

FIA INC. Fluid Industrial Associates, INC.



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SUBMITTAL DATA ***JULY 26, 2013***

PROJECT:	CASCO BAY FERRY TERMINAL	QUOTE #: 313501
LOCATION:	PORTLAND, ME	FIA SALESMAN: KIM GARRANT
ENGINEER:	ALLIED ENGINEERING	CUSTOMER: RIVERSIDE MECHANICAL
EQUIPMENT:	1 SET OF SUBMITTALS	ATTENTION: ROB WALDRON

REMARKS:

EQUIPMENT IS ON HOLD FOR APPROVAL PENDING RETURN OF APPROVED SUBMITTALS AND HARD COPY OF PURCHASE ORDER.



Lochinvar[®]
High Efficiency Water Heaters, Boilers and Pool Heaters

**KNIGHT XL
COMMERCIAL BOILER
Submittal Sheet**

KBX-Sub-08

KNIGHT[®] XL COMMERCIAL CONDENSING HEATING BOILERS

JOB NAME Casco Bay Ferry Terminal

LOCATION Portland, ME

ARCH./ENGR. Allied Engineering

WHOLESALE Redlon & Johnson

MECH. CONTRACTOR Riverside Mechanical

MODEL NO. KBN501

TYPE GAS natural

Btu/hr INPUT 500,000

Btu/hr OUTPUT 467,000

NOTES

STANDARD FEATURES

- › **Up to 94.6% 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 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**
 - › Lead Lag
 - › Efficiency Optimization
- › **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**
 - › MODBUS Communication (Optional)
 - › 0-10VDC Input to Control Modulation or Set Point
 - › 0-10VDC Input Signal from Variable Speed System Pump*
 - › 0-10VDC Modulation Rate Output
 - › 0-10VDC 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
 - › 0-10VDC 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
- › **Other Features**
 - › Low Water Flow Safety Control & Indication
 - › Password Security
 - › Inlet & Outlet Temperature Readout
 - › Customizable Freeze Protection Parameters
 - › Custom Maintenance Reminder with Contractor Info

OPTIONAL EQUIPMENT

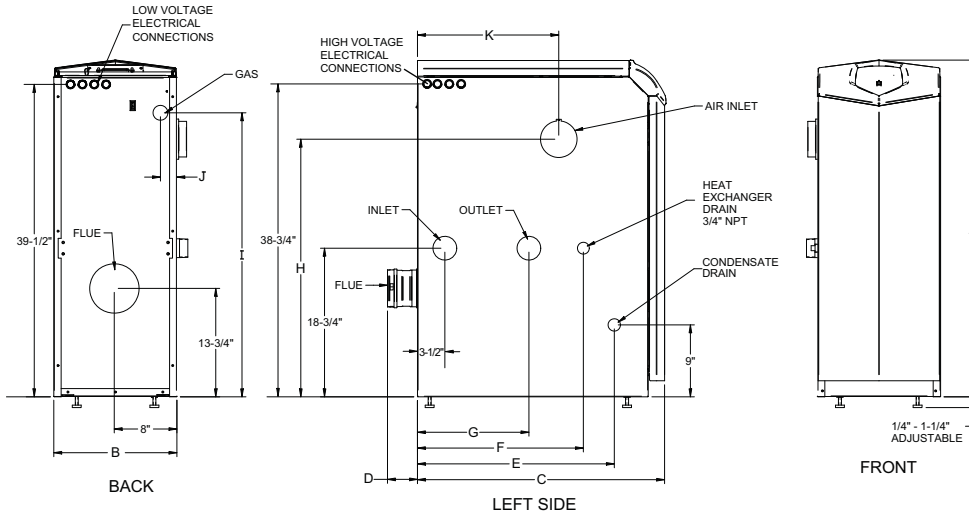
- Alarm Bell
- Condensate Neutralization Kit
- Concentric Vent Kit (KB400-KB601)
- High & Low Gas Pressure Switches w/ Manual Reset (KB501-KB801)
- Low Water Cutoff w/ Manual Reset & Test
- SMART SYSTEM PC Software
- Stainless Steel Vent Kits (KB701-KB801)
- Stack Frame

FIRING CODES

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

*Exclusive feature, available only from Lochinvar

KNIGHT XL Commercial Boiler Dimensions & Specifications



KNIGHT XL HEATING BOILER						DIMENSIONS AND SPECIFICATIONS															
Model Number	Input Min MBH	Input Max MBH	Thermal Efficiency	Output MBH	Net I=B=R MBH	A	B	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
KBN400	80	399	93.3%	377	374	42-1/2"	15-1/2"	27-3/4"	3-3/4"	20-3/4"	21"	14"	34"	34"	7"	18-3/4"	1"	1-1/2"	4"	4"	280
KBN501	100	500	93.3%	467	406	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	94.6%	567	493	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	94.3%	660	574	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.

VENTING OPTIONS

- Direct Vent Vertical
- Direct Vent Horizontal
- Vertical Vent with Sidewall Air Intake
- Sidewall Vent with Rooftop Air Intake
- Vertical Vent with Optional Room Air
- Sidewall Vent with Optional Room Air



