

HIGH EFFICIENCY COMMERCIAL POOL PACKAGE SYSTEMS

AQUAS™

COMMERCIAL POOL PACKAGE

- Indirect Pool Water Heating
- Programming and data at your fingertips
- PVC Direct Vent up to 100 equivalent feet
- Pool heat exchanger rated for salt water

SMART TOUCH™

AQUAS Pool Heater Package featuring SMART TOUCH™ control w/ touch screen display and 10:1 turndown

Now Available!

**TITANIUM
POOL
HEAT EXCHANGER**

SMART SYSTEM™

AQUAS Pool Heater Package featuring SMART SYSTEM™ control with LCD Display, Navigation dial and 5:1 turndown



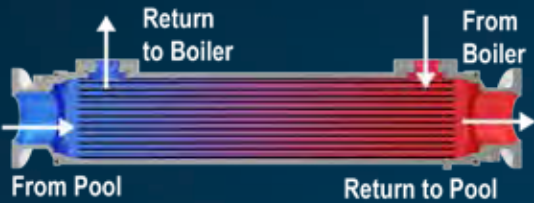
Lochinvar®
HIGH EFFICIENCY POOL & SPA HEATERS

INNOVATION IN DESIGN

The AQUAS commercial pool package is a dramatic advancement in the design of pool heating systems. The AQUAS package is a factory assembled system featuring a free-standing boiler piped to a dedicated cupro-nickel pool heat exchanger.

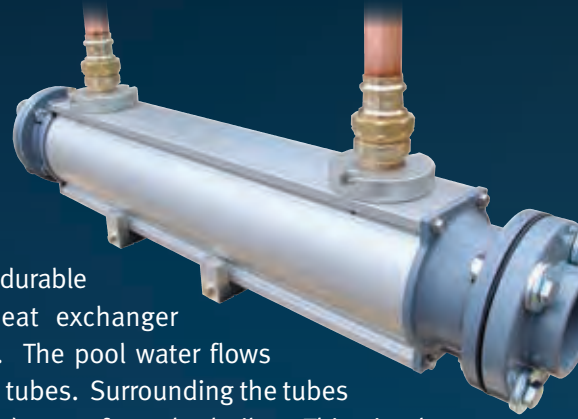
The AQUAS indirect pool heating design gives you...

- Effective heat transfer from a high efficiency, condensing modulating boiler.
- A complete factory assembled package reduces installation cost and time.
- Separating the pool water from the direct-fired heat source reduces maintenance and promotes longer equipment life.
- Reliability and performance with a positive user experience.



POOL HEAT EXCHANGER - A durable

industrial grade cupro-nickel heat exchanger provides effective heat transfer. The pool water flows through a series of cupro-nickel tubes. Surrounding the tubes is a chamber filled with heated water from the boiler. This simple design keeps the pool water separate from the heat source while allowing for complete and highly efficient heat transfer.



OPTIONAL TITANIUM POOL HEAT EXCHANGER

Now, Lochinvar offers an optional titanium pool heat exchanger. Titanium is a strong but light-weight alloy used in aerospace, automotive and military applications. Used in pool systems, titanium is highly resistant to corrosion from salt water and chlorine.

THERMAL EFFICIENCY

The AQUAS pool package is constructed with stainless steel modulating condensing boilers that deliver up to 97% thermal efficiency. Low return water temperature from a pool makes for an ideal application. The heat exchanger is sized to maximize the heat transfer of the boiler water to the pool water flowing through the heat exchanger. Higher thermal efficiency reduces your fuel costs.

Model	Input Btu/hr	Thermal Efficiency	Output Btu/hr
AQUAS	1,500,000	97%	1,455,000
Brand X	1,800,000	82%	1,476,000

Input Btu/hr	Est. Annual Hours	Price per Therm	Annual Fuel Cost	Total Savings
1,500,000	2189	\$1.11	\$36,512.52	\$7,302.50
1,800,000	2189	\$1.11	\$43,815.02	

DIRECT-VENTING UP TO 100 FEET

AQUAS offers multiple venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof.



Paintable Sidewall Vent Termination



FACTORY SUPPLIED AND SHIPPED STANDARD WITH EVERY MODEL

XPN 402-802



REFINED DESIGN PUTS MORE CONTROL AND INFORMATION AT YOUR FINGERTIPS

Just a Few of the Advanced Features:

- MULTI-COLOR GRAPHIC LCD DISPLAY
- NAVIGATION DIAL
- CASCADE OF UP TO 8 AQUAS PACKAGES
- USB PORT FOR PC CONNECTION
- MAINTENANCE REMINDER WITH INSTALLER NAME & NUMBER
- MODBUS COMMUNICATION (OPTIONAL)
- NIGHT SETBACK
- PASSWORD SECURITY
- OPERATIONAL AND ALARM READOUTS



AT-A-GLANCE COLOR CODING



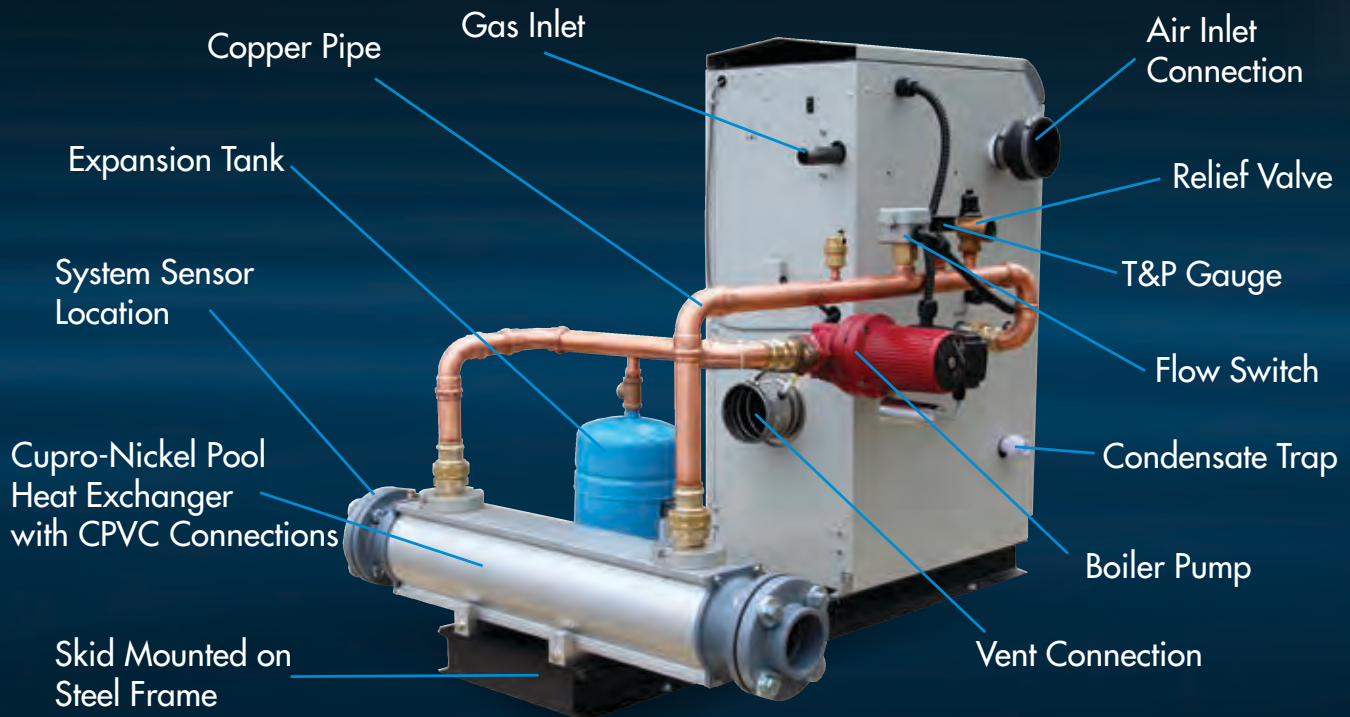
BLUE SCREEN
Normal system operation.



YELLOW SCREEN
Maintenance due - with installer's name and number



RED SCREEN
Lockout mode.



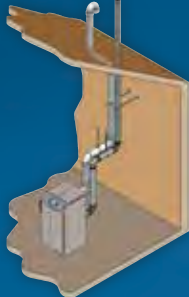
NOTE: Indoor model shown

XPN 402 - 802 VENTING OPTIONS

Direct Vent Sidewall



Direct Vent Vertical



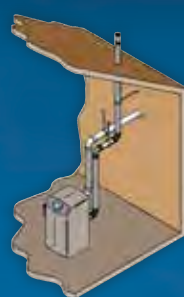
Room Air Sidewall



Room Air Vertical



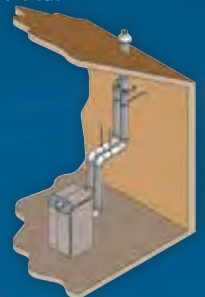
Vertical w/Sidewall Air



Concentric Direct Vent* Sidewall



Concentric Direct Vent* Vertical



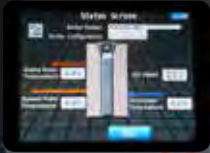
* Optional concentric vent kit sold separately (for 402-602 models)

XPN 1002 - 1502



**UNEQUALED CONTROL AND MONITORING
FUNCTIONS THAT ARE EASY TO USE**

EXAMPLE SCREENS



MAIN SCREEN
Normal System
Operation



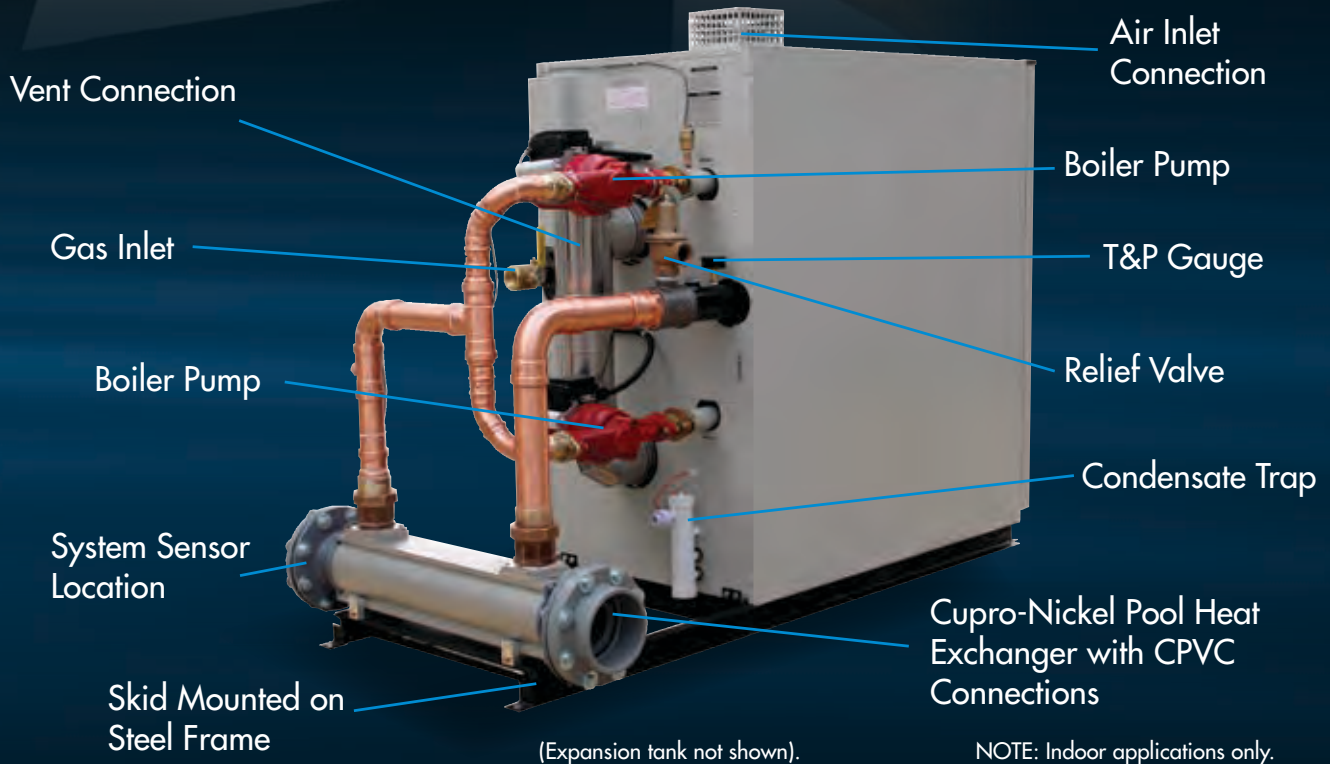
CASCADE SCREEN
Multiple Unit
Control



BLOWER SCREEN
Unit Modulation

Just a Few of the Advanced Features:

- FULL COLOR TOUCHSCREEN LCD DISPLAY
- CASCADE OF UP TO 8 AQUAS PACKAGES
- USB PORT FOR PC CONNECTION
- MODBUS COMMUNICATION (OPTIONAL)
- PUMP CONTROL
- TIME CLOCK
- DATA LOGGING
- ANTI-CYCLING
- RUNTIME AND CYCLE COUNTER
- OPERATIONAL AND ALARM READOUTS



XPN 1002- 1502 VENTING OPTIONS

Room Air Vertical



Room Air Sidewall



Direct Vent Sidewall



Direct Vent Vertical



Vertical w/Sidewall Air



Inside the Boiler

The AQUAS is an innovative pool package that begins with the most advanced boilers in the industry today. The AQUAS boiler is a high efficiency, condensing boiler perfectly suited for the low water temperatures typical of pool heating. The following are some of the exciting features you get with the advanced boiler design.



NEGATIVE REGULATION TECHNOLOGY

Negative Regulation or Neg/Reg technology is a unique combination of combustion air blower and dedicated gas valve that work together to deliver a precise mixture of gas and air to the burner. With Neg/Reg, the gas/air mixture remains perfectly balanced for clean combustion throughout the modulating input range with supply gas pressures as low as 4 inches water column.

“FAIL-SAFE” DIRECT-SPARK IGNITION

With each call for heat, two electrodes will ignite the gas/air mixture and a third electrode will monitor the flame signal. The SMART SYSTEM and SMART TOUCH control programs will lock out if ignition does not occur and provide you with an immediate alarm signal.

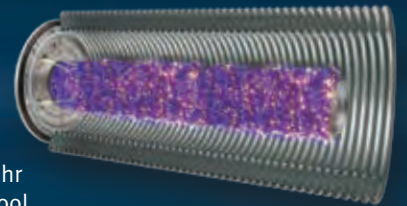


TWO-IN-ONE STAINLESS STEEL HEAT EXCHANGER

The stainless steel heat exchanger inside the boiler is divided into two sections inside a fully welded stainless steel body. The primary section absorbs a majority of heat from the burner flame while the secondary section absorbs additional heat from condensing flue gases to deliver the industry's highest thermal transfer.

FULLY MODULATING BURNER

Modulation is an important combustion feature that is long overdue in the pool industry. Why fire the appliance at 100% input in short bursts to heat the pool water? With a modulating burner, the boiler will tune in the input rate to exactly match the Btu/hr losses in the pool water. The burner will then “cruise” along comfortably, heating the pool water in long, low input burn cycles that dramatically increase the overall life of the boiler.



DIRECT VENT WITH PVC

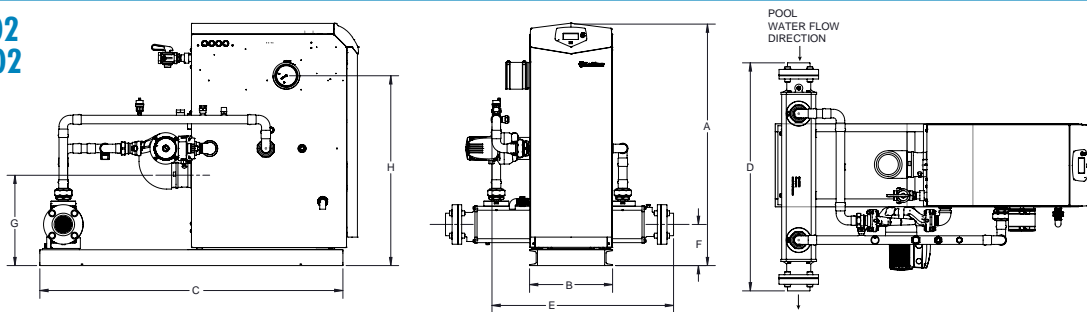
Reduce your installation cost, save time and effort by installing the AQUAS pool package with PVC pipe. The AQUAS pool package offers a variety of vent designs in your choice of PVC, CPVC, Polypropylene or Stainless Steel vent material. What's more, you can Direct Vent the AQUAS. By drawing the combustion air into the appliance with a dedicated intake pipe, the AQUAS is protected from corrosive pool chemicals that could damage the combustion system.

OUTDOOR RATED MODELS

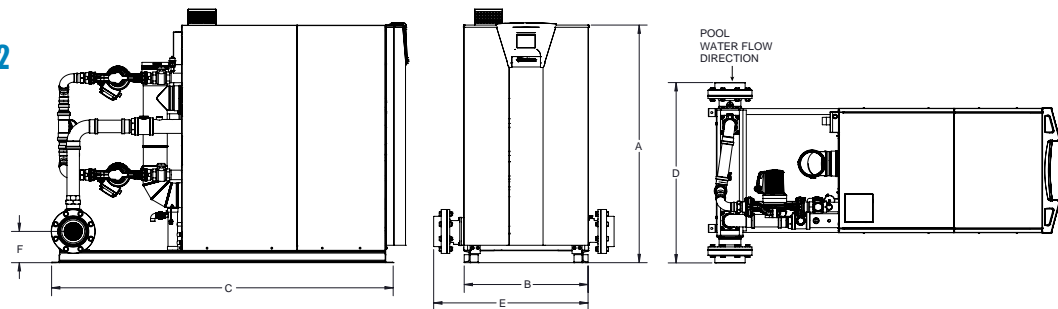
The AQUAS OXN402-802 models are specially trimmed for outdoor installation. The jacket is sealed and rated to protect the boiler against the elements. Pump covers, air intake covers and a specially-designed vent assembly complete the package to allow for easy installation outdoors.



**XPN 402 - 802
OXN 402 - 802**



XPN 1002 - 1502



Model Number	Output Btu/hr	A	B	C	D	E	F	G	H	Pool Conn.	Gas Conn.	Vent Size	Air Inlet	Pool Flow	Pressure Drop-Ft/Hd	Shipping Weight
XPN402	373,599	45-3/4"	15-3/4"	53"	43-1/4"	34-1/2"	7-3/4"	17-1/4"	37-1/4"	2-1/2" / 3"	1"	4"	4"	93	0.73	465
XPN502	467,000	45-3/4"	15-3/4"	57-1/2"	43-1/4"	34-1/2"	7-3/4"	17-1/4"	36"	2-1/2" / 3"	1"	4"	4"	117	1.15	497
XPN602	559,800	46"	15-3/4"	69"	43-1/4"	34-3/4"	7-3/4"	17-1/4"	39-1/2"	3"	1"	4"	4"	142	1.72	534
XPN702	653,100	46"	15-3/4"	74"	44"	35"	7-3/4"	17-1/4"	39-1/2"	3" / 4"	1"	6"	4"	166	0.55	634
XPN802	746,400	46"	15-3/4"	79"	44"	35"	7-3/4"	17-1/4"	39-1/2"	3" / 4"	1"	6"	4"	202	0.80	671
XPN1002	941,000	59-1/2"	31"	79-3/4"	44"	37-1/2"	7-3/4"	N/A	N/A	4"	1-1/2"	6"	6"	243	1.13	1022
XPN1302	1,238,000	59-1/2"	31"	80-1/2"	45-1/4"	38-1/2"	7-3/4"	N/A	N/A	6"	1-1/2"	6"	6"	316	1.27	1102
XPN1502	1,445,000	59-1/2"	31"	84-1/2"	45-1/4"	38-3/4"	7-3/4"	N/A	N/A	6"	1-1/2"	6"	6"	364	1.31	1192
OXN402	372,267	45-3/4"	15-3/4"	53"	43-1/4"	34-1/2"	7-3/4"	17-1/4"	N/A	2-1/2" / 3"	1"	4"	4"	93	0.73	465
OXN502	466,500	45-3/4"	15-3/4"	57-1/2"	43-1/4"	34-1/2"	7-3/4"	17-1/4"	N/A	2-1/2" / 3"	1"	4"	4"	117	1.15	497
OXN602	559,800	46"	15-3/4"	69"	43-1/4"	34-3/4"	7-3/4"	17-1/4"	N/A	3"	1"	4"	4"	142	1.72	534
OXN702	653,100	46"	15-3/4"	74"	44"	35"	7-3/4"	17-1/4"	N/A	3" / 4"	1"	6"	4"	166	0.55	634
OXN802	746,400	46"	15-3/4"	79"	44"	35"	7-3/4"	17-1/4"	N/A	3" / 4"	1"	6"	4"	202	0.80	671

Notes: * BTU output based on 80 degree pool water and a delta T of 8 degrees across the pool heat exchanger. Change 'N' to 'L' for LP gas models.
No deration on LP models. Performance data is based on manufacturer test results. Agency certification applies to the boiler.

STANDARD FEATURES

- > 97% Thermal Efficiency
- > Modulating Burner with 5:1 Turndown (402-802)
- > Modulating Burner with 10:1 Turndown (1002-1502)
 - Direct-Spark Ignition
 - Low NOx Operation
 - Sealed Combustion
 - Low Gas Pressure Operation
- > Vertical & Horizontal Venting
 - Category IV Venting up to 100 Feet PVC, CPVC
 - Polypropylene or AL29-4C Vent Material
 - Sidewall Vent Terminations provided
- > ASME Stainless Steel Boiler Heat Exchanger
 - ASME Certified, "H" Stamped
 - Gasketless design
 - 160 psi working pressure
 - On/Off Switch
 - Re-circulation Boiler Pumps
 - Expansion Tank w/ Fill Valve
 - Adjustable High Limit w/ Auto Reset
 - Adjustable High Limit w/ Manual Reset
 - Flow Switch (402-802)
 - Low Water Cutoff w/ Manual Reset & Test (1002-1502)
 - Low Air Pressure Switches
 - High & Low Gas Pressure Switches w/ Manual Reset (1002-1502)

Inlet & Outlet Temperature Sensors

- Two Easy Access Terminal Strips
- 30 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Material
- > Standard Cupro-Nickel Pool Heat Exchanger
 - Salt Water Ready
 - Flanged CPVC Connections

SMART TOUCH™ & SMART SYSTEM™ FEATURES

- > SMART SYSTEM™ Operating Control (402-802)
 - Multi-Colored Graphic LCD Display w/ Navigation Dial
- > SMART TOUCH™ Operating Control (1002-1502)
 - Full Color Touch Screen LCD Display
- > Built in Cascading Sequencer for up to 8 Pool Heaters
 - Lead Lag
 - Efficiency Optimization
 - Mix multiple input sizes
- > Outdoor Reset Control w/ Outdoor Air Sensor
- > Programmable System Efficiency Optimizers
 - Night Setback
 - Anti-Cycling
 - Ramp Delay
 - Boost Temperature & Time
- > Building Management System Integration
 - Optional Modbus communication
 - 0-10 VDC Input Control for Modulation or SetPoint
 - 0-10 VDC Output for Modulation Rate

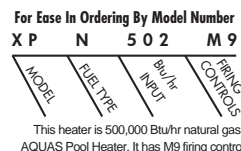
OPTIONAL EQUIPMENT

- Titanium Pool Heat Exchanger
- Alarm Bell
- Condensate Neutralization Kit
- High & Low Gas Pressure Switches w/ Manual Reset (402-802)
- Low Water Cut-Off w/ Manual Reset & Test (402-802)
- Stainless Steel Vent Kits (702-802)
- Room Air Kit
- Stack Frame (402-802)
- Secondary Heat Exchangers
- Modbus Communication
- BMS Gateways for LON or BACnet

FIRING CODES

- > M9 Standard Construction
- > M7 California Code
- > M13 CSD1 / Factory Mutual / GE Gap (502-1502)

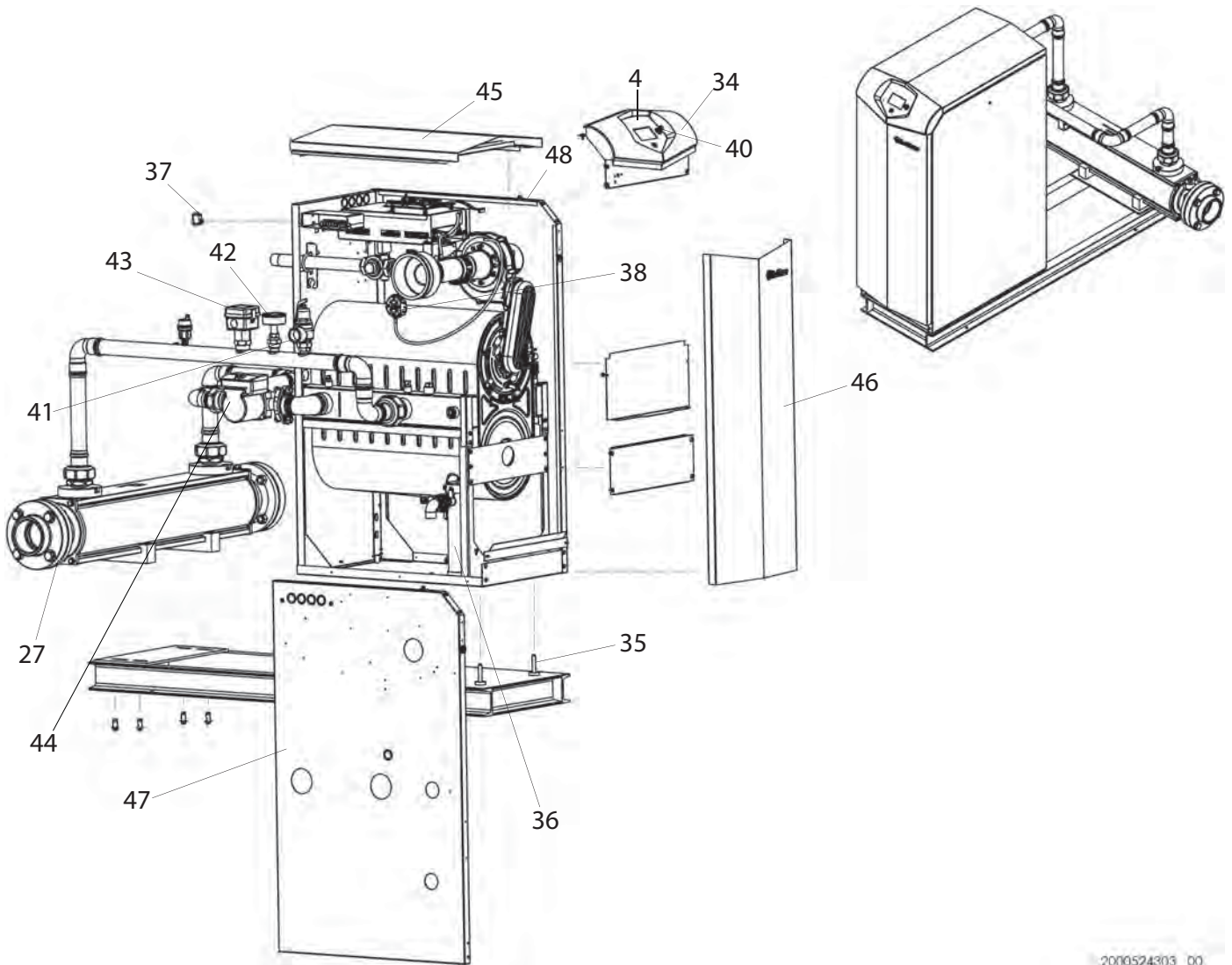
Patent # 7,506,617 and # 8,371,252



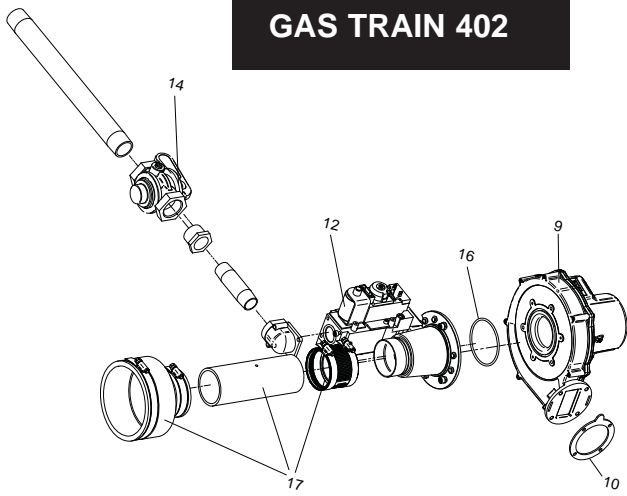


Replacement Parts List

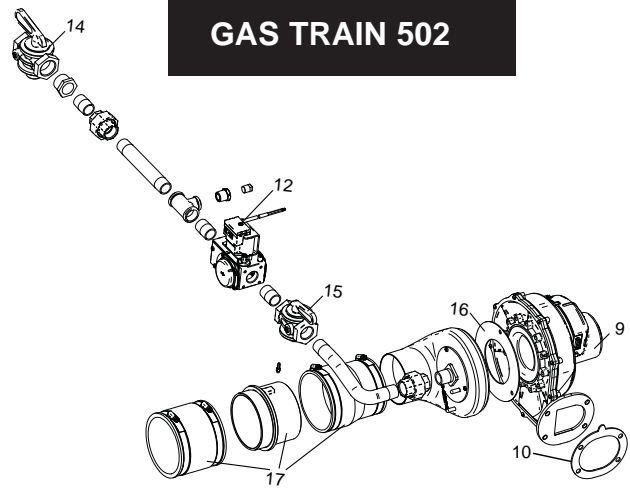
KnightXL[®] **AQUAS[™] COMMERCIAL POOL PACKAGE** **XP 402 - 802**



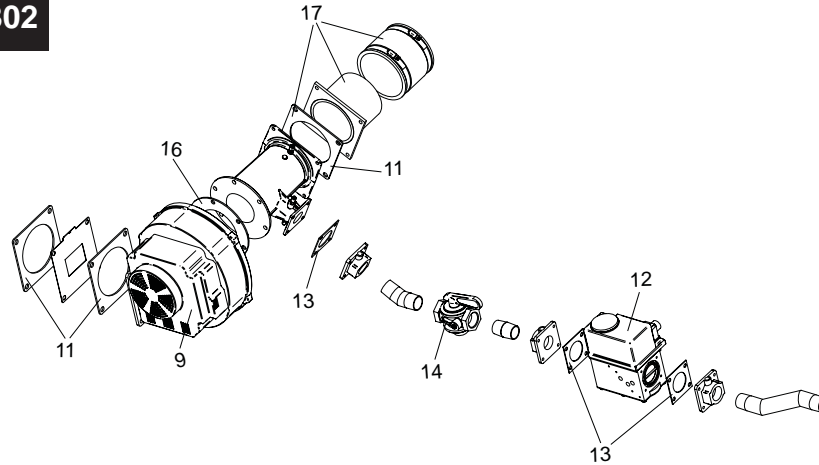
GAS TRAIN 402



GAS TRAIN 502

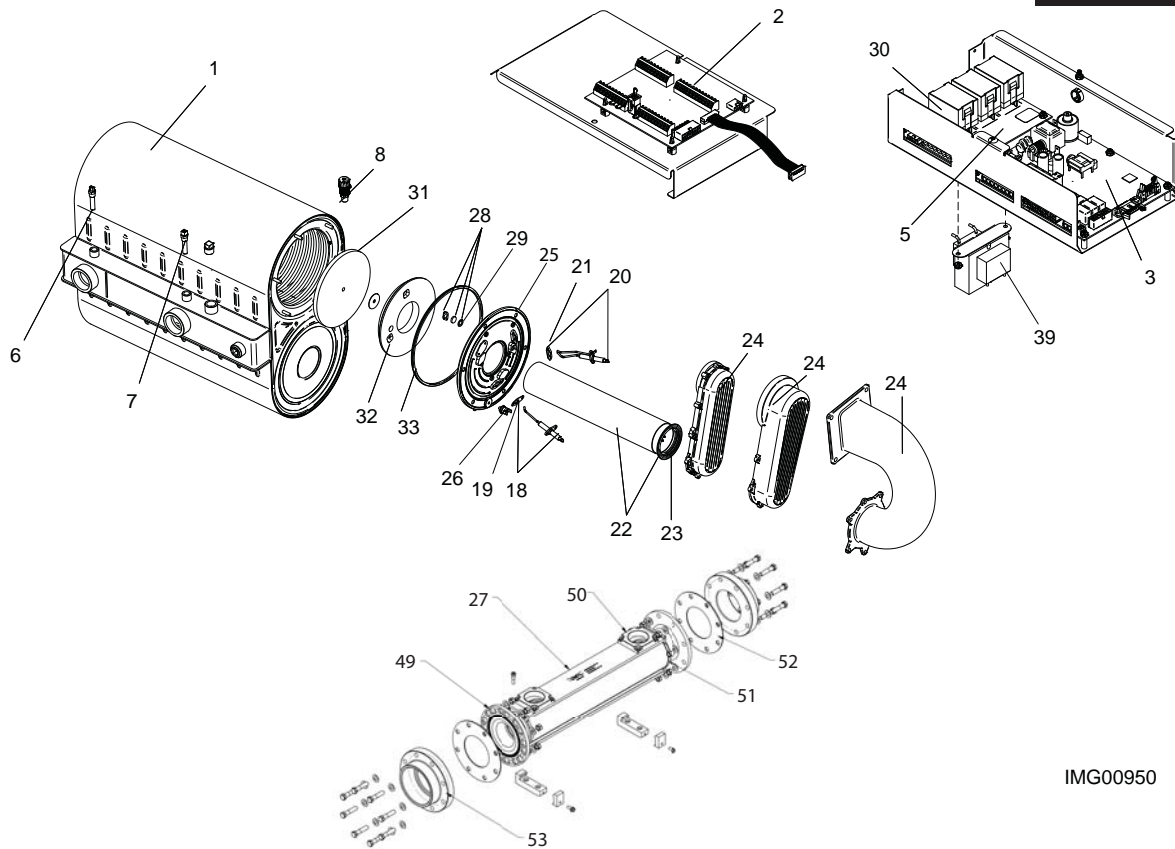


GAS TRAIN 602-802



PRIMARY HEAT EXCHANGER

CONTROL PANEL



IMG00950

SECONDARY/AUXILIARY HEAT EXCHANGER

ITEM NO.	PART NO.	LEGACY NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY				
1	100147457	HEX3081	HEAT EXCHANGER	XP 402
1	100147458	HEX3082	HEAT EXCHANGER	XP 502
1	100147460	HEX3088	HEAT EXCHANGER	XP 602
1	100147461	HEX3089	HEAT EXCHANGER	XP 702
1	100147462	HEX3090	HEAT EXCHANGER	XP 802
CONTROLS				
2	100167579	RLY20062	LOW VOLTAGE CONNECTION BOARD	ALL
3	100167830	RLY30072	INTEGRATED CONTROL	XP 402
3	100167831	RLY30073	INTEGRATED CONTROL	XP 502
3	100167832	RLY30074	INTEGRATED CONTROL	XP 602 - 802
4	100167575	RLY20058	USER INTERFACE CONTROL	ALL
5	100167683	RLY2085	RELAY BOARD, 1.5 HP PUMP	ALL
6	100170596	TST2060	INLET SENSOR	ALL
7	100170537	TST20009	OUTLET SENSOR/ HIGH LIMIT	ALL
8	100167445	RLV30000	AIR VENT VALVE	ALL
9	100145008	FAN3035	FAN ASSEMBLY	XP 402
9	100145009	FAN3037	FAN ASSEMBLY	XP 502
9	100144980	FAN30001	FAN ASSEMBLY	XP 602 - 802
10	100146541	GKT2436	BLOWER/AIR ARM GASKET	XP 402
10	100146542	GKT2438	BLOWER/AIR ARM GASKET	XP 502
11	100146458	GKT2034	BLOWER/AIR ARM GASKET	XP 602 - 802
GAS VALVES				
12	100172006	VAL3204	GAS VALVE ASSEMBLY	XP 402
12	100172009	VAL3207	GAS VALVE ASSEMBLY NAT	XPN502
12	100172014	VAL3212	GAS VALVE ASSEMBLY NAT	XPN602
12	100171923	VAL30006	GAS VALVE ASSEMBLY NAT	XPN702
12	100172015	VAL3213	GAS VALVE ASSEMBLY NAT	XPN802
12	100171928	VAL30011	GAS VALVE ASSEMBLY LP	XPL502
12	100171929	VAL30012	GAS VALVE ASSEMBLY LP	XPL602
12	100171930	VAL30013	GAS VALVE ASSEMBLY LP	XPL702
12	100171931	VAL30014	GAS VALVE ASSEMBLY LP	XPL802
13	100146470	GKT2050	GAS VALVE GASKET	XP 602 - 802
14	100146149	GAC2029	GAS CUT OFF VALVE 1X1	XP 402, 602-802
15	100146148	GAC2028	GAS CUT OFF VALVE 3/4 X 3/4	XP 502
16	100146547	GKT2444	GASKET, VENTURI	XP 402
16	100146494	GKT2080	AIR SHROUD GASKET	XP 502
16	100146469	GKT2049	GASKET, VENTURI	XP 602 - 802
17	100163254	MSC3185	AIR INLET KIT	XP 402
17	100163256	MSC3187	AIR INLET KIT	XP 502
17	100163255	MSC3186	AIR INLET KIT	XP 602 - 802
PILOT & BURNER ASSEMBLIES				
18	100165930	PLT3022	FLAME SENSOR W/ GASKET	XP 402 - 502
18	100165931	PLT3023	FLAME SENSOR W/ GASKET	XP 602 - 802
19	100146550	GKT2450	GASKET, FLAME SENSOR	ALL
20	100165929	PLT3021	IGNITOR W/ GASKET	XP 402 - 502
20	100165920	PLT30000	IGNITOR W/ GASKET	XP 602 - 802
21	100146549	GKT2449	GASKET, IGNITOR	ALL
22	100135311	BNR3429	BURNER W/ GASKET	XP 402 - 502
22	100135313	BNR3432	BURNER W/ GASKET	XP 602
22	100135314	BNR3433	BURNER W/ GASKET	XP 702
22	100135315	BNR3434	BURNER W/ GASKET	XP 802
23	100146551	GKT2451	GASKET, BURNER	XP 402 - 502
23	100146481	GKT2062	GASKET, BURNER	XP 602 - 802
24	100173792	WTR3078	GAS/AIR ARM ASSEMBLY W/ GASKET	XP 402
24	100173793	WTR3079	GAS/AIR ARM ASSEMBLY W/ GASKET	XP 502
24	100173798	WTR3085	GAS/AIR ARM ASSEMBLY W/ GASKET	XP 602 - 802
25	100173794	WTR3080	HEAT EXCHANGER ACCESS DOOR KIT	XP 402 - 502
25	100173799	WTR3086	HEAT EXCHANGER ACCESS DOOR KIT	XP 602 - 802
INDIRECT HEAT EXCHANGER				
26	100094572	HLC20005	HEX DOOR TEMP SWITCH BEGINNING SERIAL # F14	ALL
27	100208919	HEX30103	KIT, HEAT EXCHANGER, INDIRECT, CUNI, 1.0, SVC	XP 402 - 602
27	100208920	HEX30104	KIT, HEAT EXCHANGER, INDIRECT, CUNI, 1.5, SVC	XP 702 - 802
27	100208922	HEX30106	KIT, HEAT EXCHANGER, INDIRECT, TI, 1.0, SVC	XP 402 - 602
27	100208923	HEX30107	KIT, HEAT EXCHANGER, INDIRECT, TI, 1.5, SVC	XP 702 - 802

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

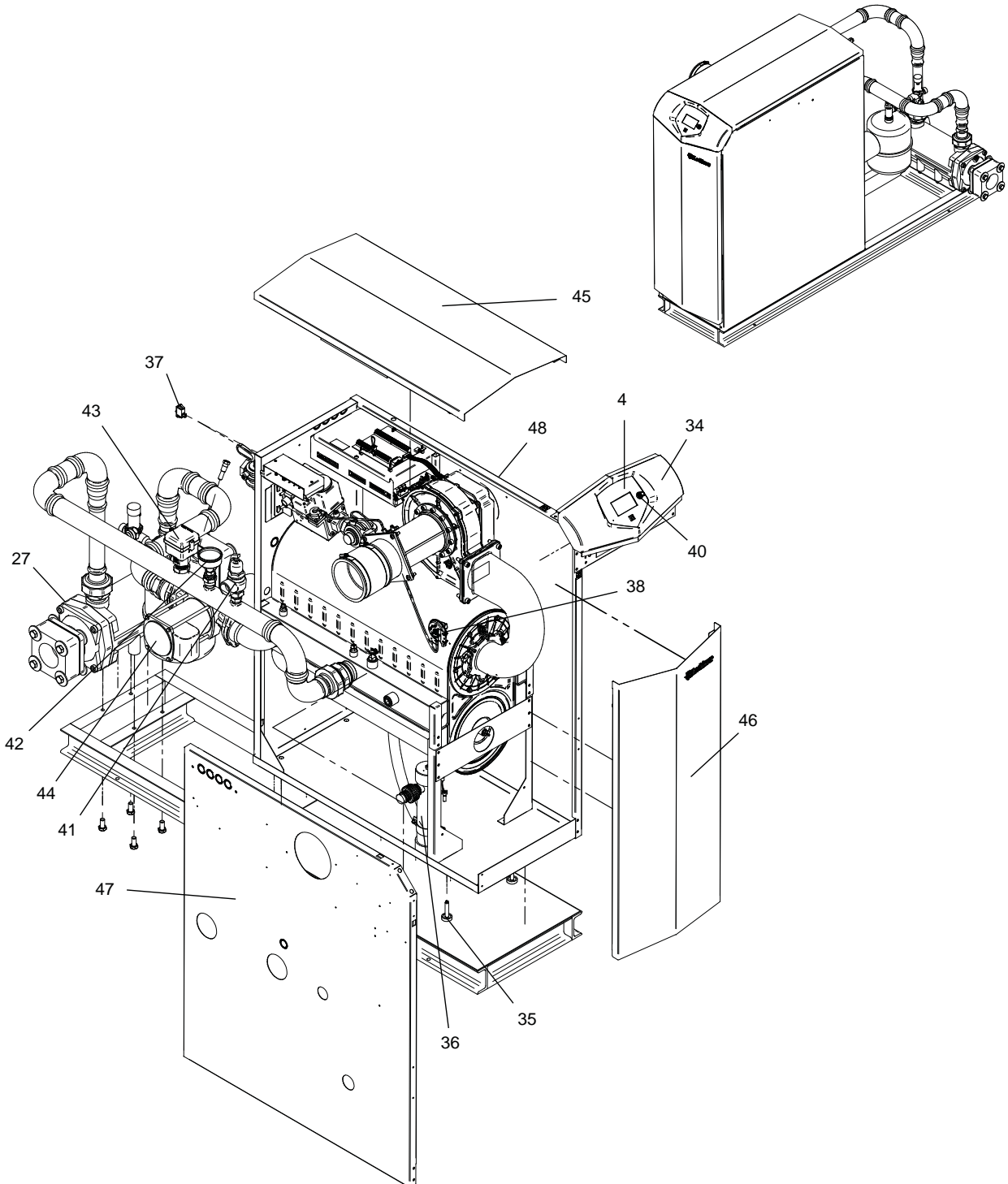
ITEM NO.	PART NO.	LEGACY NO.	DESCRIPTION	MODEL
MISCELLANEOUS				
28	100163249	MSC3180	SIGHT GLASS	ALL
29	100146553	GKT2453	GASKET, SIGHT GLASS	ALL
30	100167708	RLY2222	RELAY, 1.5 HP PUMP	ALL
31	100145494	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
32	100145495	FIB2168	BURNER PLATE, INSULATION, DOOR	XP 402 - 502
32	100145476	FIB2146	BURNER PLATE, INSULATION, DOOR	XP 602 - 802
33	100146555	GKT2455	GASKET DOOR RUBBER	XP 402 - 502
33	100146482	GKT2063	GASKET DOOR RUBBER	XP 602 - 802
34	100162908	MSC2177	DISPLAY BEZEL	ALL
35	100134788	BLT2104	LEVELING LEGS	ALL
36	100163244	MSC30050	CONDENSATE TRAP	ALL
-	100169481	SWT2011	BLOCKED DRAIN SWITCH	ALL
37	100169476	SWT2006	ON/OFF SWITCH	ALL
38	100166100	PRS20002	PRESSURE SWITCH	XP 402
38	100166114	PRS20020	PRESSURE SWITCH	XP 502
38	100166113	PRS20019	PRESSURE SWITCH	XP 602 - 802
39	100170172	TRF20000	TRANSFORMER, 40VA	XP 402 - 702
39	100170173	TRF20002	TRANSFORMER, 60VA	XP 802
40	100162600	MSC20123	KNOB, FLUTED W/ SKIRT	ALL
41	100167399	RLV2002	RELIEF VALVE 30 PSI	ALL
42	100146999	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
43	100173714	WTR2210	FLOW SWITCH	ALL
-	100146010	FUS20001	0.8 AMP	ALL
-	100146012	FUS2001	3.15 AMP	ALL
-	100146013	FUS2002	5 AMP	ALL
-	100163053	MSC2514	HIGH VOLTAGE CONNECTION BOARD	ALL
-	100170642	TST30011	FLUE TEMP SENSOR KIT	ALL
-	100157718	KIT3078	SYSTEM SENSOR KIT	ALL
-	100173646	WTR20009	MRLWCO WITH TEST	ALL
-	100157721	KIT3087	NEUTRALIZER KIT	XP 402 - 502
-	100157700	KIT3046	NEUTRALIZER KIT	XP 602 - 802
-	100157719	KIT3085	ALARM BELL	ALL
-	100159011	LPK3949	LP CONVERSION KIT	XP 402
-	100159012	LPK3950	LP CONVERSION KIT	XP 502 - 802
-	100170581	TST2032	SYSTEM SENSOR	ALL
-	100170590	TST2044	BULB WELL 1/4"	ALL
-	100148402	HLC30000	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
PUMP				
44	100166418	PUM30020	PUMP	XP 402 - 502
44	100166416	PUM30018	PUMP	XP 602 - 802
JACKET ASSEMBLY				
45	100149689	JKB30009	JACKET, TOP	XP 402
45	100149690	JKB30010	JACKET, TOP	XP 502
45	100149691	JKB30011	JACKET, TOP	XP 602
45	100149692	JKB30012	JACKET, TOP	XP 702
45	100267269	JKB40030	JACKET, TOP	XP 802
46	100189058	JKB30116	JACKET, FRONT	ALL
47	100149878	JKB40102	JACKET, LEFT SIDE	XP 402
47	100149861	JKB40084	JACKET, LEFT SIDE	XP 502
47	100149862	JKB40085	JACKET, LEFT SIDE	XP 602
47	100149863	JKB40086	JACKET, LEFT SIDE	XP 702
47	100149864	JKB40087	JACKET, LEFT SIDE	XP 802
48	100150356	JKB60250	JACKET, RIGHT SIDE	XP 402
48	100150359	JKB60258	JACKET, RIGHT SIDE	XP 502
48	100150361	JKB60263	JACKET, RIGHT SIDE	XP 602
48	100150362	JKB60265	JACKET, RIGHT SIDE	XP 702
48	100150364	JKB60267	JACKET, RIGHT SIDE	XP 802
49	100209139	PVC30036	KIT, END CAP FLANGE 3" ID AQUAS ALFA LAVA	XP 402 - 602
49	100209140	PVC30037	KIT, END CAP FLANGE 4" ID AQUAS ALFA LAVA	XP 702 - 802
50	100208989	MSC30098	KIT, O-RING 139.7 X 5.33, END CAP	XP 402 - 802
51	100232478	MSC30099	KIT, O-RING 78.97 X 3.53, BOILER CONNECTION	XP 402 - 802
52	100146441	GKT20144	GASKET, 3", EPDM	XP 402 - 602
52	100146433	GKT20130	GASKET, 4", EPDM	XP 702 - 802
53	100166553	PVC20103	FLANGE, 3", CPVC	XP 402 - 602
53	100166550	PVC20100	FLANGE, 4", CPVC	XP 702 - 802

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

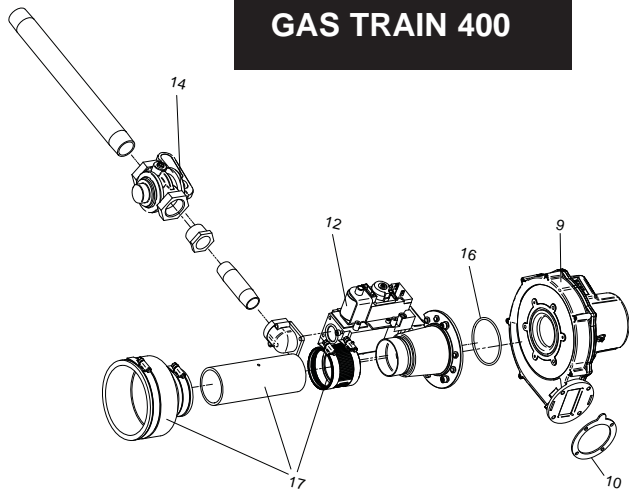


Replacement Parts List

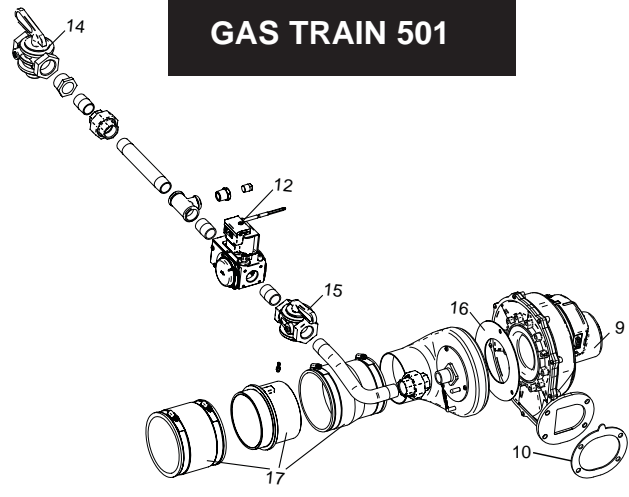
KnightXL[®]
AQUAS[™] COMMERCIAL POOL PACKAGE
XPN 400 - 801



