CONDENSING RESIDENTIAL GAS BOILERS

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

95% AFUE EFFICIENCY

Most Efficient 2012

Lochiniar
High Efficiency Water Heaters, Boilers and Pool Heaters

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 Is Now Even Better!

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

The KNIGHT Boiler has been designated as one of the Most Efficient ENERGY STAR qualified products in 2012.
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.

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

**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.

**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.

**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.

**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.

**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.

**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.

**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.
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.
**Knight Heating Boiler**

**Dimensions and Specifications**

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Input</th>
<th>Heating Capacity MBH</th>
<th>AFUE %</th>
<th>Max. MBH</th>
<th>Min. MBH</th>
</tr>
</thead>
<tbody>
<tr>
<td>KBN106</td>
<td>21</td>
<td>105</td>
<td>95.0</td>
<td>139</td>
<td>74</td>
</tr>
<tr>
<td>KBN151</td>
<td>30</td>
<td>150</td>
<td>95.0</td>
<td>121</td>
<td>84</td>
</tr>
<tr>
<td>KBN211</td>
<td>42</td>
<td>210</td>
<td>95.0</td>
<td>170</td>
<td>64</td>
</tr>
<tr>
<td>KBN286</td>
<td>57</td>
<td>285</td>
<td>95.0</td>
<td>232</td>
<td>125</td>
</tr>
</tbody>
</table>

**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**

- **High-Voltage Terminal Strip:** 120 VAC / 60 Hertz / 1 Phase Power Supply
- **Low Voltage Terminal Strip:** 24 VA Device Relay
- **Three Sets of Pump Contacts**
- **Cascade Multiple Sized Boilers**
- **Boost Temperature & Time**
- **Three Pump Control**
- **System Pump with Parameter for Continuous Operation**
- **Boiler with Variable Speed Pump Control**
- **Domestic Hot Water Priority**
- **High-Temperature Switch**
- **Low-NOx Operation**
- **Direct-Spark Ignition**
- **ASME Stainless Steel Heat Exchanger**
- **Vertical & Horizontal Direct-Vent**
- **ENERGY STAR Most Efficient Recognition**
- **Condensate Trap**
- **Modulating Burner with 1:3 Turndown**
- **Optional Equipment**
  - **Modbus Communication**
  - **Modbus Communication with Flow Switch**
  - **Modbus Communication with Flow Switch & Low-Water Cut-off with Manual Reset**
  - **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell**
  - **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit**
  - **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame**
  - **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame, BMS Gateway to LON or BacNet**
  - **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame, BMS Gateway to LON or BacNet, Sidewall Vent Termination**
  - **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame, BMS Gateway to LON or BacNet, Sidewall Vent Termination, 12-Year Limited Warranty**

**Standard Features**

- **95% DOE AFUE Efficiency**
- **ASME Stainless Steel Heat Exchanger**
- **Three Pump Control**
- **Condensate Trap**
- **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**

**Optional Equipment**

- **Modbus Communication**
- **Modbus Communication with Flow Switch**
- **Modbus Communication with Flow Switch & Low-Water Cut-off with Manual Reset**
- **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell**
- **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit**
- **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame**
- **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame, BMS Gateway to LON or BacNet**
- **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame, BMS Gateway to LON or BacNet, Sidewall Vent Termination**
- **Modbus Communication with Flow Switch, Low-Water Cut-off with Manual Reset, & Alarm Bell, Concentric Vent Kit, Stack Frame, BMS Gateway to LON or BacNet, Sidewall Vent Termination, 12-Year Limited Warranty**

**Firing Codes**

- **M9** Standard Construction
- **M7** California Code