Lochinvar
High Efficiency Water Heaters, Boilers and Pool Heaters



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www.Lochinvar.com



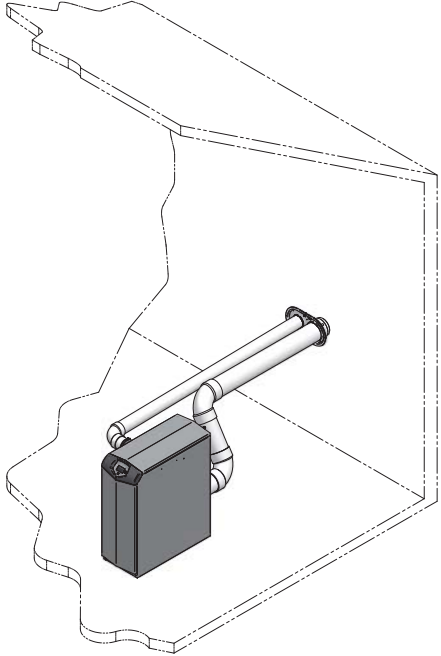
KNIGHT[®] BOILER PRODUCT SUMMARY

(KB) 399,000 - 800,000 BTU/HR

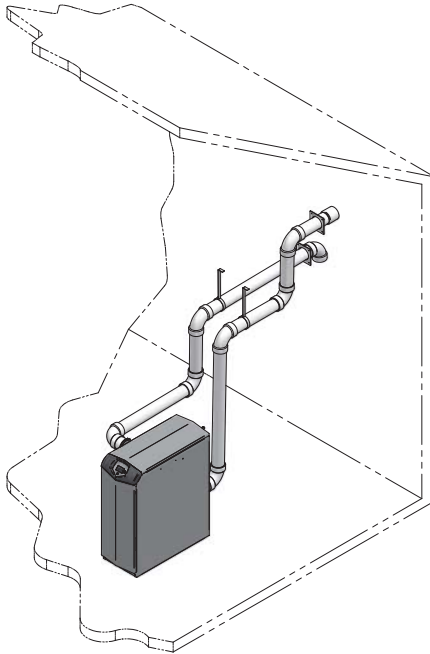
	KB-400	KB-501	KB-601	KB-701	KB-801
WATER					
GALLON CAPACITY	3.4	4.2	4.2	5.0	5.7
HEATING SURFACE (SQ. FT.)	41.8	50.8	50.8	57.8	65.3
WATER CONNECTIONS	1-1/2"	1-1/2"	2"	2"	2"
DRAIN	3/4"	3/4"	3/4"	3/4"	3/4"
20°F ΔT WATER FLOW (GPM)	37	47	55	65	74
HEAD LOSS (FT. OF HD.)	21	23	31	30	33
35°F ΔT WATER FLOW (GPM)	21	26	32	37	42
HEAD LOSS (FT. OF HD.)	8	10	13	11	12
MAX. WORKING PRESSURE (PSI)	160	160	160	160	160
# OF RELIEF VALVES	1	1	1	1	1
RELIEF VALVE SIZE	3/4"	3/4"	3/4"	3/4"	3/4"
RELIEF VALVE RATING (MBH)	697	697	697	1,352	1,352
RELIEF VALVE PRESSURE RATING (PSI)	50	50	50	50	50
GAS					
INLET CONNECTION	1"	1"	1"	1"	1"
MAX. INLET PRESSURE, NAT	10.5" w.c.	10.5" w.c.	10.5" w.c.	10.5" w.c.	10.5" w.c.
MIN. INLET PRESSURE, NAT	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.	4.0" w.c.
MAX. INLET PRESSURE, LP	13.0" w.c.	13.0" w.c.	13.0" w.c.	13.0" w.c.	13.0" w.c.
MIN. INLET PRESSURE, LP	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.	8.0" w.c.
BTU/HR INPUT	399,000	500,000	600,000	700,000	800,000
BTU/HR OUTPUT (HIGH FIRE)	372,267	466,500	567,600	660,100	752,000
BTU/HR OUTPUT (LOW FIRE)	74,453	93,300	113,520	132,020	150,400
ELECTRICAL					
VOLTAGE/HEATER	120	120	120	120	120
VOLTAGE/CONTROL	24	24	24	24	24
TOTAL AMPS	1.5	1.7	2.7	2.7	2.7
# OF ELECTRICAL CONNECTIONS	1	1	1	1	1
DIMENSIONS					
HEIGHT	42-1/2"	42-1/2"	42-1/2"	42-1/2"	42-1/2"
WIDTH	15-1/2"	15-1/2"	15-1/2"	15-1/2"	15-1/2"
DEPTH	27"	31-1/4"	36-1/4"	40-1/4"	45-1/4"
SERVICE CLEARANCES					
FRONT	24"	24"	24"	24"	24"
BACK	14"	14"	14"	14"	14"
RIGHT SIDE	0"	0"	0"	0"	0"
LEFT SIDE (PIPING)	24"	24"	24"	24"	24"
TOP	24"	24"	24"	24"	24"
DIRECT VENTING					
SIZE	4"	4"	4"	6"	6"
VENT CATEGORY	IV	IV	IV	IV	IV
VENT MATERIAL	PVC	PVC	PVC	PVC	PVC

3 General venting

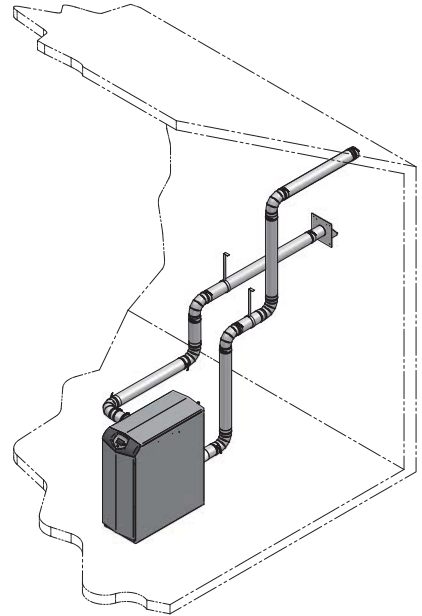
Direct venting options - Sidewall Vent



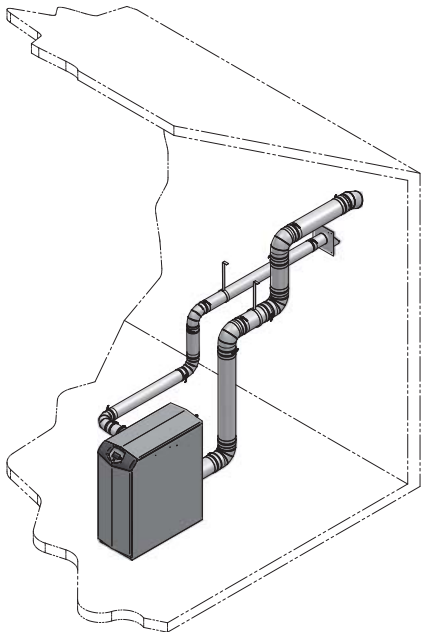
PVC/CPVC Two Pipe
See Figure 4-1A
Models 400 - 601 Only