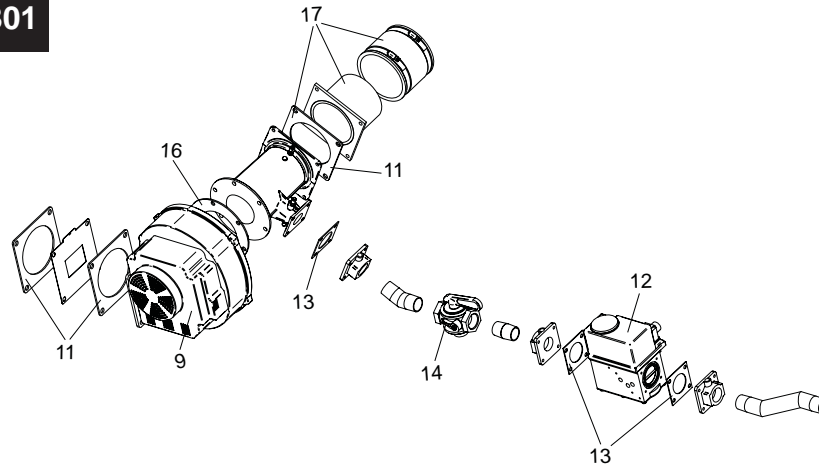
GAS TRAIN 400



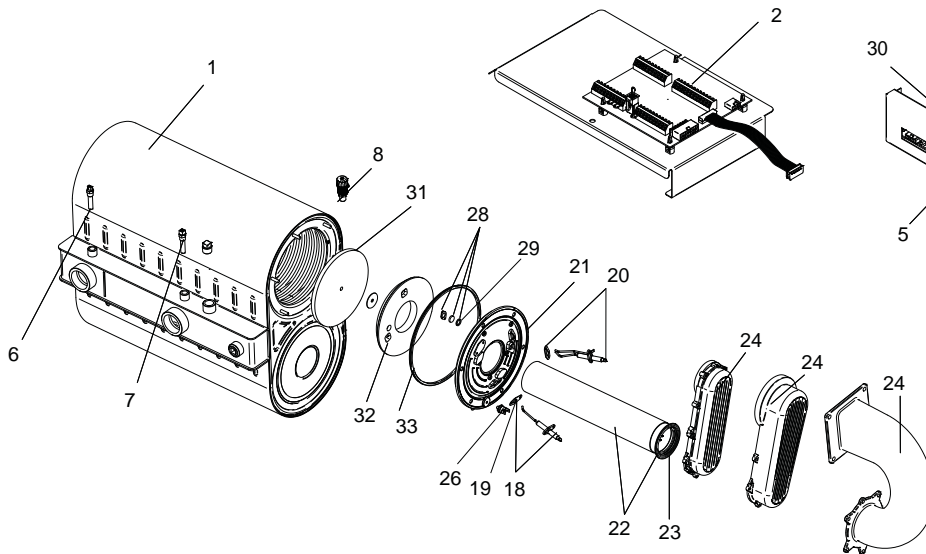
GAS TRAIN 501



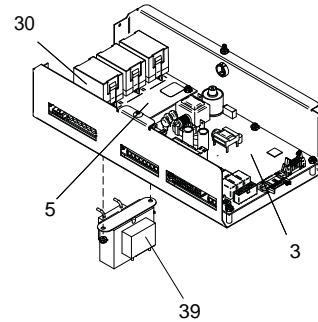
GAS TRAIN 601-801



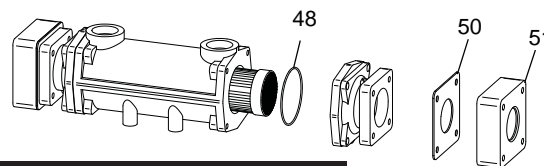
PRIMARY HEAT EXCHANGER



CONTROL PANEL



SECONDARY/AUXILIARY HEAT EXCHANGER



IMG00950

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX3081	HEAT EXCHANGER	XP400
1	HEX3082	HEAT EXCHANGER	XP501
1	HEX3088	HEAT EXCHANGER	XP601
1	HEX3089	HEAT EXCHANGER	XP701
1	HEX3090	HEAT EXCHANGER	XP801
CONTROLS			
2	RLY20062	LOW VOLTAGE CONNECTION BOARD	ALL
3	RLY30058	INTEGRATED CONTROL PRIOR TO SERIAL #H10	XP400
3	RLY30072	INTEGRATED CONTROL BEGINNING SERIAL #H10	XP400
3	RLY30059	INTEGRATED CONTROL PRIOR TO SERIAL #H10	XP501
3	RLY30073	INTEGRATED CONTROL BEGINNING SERIAL #H10	XP501
3	RLY30060	INTEGRATED CONTROL PRIOR TO SERIAL #H10	XP601 - 801
3	RLY30074	INTEGRATED CONTROL BEGINNING SERIAL #H10	XP601 - 801
4	RLY20058	USER INTERFACE CONTROL	ALL
5	RLY2085	RELAY BOARD, 1.5 HP PUMP	ALL
6	TST2060	INLET SENSOR	ALL
7	TST20009	OUTLET SENSOR/ HIGH LIMIT	ALL
8	RLV30000	AIR VENT VALVE	ALL
9	FAN3035	FAN ASSEMBLY	XP400
9	FAN3037	FAN ASSEMBLY	XP501
9	FAN30001	FAN ASSEMBLY	XP601 - 801
10	GKT2436	BLOWER/AIR ARM GASKET	XP400
10	GKT2438	BLOWER/AIR ARM GASKET	XP501
11	GKT2034	BLOWER/AIR ARM GASKET	XP601 - 801
GAS VALVES			
12	VAL3204	GAS VALVE ASSEMBLY	XP400
12	VAL3207	GAS VALVE ASSEMBLY NAT	XP501
12	VAL3212	GAS VALVE ASSEMBLY NAT	XP601
12	VAL30006	GAS VALVE ASSEMBLY NAT	XP701
12	VAL3213	GAS VALVE ASSEMBLY NAT	XP801
12	VAL30011	GAS VALVE ASSEMBLY LP	XP501
12	VAL30012	GAS VALVE ASSEMBLY LP	XP601
12	VAL30013	GAS VALVE ASSEMBLY LP	XP701
12	VAL30014	GAS VALVE ASSEMBLY LP	XP801
13	GKT2050	GAS VALVE GASKET	XP601 - 801
14	GAC2029	GAS CUT OFF VALVE 1X1	XP400, 601-801
15	GAC2028	GAS CUT OFF VALVE 3/4 X 3/4	XP501
16	GKT2444	GASKET, VENTURI	XP400
16	GKT2080	AIR SHROUD GASKET	XP501
16	GKT2049	GASKET, VENTURI	XP601 - 801
17	MSC3185	AIR INLET KIT	XP400
17	MSC3187	AIR INLET KIT	XP501
17	MSC3186	AIR INLET KIT	XP601 - 801
PILOT & BURNER ASSEMBLIES			
18	PLT3022	FLAME SENSOR W/ GASKET	XP400/501
18	PLT3023	FLAME SENSOR W/ GASKET	XP601 - 801
19	GKT2450	GASKET, FLAME SENSOR	ALL
20	PLT3021	IGNITOR W/ GASKET	XP400/501
20	PLT30000	IGNITOR W/ GASKET	XP601 - 801
21	GKT2449	GASKET, IGNITOR	ALL
22	BNR3429	BURNER W/ GASKET	XP400/501
22	BNR3432	BURNER W/ GASKET	XP601
22	BNR3433	BURNER W/ GASKET	XP701
22	BNR3434	BURNER W/ GASKET	XP801
23	GKT2451	GASKET, BURNER	XP400/501
23	GKT2062	GASKET, BURNER	XP601 - 801
24	WTR3078	GAS/AIR ARM ASSEMBLY W/ GASKET	XP400
24	WTR3079	GAS/AIR ARM ASSEMBLY W/ GASKET	XP501
24	WTR3085	GAS/AIR ARM ASSEMBLY W/ GASKET	XP601 - 801
25	WTR3080	HEAT EXCHANGER ACCESS DOOR KIT	XP400/501
25	WTR3086	HEAT EXCHANGER ACCESS DOOR KIT	XP601 - 801
INDIRECT HEAT EXCHANGER			
26	HLC20005	HEX DOOR TEMP SWITCH BEGINNING SERIAL # F14	ALL
27	HEX30007	HEAT EXCHANGER, INDIRECT	XP400 - 601
27	HEX30008	HEAT EXCHANGER, INDIRECT	XP701 - 801

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

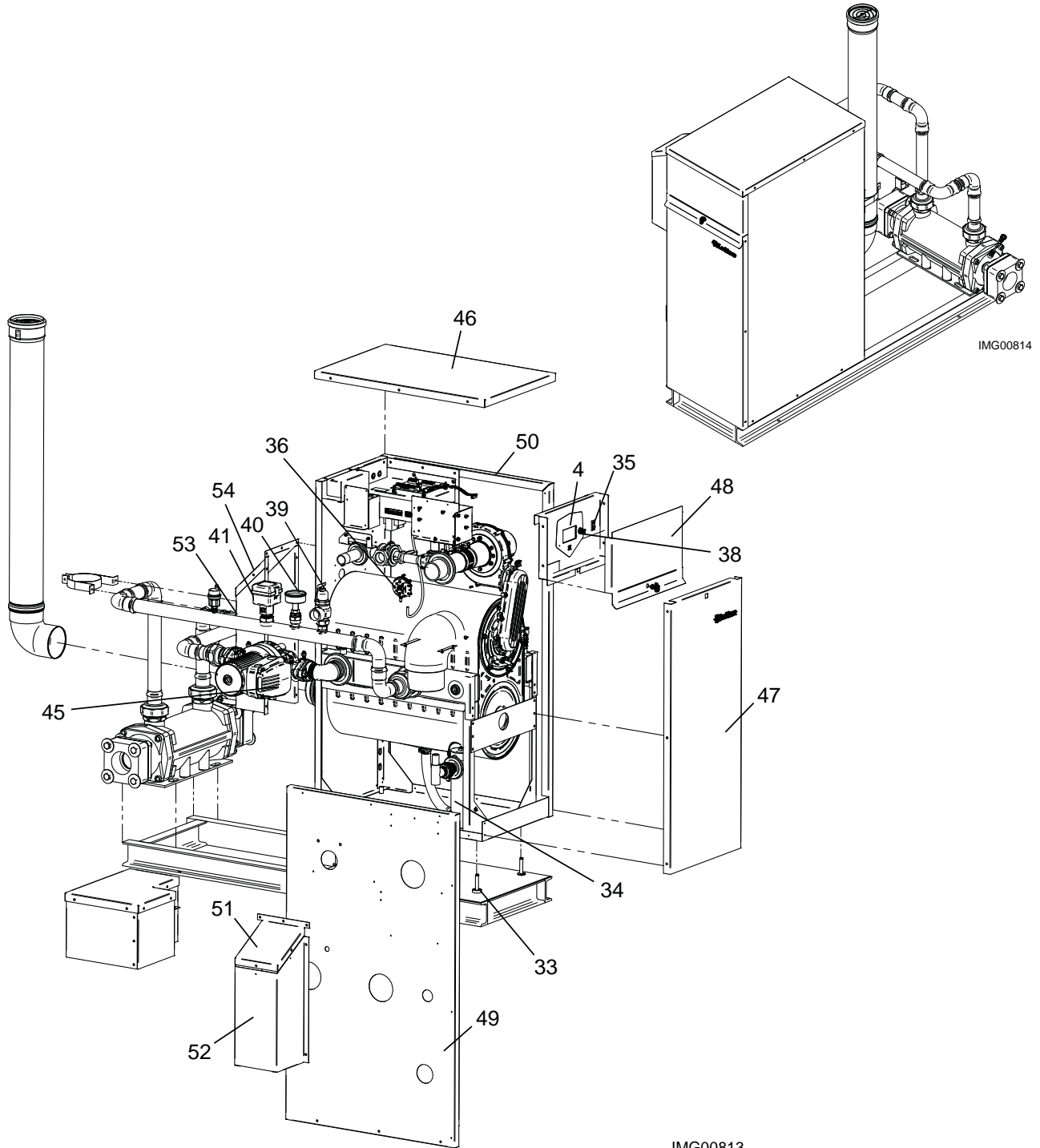
ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
28	MSC3180	SIGHT GLASS	ALL
29	GKT2453	GASKET, SIGHT GLASS	ALL
30	RLY2222	RELAY, 1.5 HP PUMP	ALL
31	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
32	FIB2168	BURNER PLATE, INSULATION, DOOR	XPN400/501
32	FIB2146	BURNER PLATE, INSULATION, DOOR	XPN601 - 801
33	GKT2455	GASKET DOOR RUBBER	XPN400/501
33	GKT2063	GASKET DOOR RUBBER	XPN601 - 801
34	MSC2177	DISPLAY BEZEL	ALL
35	BLT2104	LEVELING LEGS	ALL
36	MSC30050	CONDENSATE TRAP	ALL
-	SWT2011	BLOCKED DRAIN SWITCH	ALL
37	SWT2006	ON/OFF SWITCH	ALL
38	PRS20002	PRESSURE SWITCH	XPN400
38	PRS20020	PRESSURE SWITCH	XPN501
38	PRS20019	PRESSURE SWITCH	XPN601 - 801
39	TRF20000	TRANSFORMER, 40VA	XPN400-701
39	TRF20002	TRANSFORMER, 60VA	XPN801
40	MSC20123	KNOB, FLUTED W/ SKIRT	ALL
41	RLV2002	RELIEF VALVE 30 PSI	ALL
42	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
43	WTR2210	FLOW SWITCH	ALL
-	FUS20001	0.8 AMP	ALL
-	FUS2001	3.15 AMP	ALL
-	FUS2002	5 AMP	ALL
-	MSC2514	HIGH VOLTAGE CONNECTION BOARD	ALL
-	TST30011	FLUE TEMP SENSOR KIT	ALL
-	KIT3078	SYSTEM SENSOR KIT	ALL
-	WTR20009	MRLWCO WITH TEST	ALL
-	KIT3087	NEUTRALIZER KIT	XPN400/501
-	KIT3046	NEUTRALIZER KIT	XPN601 - 801
-	KIT3085	ALARM BELL	ALL
-	LPK3949	LP CONVERSION KIT	XPN400
-	LPK3950	LP CONVERSION KIT	XPN501-801
-	TST2032	SYSTEM SENSOR	ALL
-	TST2044	BULB WELL 1/4"	ALL
-	HLC30000	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
PUMP			
44	PUM30013	PUMP PRIOR TO SERIAL #D12	XPN400-601
44	PUM30020	PUMP AFTER SERIAL #D12	XPN400-501
44	PUM3013	PUMP PRIOR TO SERIAL #D12	XPN701-801
44	PUM30018	PUMP AFTER SERIAL #D12	XPN601-801
JACKET ASSEMBLY			
45	JKB30009	JACKET, TOP	XPN400
45	JKB30010	JACKET, TOP	XPN501
45	JKB30011	JACKET, TOP	XPN601
45	JKB30012	JACKET, TOP	XPN701
45	JKB40030	JACKET, TOP	XPN801
46	JKB30116	JACKET, FRONT	ALL
47	JKB40102	JACKET, LEFT SIDE	XPN400
47	JKB40084	JACKET, LEFT SIDE	XPN501
47	JKB40085	JACKET, LEFT SIDE	XPN601
47	JKB40086	JACKET, LEFT SIDE	XPN701
47	JKB40087	JACKET, LEFT SIDE	XPN801
48	JKB60250	JACKET, RIGHT SIDE	XPN400
48	JKB60258	JACKET, RIGHT SIDE	XPN501
48	JKB60263	JACKET, RIGHT SIDE	XPN601
48	JKB60265	JACKET, RIGHT SIDE	XPN701
48	JKB60267	JACKET, RIGHT SIDE	XPN801
49	GKT30002	GASKET, O-RING	XPN400-601
49	GKT30003	GASKET, O-RING	XPN701-801
50	GKT30010	GASKET, FLANGE	XPN400-601
50	GKT30011	GASKET, FLANGE PRIOR TO SERIAL #H13	XPN701-801
50	GKT30016	GASKET, FLANGE AFTER SERIAL #H13	XPN701-801
51	PVC20103	FLANGE, 3" CPVC	XPN400-601
51	PVC20039	FLANGE, 3" CPVC PRIOR TO SERIAL #H13	XPN701-801
51	PVC20100	FLANGE, 3" CPVC AFTER SERIAL #H13	XPN701-801

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS



Replacement Parts List

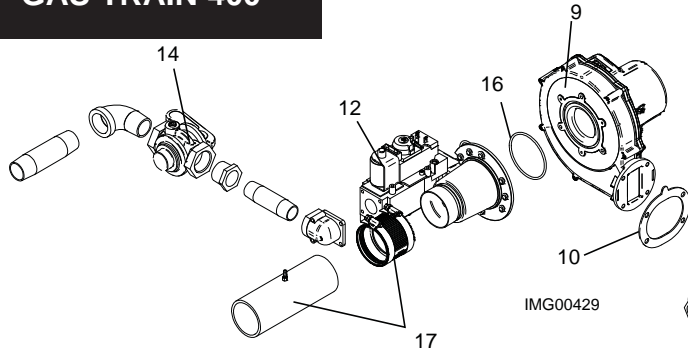
**Outdoor Knight XL
AQUAS™ COMMERCIAL POOL PACKAGE
OXN 400 thru 801**



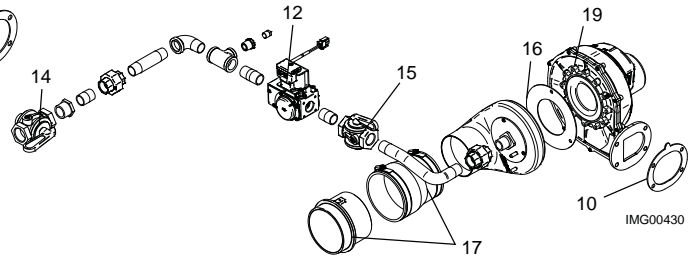
IMG00814

IMG00813

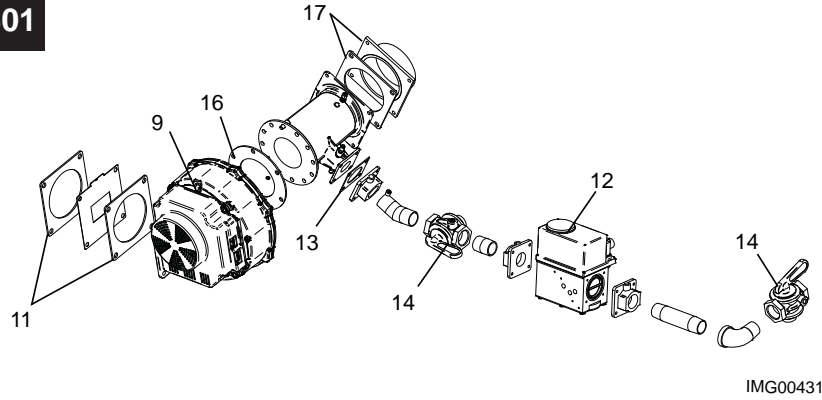
GAS TRAIN 400



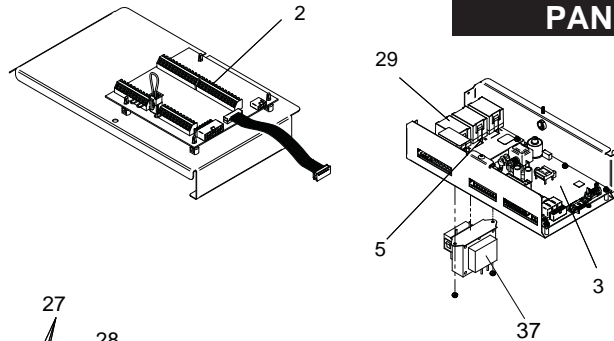
GAS TRAIN 501



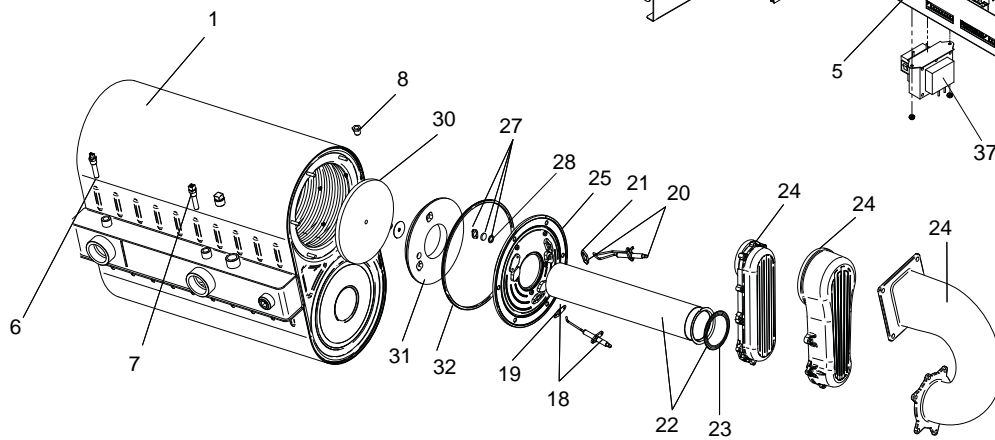
GAS TRAIN 601-801



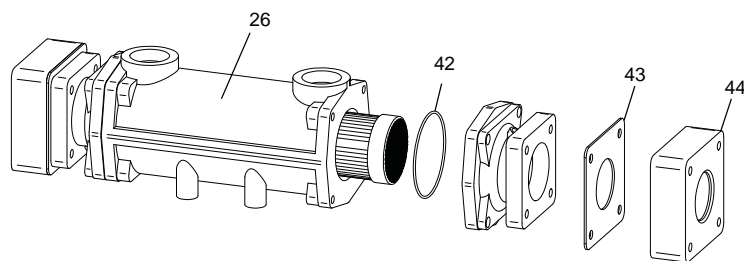
CONTROL PANEL



HEAT EXCHANGER 400-801



SECONDARY/AUXILIARY HEAT EXCHANGER



IMG00784

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX3081	HEAT EXCHANGER	OX 400
1	HEX3082	HEAT EXCHANGER	OX 501
1	HEX3088	HEAT EXCHANGER	OX 601
1	HEX3089	HEAT EXCHANGER	OX 701
1	HEX3090	HEAT EXCHANGER	OX 801
CONTROLS			
2	RLY20062	LOW VOLTAGE CONNECTION BOARD	ALL
3	RLY30072	INTEGRATED CONTROL	OX 400
3	RLY30073	INTEGRATED CONTROL	OX 501
3	RLY30074	INTEGRATED CONTROL	OX 601 - 801
4	RLY20058	USER INTERFACE CONTROL	ALL
5	RLY2085	RELAY BOARD, 1.5 HP PUMP	ALL
6	TST2060	INLET SENSOR	ALL
7	TST20009	OUTLET SENSOR / HIGH LIMIT	ALL
8	RLV30000	AIR VENT VALVE	ALL
9	FAN3035	FAN ASSEMBLY	OX 400
9	FAN3037	FAN ASSEMBLY	OX 501
9	FAN30001	FAN ASSEMBLY	OX 601 - 801
10	GKT2436	GASKET, BLOWER / AIR ARM	OX 400
10	GKT2438	GASKET, BLOWER / AIR ARM	OX 501
11	GKT2034	GASKET, BLOWER / AIR ARM	OX 601 - 801
GAS VALVES			
12	VAL3204	GAS VALVE ASSEMBLY	OX 400
12	VAL3207	GAS VALVE ASSEMBLY NAT	OXN501
12	VAL3212	GAS VALVE ASSEMBLY NAT	OXN601
12	VAL30006	GAS VALVE ASSEMBLY NAT	OXN701
12	VAL3213	GAS VALVE ASSEMBLY NAT	OXN801
12	VAL30011	GAS VALVE ASSEMBLY LP	OXL501
12	VAL30012	GAS VALVE ASSEMBLY LP	OXL601
12	VAL30013	GAS VALVE ASSEMBLY LP	OXL701
12	VAL30014	GAS VALVE ASSEMBLY LP	OXL801
13	GKT2050	GASKET, GAS VALVE	OX 601 - 801
14	GAC2029	GAS CUT OFF VALVE 1X1	OX 400, 601 - 801
15	GAC2028	GAS CUT OFF VALVE 3/4 X 3/4	OX 501
16	GKT2444	GASKET, VENTURI	OX 400
16	GKT2080	GASKET, AIR SHROUD	OX 501
16	GKT2049	GASKET, VENTURI	OX 601 - 801
17	MSC30033	AIR INLET, KIT	OX 400
17	MSC30034	AIR INLET, KIT	OX 501
17	MSC30035	AIR INLET, KIT	OX 601 - 801
PILOT & BURNER ASSEMBLIES			
18	PLT3022	FLAME SENSOR W/ GASKET	OX 400 - 501
18	PLT3023	FLAME SENSOR W/ GASKET	OX 601 - 801
19	GKT2450	GASKET, FLAME SENSOR	OX 400 - 501
20	PLT3021	IGNITOR W/ GASKET	OX 400 - 501
20	PLT30000	IGNITOR W/ GASKET	OX 601 - 801
21	GKT2449	GASKET, IGNITOR	ALL
22	BNR3429	BURNER W/ GASKET	OX 400 - 501
22	BNR3432	BURNER W/ GASKET	OX 601
22	BNR3433	BURNER W/ GASKET	OX 701
22	BNR3434	BURNER W/ GASKET	OX 801
23	GKT2451	GASKET, BURNER	OX 400/501
23	GKT2062	GASKET, BURNER	OX 601 - 801
24	WTR3078	GAS/AIR ARM ASSEMBLY W/ GASKET	OX 400
24	WTR3079	GAS/AIR ARM ASSEMBLY W/ GASKET	OX 501
24	WTR3085	GAS/AIR ARM ASSEMBLY W/ GASKET	OX 601 - 801
25	WTR3080	HEAT EXCHANGER ACCESS DOOR KIT	OX 400 - 501
25	WTR3086	HEAT EXCHANGER ACCESS DOOR KIT	OX 601 - 801
INDIRECT HEAT EXCHANGER			
26	HEX20016	HEAT EXCHANGER, INDIRECT	OX 400 - 601
26	HEX20017	HEAT EXCHANGER, INDIRECT	OX 701 - 801
MISCELLANEOUS			
27	MSC3180	SIGHT GLASS	ALL
28	GKT2453	GASKET, SIGHT GLASS	ALL
29	RLY2222	RELAY, 1.5 HP PUMP	ALL
30	FIB2167	DIVIDER PLATE, INSULATION, BAFFLE	ALL
31	FIB2168	BURNER PLATE, INSULATION, DOOR	OX 400 - 501
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

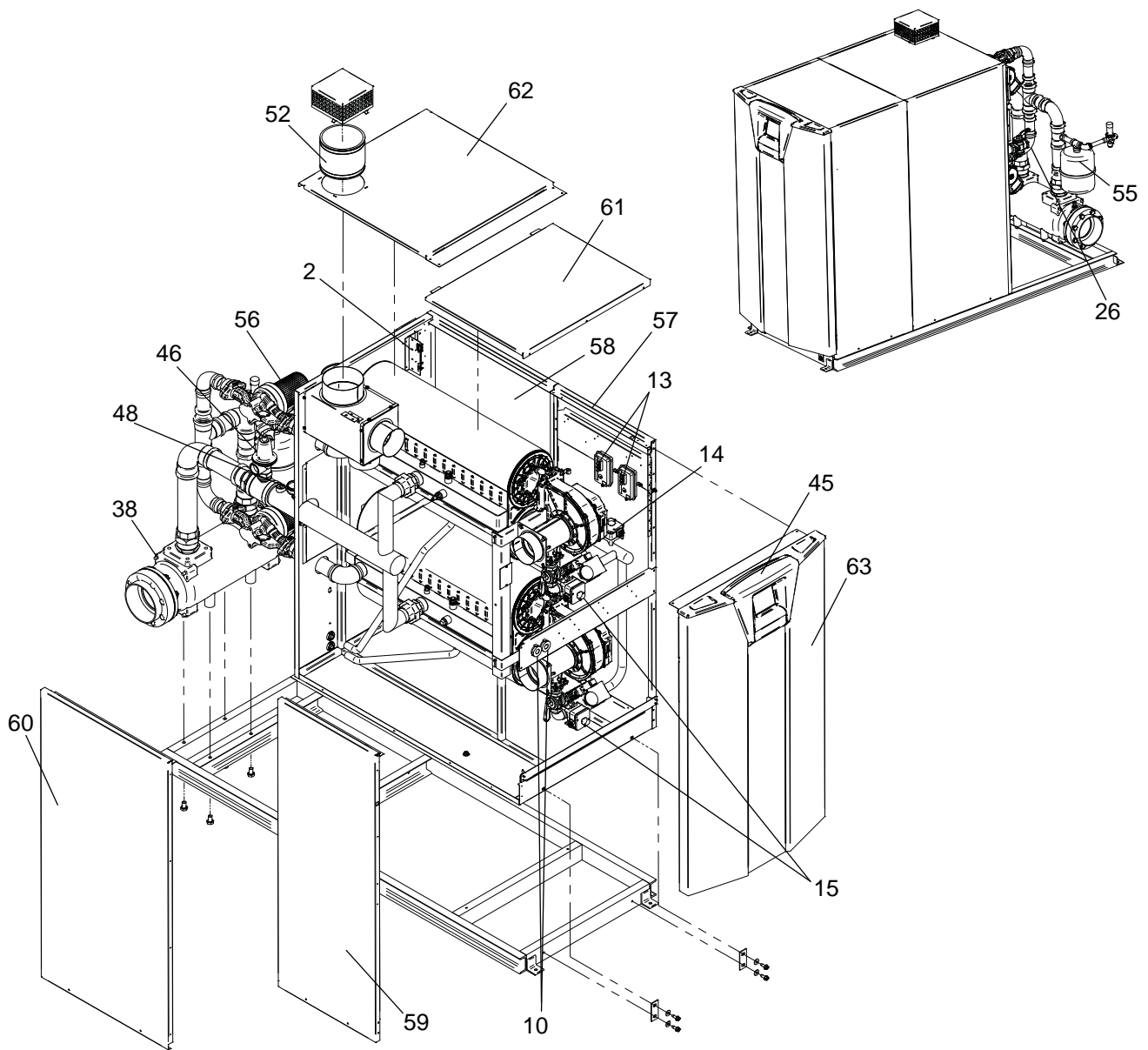
ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
31	FIB2146	BURNER PLATE, INSULATION, DOOR	OX 601 - 801
32	GKT2455	GASKET, DOOR, RUBBER	OX 400 - 501
32	GKT2063	GASKET, DOOR, RUBBER	OX 601 - 801
33	BLT2104	LEVELING LEGS	ALL
34	MSC30050	CONDENSATE TRAP	ALL
-	SWT2011	BLOCKED DRAIN SWITCH	ALL
35	SWT2006	ON/OFF SWITCH	ALL
36	PRS20002	PRESSURE SWITCH	OX 400
36	PRS20020	PRESSURE SWITCH	OX 501
36	PRS20019	PRESSURE SWITCH	OX 601 - 801
37	TRF20000	TRANSFORMER, 40VA	OX 400 - 701
37	TRF20002	TRANSFORMER, 60VA	OX 801
38	MSC20123	KNOB, FLUTED W/ SKIRT	ALL
39	RLV2002	RELIEF VALVE 30 PSI	ALL
40	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
41	WTR2210	FLOW SWITCH	ALL
42	GKT30002	GASKET, O-RING	OX 400 - 601
42	GKT30003	GASKET, O-RING	OX 701 - 801
43	GKT30010	GASKET, FLANGE	OX 400 - 601
43	GKT30011	GASKET, FLANGE	OX 701 - 801
44	PVC20040	FLANGE, 2 1/2" CPVC	OX 400 - 601
44	PVC20039	FLANGE, 3" CPVC	OX 701 - 801
-	FUS20001	0.8 AMP	ALL
-	FUS2001	3.15 AMP	ALL
-	FUS2002	5 AMP	ALL
-	MSC2514	HIGH VOLTAGE CONNECTION BOARD	ALL
-	TST30006	POOL SENSOR KIT	ALL
-	TST30011	FLUE TEMP SENSOR KIT	ALL
-	WTR30024	MRLWCO WITH MANUAL RESET	ALL
-	KIT3087	NEUTRALIZER KIT	OX 400 - 501
-	KIT3046	NEUTRALIZER KIT	OX 601 - 801
-	KIT3085	ALARM BELL	ALL
-	LPK3949	LP CONVERSION KIT	OX 400
-	LPK3950	LP CONVERSION KIT	OX 501 - 801
-	LBL20279	USER INTERFACE OVERLAY	ALL
PUMP			
45	PUM30020	PUMP	OX 400 - 501
45	PUM30018	PUMP	OX 601 - 801
JACKET ASSEMBLY			
46	JKB30098	JACKET, TOP	OX 400
46	JKB30099	JACKET, TOP	OX 501
46	JKB30100	JACKET, TOP	OX 601
46	JKB30101	JACKET, TOP	OX 701
46	JKB30102	JACKET, TOP	OX 801
47	JKB30032	JACKET, FRONT, LOWER	OX 400 - 801
48	JKB30104	JACKET, FRONT, UPPER	ALL
49	JKB30105	JACKET, LEFT SIDE	OX 400
49	JKB30106	JACKET, LEFT SIDE	OX 501
49	JKB30107	JACKET, LEFT SIDE	OX 601
49	JKB30108	JACKET, LEFT SIDE	OX 701
49	JKB30109	JACKET, LEFT SIDE	OX 801
50	JKB60632	JACKET, RIGHT SIDE	OX 400
50	JKB60634	JACKET, RIGHT SIDE	OX 501
50	JKB60508	JACKET, RIGHT SIDE	OX 601
50	JKB60636	JACKET, RIGHT SIDE	OX 701
50	JKB60602	JACKET, RIGHT SIDE	OX 801
51	JKB60676	COVER, AIR INLET BOX TOP	OX 400
51	JKB60526	COVER, AIR INLET BOX TOP	OX 501 - 801
52	JKB30071	COVER, AIR INLET BOX	OX 400
52	JKB30072	COVER, AIR INLET BOX	OX 501 - 801
53	JKB60514	COVER,FLUE BOX	OX 400 - 601
53	JKB60608	COVER,FLUE BOX	OX 701 - 801
54	JKB30059	COVER,FLUE BOX TOP	OX 400 - 601
54	JKB30060	COVER,FLUE BOX TOP	OX 701 - 801

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

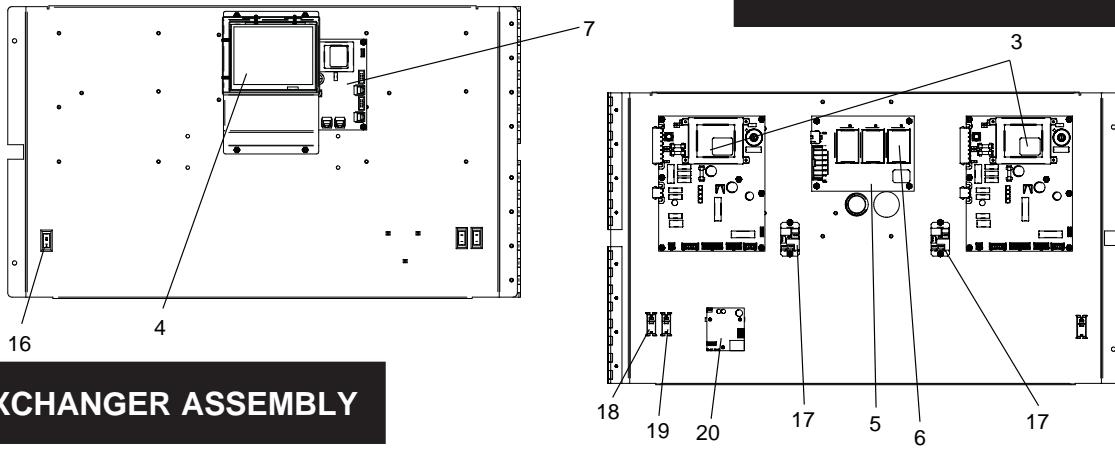


Replacement Parts List

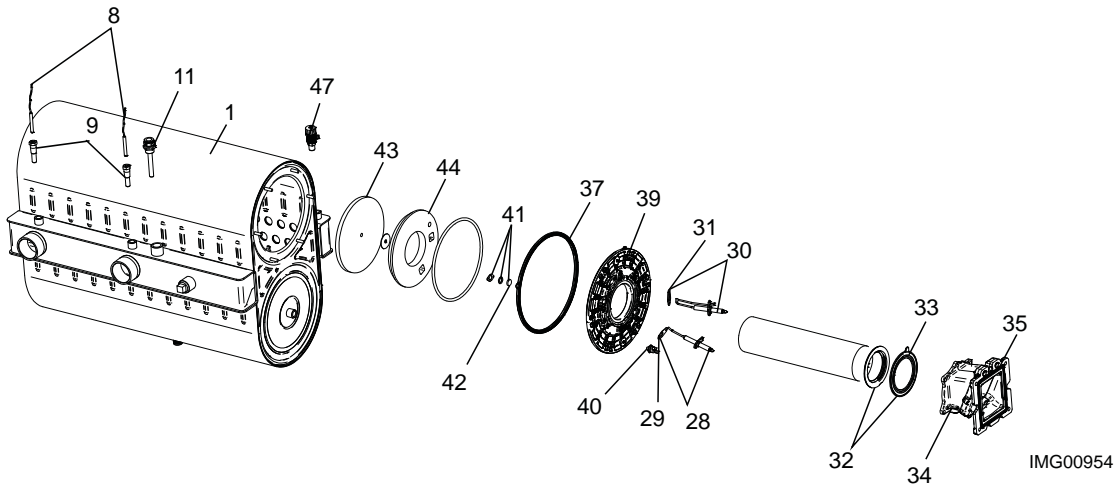
SYNC® AQUAS™ COMMERCIAL POOL PACKAGE XPN 1.0 - 1.5



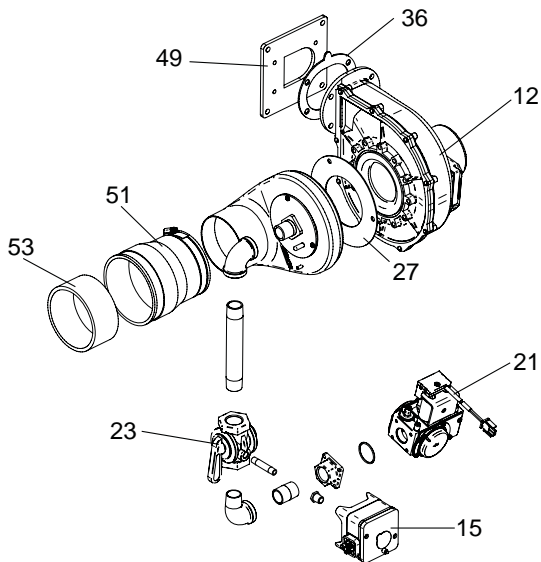
CONTROL PANEL ASSEMBLY



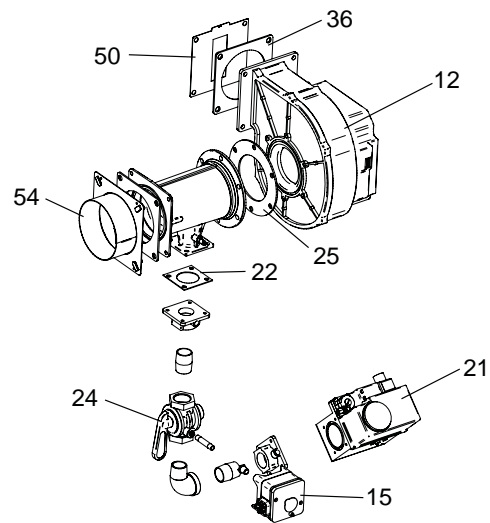
HEAT EXCHANGER ASSEMBLY



GAS TRAIN XPN 1.0



GAS TRAIN XPN 1.3, 1.5



ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX30000	HEAT EXCHANGER	XPN/L1000
1	HEX30001	HEAT EXCHANGER	XPN/L1300
1	HEX30002	HEAT EXCHANGER	XPN/L1500
CONTROLS			
2	RLY20023	LOW VOLTAGE CONNECTION BOARD	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)			
3	RLY30089	INTEGRADED CONTROL	XPN/L1000
3	RLY30091	INTEGRADED CONTROL	XPN/L1300-1500
3	RLY30090	INTEGRATED CONTROL HIGH ALTITUDE	XPN/L1000
3	RLY30092	INTEGRATED CONTROL HIGH ALTITUDE	XPN/L1300-1500
4	RLY30031	LCD DISPLAY	ALL
5	RLY2085	PUMP RELAY BOARD	ALL
6	RLY2222	1.5HP PUMP RELAY	ALL
7	RLY20054	ECS CONTROL BOARD	ALL
8	TST2032	INLET/OUTLET SENSOR	ALL
9	TST2044	BULBWELL, INLET/OUTLET SENSOR	ALL
10	HLC2701	MANUAL RESET HIGH LIMIT	ALL
11	TST2306	BULBWELL, HIGH LIMIT	ALL
12	FAN30005	FAN ASSEMBLY	XPN/L1000
12	FAN30001	FAN ASSEMBLY	XPN/L1300-1500
13	PRS2054	AIR PRESSURE SWITCH	ALL
13	PRS20018	AIR PRESSURE SWITCH, HIGH ALTITUDE	ALL
14	PRS2046	GAS PRESSURE SWITCH, LOW	ALL
15	PRS2047	GAS PRESSURE SWITCH, HIGH	ALL
16	SWT2006	ON/OFF SWITCH	ALL
17	RLY2105	RELAY, 24VAC	ALL
18	SWT2002	MOMENTARY OFF SWITCH, RED	ALL
19	SWT2003	MOMENTARY OFF SWITCH, BLACK	ALL
20	WTR30000	LOW WATER CUT-OFF, MANUAL RESET	ALL
20	WTR30001	LOW WATER CUT-OFF, AUTO RESET	ALL
-	WTR20011	PROBE, LWCO	ALL
-	WTR20000	BOOT, LWCO	ALL
GAS VALVES			
21	VAL30007	GAS VALVE ASSEMBLY NAT	XPN1000
21	VAL30008	GAS VALVE ASSEMBLY NAT	XPN1300
21	VAL30009	GAS VALVE ASSEMBLY NAT	XPN1500
21	VAL30015	GAS VALVE ASSEMBLY LP	XPL1000
21	VAL30016	GAS VALVE ASSEMBLY LP	XPL1300
21	VAL30017	GAS VALVE ASSEMBLY LP	XPL1500
22	GKT2050	GAS VALVE GASKET	XPN/L1300-1500
23	GAC2028	GAS CUT OFF VALVE 3/4"	XPN/L1000
24	GAC2029	GAS CUT OFF VALVE 1X1	XPN/L1300-1500
25	GKT2081	GASKET, VENTURI	XPN/L1300-1500
26	VAL2951	GAS CUT OFF VALVE 1 1/2"	ALL
27	GKT2080	AIR SHROUD GASKET	XPN/L1000
PILOT & BURNER ASSEMBLIES			
28	PLT3023	FLAME SENSOR W/ GASKET	ALL
29	GKT2450	GASKET, FLAME SENSOR	ALL
30	PLT30000	IGNITER W/ GASKET	ALL
31	GKT2449	GASKET, IGNITER	ALL
32	BNR30000	BURNER W/ GASKET	XPN/L1000
32	BNR30001	BURNER W/ GASKET	XPN/L1300
32	BNR30002	BURNER W/ GASKET	XPN/L1500
33	GKT2062	GASKET, BURNER	ALL
34	WTR20001	FLAPPER VALVE ASSEMBLY & STABILITOR	ALL
35	GKT20012	GASKET, FLAPPER VALVE	ALL
36	GKT2034	GASKET, FAN	XPN/L1300-1500
36	GKT2438	GASKET, FAN	XPN/L1000
37	GKT2063	GASKET DOOR RUBBER	ALL
INDIRECT HEAT EXCHANGERS			
38	HEX30085	HEAT EXCHANGER, INDIRECT	XPN/L1000
38	HEX30087	HEAT EXCHANGER, INDIRECT	XPN/L1300-1500
39	WTR3086	HEX ACCESS DOOR KIT	ALL
40	HLC20005	HEX DOOR TEMP SWITCH BEGINNING SN# F14	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

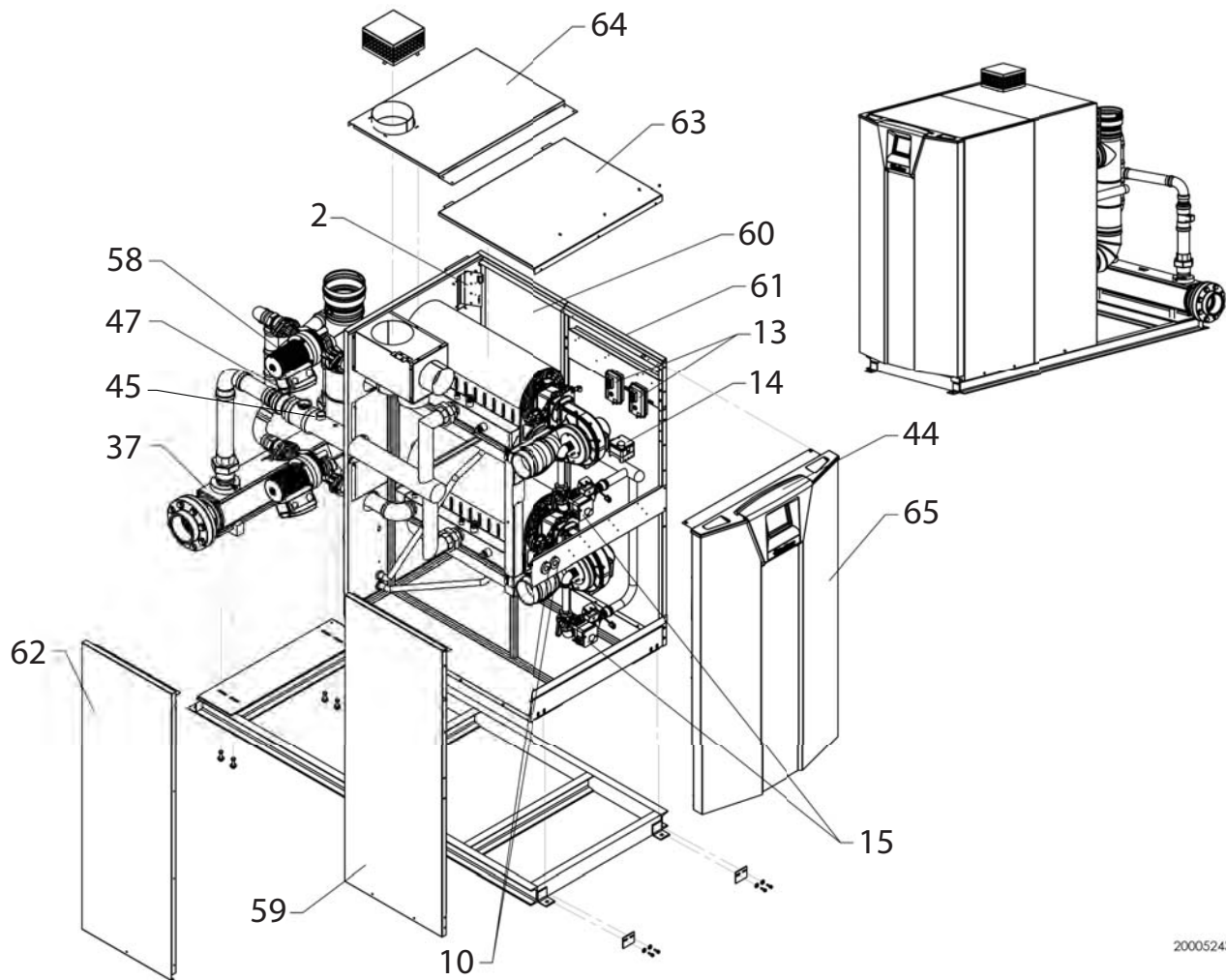
ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
41	MSC3180	SIGHT GLASS	ALL
42	GKT2453	GASKET, SIGHT GLASS	ALL
43	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
44	FIB2146	BURNER PLATE, INSULATION, DOOR	ALL
45	MSC2242	DISPLAY BEZEL	ALL
46	RLV20007	RELIEF VALVE 30 PSI	XPN/L1000
46	RLY20016	RELIEF VALVE 30 PSI	XPN/L1300-1500
47	RLV30000	AIR VENT VALVE	ALL
48	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
49	JKB20001	ADAPTER, FAN	XPN/L1000
50	JKB60071	AIR SHUTTER	XPN/L1300
51	CPG2064	COUPLING 4"	XPN/L1000
52	CPG20000	COUPLING 6"	ALL
53	PVC20025	INLET STIFFENER	XPN/L1000
54	JKD5040	INLET ADAPTER	XPN/L1300-1500
55	EXP20000	EXPANSION TANK, 2 GAL	ALL
-	FUS2000	1.25 AMP	ALL
-	FUS2001	3.15 AMP	ALL
-	FUS2002	5 AMP	ALL
-	MSC30049	CONDENSATE TRAP	ALL
-	SWT2011	BLOCKED DRAIN SWITCH	ALL
-	TST3403	FLUE TEMP SENSOR KIT	ALL
-	KIT3046	NEUTRALIZER KIT	ALL
-	KIT3085	ALARM BELL KIT	ALL
-	KIT30047	SIDEWALL VENT KIT	ALL
-	KIT30064	HEAT EXCHANGER CLEANING KIT	ALL
-	MSC20062	DOOR CATCH	ALL
-	MSC2202	DOOR STRIKE	ALL
-	HLC30000	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
PUMP			
56	PUM30018	PUMP ASSEMBLY	ALL
JACKET ASSEMBLIES			
57	JKB30020	JACKET, OUTER SIDE, RIGHT FRONT	ALL
58	JKB60397	JACKET, OUTER SIDE, RIGHT REAR	XPN/L1000
58	JKB60411	JACKET, OUTER SIDE, RIGHT REAR	XPN/L1300
58	JKB60412	JACKET, OUTER SIDE, RIGHT REAR	XPN/L1500
59	JKB30021	JACKET, OUTER SIDE, LEFT FRONT	ALL
60	JKB60394	JACKET, OUTER SIDE, LEFT REAR	XPN/L1000
60	JKB60409	JACKET, OUTER SIDE, LEFT REAR	XPN/L1300
60	JKB60410	JACKET, OUTER SIDE, LEFT REAR	XPN/L1500
61	JKB60398	JACKET, OUTER FRONT TOP	ALL
62	JKB60392	JACKET, OUTER REAR TOP	XPN/L1000
62	JKB60407	JACKET, OUTER REAR TOP	XPN/L1300
62	JKB60408	JACKET, OUTER REAR TOP	XPN/L1500
63	JKB30022	JACKET, FRONT DOOR ASSEMBLY	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS

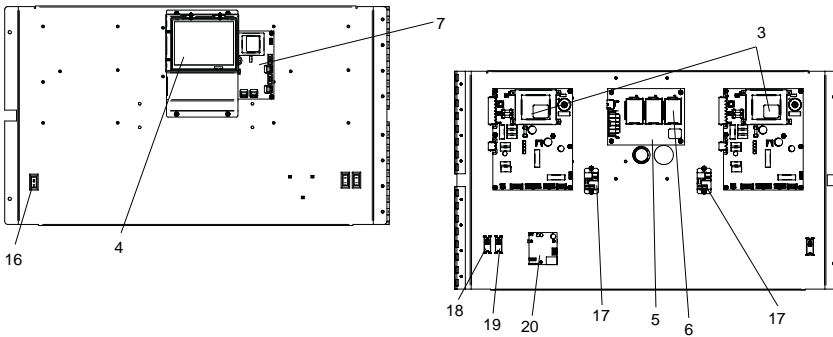


Replacement Parts List

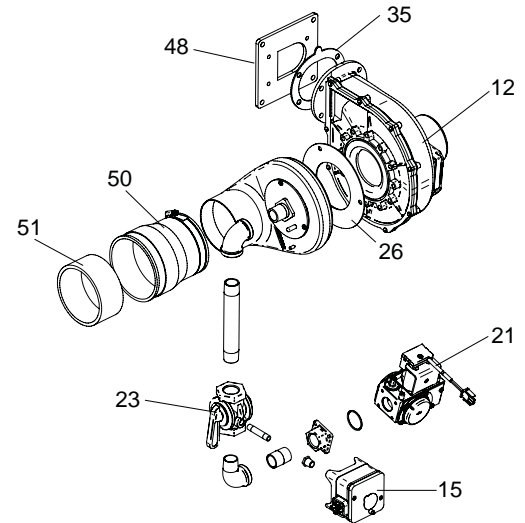
SYNC® AQUAS™ COMMERCIAL POOL PACKAGE XP 1002 - 1502



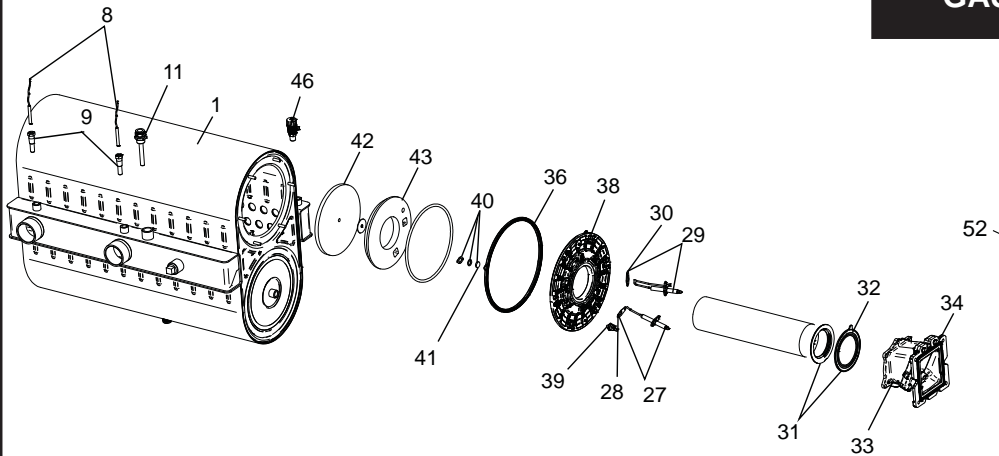
CONTROL PANEL ASSEMBLY



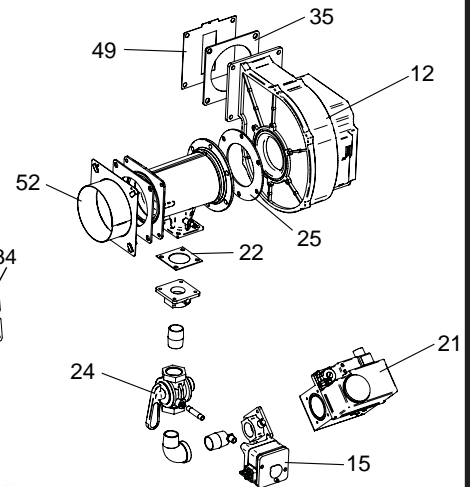
GAS TRAIN XPN 1002



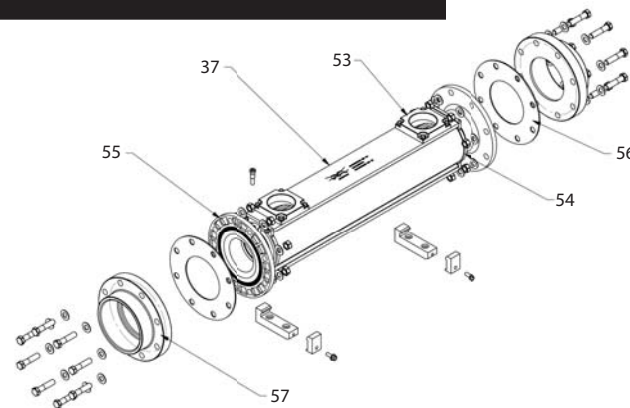
HEAT EXCHANGER ASSEMBLY



GAS TRAIN XPN 1302, 1502



SECONDARY/AUXILIARY HEAT EXCHANGER



ITEM NO.	PART NO.	LEGACY NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY				
1	100147302	HEX30000	HEAT EXCHANGER	XP 1002
1	100147303	HEX30001	HEAT EXCHANGER	XP 1302
1	100147304	HEX30002	HEAT EXCHANGER	XP 1502

