-Year Parts Warranty

**Optional Equipment**

- CON·X·US Remote Connectivity
- 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
- Wireless Outdoor Sensor

**Firing Codes**

- M9: Standard Construction
- M7: California Code

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