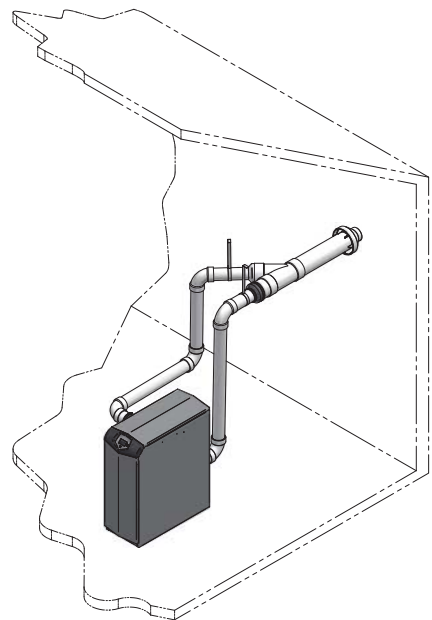
PVC/CPVC Alternate Two Pipe
See Figure 4-2A



Stainless Steel Two Pipe
See Figure 4-1C
Models 400 - 601 Only



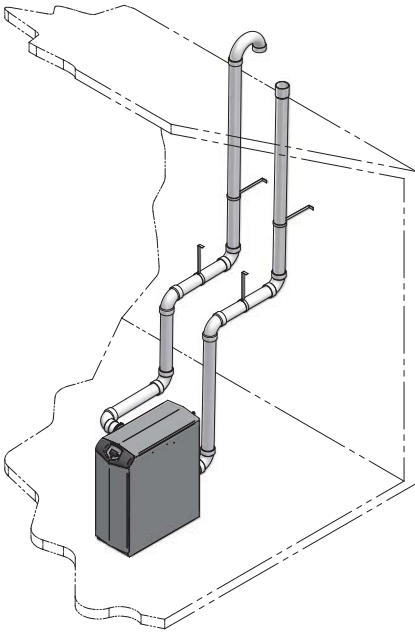
Stainless Steel Alternate Two Pipe
See Figure 4-2B



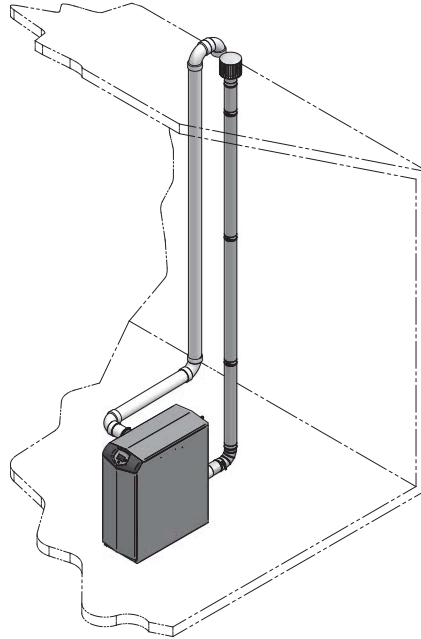
PVC/CPVC Concentric
See Figure 4-7
Models 400 - 601 Only