CONTROLS

2	100167547	RLY20023	LOW VOLTAGE CONNECTION BOARD	ALL
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PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	LEGACY NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)				
3	100167846	RLY30089	INTEGRADED CONTROL	XP 1002
3	100167848	RLY30091	INTEGRADED CONTROL	XP 1302 - 1502
3	100167847	RLY30090	INTEGRATED CONTROL HIGH ALTITUDE	XP 1002
3	100167849	RLY30092	INTEGRATED CONTROL HIGH ALTITUDE	XP 1302 - 1502
4	100167787	RLY30031	LCD DISPLAY	ALL
5	100167683	RLY2085	PUMP RELAY BOARD	ALL
6	100167708	RLY2222	1.5HP PUMP RELAY	ALL
7	100167571	RLY20054	ECS CONTROL BOARD	ALL
8	100170581	TST2032	INLET/OUTLET SENSOR	ALL
9	100170590	TST2044	BULB WELL, INLET/OUTLET SENSOR	ALL
10	100148393	HLC2701	MANUAL RESET HIGH LIMIT	ALL
11	100170603	TST2306	BULB WELL, HIGH LIMIT	ALL
12	100144984	FAN30005	FAN ASSEMBLY	XP 1002
12	100144980	FAN30001	FAN ASSEMBLY	XP 1302 - 1502
13	100166152	PRS2054	AIR PRESSURE SWITCH	ALL
13	100166112	PRS20018	AIR PRESSURE SWITCH, HIGH ALTITUDE	ALL
14	100166147	PRS2046	GAS PRESSURE SWITCH, LOW	ALL
15	100166148	PRS2047	GAS PRESSURE SWITCH, HIGH	ALL
16	100169476	SWT2006	ON/OFF SWITCH	ALL
17	100167686	RLY2105	RELAY, 24VAC	ALL
18	100169472	SWT2002	MOMENTARY OFF SWITCH, RED	ALL
19	100169473	SWT2003	MOMENTARY OFF SWITCH, BLACK	ALL
20	100173747	WTR30000	LOW WATER CUT-OFF, MANUAL RESET	ALL
20	100173748	WTR30001	LOW WATER CUT-OFF, AUTO RESET	ALL
-	100173648	WTR20011	PROBE, LWCO	ALL
-	100173640	WTR20000	BOOT, LWCO	ALL
GAS VALVES				
21	100171924	VAL30007	GAS VALVE ASSEMBLY NAT	XPN1002
21	100171925	VAL30008	GAS VALVE ASSEMBLY NAT	XPN1302
21	100171926	VAL30009	GAS VALVE ASSEMBLY NAT	XPN1502
21	100171932	VAL30015	GAS VALVE ASSEMBLY LP	XPL1002
21	100171933	VAL30016	GAS VALVE ASSEMBLY LP	XPL1302
21	100171934	VAL30017	GAS VALVE ASSEMBLY LP	XPL1502
22	100146470	GKT2050	GAS VALVE GASKET	XP 1302 - 1502
23	100146148	GAC2028	GAS CUT OFF VALVE 3/4"	XP 1002
24	100146149	GAC2029	GAS CUT OFF VALVE 1X1	XP 1302 - 1502
25	100146495	GKT2081	GASKET, VENTURI	XP 1302 - 1502
-	100171912	VAL2951	GAS CUT OFF VALVE 1 1/2"	ALL
26	100146494	GKT2080	AIR SHROUD GASKET	XP 1002
PILOT & BURNER ASSEMBLIES				
27	100165931	PLT3023	FLAME SENSOR W/ GASKET	ALL
28	100146550	GKT2450	GASKET, FLAME SENSOR	ALL
29	100165920	PLT30000	IGNITER W/ GASKET	ALL
30	100146549	GKT2449	GASKET, IGNITER	ALL
31	100135261	BNR30000	BURNER W/ GASKET	XP 1002
31	100135262	BNR30001	BURNER W/ GASKET	XP 1302
31	100135263	BNR30002	BURNER W/ GASKET	XP 1502
32	100146481	GKT2062	GASKET, BURNER	ALL
33	100173641	WTR20001	FLAPPER VALVE ASSEMBLY & STABILATOR	ALL
34	100146342	GKT20012	GASKET, FLAPPER VALVE	ALL
35	100146458	GKT2034	GASKET, FAN	XP 1302 - 1502
35	100146542	GKT2438	GASKET, FAN	XP 1002
36	100146482	GKT2063	GASKET DOOR RUBBER	ALL
INDIRECT HEAT EXCHANGERS				
37	100208920	HEX30104	KIT, HEAT EXCHANGER, INDIRECT, CUNI, 1.5, SVC	XP 1002
37	100208921	HEX30105	KIT, HEAT EXCHANGER, INDIRECT, CUNI, 2.0, SVC	XP 1302 - 1502
37	100208923	HEX30107	KIT, HEAT EXCHANGER, INDIRECT, TI, 1.5, SVC	XP 1002
37	100208924	HEX30108	KIT, HEAT EXCHANGER, INDIRECT, TI, 2.0, SVC	XP 1302 - 1502
38	100173799	WTR3086	HEX ACCESS DOOR KIT	ALL
39	100094572	HLC20005	HEX DOOR TEMP SWITCH	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	LEGACY NO.	DESCRIPTION	MODEL
MISCELLANEOUS				
40	100163249	MSC3180	SIGHT GLASS	ALL
41	100146553	GKT2453	GASKET, SIGHT GLASS	ALL
42	100145494	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
43	100145476	FIB2146	BURNER PLATE, INSULATION, DOOR	ALL
44	100162556	MSC20069	DISPLAY BEZEL	ALL
45	100167384	RLV20007	RELIEF VALVE 30 PSI	XP 1002
45	100167564	RLY20046	RELIEF VALVE 30 PSI	XP 1302 - 1502
46	100167445	RLV30000	AIR VENT VALVE	ALL
47	100146999	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
48	100149666	JKB20001	ADAPTER, FAN	XP 1002
49	100150174	JKB60071	AIR SHUTTER	XP 1302
50	100138385	CPG2064	COUPLING 4"	XP 1002
-	100138301	CPG20000	COUPLING 6"	ALL
51	100166490	PVC20025	INLET STIFFENER	XP 1002
52	100151317	JKD5040	INLET ADAPTER	XP 1302 - 1502
-	100143781	EXP20000	EXPANSION TANK, 2 GAL	ALL
-	100146009	FUS2000	1.25 AMP	ALL
-	100146012	FUS2001	3.15 AMP	ALL
-	100146013	FUS2002	5 AMP	ALL
-	100163242	MSC30049	CONDENSATE TRAP	ALL
-	100169481	SWT2011	BLOCKED DRAIN SWITCH	ALL
-	100170652	TST3403	FLUE TEMP SENSOR KIT	ALL
-	100157700	KIT3046	NEUTRALIZER KIT	ALL
-	100157719	KIT3085	ALARM BELL KIT	ALL
-	100157612	KIT30047	SIDEWALL VENT KIT	ALL
-	100157628	KIT30064	HEAT EXCHANGER CLEANING KIT	ALL
-	100162552	MSC20062	DOOR CATCH	ALL
-	100162929	MSC2202	DOOR STRIKE	ALL
-	100148402	HLC30000	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
53	100208989	MSC30098	KIT, O-RING 139.7 X 5.33, END CAP	ALL
54	100232478	MSC30099	KIT, O-RING 78.97 X 3.53, BOILER CONNECTION	ALL
55	100209140	PVC30037	KIT, END CAP FLANGE 4" ID AQUAS ALFA LAVA	XP 1002
55	100209141	PVC30038	KIT, END CAP FLANGE 6" ID AQUAS ALFA LAVA	XP 1302 - 1502
56	100146433	GKT20130	GASKET, 4" EPDM	XP 1002
56	100146431	GKT20129	GASKET, 6" EPDM	XP 1302 - 1502
57	100166550	PVC20100	FLANGE, 4", CPVC	XP 1002
57	100166549	PVC20099	FLANGE, 6", CPVC	XP 1302 - 1502
PUMP				
58	100166416	PUM30018	PUMP ASSEMBLY	ALL
JACKET ASSEMBLIES				
59	100149699	JKB30020	JACKET, OUTER SIDE, LEFT FRONT	ALL
60	100150493	JKB60397	JACKET, OUTER SIDE, RIGHT REAR	XP 1002
60	100150509	JKB60411	JACKET, OUTER SIDE, RIGHT REAR	XP 1302
60	100150510	JKB60412	JACKET, OUTER SIDE, RIGHT REAR	XP 1502
61	100149700	JKB30021	JACKET, OUTER SIDE, RIGHT FRONT	ALL
62	100150490	JKB60394	JACKET, OUTER SIDE, LEFT REAR	XP 1002
62	100150506	JKB60409	JACKET, OUTER SIDE, LEFT REAR	XP 1302
62	100150508	JKB60410	JACKET, OUTER SIDE, LEFT REAR	XP 1502
63	100150494	JKB60398	JACKET, OUTER FRONT TOP	ALL
64	100150488	JKB60392	JACKET, OUTER REAR TOP	XP 1002
64	100150504	JKB60407	JACKET, OUTER REAR TOP	XP 1302
64	100150505	JKB60408	JACKET, OUTER REAR TOP	XP 1502
65	100149701	JKB30022	JACKET, FRONT DOOR ASSEMBLY	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS

CONDENSING COMMERCIAL GAS WATER HEATERS



SMART SYSTEM™

OPERATING CONTROL FEATURING
A BUILT-IN CASCADING SEQUENCER

EIGHT MODELS FROM 150,000 TO
800,000 BTU/HR

FIRING RATE MODULATION TO 5:1

LESS THAN 20 ppm NO_x

DIRECT-VENT FLEXIBILITY TO 100 FEET



96%  **THERMAL EFFICIENCY**



DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA

ARMOR[®]

CONDENSING WATER HEATER

A BETTER WAY TO ACHIEVE 96% THERMAL EFFICIENCY

ARMOR is a fully condensing commercial gas water heater. Available in eight models with inputs ranging from 150,000 to 800,000 Btu/hr, the ARMOR achieves thermal efficiencies up to 96%.

SEPARATE TANK FOR FLEXIBILITY, LOWER REPLACEMENT COSTS

With standard tank-type water heaters, your choices are limited when it comes to matching input with storage capacity to meet "peak demand" delivery requirements. With ARMOR, you can match one or more water heaters with inputs ranging from 150,000 to 800,000 with one or more storage tanks in a wide variety of sizes. Lochinvar Lock-Temp[®] tanks are available to meet the need, from our 80-gallon vertical to the 5000-gallon vertical or horizontal model. Another advantage of the ARMOR "dual component" system is lower replacement costs. Standard tank-type designs require replacement of the entire water heater. With ARMOR, you'll save time and money by only replacing individual components as needed, such as the pump or storage tank.



AW (286-801)

FULLY MODULATING WITH 5:1 TURNDOWN

ARMOR features advanced Negative Regulation (Neg/Reg) sealed combustion technology, permitting fan speed to constantly adjust the volume of fuel and air entering the burner. This ensures that ARMOR can safely and reliably operate with supply gas pressure as low as 4 inches water column.

ARMOR is equipped with fully modulating combustion with 5:1 turndown. This means ARMOR can fire as low as 20% of maximum input when water heating demand is lowest, and increase the firing rate up to 100% as demand increases. The result is better overall efficiency and less cycling, compared to tank-type units which are "on-off," which means they can only fire at 100% of maximum input.

STAINLESS STEEL CONDENSING HEAT EXCHANGER

The ARMOR's stainless steel heat exchanger is built to ASME Section IV requirements. Its design provides superior resistance to corrosion caused by condensation from low entering water temperatures. Non - Condensing commercial water heaters will fail early with low entering water temperatures; however, with the ARMOR the lower the supply water temperature the more efficiently it performs throughout the life of the heater.

DIRECT-VENTING UP TO 100 FEET



Sidewall Vent Termination

ARMOR offers 7 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof.

**Optional Concentric Vent Kit Sold Separately (for 151-601 Models)*

FACTORY SUPPLIED AND SHIPPED STANDARD WITH EVERY MODEL



SMART SYSTEM

THE ULTIMATE WATER HEATER OPERATING CONTROL WITH GRAPHIC LCD DISPLAY

COMPATIBILITY WITH COPPER-FIN II™ NON-CONDENSING WATER HEATER TO CREATE A FRONT END LOADING SYSTEM

WATER HEATERS WITH DIFFERENT INPUTS CAN BE CASCADED TOGETHER TO MAXIMIZE TURNDOWN CAPABILITY

NIGHT SETBACK CAPABILITIES

- > SETBACK OF STORAGE TANK TEMPERATURE
- > SETBACK OF BUILDING RECIRCULATING TEMPERATURE*

WATER HEATER PUMP CONTROL:

- > PUMP DELAY WITH FREEZE PROTECTION
- > BUILDING RECIRCULATION PUMP CONTROL*
- > PUMP EXERCISE

HIGH-VOLTAGE TERMINAL STRIP:

- > 110 VAC INPUT TO WATER HEATER
- > DRY CONTACTS FOR WATER HEATER PUMP CONTROL
- > DRY CONTACTS FOR BUILDING RECIRC. PUMP CONTROL*

LOW-VOLTAGE TERMINAL STRIP

- WITH 28 POINTS OF CONNECTION
- > 0-10V WATER HEATER RATE OUTPUT
- > 0-10V HEAT DEMAND INPUT
- > MODBUS CONTACTS

USB CONNECTION POINT FOR OPTIONAL SMART SYSTEM PC SOFTWARE WITH ADVANCED SETUP AND DIAGNOSTICS

MODBUS COMPATIBILITY (OPTIONAL)

* EXCLUSIVE TO LOCHINVAR SMART SYSTEM

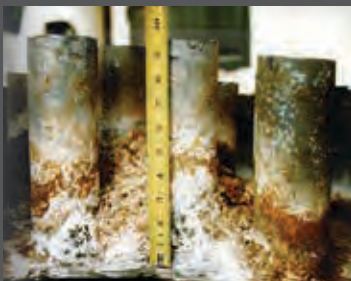


LONG-LASTING “LIFE CYCLE” EFFICIENCY

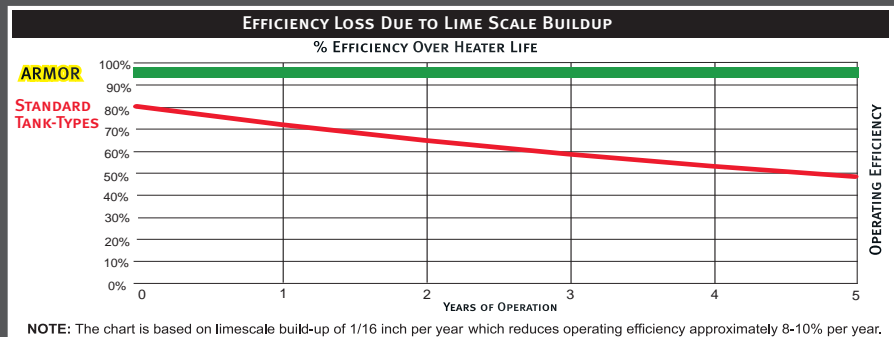
In a standard tank-type water heater, lime scale builds up over time on important heat transfer surfaces, insulating the water from the heat source. This decreases thermal efficiency and increases operating cost. Just 1/4" of lime scale can increase operating costs as much as 25%! This buildup in the bottom of the tank and around the flue tubes can cause tank-type heaters to fail in as little as 2-3 years.

ARMOR's “Better idea” concept eliminates the impact of lime scale, maintaining a high-rated thermal efficiency and low operating cost throughout its long life cycle.

The chart below illustrates how ARMOR is a better way, delivering true “life cycle efficiency” compared to standard tank-type units.



Traditional tank-type water heater flue tubes with nearly 6" of lime scale buildup



FLEXIBLE VENTING OPTIONS - Up to 100 feet of air intake and 100 feet of exhaust vent with PVC, CPVC, Polypropylene or SS.

Direct Vent Sidewall

Direct Vent Vertical

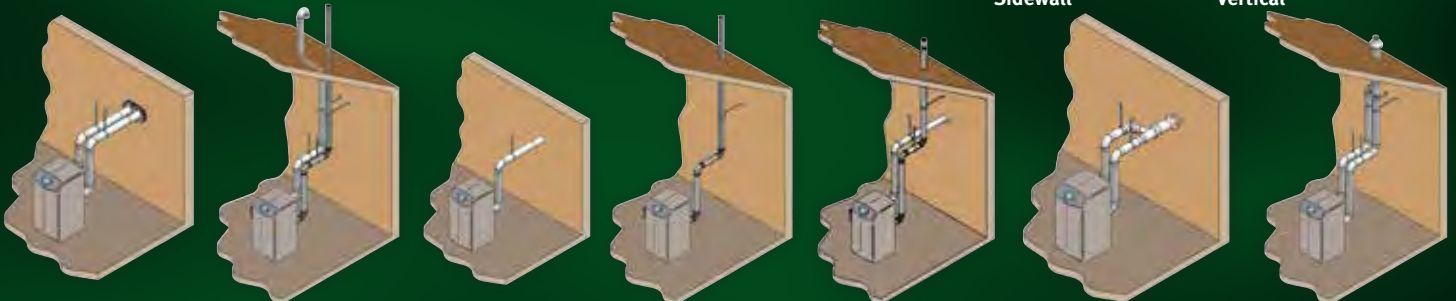
Room Air Sidewall

Room Air Vertical

Vertical w/Sidewall Air

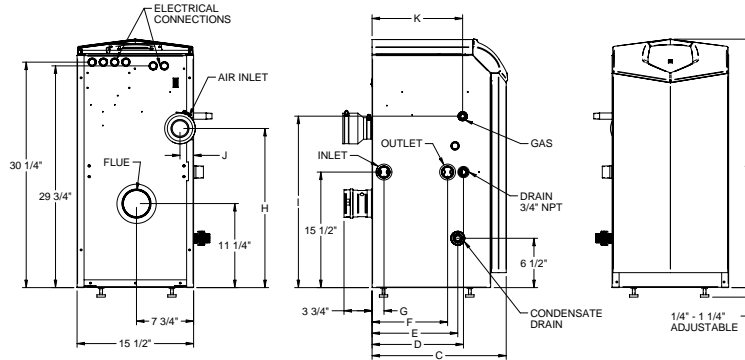
Concentric Direct Vent Sidewall*

Concentric Direct Vent Vertical*



ARMOR™ WATER HEATER DIMENSIONS AND SPECIFICATIONS

MODELS 151 & 200

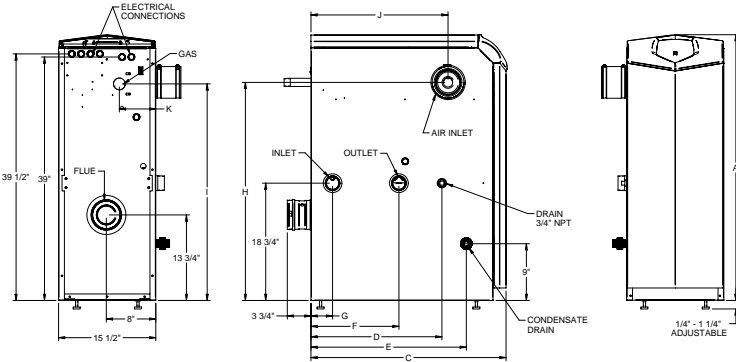


MODELS 286-801

Model Number Guide

AW	N	151	PM
Model	Natural Gas	Btu/hr Input	Pump Mount

Armor Water Heater,
Natural Gas,
150,000 Btu/hr Input,
Pump Mount



Model Number	Btu/hr Input	GPH @ 100° Rise	A	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
AWN151PM	150,000	175	33-1/4"	18"	12-1/4"	11-1/2"	10"	1-1/2"	21-1/4"	23"	1-3/4"	12"	1/2"	1-1/4"	3"	3"	165
AWN200PM	199,999	233	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"	1-1/4"	3"	3"	181
AWN286PM	285,000	332	42-1/2"	19-3/4"	12-3/4"	13-1/2"	6"	2"	34"	31"	11-3/4"	4-1/4"	3/4"	2"	4"	4"	236
AWN400PM	399,999	466	42-1/2"	27"	21"	20-3/4"	14"	3-1/2"	34"	34"	18-3/4"	2"	1"	2"	4"	4"	306
AWN501PM	500,000	582	42-1/2"	31-1/2"	21"	25"	14"	3-1/2"	35"	35"	22"	5-3/4"	1"	2"	4"	4"	339
AWN601PM	600,000	699	42-1/2"	36-1/4"	21"	25"	14"	3-1/2"	36"	32-3/4"	19-1/2"	5-1/2"	1"	2"	4"	4"	380
AWN701PM	700,000	815	42-1/2"	40-1/4"	23"	29"	17"	3-1/2"	36"	32-3/4"	23-1/2"	3-1/4"	1"	2"	4"	6"	461
AWN801PM	800,000	931	42-1/2"	45-1/4"	23"	33-1/4"	17"	3-1/2"	36"	32-3/4"	27-3/4"	3-1/4"	1"	2"	4"	6"	527

STANDARD FEATURES

- > 96% Thermal Efficiency (AHRI Certified)
- > Modulating Burner with 5:1 Turndown
 - Direct-Spark Ignition
 - Low NOx Operation
 - Sealed Combustion
 - Low Gas Pressure Operation
- > Vertical & Horizontal Direct-Vent
 - PVC, CPVC, Polypropylene or SS up to 100 Feet
 - PVC/CPVC Sidewall Vent Termination
- > Stainless Steel Heat Exchanger
 - All Welded Construction, Gasketless Design
 - 160 psi Working Pressure
 - ASME Construction (AW 286-801)
- > Natural to L.P. Conversion Kit
- > All Bronze Circulating Pump
- > On/Off Switch
- > Flow Switch
- > ASME Temperature & Pressure Relief Valve (286-801)
- > Downstream Test Valves (AW 501-801)
- > Adjustable Leveling Legs
- > Tank Sensor
- > Adjustable High Limit w/ Manual Reset
- > Automatic Reset High Limit
- > Condensate Trap
- > Zero Clearances to Combustible Material
- > 5 Year Limited Warranty (See Warranty for Details)
- > 1 Year Parts Warranty (See Warranty for Details)

SMART SYSTEM FEATURES

- > SMART SYSTEM Digital Operating Control
 - Multi Color Graphic LCD Display
- > Built in Cascading Sequencer for up to 8 Water Heaters
 - Multiple Size Water Heater Cascade
 - Lead Lag
 - Efficiency Optimization
 - Front-End Loading Capability with CopperFin II
- > Building Management System Integration
 - 0-10 VDC Input to Control Modulation or Set point
 - 0-10 VDC Modulation Rate Output
 - 0-10 VDC Input to Enable/Disable call for heat
- > Access to BMS Settings Through Graphic LCD Display
- > Low Water Flow Safety Control & Indication
- > Inlet & Outlet Temperature Sensors & Readout
- > Flue Temperature Sensor
- > Water Heater Pump Control
- > Pump Delay with Freeze Protection
- > Pump Exercise
- > Night Setback
- > Building Recirculation Loop Pump Control*
 - Night Setback of Building Recirculation Loop*
- > Time Clock
- > Maintenance Reminder
 - Ability to program installer name and number into the product as service contact
- > High Voltage Terminal Strip
 - 120 VAC / 60 Hertz / 1 Phase Power Supply
 - Pump Control Contacts
 - Water Heater Pump Control Contacts
 - Building Recirculation Pump Control Contacts

*Exclusive to Lochinvar

Low Voltage Terminal Strip

- 24 VAC Auxiliary Device Relay
- Auxiliary Proving Switch Contacts
- Flow Switch Contacts
- Alarm on Any Failure Contacts
- Runtime Contacts
- Tank Sensor Contacts
- Cascade Contacts
- 0-10 VDC BMS External Control Contact
- 0-10 VDC Boiler Rate Output Contacts

FIRING CONTROL SYSTEMS

- M9 Standard Construction
- M7 California Code (AW 286-801)

OPTIONAL EQUIPMENT

- > Alarm Bell
- > Condensate Neutralization Kit
- > High & Low Gas Pressure Switches (AW 501-801)
- > Concentric Vent Kit (3" & 4" PVC/CPVC only)
- > BMS Gateway to LON
- > Bacnet Communication
- > ModBus Communication
- > SMART SYSTEM PC Software
- > Room Air Vent Kits
- > Stack Frame



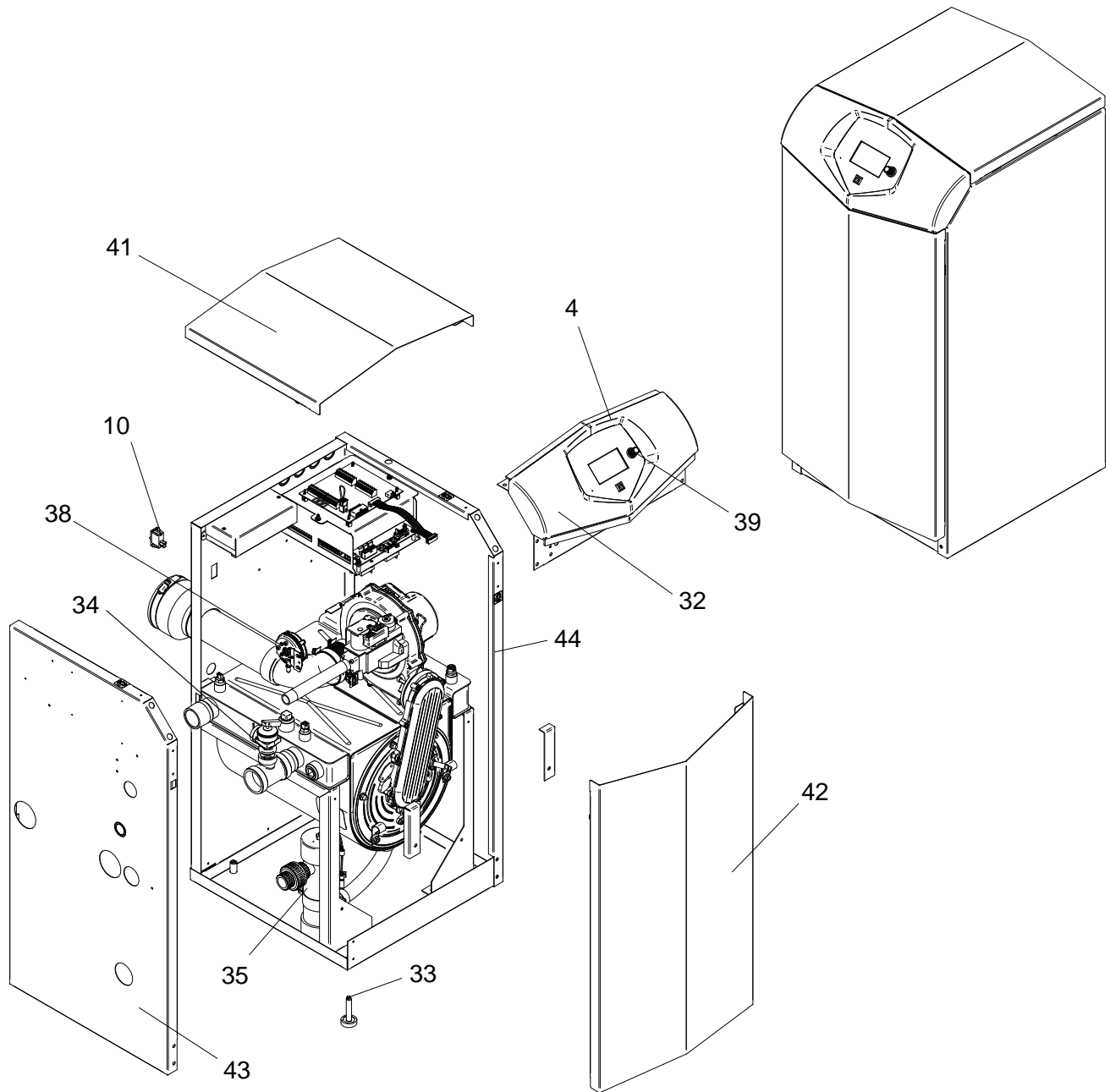
Lochinvar.com



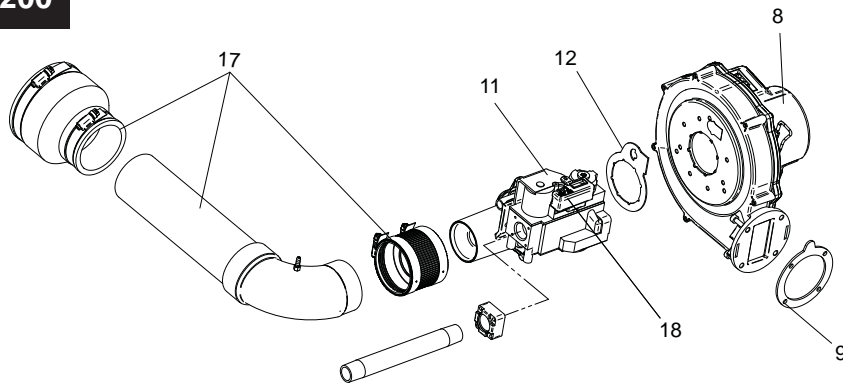


Replacement Parts List

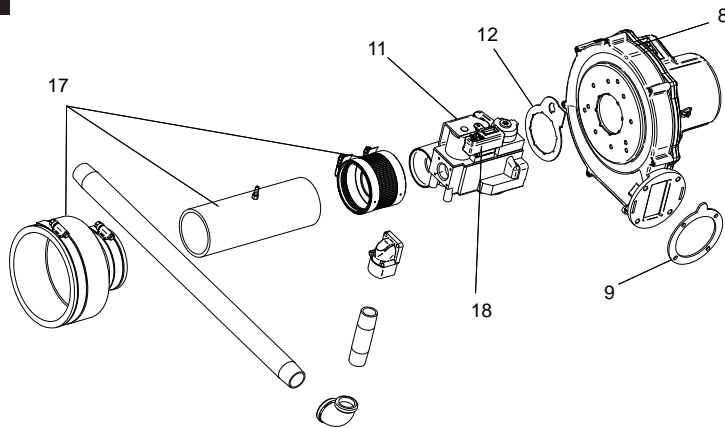
Armor Condensing Water Heater AW 151 thru 801



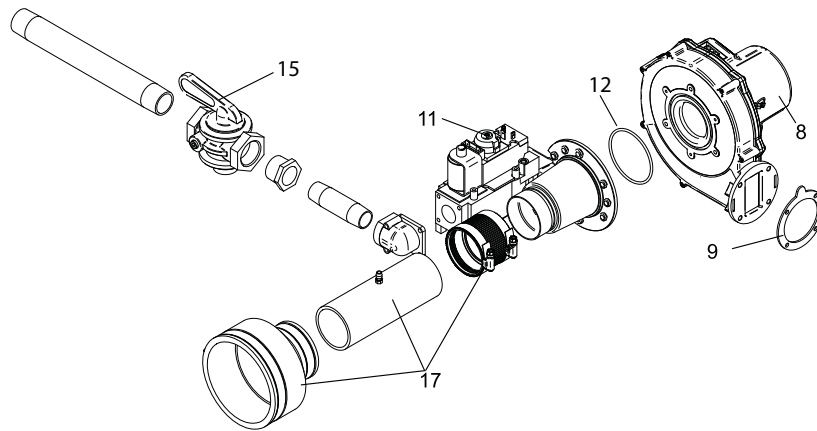
GAS TRAIN 151-200



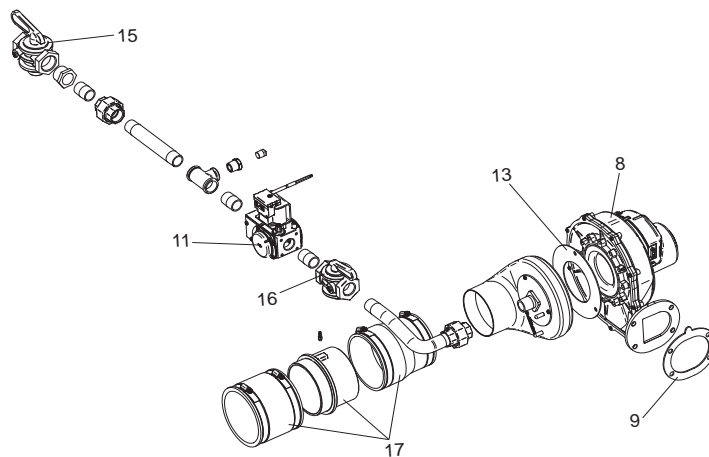
GAS TRAIN 286



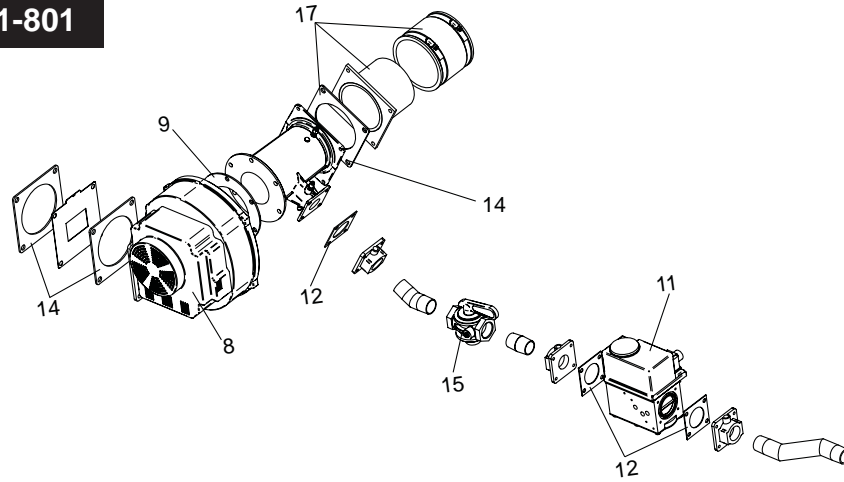
GAS TRAIN 400



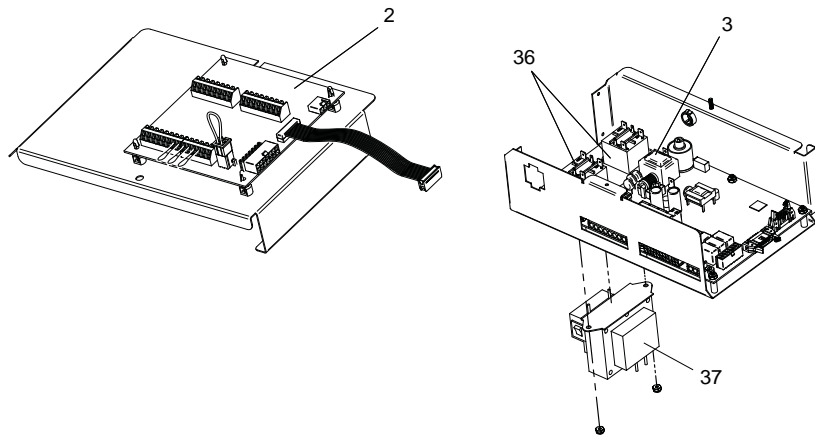
GAS TRAIN 501



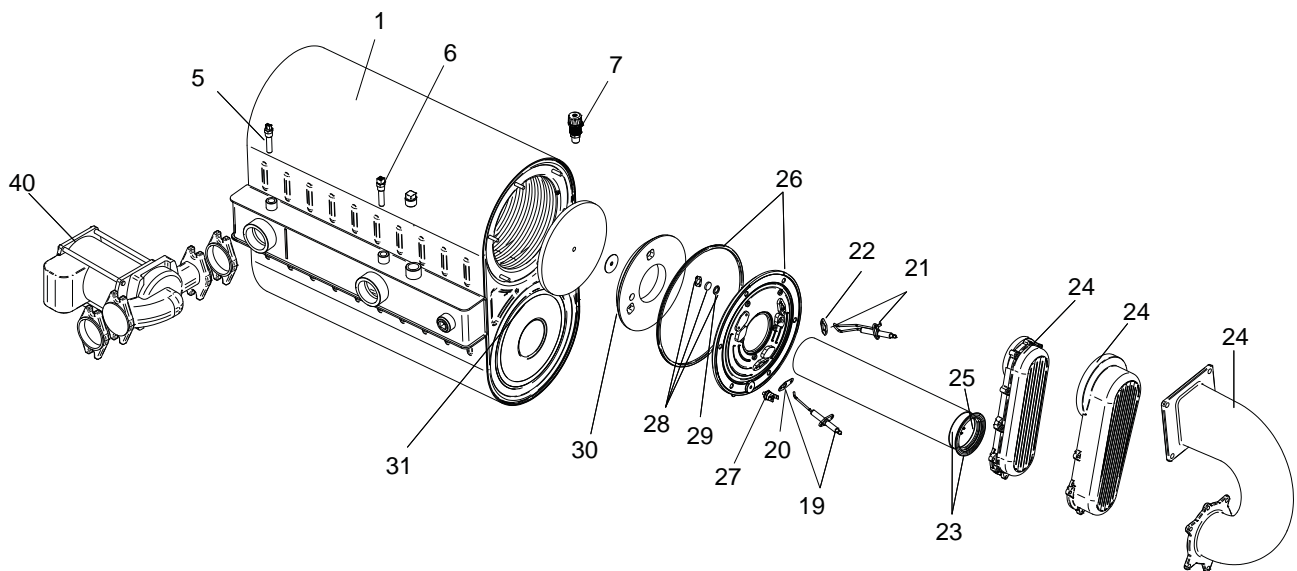
GAS TRAIN 601-801



CONTROL PANEL



HEAT EXCHANGER



IMG00951

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100147750	HEAT EXCHANGER	AW 151
1	100147751	HEAT EXCHANGER	AW 200
1	100147752	HEAT EXCHANGER	AW 286
1	100147753	HEAT EXCHANGER	AW 400
1	100147754	HEAT EXCHANGER	AW 501
1	100147306	HEAT EXCHANGER	AW 601
1	100147307	HEAT EXCHANGER	AW 701
1	100147308	HEAT EXCHANGER	AW 801
CONTROLS			
2	100208473	CONNECTION BOARD	ALL
3	100167803	INTEGRATED CONTROL	AW 151-286
3	100167804	INTEGRATED CONTROL	AW 400
3	100167805	INTEGRATED CONTROL	AW 501
3	100167807	INTEGRATED CONTROL	AW 601 - 801
3	100167808	HIGH ALTITUDE INTEGRATED CONTROL	AW 151-286
3	100167809	HIGH ALTITUDE INTEGRATED CONTROL	AW 400
3	100167810	HIGH ALTITUDE INTEGRATED CONTROL	AW 501
3	100167811	HIGH ALTITUDE INTEGRATED CONTROL	AW 601 - 801
4	100208458	USER INTERFACE CONTROL	ALL
5	100208549	SENSOR, INLET	ALL
6	100208544	SENSOR, OUTLET / HIGH LIMIT	ALL
7	100167445	AIR VENT VALVE	ALL
8	100145004	FAN ASSEMBLY	AW 151
8	100145005	FAN ASSEMBLY	AW 200
8	100145006	FAN ASSEMBLY	AW 286
8	100145008	FAN ASSEMBLY	AW 400
8	100145009	FAN ASSEMBLY	AW 501
8	100144980	FAN ASSEMBLY	AW 601-801
9	100208764	GASKET, BLOWER	AW 200
9	100208101	GASKET, BLOWER	AW 151, 286, 400
9	100208759	GASKET, BLOWER	AW 501
9	100233694	GASKET, VENTURI	AW 601 - 801
10	100208242	SWITCH, ON/OFF	ALL
GAS VALVES			
11	100172003	GAS VALVE ASSEMBLY NAT	AW 151
11	100172004	GAS VALVE ASSEMBLY NAT	AW 200
11	100172005	GAS VALVE ASSEMBLY NAT	AW 286
11	100172006	GAS VALVE ASSEMBLY NAT	AW 400
11	100172009	GAS VALVE ASSEMBLY NAT	AW 501
11	100172014	GAS VALVE ASSEMBLY NAT	AW 601
11	100171923	GAS VALVE ASSEMBLY NAT	AW 701
11	100172015	GAS VALVE ASSEMBLY NAT	AW 801
11	100171928	GAS VALVE ASSEMBLY LP	AW 501
11	100171929	GAS VALVE ASSEMBLY LP	AW 601
11	100171930	GAS VALVE ASSEMBLY LP	AW 701
11	100171931	GAS VALVE ASSEMBLY LP	AW 801
12	100208760	GASKET, GAS VALVE	AW 151-286
12	100208761	GASKET, GAS VALVE	AW 400
12	100208105	GASKET, GAS VALVE	AW 601-801
13	100233703	GASKET, AIR SHROUD	AW 501
14	100208089	GASKET, AIR INTAKE	AW 400-801
15	100146149	GAS CUT OFF VALVE 1" X 1"	AW 501-801
16	100146148	GAS CUT OFF VALVE 3/4" X 3/4"	AW 501
PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
GAS VALVES (CONT.)			
17	100163251	AIR INLET KIT	AW 151
17	100163252	AIR INLET KIT	AW 200
17	100163253	AIR INLET KIT	AW 286
17	100163254	AIR INLET KIT	AW 400
17	100163255	AIR INLET KIT	AW 601-801
17	100163256	AIR INLET KIT	AW 501
18	100208324	GAS VALVE SWITCH	AW 151 - 286
PILOT & BURNER ASSEMBLIES			
19	100165930	FLAME SENSOR W/ GASKET	AW 151-501
19	100165931	FLAME SENSOR W/ GASKET	AW 601-801
20	100208091	GASKET, FLAME SENSOR	ALL
21	100165929	IGNITOR W/ GASKET	AW 151-501
21	100165920	IGNITOR W/ GASKET	AW 601-801
22	100208086	GASKET, IGNITOR	ALL
23	100135308	BURNER W/GASKET	AW 151
23	100135309	BURNER W/GASKET	AW 200
23	100135310	BURNER W/GASKET	AW 286
23	100135311	BURNER W/GASKET	AW 400-501
23	100135313	BURNER W/ GASKET	AW 601
23	100135314	BURNER W/ GASKET	AW 701
23	100135315	BURNER W/ GASKET	AW 801
24	100173796	GAS/AIR ARM ASSEMBLY W/ GASKET	AW 151
24	100173792	GAS/AIR ARM ASSEMBLY W/ GASKET	AW 200-400
24	100173793	GAS/AIR ARM ASSEMBLY W/ GASKET	AW 501
24	100173798	GAS/AIR ARM ASSEMBLY W/GASKET	AW 601-801
25	100208085	GASKET, BURNER	AW 151-501
25	100233594	GASKET, BURNER	AW 601-801
26	100173794	HEAT EXCHANGER ACCESS DOOR KIT	AW 151-501
26	100173799	HEAT EXCHANGER ACCESS DOOR KIT	AW 601-801
27	100094572	SWITCH, HEX DOOR TEMP (BEGINNING SN# F14)	AW 286-801
MISCELLANEOUS			
28	100163249	SIGHT GLASS	ALL
29	100208762	GASKET, SIGHT GLASS	ALL
30	100208060	INSULATION, BURNER PLATE DOOR	AW 151-501
30	100208059	INSULATION, BURNER PLATE DOOR	AW 601-801
31	100208061	INSULATION BAFFLE, DIVIDER PLATE	ALL
32	100163192	DISPLAY BEZEL	ALL
33	100134788	LEVELING LEG	ALL
34	100208453	T & P RELIEF 1" X 150#	AW 151-200
34	100208443	T & P RELIEF 3/4" X 150#	AW 286-400
34	100208446	T & P RELIEF 3/4" X 150#	AW 501-801
-	100208808	FUSE, 0.8 AMP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100208660	FLOW SWITCH	AW 151-200 & 400-801
-	100208661	FLOW SWITCH	AW 286
35	100163241	CONDENSATE TRAP	AW 151-200
35	100163244	CONDENSATE TRAP	AW 286-801
36	100208509	RELAY, 1.5 HP PUMP	ALL
-	100208243	SWITCH, BLOCKED DRAIN	ALL
-	100208154	GAUGE TRIOMETER, 75# PSI	AW 501-801
-	100170642	FLUE TEMP SENSOR KIT	ALL
-	100189053	KIT, COLLAR, FLUE 3"	AW 151-200

PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
-	100189054	KIT, COLLAR, FLUE 4"	AW 286-601
-	100157660	ALARM BELL	ALL
-	100157721	NEUTRALIZER KIT	AW 151-501
-	100157700	NEUTRALIZER KIT	AW 601-801
-	100170644	SENSOR KIT, TANK	ALL
37	100208230	TRANSFORMER	AW 151-701
37	100208246	TRANSFORMER	AW 801
38	100208377	SWITCH, PRESSURE	AW 151 & 286
38	100208378	SWITCH, PRESSURE	AW 200 & 400
38	100208383	SWITCH, PRESSURE	AW 501
38	100208382	SWITCH, PRESSURE	AW 601-801
39	100162600	FLUTED KNOB W/ SKIRT	ALL
-	100159008	LP CONVERSION KIT	AW 151
-	100159009	LP CONVERSION KIT	AW 200
-	100159010	LP CONVERSION KIT	AW 286
-	100159011	LP CONVERSION KIT	AW 400
-	100159012	LP CONVERSION KIT	AW 501-801
-	100148402	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
-	100208625	HARNESS, CONNECTION BOARD	ALL
-	100172816	HARNESS, RELAY	ALL
-	100172817	HARNESS, POWER	AW 151-286
-	100172815	HARNESS, POWER	AW 400-801
-	100208627	HARNESS, GAS VALVE	AW 151-286
-	100173091	HARNESS, GAS VALVE	AW 400
-	100173314	HARNESS, GAS VALVE	AW 501
-	100172958	HARNESS, GAS VALVE	AW 601-801
-	100208628	HARNESS, UNIT	AW 151 & 200
-	100072936	HARNESS, UNIT	AW 286
-	100072937	HARNESS, UNIT	AW 400-801
-	100208636	CABLE, RIBBON	AW 151-501
-	100208638	CABLE, RIBBON	AW 601-801
-	100208621	HARNESS, SPARK ELECTRODE	AW 151 & 200
-	100208620	HARNESS, SPARK ELECTRODE	AW 286
-	100208618	HARNESS, SPARK ELECTRODE	AW 400 & 501
-	100208623	HARNESS, SPARK ELECTRODE	AW 601-801
-	100208622	HARNESS, FLAME SENSE ELECTRODE	ALL
PUMPS			
40	100208409	PUMP	AW 151-200
40	100166428	PUMP	AW 286
40	100232190	PUMP	AW 400
40	100232190	PUMP	AW 501-601
40	100166409	PUMP	AW 701-801
JACKET ASSEMBLY			
41	100149684	JACKET, TOP	AW 151
41	100149687	JACKET, TOP	AW 200
41	100149688	JACKET, TOP	AW 286
41	100149689	JACKET, TOP	AW 400
41	100149690	JACKET, TOP	AW 501
41	100149691	JACKET, TOP	AW 601
41	100149692	JACKET, TOP	AW 701
41	100149693	JACKET, TOP	AW 801
42	100189059	JACKET, FRONT	AW 151-200
42	100189060	JACKET, FRONT	AW 286
PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
JACKET ASSEMBLY			
42	100189061	JACKET, FRONT	AW 400-801
43	100149874	JACKET, LEFT SIDE	AW 151
43	100149875	JACKET, LEFT SIDE	AW 200
43	100149876	JACKET, LEFT SIDE	AW 286
43	100149878	JACKET, LEFT SIDE	AW 400
43	100149861	JACKET, LEFT SIDE	AW 501
43	100149862	JACKET, LEFT SIDE	AW 601
43	100149863	JACKET, LEFT SIDE	AW 701
43	100149864	JACKET, LEFT SIDE	AW 801
44	100150904	JACKET, RIGHT SIDE	AW 151
44	100150905	JACKET, RIGHT SIDE	AW 200
44	100150906	JACKET, RIGHT SIDE	AW 286
44	100150907	JACKET, RIGHT SIDE	AW 400
44	100150341	JACKET, RIGHT SIDE	AW 501
44	100150212	JACKET, RIGHT SIDE	AW 601
44	100150220	JACKET, RIGHT SIDE	AW 701
44	100150225	JACKET, RIGHT SIDE	AW 801

PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS

CONDENSING COMMERCIAL GAS WATER HEATERS



SMART SYSTEM™

OPERATING CONTROL FEATURING
A BUILT-IN CASCADING SEQUENCER

2 WALL MOUNT SPACE SAVING MODELS—
125,000 BTU/HR AND 199,999 BTU/HR

FIRING RATE MODULATION TO 5:1

LESS THAN 20 ppm NO_x

DIRECT-VENT FLEXIBILITY TO 100 FEET



96%
THERMAL EFFICIENCY





A WALL MOUNTED WATER HEATER

Lochinvar has added to its successful stainless steel, condensing Armor water heater series with wall mounted models. The Armor Wall Mount is available in two sizes, 125,000 and 199,999 Btu/hr input. The light weight but powerful water heaters hang on any wall to give you more free space in your mechanical room.

THE “BETTER IDEA” SYSTEM AND INSTANTANEOUS WATER HEATERS

The water heater and tank combination is the heart of Lochinvar’s “BETTER IDEA” water heating philosophy. The ARMOR water heater is always installed with a separate storage tank to provide an effective water heating package for commercial domestic water systems. The industry has made a few unsuccessful attempts at applying residential instantaneous water heating to commercial applications. Instantaneous products are outmatched by the faster, larger and variable hot water demands of a commercial application. Storage is essential to supply the water to a system at a variety of speeds and volumes. What’s more, the ARMOR “BETTER IDEA” system delivers lower equipment costs and lower installation costs than a comparable instantaneous package.



FULLY MODULATING WITH 5:1 TURNDOWN

ARMOR features advanced Negative Regulation (Neg/Reg) sealed combustion technology, permitting fan speed to constantly adjust the volume of fuel and air entering the burner. This ensures that ARMOR can safely and reliably operate with supply gas pressure as low as 4 inches water column.

ARMOR is equipped with fully modulating combustion with 5:1 turndown. This means ARMOR can fire as low as 20% of maximum input when water heating demand is lowest, and increase the firing rate up to 100% as demand increases. The result is better overall efficiency and less cycling, compared to all other tank-type units which are “on-off,” which means they can only fire at 100% of maximum input.

STAINLESS STEEL CONDENSING HEAT EXCHANGER

The stainless steel design provides superior resistance to corrosion caused by condensation from low entering water temperatures. Traditional commercial water heaters will fail early with low entering water temperatures; however, with the ARMOR the lower the supply water temperature the more efficiently it performs throughout the life of the heater.

A STAINLESS STEEL STORAGE TANK

Available in 60, 80 and 119 gallon capacities, Lochinvar’s Lock-Temp Stainless Steel storage tank makes a perfect companion to the Armor Floor Mount and Wall Mount water heaters. 14 gauge 316L stainless is formed, cut and fully welded into a light weight tank.

The stainless steel is “passivated” with a nitric acid treatment to re-establish the oxide level of the metal after welding and to ensure corrosion resistance. The tank is finished with a dent resistant polypropylene jacket and high density expanded foam insulation rated to exceed ASHRAE Energy Efficiency Standards for standby losses. Lochinvar backs its Stainless Steel Storage Tank with a 10 year limited warranty.



5 F



Lochinvar SMART SYSTEM

THE ULTIMATE WATER HEATER OPERATING CONTROL WITH GRAPHIC LCD DISPLAY

WATER HEATERS WITH DIFFERENT INPUTS CAN BE CASCADED TOGETHER TO MAXIMIZE TURNDOWN CAPABILITY

COMPATIBILITY WITH COPPER-FIN II® NON-CONDENSING WATER HEATER TO CREATE A FRONT END LOADING SYSTEM

NIGHT SETBACK CAPABILITIES

- > SETBACK OF STORAGE TANK TEMPERATURE

WATER HEATER PUMP CONTROL

- > PUMP DELAY WITH FREEZE PROTECTION
- > BUILDING RECIRCULATION PUMP CONTROL*
- > PUMP EXERCISE

HIGH-VOLTAGE TERMINAL STRIP

- > 110 VAC INPUT TO WATER HEATER
- > DRY CONTACTS FOR WATER HEATER PUMP CONTROL
- > DRY CONTACTS FOR BUILDING RECIRC. PUMP CONTROL*

LOW-VOLTAGE TERMINAL STRIP WITH 28 POINTS OF CONNECTION

- > 0-10 VDC WATER HEATER RATE OUTPUT
- > 0-10 VDC HEAT DEMAND INPUT
- > MODBUS CONTACTS

USB CONNECTION POINT FOR OPTIONAL SMART SYSTEM PC SOFTWARE WITH ADVANCED SETUP AND DIAGNOSTICS

MODBUS COMPATIBILITY (OPTIONAL)

* EXCLUSIVE TO LOCHINVAR SMART SYSTEM

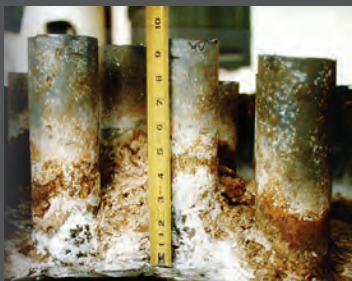


LONG-LASTING "LIFE CYCLE" EFFICIENCY

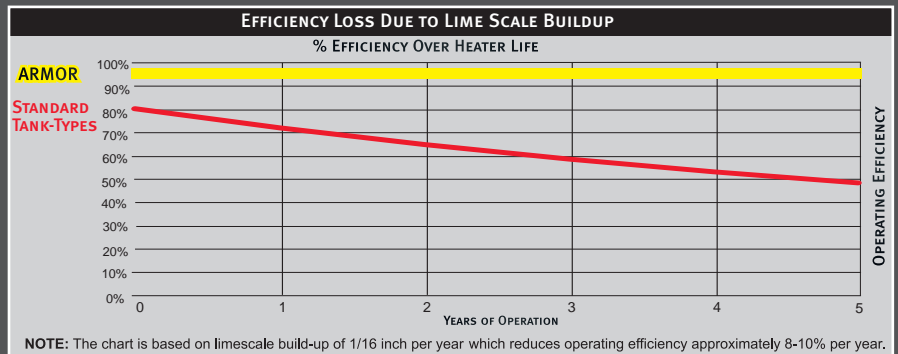
In a standard tank-type water heater, lime scale builds up over time on important heat transfer surfaces, insulating the water from the heat source. This buildup in the bottom of the tank and around the flue tubes can cause tank-type heaters to fail in as little as 2-3 years. This decreases thermal efficiency and increases operating cost. Just 1/4" of lime scale in the tank can increase operating costs as much as 25%!

ARMOR's "Better Idea" concept eliminates the impact of lime scale, maintaining a high-rated thermal efficiency and low operating cost throughout its long life cycle.

The chart below illustrates how ARMOR is a better way, delivering true "life cycle efficiency" compared to standard tank-type units.



Traditional tank-type water heater flue tubes with nearly 6" of lime scale buildup



FLEXIBLE VENTING OPTIONS - Up to 100 feet of air intake and 100 feet of exhaust vent with PVC, CPVC, Polypropylene or SS.

ARMOR offers 5 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs

up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof.

