Rinnai

RU98i (KB

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 02/24/16

Type of Appliance	Condensing, Tankless, Temperature controlled, gas hot water system, Energy Star Qualified
Rinnai model number	REU-KB3237FFUD-US
Operation / Installation	Forced combustion; indoor only
Minimum/Maximum Gas Rate (Input)	15,200 - 199,000 BTU/h
Electrical	Appliance: AC 120 Volts - 60 Hz Temperature Controller: DC 12 Volts
Electrical Consumption	Normal: 64 w Standby: 2 w Anti-frost protection: 146 w
Ignition System	Direct electronic ignition
Hot Water Capacity	Minimum flow rate: 0.26 GPM Minimum activation flow rate: 0.4 GPM Maximum flow rate: 9.8 GPM
Temperature	98° - 120° F (factory default) Maximum temperature is selectable at 120° F or at 140° F; 98° - 185° F available with the MCC-91-2 controller for commercial and hydronic applications
Temperature (without remote)	120° F (factory default) or 140° F
Approved Gas Types	Natural or Propane (ensure unit matches gas type)
Energy Factor (EF)	Natural Gas: 0.95 Propane: 0.95
Service Connections	Gas supply: 3/4 inch MNPT Cold water inlet: 3/4 inch MNPT Hot water outlet: 3/4 inch MNPT
Isolation & Pressure Relief Valves Included	Heavy duty forged brass Webstone Isolator valves EXP E2, certified to NSF/ANSI 61-8 for potable water
Water Flow Control	Water flow sensor, electronic water control and by-pass control
Minimum/Maximum Water Supply Pressure	15 - 150 PSI (50 PSI or above is recommended for maximum flow)

Rinnai is continually updating and improving products; therefore, specifications are subject to change without prior notice. Local, state, provincial and federal codes must be adhered to prior to installation.

FLOW TABLE

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Controller	MC-91-1US (included) Deluxe controller: MC-100V-1US (optional) Bathroom controller: BC-100V-1US (optional) MCC-91-1US (optional; for hydronic and commercial a
Controller Cable	Non-polarized two-core cable, minimum 22 AWG
Safety Devices	• Flame failure - Flame Rod • Boiling protection • Combustion fan rpm check • Over current - glass fuse • Remaining flame (OHS) • Thermal fuse • Automatic frost protection
Clearances from Combustibles * 24 inches required for serviceability	• Top of heater - 6 inches • Front of heater - 6 inches * • Sides of heater - 2 inches • Back of heater - 0 inches • Bottom of heater - 12 inches • From vent pipe - 0 inches
Clearances from Non-combustibles * 24 inches required for serviceability	• Top of heater - 2 inches • Front of heater - 6 inches * • Sides of heater - 1/2 inches • Back of heater - 0 inches • Bottom of heater - 12 inches • From vent pipe - 0 inches
Min. / Max. Gas Supply Pressure	Natural Gas: min 5" W.C. max 10.5" W.C. Propane Gas: min 8" W.C. max 13.5" W.C.
Manifold Gas Pressure (inches W.C.)	Natural Gas: high fire 3.1" W.C. low fire 0.51" W.C. Propane Gas: high fire 3.7" W.C. low fire 0.52" W.C.
NOx	Complies with South Coast Air Quality Management District 14 ng/J or 20 ppm NOx emission levels

Limited Warranty

Heat exchanger: 12 years* for residential, 10 years for residential and space heating, and 5 years* for commercial; All other parts: 5 years*; Labor: 1 year;
(* 3 years if used as a circulating water heater within a circulation loop, when the water heater is in series with a circulation system and all circulating water flows through the water heater, and where an aquastat / thermostat, timer, or an on-demand recirculation system is not incorporated.)
Refer to the manual for complete warranty information.

DIMENSIONS

WEIGHT: 70.5 lb (32 kg)

DIM	Inches (mm)
A (GAS)	1.6 (40.2)
A (COLD)	2.0 (50.2)
A (HOT)	1.6 (41.2)
A (CONDENSATE OUTLET)	0.9 (22.4)
B	5.0 (127.2)
C	1.9 (47.8)
D	0.52 (13.3)

DIM	Inches (mm)
E	2.2 (56.3)
F	2.3 (58.3)
G	5.0 (127.2)
H	2.0 (50)
I	3.0 (76)
J	7.1 (179)
K	18.3 (466)

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Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

KNIG
HEATING
Submittal
KBN-Su

RESURGAM CITY OF PORTLAND, MAINE
Reviewed for Code Compliance
Inspections Division
Approved with Conditions

KNIGHT® FLOOR STANDING HEATING BOILERS

Date: 02/24/16

JOB NAME _____
LOCATION _____
ENGINEER _____
WHOLESALER _____
MECH. CONTRACTOR _____
MODEL NO. _____
TYPE GAS _____
Btu/hr INPUT _____
Btu/hr OUTPUT _____
NOTES

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**
  - 0-10VDC Input to Control Modulation or Set Point
  - 0-10VDC Modulation Rate Output
  - 0-10VDC Input Signal from Variable Speed System Pump*
  - 0-10VDC 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
  - 0-10VDC BMS External Control Contact
  - 0-10VDC Boiler Rate Output Contacts
  - 0-10VDC Variable Speed System Pump Signal Input
  - 0-10VDC 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 Most Efficienct 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 BACNnet IP
- ☐ BACnet MSTP Communication
- ☐ Sidewall Vent Kit

FIRING CODES

- ☐ M9 Standard Construction
- ☐ M7 California Code

KNIGHT Heating Boiler Dimensions & Specifications

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 02/24/16

Models:
KBN 081-211

Model:
KBN286

Knight Heating Boiler

Model Number	Input Min. MBH	Input Max. MBH	AFUE %	Heating Capacity MBH	NET AHRI Rating 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

A	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
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
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
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
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
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

Lochinvar®
HIGH EFFICIENCY BOILERS & WATER HEATERS

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