3 General venting

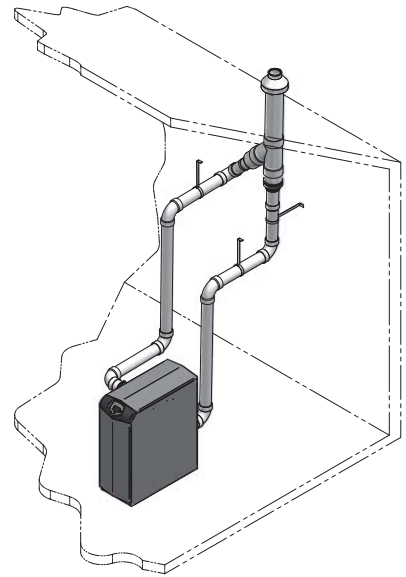
Direct venting options - Vertical Vent



PVC/CPVC
Two Pipe
See Figure 5-1A

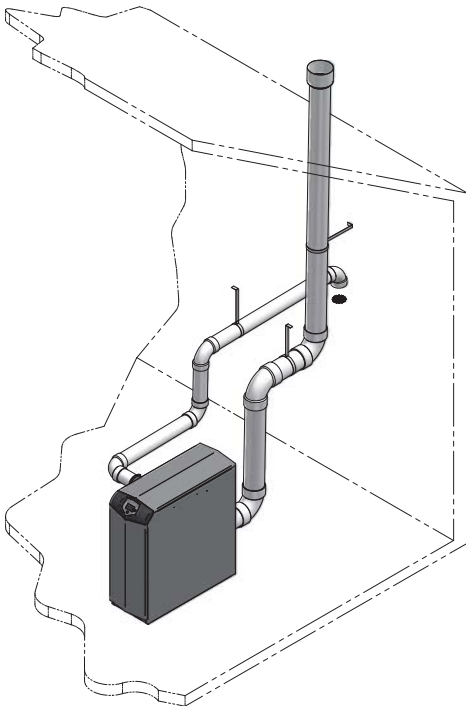


Stainless Steel
Two Pipe
See Figure 5-1B

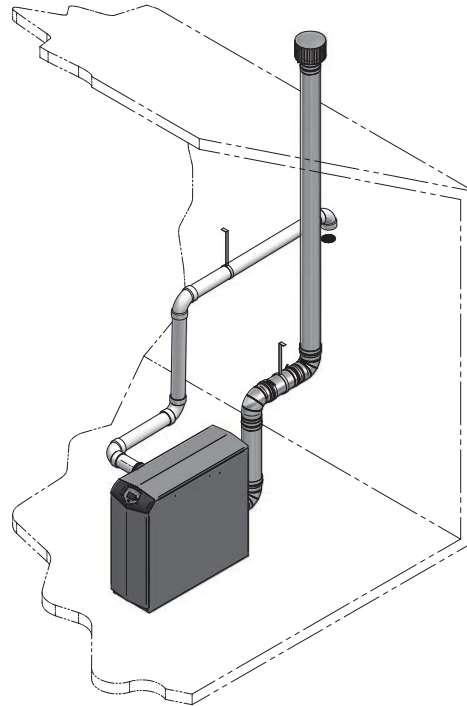


PVC/CPVC
Concentric
See Figure 5-5

Direct venting options - Vertical Vent, Sidewall Air



PVC/CPVC
Vertical Vent, Sidewall Air



Stainless Steel
Vertical Vent, Sidewall Air

6 Hydronic piping

Figure 6-5 Pressure Drop vs. Flow - Models 400 and 501

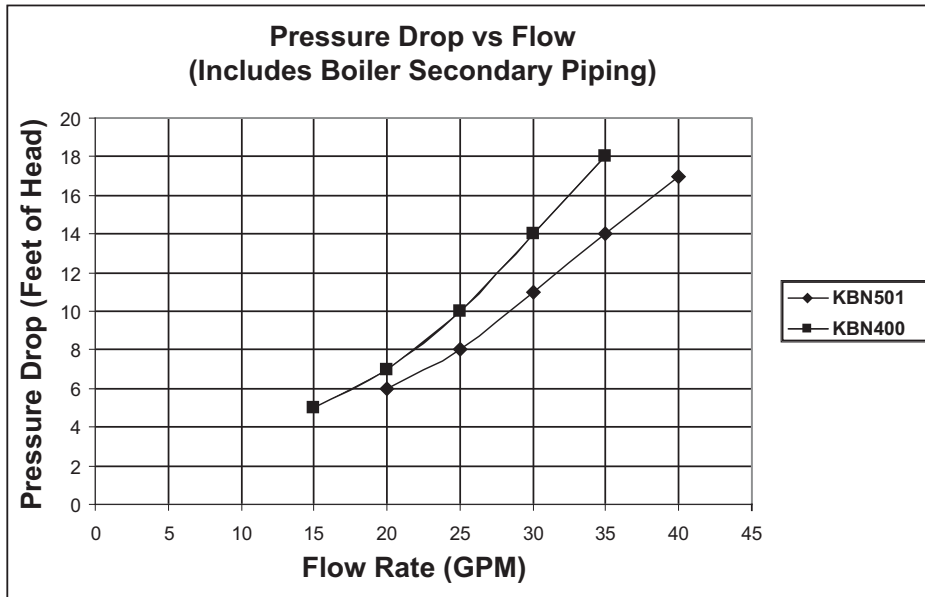


Figure 6-6 Pressure Drop vs. Flow - Models 601 thru 801

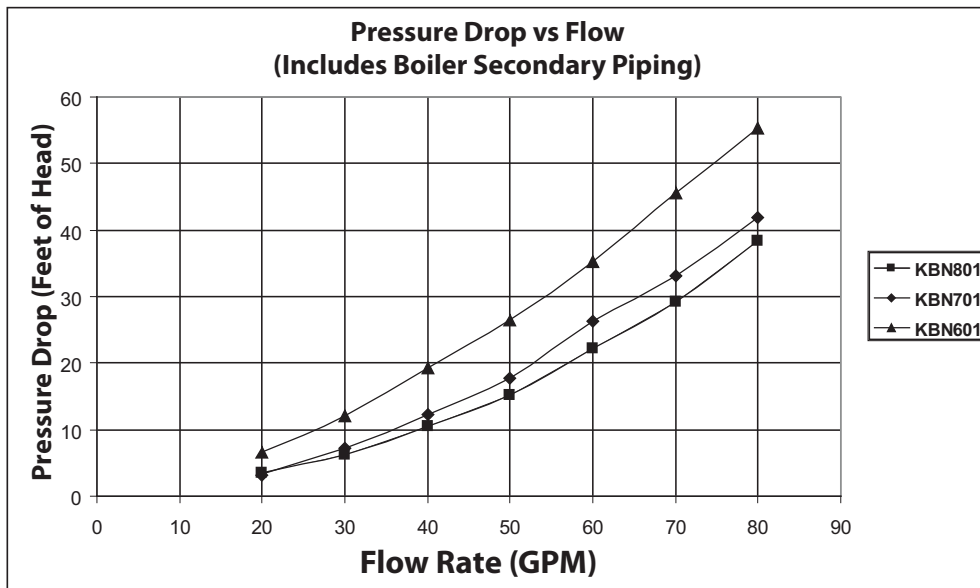


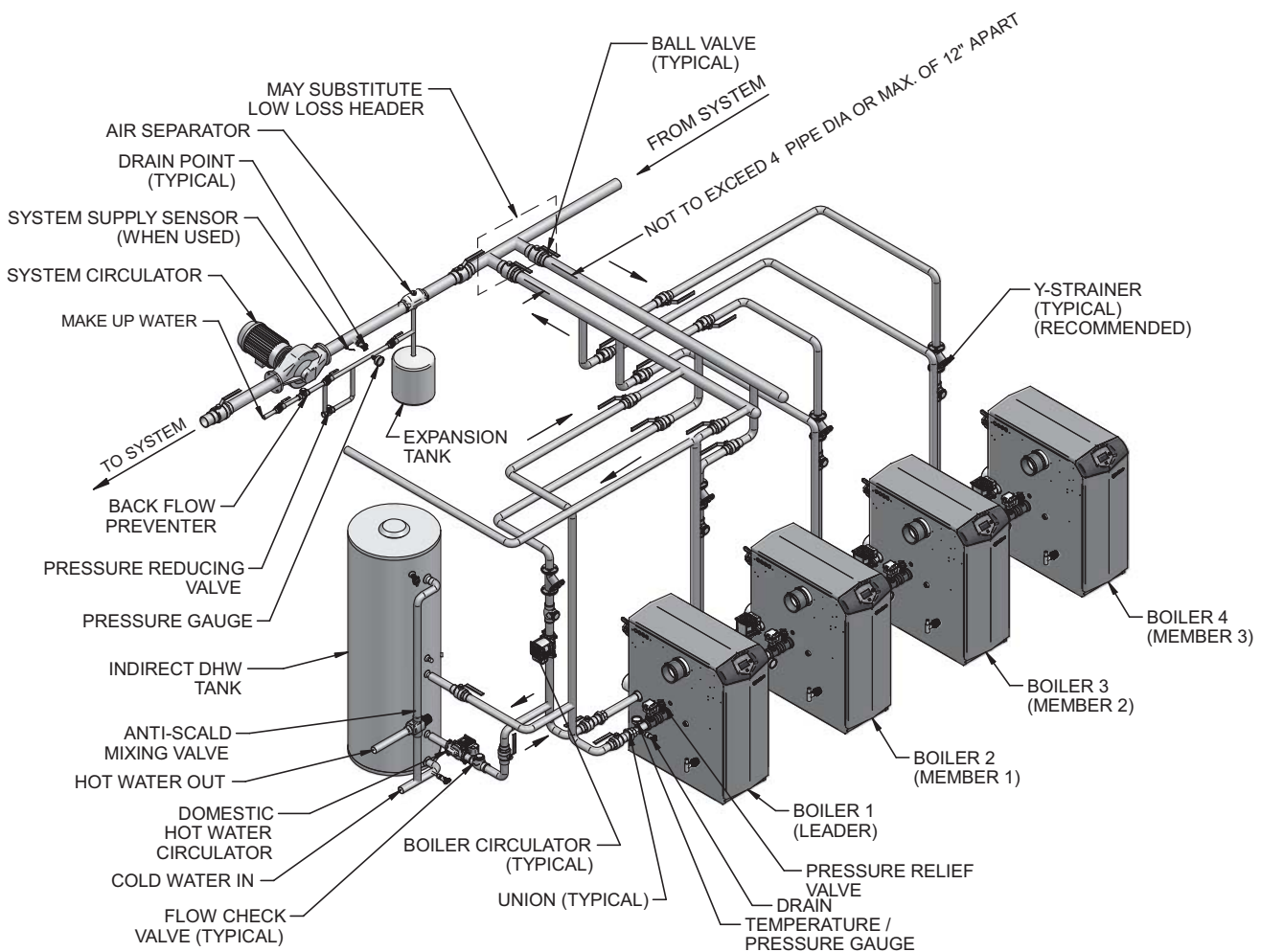
Table 6B Sizing Information for Temperature Rise Applications_20°F, 25°F, 30°F and 35°F

TEMPERATURE RISE APPLICATIONS									
Model	MINIMUM PIPE SIZE	20°F		25°F		30°F		35°F	
		GPM	FT/HD	GPM	FT/HD	GPM	FT/HD	GPM	FT/HD
400	1 1/2"	37	21	30	14	26	11	21	8
501	1 1/2"	46	23	37	16	32	13	26	10
601	2"	55	31	44	22	38	18	32	13
701	2"	65	30	52	20	45	16	37	11
801	2"	74	33	60	23	51	18	42	12

6 Hydronic piping

Figure 6-10 Multiple Boilers - Primary/Secondary Piping

Model	Number of Units						
	2	3	4	5	6	7	8