Direct Vent Sidewall



Direct Vent Vertical



Vertical w/Sidewall Air



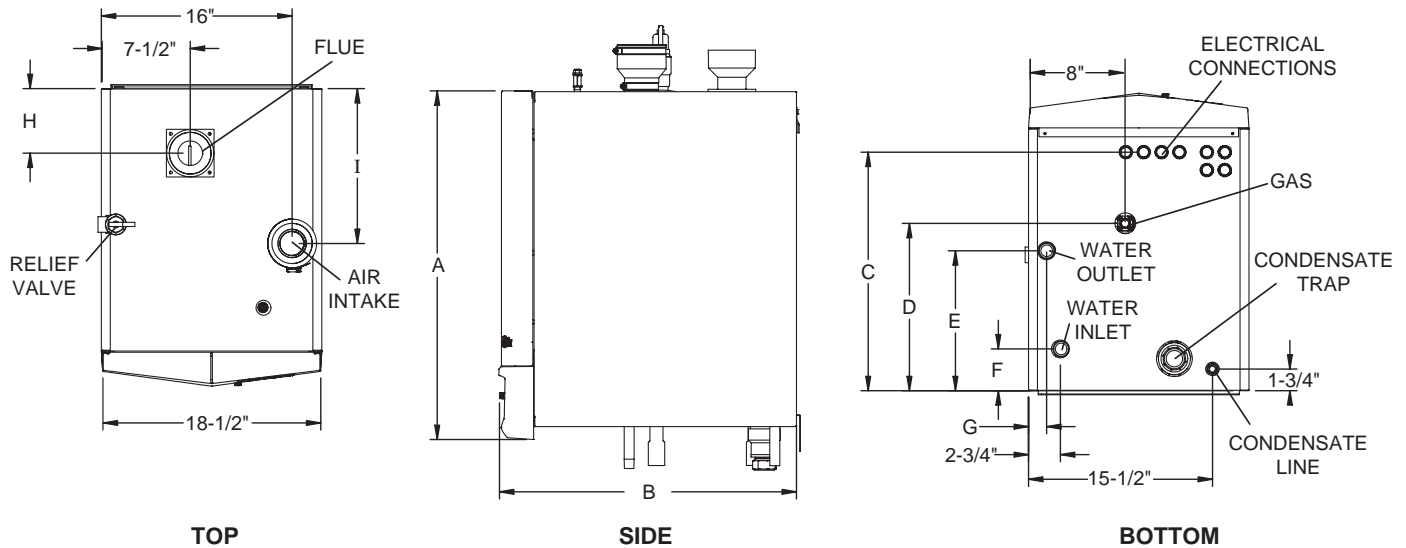
Concentric Direct Vent Vertical



Concentric Direct Vent Sidewall



ARMOR™ WALL MOUNT WATER HEATER DIMENSIONS AND SPECIFICATIONS



Model Number Guide			
WA	N	125	PM
Model	Natural Gas	Btu/hr Input	Pump Mount

Wall Mount Armor Water Heater,
Natural Gas,
125,000 Btu/hr Input,
Pump Mount

Model Number	Btu/hr Input	GPH @ 100° Rise	A	B	C	D	E	F	G	H	I	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
WAN125PM	125,000	144	29-1/4"	18"	13"	7"	13"	3-1/2"	2-3/4"	5-1/2"	6"	1/2"	1"	3"	3"	145
WAN200PM	199,999	233	29-1/4"	25"	20"	14"	11-3/4"	3-1/2"	1-1/2"	5-1/2"	13"	1/2"	1-1/4"	3"	3"	177

STANDARD FEATURES

- › AHRI Certified 96% Thermal Efficiency
- › Wall Mounted Models
- › Modulating Burner with 5:1 Turndown
 - Direct-Spark Ignition
 - Low NOx Operation
 - Sealed Combustion
 - Low Gas Pressure Operation
- › Vertical & Horizontal Direct-Vent
 - PVC/CPVC, Polypropylene or SS up to 100 Feet
 - PVC/CPVC, Polypropylene Sidewall Vent Termination
- › Stainless Steel Heat Exchanger
 - All Welded Construction, Gasketless Design
 - 160 psi Working Pressure
 - Natural to L.P. Conversion Kit
 - All Bronze Circulating Pump
 - Flow Switch
 - Temperature & Pressure Relief Valve
 - Tank Sensor
 - Adjustable High Limit w/ Manual Reset
 - Automatic Reset High Limit
 - Condensate Trap
 - Zero Clearances to Combustible Material
 - 5 Year Limited Warranty (See Warranty for Details)
 - 1 Year Parts Warranty (See Warranty for Details)

SMART SYSTEM™ FEATURES

- › SMART SYSTEM™ Digital Operating Control
 - Multi Color Graphic LCD Display
- › Built in Cascading Sequencer for up to 8 Water Heaters
 - Multiple Size Water Heater Cascade
 - Lead Lag
 - Efficiency Optimization
- › Building Management System Integration
 - Modbus Communication (Optional)
 - 0-10 VDC Input to Control Modulation or Set point
 - 0-10 VDC Modulation Rate Output
 - 0-10 VDC Input to Enable/Disable call for heat
 - Access to BMS Settings Through Graphic LCD Display
 - Low Water Flow Safety Control & Indication
 - Inlet & Outlet Temperature Sensors & Readout
 - Flue Temperature Sensor
 - Water Heater Pump Control
 - Pump Delay with Freeze Protection
 - Pump Exercise
 - Night Setback
 - Building Recirculation Loop Pump Control
 - Time Clock
- › Maintenance Reminder
 - Ability to program installer name and number into the product as service contact

High Voltage Terminal Strip

- 120 VAC / 60 Hertz / 1 Phase Power Supply
- Pump Control Contacts
- Water Heater Pump Control Contacts
- Building Recirculation Pump Control Contacts

Low Voltage Terminal Strip

- 24 VAC Louver Relay
- Louver Proving Switch Contacts
- Flow Switch Contacts
- Alarm on Any Failure Contacts
- Runtime Contacts
- Tank Sensor Contacts
- Cascade Contacts
- 0-10 VDC BMS External Control Contacts
- 0-10 VDC Boiler Rate Output Contacts

FIRING CONTROL SYSTEMS

- › M9 Standard Construction

OPTIONAL EQUIPMENT

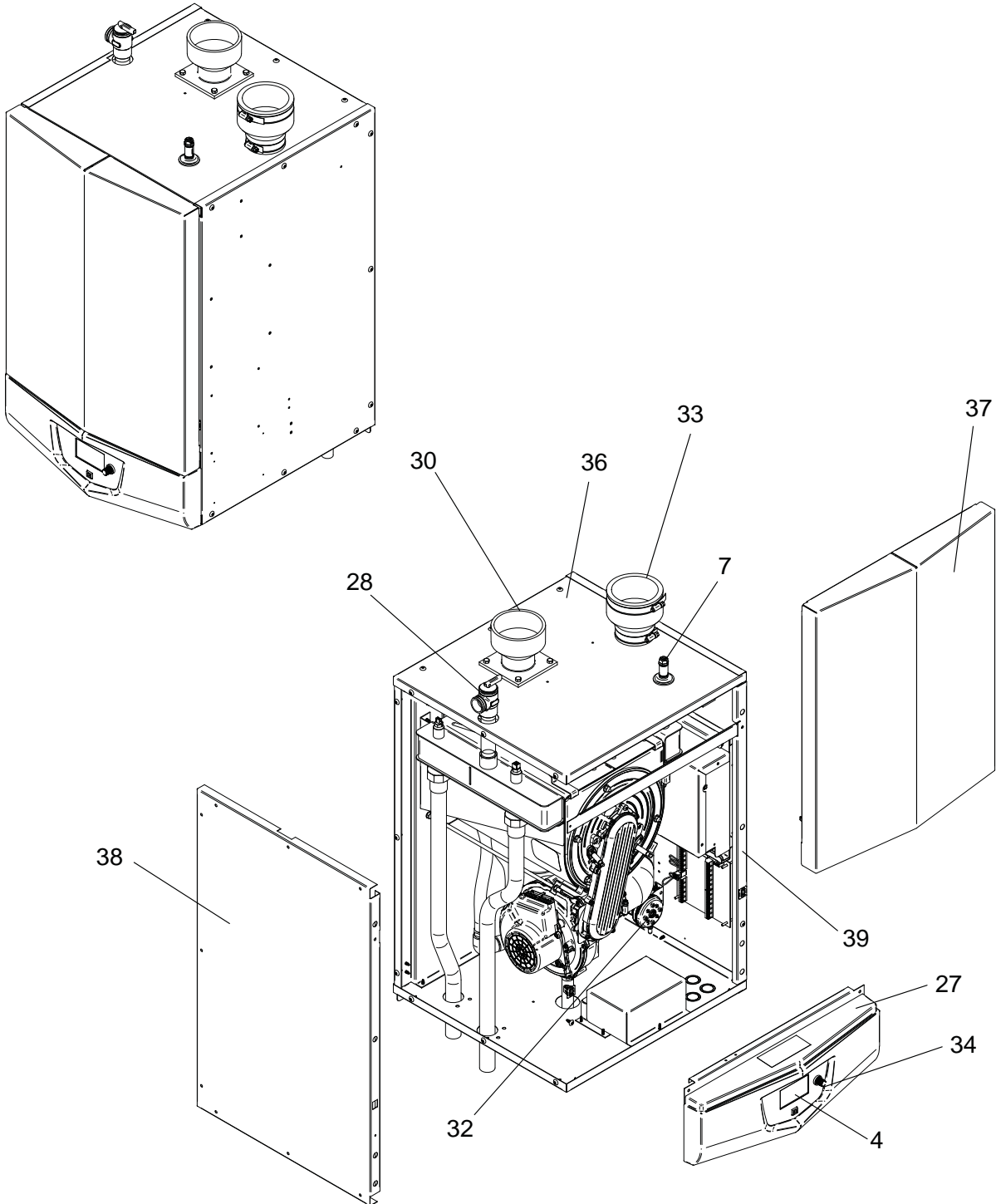
- › Alarm Bell
- › Condensate Neutralization Kit
- › Concentric Vent Kit (3" PVC/CPVC only)
- › ModBus Communications
- › BMS Gateway to LON or BacNet
- › SMART SYSTEM PC Software



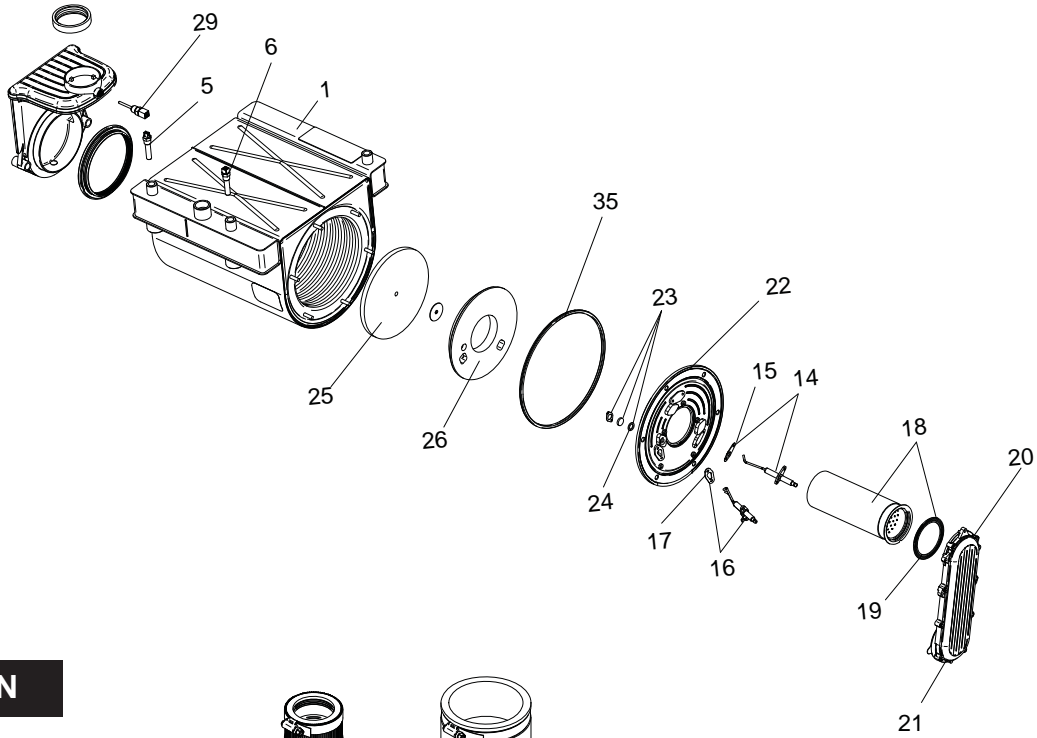


Replacement Parts List

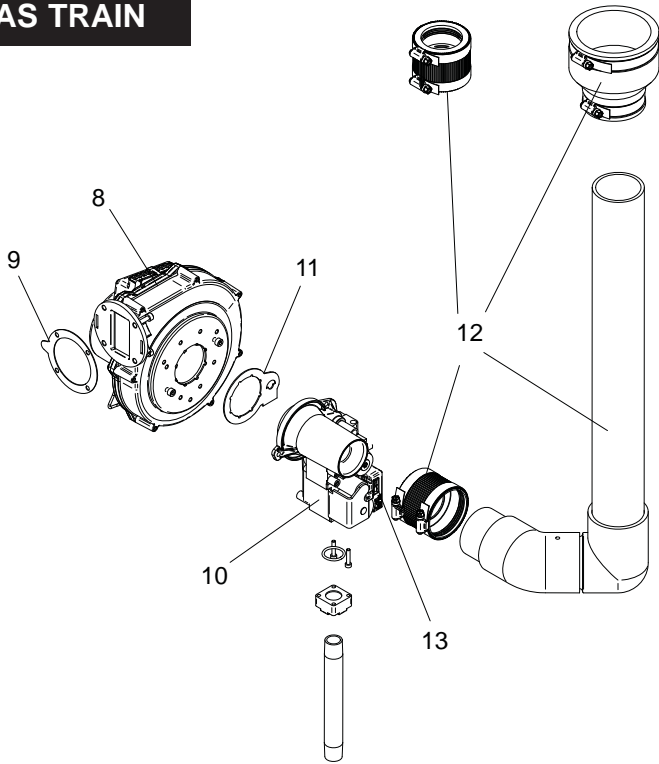
Armor Wall Mount Water Heaters WA 125 thru 200



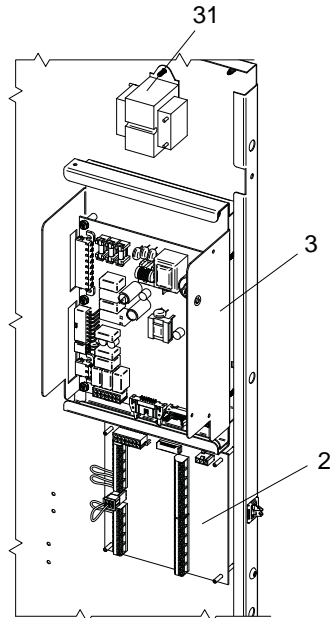
HEAT EXCHANGER



GAS TRAIN



CONTROL PANEL



ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100147385	HEAT EXCHANGER	WA 125
1	100147386	HEAT EXCHANGER	WA 200
CONTROLS			
2	100208473	LOW VOLTAGE CONNECTION BOARD	ALL
3	100167803	INTEGRATED CONTROL	ALL
3	100167808	HIGH ALTITUDE INTEGRATED CONTROL	ALL
4	100208458	USER INTERFACE CONTROL	ALL
-	100158178	USER INTERFACE OVERLAY	ALL
5	100208565	SENSOR, INLET	ALL
6	100208566	SENSOR, OUTLET / HIGH LIMIT	ALL
7	100167445	AIR VENT VALVE	ALL
8	100145003	FAN ASSEMBLY	WA 125
8	100145005	FAN ASSEMBLY	WA 200
9	100208764	GASKET, BLOWER	WA 125
9	100208101	GASKET, BLOWER	WA 200
GAS VALVES			
10	100171984	GAS VALVE ASSEMBLY	WA 125
10	100172013	GAS VALVE ASSEMBLY	WA 200
11	100208760	GASKET, VENTURI	ALL
12	100163245	AIR INLET KIT	ALL
13	100208324	SWITCH, GAS VALVE	ALL
PILOT & BURNER ASSEMBLIES			
14	100165930	FLAME SENSOR W/ GASKET	ALL
15	100208091	GASKET, FLAME SENSOR	ALL
16	100165929	IGNITOR W/ GASKET	ALL
17	100208086	GASKET, IGNITOR	ALL
18	100135278	BURNER W/ GASKET	WA 125
18	100135309	BURNER W/ GASKET	WA 200
19	100208085	GASKET, BURNER	ALL
20	100173791	GAS/AIR ARM ASSEMBLY W/GASKET	WA 125
20	100173792	GAS/AIR ARM ASSEMBLY W/GASKET	WA 200
21	100208763	GASKET, GAS/AIR ARM ASSEMBLY	ALL
22	100173749	HEAT EXCHANGER ACCESS DOOR	ALL
MISCELLANEOUS			
23	100163249	SIGHT GLASS	ALL
24	100208762	GASKET, SIGHT GLASS	ALL
25	100208061	DIVIDER PLATE, INSULATION BAFFLE	ALL
26	100145602	BURNER PLATE, INSULATION, DOOR	ALL
27	100162947	DISPLAY BEZEL	ALL
28	100167359	RELIEF VALVE - 150 PSI	ALL
29	100208556	SENSOR, FLUE	ALL
30	100166586	FLUE CONNECTION - 3"	WA 125
31	100208230	TRANSFORMER, 24V, 40VA	ALL
32	100208381	SWITCH, PRESSURE	WA 125
32	100166111	SWITCH, PRESSURE	WA 200
33	100138380	COUPLING, AIR INLET - 3"	ALL
33	100138382	COUPLING, AIR INLET - 2"	ALL
34	100162600	KNOB, FLUTED W/ SKIRT	ALL
35	100208088	GASKET, DOOR, RUBBER	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
-	100208569	BULB WELL - 1/4"	ALL
-	100208552	SENSOR, TANK	ALL
-	100149680	WALL MOUNT BRACKET	ALL
-	100208808	FUSE, 0.8 AMP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100208653	FLOW SWITCH	ALL
-	100208243	SWITCH, BLOCKED DRAIN	ALL
-	100170644	SENSOR KIT, WATER HEATER	ALL
-	100208652	MRLWCO WITH TEST	ALL
-	100157721	NEUTRALIZER KIT	ALL
-	100157660	ALARM BELL	ALL
-	100158945	LP CONVERSION KIT	WA 125
-	100159009	LP CONVERSION KIT	WA 200
-	100163247	CONDENSATE TRAP ASSEMBLY	ALL
-	100157626	HEAT EXCHANGER CLEANING KIT	WA 125
-	100157627	HEAT EXCHANGER CLEANING KIT	WA 200
-	100208626	HARNESS, CONNECTION BOARD	ALL
-	100172816	HARNESS, RELAY	ALL
-	100172843	HARNESS, UNIT	ALL
-	100172926	HARNESS, POWER	ALL
-	100208636	CABLE, RIBBON	ALL
-	100208620	HARNESS, SPARK ELECTRODE	ALL
-	100208622	HARNESS, FLAME SENSE ELECTRODE	ALL
PUMPS			
-	100166430	PUMP	ALL
JACKET ASSEMBLY			
36	100150548	JACKET, TOP	WA 125
36	100150537	JACKET, TOP	WA 200
37	100149766	JACKET, FRONT	ALL
38	100150547	JACKET, LEFT SIDE	WA 125
38	100150536	JACKET, LEFT SIDE	WA 200
39	100149935	JACKET, RIGHT SIDE	WA 125
39	100149932	JACKET, RIGHT SIDE	WA 200
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

CONDENSING COMMERCIAL GAS WATER HEATERS



SMART TOUCH

TOUCHSCREEN OPERATING CONTROL
FEATURING A BUILT-IN CASCADING SEQUENCER

1.0, 1.3 AND 1.5 MILLION BTU/HR

FIRING RATE MODULATION TO 10:1

LESS THAN 20 ppm NO_x

DIRECT-VENT FLEXIBILITY TO 100 FEET



96%
THERMAL EFFICIENCY



Lochinvar[®]
HIGH EFFICIENCY BOILERS & WATER HEATERS

ARMOR X2™

COMMERCIAL CONDENSING WATER HEATER

AN INNOVATION IN COMMERCIAL WATER HEATING



The ARMOR X2 Commercial Water Heater combines stainless steel heat exchanger technology with **Modulating Condensing** combustion to deliver efficiencies as high as 96%. With models at 1.0, 1.3 and 1.5 million BTU/hr inputs, ARMOR X2 will serve a large range of commercial applications and add the “green” touch that building owners and facility managers desire.

ARMOR X2 delivers new levels of innovation with SMART TOUCH™... touchscreen technology that puts total operational control at your fingertips! With Lochinvar SMART TOUCH, it's easier than ever to set up a perfectly synchronized “green” system, and access a complete onboard database of real-time operational data and performance history.

Other features of the ARMOR X2 include space-saving footprints, direct-vent design with intake and exhaust runs up to 100 equivalent feet, and a built-in cascading sequencer for up to 8 water heaters, delivering up to 12 million BTU/hr capacity.

THE ARMOR X2

Lochinvar's largest commercial condensing water heater, the Armor X2 offers peace of mind in the truest sense. With two independent combustion systems operating with two 316L stainless steel heat exchangers, along with gas valves and combustion blowers designed to work in concert, worries about meeting the domestic hot water demand are a thing of the past. This built in redundancy means that if a failure of a component such as the spark igniter occurs on one heating module the second heating module will come on-line to meet the hot water demand.

With unparalleled modulation capabilities the Armor X2 boasts a turndown ratio of 10:1. This means that at times when the hot water demand requires less than the full input capabilities of the water heater, Armor X2 will deliver the proper amount of heat to exactly match the demand with inputs as low as 10% of the maximum water heater input.

Couple the Armor X2 with a Lock-Temp Storage tank for long system life and high performance. All Lock-Temp storage tanks are equipped with the patented Lock-Temp baffle. This baffle isolates the turbulence of incoming water thus allowing the tank to be a constant temperature throughout, this feature allows for an industry best 80% tank drawdown.

If foot print, installation costs or final installed appearance are of great concern, consider allowing Lochinvar to create a custom water heater package for your application. Each package is custom built, factory assembled and tested to meet the requirements of the job. All packages include a welded I-beam skid which houses the water heater plant and associated storage tank(s) for ease of maneuverability and installation.



SMART TOUCH

UNEQUALED CONTROL AND MONITORING FUNCTIONS THAT ARE EASY TO USE

TOTAL CONTROL, AT YOUR FINGERTIPS

The full-color Lochinvar SMART TOUCH Main Menu screen is your gateway to complete control of all ARMOR X2 functions, and total access to system performance data and history. Do it all and see it all right here, with or without connecting to a separate PC using Lochinvar SMART TOUCH software.

- MODBUS COMMUNICATION
- PASSWORD SECURITY
- PRODUCT SERVICE INDICATOR
- FREEZE PROTECTION
- LOW WATER FLOW INDICATOR
- NIGHT TEMPERATURE SETBACK
- BUILDING MANAGEMENT SYSTEM CONTROL
- TANK TEMPERATURE READOUT
- WATER HEATER CONTROLS
- PC CONNECTION



THE ARMOR X2 COMBUSTION SYSTEM

ADVANCED NEGATIVE REGULATION TECHNOLOGY

ARMOR X2 safely and reliably operates with supply gas pressure as low as 4 inches water column, because Negative Regulation (Neg/Reg) technology automatically adjusts fan speed to ensure the correct volume of fuel and air enter the burner.

“FAIL-SAFE” DIRECT-SPARK IGNITION

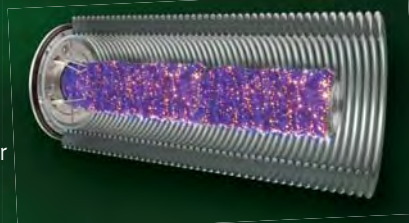
With each call for heat, two electrodes ignite the fuel/gas mixture. A third electrode then senses for flame. SMART TOUCH will lock out and display the fault if ignition does not occur.

TWO-IN-ONE STAINLESS STEEL HEAT EXCHANGER

A primary heat exchanger combined with a secondary heat exchanger captures flue gas heat and eliminates low temperature protection requirements. The stainless steel, pH-tolerant design features a weld-sealed assembly with no O-rings or gaskets. The Armor X2 is ASME Section IV approved and stamped.

FULLY MODULATING BURNER

SMART TOUCH allows fully modulating combustion with 10:1 turndown. The combustion system can fire as low as 10% of maximum input, and modulates the firing rate up to 100% as demand increases. The burner design incorporates a woven steel mesh sleeve over a stainless steel burner tube and fires in a 360° pattern along the entire length of the primary heat exchanger. These together allow ARMOR X2's compact size to excel compared to units with larger multiple burners.



DIRECT-VENTING UP TO 100 FEET



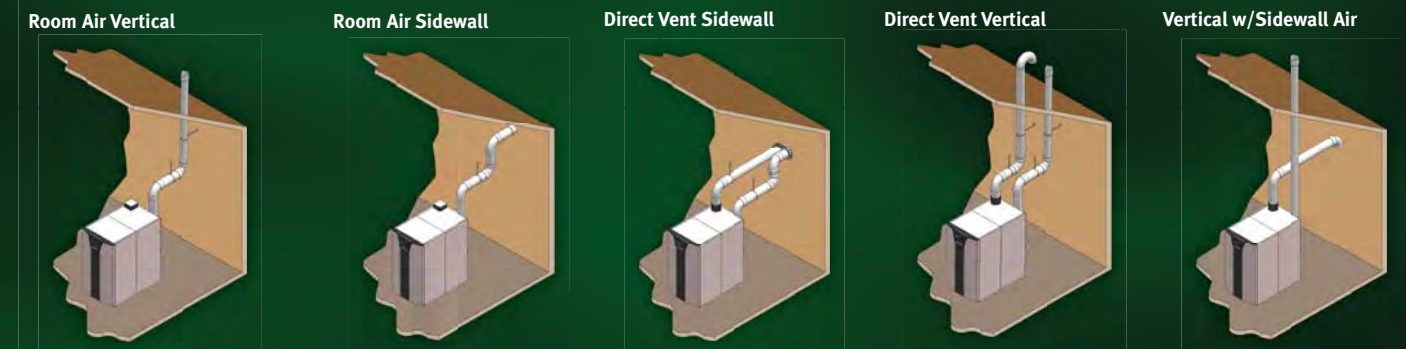
Sidewall Vent Termination

ARMOR X2 offers multiple venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof.

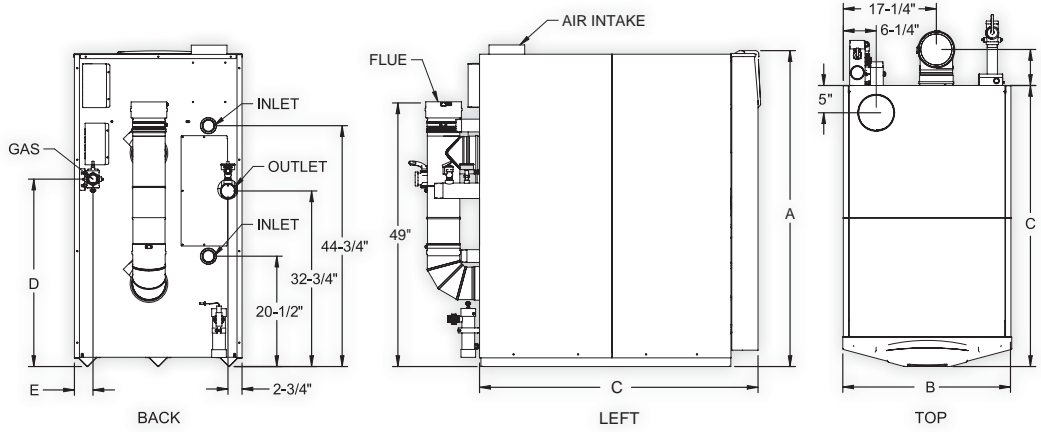
FACTORY SUPPLIED AND SHIPPED STANDARD WITH EVERY MODEL



FLEXIBLE VENTING OPTIONS - Up to 100 feet of air intake and 100 feet of exhaust vent with PVC, CPVC, Polypropylene or SS.



DIMENSIONS AND SPECIFICATIONS



Model Number Guide

AW	N	1500	PM
Model	Natural Gas	Btu/hr Input	Pump Mounted

Armor X2 Water Heater,
Natural Gas,
1,500,000 Btu/hr input,
PM Pump Mounted

ARMOR X2 WATER HEATER				DIMENSIONS AND SPECIFICATIONS											
Model Number	Btu/hr Input	Thermal Efficiency	GPH @ 100° Rise	A	B	C	D	E	F	Gas Conn.	Inlet Water Conn.	Outlet Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
AWN1000PM	1,000,000	96.0%	1,164	58-3/4"	31"	48"	35"	4-1/2"	15"	1-1/2"	2 x 2"	3"	6"	6"	910
AWN1300PM	1,300,000	96.0%	1,513	58-3/4"	31"	52-1/4"	34-3/4"	3-1/2"	6-3/4"	1-1/2"	2 x 2"	3"	6"	6"	1049
AWN1500PM	1,500,000	96.0%	1,745	58-3/4"	31"	56-1/2"	34-3/4"	3-1/2"	6-3/4"	1-1/2"	2 x 2"	3"	6"	6"	1185

Notes: Change 'N' to 'L' for L.P. Gas Model. No deration on L.P. models. Performance data based on manufacturer test results. 120 VAC / 15 AMP circuit required. All dimensions shown in inches.

STANDARD FEATURES

- > 96% Thermal Efficiency (AHRI Certified)
- > Modulating Burner with 10:1 Turndown
 - > Direct-Spark Ignition
 - > Low NOx Operation
 - > Sealed Combustion
 - > Low Gas Pressure Operation
- > Vertical & Horizontal Venting
 - > Category IV Venting up to 100 Feet
 - > PVC, CPVC, Polypropylene or AL29-4C Vent Material
 - > Sidewall Vent Termination Provided
- > ASME Stainless Steel Heat Exchanger
 - > Gasketless Design
 - > 160 psi Working Pressure
- > (2) Low Lead Bronze Circulating Pumps
- > On/Off Switch
- > Adjustable High Limit with Manual Reset
- > Low Air Pressure Switch
- > Flow Switch
- > Inlet & Outlet Temperature Sensors
- > Two Easy Access Terminal Strips
- > Temperature & Pressure ASME Relief Valve
- > Zero Clearance to Combustible Material
- > Approved for Combustible Floor Installation
- > 1 Year Warranty on Parts
- > 5 Year Limited Warranty (see warranties for details)

SMART TOUCH™ FEATURES

- > SMART TOUCH™ Touchscreen Operating Control
 - > Full-Color Touchscreen LCD Display
 - > Built-in Cascading Sequencer for up to 8 Water Heaters
 - > Building Management System Integration with 0-10 VDC Input
 - > Password Security
 - > Low Water Flow Safety Control & Indication
 - > Inlet & Outlet Temperature Readout
 - > Freeze Protection
 - > Service Reminder
 - > Time Clock
- > Data Logging
 - > Hours Running
 - > Ignition Attempts
 - > Last 10 Lockouts
- > Programmable System Efficiency Optimizers
 - > Night Setback
 - > Anti-Cycling
- > Water Heater Pump Control
 - > High Voltage Terminal Strip
 - > 120 VAC / 60 Hertz / 1-Phase Power Supply
 - > Pump Contacts
- > Low Voltage Terminal Strip
 - > 24 VAC Auxiliary Device Relay
 - > Auxiliary Proving Switch Contacts
 - > Alarm on Any Failure Contacts
 - > Runtime Contacts
 - > Tank Thermostat Contacts
 - > Tank Sensor Contacts
 - > Cascade Contacts

OPTIONAL EQUIPMENT

- > Alarm Bell
- > Condensate Neutralization Kit
- > SMART TOUCH PC Software
- > Modbus Communications
- > Stainless Steel Vent Kits (1300 & 1500)
- > BMS Gateway to LON or BacNet

CODES & REGISTRATIONS

- > ANSI Z21.10.3 compliant
- > ASME certified, "HLW" stamp
- > California Code compliant
- > Massachusetts Code compliant
- > South Coast Air Quality Management District registered

Patent # 8,371,252

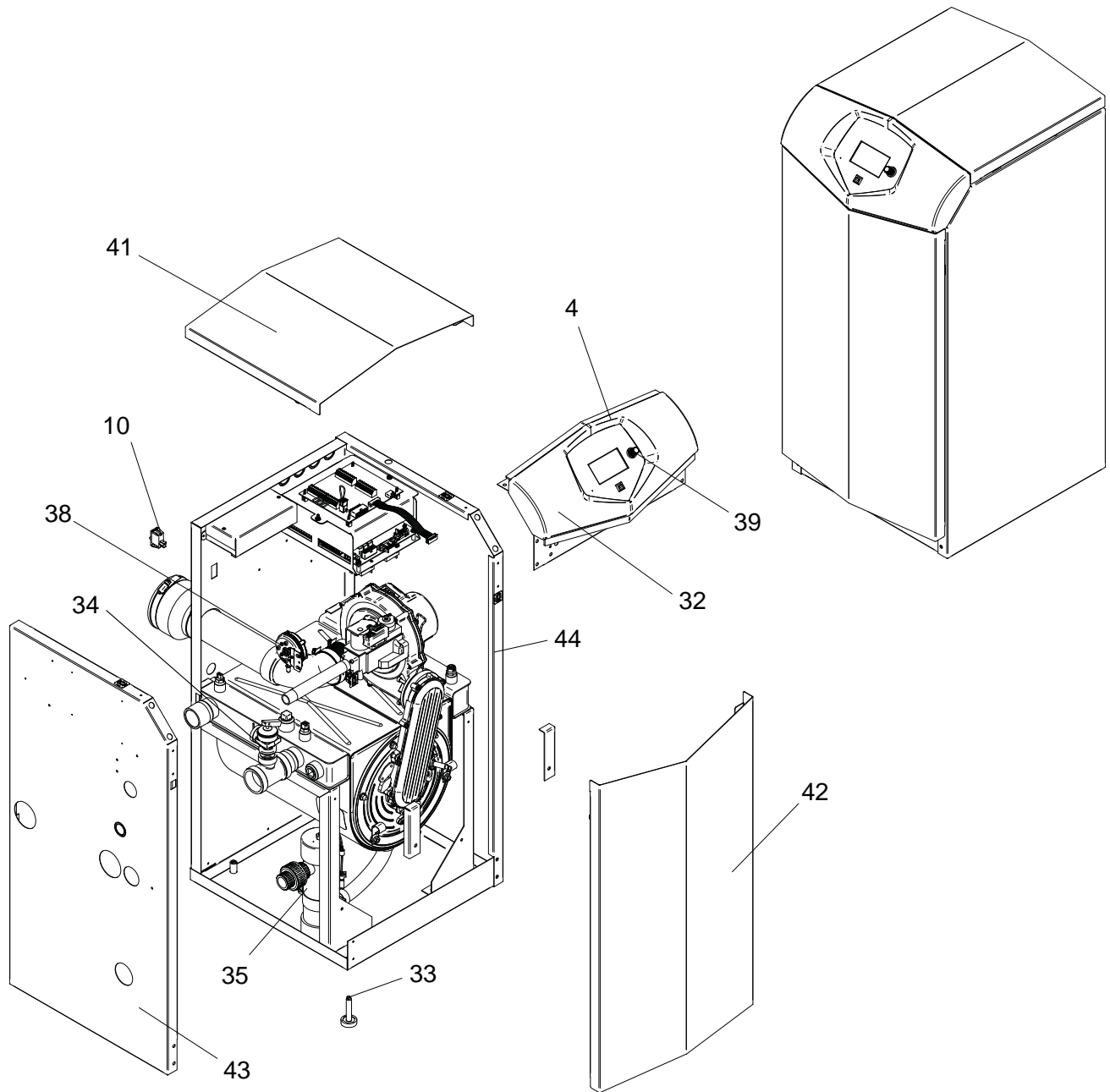


LOW LEAD CONTENT HLW

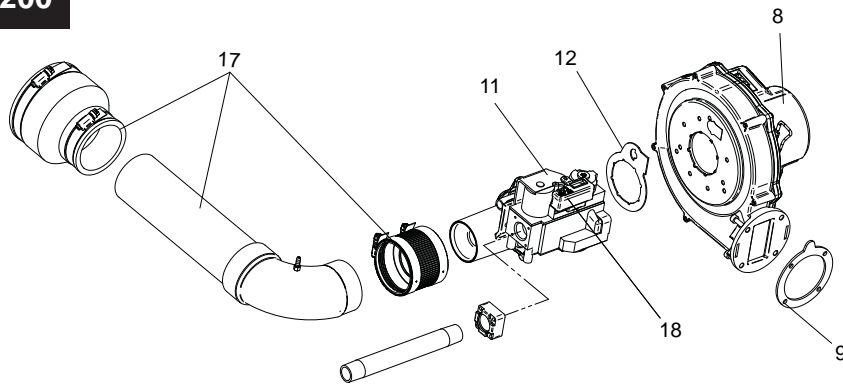


Replacement Parts List

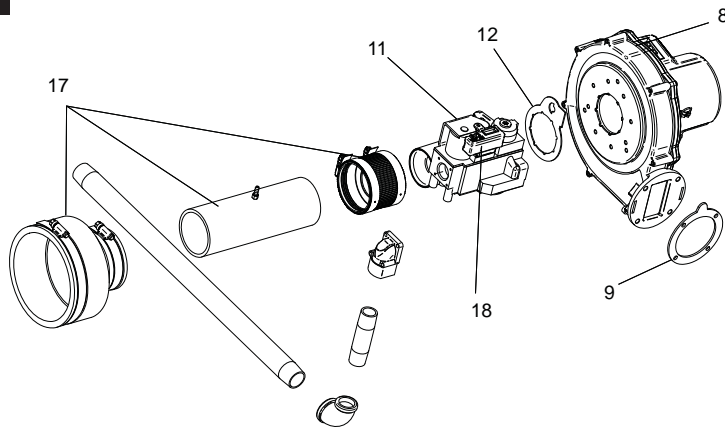
Armor Condensing Water Heater AW 151 thru 801



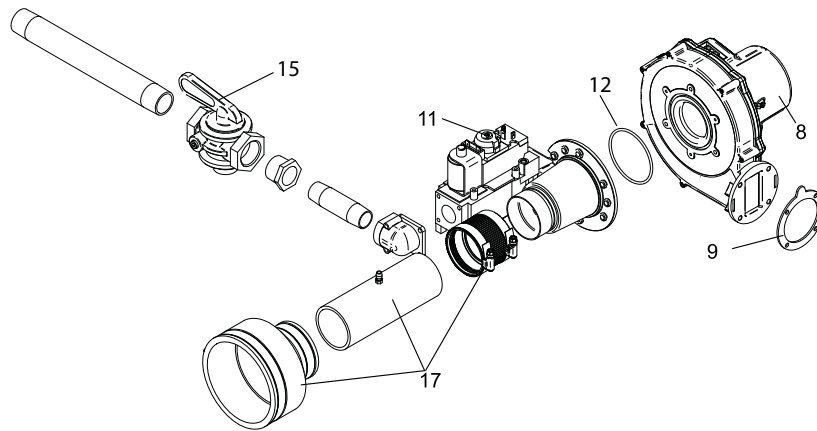
GAS TRAIN 151-200



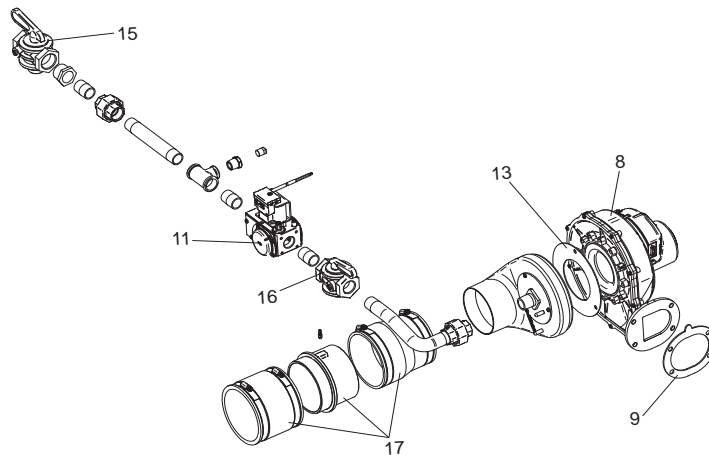
GAS TRAIN 286



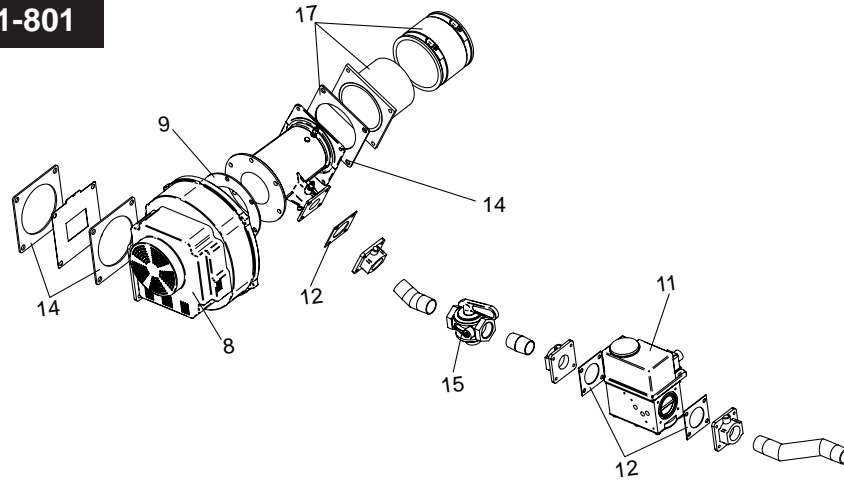
GAS TRAIN 400



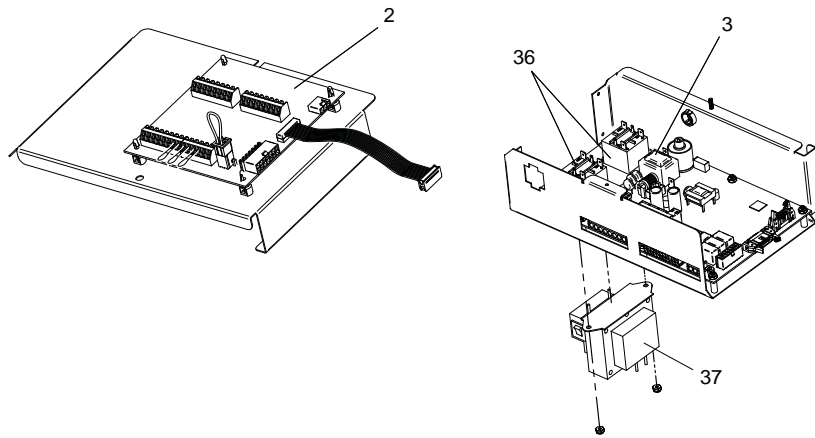
GAS TRAIN 501



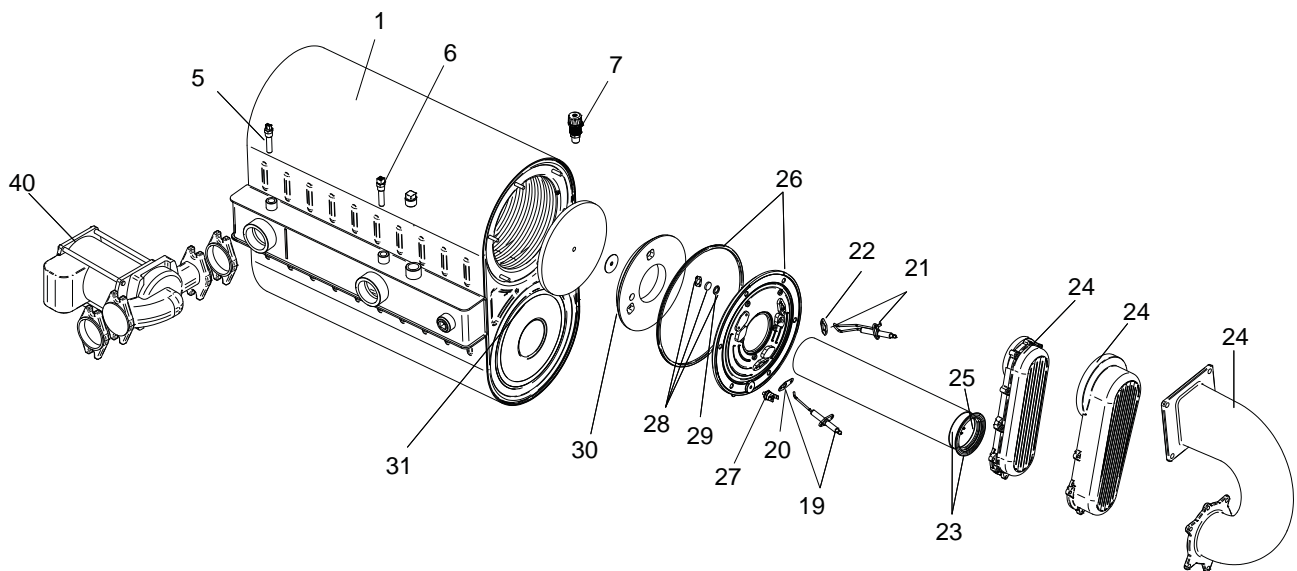
GAS TRAIN 601-801



CONTROL PANEL



HEAT EXCHANGER



IMG00951

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100147750	HEAT EXCHANGER	AW 151
1	100147751	HEAT EXCHANGER	AW 200
1	100147752	HEAT EXCHANGER	AW 286
1	100147753	HEAT EXCHANGER	AW 400
1	100147754	HEAT EXCHANGER	AW 501
1	100147306	HEAT EXCHANGER	AW 601
1	100147307	HEAT EXCHANGER	AW 701
1	100147308	HEAT EXCHANGER	AW 801
CONTROLS			
2	100208473	CONNECTION BOARD	ALL
3	100167803	INTEGRATED CONTROL	AW 151-286
3	100167804	INTEGRATED CONTROL	AW 400
3	100167805	INTEGRATED CONTROL	AW 501
3	100167807	INTEGRATED CONTROL	AW 601 - 801
3	100167808	HIGH ALTITUDE INTEGRATED CONTROL	AW 151-286
3	100167809	HIGH ALTITUDE INTEGRATED CONTROL	AW 400
3	100167810	HIGH ALTITUDE INTEGRATED CONTROL	AW 501
3	100167811	HIGH ALTITUDE INTEGRATED CONTROL	AW 601 - 801
4	100208458	USER INTERFACE CONTROL	ALL
5	100208549	SENSOR, INLET	ALL
6	100208544	SENSOR, OUTLET / HIGH LIMIT	ALL
7	100167445	AIR VENT VALVE	ALL
8	100145004	FAN ASSEMBLY	AW 151
8	100145005	FAN ASSEMBLY	AW 200
8	100145006	FAN ASSEMBLY	AW 286
8	100145008	FAN ASSEMBLY	AW 400
8	100145009	FAN ASSEMBLY	AW 501
8	100144980	FAN ASSEMBLY	AW 601-801
9	100208764	GASKET, BLOWER	AW 200
9	100208101	GASKET, BLOWER	AW 151, 286, 400
9	100208759	GASKET, BLOWER	AW 501
9	100233694	GASKET, VENTURI	AW 601 - 801
10	100208242	SWITCH, ON/OFF	ALL
GAS VALVES			
11	100172003	GAS VALVE ASSEMBLY NAT	AW 151
11	100172004	GAS VALVE ASSEMBLY NAT	AW 200
11	100172005	GAS VALVE ASSEMBLY NAT	AW 286
11	100172006	GAS VALVE ASSEMBLY NAT	AW 400
11	100172009	GAS VALVE ASSEMBLY NAT	AW 501
11	100172014	GAS VALVE ASSEMBLY NAT	AW 601
11	100171923	GAS VALVE ASSEMBLY NAT	AW 701
11	100172015	GAS VALVE ASSEMBLY NAT	AW 801
11	100171928	GAS VALVE ASSEMBLY LP	AW 501
11	100171929	GAS VALVE ASSEMBLY LP	AW 601
11	100171930	GAS VALVE ASSEMBLY LP	AW 701
11	100171931	GAS VALVE ASSEMBLY LP	AW 801
12	100208760	GASKET, GAS VALVE	AW 151-286
12	100208761	GASKET, GAS VALVE	AW 400
12	100208105	GASKET, GAS VALVE	AW 601-801
13	100233703	GASKET, AIR SHROUD	AW 501
14	100208089	GASKET, AIR INTAKE	AW 400-801
15	100146149	GAS CUT OFF VALVE 1" X 1"	AW 501-801
16	100146148	GAS CUT OFF VALVE 3/4" X 3/4"	AW 501
PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
GAS VALVES (CONT.)			
17	100163251	AIR INLET KIT	AW 151
17	100163252	AIR INLET KIT	AW 200
17	100163253	AIR INLET KIT	AW 286
17	100163254	AIR INLET KIT	AW 400
17	100163255	AIR INLET KIT	AW 601-801
17	100163256	AIR INLET KIT	AW 501
18	100208324	GAS VALVE SWITCH	AW 151 - 286
PILOT & BURNER ASSEMBLIES			
19	100165930	FLAME SENSOR W/ GASKET	AW 151-501
19	100165931	FLAME SENSOR W/ GASKET	AW 601-801
20	100208091	GASKET, FLAME SENSOR	ALL
21	100165929	IGNITOR W/ GASKET	AW 151-501
21	100165920	IGNITOR W/ GASKET	AW 601-801
22	100208086	GASKET, IGNITOR	ALL
23	100135308	BURNER W/GASKET	AW 151
23	100135309	BURNER W/GASKET	AW 200
23	100135310	BURNER W/GASKET	AW 286
23	100135311	BURNER W/GASKET	AW 400-501
23	100135313	BURNER W/ GASKET	AW 601
23	100135314	BURNER W/ GASKET	AW 701
23	100135315	BURNER W/ GASKET	AW 801
24	100173796	GAS/AIR ARM ASSEMBLY W/ GASKET	AW 151
24	100173792	GAS/AIR ARM ASSEMBLY W/ GASKET	AW 200-400
24	100173793	GAS/AIR ARM ASSEMBLY W/ GASKET	AW 501
24	100173798	GAS/AIR ARM ASSEMBLY W/GASKET	AW 601-801
25	100208085	GASKET, BURNER	AW 151-501
25	100233594	GASKET, BURNER	AW 601-801
26	100173794	HEAT EXCHANGER ACCESS DOOR KIT	AW 151-501
26	100173799	HEAT EXCHANGER ACCESS DOOR KIT	AW 601-801
27	100094572	SWITCH, HEX DOOR TEMP (BEGINNING SN# F14)	AW 286-801
MISCELLANEOUS			
28	100163249	SIGHT GLASS	ALL
29	100208762	GASKET, SIGHT GLASS	ALL
30	100208060	INSULATION, BURNER PLATE DOOR	AW 151-501
30	100208059	INSULATION, BURNER PLATE DOOR	AW 601-801
31	100208061	INSULATION BAFFLE, DIVIDER PLATE	ALL
32	100163192	DISPLAY BEZEL	ALL
33	100134788	LEVELING LEG	ALL
34	100208453	T & P RELIEF 1" X 150#	AW 151-200
34	100208443	T & P RELIEF 3/4" X 150#	AW 286-400
34	100208446	T & P RELIEF 3/4" X 150#	AW 501-801
-	100208808	FUSE, 0.8 AMP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100208660	FLOW SWITCH	AW 151-200 & 400-801
-	100208661	FLOW SWITCH	AW 286
35	100163241	CONDENSATE TRAP	AW 151-200
35	100163244	CONDENSATE TRAP	AW 286-801
36	100208509	RELAY, 1.5 HP PUMP	ALL
-	100208243	SWITCH, BLOCKED DRAIN	ALL
-	100208154	GAUGE TRIOMETER, 75# PSI	AW 501-801
-	100170642	FLUE TEMP SENSOR KIT	ALL
-	100189053	KIT, COLLAR, FLUE 3"	AW 151-200
PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
-	100189054	KIT, COLLAR, FLUE 4"	AW 286-601
-	100157660	ALARM BELL	ALL
-	100157721	NEUTRALIZER KIT	AW 151-501
-	100157700	NEUTRALIZER KIT	AW 601-801
-	100170644	SENSOR KIT, TANK	ALL
37	100208230	TRANSFORMER	AW 151-701
37	100208246	TRANSFORMER	AW 801
38	100208377	SWITCH, PRESSURE	AW 151 & 286
38	100208378	SWITCH, PRESSURE	AW 200 & 400
38	100208383	SWITCH, PRESSURE	AW 501
38	100208382	SWITCH, PRESSURE	AW 601-801
39	100162600	FLUTED KNOB W/ SKIRT	ALL
-	100159008	LP CONVERSION KIT	AW 151
-	100159009	LP CONVERSION KIT	AW 200
-	100159010	LP CONVERSION KIT	AW 286
-	100159011	LP CONVERSION KIT	AW 400
-	100159012	LP CONVERSION KIT	AW 501-801
-	100148402	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
-	100208625	HARNESS, CONNECTION BOARD	ALL
-	100172816	HARNESS, RELAY	ALL
-	100172817	HARNESS, POWER	AW 151-286
-	100172815	HARNESS, POWER	AW 400-801
-	100208627	HARNESS, GAS VALVE	AW 151-286
-	100173091	HARNESS, GAS VALVE	AW 400
-	100173314	HARNESS, GAS VALVE	AW 501
-	100172958	HARNESS, GAS VALVE	AW 601-801
-	100208628	HARNESS, UNIT	AW 151 & 200
-	100072936	HARNESS, UNIT	AW 286
-	100072937	HARNESS, UNIT	AW 400-801
-	100208636	CABLE, RIBBON	AW 151-501
-	100208638	CABLE, RIBBON	AW 601-801
-	100208621	HARNESS, SPARK ELECTRODE	AW 151 & 200
-	100208620	HARNESS, SPARK ELECTRODE	AW 286
-	100208618	HARNESS, SPARK ELECTRODE	AW 400 & 501
-	100208623	HARNESS, SPARK ELECTRODE	AW 601-801
-	100208622	HARNESS, FLAME SENSE ELECTRODE	ALL
PUMPS			
40	100208409	PUMP	AW 151-200
40	100166428	PUMP	AW 286
40	100232190	PUMP	AW 400
40	100232190	PUMP	AW 501-601
40	100166409	PUMP	AW 701-801
JACKET ASSEMBLY			
41	100149684	JACKET, TOP	AW 151
41	100149687	JACKET, TOP	AW 200
41	100149688	JACKET, TOP	AW 286
41	100149689	JACKET, TOP	AW 400
41	100149690	JACKET, TOP	AW 501
41	100149691	JACKET, TOP	AW 601
41	100149692	JACKET, TOP	AW 701
41	100149693	JACKET, TOP	AW 801
42	100189059	JACKET, FRONT	AW 151-200
42	100189060	JACKET, FRONT	AW 286
PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
JACKET ASSEMBLY			
42	100189061	JACKET, FRONT	AW 400-801
43	100149874	JACKET, LEFT SIDE	AW 151
43	100149875	JACKET, LEFT SIDE	AW 200
43	100149876	JACKET, LEFT SIDE	AW 286
43	100149878	JACKET, LEFT SIDE	AW 400
43	100149861	JACKET, LEFT SIDE	AW 501
43	100149862	JACKET, LEFT SIDE	AW 601
43	100149863	JACKET, LEFT SIDE	AW 701
43	100149864	JACKET, LEFT SIDE	AW 801
44	100150904	JACKET, RIGHT SIDE	AW 151
44	100150905	JACKET, RIGHT SIDE	AW 200
44	100150906	JACKET, RIGHT SIDE	AW 286
44	100150907	JACKET, RIGHT SIDE	AW 400
44	100150341	JACKET, RIGHT SIDE	AW 501
44	100150212	JACKET, RIGHT SIDE	AW 601
44	100150220	JACKET, RIGHT SIDE	AW 701
44	100150225	JACKET, RIGHT SIDE	AW 801

PLEASE HAVE SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS

G R E A T V A L U E I N H E A T I N G E F F I C I E N C Y



FIVE YEAR
5
LIMITED PARTS WARRANTY

 **Lochinvar**[®]
HIGH EFFICIENCY BOILERS & WATER HEATERS

CADET[®]
HEATING BOILER

CADET[®]

HEATING BOILER

Lochinvar brings you the best all-around value in today's home heating market.