Manifold Pipe Sizes in Inches (mm)							
400	2 1/2 (64)	3 (76)	3 1/2 (89)	4 (102)	4 (102)	5 (127)	6 (152)
501	3 (76)	3 1/2 (89)	4 (102)	5 (127)	5 (127)	6 (152)	6 (152)
601	3 1/2 (89)	4 (102)	5 (127)	5 (127)	6 (152)	6 (152)	8 (203)
701	3 1/2 (89)	5 (127)	5 (127)	6 (152)	6 (152)	8 (203)	8 (203)
801	4 (102)	5 (127)	5 (127)	6 (152)	8 (203)	8 (203)	8 (203)



CAUTION

Indirect water heaters are capable of transferring a limited number of Btu's into the water. Ensure boiler output does not exceed indirect water heater transfer capabilities.

NOTICE

Please note that these illustrations are meant to show system piping concept only, the installer is responsible for all equipment and detailing required by local codes.

NOTICE

System flow should always remain higher than the required flow for the boiler(s) when the boiler(s) is in operation to prevent short cycling and high limit issues.

8 Field wiring

⚠ WARNING

ELECTRICAL SHOCK HAZARD – For your safety, turn off electrical power supply before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

NOTICE

Wiring must be N.E.C. Class 1.

If original wiring as supplied with boiler must be replaced, use only type 105°C wire or equivalent.