This modulating/condensing residential heating boiler offers fuel cost savings and outstanding quality at lower cost than other high-efficiency designs. With gas inputs from 40,000 to 120,000 Btu/hr, these wall-mount boilers can handle the heating load for almost any home.

94% AFUE EFFICIENCY

**COMPACT
WALL-MOUNT DESIGN**

MODULATING BURNER

**OUTDOOR RESET
WITH SENSOR**

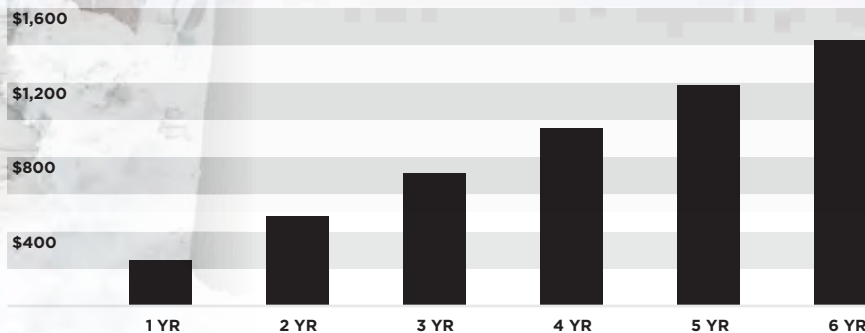
**COMBINATION HYDRONIC SPACE
HEATING/DOMESTIC WATER
HEATING MODEL AVAILABLE**



94% AFUE Efficiency Reduces Heating Bills.

For example, over 6 years, CADET could save over \$1,400 in fuel costs.*

Depending on where it is installed, CADET may qualify for Energy Tax Credits.



*Fuel savings are compared to an 80% AFUE boiler and based on a 70,000 Btu heating load with 2,000 hours of operation with a fuel cost of \$1.13 per therm.

Stainless Steel Heat Exchanger with ASME 'H' Stamp.



1. A commercial-grade ASME certified heat exchanger exemplifies the highest standards for design, materials and manufacturing.

Fully Modulating Burner.

2. Modulation adjusts the firing rate of the boiler to match the heat loss of the home, reducing burner cycling and increasing overall system efficiency.

Outdoor Reset with Sensor.

3. Monitors outdoor temperature to help CADET maintain a steady, consistent indoor comfort level year-round. Allows boiler control to “reset” indoor water temperature as needed when outdoor temperatures fluctuate.

Push-Button Digital Control.



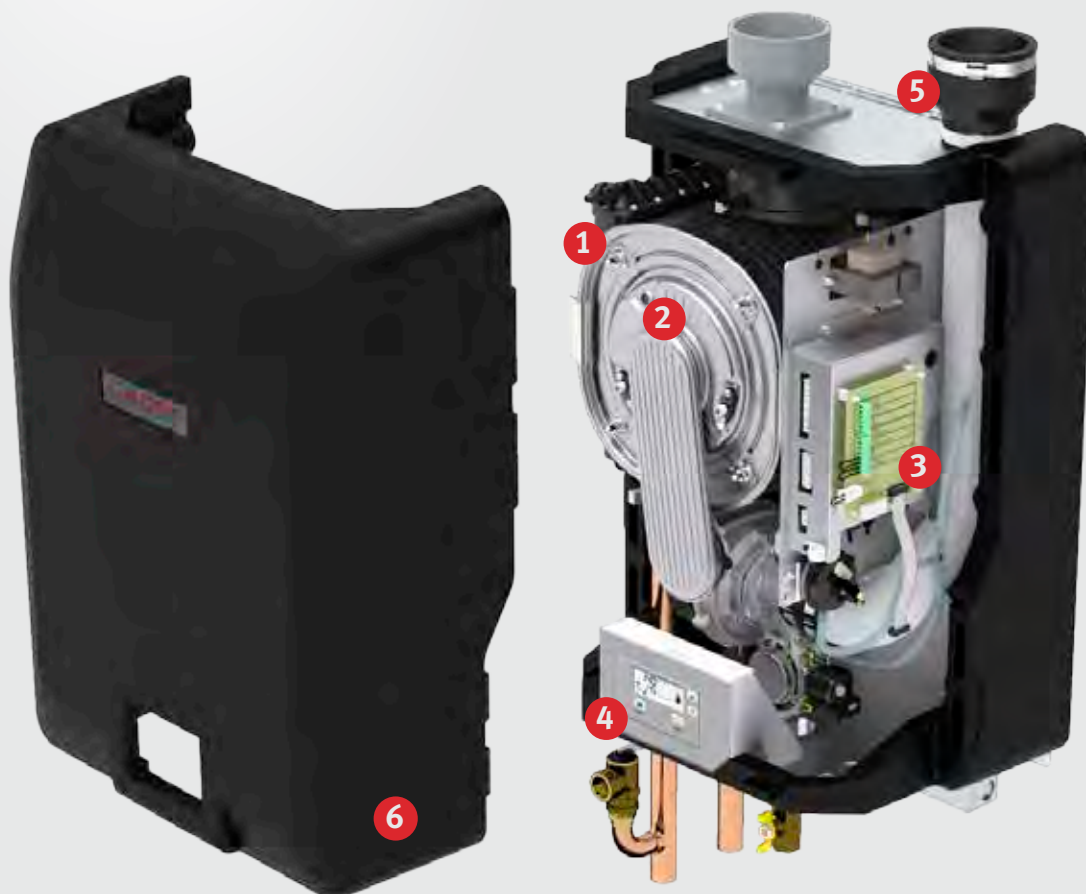
4. Constant display of actual output temperature, and easy adjustment of setpoint.

Venting Versatility.

5. CADET can be installed with a variety of venting configurations, including vertical or sidewall direct venting. Air intake and exhaust vent runs up to 100 feet can be utilized to meet the most challenging installation requirements. 3" polypropylene, PVC, CPVC or stainless steel pipe can be used. This venting flexibility is ideal for projects that will require new vent material when a non-condensing boiler is being replaced.

Expanded Polypropylene (EPP) Jacket.

6. Lightweight for easier handling. Deadens sound for quieter operation. Highly dent and scratch-resistant.



Combination Unit for Space Heating and Domestic Water Heating.

The CADET™ CCN120 eliminates the need for separate hydronic heating and domestic water heating equipment. It is equipped with a separate heat exchanger that delivers up to 3.0 GPM of domestic hot water at a 70°F temperature rise. An integrated flow switch, water temperature sensor and timer ensures that both the space heating and water heating demands are always met, without the need for a separate storage tank.



Standard Features

- 94% AFUE Efficiency
- Modulating Burner
- Direct-Spark Ignition
- Low-NOx Operation
- Field Convertible from Natural to LP Gas
- ASME Boiler Heat Exchanger
- 30 psi ASME Relief Valve
- Freeze Protection
- Vertical & Horizontal Direct-Vent

- PVC, CPVC, Polypropylene or SS Venting up to 100 feet
- Push-Button Digital Control
- Outdoor Temperature Reset (sensor included)
- Boiler Pump Control
- DHW Pump Control
- Expanded Polypropylene Jacket
- 10-Year Boiler Heat Exchanger Limited Warranty
- 5-Year Parts Warranty

Additional Information on CCN120 Combination Boiler

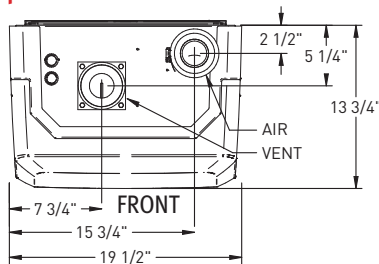
- 3.0 GPM Flow Rate at 70°F Temp. Rise
- 3/4" Hot and Cold Water Connections
- Domestic Hot Water Pump and Domestic Hot Water Pump Control

*Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. *The ratings have been determined under the provisions governing forced draft burners.

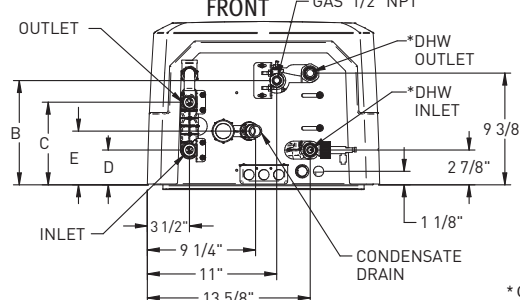
Cadet Heating Boiler						Dimensions and Specifications								
Model	INPUT (MBH)		%AFUE	Heating Capacity (MBH)	Net AHRI Rating (MBH)	Height	GAS to unit back	OUTLET to unit back	INLET to unit back	CONDENSATE to unit back	Vent	Air Intake	Water	Weight
	Max.	Min.				A	B	C	D	E				
CDN040	40	9	94.0	37	32	26"	4 1/4"	5 1/4"	4"	2 1/2"	2"	2"	3/4"	94
CDN070	70	14	94.0	65	57	26"	4 1/2"	5 3/4"	3"	1 1/2"	2"	2"	1"	98
CDN100	100	20	94.0	93	81	26"	6"	5 3/4"	3"	1 1/2"	2"	2"	1"	102
CDN120	120	24	94.0	112	97	26"	7 1/4"	7"	3"	1 1/2"	3"	3"	1"	108
CCN120	120	24	94.0	112	97	35"	8 3/4"	7"	3"	4 1/2"	3"	3"	1"	131

* CCN120 is Combination Hydronic Space Heating/Domestic Water Heating Boiler. Combination Unit Domestic Water Connections are 3/4" *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.

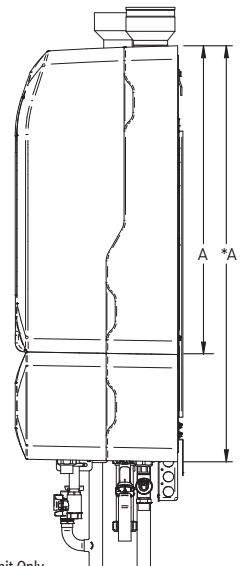
Top View



Bottom View



Side View



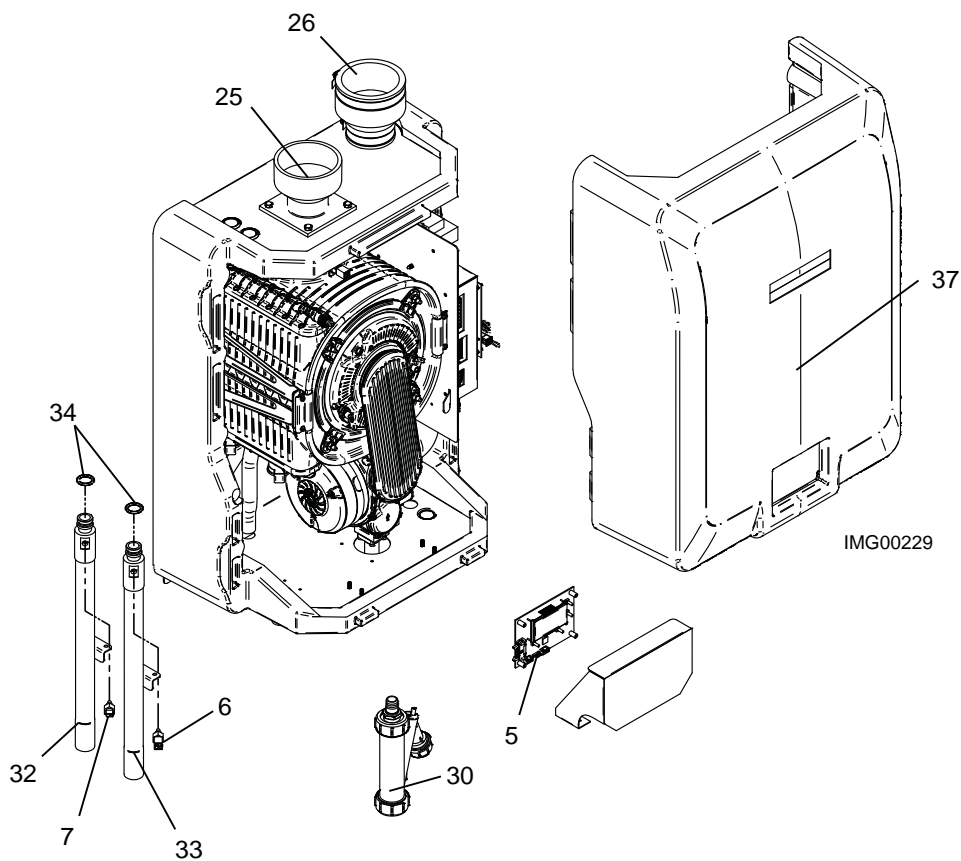
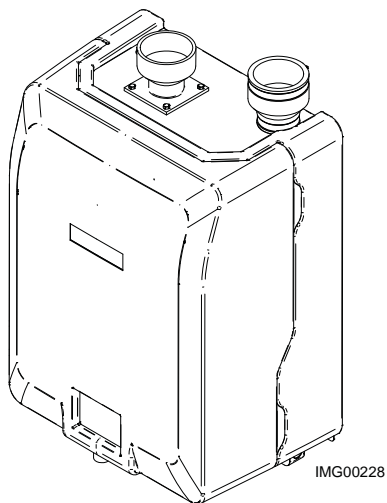
* CCN120 Combination Unit Only



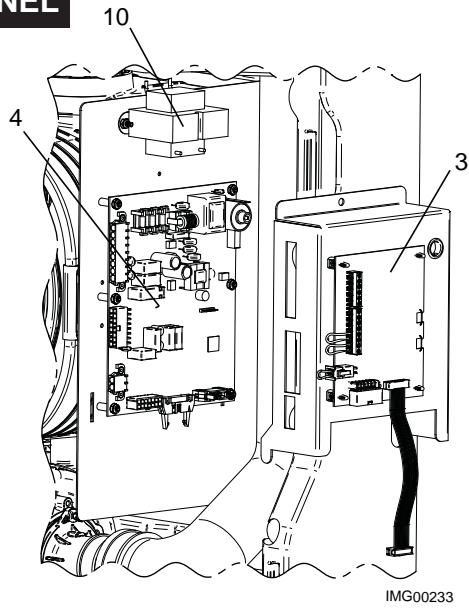


Replacement Parts List

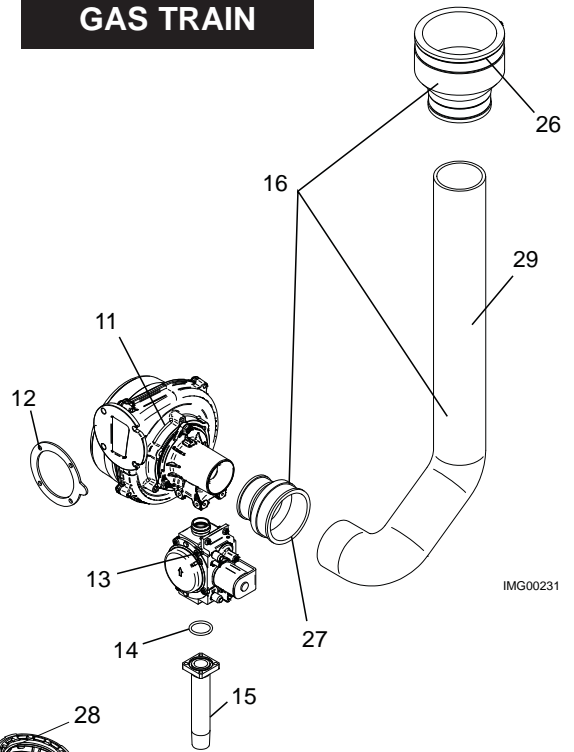
Cadet™ Heating Boilers CD(N,L) 40 thru 120 CC(N,L) 120



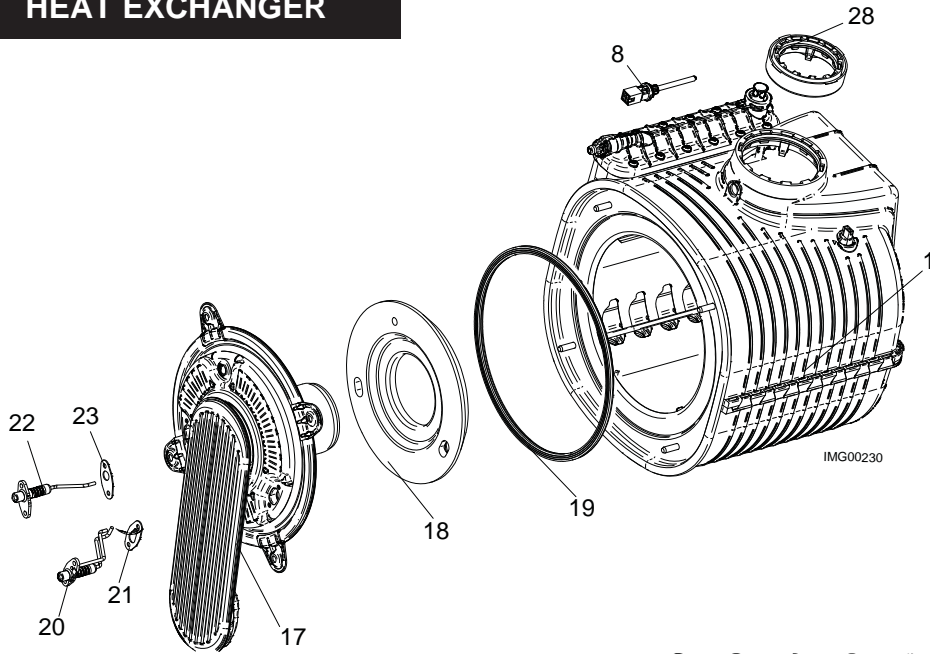
CONTROL PANEL



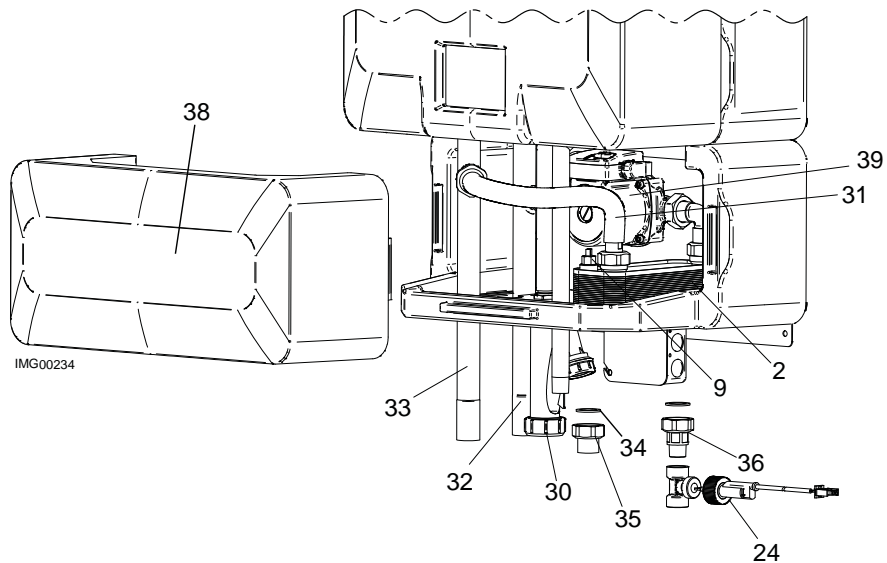
GAS TRAIN



HEAT EXCHANGER



CC(N,L) 120



ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLIES			
1	HEX30054	HEAT EXCHANGER ASSEMBLY	CD 040
1	HEX30055	HEAT EXCHANGER ASSEMBLY	CD 070
1	HEX30056	HEAT EXCHANGER ASSEMBLY	CD 100
1	HEX30057	HEAT EXCHANGER ASSEMBLY	CD/CC 120
2	HEX20063	HEAT EXCHANGER, BRAZED PLATE	CC 120
CONTROLS			
3	RLY30094	CONNECTION BOARD	ALL
4	RLY20107	CONTROL BAORD, MAIN	CD 040
4	RLY20092	CONTROL BOARD, MAIN	CD/CC 070-120
5	RLY20093	CONTROL BOARD, USER INTERFACE	ALL
-	LBL20255	LABEL, CONTROL OVERLAY	ALL
6	TST20022	SENSOR, OUTLET	ALL
7	TST20023	SENSOR, INLET	ALL
8	TST20031	SENSOR, FLUE	ALL
9	TST20032	SENSOR, DHW	CC 120
-	TST2311	SENSOR, OUTDOOR AIR	ALL
10	TRF20000	TRANSFORMER - 24V, 40VA	ALL
GAS TRAIN			
11	FAN30007	FAN ASSEMBLY W/ VENTURI AND GASKET	CD 040 - 070
11	FAN30008	FAN ASSEMBLY W/ VENTURI AND GASKET	CD/CC 100 - 120
12	GKT2456	GASKET, BLOWER	CD 040 & 100
12	GKT2436	GASKET, BLOWER	CD/CC 070 & 120
-	MSC20274	COUPLING, VENTURI TO VALVE - RUBBER	ALL
13	VAL30058	GAS VALVE ASSEMBLY W/ GASKET	CD 040
13	VAL30067	GAS VALVE ASSEMBLY W/ GASKET	CD 070
13	VAL30068	GAS VALVE ASSEMBLY W/ GASKET	CD 100
13	VAL30069	GAS VALVE ASSEMBLY W/ GASKET	CD/CC 120
-	MSC20273	SWITCH, GAS VALVE (BEFORE SERIAL #E15)	ALL
-	MSC20378	SWITCH, GAS VALVE (AFTER SERIAL #E15)	ALL
14	GKT20081	GASKET, GAS VALVE O-RING	ALL
15	BKP20065	PIPE, GAS - 1/2"	CD 040 - 120
15	BKP20066	PIPE, GAS - 1/2"	CC 120
16	MSC30025	KIT, AIR INLET	CD 040
16	MSC30026	KIT, AIR INLET	CD 070
16	MSC30027	KIT, AIR INLET	CD 100
16	MSC30028	KIT, AIR INLET	CD/CC 120
PILOT AND BURNER ASSEMBLIES			
17	WTR30015	HEAT EXCHANGER ACCESS DOOR KIT W/ BURNER	CD 040
17	WTR30016	HEAT EXCHANGER ACCESS DOOR KIT W/ BURNER	CD 070
17	WTR30017	HEAT EXCHANGER ACCESS DOOR KIT W/ BURNER	CD 100
17	WTR30018	HEAT EXCHANGER ACCESS DOOR KIT W/ BURNER	CD/CC 120
18	FIB20131	INSULATION, BURNER DOOR	ALL
19	GKT20085	GASKET, BURNER DOOR - RUBBER	ALL
20	PLT30006	IGNITOR W/ GASKET	ALL
21	GKT20087	GASKET, IGNITOR	ALL
22	PLT30007	FLAME SENSOR W/ GASKET	ALL
23	GKT20086	GASKET, FLAME SENSOR	ALL
MISCELLANEOUS			
24	WTR20031	FLOW SWITCH W/ BRASS TEE	CC 120
25	PVC2047	FLUE CONNECTION - 2"	CD 040 - 100
25	PVC2048	FLUE CONNECTION - 3"	CD/CC 120
26	CPG2062	COUPLING, AIR INLET W/ CLIPS - 2"	CD 040 - 100
26	CPG2059	COUPLING, AIR INLET W/ CLIPS - 2" TO 3"	CD/CC 120
27	CPG20022	COUPLING, VENTURI	ALL
28	MSC20242	ADAPTER, HEX FLUE - 2"	ALL
29	PVC20060	PIPE, AIR INLET	CD 040
29	PVC20061	PIPE, AIR INLET	CD 070
29	PVC20062	PIPE, AIR INLET	CD 100
PLASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
29	PVC20063	PIPE, AIR INLET	CD/CC 120
30	MSC30029	KIT, CONDENSATE TRAP	ALL
31	TUB20042	TUBING, STAINLESS STEEL FLEX W/ GASKETS - 3/4" X 16"	CC 120
32	TUB20080	PIPE ASSEMBLY, WATER INLET - 3/4"	CD 040
32	TUB20076	PIPE ASSEMBLY, WATER INLET - 1"	CD 070 - 120
32	TUB20079	PIPE ASSEMBLY, WATER INLET - COMBI	CC 120
33	TUB20081	PIPE ASSEMBLY, WATER OUTLET - 3/4"	CD 040
33	TUB20077	PIPE ASSEMBLY, WATER OUTLET - 1"	CD 070 - 120
33	TUB20078	PIPE ASSEMBLY, WATER OUTLET - COMBI	CC 120
34	GKT20126	GASKET, WATER CONNECTION	CD/CC 040-120
35	BRS20046	ADAPTER, UNION W/ GASKET - 3/4"	CC 120
36	BRS20047	ADAPTER, UNION W/ GASKET - 1/2"	CC 120
-	MSC20356	CLIP, WATER CONNECTION	CD/CC 040-120
-	RLV2030	RELIEF VALVE - 30#	ALL
-	GTP2900	GAUGE, TEMP AND PRESSURE - 75#	ALL
-	MSC2232	SCREEN, AIR INLET - 2"	CD 040 - 100
-	MSC2516	SCREEN, AIR INLET - 3"	CD/CC 120
-	JKB60467	AIR SHUTTER	CD 040
-	JKB60468	AIR SHUTTER	CD 100
-	PVC20059	PIPE, CONDENSATE - 3/4"	ALL
-	MSC20244	HOSE, CONDENSATE	CD 040 - 120
-	MSC20245	HOSE, CONDENSATE	CC 120
-	MSC2461	TUBING, SILICONE - 1/8" (ORDER BY THE FOOT)	ALL
-	MSC2155	TEE, HOSE MENDER - 3/16"	ALL
-	KIT40065	KIT, INSTALL	CD 040 - 100
-	KIT40066	KIT, INSTALL	CD/CC 120
-	JKB60428	BRACKET, WALL MOUNT - TOP	ALL
-	JKB5137	BRACKET, WALL MOUNT - BOTTOM	ALL
-	WRE2203	CABLE, RIBBON	ALL
-	WRE20068	HARNESS, GAS VALVE	ALL
-	WRE20146	HARNESS, SPARK ELECTRODE	ALL
-	WRE20147	HARNESS, FLAME SENSOR ELECTRODE	ALL
-	WRE20054	HARNESS, CONNECTION BOARD*	ALL
-	WRE20141	HARNESS, UNIT	ALL
-	WRE20142	HARNESS, POWER	ALL
-	LPK30012	LP CONVERSION KIT	CD 040 & 70
-	LPK30014	LP CONVERSION KIT	CD 100 & CD/CC 120
JACKET ASSEMBLIES			
37	MSC20223	JACKET, COVER	ALL
38	MSC20229	JACKET, COVER - DHW BOTTOM	CC 120
PUMPS			
39	PUM30019	PUMP W/ GASKETS	CC 120
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			



Charger Power DV Commercial Gas Water Heaters

Power Direct Vent Water Heaters

Ideal for restaurants, commercial kitchens retrofit and replacement applications.

Standard Features

- **Independent PVC Venting** - The stand alone vent exhausts the byproducts of combustion and the separate air intake provides fresh combustion air to the unit. Vents up to 40 feet to an outside wall, with one 90 degree elbow, using 3" PVC or CPVC pipe. Vents up to 55 feet to an outside wall, with one 90 degree elbow, using 4" PVC or CPVC pipe.
- **Glass-Lined Steel Tank** – 300 PSI test pressure, 150 PSI working pressure.
- **Magnesium Tank Saver Anode** – Large diameter anode rod for longer tank life and greater protection.
- **Electronic Ignition** – Spark-to-pilot ignition system eliminates the need for a continuously burning pilot light, which saves energy, by providing pilot gas only when the system calls for heat.
- **Approved for Operation at 180°F Outlet Temperature.**
- **Temperature & Pressure Relief Valve** – Factory installed.
- **Brass Drain Valve**
- **Handhole Cleanout** – Provides easy access.
- **Dielectric Fittings** – Factory installed and designed to provide additional protection for longer tank life.
- **Automatic Induced-Draft Blower** – Provides balanced flue operation for direct vent applications.
- **Non-CFC Foam Insulation** – Meets ASHRAE standby loss requirements.
- **CSA International Design Certified**
- **Warranty** – 3 year limited tank warranty; 1 year limited warranty on parts. (See warranty for details)

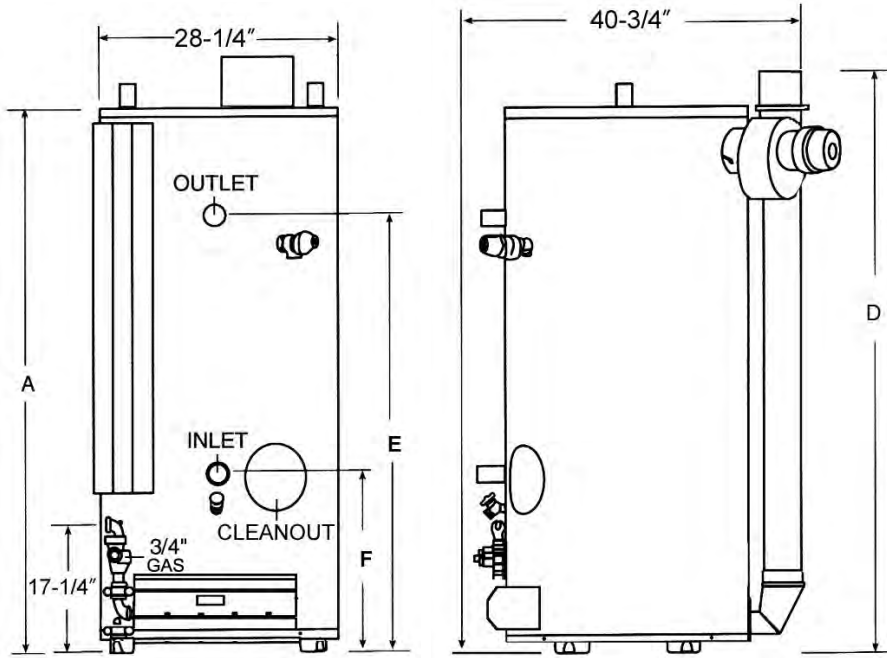


**80% THERMAL
EFFICIENCY**

Options

- **ASME Tank Construction**
(250,000 Btu/hr model only)
- **NSF Construction**
- **Low NOx Construction**

Charger Power DV Commercial Water Heater Dimensions



FOR EASE IN ORDERING
BY MODEL NUMBER

P	N	R	200	100
POWER DIRECT VENT	NAT. GAS	CONSTRUCTION	Btu/hr. INPUT	GALLON CAPACITY

This heater is a 199,999 Btu/hr input, Natural gas Charger Power Direct Vent, water heater with a 100 gallon storage capacity

Model Number	Tank Const.	Gal. Cap.	Btu/hr Input	GPH @ 100°F Rise	A	D	E	F	Vent Size	Water Top	Connections Front	Connections Rear	Shipping Weight
PNR150-080	STD	80	150,000	145	63-1/2"	68-1/4"	51-1/4"	20-3/4"	3"	1-1/2"	1-1/2"	2"	645
PNR150-100	STD	100	150,000	145	72"	77-1/4"	60-1/4"	20-3/4"	3"	1-1/2"	1-1/2"	2"	735
PNR200-080	STD	80	199,999	194	63-1/2"	68-1/4"	51-1/4"	20-3/4"	3"	1-1/2"	1-1/2"	2"	645
PNR200-100	STD	100	199,999	194	72"	77-1/4"	60-1/4"	20-3/4"	3"	1-1/2"	1-1/2"	2"	735
PNR250-080	STD	80	250,000	242	63-1/2"	73"	51-1/4"	20-3/4"	4"	1-1/2"	1-1/2"	2"	645
PNR250-100	STD	100	250,000	242	72"	82"	60-1/4"	20-3/4"	4"	1-1/2"	1-1/2"	2"	735
PNA251-080	ASME	80	250,000	242	63-1/2"	73"	51-1/4"	20-3/4"	4"	1-1/2"	1-1/2"	2"	720
PNA251-100	ASME	100	250,000	242	72"	82"	60-1/4"	20-3/4"	4"	1-1/2"	1-1/2"	2"	815

Notes: Change 'N' to 'L' to denote LP models.
115 Volt AC required

Gas Connections are 3/4"



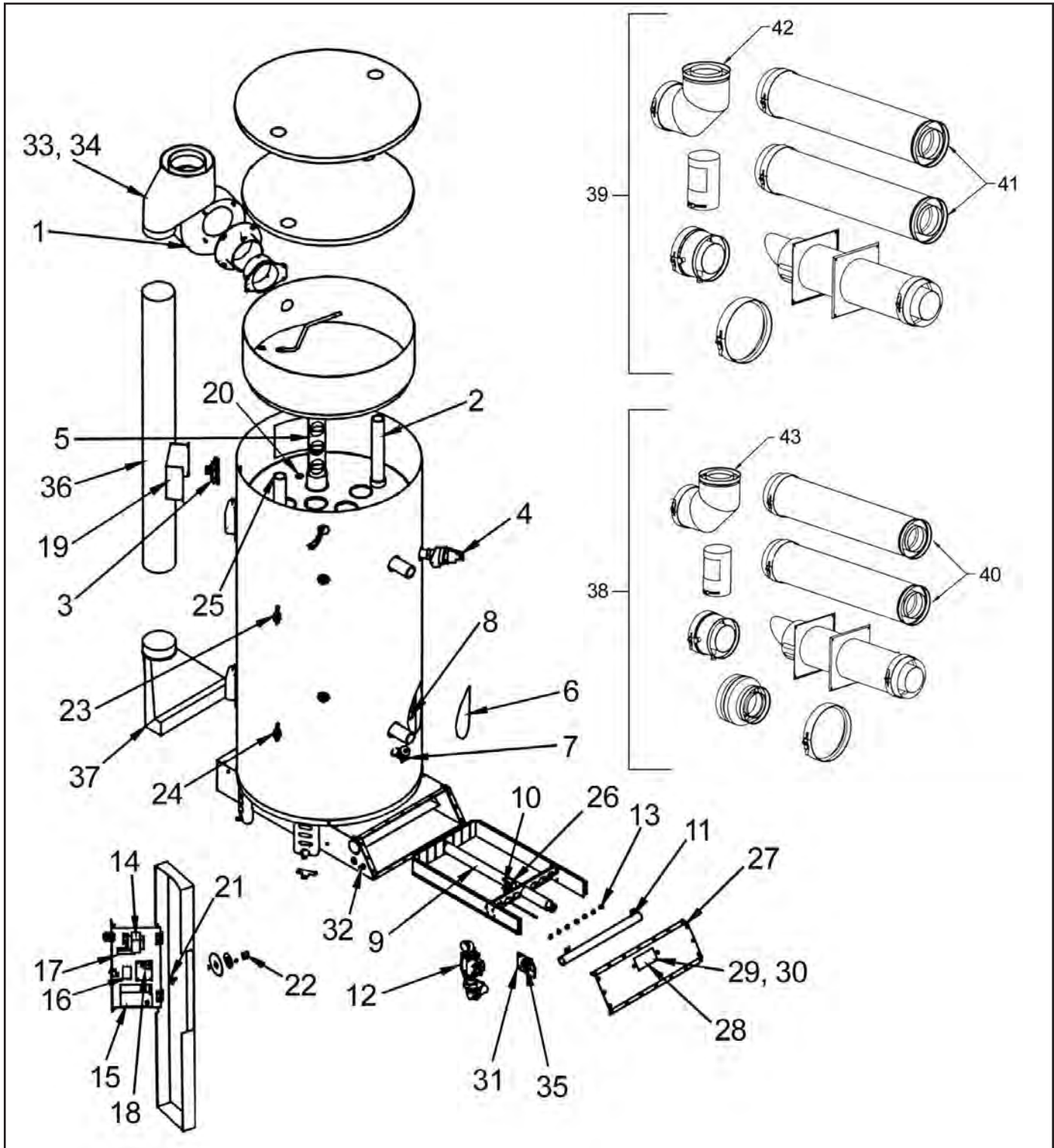
Lochinvar[®]
High Efficiency Water Heaters, Boilers and Pool Heaters





Replacement Parts List

**Charger DV
Commercial Gas
DNR, DLR / DNA, DLA Models**



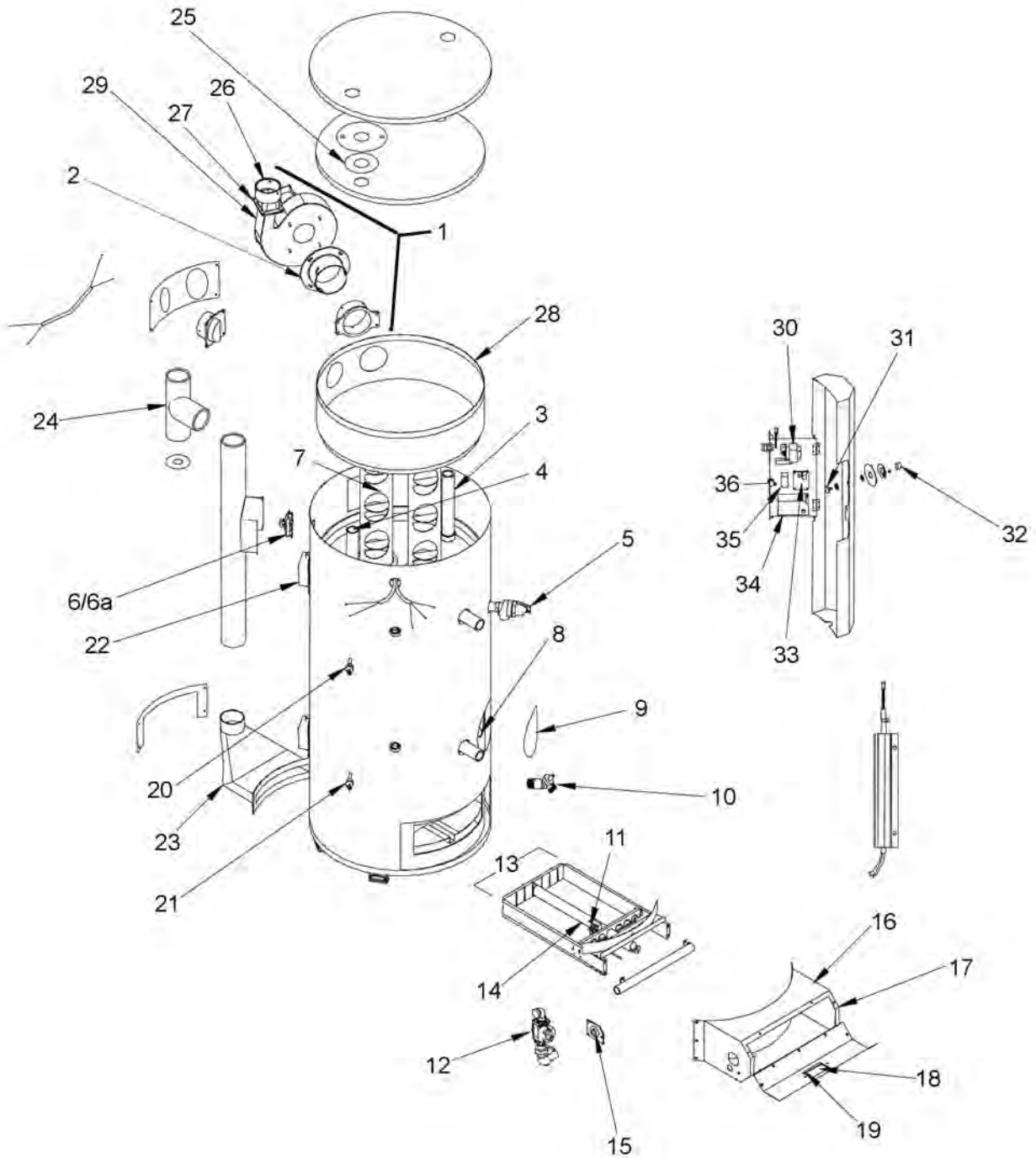
ITEM #	PART #	DISCRIPTION	MODEL #
1	PVT1040	INDUCED DRAFT BLOWER	ALL
2	WTR1090	DIP TUBE (80 Gal.)	DN(L)R(A)199-080 & 301-080
2	WTR1091	DIP TUBE (100 Gal.)	DN(L)R(A)199-100 & 360-100
3	PRS1020	PRESSURE SWITCH	DN(L)R(A)199-080 to 301-100
3	PRS1021	PRESSURE SWITCH	DN(L)R(A)360
4	RLV1014	T & P RELIEF VALVE	DN(L)R(A)199-080 & 100
4	RLV1015	T & P RELIEF VALVE	DN(L)R(A)301-080 to 360-100
5	JKT1215	FLUE BAFFLE	ALL
6	WTR1040	CLEANOUT ACCESS COVER	ALL
7	DRV2508	DRAIN VALVE	ALL
8	GKT1010	GASKET, HANDHOLE	DN(L)R199, 300, & 360
8	GKT1017	GASKET, HANDHOLE (ASME)	DN(L)A199, 301, & 361
9	BNR1059	BURNER, MAIN	ALL
10	PLT1120	PILOT ASSEMBLY, NAT	DNR(A)199 to 360
10	PLT1121	PILOT ASSEMBLY, LPG	DLR(A)199 to 360
11	MAN1021-7	MANIFOLD, BURNER	ALL
12	VAL1041	VALVE, NATURAL GAS	DNR(A)199 to 360
12	VAL1065	VALVE, LP GAS	DLR(A)199 to 360
13	ORF1020-42	ORIFICE	DNR(A)199
13	ORF1020-52	ORIFICE	DLR(A)199
13	ORF1020-33	ORIFICE	DNR(A)300, 301
13	ORF1020-49	ORIFICE	DLR(A)300, 301
13	ORF1020-31	ORIFICE	DNR(A)360, 361
13	ORF1020-47	ORIFICE	DLR(A)360, 361
14	TRF1038	TRANSFORMER	ALL
15	RLY1134	IGNITION MODULE	ALL
16	RLY1140	BLOWER RELAY	ALL
17	SWT1000	MAIN POWER SWITCH	ALL
18	TST1294	TSAT CONTROL BOARD	ALL
19	JKT1200	UTILITY COVER - GRAY	ALL
20	WTR1085	ANODE ROD	ALL
21	TST1191	TSTAT POTENTIOMETER	ALL
22	TST1096	KNOB FOR POTENTIOMETER	ALL
23	TST1187	UPPER TEMP SENSOR	ALL
24	TST1188	LOWER TEMP SENSOR	ALL
25	WTR1080	OUTLET NIPPLE	ALL
26	JKT3003	PILOT SHIELD	ALL
-	MSC2706	TUBING EDPM (order by ft.)	ALL
27	JKT1215	BURNER ACCESS PANEL	ALL
28	MSC1110	BURNER SIGHT GLASS	ALL
29	MSC1111	SIGHT GLASS BACKING PLATE	ALL
30	GKT1110	SIGHT GLASS GASKET	ALL
31	GKT1111	SIGHT GLASS GROMMET	ALL
32	GKT1115	GASKET KIT, BURNER ACCESS	ALL
33	DRH1085	VENT ADAPTER	ALL
34	GKT1112	GASKET, BLOWER & VENT	ALL
-	DRH1160	SILICONE	ALL
35	DRH1087	FLANGE, COMB. BOX	ALL
36	DRH1088	COMBUSTION AIR INLET TUBE	ALL
37	DRH1089	AIR INLET BOOT	ALL
-	WRE1055	LOWER SENSOR WIRE HARN	DN(L)R(A)199-080, 301-080
-	WRE1056	LOWER SENSOR WIRE HARN	DN(L)R(A)199-100, 301-100, & 361-100
-	WRE1057	WIRE HARNESS BLOWER	ALL
-	WRE1058	WIRE HARNESS PSI SWITCH	ALL
38	DRH1171	VENT KIT ASSEMBLY 6"	DN(L)R(A)199
39	DRH1173	VENT KIT ASSEMBLY 8"	DN(L)R(A)300, 301, 360, & 361
40	DRH1175	VENT EXTENSION TUBE 39"	DN(L)R(A)199
41	DRH1176	VENT EXTENSION TUBE 39"	DN(L)R(A)300, 301, 360, & 361
-	DRH1177	VENT TERMINAL FLAT ROOF	DN(L)R(A)199
-	DRH1178	VENT TERMINAL SLOPE ROOF	DN(L)R(A)199
-	DRH1179	VENT TERMINAL FLAT ROOF	DN(L)R(A)300, 301, 360, & 361
-	DRH1180	VENT TERMINAL SLOPE ROOF	DN(L)R(A)300, 301, 360, & 361
42	DRH1181	VENT ELBOW 8"	DN(L)R(A)300, 301, 360, & 361
43	DRH1182	VENT ELBOW 6"	DN(L)R(A)199

Please provide model & serial number when ordering parts.



Replacement Parts List

**Charger Power DV
Commercial Gas Water Heaters
Models PNR(L) 150-080 – 251-100**



ITEM	DESCRIPTION	MODEL NUMBERS / PART NUMBERS			
		PN(L)R150-080 PN(L)R150-100	PN(L)R200-080 PN(L)R200-100	PN(L)R250-080 PN(L)R250-100	PN(L)A251-080 PN(L)A251-100
1	Blower Assembly	FAN1004	FAN1004	FAN1004	FAN1004
2	Blower Gasket	GKT1012	GKT1012	GKT1012	GKT1012
3	Dip Tube (-080 models)	WTR1033	WTR1033	WTR1033	WTR1033
3	Dip Tube (-100 models)	WTR1034	WTR1034	WTR1034	WTR1034
4	Anode Rod - Magnesium (-080 models)	WTR1001	WTR1001	WTR1001	WTR1001
4	Anode Rod - Magnesium (-100 models)	WTR1005	WTR1005	WTR1005	WTR1005
5	T & P Valve	RLV1003	RLV1003	RLV1003	RLV1003
6	Pressure Switch	PRS1002	PRS1003	PRS1002	PRS1002
6a	High Alt. Pressure Switch (-100 model)	-	PRS1005	PRS1003	PRS1003
7	Flue Baffle	JKT1003	JKT1003	JKT1003	JKT1003
8	Handhole Gasket	GKT1010	GKT1010	GKT1010	GKT1010
9	Cleanout Cover	WTR1024	WTR1024	WTR1024	WTR1024
10	Drain Valve	DRV1000	DRV1000	DRV1000	DRV1000
11	Pilot Assembly NAT	PLT1511	PLT1511	PLT1511	PLT1511
11	Pilot Assembly LPG	PLT1512	PLT1512	PLT1512	PLT1512
12	Gas Valve NAT	VAL1041	VAL1041	VAL1041	VAL1041
12	Gas Valve LPG	VAL1065	VAL1065	VAL1065	VAL1065
13	Burner Assembly NAT	BNR1000	BNR1000	BNR1000	BNR1000
13	Burner Assembly LPG	BNR1001	BNR1001	BNR1001	BNR1001
13	Burner Assembly Low Nox (-SC)	BNR1043	BNR1043	BNR1043	BNR1043
14	Main Burner	BNR1059	BNR1059	BNR1059	BNR1059
14	Main Burner Low Nox (-SC)	BNR1100	BNR1100	BNR1100	BNR1100
15	Flange Combustion Box	MSC1004	MSC1004	MSC1004	MSC1004
16	Combustion Box Gasket - top/bottom	GKT1004	GKT1004	GKT1004	GKT1004
17	Combustion Box Gasket - side	GKT1007	GKT1007	GKT1007	GKT1007
18	Sight Glass	MSC1002	MSC1002	MSC1002	MSC1002
19	Sight Glass Gasket	GKT1024	GKT1024	GKT1024	GKT1024
20	Upper Temperature Sensor	TST1187	TST1187	TST1187	TST1187
21	Lower Temperature Sensor	TST1188	TST1188	TST1188	TST1188
22	Utility Cover	JKT1212	JKT1212	JKT1212	JKT1212
23	Air Inlet Boot	MSC1016	MSC1016	MSC1016	MSC1016
24	Dilution Air Tee	MSC1001	MSC1001	MSC1001	MSC1001
25	Collector Nipple Gasket	GKT1000	GKT1000	GKT1000	GKT1000
26	Blower Outlet Connection	FAN1003	FAN1003	FAN1003	FAN1003
27	Blower Outlet Flange Gasket	GKT1001	GKT1001	GKT1001	GKT1001
28	Flue Collector Gasket	GKT1002	GKT1002	GKT1002	GKT1002
29	High Limit Switch	PRS1022	PRS1022	PRS1022	PRS1022
30	Transformer	TRF1038	TRF1038	TRF1038	TRF1038
31	Thermostat Potentiometer	TST1091	TST1091	TST1091	TST1091
32	Potentiometer Knob	TST1096	TST1096	TST1096	TST1096
33	Thermostat Control Board	TST1292	TST1292	TST1292	TST1292
34	Ignition Module	RLY1004	RLY1004	RLY1004	RLY1004
35	Terminal Block	BLK1003	BLK1003	BLK1003	BLK1003
36	Main Power Switch	MSC1000	MSC1000	MSC1000	MSC1000

Please provide model & serial number when ordering parts.



Compact ASME Hi-Power Commercial Electric Water Heaters

Commercial Electric Water Heaters 5 to 120 Gallon - ASME Construction

Outstanding Features

- **Advanced Electronic Controls** – LCD readout displays operational and diagnostic information in words, not codes. Features Low Water Cutoff, Enable / Disable Contacts, Element Sensing and Night Setback
- **Glass-Lined Steel Tank** – The durable glass lining is fused to the tank at 1600°F to assure lasting protection against rust and corrosion while providing clean, clear hot water. ASME construction – 150 psi working pressure for 5 thru 50 gallon models and 125 psi working pressure for 65 thru 120 gallon models.
- **Powered Anode** – Combined magnesium anode and powered anode provide extra protection from corrosion for long trouble-free service.
- **Heating Element** – Incoloy sheathed immersion type heats water faster, more economically. Low watt density, (75 watts/in²)
- **Energy Cut-Off** – Shuts off electrical power to the elements should the water temperature in the tank reach 205°F.
- **ASME Temperature and Pressure Relief Valve** – Factory installed.
- **Non-CFC Foam Insulation** – Superior material formulation provides uniform tank coverage with a thick blanket of insulating foam. This non-CFC polyurethane closed cell foam minimizes standby losses and maximizes heat retention.
- **Hinged Access Door** – Provides easy access to electrical controls.
- **Immersion Thermostats with Contactors** – Thermostat settings range from 80°-180°F and can be adjusted to “off” position.
- **3 Year Limited Tank Warranty, 1-Year Limited Parts Warranty** – See warranty for details



Optional Equipment

- 150 PSI Working Pressure (65-120 Models)
- High and/or Low Water Pressure Limit Switches
- Alarm Horn
- Temperature & Pressure Gauge
- 4" x 6" Handhole Cleanout
- Pilot Lights & Switches
- Modulating Control

Meets ASHRAE Energy Efficiency Standards

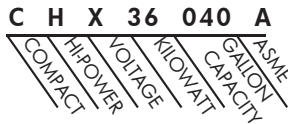
Dimensions & Specifications

Model Number	Gallon Capacity	Maximum kW	A	B	C	D	Water Conn.	Shipping Weight
CH(X)kW 005A	5	3	20-1/2"	16-1/4"	22-1/2"	5-1/4"	3/4"	100
CH(X)kW 010A	10	6	26-1/4"	18-3/4"	25"	5-1/4"	3/4"	116
CH(X)kW 020A	20	18	27-1/4"	20-1/2"	26-1/2"	5-3/4"	3/4"	145
CH(X)kW 030A	30	24	35-3/4"	20-1/2"	26-1/2"	5-3/4"	3/4"	168
CH(X)kW 040A	40	36	45-3/4"	20-1/2"	26-1/2"	5-3/4"	3/4"	206
CH(X)kW 050A	50	90	54-3/4"	20-1/2"	26-1/2"	5-3/4"	3/4"	235
CH(X)kW 065A	65	90	54"	26-1/2"	33-1/2"	7"	1-1/4"	280
CH(X)kW 080A	80	90	52-1/4"	28"	35"	7"	1-1/4"	300
CH(X)kW 100A	100	90	60-1/2"	28"	35"	7"	1-1/4"	354
CH(X)kW 120A	120	90	65-1/2"	30"	37"	7-1/2"	1-1/4"	430

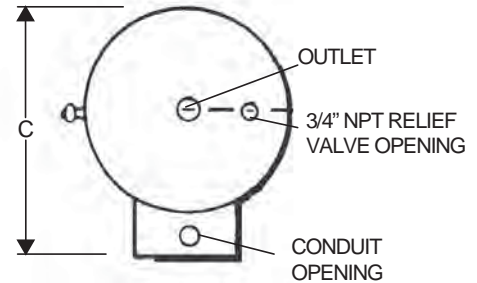
NOTE: Allow 24" clearance from front access panel for service and maintenance.

VOLTAGE SCHEDULE	
A - 240V / 1 PH	Z - 415V / 3 PH
J - 208V / 1 PH	V - 480V / 1 PH
K - 208V / 3 PH	X - 480V / 3 PH
B - 240V / 3 PH	M - 575V / 3 PH
W - 277V / 1 PH	N - 600V / 3 PH
Y - 380V / 3 PH	

FOR EASE IN ORDERING
BY MODEL NUMBER



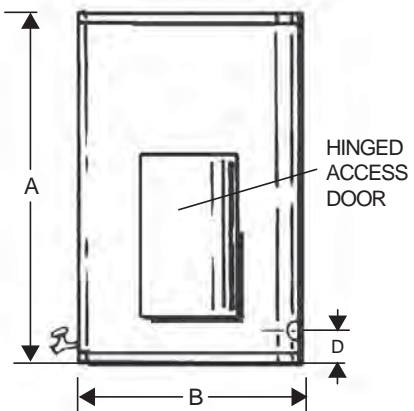
This heater is a Hi-Power Compact, 480 vclt, 3 phase, 36 kW, 40 gallon water heater with ASME construction.



Amperage Table

kW	SINGLE PHASE				THREE PHASE		
	208V	240V	277V	480V	208V	240V	480V
3	14.4	12.5	10.8	6.3	8.3	7.2	3.6
6	28.8	25.0	21.7	12.5	16.7	14.4	7.2
9	43.3	37.5	32.5	18.8	25.0	21.7	10.8
12	57.7	50.0	43.3	25.0	33.3	28.9	14.4
15	72.1	62.5	54.2	31.3	41.6	36.1	18.0
18	86.5	75.0	65.0	37.5	50.0	43.3	21.7
24	115.4	100.0	86.6	50.0	66.6	57.7	28.9
30	144.2	125.0	108.3	62.5	83.3	72.2	36.1
36	173.1	150.0	130.0	75.0	99.9	86.6	43.3
45	216.3	187.5	162.5	93.8	124.9	108.3	54.1
54	N/A	225.0	194.9	112.5	149.9	129.9	65.0
60	N/A	250.0	216.6	125.0	166.5	144.3	72.2
75	N/A	N/A	N/A	156.3	208.2	180.4	90.2
90	N/A	N/A	N/A	187.5	249.8	216.5	108.3

Note: All ASME models with an amp draw in excess of 120 amps receive factory installed internal fusing.



Note: Outlet connection for 5 thru 50 models 3/4" NPT. Outlet connection for 65 thru 120 models 1-1/4" NPT.

GPH Recovery Rate

INPUT		Recovery Rate (GPH @ °F Rise)											
kW	Btu/hr	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F	110°F	120°F	130°F	140°F
3	10,239	41	31	34	20	17	15	13	12	11	10	10	9
6	20,478	82	62	49	41	35	31	27	25	22	21	19	18
9	30,717	123	92	74	62	53	46	41	37	34	31	28	26
12	40,956	164	123	98	82	70	61	55	49	45	41	38	35
15	51,195	205	154	123	102	88	77	68	61	56	51	47	44
18	61,434	246	184	148	123	105	92	82	74	67	62	57	53
24	81,912	328	246	197	164	140	123	109	98	90	82	76	70
30	102,390	410	308	246	205	176	154	137	123	112	103	95	88
36	122,868	492	369	295	246	211	184	164	148	134	123	113	105
45	153,585	615	461	369	307	263	230	205	184	168	154	142	132
54	184,302	738	554	443	359	316	277	246	221	201	185	170	158
60	204,780	819	615	492	410	351	307	273	246	223	205	189	176
75	255,975	1,025	768	615	512	439	384	341	307	279	256	236	219
90	307,710	1,229	922	738	615	527	461	410	369	335	307	284	263





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

COMMERCIAL ELECTRIC SERVICE PARTS LIST

Lochinvar Parts & Service Department
300 Maddox Simpson Pkwy • Lebanon, TN
Phone: 615-889-8900 • Fax: 615-882-2918
E-mail: parts_team@lochinvar.com

MODELS:
CH(X)005A thru CH(X)**120A**
Series 100 and 102

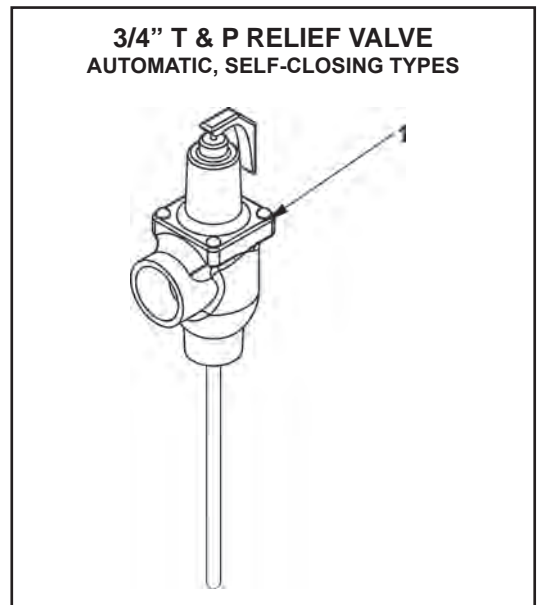
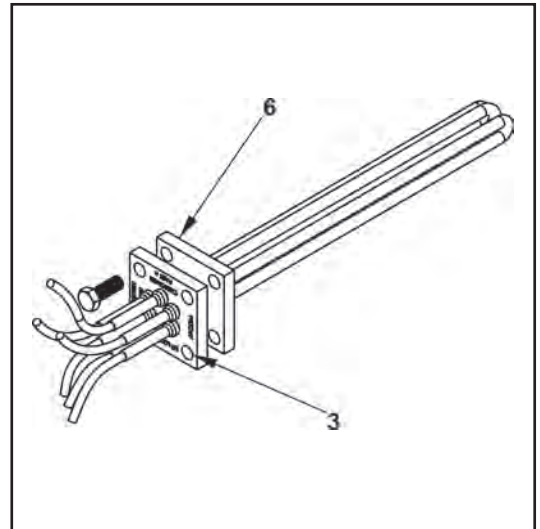
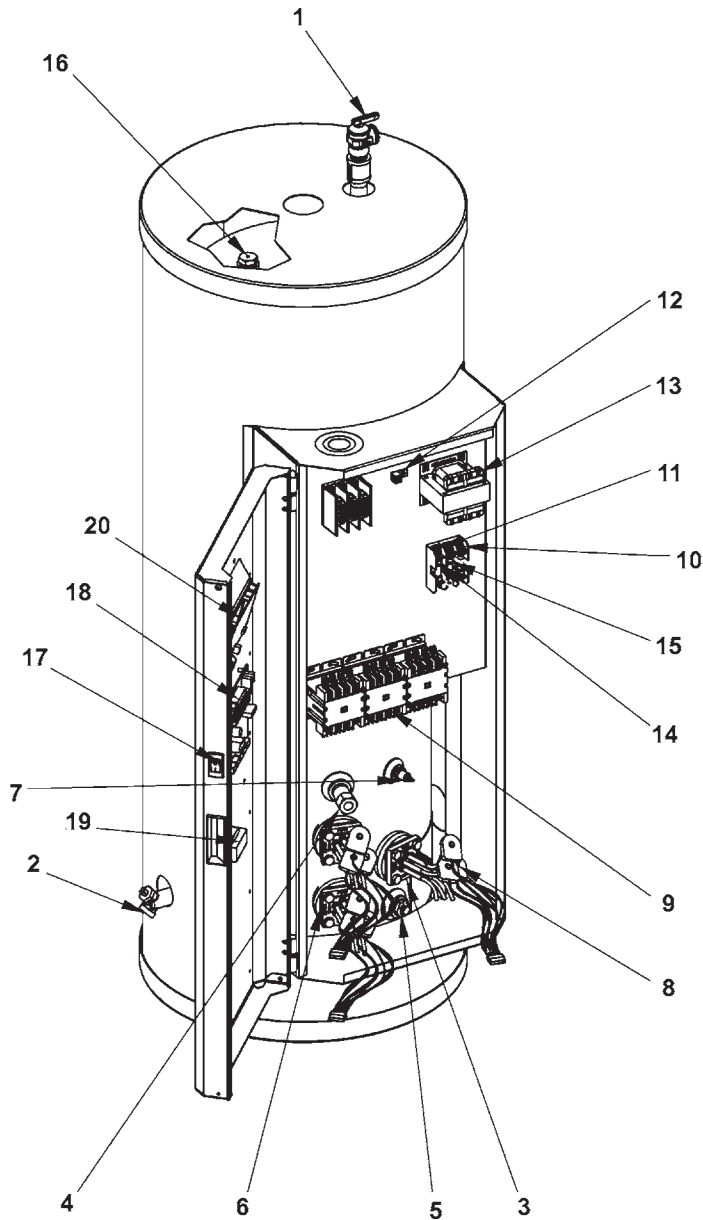


Table 1. ELEMENT CHART AND CONNECTIONS

Part Number	KW	Volts	Phase	Element	Fits Tank Size (Gals)	Part Number	KW	Volts	Phase	Element	Fits Tank Size (Gals)
9007151005	2	208 240 480	1 or 3 1 or 3	9.5"	5 Thru 120	9004850105 9004869105	9	208 240 480	1 or 3 1 or 3	15.5"	20 Thru 120
9004835105 9004846105 9007152005	3	208 240 480	1 or 3 1 or 3	9.5"	5 Thru 120	9004851105 9004866105	10	208 240 480	1 or 3 1 or 3	15.5"	2 Thru 120
9004832105 9004847105 9007153005	5	208 240 480	1 or 3 1 or 3	9.5"	5 Thru 120	9004841105 9004852105 9004870105	12	208 240 480	1 or 3 1 or 3	15.0"	65 Thru 120
9004836105 9004848105 9004860105	6	208 240 480	1 or 3 1 or 3	12.0"	10 Thru 120	9004842105 9004843105 9004872105	15	208 240 480	1 or 3 1 or 3	15.0"	65 Thru 120
9004837105 9004849105 9004861105	7.5	208 240 480	1 or 3 1 or 3	14.5"	20 Thru 120	9004834105 9004845105 9004856105	18	208 240 480	1 or 3	15.0"	65 Thru 120

Elements marked 277/480v. Element resistance wires operate at 277v 1 on 480v 3 due to Y connection on Element.

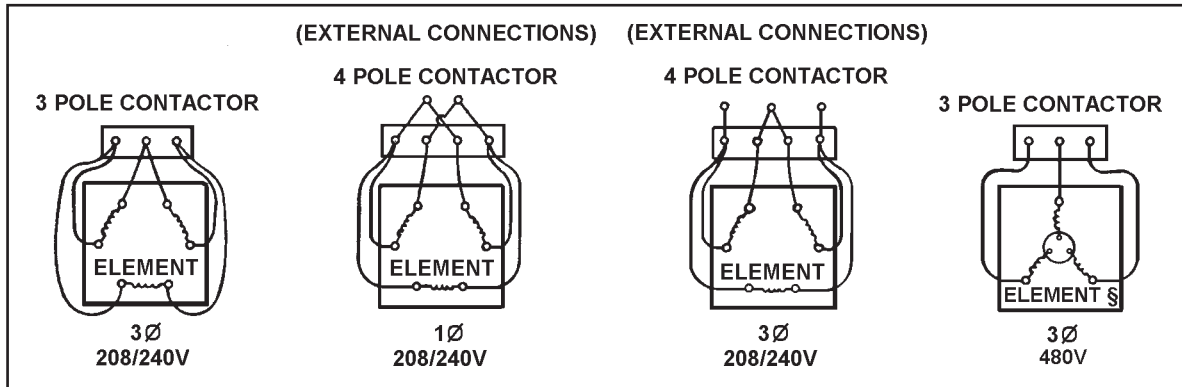


Table 2. CONTROL CIRCUIT FUSING

Voltage	120	208	220	240	277	380	415	480	575	600
Fuse Type	FNM	FNQ-R	FNQ-R	FNQ-R	FNQ-R	FNQ-R	FNQ-R	FNQ-R	FNQ-R	FNQ-R
VA	Secondary		Primary							
50	0.6 (9007133005)	1.25 (02006012)	N/A	N/A	0.8 (02006008)	0.6 (02006006)	N/A	N/A	0.4 (02006004)	0.4 (02006004)
75	1 (02005010)	1.5 (02006015)	1.5 (02006015)	1.5 (02006015)	1.25 (02006012)	0.8 (02006008)	0.8 (02006008)	0.6 (02006006)	0.6 (02006006)	0.6 (02006006)
100	1.25 (02005012)	2 (02006020)	2 (02006020)	2 (02006020)	1.5 (02006015)	1.25 (02006012)	1.25 (02006012)	0.8 (02006008)	0.8 (02006008)	0.8 (02006008)

Fuse amp rating is shown in **bold**.
Factory part numbers are shown in ().



Item Number	Part Number	Description
1	9005715205	Relief Valve 3/4"
2	9003906015	3/4" Drain Valve
3	Refer to Table 1	Element
4	9006865015	Temperature Probe
5	198093-000	Electric Anode 22MM 20/100
6	01240406	Element Gasket
7	9004819105	Iwco Probe
8	9006867005	Element Current Sensor Assembly
9	9004817105 9004816105	Contactor 4 Pole 120V *Contactor 3 Pole 120V
10	02101031	Secondary Fuse Block - Control Circuit
11	02101032	Primary Fuse Block - Control Circuit
12	04800002	Ground Lug
13	9006863005	Transformer
14	See Table 2	Fuse Buss FNM
15	See Table 2	Fuse Buss FNQ-R
16	9003944005 9003892005	Anode 16" Long 0.840" diameter, 3/4" NPT 33" Long 0.840" diameter, 3/4" NPT
17	9004484215	Pilot Switch
18	See PN on Board	Control Board
19	9006863005	Secondary transformer 120v/24v 25VA
20	9006240005	User Interface Module


* Not Illustrated

** Power Circuit Fusing is required at or above 120 amp

Prior to calling the Parts Department, record your model and Serial number in the space provided. These important identification numbers can be found on the barcode label, adjacent to the water heater rating plate. See sample barcode tag below.

Model No.: _____

Serial Number: _____



09642518
model #: 18 DIGIT MODEL NO.
Item id: XXXXXXXXXX
serial #: J07R000385
lot: 3 gas type: 0





HIGH EFFICIENCY BOILERS

FTXL™

FIRE TUBE BOILER

SMART SYSTEM™

CON-X-US® REMOTE CONNECT CAPABLE

CASCADING SEQUENCER

LOCH-N-LINK® USB DRIVE SETUP

5 INPUTS FROM 399,999 TO 850,000 BTU/HR

UP TO 10:1 TURNDOWN RATIO

COMMON VENT AND PVC DIRECT-VENTING

FLOW RATES FROM 10 TO 150 GPM

SMALL 6.2 SQ. FT. FOOTPRINT

4 PUMP CONTROL

WIRELESS OUTDOOR SENSOR CAPABLE



98% **AHRI CERTIFIED™**
www.ahridirectory.org

THERMAL EFFICIENCY*

*See back page for efficiency by model

 **Lochinvar®**
HIGH EFFICIENCY BOILERS & WATER HEATERS

DESIGNED ★ ENGINEERED ★ ASSEMBLED

USA

Lochinvar.com



THE NEW 98% STANDARD

Lochinvar re-defined the fire-tube boiler category with its KNIGHT® Wall-Mount and CREST® lines. For residential and light commercial applications, the FTXL™ adds models from 399,999 to 850,000 Btu/hr, and takes Lochinvar's fire-tube technology to the next level. FTXL offers best-in-class AHRI Thermal Efficiency and footprints, plus remote connectivity that puts the SMART SYSTEM™ control at your fingertips, anywhere!

REDUCE INSTALLATION COST WITH VARIABLE FLOW TECHNOLOGY

FTXL can operate over a wide range of flow rates* with very low pressure drop. This permits installation of a "full flow" (variable primary) system eliminating the time and materials cost of primary/secondary piping, and pumps needed to maintain flow in a water-tube boiler. Variable flow also makes FTXL more flexible at handling frequent fluctuations in the system flow rate.

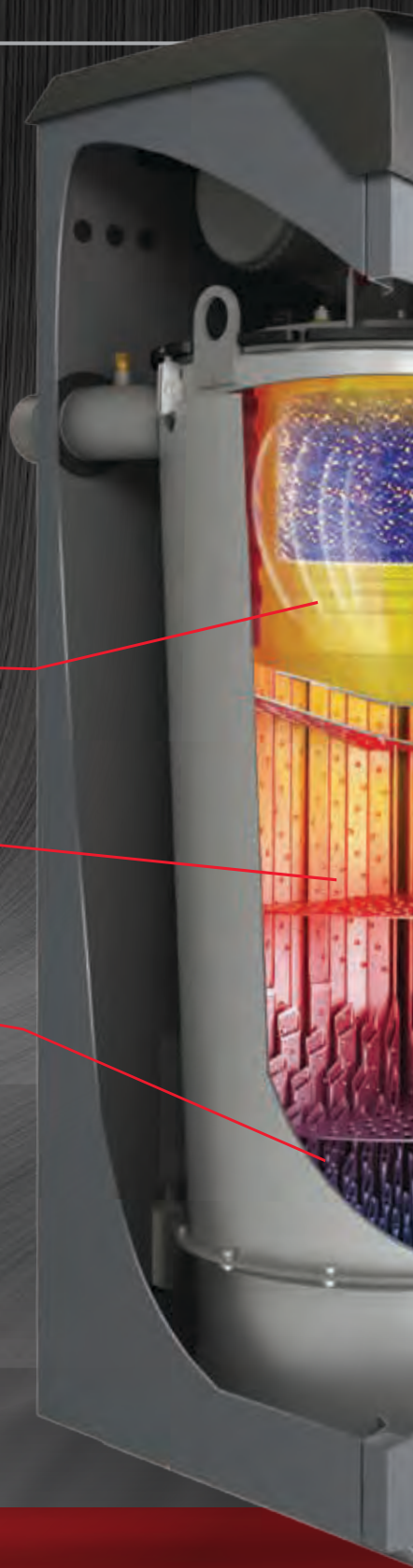
*See back page for minimum and maximum flow rates by model.

SMOOTH-RUNNING, MODULATING COMBUSTION

FTXL boilers have a top-mounted, micrometal fiber burner, with a blower/gas valve assembly that drives heat energy downward, through stainless steel fire tubes, with exhaust venting through the bottom of the unit. With up to 10:1 modulation turndown, the burner automatically changes its firing rate as building heat loads vary. An FTX500 fires at its maximum 500,000 Btu/hr rate when heat load is highest, then gradually "turns down" to as low as 10% (50,000 Btu/hr) as load decreases. A modulating system runs smoothly and efficiently, without frequent on/off cycling.

MINIMUM SUPPLY PRESSURE, INSTALLER-FRIENDLY

FTXL operates with supply gas pressure as low as 4 inches water column. *Negative Regulation* draws gas into a pre-mix combustion system, instead of relying on utility pressure through the gas valve. The result is steady operation in low gas pressure systems or when peak demand occurs on gas supply. Automatic fan speed control fine-tunes the correct fuel/air ratio entering the burner, providing superior combustion throughout the entire operating range.



MICROMETAL FIBER BURNER
DELIVERS HEAT TO THE
COMBUSTION CHAMBER

BAFFLES DIRECT THE
FLOW OF WATER FOR
OPTIMAL HEAT TRANSFER

WATER ENTERS THE BOTTOM
AND TRAVERSES UP AND
AROUND FIRE TUBES

DOWNWARD FLOW OF FLUE
GASES TRANSFER HEAT
WITHIN FIRE TUBES



INTRODUCING BOILER PLANT CONTROL, *FROM ANYWHERE.*

FTXL features the next generation of Lochinvar's all-in-one SMART SYSTEM operating control with a re-designed multi-color LCD interface. SMART SYSTEM provides outstanding functionality, and can be integrated directly into a Building Automation System via ModBus and other communications protocols. And now, 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 FTXL boiler plants without ever stepping into the mechanical room. 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 any Internet-capable device.

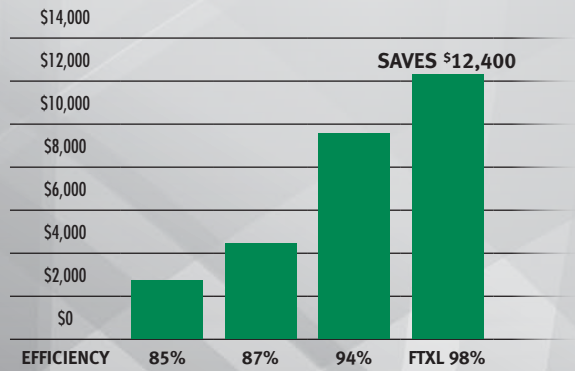


HOW 98% TRANSLATES INTO FTXL SAVINGS

Even when compared to other condensing boilers, the FTXL fire-tube combustion system will produce significant fuel cost savings. Here are three comparisons, based on building load of approximately 19,000 therms/year, at a cost of \$1.09 per therm of natural gas.

Fuel savings is based on a heating load of 19,000 therms per year being supplied by an 82% efficient boiler at the DOE National average for natural gas of \$1.09.

3 - Year Fuel Savings

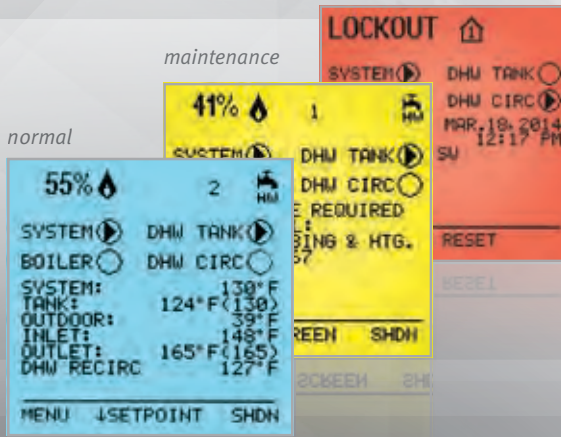


ENHANCED MULTI-COLOR LCD INTERFACE

lockout

maintenance

normal



WIRELESS OUTDOOR SENSOR

Easy to install, greatly reduces time and materials cost for running sensor wire from standard outdoor temperature sensor to boiler control. Approximate range 2,000 feet line-of-sight.



LOCH-N-LINK® EASY USB FLASH PROGRAMMING

Use a USB drive to name, store and easily manage multiple existing proven parameter sets. Quickly upload them via the front panel port into the FTXL boiler, reducing installation and programming time by up to 30 minutes per boiler.

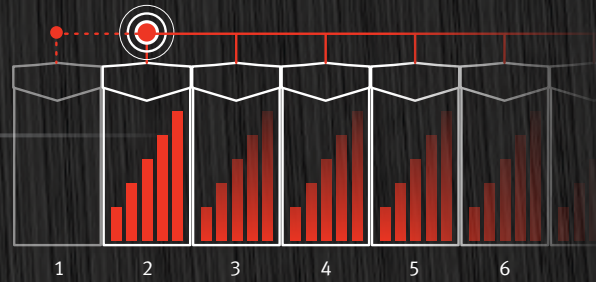




PEACE OF MIND, WHEN IT MATTERS MOST

Up to eight FTXL boilers can be sequenced using a 2-wire daisy-chain connection. Cascade sequencing can be programmed for “Lead-Lag” or “Efficiency Optimized” operation.

With Lead-Lag operation, one lead boiler modulates to capacity on demand. As load increases, the system then cascades to additional lag boilers in sequence. The first-on role shifts daily, distributing equal runtimes to each unit.



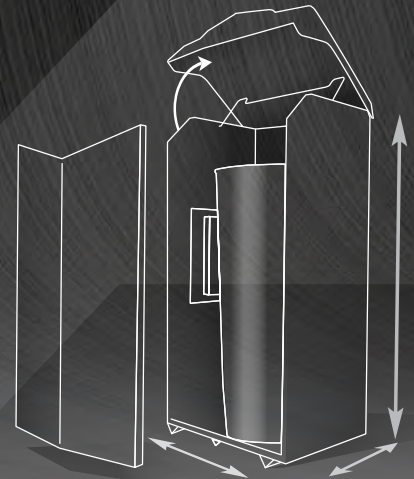
In an Efficiency Optimized system, all boilers fire and modulate simultaneously at the same BTU/hr input rates, maximizing thermal efficiency.

If the lead boiler is turned off for maintenance, Cascade Redundancy automatically shifts the lead role to the second sequenced boiler. Peace of mind comes from knowing the system will still function with no downtime until the original lead boiler is back online.

THE SMALLEST FOOTPRINT, EASY TO INSTALL & SERVICE

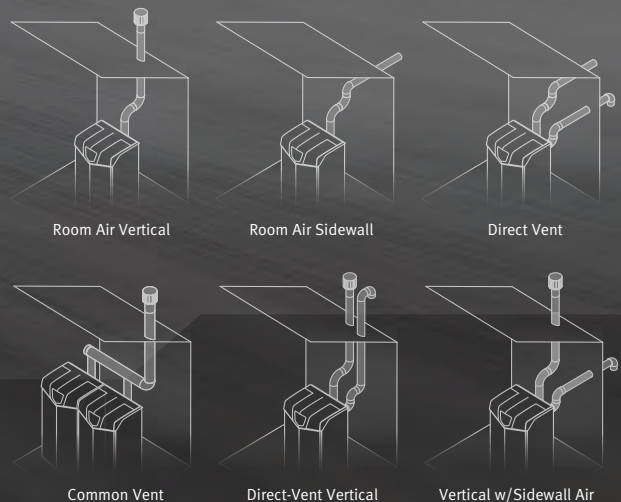
FTXL can be installed with zero clearance on the left and right, and the boiler’s installed footprint is just 6.2 sq. ft.

All water, gas and vent connections are in the back of the unit. A hinged top opens for easy access to components and the front panel is easily removed using no tools.

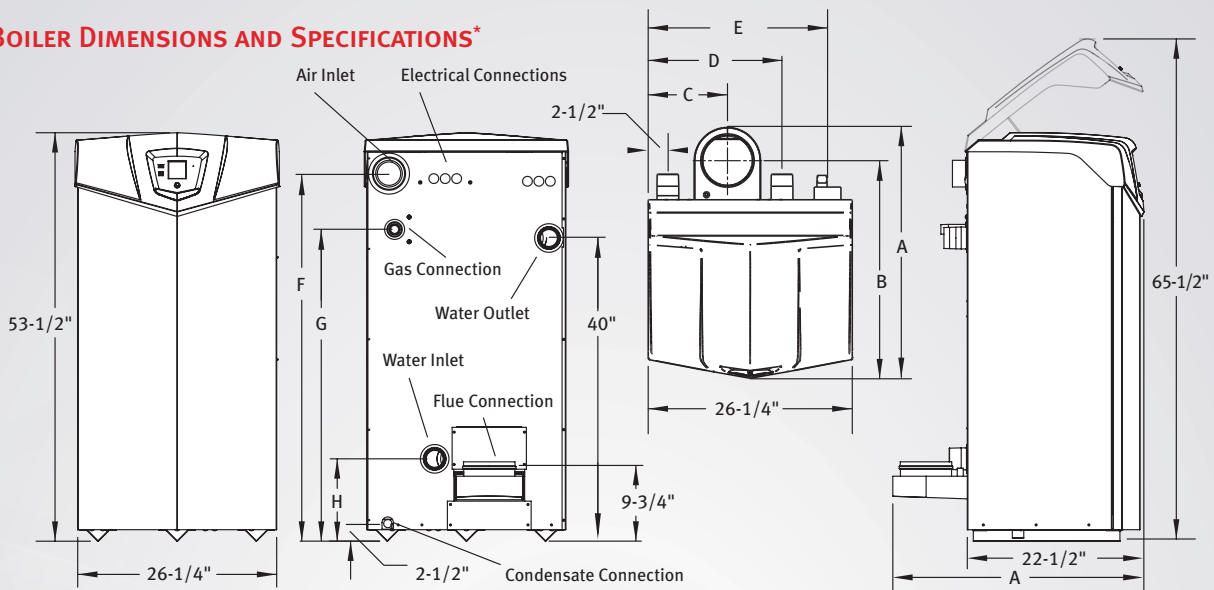


FLEXIBLE VENTING OPTIONS

FTXL offers 6 venting options, and permits direct-vent air intake and exhaust runs up to 100 equivalent feet, using PVC, CPVC, polypropylene or stainless steel pipe. Plus multiple units can be common-vented to reduce time and materials costs.



FTXL™ BOILER DIMENSIONS AND SPECIFICATIONS*



FTXL BOILER



DIMENSIONS AND SPECIFICATIONS

Model Number	Input Min MBH	Input Max MBH	Thermal Efficiency	Gross Output MBH	NET AHRI Rating MBH	Turn down	Flow (GPM) Min	Flow (GPM) Max	HEX Water Volume	A	B	C	D	E	F	G	H	Water Conn.	Vent Size	Air Intake	Gas Conn.	Shipping Wt. (lbs.)
FTX400(N,L)	40.0	399.9	98.0%	392	341	10:1	10	105	13	30-1/2"	27-1/2"	10-1/4"	17"	23-1/4"	46-1/4"	39-1/2"	10-3/4"	2"	4"	4"	1"	435
FTX500(N,L)	50.0	500.0	97.7%	489	425	10:1	15	105	12	30-1/2"	27-1/2"	10-1/4"	17"	23-1/4"	46-1/4"	39-1/2"	10-3/4"	2"	4"	4"	1"	460
FTX600(N,L)	85.0	600.0	97.5%	585	509	7:1	15	105	12	30-1/2"	27-1/2"	10-1/4"	17"	23-1/4"	46-1/4"	39-1/2"	10-3/4"	2"	4"	4"	1"	470
FTX725(N,L)	103.5	725.0	97.2%	705	613	7:1	20	150	17	33"	28-1/2"	10-1/2"	17-1/2"	23-1/2"	48-1/2"	41-1/4"	11"	2-1/2"	6"	4"	1"	510
FTX850(N,L)	121.5	850.0	97.0%	825	717	7:1	25	150	16	33"	28-1/2"	10-1/2"	17-1/2"	23-1/2"	48-1/2"	41-1/4"	11"	2-1/2"	6"	4"	1"	535

*Information subject to change without notice. Dimensions are in inches. Select "N" or "L" for Natural or LP gas. *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. *Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. *The ratings have been determined under the provisions governing forced draft burners.

SMART SYSTEM FEATURES

- ▶ **Smart System Digital Operating Control**
Multi-Color Graphic LCD Display w/Navigation Dial
- ▶ **Loch-N-Link® USB Thumb Drive Port for Easy Programming**
- ▶ **Cascading Sequencer with Built-in Redundancy**
Selectable Cascade Type:
Lead Lag/Efficiency Optimization
Multiple Size Boilers
Front-End Loading
- ▶ **3 Reset Temperatures Inputs w/Independent Outdoor Reset Curves for Each**
Outdoor Sensor
- ▶ **Four-Pump Control**
System Pump with Parameter for Continuous Operation
Boiler Pump with Variable-Speed Control
Domestic Hot Water Boiler Pump
Domestic Hot Water Recirculation Pump Control with Sensor
- ▶ **Building Management System Integration**
0-10 VDC Input to Control Modulation or Setpoint
0-10 VDC Input from Variable-Speed System Pump
0-10 VDC Modulation Rate Output Signal
0-10 VDC Enable/Disable Signal
- ▶ **Programmable System Efficiency Optimizers**
Space Heating Night Setback
DHW Night Setback
Anti-Cycling
Ramp Delay
Boost Time and Temperature
- ▶ **High-Voltage Terminal Strip**
120 VAC/60 Hertz/1 Phase
Pump Contacts for 3 Pumps

- ▶ **Low-Voltage Terminal Strip**
Building Recirculation Pump Start/Stop
Proving Switch Contacts
Flow Switch Contacts
Alarm Contacts
Runtime Contacts
3 Space Heat Thermostat Contacts
Tank Thermostat Contacts
System Sensor Contacts
Tank Sensor Contacts
Cascade Contacts
0-10 VDC BMS Contacts
0-10 VDC Boiler Rate Output Contacts
0-10 VDC Boiler Pump Speed Contacts
0-10 VDC System Pump Speed Contacts
ModBus Contacts
- ▶ **Time Clock**
- ▶ **Data Logging**
Ignition Attempts
Last 10 Lockouts
Space Heat Run Hours
Domestic Hot Water Run Hours

STANDARD FEATURES

- ▶ **97%-98% Thermal Efficiency**
- ▶ **Modulating Burner with up to 10:1 Turndown**
Direct Spark Ignition
Low NOx Operation
Sealed Combustion
Low Gas Pressure Operation
- ▶ **Stainless Steel Fire-Tube Heat Exchanger**
ASME-Certified, "H" Stamped
160 psi Working Pressure
50 psi Relief Valve
Combustion Analyzer Test Port
Fully Welded Design

- ▶ **Vertical and Horizontal Direct Vent**
Direct Vent up to 100 feet
PVC, CPVC, Polypropylene or AL29-4C
Factory Supplied Sidewall Vent Termination
- ▶ **Smart System Control**
- ▶ **Other Features**
On/Off Switch
Adjustable High Limit with Manual Reset
Automatic Reset High Limit
Manual Reset Low Water Cutoff
Flue Temperature Sensor
Low Air Pressure Switch
Temperature and Pressure Gauge
Condensate Trap
Zero Service Clearances
10-Year Limited Warranty (See Warranty)
Custom Maintenance Reminder with Contact Info
Password Security
Customizable Freeze Protection Parameters

OPTIONAL EQUIPMENT

- CON-X-US Remote Connectivity
- Motorized Isolation Valve
- Wireless Outdoor Temperature Sensor
- Multi-Temperature Loop Control
- Variable-Speed Boiler Circulator
- Constant-Speed Boiler Circulator
- ModBus Communication
- Alarm Bell
- Condensate Neutralization Kit
- Concentric Vent Kit (FTX400-FTX600)
- BMS Gateway to BACnet or LonWorks
- High and Low Gas Pressure Switches w/Manual Reset (FTX500-FTX850)
- ▶ **Firing Controls**
M9-Standard Construction
M13-CSD-1/FM/GE Gas (FTX500-FTX850)

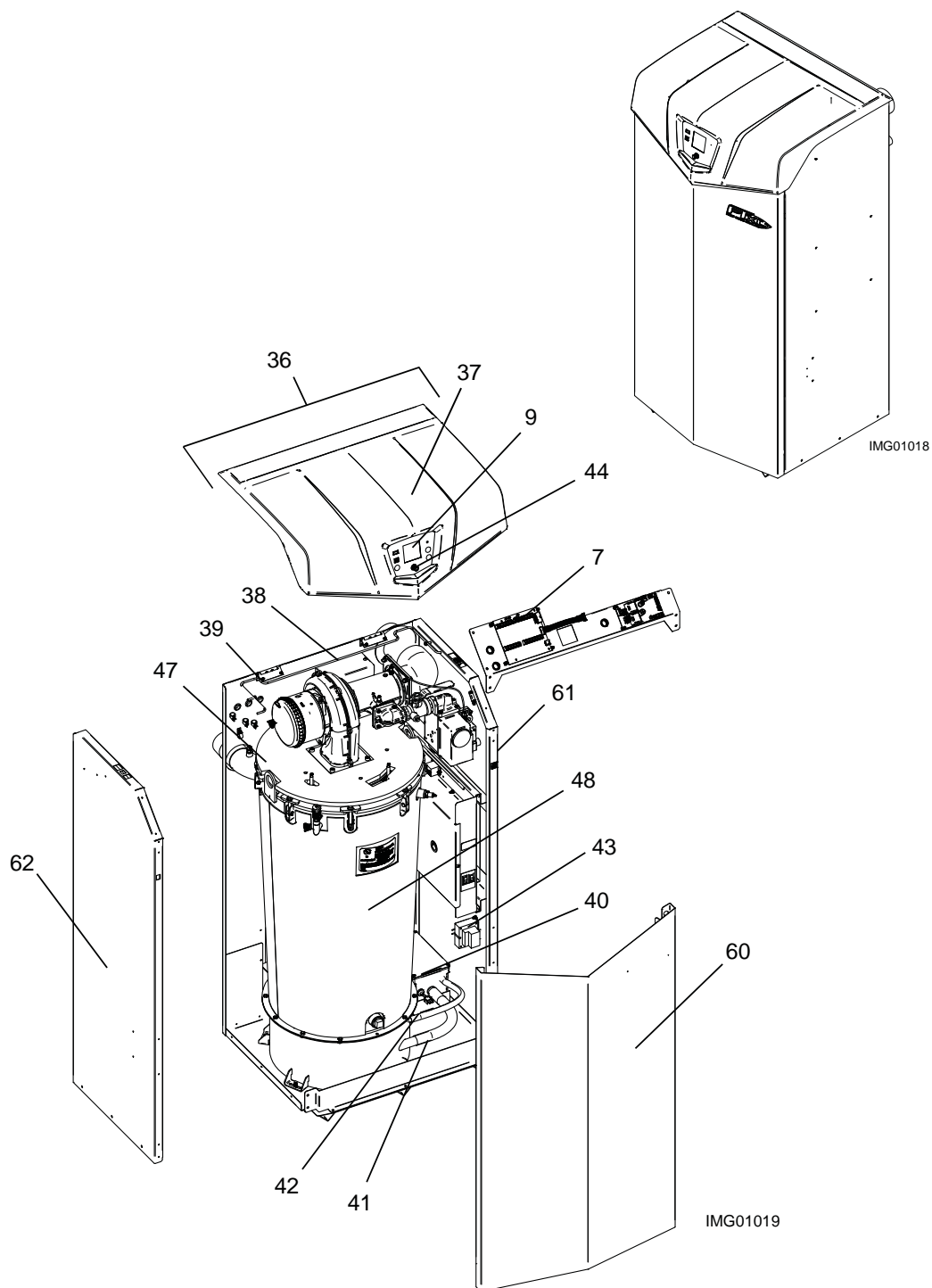




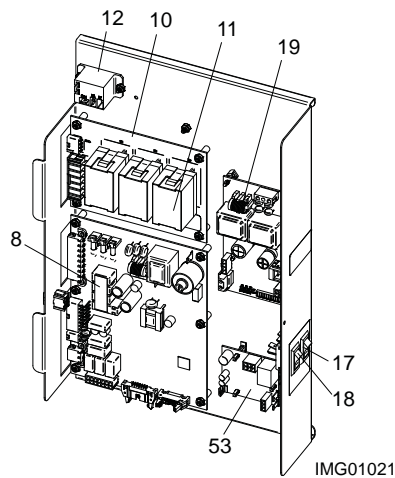
Lochinvar[®]
HIGH EFFICIENCY BOILERS & WATER HEATERS

Replacement Parts List

FTXL[®]
Heating Boilers
FTX400 - 850(N/L)

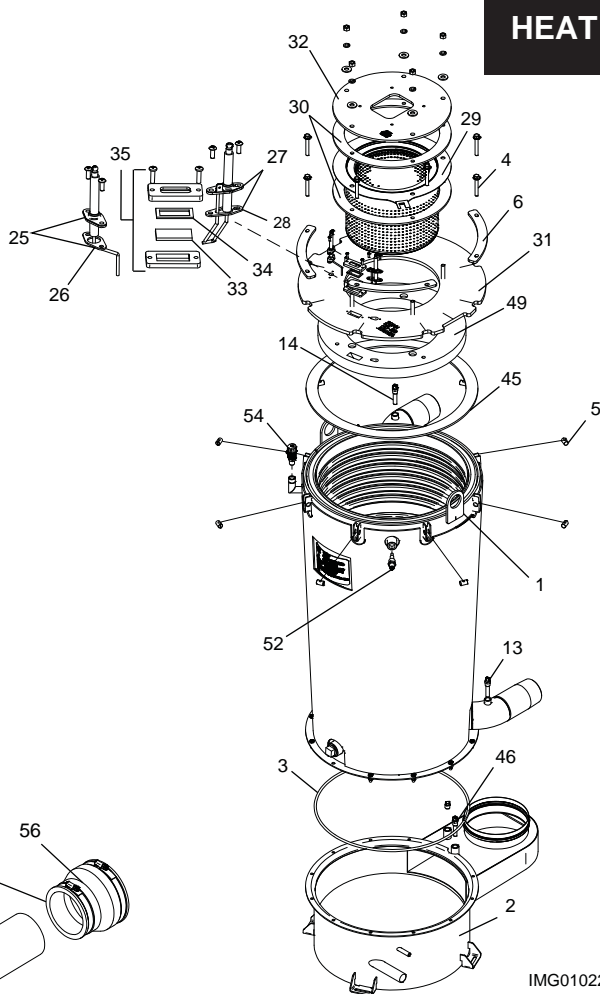


CONTROL PANEL



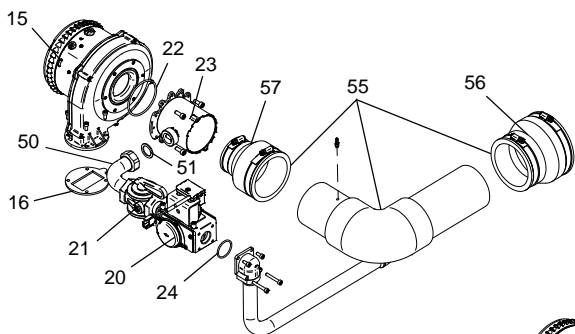
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HEAT EXCHANGER

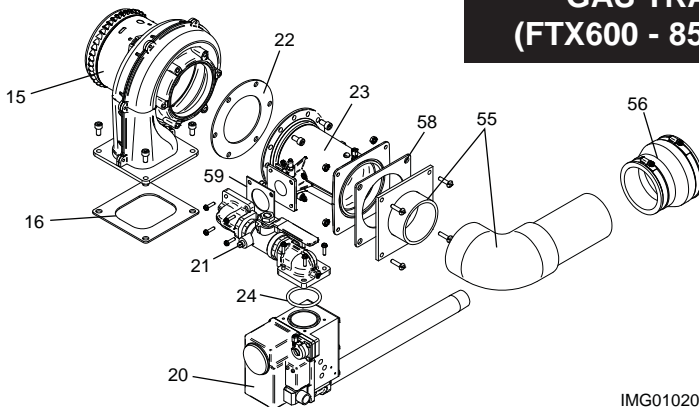


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GAS TRAIN (FTX400 - 500 N/L)



GAS TRAIN (FTX600 - 850 N/L)



IMG01020

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX30095	HEAT EXCHANGER COMPLETE	FTX400
1	HEX30096	HEAT EXCHANGER COMPLETE	FTX500-600
1	HEX30097	HEAT EXCHANGER COMPLETE	FTX725
1	HEX30098	HEAT EXCHANGER COMPLETE	FTX850
2	HEX30099	HEAT EXCHANGER FLUE COLLECTOR	FTX400-600
2	HEX30100	HEAT EXCHANGER FLUE COLLECTOR	FTX725-850
3	GKT20152	FLUE GASKET	FTX400-600
3	GKT20153	FLUE GASKET	FTX725-850
4	BLT20120	BOLT, HEX	ALL
5	BLT20121	NUT, HEX	ALL
6	JKB60843	WASHER, HEX	FTX 400-600
6	JKB60823	WASHER, HEX	FTX725-850

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS			
7	RLY20137	CONNECTION BOARD, LOW VOLTAGE	ALL
8	RLY30131	INTEGRATED CONTROL	FTX400
8	RLY30132	INTEGRATED CONTROL	FTX500
8	RLY30133	INTEGRATED CONTROL	FTX600
8	RLY30134	INTEGRATED CONTROL	FTX725
8	RLY30135	INTEGRATED CONTROL	FTX850
8	RLY30136	HIGH ALTITUDE INTEGRATED CONTROL	FTX400
8	RLY30137	HIGH ALTITUDE INTEGRATED CONTROL	FTX500
8	RLY30138	HIGH ALTITUDE INTEGRATED CONTROL	FTX600
8	RLY30139	HIGH ALTITUDE INTEGRATED CONTROL	FTX725
8	RLY30140	HIGH ALTITUDE INTEGRATED CONTROL	FTX850
9	RLY20136	USER INTERFACE CONTROL	ALL
10	RLY2085	RELAY BOARD, 1.5 HP PUMP	ALL
11	RLY2222	RELAY, 1.5 HP PUMP	ALL
12	RLY2706	RELAY, 120 VAC, 60 HZ	ALL
13	TST2060	INLET SENSOR	ALL
14	TST20009	OUTLET SENSOR/ HIGH LIMIT	ALL
15	FAN30017	FAN ASSEMBLY	FTX400
15	FAN30016	FAN ASSEMBLY	FTX500
15	FAN30015	FAN ASSEMBLY	FTX600-850
16	GKT20139	BLOWER GASKET	FTX400-500
16	GKT20138	BLOWER GASKET	FTX600-850
17	SWT2003	SWITCH OFF, MOMENTARY, BLACK	ALL
18	SWT2002	SWITCH OFF, MOMENTARY, RED	ALL
19	RLY20041	MODBUS BOARD	ALL
GAS VALVES			
20	VAL30097	GAS VALVE ASSEMBLY NAT & LP	FTX400
20	VAL30096	GAS VALVE ASSEMBLY NAT & LP	FTX500
20	VAL30095	GAS VALVE ASSEMBLY NAT	FTX600
20	VAL30094	GAS VALVE ASSEMBLY NAT	FTX725
20	VAL30093	GAS VALVE ASSEMBLY NAT	FTX850
20	VAL30092	GAS VALVE ASSEMBLY LP	FTX600
20	VAL30091	GAS VALVE ASSEMBLY LP	FTX725
20	VAL30090	GAS VALVE ASSEMBLY LP	FTX850
21	GAC2028	GAS CUT OFF VALVE 3/4 X 3/4	FTX500
21	VAL2207	VALVE, THREADED BALL W/ TAP	FTX600-850
22	GKT2444	GASKET, VENTURI	FTX400-500
22	GKT2049	GASKET, VENTURI	FTX600-850
23	VAL20123	VENTURI, NAT	FTX400-500
23	VAL20133	VENTURI, LP	FTX400-500
23	VAL2722	VENTURI	FTX600
23	VAL20135	VENTURI	FTX725-850
24	GKT20065	GASKET, GAS VALVE	FTX500
24	GKT20066	GASKET, GAS VALVE	FTX600-850
PILOT & BURNER ASSEMBLIES			
25	PLT30003	FLAME SENSOR W/ GASKET	ALL
26	GKT20055	GASKET, FLAME SENSOR	ALL
27	PLT30004	IGNITOR W/ GASKET	ALL
28	GKT20054	GASKET, IGNITOR	ALL
29	BNR30024	BURNER W/ GASKET	FTX400
29	BNR30025	BURNER W/ GASKET	FTX500-600
29	BNR30026	BURNER W/ GASKET	FTX725-850
30	GKT20145	GASKET, BURNER	FTX400-600
30	GKT20150	GASKET, BURNER	FTX725-850
31	WTR30036	DOOR, HEAT EXCHANGER ASSY	FTX400-600
31	WTR30035	DOOR, HEAT EXCHANGER ASSY	FTX725-850
32	WTR30034	PLATE, FAN HEAT EXCHANGER ASSY	FTX400-500
32	WTR30033	PLATE, FAN HEAT EXCHANGER ASSY	FTX600
32	WTR30032	PLATE, FAN HEAT EXCHANGER ASSY	FTX725-850
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
33	MSC20372	SIGHT GLASS	ALL
34	GKT20135	GASKET, SIGHT GLASS	ALL
35	MSC30056	KIT, SIGHT GLASS	ALL
36	PAN30046	BEZEL WITH DISPLAY	ALL
37	MSC20370	BEZEL, DISPLAY	ALL
38	MSC20391	ROD, PROP, BEZEL	ALL
39	HNG20000	HINGE, SPRING, STEEL, ZINC	ALL
40	MSC20149	CONDENSATE TRAP	ALL
41	MSC20396	HOSE, CONDENSATE 1"	ALL
42	MSC20397	HOSE, CONDENSATE 3/8"	ALL
43	TRF20002	TRANSFORMER 60 VA	ALL
44	MSC20123	KNOB, FLUTED W / SKIRT	ALL
45	GKT20133	GASKET, HEX, KIT	FTX400-600
45	GKT20149	GASKET, HEX, KIT	FTX725-850
46	TST20026	FLUE TEMP SENSOR	ALL
47	FIB20156	INSULATION, TOP	FTX400-500
47	FIB20170	INSULATION, TOP	FTX600
47	FIB20155	INSULATION, TOP	FTX725-850
48	FIB20164	INSULATION, BLANKET	FTX400-600
48	FIB20163	INSULATION, BLANKET	FTX725-850
49	FIB20165	FIBERBOARD, BURNER 245 MM	FTX400-600
49	FIB20166	FIBERBOARD, BURNER 245 MM	FTX725-850
50	BRS20084	ADAPTER G1 UNION X 3/4 NPT	FTX400-500
51	GKT20148	O-RING, 1" BSPP, UNION	FTX400-500
52	WTR20011	PROBE, LWCO, SHORT	ALL
53	WTR2220	LWCO, 24 V, AUTO, M RESET	ALL
54	RLV30000	AIR VENT VALVE	ALL
55	MSC30055	KIT, AIR INTAKE	FTX400-500
55	MSC30054	KIT, AIR INTAKE	FTX600-850
56	CPG20023	COUPLING, AIR, INLET 3-4	ALL
57	CPG2059	COUPLING, AIR INLET 2-3	FTX400-500
58	GKT2034	GASKET, AIR INTAKE	FTX600-850
59	GKT2050	GASKET, FLANGE, VENTURI	FTX600-850
-	SWT2006	ON/OFF SWITCH	ALL
-	RLV2084	RELIEF VALVE 50 PSI	FTX400-600
-	RLV2001	RELIEF VALVE 50 PSI	FTX725-850
-	TST2311	OUTDOOR AIR SENSOR	ALL
-	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
-	TST2032	SYSTEM SENSOR	ALL
-	KIT3087	NEUTRALIZER KIT	FTX400-500
-	KIT30097	NEUTRALIZER KIT	FTX600-850
-	MSC20062	CATCH, DOOR, BLUE	ALL
-	MSC2202	STRIKE, DOOR	ALL
-	WRE20222	HARNESS, UNIT	ALL
-	WRE20221	HARNESS, POWER	ALL
-	WRE20099	HARNESS, ELECTRODE, FLAME SENSE	ALL
-	WRE2209	HARNESS, SPARK ELECTRODE	ALL
-	WRE20225	RIBBON CABLE	ALL
-	WRE20214	HARNESS, GAS VALVE	FTX400-500
-	WRE20215	HARNESS, GAS VALVE	FTX600-850
-	TST30019	SENSOR COMM BOILER, KIT	ALL
-	KIT40116	INSTALL KIT	FTX400-600
-	KIT40117	INSTALL KIT	FTX725-850
-	LPK30017	LP KIT	FTX400-500
-	LPK30018	LP KIT	FTX600-850
-	LBL20421	USER INTERFACE OVERLAY	ALL
JACKET ASSEMBLY			
60	JKB30120	JACKET, OUTER FRONT	ALL
61	JKB30121	JACKET, OUTER RIGHT	ALL
62	JKB30122	JACKET, OUTER LEFT	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS



Intelli-Fin[®]

**High Efficiency
Commercial Gas
Water Heaters**



97% Thermal Efficiency
LonWorks[®] Compatible Intelligence
Highly Flexible and Ultra Quiet
Super Compact Design

Variable Frequency Drive Lets You Change Output to Match Demand

Intelli-Fin is the first water heater to feature variable frequency drive. Variable frequency drive further increases the thermal efficiency by precisely supplying the proper amount of gas and air to the burner. Ensuring this balance yields complete combustion and therefore increased Btu/hr output. Just as the electronic fuel injection system in your car adapts to changes in atmosphere, the Intelli-Fin's variable frequency drive allows the system to adjust. This means maximum efficiency, no matter what the system load may be.

In addition to the tight control of the combustion system, variable frequency drive allows Intelli-Fin to adjust its output to meet demand, limiting excessive heat, thereby maximizing efficiency. Because the variable frequency drive controls fan motor speed in an infinitely proportional manner, Btu/hr output can be adjusted to match any heating demand. In fact, Intelli-Fin can reduce output from 100% down to 25% of rated capacity and efficiently provide heat at any fraction of the load in between.

This variable combustion process combined with Lochinvar's new temperature control, accurate to within 1°F, enables Intelli-Fin to track the domestic load precisely. By precisely tracking the load, hot water

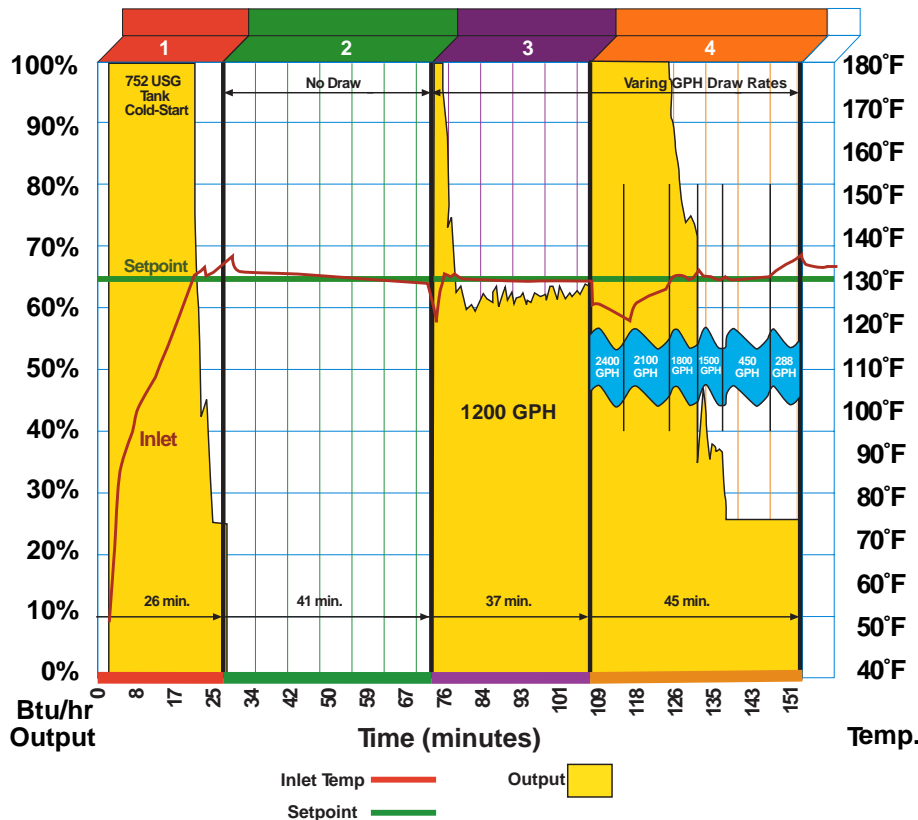
output equals the facility domestic load. This means that your water heater can automatically provide the required amount of hot water for large dump loads and consistent draw applications, without wasting energy. With Intelli-Fin, it is now possible to tailor system output to meet demand, while significant energy is saved and short cycling is eliminated. That's an intelligent new advantage for you.