Boiler must be electrically grounded as required by National Electrical Code ANSI/NFPA 70 – latest edition.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

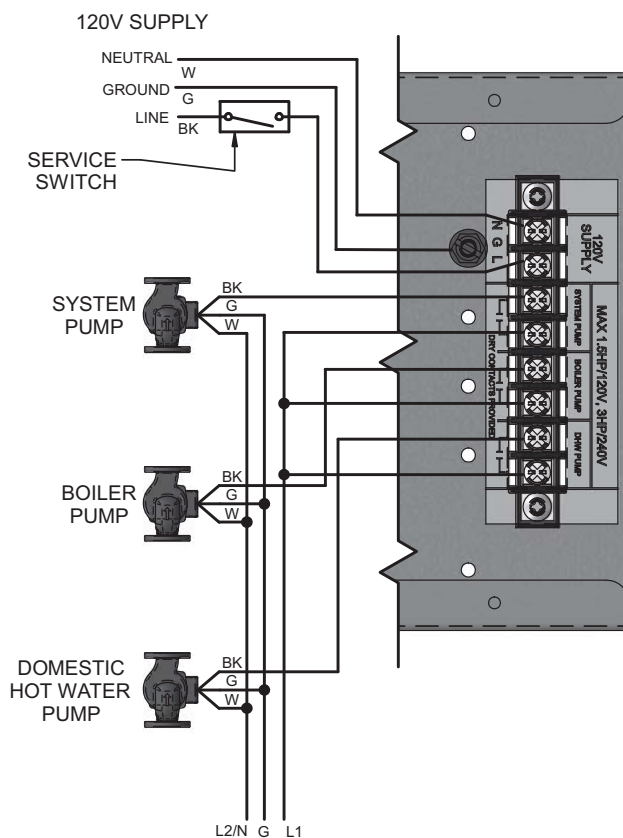
Installation must comply with:

1. National Electrical Code and any other national, state, provincial, or local codes, or regulations.
2. In Canada, CSA C22.1 Canadian Electrical Code Part 1, and any local codes.

Line voltage connections

1. Connect 120 VAC power wiring to the line voltage terminal strip in the junction box, as shown in FIG. 8-1.
2. Provide and install a fused disconnect or service switch (15 amp recommended) as required by the code (see FIG. 8-1).
3. When connecting a domestic hot water (DHW) pump, connect the wiring to the line voltage terminal strip as shown in FIG. 8-1.
4. To activate a system pump, wire as shown in FIG. 8-1. Dry contacts are sized for 1.5 hp/120V, 3 hp/240V or 30 amps.

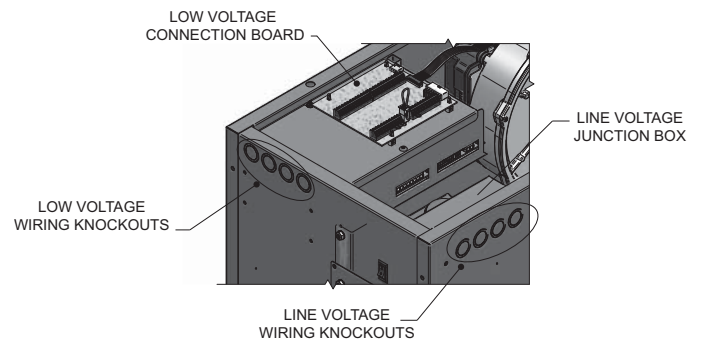
Figure 8-1 Line Voltage Field Wiring Connections