Flexibility in Water and Gas Supplies

Intelli-Fin's advanced burner technology operates within a broader range of inlet gas supply pressures. Intelli-Fin can operate with a minimum inlet gas pressure as low as 4 inches of water column. This advanced design prevents nuisance operational problems in areas of varying gas supply pressures. Unlike other high efficiency products, Intelli-Fin does not require high pressure gas service or additional gas pressure boosters.

The sophisticated heat transfer system of Intelli-Fin integrates dual heat transfer surfaces with a fully automatic pumped bypass. This innovative design provides increased installation flexibility within low return water temperature applications, allowing Intelli-Fin to operate with return water temperatures as low as 50°F. The fully automatic bypass controls the point where condensate occurs within Intelli-Fin. This innovative design increases the product flexibility, maximizes efficiency and eliminates worry.

Intelli-Fin® Precisely Tracks Domestic Water Demand and Adjusts Heat Output



- 1** One key advantage of the Intelli-Fin's variable frequency drive, is that it adjusts output capacity anywhere between 100% and 25% (yellow bar shows output capacity). In this chart, Intelli-Fin operates at full capacity during cold start to heat a 752-gallon tank from a 40-degree inlet water temperature up to the 130-degree set point, then reduces capacity as water temperature rises.
- 2** Once the tank is full and there is no demand on the system, Intelli-Fin shuts down.
- 3** A sudden 1200 GPH draw re-starts the unit, which quickly compensates and then begins modulating again to maintain the setpoint temperature.
- 4** Varied demand shows how the water heater continually adjusts to demand tracking the set point with precise Btu/hr output, maximizing efficiency.



Sequencing options allow for closer control of domestic water systems. Options include first on/first off with lead lag, first on/last off, efficiency optimization (lead lag), and run time optimization (lead lag). Units can be kept within 24 hours total operating time of each other.

Intelligent Enough to Speak Your Language

Intelli-Fin is the first water heater designed to be fully compatible with LonWorks®, the interoperability language that is fast becoming the language standard for building management systems. LonWorks allows the Intelli-Fin to provide open control protocols that let it function in a broad range of building management systems, with minimal effort required for integration.



Fully LonWorks compatible, the Intelli-Fin's Command Display also allows for up to 21 diagnostic readouts. This "window" into water heater operation provides the ability to customize performance.

The LonWorks network protocols are in use across a broad range of building management products, and with the introduction of Intelli-Fin, it is easier to link components for simplified building integration. LonWorks also simplifies building upgrades in the future.

To enhance this LonWorks performance, Lochinvar has developed a new control, which provides a remarkable amount of information and the ability to customize equipment for a specific application. This control along with the Command Display allows local monitoring of 21 diagnostic points and adjustment of 6 operational characteristics. If remote system management is desired, all Intelli-Fin functionality can be accessed, reviewed and adjusted via a phone line and personal computer. This means increased peace of mind and the ability to adjust the system without an expensive service call.

An Intelligent Use of Space

Intelli-Fin is about the size of a four-drawer filing cabinet. This remarkably small footprint makes it ideal for retrofit installations as well as new construction. In fact, it's often easier to retrofit an Intelli-Fin system than remove an existing system because it's so much smaller and easier to install.

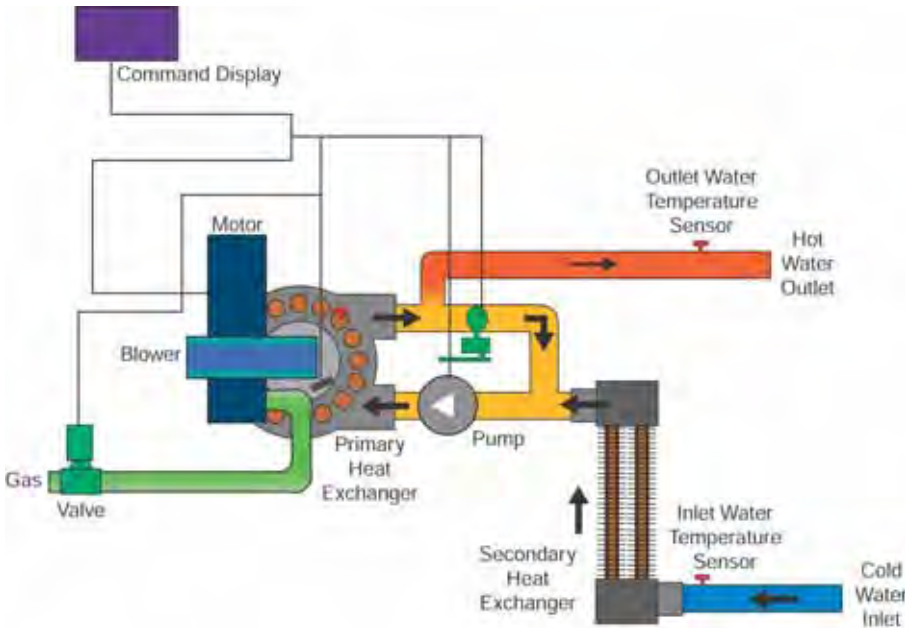
Intelli-Fin's chassis has been engineered so that it makes use of vertical rather than horizontal space. This allows the smaller footprint, but the unit is still so compact that it fits in spaces no higher than 80 inches.

For even more convenience, Intelli-Fin offers several venting options. It's even possible to direct vent Intelli-Fin through a side wall.

Intelligent Enough To Provide Diagnostic Support

Intelli-Fin adds a new dimension to communications. Thanks to its intelligence, it can identify problems and notify the proper maintenance people, providing diagnostic codes for as many as 21 separate functions. It's even possible to communicate remotely with the system, so maintenance staff can investigate alarms from offsite and determine specific needs, therefore being better prepared should onsite service be necessary.

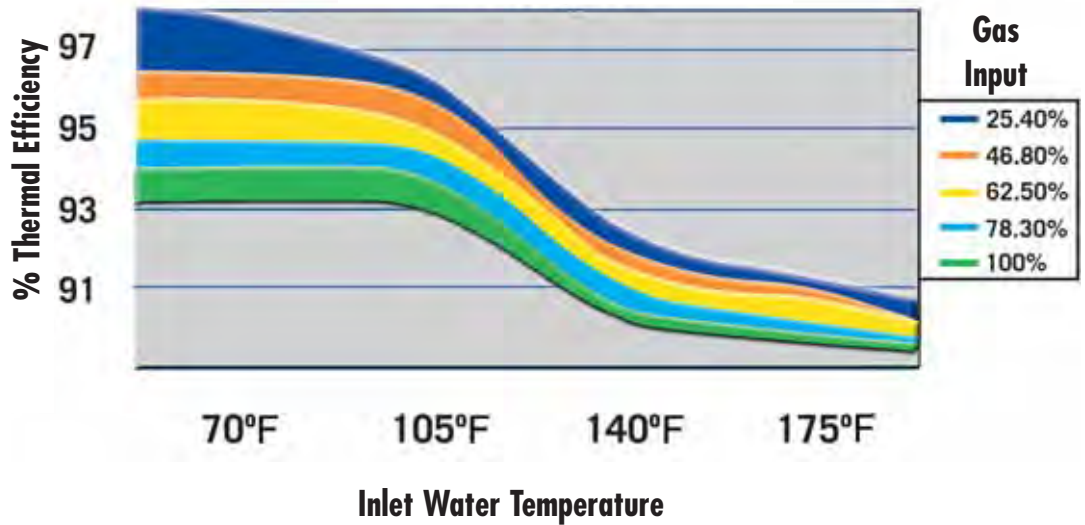
Intelli-Fin® Operating Schematic



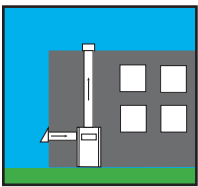
The Intelli-Fin can operate with a broad range of gas pressure and water temperature situations thanks to its intelligent controls and unique heat exchanger arrangement. The dual heat exchanger arrangement preheats return water to control condensate formation. Using a pumped bypass, a portion of the heated supply water is recirculated to raise inlet temperature to a point where condensation on the primary heat exchanger is avoided. In addition, gas and air supply for combustion are also adjusted to ensure sufficient Btu/hr output to raise supply water temperature to the prescribed set point.

Intelli-Fin Efficiency Data at Firing Rate

Intelli-Fin provides thermal efficiency ratings as high as 97%. Because of its ability to infinitely modulate operation, efficiency is maintained at maximum levels to provide lowest total operating cost.

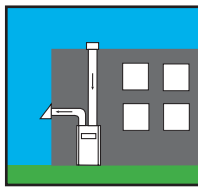


Venting Options



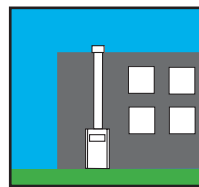
Intelli-Vent Vertical

Vents vertically up to 100 equivalent feet. Directly draws combustion air 100 equivalent feet from a side wall.



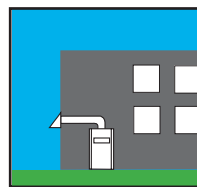
Intelli-Vent Horizontal

Vents horizontally up to 100 equivalent feet. Directly draws combustion air 100 equivalent feet from the roof top.



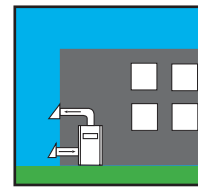
Vertical

Vents vertically using Category IV approved vent material.



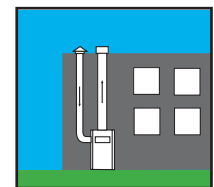
Sidewall

Vents horizontally up to 100 equivalent feet.



Direct Vent Horizontal

Vents horizontally up to 100 equivalent feet. Directly draws combustion air 100 equivalent feet from a side wall.



Direct Vent Vertical

Vents vertically up to 100 equivalent feet. Directly draws combustion air 100 equivalent feet from the roof top.

See Installation and Design Documents for details



by Lochinvar

The Intelligent Approach to Water Heating

Lochinvar has a tradition of setting industry standards for water heater efficiency, and our Intelli-Fin Series takes efficiency to a higher level – not just with superior water heater technology, but with a new level of intelligence.

Our 1.5 million, 1.7 million, and 2.0 million-Btu/hr Intelli-Fin water heaters are whisper-quiet. They are engineered to take advantage of the power of digital communications. That's a powerful advantage, because this capability, along with Lochinvar's engineering, means Intelli-Fin provides you with **the lowest total cost of water heater operation.**

Pushing the Upper Limits of Efficiency

Intelli-Fin has been engineered so that it offers a dramatic increase in efficiency. Independent testing shows that Intelli-Fin reaches 97% thermal efficiency. That means for every energy dollar, 97 cents is converted into useable heat. That's pushing the limits of what is possible within the laws of physics.

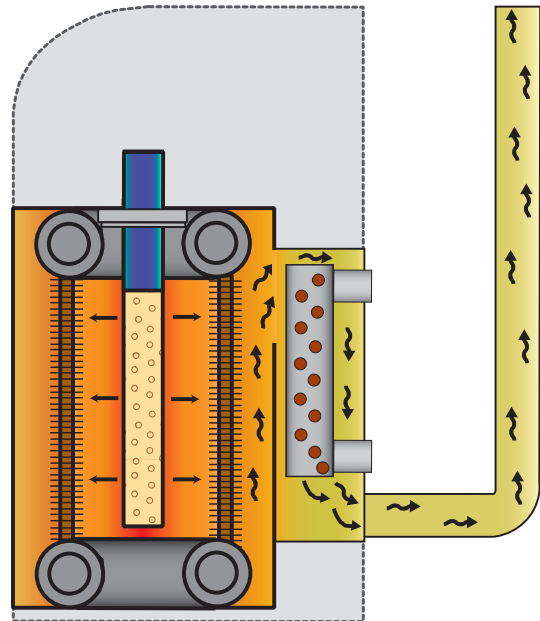
To achieve this higher efficiency, Lochinvar utilizes a dual heat exchanger arrangement to create a heat trap. One heat exchanger surrounds the unit's burner, absorbing heat at the point of combustion. A second heat exchanger captures additional heat as the spent gases are extracted from the combustion chamber. The position of this second heat exchanger forces the products of combustion to flow over its entire surface allowing the remaining heat to be absorbed and transferred to the water.

If your project demands high efficiency, Intelli-Fin delivers.



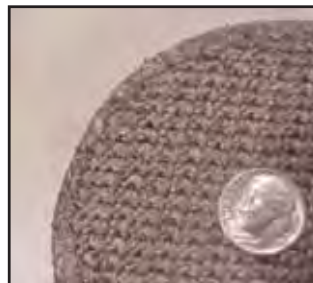
UP TO **97%**
Thermal Efficiency

97 cents from every energy dollar goes into useable heat.



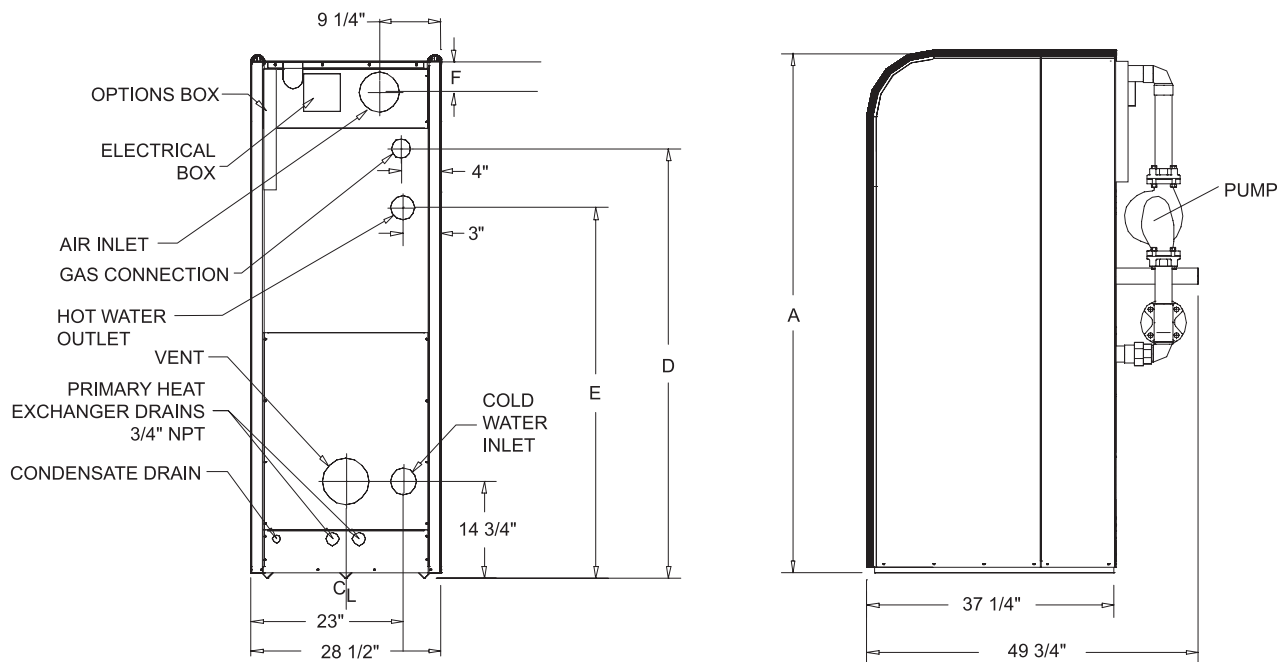
Intelli-Fin's dual heat exchanger arrangement creates a heat trap to capture convective heat flow. Trapping this latent heat reduces flue losses, increases efficiency and saves energy dollars.

Five Year Burner Warranty



Our Alchromesh (aluminum/chromium alloy) metallic burner disperses the flame to improve heat transfer. This unique construction also improves durability. In fact, our burner features a five year warranty.

Intelli-Fin® Water Heater Dimensions & Specifications



Model Number	Btu/hr Input	GPH @ 100°F Rise	A	D	E	F	Air Inlet Size	Vent Size	Shipping Weight
IWN1500	1,500,000	1,700	67-3/4"	52-3/4"	40-3/4"	4-1/2"	6"	6"	1,495
IWN1700	1,700,000	1,927	72-1/4"	57-1/4"	45-1/4"	4-1/2"	7"	7"	1,545
IWN2000	2,000,000	2,267	79"	64"	52"	6-1/2"	8"	8"	1,610

Notes: Change 'N' to 'L' for LP Gas Model. No deration on LP models. Performance data is based on manufacturer test results. All gas connections are 1-1/2" NPT. All water connections are 3".

Standard Features

- Up to 97% Thermal Efficiency
- 25 - 100% Infinitely Proportional Firing Rate
- LonMark Building Management System Compatibility
- Command Display - 21 Point Diagnostic Control (One per Job Site)
- Variable Frequency Drive
- Digital Temperature Control Accurate to 1°F
- Alcomesh Burner with 5-Year Limited Warranty
- Low NOx Operation Exceeds the most Stringent Air Quality Requirements
- ASME Copper Finned Tube Heat Exchanger
- 160 psi Working Pressure
- Gasketless Heat Exchanger Design
- All Bronze Circulating Pump-Mounted and Wired
- Pump Delay
- Glass-Lined Water Surfaces
- Internal Stainless Steel Jacket
- Internal Corrosion Protection
- Low Gas Pressure Operation
- Zero Clearance to Combustible Materials
- Alarm Contacts on any Failure

- Contacts for Air Louver
- ASME Temperature & Pressure Relief Valve
- Down Stream Test Valve
- Adjustable High Limit w/ Manual Reset
- Manual Control Override
- Flow Switch
- Small Footprint
- Whisper Quiet Operation
- 24 Volt Circuit Breaker
- Freeze Protection
- Construction Air Filter
- 5 Year Limited Warranty on Heat Exchanger

Optional Equipment

- 4-20 mA DDC Signal
- Additional Command Display
- Alarm Bell
- Cupro-Nickel Heat Exchanger
- High Gas Pressure Switch
- Horizontal Air Intake Cap
- Horizontal Vent Cap
- Low Gas Pressure Switch
- Low Water Cut-Off
- Neutralization Kit

Monitoring

- Local Monitoring via Personal Computer Includes Serial LonTalk Adapter
- Remote Monitoring via Personal Computer Includes Serial LonTalk Adapter and Network Modem

Sequencing

- Standard Sequencing Package:
 - First On/Last Off
 - First On/First Off with Lead-Lag
- Custom Sequencing Package:
 - Efficiency Optimization
 - Efficiency Optimization with Run Time Equalization
 - First On/Last Off
 - First On/First Off with Lead-Lag

Available Firing Systems

- M9 Electronic Control with Proportional Fire Hot-Surface Ignition (Standard)
- M13 GE GAP/FM
- M7 State of California Code

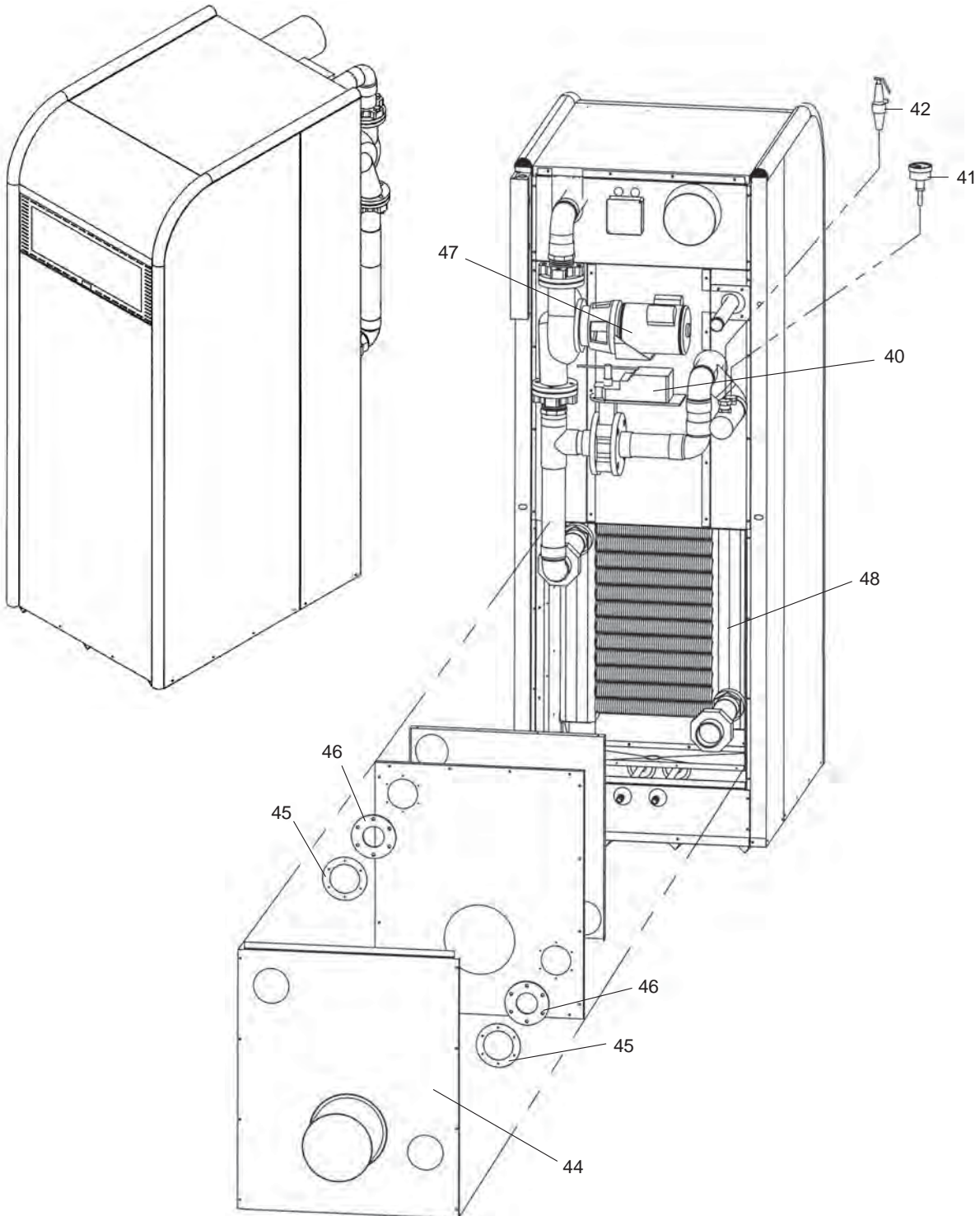
Registered under U.S. Patent # 6,428,312 and 6,619,951



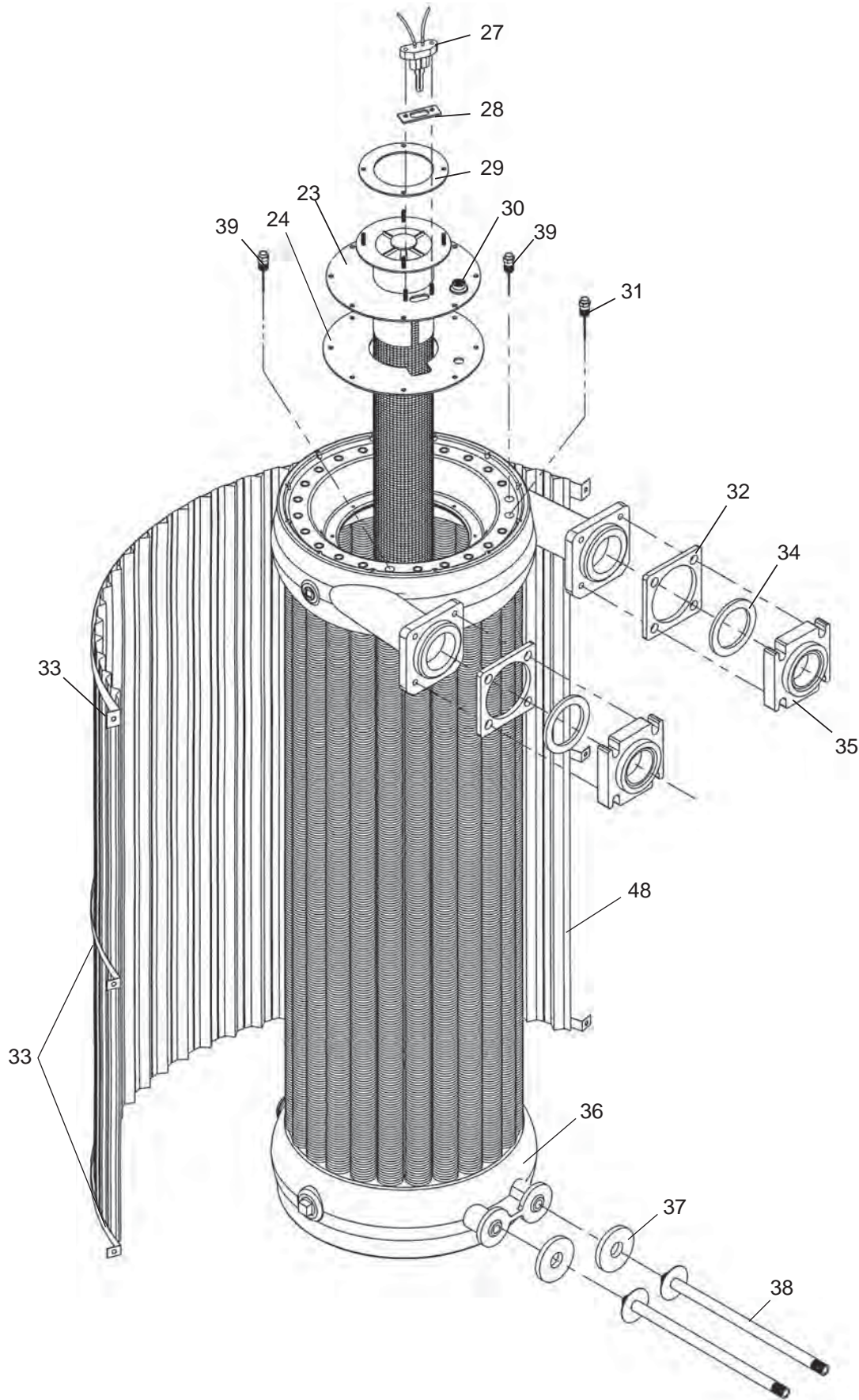


Replacement Parts List

Intelli-Fin® Boilers/Water Heaters IB/IW 1500, 1700, 2000

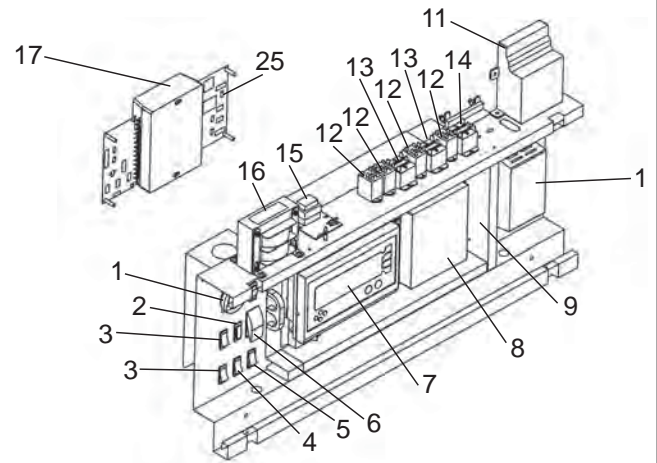
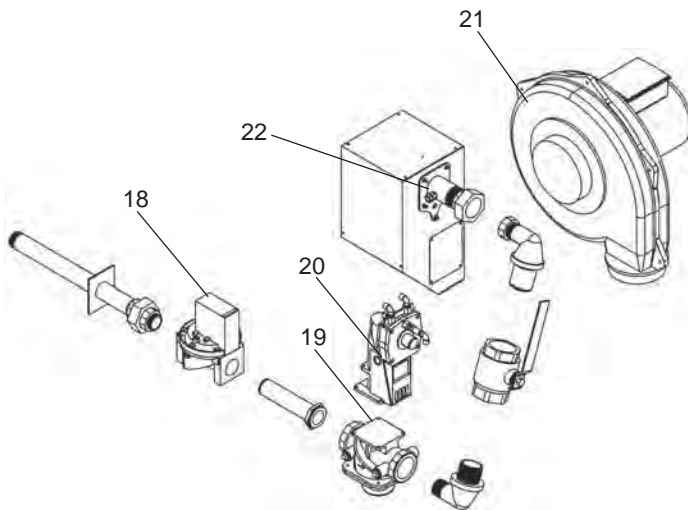


HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY

CONTROL PANEL



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
CONTROLS			
1	HLC2702	High Limit, Manual Reset	ALL
2	LHT2001	Light, 24 VAC Indicator, Amber	ALL
3	SWT2001	Switch, On/Off	ALL
4	SWT2002	Switch, Momentary Off (Red)	ALL
5	SWT2003	Switch, Momentary Off (Black)	ALL
6	SWT2000	Switch, On/Off Power	ALL
7	RLY3717	Command Display	ALL
8	RLY2402	Module, Ignition	ALL
9	SWT2004	Switch, Round Pushbutton	ALL
10	RLY3020	Variable Frequency Drive	ALL
11	RLY2718	Module, Pulse to Analog	ALL
12	RLY2902	Relay, 24 Volt Control	ALL
13	RLY2708	Relay, Ignition Enable	ALL
14	RLY2706	Relay, Pump	ALL
15	WTR2530	Low Water Cut-Off, Manual Reset (Optional) (Prior to Serial H08H00211245)	ALL
15	WTR30000	Low Water Cut-Off, Manual Reset (Optional) (Beginning Serial H08H00211245)	ALL
15	WTR2528	Low Water Cut-Off, Auto Reset (Optional) (Prior to Serial H08H00211245)	ALL
15	WTR30001	Low Water Cut-Off, Auto Reset (Optional) (Beginning Serial H08H00211245)	ALL
-	WTR2222	Low Water Cut-Off Probe (Optional)	ALL
-	WTR20000	Low Water Cut-Off Boot (Optional)	ALL
16	TRF2010	Transformer 120 volt	ALL
17	RLY3027	Interface Board/XL-10 Programmed	ALL
-	MSC2549	Terminator Module	ALL
GAS TRAIN ASSEMBLIES			
18	VAL2044	Valve, Main Gas	ALL
19	VAL2710	Valve, 1-1/2" Body Auto Proportioning	1500
19	VAL2711	Valve, 2" Body Auto Proportioning	1700-2000
20	VAL3004	Actuator Kit	ALL
21	FAN3006	Fan Kit	1500
21	FAN3007	Fan Kit	1700
21	FAN3008	Fan Kit	2000
22	GKT2000	Gasket, Orifice Holder	ALL
23	BNR3419	Burner Assembly	1500
23	BNR3420	Burner Assembly	1700
23	BNR3421	Burner Assembly	2000
24	GKT2102	Burner Gasket	ALL
25	RLY2043	XL - 10 Interface Board - Wings	ALL
27	PLT3400	Ignitor, Hot Surface	ALL
28	GKT2012	Gasket, Ignitor	ALL
29	GKT2103	Gasket, Blower	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
GAS TRAIN ASSEMBLIES (CONTINUED)			
30	MSC2731	Sight Glass	ALL
-	TST2409	Inlet/Outlet Bypass Sensor	ALL
-	WRE2143	Inlet Sensor Harness w/ Plug	ALL
-	WRE2135	Bypass/Outlet Assembly	ALL
HEAT EXCHANGERS			
36	HEX3060	Heat Exchanger (HLW)	IW1500
36	HEX3061	Heat Exchanger (HLW)	IW1700
36	HEX3062	Heat Exchanger (HLW)	IW2000
36	HEX3068	Heat Exchanger (H)	IB1500
36	HEX3069	Heat Exchanger (H)	IB1700
36	HEX3070	Heat Exchanger (H)	IB2000
48	HEX3067	Heat Exchanger, Secondary	ALL
31	TST2300	Bulbwell Thermostat, 3/8" (High Limit)	ALL
32	GKT2006	Gasket, Flange	ALL
33	JKH6431	Retainer V-Baffle (3x Req.)	ALL
34	GKT2006	Gasket, Top Header Flange	ALL
35	WTR4708	Flange, Cast	ALL
37	GKT2006	Gasket, Flange for Drain Valve	ALL
38	DRV3800	Drain Pipe Assembly	ALL
39	TST2306	Bulbwell Thermostat, 3/8"	ALL
48	JKH2012	V-Baffle (24x Req.)	1500
48	JKH2013	V-Baffle (24x Req.)	1700
48	JKH2014	V-Baffle (24x Req.)	2000
MISCELLANEOUS			
40	VAL2058	Valve, Actuator (Prior to Serial J04)	ALL
40	VAL2158	Valve, Actuator (Beginning Serial J04)	ALL
41	GTP2900	Gauge, Pressure & Temperature	IB
41	GTP3000	Gauge, Temperature	IW
42	RLV2016	Relief Valve, Temperature & Pressure, 1", 150 PSI	IW
42	RLV2003	Relief Valve, Pressure 1", 50 PSI	IB1500 & 1700
42	RLV2001	Relief Valve, Pressure 3/4", 50 PSI (2 Req'd.)	IB2000
44	JKH6863	Jacket, Back Secondary HEX Access	ALL
45	JKH6818	Flange, Pipe	ALL
46	GKT2434	Grommet, Pipe	ALL
47	ARM3072PAB	Pump Assembly	IW
47	ARM3072PBF	Pump Assembly	IB
-	PRS30022	Pressure Switch (Prior to Serial F05)	ALL
-	PRS2007	Pressure Switch (Beginning Serial F05)	ALL
-	JKH6865	Door, Front Upper Outer	ALL
-	MSC2465	Circuit Breaker, 5 AMP	ALL
-	LHT2000	Light, 24 VAC Indicator, Red	ALL
-	SWT2005	Switch, Lever Handle	ALL
-	FIB2104	Insulation Top	ALL
-	FIB2105	Insulation Back	ALL
-	FIB2106	Insulation Front Door	1500
-	FIB2107	Insulation Front Door	1700
-	FIB2108	Insulation Front Door	2000
-	FIB2109	Insulation Front	1500
-	FIB2110	Insulation Front	1700
-	FIB2111	Insulation Front	2000
-	FIB2112	Insulation Side	1500
-	FIB2113	Insulation Side	1700
-	FIB2114	Insulation Side	2000
-	GKT2053	Gasket, Jacket (Order by the Foot)	ALL
-	KIT3000	Neutralizing Kit (Prior to Serial K05)	ALL
-	KIT3046	Neutralizing Kit (Beginning Serial K05)	ALL
-	MSC2976	Condensate Trap (Beginning Serial K05)	ALL
-	MSC2737	Condensate Trap (Prior to Serial K05)	ALL
-	WRE2106	Communication Wire (Purchase by the Foot)	ALL
-	WTR2040	Flow Switch	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

CONDENSING RESIDENTIAL GAS BOILERS



**CONXUS**
REMOTE CONNECT CAPABLE

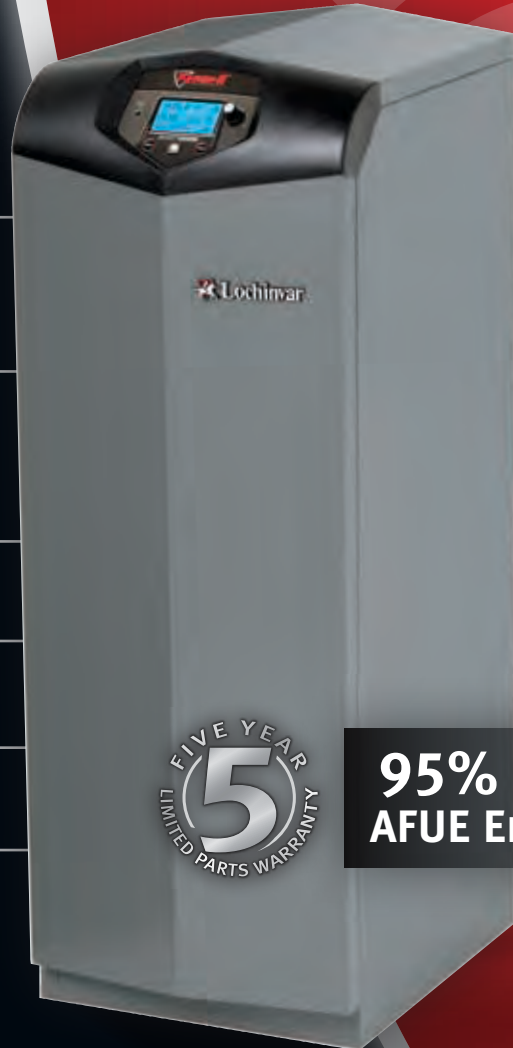
**SMART SYSTEM**
CONTROL WITH ADVANCED USER FEATURES

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

5:1 TURNDOWN RATIO

LESS THAN 20 ppm NO_x

DIRECT VENT FLEXIBILITY TO 100 FEET



95% **AFUE EFFICIENCY**



DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA



95% DOE AFUE EFFICIENCY

THE BEST YOU CAN BUY

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.



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.



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.



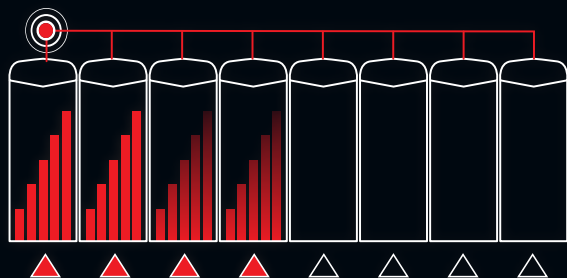
RED SCREEN

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

SELECTABLE CASCADE OPTIONS

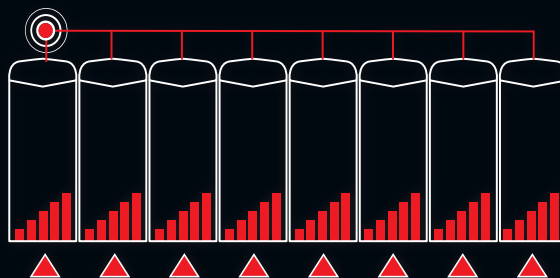
When multiple KNIGHT boilers are installed together, the SMART SYSTEM built-in sequencer can be set for "Lead-Lag" cascade or "Efficiency Optimized" cascade operation.

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

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 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.

**Exclusive feature, available only from Lochinvar*

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.

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

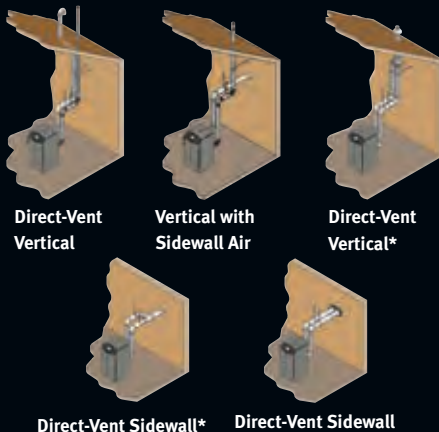
Input from variable speed system pump allows faster reaction to changes of flow in system, reducing possibility of temperature over-shoot and cycling.

* 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.



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



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.



KBN286 Shown

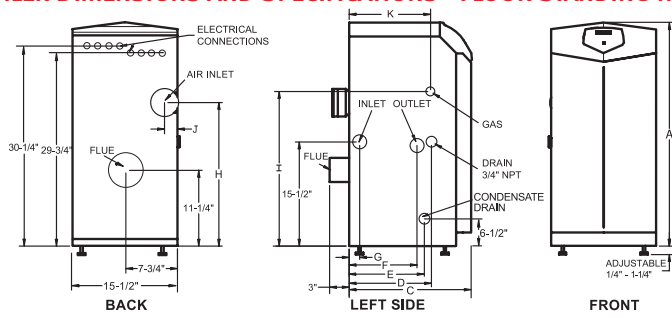
TEAM KNIGHT WITH SQUIRE FOR LOW-COST DOMESTIC HOT WATER!



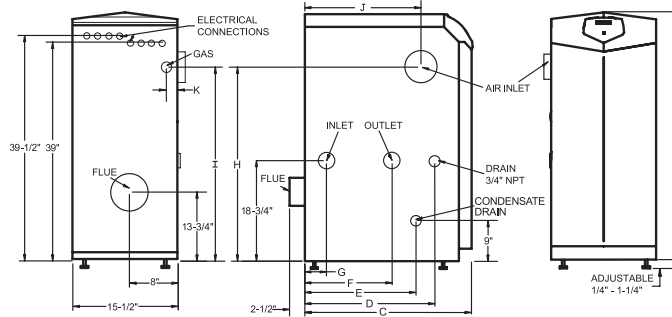
KNIGHT's Domestic Hot Water Prioritization feature means you can easily install it with Lochinvar's SQUIRE® indirect water heater, available in 30, 40, 50, 65, 80 and 119 gallons. This combination will give homeowners high-efficiency space heating from KNIGHT, and abundant domestic hot water from SQUIRE. 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 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. *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. *Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. *The ratings have been determined under the provisions governing forced draft burners.

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/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
 - 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

*Exclusive feature, available only from Lochinvar

- ▶ **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**

Patent Pending

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

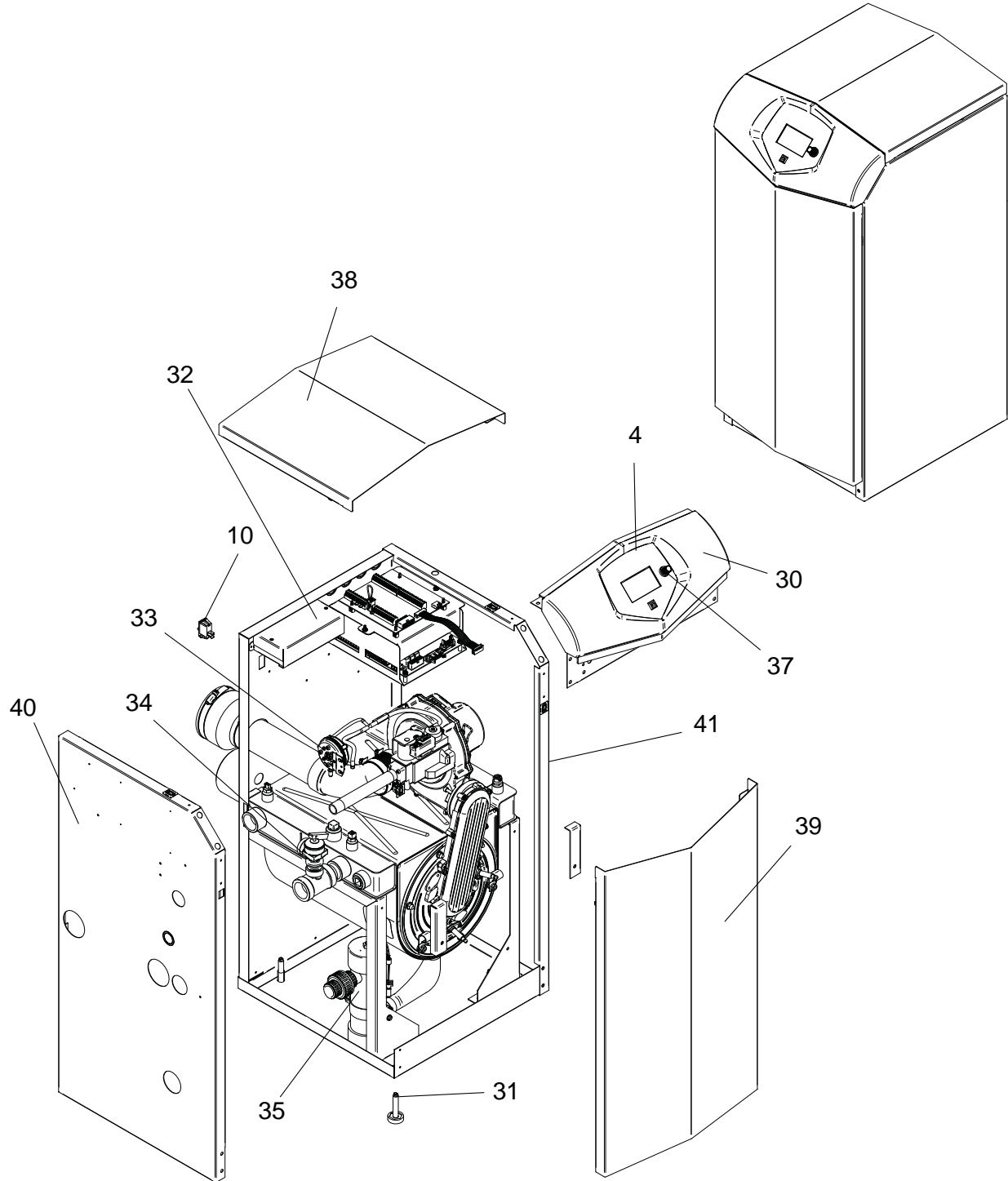
- ▶ M9 Standard Construction
- ▶ M7 California Code



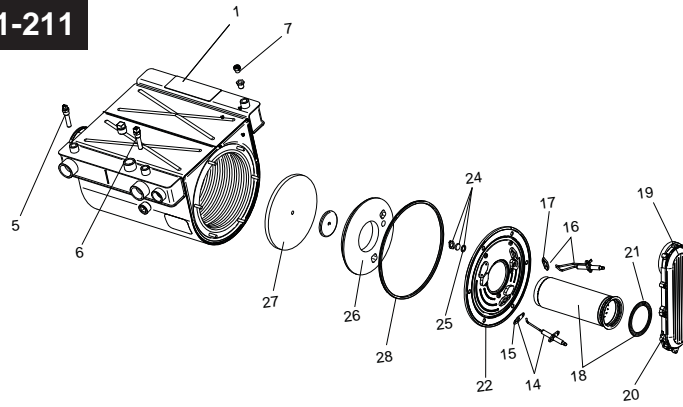


Replacement Parts List

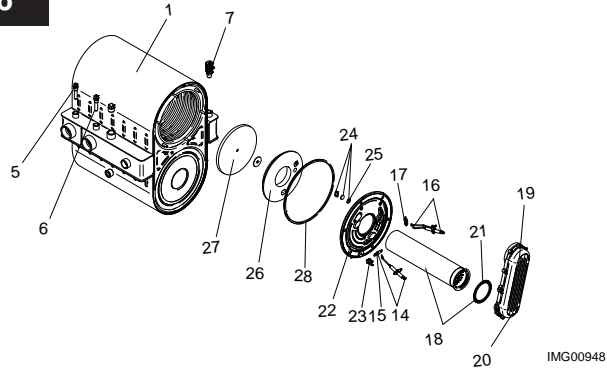
**Knight
Heating Boilers
KB 81 thru 286**



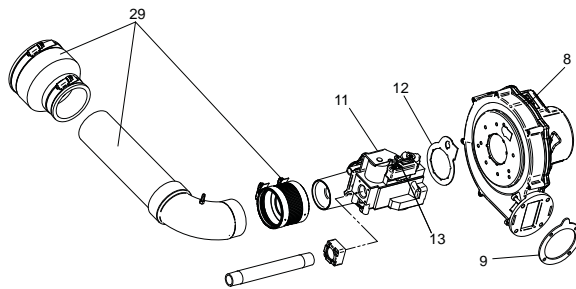
HEAT EXCHANGER 81-211



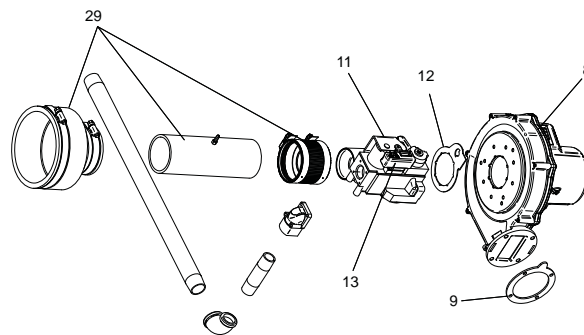
HEAT EXCHANGER 286



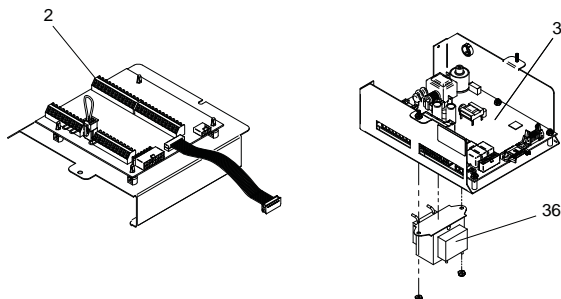
GAS TRAIN 81-211



GAS TRAIN 286



CONTROL PANEL



ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100147452	HEAT EXCHANGER	KB 081
1	100147453	HEAT EXCHANGER	KB 106
1	100147454	HEAT EXCHANGER	KB 151
1	100147455	HEAT EXCHANGER	KB 211
1	100147456	HEAT EXCHANGER	KB 286
CONTROLS			
2	100208459	LOW VOLTAGE CONNECTION BOARD	ALL
3	100167799	INTEGRATED CONTROL PRIOR TO H10	KB 81-286
3	100167819	INTEGRATED CONTROL BEGINNING H10	KB 81-286
3	100167800	HIGH ALTITUDE INTEGRATED CONTROL PRIOR TO H10	KB 81-286
3	100167820	HIGH ALTITUDE INTEGRATED CONTROL BEGINNING H10	KB 81-286
4	100208458	USER INTERFACE CONTROL	ALL
-	100158021	USER INTERFACE OVERLAY	ALL
5	100208549	INLET SENSOR	ALL
6	100208544	OUTLET/HIGH LIMIT SENSOR	ALL
7	100167445	AIR VENT VALVE	ALL
8	100145003	FAN ASSEMBLY	KB 081 & 106
8	100145004	FAN ASSEMBLY	KB 151
8	100145005	FAN ASSEMBLY	KB 211
8	100145006	FAN ASSEMBLY	KB 286
9	100208764	GASKET/ BLOWER	KB 081, 106 & 211
9	100208101	GASKET/ BLOWER	KB 151 & 286
10	100208242	ON/OFF SWITCH	ALL
GAS VALVES			
11	100172007	GAS VALVE ASSEMBLY	KBN081
11	100172002	GAS VALVE ASSEMBLY	KBN106
11	100172003	GAS VALVE ASSEMBLY	KBN151
11	100172004	GAS VALVE ASSEMBLY	KBN211
11	100172005	GAS VALVE ASSEMBLY	KBN286
12	100208760	GAS VALVE GASKET	KBN081-286
13	100208324	GAS VALVE SWITCH	ALL
PILOT & BURNER ASSEMBLIES			
14	100165930	FLAME SENSOR W/GASKET	ALL
15	100208091	GASKET, FLAME SENSOR	ALL
16	100165929	IGNITOR W/GASKET	ALL
17	100208086	GASKET, IGNITOR	ALL
18	100135275	BURNER W/ GASKET	KB 081
18	100135307	BURNER W/ GASKET	KB 106
18	100135308	BURNER W/ GASKET	KB 151
18	100135309	BURNER W/ GASKET	KB 211
18	100135310	BURNER W/ GASKET	KB 286
19	100173791	GAS/AIR ARM ASSEMBLY W/GASKET	KB 081
19	100173795	GAS/AIR ARM ASSEMBLY W/GASKET	KB 106
19	100173796	GAS/AIR ARM ASSEMBLY W/GASKET	KB 151
19	100173792	GAS/AIR ARM ASSEMBLY W/GASKET	KB 211/286
20	100208763	GASKET - GAS / AIR ARM ASSEMBLY	ALL
21	100208085	GASKET, BURNER	ALL
22	100173794	HEAT EXCHANGER ACCESS DOOR KIT	ALL
23	100094572	HEX DOOR TEMP SWITCH BEGINNING SN# F14	KB 286
MISCELLANEOUS			
24	100163249	SIGHT GLASS	ALL
25	100208762	GASKET/ SIGHT GLASS	ALL
26	100208060	BURNER PLATE, INSULATION, DOOR	ALL
27	100208061	DIVIDER PLATE, INSULATION BAFFLE	ALL
28	100208088	GASKET DOOR RUBBER	ALL
29	100163250	AIR INLET KIT	KB 081-106
29	100163251	AIR INLET KIT	KB 151
29	100163252	AIR INLET KIT	KB 211
29	100163253	AIR INLET KIT	KB 286
30	100208320	DISPLAY BEZEL	ALL
31	100134788	LEVELING LEG	ALL
32	100163053	HIGH VOLTAGE CONNECTION BOARD	ALL
33	100166098	PRESSURE SWITCH	KB 081
33	100208377	PRESSURE SWITCH	KB 106, 151 & 286

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
33	100208378	PRESSURE SWITCH	KB 211
34	100208449	RELIEF VALVE 30 PSI	ALL
35	100163241	CONDENSATE TRAP	KB 081-211
35	100163244	CONDENSATE TRAP	KB 286
36	100208230	TRANSFORMER	ALL
37	100162600	KNOB, FLUTED W/ SKIRT	ALL
-	100208808	FUSE, 0.8 AMP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100208653	FLOW SWITCH	ALL
-	100208834	OUTDOOR AIR SENSOR	ALL
-	100208243	BLOCKED DRAIN SWITCH	ALL
-	100208152	GAUGE TRIOMETER, 75# PSI	ALL
-	100170642	FLUE TEMP SENSOR KIT	ALL
-	100208652	MRLWCO WITH TEST	ALL
-	100157719	ALARM BELL	ALL
-	100157718	SYSTEM SENSOR	ALL
-	100157721	NEUTRALIZER KIT	ALL
-	100159006	LP CONVERSION KIT	KBN081
-	100159007	LP CONVERSION KIT	KBN106
-	100159008	LP CONVERSION KIT	KBN151
-	100159009	LP CONVERSION KIT	KBN211
-	100159010	LP CONVERSION KIT	KBN286
-	100189053	KIT FLUE COLLAR 3"	KB 081-211
-	100189054	KIT FLUE COLLAR 4"	KB 286
-	100157626	HEAT EXCHANGER CLEANING KIT	KB 081-106
-	100157627	HEAT EXCHANGER CLEANING KIT	KB 151-286
-	100163204	BIRD SCREEN KIT 3"	KB 081-211
-	100163205	BIRD SCREEN KIT 4"	KB 286
-	100208569	BULBWELL 1/4"	ALL
-	100208552	SYSTEM SENSOR	ALL
-	100148402	LIMIT, HEAT EXCHANGER OVER TEMP	KB 286
-	100208625	HARNESS, CONNECTION BOARD	ALL
-	100172813	HARNESS, POWER	ALL
-	100208627	HARNESS, GAS VALVE	ALL
-	100208628	HARNESS, UNIT	KB 081-211
-	100072936	HARNESS, UNIT	KB 286
-	100208636	CABLE, RIBBON	ALL
-	100208620	HARNESS, SPARK ELECTRODE	KB 081-106 & 286
-	100208621	HARNESS, SPARK ELECTRODE	KB 151 & 211
-	100208622	HARNESS, FLAME SENSE ELECTRODE	ALL
PUMPS			
-	100166434	PUMP	KB 081-211
-	100166410	PUMP, HIGH ALTITUDE	KB 081-211
-	100166435	PUMP	KB 286
JACKET ASSEMBLY			
38	100269740	JACKET, TOP	KB 081 - 106
38	100150355	JACKET, TOP	KB 151
38	100149840	JACKET, TOP	KB 211
38	100149825	JACKET, TOP	KB 286
39	100189055	JACKET, FRONT	KB 081 - 211
39	100189056	JACKET, FRONT	KB 286
40	100149867	JACKET, LEFT SIDE	KB 081
40	100149868	JACKET, LEFT SIDE	KB 106
40	100149869	JACKET, LEFT SIDE	KB 151
40	100149870	JACKET, LEFT SIDE	KB 211
40	100149871	JACKET, LEFT SIDE	KB 286
41	100150215	JACKET, RIGHT SIDE	KB 081 - 106
41	100150222	JACKET, RIGHT SIDE	KB 151
41	100150233	JACKET, RIGHT SIDE	KB 211
41	100150244	JACKET, RIGHT SIDE	KB 286

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

HIGH EFFICIENCY RESIDENTIAL BOILERS



SMART SYSTEM™

CON-X-US® REMOTE CONNECT CAPABLE

LOCH-N-LINK™ USB DRIVE SETUP

3 SETPOINTS WITH OUTDOOR RESET CURVES

DHW RECIRCULATION PUMP CONTROL

FLOOR-STANDING FIRE TUBE DESIGN

6 MODELS: 55,000 – 285,000 BTU/HR

UP TO 10:1 TURNDOWN RATIO

DIRECT-VENT FLEXIBILITY TO 100 FEET



FIVE YEAR
LIMITED PARTS WARRANTY

95% **AFUE EFFICIENCY** **AHRP CERTIFIED™**
www.ahrpdirectory.org



DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA



MONEY-SAVING 95% EFFICIENCY AND EASIER THAN EVER TO INSTALL

The KNIGHT® floor-standing fire tube-boiler features reduced installation footprint for flexibility in boiler placement. Plus, all connections are on the top and left side, so KNIGHT is an easy drop-in replacement for older, less efficient boilers. Six models offer inputs from 55,000 to 285,000 Btu/hr.