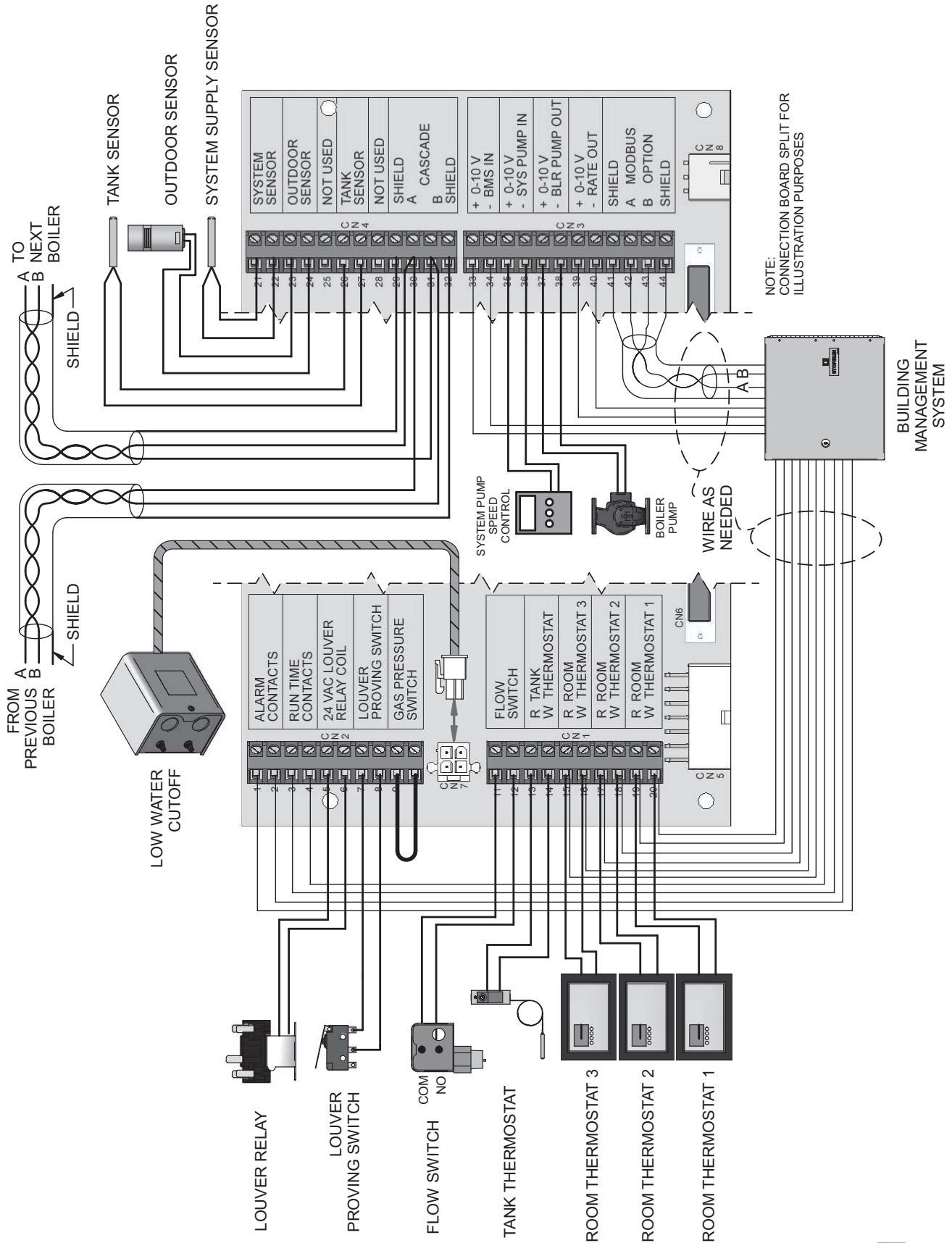
Low voltage connections

1. Route all low voltage wires through the knockouts in the rear of the boiler, as shown in FIG. 8-2.
2. Connect low voltage wiring to the low voltage connection board as shown in FIG. 8-3 on page 53 of this manual and the boiler wiring diagram.

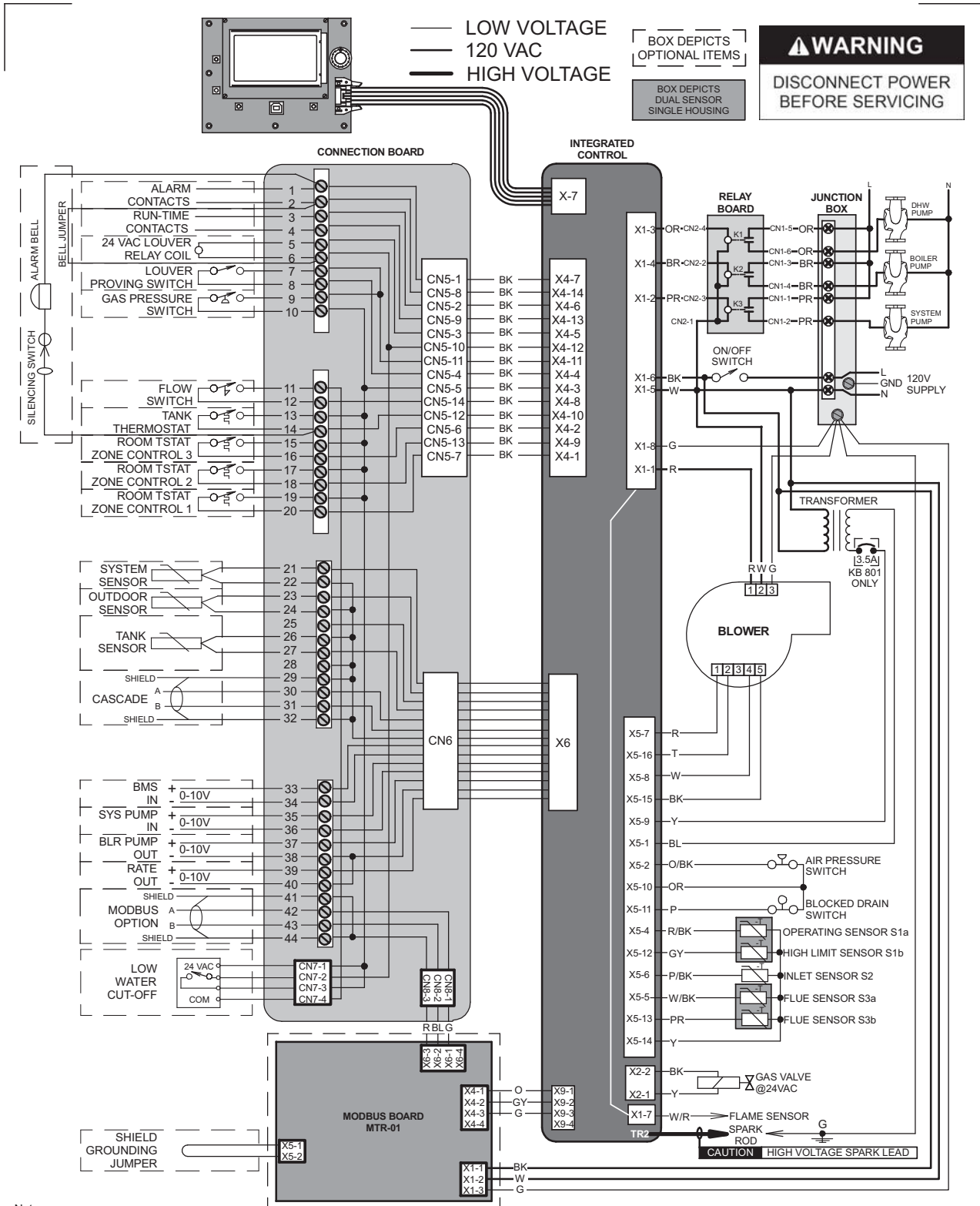
Figure 8-2 Routing Field Wiring



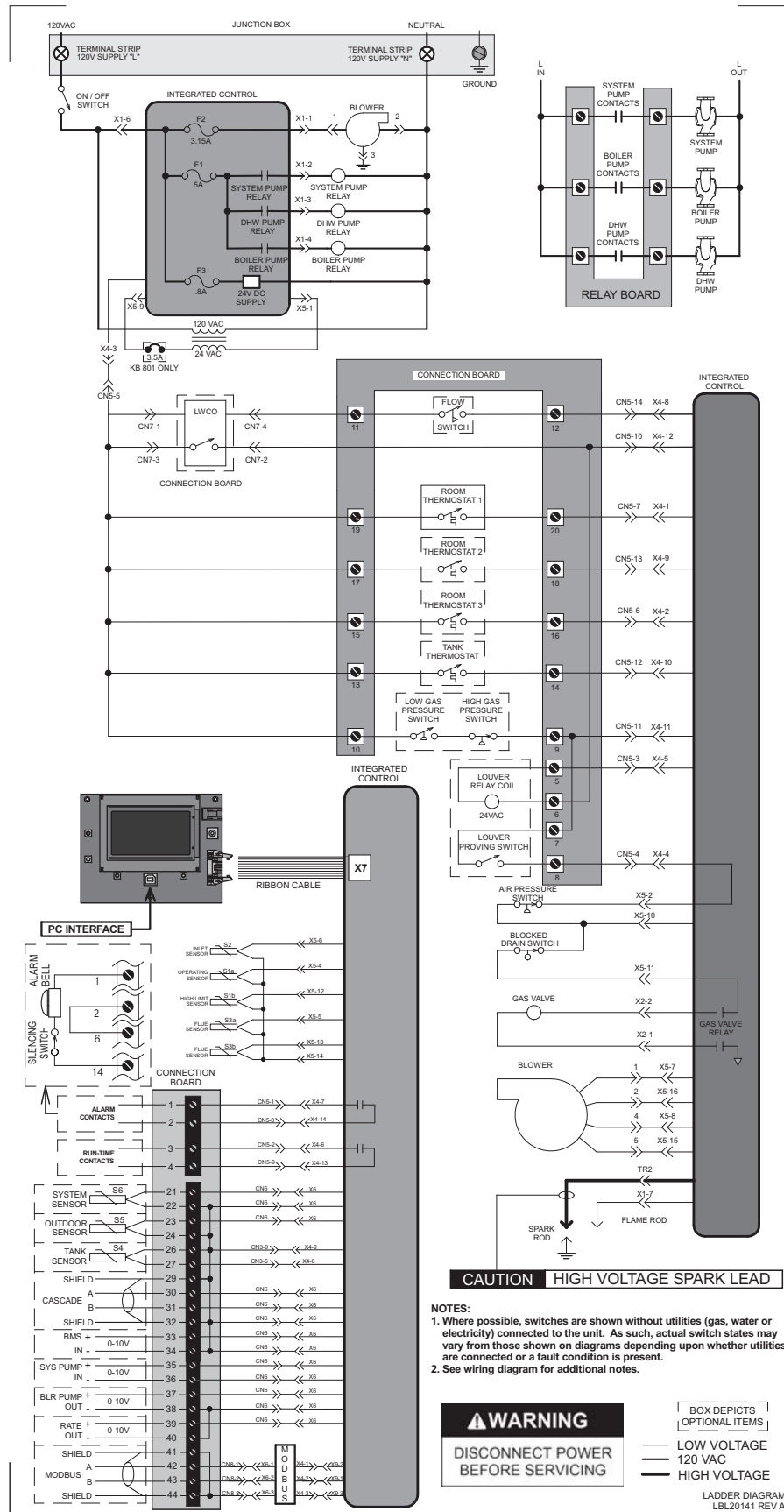
8 Field wiring *(continued)*

Figure 8-3 Low Voltage Field Wiring Connections


13 Diagrams

Figure 13-1 Wiring Diagram


13 Diagrams

Figure 13-2 Ladder Diagram




Certificate of Product Performance

Commercial Boiler Heating Equipment

Certified Reference Number: 1346709 **Date Generated:** 09/14/10 **Status:** Approved

This certificate serves as verification that the model cited below has been rated in accordance with applicable federal testing methods and verified by AHRI as capable of achieving the energy efficiency and performance ratings as tested within prescribed tolerances. This certificate and these certified ratings ONLY apply to the specific model detailed below and are non-transferable to alternate models or configurations.

Manufacturer: LOCHINVAR CORPORATION
Series: Knight XL
Material: Stainless Steel
Location: Indoor
Model Number: KBN501
Fuel Type: Natural Gas
Input: 500.0 MBTUH
Heating Cap.: 467 MBTUH
Combustion Eff.: 95.0
Thermal Eff.: 93.3
Water: 406.00 MBTUH
CO2: 9.2 %
Ignition Type: Intermittent/Electronic Ignition
Draft Type: Forced Draft

Certified ratings for ARI, GAMA, and I-B-R certification programs are valid only for models and configurations listed in the AHRI Directory of Certified Product Performance located at www.ahridirectory.org. The information for the model cited on this certificate can be located in the online directory by using the reference number on the certificate. AHRI does not endorse

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Lochinvar Corporation
300 Maddox Simpson Parkway ▼ Lebanon, TN 37090
615/889-8900 ▼ Fax: 615/547-1000

April 9, 2009

Subject: Buy America Act

To whom it may concern:

Please be advised. Lochinvar Corporation is a U.S. Manufacturer located in Lebanon, Tenn. All Lochinvar products meet the requirements of the *Buy America Act*.

Please do not hesitate to call if you have any questions.

Michael G. Juhnke
Product Program Manager
Lochinvar Corporation