USE EXISTING PIPING TO REDUCE COSTS

The KNIGHT fire tube boiler operates with low pressure drop. The design incorporates a small volume of water in the heat exchanger. This allows the boiler to be installed in a primary/secondary or a full-flow piped system. There is no need to change the piping to accommodate the boiler. The boiler adapts to the system. This flexibility allows for a faster, more cost-effective boiler upgrade.

10:1 TURNDOWN RATIO OPTIMIZES PERFORMANCE

Modulation turndown up to 10:1 means the firing rate automatically changes as the heat load varies. A KHN110 KNIGHT boiler fires at its maximum 110,000 Btu/hr rate when load is highest, then “turns down” to as low as 10% (11,000 Btu/hr) as load decreases. A modulating boiler runs smoothly and efficiently, without frequent on/off cycling.

SAFE, RELIABLE NEG/REG TECHNOLOGY

KNIGHT boilers can operate with low gas supply pressure. **Negative Regulation** uses a pre-mix gas system instead of relying on utility pressure through the gas valve. The result is steady operation in low gas pressure systems or when gas demand is highest. Automatic fan control fine-tunes the air/fuel ratio, providing superior combustion throughout the operating range.

SUPERIOR DIRECT-VENTING FLEXIBILITY

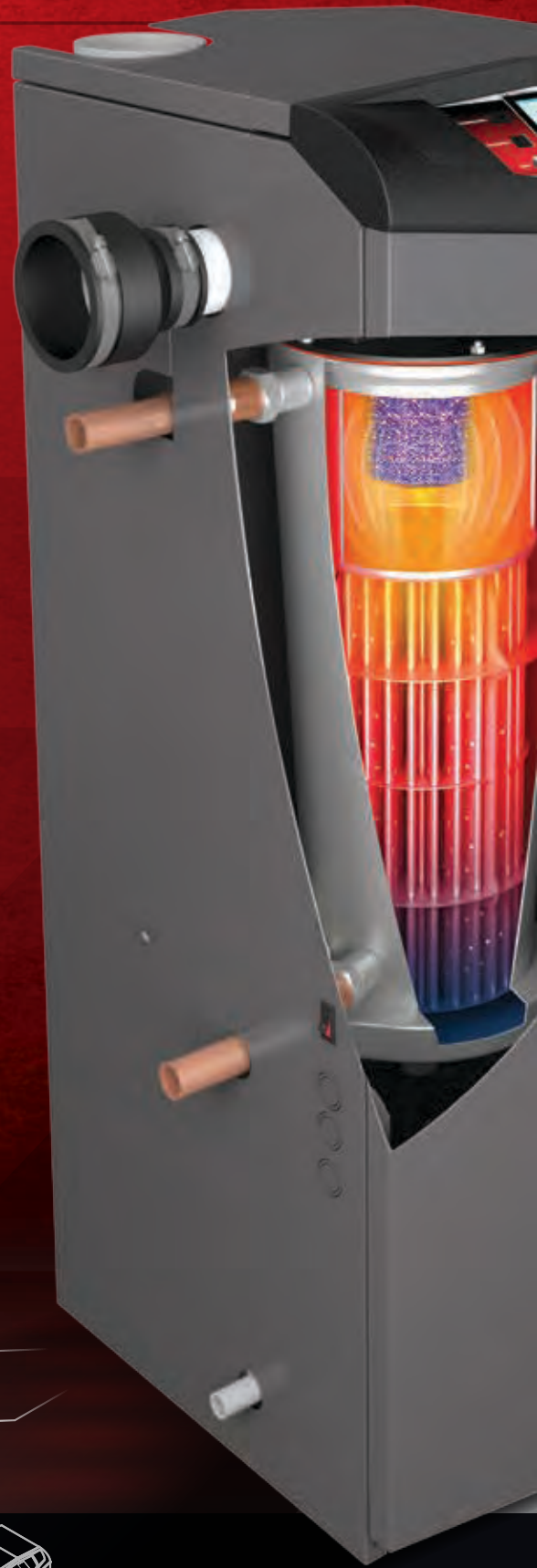
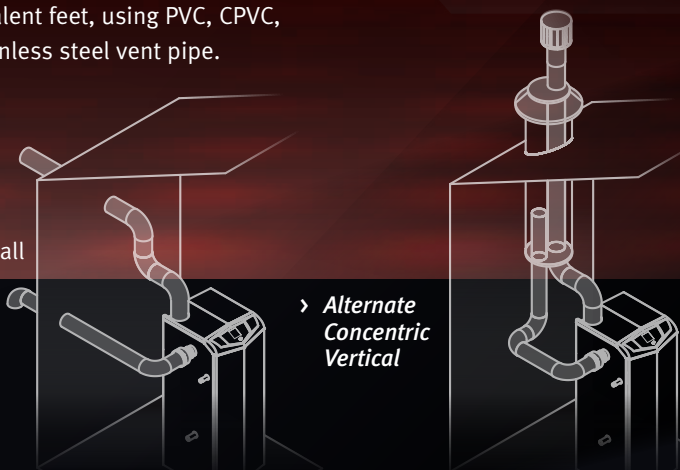
KNIGHT boilers can be installed with direct-vent air intake and exhaust runs up to 100 equivalent feet, using PVC, CPVC, polypropylene or AL29-4C stainless steel vent pipe.

Venting Options

- > Direct Vent Vertical
- > Vertical w/Sidewall Air
- > Concentric Direct Vent Sidewall
- > **Direct Vent Sidewall**

- > **Alternate Concentric Vertical**

Consult Installation & Operations manual for complete KNIGHT venting information.





BOILER CONTROL, FROM ANYWHERE.

From wherever you are, the CON-X-US® option lets you use any Internet-capable device to link up with the SMART SYSTEM™ on an unlimited number of KNIGHT® boilers.

- › **Do regular CON-X-US checks for all your KNIGHT customers**, and let them know you're monitoring their boiler's performance.
- › **Adjust setpoints, domestic hot water, reset curves, pump delays and more**, using the CON-X-US interactive display.
- › **Status alerts via text or e-mail** let you know when a KNIGHT boiler needs attention.

With CON-X-US, you're always in touch and in control. Optional CON-X-US control board is sold separately.



THE ULTIMATE IN BOILER CONTROL & MONITORING

The industry's most advanced boiler control system now includes the CON-X-US® Remote Connect option and LOCH-N-LINK™ Flash Programming feature. See back cover for a complete list of SMART SYSTEM™ functions and features.

COLOR-CODED LCD DISPLAY



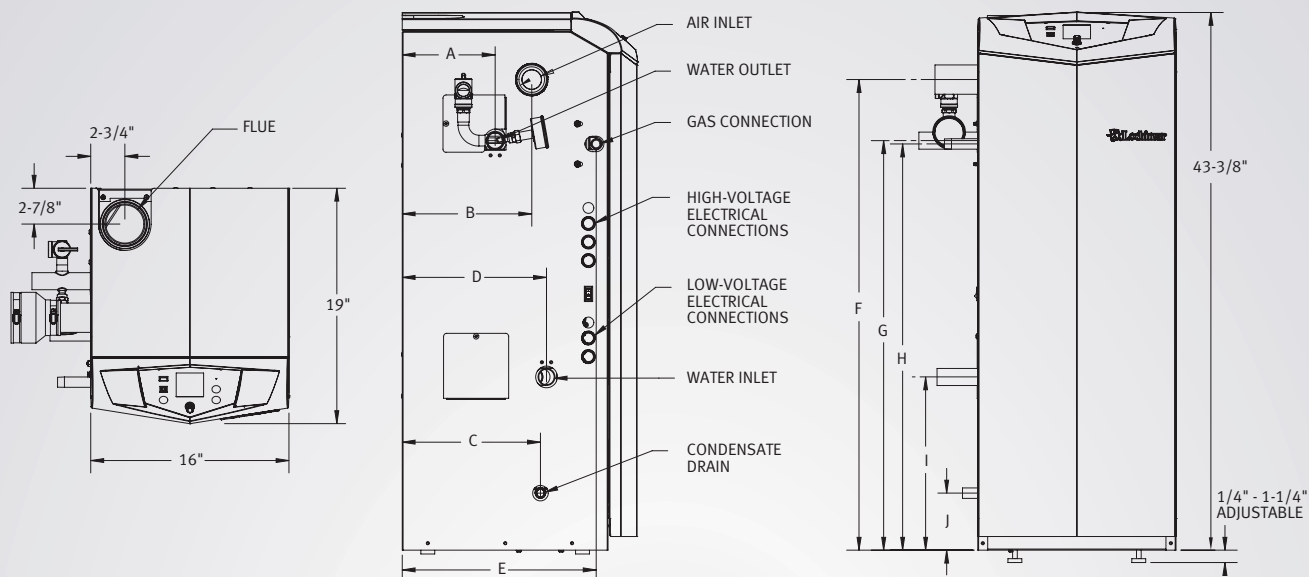
- Blue Screen* Normal system operation
- Yellow Screen* Maintenance due shows installer name & number
- Red Screen* Lockout mode



LOCH-N-LINK™ EASY USB FLASH PROGRAMMING

Use a USB drive to name, store and easily manage multiple proven parameter sets. Quickly upload them via the front panel port, reducing installation and programming time.

KNIGHT® BOILER DIMENSIONS AND SPECIFICATIONS*



KNIGHT BOILER



DIMENSIONS AND SPECIFICATIONS

Model Number	Input MBH			Heating Capacity MBH	Net AHRI Rating MBH	A	B	C	D	E	F	G	H	I	J	Gas Connect.	Water Connect.	Air Inlet	Vent Size	Shipping Weight
	Min	Max	AFUE%																	
KHN055	8.3	55	95	51	44	6"	8-3/8"	11-1/8"	10-1/2"	13-1/4"	37-1/2"	32-5/8"	32-1/4"	13-1/4"	3-3/8"	1/2"	1"	2"	2"	160
KHN085	8.5	85	95	79	69	6"	8-3/8"	11-1/8"	10-1/2"	13-1/4"	37-1/2"	32-5/8"	32-1/4"	13-1/4"	3-3/8"	1/2"	1"	2"	2"	165
KHN110	11	110	95	102	89	7-3/8"	9-3/4"	11-1/8"	10-5/8"	14-5/8"	37-3/4"	33"	32-1/2"	14"	4-5/8"	1/2"	1"	3"	3"	170
KHN155	15.5	155	95	144	125	7-3/8"	9-3/4"	11-1/8"	10-5/8"	14-5/8"	37-3/4"	33"	32-1/2"	14"	4-5/8"	1/2"	1"	3"	3"	175
KHN199	19.9	199.9	95	185	161	7-1/2"	10-1/2"	11-1/8"	11-5/8"	15-3/8"	38"	33"	32-3/4"	14"	4-5/8"	1/2"	1-1/4"	3"	3"	195
KHN285	28.5	285	95	264	229	7-1/2"	10-1/2"	11-1/8"	11-5/8"	15-3/8"	38"	33"	32-3/4"	14"	4-5/8"	1/2"	1-1/4"	3"	3"	205

*Information subject to change without notice. Change "N" to "L" for LP gas models. *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. *Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. *The ratings have been determined under the provisions governing forced draft burners.

SMART SYSTEM™ FEATURES

- ▶ **Smart System Digital Operating Control**
Multi-Color Graphic LCD Display w/Navigation Dial, Soft Keys and Loch-N-Link™ USB programming
- ▶ **Three Boiler Setpoint Temperature Inputs**
Plus Domestic Hot Water Prioritization
- ▶ **Built-in Cascading Sequencer for up to 8 Boilers, with Cascade Redundancy**
Multiple Size Boiler Cascade
Lead Lag
Efficiency Optimization
Front End Loading Capability
- ▶ **Outdoor Reset Control with Outdoor Air Sensor**
Programmable for Three Reset Temperature Inputs
- ▶ **Programmable System Efficiency Optimizers**
SH Night Setback
DHW Night Setback
Anti-Cycling
Outdoor Air Reset Curve
Ramp Delay
Modulation Factor Control
Boost Temperature & Time
- ▶ **Four Pump Control**
System Pump with Parameter for Continuous Operation
Boiler Pump with Variable Speed Control
Domestic Hot Water Pump
Domestic Hot Water Recirculation
- ▶ **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 Space Heat/DHW Switching Times
- ▶ **Building Management System Integration**
0-10 VDC Input to Control Modulation or Setpoint
0-10 VDC Modulation Rate Output
0-10 VDC Input to Enable/Disable Call for Heat

- ▶ **Access to BMS Settings through Graphic LCD Display**
- ▶ **High-Voltage Terminal Strip**
120 VAC / 60 Hertz / 1 Phase Power Supply
Three Sets of Pump Contacts
- ▶ **Low-Voltage Terminal Strip**
DHW Recirculation Pump Start/Stop
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
- ▶ **Maintenance Reminder**
Custom Maintenance Reminder with Contractor Contact Information
Installer Ability to De-activate Service Reminder
- ▶ **Low-Water Flow Safety Control & Indication**
- ▶ **Password Security**
- ▶ **Customizable Freeze Protection Parameters**

STANDARD FEATURES

- ▶ **ENERGY STAR Most Efficient Product**
- ▶ **95% DOE AFUE Efficiency**
- ▶ **Modulating Burner with up to 10:1 Turndown**
Direct Spark Ignition
Low NOx Operation
- ▶ **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
Zero Clearances to Combustible Materials
12-Year Limited Warranty (See Warranty for Details)
5-Year Limited Parts Warranty

OPTIONAL EQUIPMENT

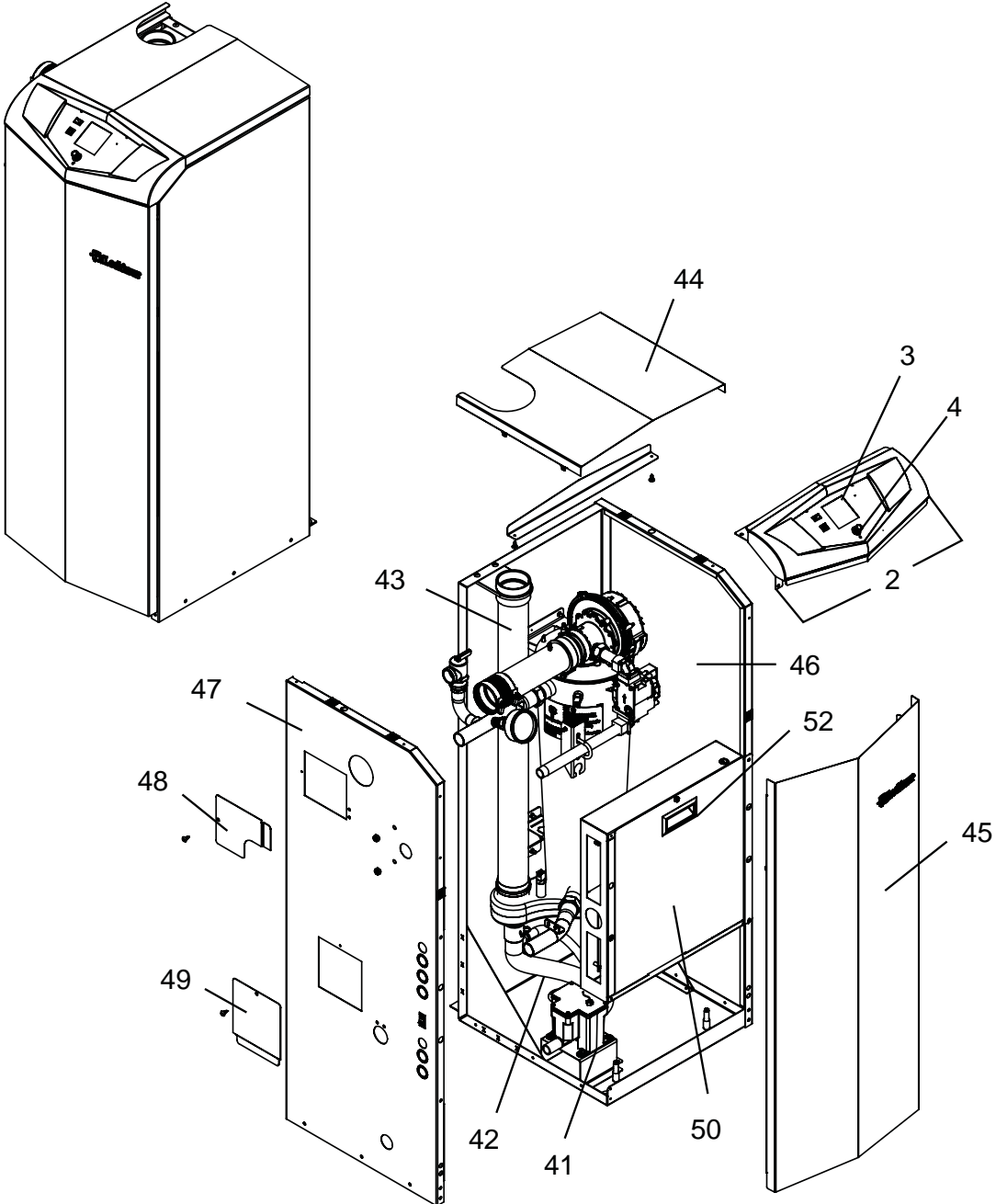
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Alarm Bell
Concentric Vent Kit
Condensate Neutralization Kit
BMS Gateway to LON or BACnet IP
Multi-Temperature Loop Control
Sidewall Vent Termination
Wireless Outdoor Sensor
LP Gas Conversion Kit
- ▶ **Firing Codes**
M9 Standard Construction
M7 California Code



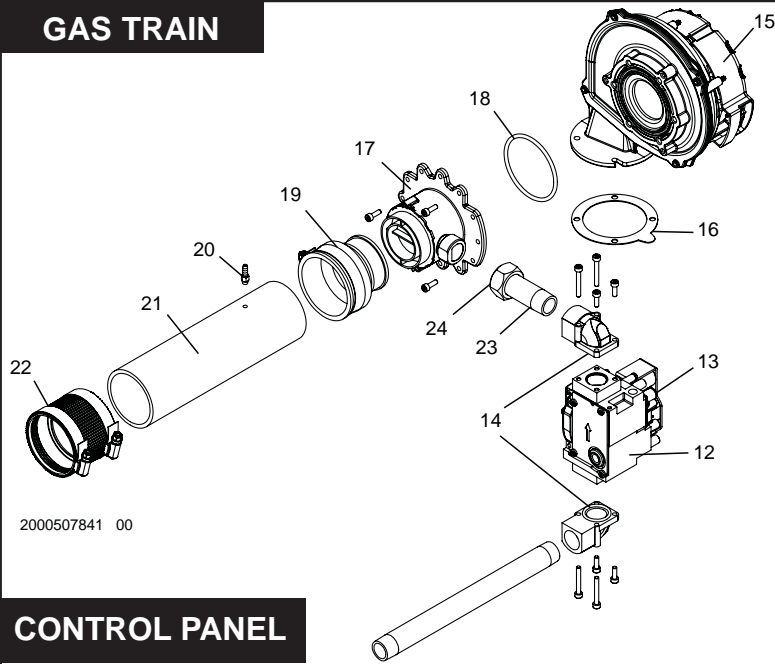


Replacement Parts List

Knight Fire Tube Boilers KH 55 thru 285

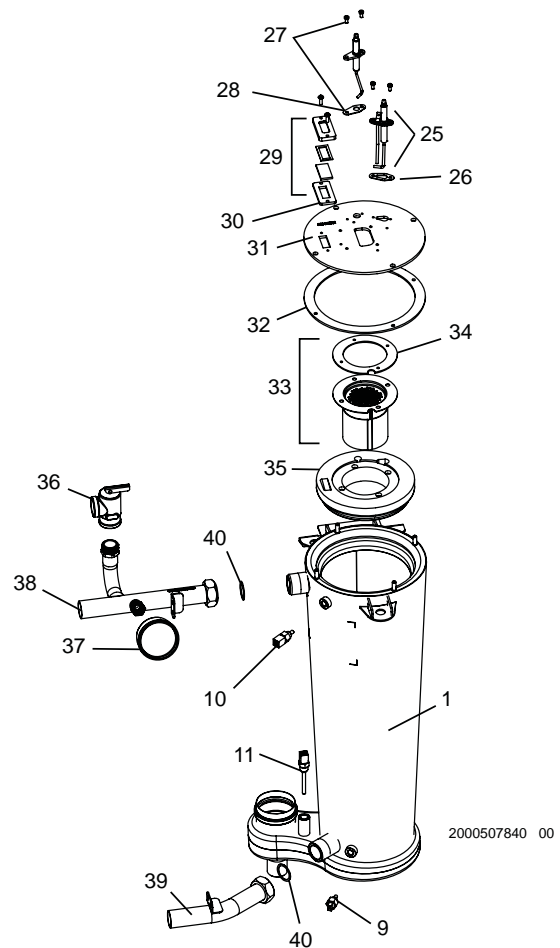


GAS TRAIN



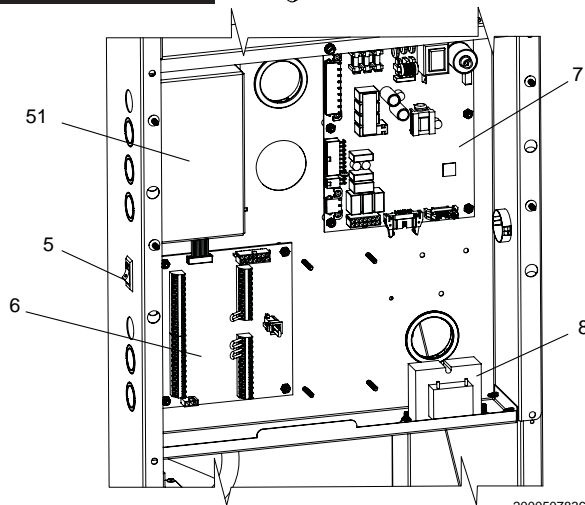
2000507841 00

HEAT EXCHANGER



2000507840 00

CONTROL PANEL



2000507836 00

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100266940	HEAT EXCHANGER	KH 055
1	100266951	HEAT EXCHANGER	KH 085
1	100266953	HEAT EXCHANGER	KH 110
1	100266958	HEAT EXCHANGER	KH 155
1	100266959	HEAT EXCHANGER	KH 199
1	100266971	HEAT EXCHANGER	KH 285
CONTROLS			
2	100267999	DISPLAY BEZEL ASSEMBLY	ALL
3	100189277	USER INTERFACE CONTROL	ALL
4	100162600	KNOB, FLUTED W/ SKIRT	ALL
5	100169476	SWITCH, POWER ON/OFF	ALL
6	100209755	LOW VOLTAGE CONNECTION BOARD	ALL
7	100266976	INTEGRATED CONTROL BOARD	KH 055
7	100266977	INTEGRATED CONTROL BOARD	KH 085
7	100266978	INTEGRATED CONTROL BOARD	KH 110
7	100266979	INTEGRATED CONTROL BOARD	KH 155
7	100266980	INTEGRATED CONTROL BOARD	KH 199
7	100266982	INTEGRATED CONTROL BOARD	KH 285
7	100266992	INTEGRATED CONTROL BOARD, HIGH ALTITUDE	KH 055
7	100266993	INTEGRATED CONTROL BOARD, HIGH ALTITUDE	KH 085
7	100266994	INTEGRATED CONTROL BOARD, HIGH ALTITUDE	KH 110
7	100266995	INTEGRATED CONTROL BOARD, HIGH ALTITUDE	KH 155
7	100266996	INTEGRATED CONTROL BOARD, HIGH ALTITUDE	KH 199
7	100266997	INTEGRATED CONTROL BOARD, HIGH ALTITUDE	KH 285
8	100170172	TRANSFORMER, 24V, 40VA	ALL
9	100170551	INLET SENSOR	ALL
10	100170550	OUTLET SENSOR / HIGH LIMIT	ALL
11	100170535	FLUE SENSOR	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
GAS TRAIN			
12	100268028	GAS VALVE ASSEMBLY	KH 055
12	100268029	GAS VALVE ASSEMBLY	KH 085
12	100268030	GAS VALVE ASSEMBLY	KH 110
12	100268031	GAS VALVE ASSEMBLY	KH 155
12	100268032	GAS VALVE ASSEMBLY	KH 199
12	100268033	GAS VALVE ASSEMBLY	KH 285
13	100267005	SWITCH, GAS VALVE ON/OFF	ALL
14	100163054	FLANGE, GAS VALVE W/ O-RING GASKET	ALL
15	100266999	FAN ASSEMBLY	KH 055-155
15	100267000	FAN ASSEMBLY	KH 199-285
16	100146541	GASKET, FAN	ALL
17	100209799	VENTURI, NAT	KH 055-085
17	100209800	VENTURI, NAT	KH 110 & 199
17	100209803	VENTURI, NAT	KH 155
17	100209810	VENTURI, NAT	KH 285
17	100209805	VENTURI, LP	KH 055
17	100209806	VENTURI, LP	KH 085
17	100209807	VENTURI, LP	KH 110
17	100209808	VENTURI, LP	KH 155
17	100209804	VENTURI, LP	KH 199
17	100209811	VENTURI, LP	KH 285
18	100209446	GASKET, VENTURI	KH 055-155
18	100146547	GASKET, VENTURI	KH 199-285
19	100138317	COUPLING, AIR INLET	KH 055-199
19	100138382	COUPLING, AIR INLET	KH 285
20	100162996	HOSE BARB, BRASS	ALL
21	100267010	AIR INTAKE CONNECTION, 2" x 8" PVC	ALL
22	100138380	COUPLING, AIR INLET	KH 110-285
23	100209326	UNION ADAPTER	ALL
24	100209445	UNION ADAPTER GASKET	ALL
PILOT & BURNER ASSEMBLIES			
25	100165925	IGNITOR W/ GASKET	ALL
26	100146549	GASKET, IGNITOR	ALL
27	100165930	FLAME SENSOR W/ GASKET	ALL
28	100146550	GASKET, FLAME SENSOR	ALL
29	100189215	SIGHT GLASS KIT	ALL
30	100209436	GASKET, SIGHT GLASS	ALL
31	100268111	HEAT EXCHANGER TOP PLATE ASSEMBLY	KH 055-085
31	100268112	HEAT EXCHANGER TOP PLATE ASSEMBLY	KH 110-155
31	100268113	HEAT EXCHANGER TOP PLATE ASSEMBLY	KH 199-285
32	100209441	GASKET, HEAT EXCHANGER TOP PLATE	KH 055-085
32	100209437	GASKET, HEAT EXCHANGER TOP PLATE	KH 110-155
32	100209435	GASKET, HEAT EXCHANGER TOP PLATE	KH 199-285
33	100267965	BURNER W/ GASKET	KH 055-085
33	100267967	BURNER W/ GASKET	KH 110-155
33	100267968	BURNER W/ GASKET	KH 199-285
34	100209440	GASKET, BURNER	KH 055-085
34	100209438	GASKET, BURNER	KH 110-155
34	100209442	GASKET, BURNER	KH 199-285
35	100209419	INSULATION, TOP PLATE	KH 055-085
35	100209424	INSULATION, TOP PLATE	KH 110-155
35	100209426	INSULATION, TOP PLATE	KH 199-285
MISCELLANEOUS			
36	100167442	RELIEF VALVE, 30 PSI	ALL
37	100146999	GAUGE, TRIOMETER, 75# PSI	ALL
38	100266425	WATER TUBE, OUTLET	KH 055-085
38	100266427	WATER TUBE, OUTLET	KH 110-155
38	100266422	WATER TUBE, OUTLET	KH 199-285
39	100266424	WATER TUBE, INLET	KH 055-085
39	100266426	WATER TUBE, INLET	KH 110-155
39	100266423	WATER TUBE, INLET	KH 199-285
40	100146354	GASKET, WATER TUBE	KH 055-155
40	100146372	GASKET, WATER TUBE	KH 199-285
41	100209668	CONDENSATE TRAP ASSEMBLY	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
42	100267403	HOSE ASSEMBLY, CONDENSATE TRAP	KH 055-085
42	100267396	HOSE ASSEMBLY, CONDENSATE TRAP	KH 110-285
43	100166513	FLUE CONNECTION PIPE, 2" CPVC	KH 055-085
43	100166514	FLUE CONNECTION PIPE, 3" CPVC	KH 110-285
-	100146010	FUSE, TIME DELAY, 0.8 AMP	ALL
-	100146012	FUSE, TIME DELAY, 3.15 AMP	ALL
-	100146013	FUSE, TIME DELAY, 5 AMP	ALL
-	100162948	BIRD SCREEN, 2" PVC	KH 055-085
-	100163055	BIRD SCREEN, 3" PVC	KH 110-285
-	100170590	BULB WELL, 1/4"	ALL
-	100170581	SENSOR, SYSTEM	ALL
-	100170604	SENSOR, OUTDOOR AIR	ALL
-	100209819	HARNESS, CONNECTION BOARD	ALL
-	100172847	HARNESS, FLAME SENSE ELECTRODE	ALL
-	100173094	HARNESS, SPARK ELECTRODE	ALL
-	100209816	HARNESS, POWER CONTROL	ALL
-	100209817	HARNESS, UNIT CONTROL	ALL
-	100173104	CABLE, RIBBON	ALL
-	100173696	FLOW SWITCH	ALL
-	100173646	LOW WATER CUT OFF, MR W/ TEST	ALL
-	100157719	KIT, ALARM BELL	ALL
-	100267566	KIT, INSTALL	KH 055-085
-	100209658	KIT, INSTALL	KH 110-155
-	100209659	KIT, INSTALL	KH 199-285
-	100157718	KIT, SYSTEM SENSOR	ALL
-	100157721	KIT, NEUTRALIZER	ALL
-	100268040	KIT, LP CONVERSION	KH 055
-	100268104	KIT, LP CONVERSION	KH 085
-	100268105	KIT, LP CONVERSION	KH 110
-	100268107	KIT, LP CONVERSION	KH 155
-	100268108	KIT, LP CONVERSION	KH 199
-	100268109	KIT, LP CONVERSION	KH 285
-	100157609	KIT, SIDEWALL VENT - 2"	KH 055-085
-	100157610	KIT, SIDEWALL VENT - 3"	KH 055-285
-	100157611	KIT, SIDEWALL VENT - 4"	KH 199-285
-	100267287	TEE, 2" CPVC W/ ANALYZER PORT	KH 055-085
-	100267285	TEE, 3" CPVC W/ ANALYZER PORT	KH 110-285
PUMPS			
-	100166349	PUMP	KH 055-155
-	100166404	PUMP	KH 199-285
JACKET ASSEMBLY			
44	100268026	JACKET, OUTER TOP ASSEMBLY	ALL
45	100268021	JACKET, OUTER FRONT ASSEMBLY	ALL
46	100268025	JACKET, OUTER RIGHT ASSEMBLY	ALL
47	100268022	JACKET, OUTER LEFT ASSEMBLY	KH 055-085
47	100268023	JACKET, OUTER LEFT ASSEMBLY	KH 110-155
47	100268024	JACKET, OUTER LEFT ASSEMBLY	KH 199-285
48	100209552	WATER OUTLET COVER PANEL	ALL
49	100209529	FLUE SENSOR COVER PANEL	ALL
50	100209538	CONTROL PANEL COVER	ALL
51	100209548	JUNCTION BOX COVER	ALL
52	100162622	DOOR HANDLE	ALL
-	100162552	DOOR CATCH	ALL
-	100162929	DOOR STRIKE	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

HIGH EFFICIENCY CONDENSING BOILERS



CONXUS[®]
REMOTE CONNECT CAPABLE

SMART SYSTEM

OPERATING CONTROL FEATURING
A BUILT-IN CASCADING SEQUENCER

7 MODELS: 55,000 – 399,999 BTU/HR

5:1 TURNDOWN RATIO

LESS THAN 20 ppm NO_x

DIRECT VENT FLEXIBILITY TO 100 FEET



95% **AFUE EFFICIENCY**
*See back page for efficiency by model



DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA



THE SMARTEST CHOICE FOR CONDENSING BOILER PERFORMANCE

The KNIGHT[™] Wall Mount, engineered with Lochinvar's exclusive SMART SYSTEM[™] control and an array of other innovative features is far ahead of any heating boiler in its class. It promises and delivers ultimate ease of installation and maintenance. With up to 99% efficiency, low-NOx emissions and a fully modulating burner, it is the best "green choice" for today's environmentally focused market.

Seven modulating/condensing stainless steel KNIGHT Wall Mount boilers are available with 55,000–399,999 Btu/hr inputs in a space-saving wall-mounted design. All are equipped for direct-vent installation with air intake and exhaust runs up to 100 feet using PVC, CPVC, Polypropylene or AL29-4C vent materials. This range of choices is ideal for residential or light-duty applications such as small hotels, schools and office buildings. For higher-demand applications, up to eight KNIGHT Wall Mount units can be installed utilizing the built-in cascading sequencer to deliver up to 3.2 million Btu/hr heating capacity.

The KNIGHT Wall Mount Boiler reflects Lochinvar's constant commitment to providing all the options you need to serve every application.



ADVANCED NEGATIVE REGULATION TECHNOLOGY

KNIGHT safely and reliably operates with supply gas pressure as low as 4 inches water column. Negative Regulation (Neg/Reg) technology automatically adjusts fan speed to ensure the correct volume and mix of fuel and air throughout the firing range.

FIRE TUBE DESIGN

This fully welded ASME Certified stainless steel heat exchanger uses oval shaped tubes to pass heat from the products of combustion into the water stored in the vessel. To facilitate heat transfer the tubes are manufactured with dimples to slow the flue products and extract available latent energy. With a fire tube design the flue products are inside tapered passage ways and the water is passed through the vessel. Since the flue products pass through tubes and the water is circulated through a larger diameter vessel a fire tube design allows for minimal head pressure loss through the boiler which allows the boiler to be installed easily into various hydronic applications.

WATER-BACKED COMBUSTION CHAMBER

An outstanding feature of the fire tube design is a water backed combustion chamber. By having the combustion chamber surrounded by water the Knight Wall Mount has more heating surface area. This larger heating surface area allows for efficiencies up to 99%.

FULLY MODULATING BURNER

The SMART SYSTEM allows fully modulating combustion with 5:1 turndown. The burner can fire as low as 20% of maximum input and modulates the firing rate up to 100% as demand increases. The burner is a single stainless steel assembly covered with woven steel mesh and fires in a 360° pattern along the entire length of the burner. This allows the compact KNIGHT to exceed the modulation capacities of units with larger multiple burners.

DIRECT VENTING UP TO 100 FEET

KNIGHT offers 5 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe.

5 FLEXIBLE VENTING OPTIONS

Direct Vent Sidewall



Direct Vent Vertical



Vertical w/Sidewall Air



Concentric Direct Vent Vertical*



Concentric Direct Vent Sidewall*



**Optional Vent Kit Sold Separately*

Lochinvar SMART SYSTEM

REFINED DESIGN PUTS MORE CONTROL AND INFORMATION AT YOUR FINGERTIPS

Advanced features include:

- MULTI-COLOR GRAPHIC LCD DISPLAY
- NAVIGATION DIAL
- USB PORT
- ABILITY TO CONTROL UP TO THREE DIFFERENT SETPOINT TEMPERATURES
- COMPATIBILITY WITH COPPER-FIN II NON-CONDENSING BOILER TO CREATE A FRONT-END LOADING SYSTEM
- BOILERS WITH DIFFERENT INPUTS CAN BE CASCADED TOGETHER TO MAXIMIZE BOILER PLANT TURNDOWN
- MODBUS CAPABILITY (OPTIONAL)
- DHW MODULATION LIMITING
- DHW NIGHT SETBACK*
- 0-10 V BOILER RATE OUTPUT
- 0-10 V SIGNAL TO CONTROL VARIABLE SPEED BOILER PUMP*
- 0-10 V SYSTEM PUMP SIGNAL INPUT*
- HEAT DEMAND FROM 0-10V INPUT
- INSTALLER CAN PROGRAM NAME AND NUMBER INTO THE BOILER
- INSTALLER ADJUSTABLE FREEZE PROTECTION PARAMETERS
- SEPARATELY ADJUSTABLE SH/DHW SWITCHING TIMES*
- INSTALLER ACCESS TO BMS AND RAMP DELAY SETTINGS

*EXCLUSIVE TO LOCHINVAR SMART SYSTEM



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.

CON-X-US®

The CON-X-US mobile communication platform allows SMART SYSTEM to go where no other boiler has gone before:

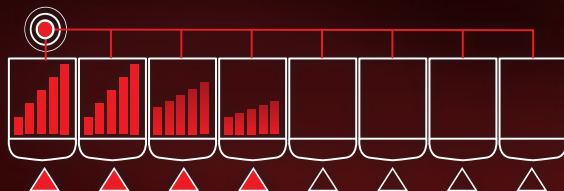
CON-X-US provides the ability to monitor and manage multiple Knight heating boilers without ever stepping into the mechanical rooms. CON-X-US will send alerts via text or e-mail notifying of changes in system status, and anytime, from anywhere, a user can check system status and re-program any boiler 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.

NEW SELECTABLE CASCADE OPTIONS

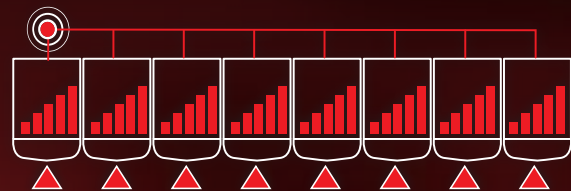
When multiple KNIGHT boilers are installed together, the SMART SYSTEM built-in sequencer can be set for "Lead-Lag" cascade or "Efficiency Optimized" cascade operation.

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.

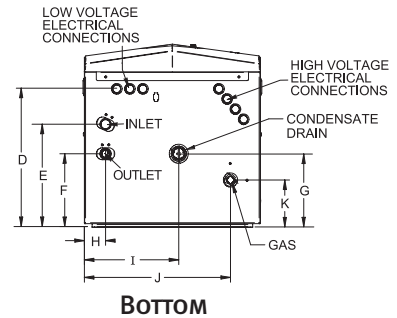
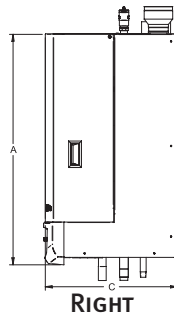
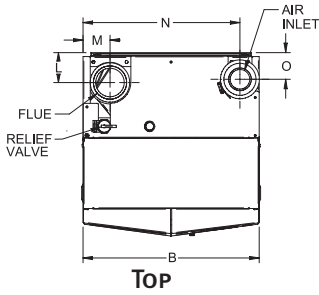
EFFICIENCY OPTIMIZED CASCADE



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 allows 2 - 8 boilers to be sequenced.

KNIGHT® WALL-MOUNT BOILER DIMENSIONS AND SPECIFICATIONS



KNIGHT HEATING BOILER

Model Number	Input Max. MBH	Input Min. MBH	*AFUE %MBH	Heating Capacity MBH	Net AHRI Rating MBH
WHN055	55	11	95.0	51	44
WHN085	85	17	95.0	79	69
WHN110	110	22	95.0	102	89
WHN155	155	31	95.0	144	125
WHN199	199.9	40	95.0	185	161
WHN285	285	57	95.0	264	229
WHN399	399	80	94.4	377	328

DIMENSIONS AND SPECIFICATIONS

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
33-1/4"	18-1/2"	16"	11-3/4"	10-1/2"	6-1/2"	4"	1-1/2"	3"	14-1/2"	5-3/4"	4"	3"	16-1/4"	5"	1/2"	1"	2"	2"	139
33-1/4"	18-1/2"	16"	11-3/4"	10-1/2"	6-1/2"	4"	1-1/2"	3"	14-1/2"	5-3/4"	4"	3"	16-1/4"	5"	1/2"	1"	2"	2"	142
33-1/4"	18-1/2"	19"	14-1/2"	10-3/4"	7-3/4"	7-3/4"	2-1/4"	10"	15-1/2"	5"	3-1/4"	3"	16-1/2"	2-3/4"	1/2"	1"	3"	3"	159
33-1/4"	18-1/2"	19"	14-1/2"	10-3/4"	7-3/4"	7-3/4"	2-1/4"	10"	15-1/2"	5"	3-1/4"	3"	16-1/2"	2-3/4"	1/2"	1"	3"	3"	166
33-1/4"	18-1/2"	19"	14-1/2"	11-3/4"	8"	8"	1-1/4"	10"	16-3/4"	4-3/4"	3-1/4"	2-3/4"	16-1/2"	3"	1/2"	1-1/4"	3"	3"	175
33-1/4"	18-1/2"	19"	14-1/2"	11-3/4"	8"	8"	1-1/4"	10"	16-3/4"	4-3/4"	3-1/4"	2-3/4"	16-1/2"	3"	1/2"	1-1/4"	3"	3"	184
35-1/2"	25"	21-3/4"	17-1/2"	12-1/2"	9-1/4"	9-1/2"	2-1/4"	13-1/4"	21-1/2"	9"	4-3/4"	4"	22-1/2"	3-3/4"	3/4"	1-1/2"	4"	4"	213

Notes: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models. *WHN399 value is Thermal Efficiency

*The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.

SMART SYSTEM™ FEATURES

- ▶ **SMART SYSTEM Digital Operating Control**
Multi-Color Graphic LCD Display with Navigation Dial and Soft Keys
- ▶ **Three Boiler Setpoint Temperature Inputs**
Plus Domestic Hot Water Prioritization
- ▶ **Built-in Cascading Sequencer for up to 8 Boilers**
Multiple Size Boiler Cascade
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
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 Space Heat/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 to Enable/Disable call for heat

- ▶ **Access to BMS Settings through Graphic LCD Display**
- ▶ **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
- ▶ **Maintenance Reminder**
Custom Maintenance Reminder with Contractor Contact Information
Installer Ability to De-activate Service Reminder
- ▶ **Low-Water Flow Safety Control & Indication**
- ▶ **Password Security**
- ▶ **Customizable Freeze Protection Parameters**

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

*The ratings have been determined under the provisions governing forced draft burners.

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
Wall-Mount Bracket
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
- Flow Switch
- Low-Water Cutoff w/Manual Reset & Test
- Alarm Bell
- Concentric Vent Kit
- Condensate Neutralization Kit
- BMS Gateway to LON or BacNet
- Multi-Temperature Loop Control
- Sidewall Vent Termination
- Floor Stand
- Wireless Outdoor Sensor

FIRING CODES

- ▶ M9 Standard Construction
- ▶ M7 California Code

* Exclusive feature, available only from Lochinvar
§ WHN 55-285 only

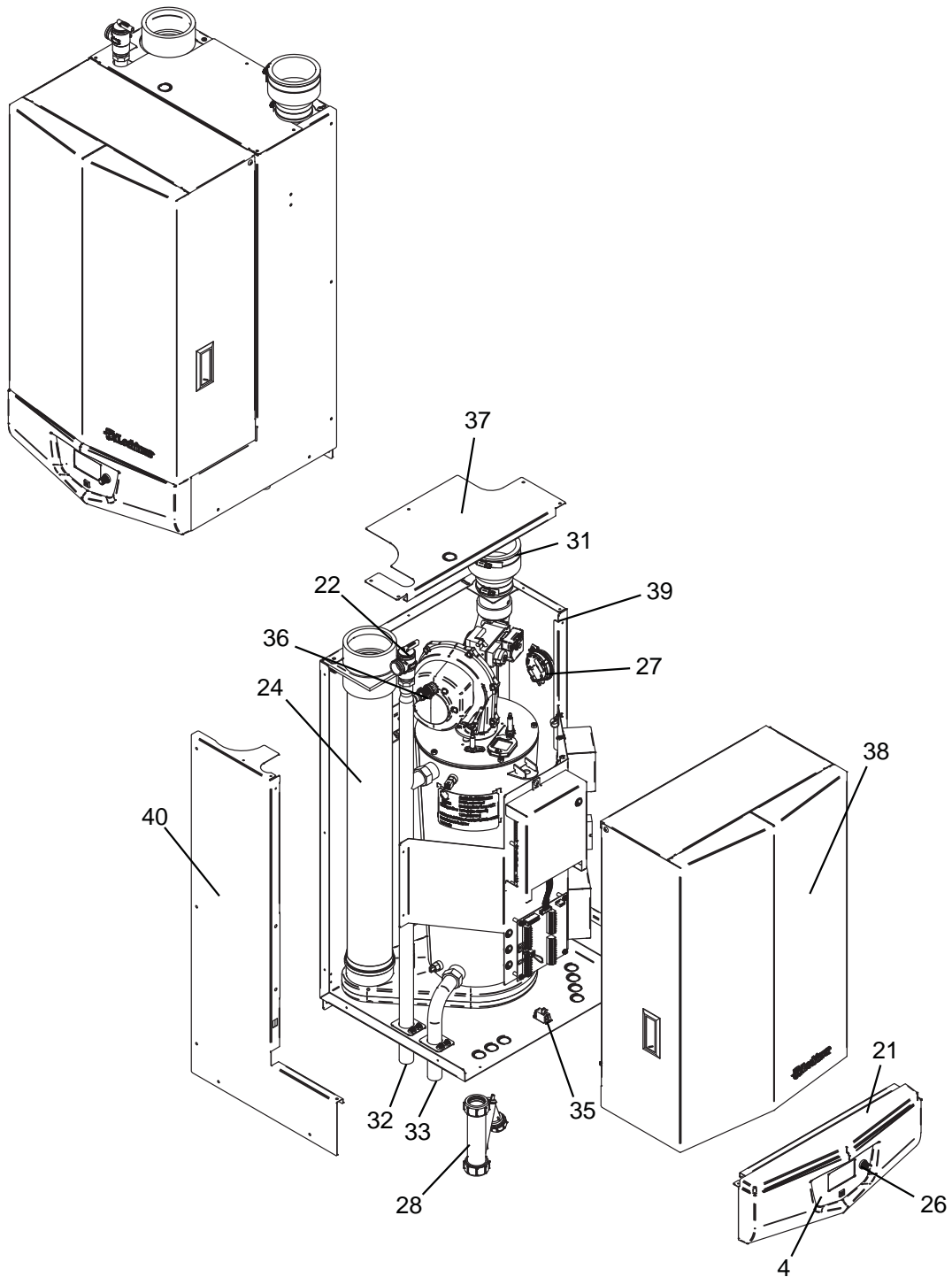
Patent Pending



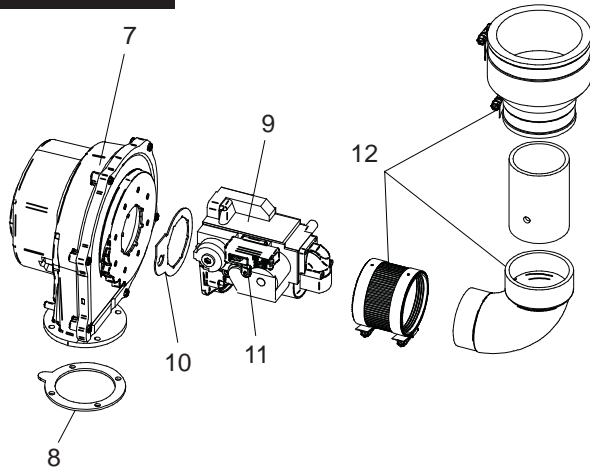


Replacement Parts List

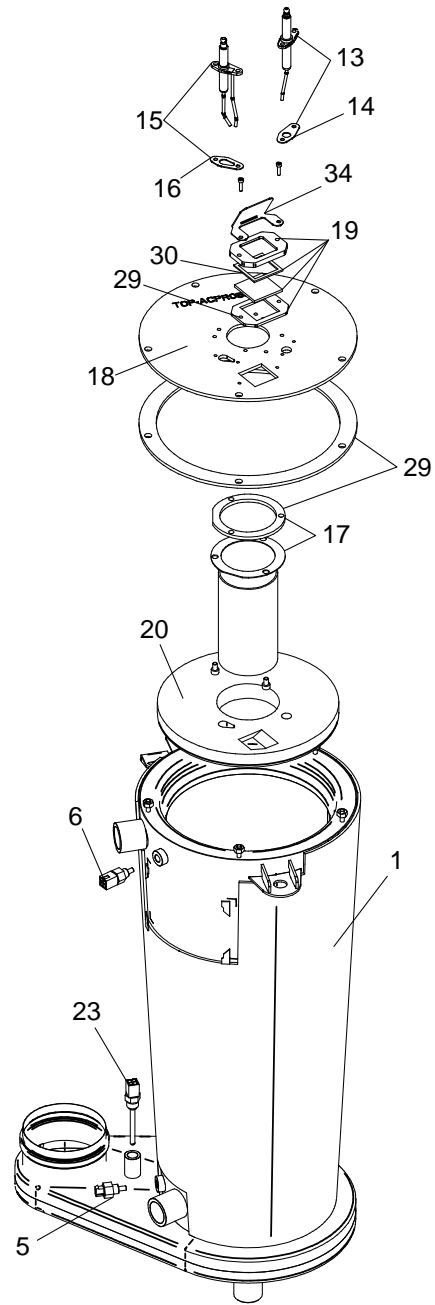
Knight Wall Mount Boilers WH 55 thru 399



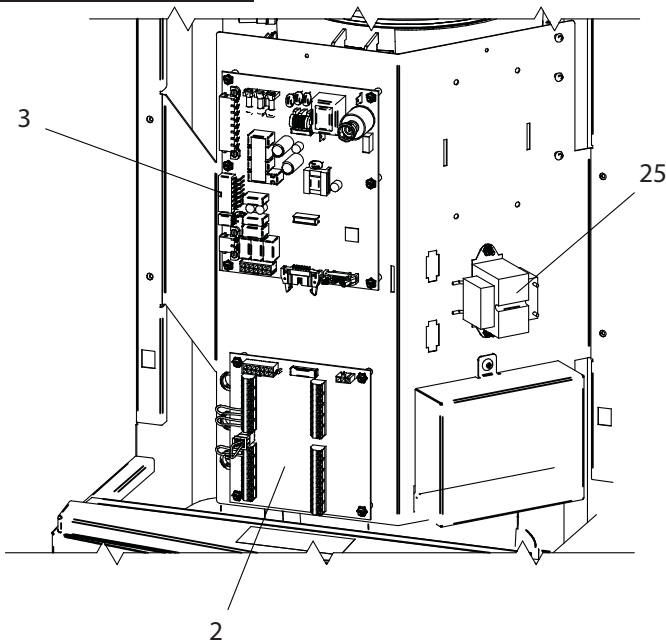
GAS TRAIN



HEAT EXCHANGER



CONTROL PANEL



ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100147333	HEAT EXCHANGER	WH55
1	100147335	HEAT EXCHANGER	WH85
1	100147336	HEAT EXCHANGER	WH110
1	100147337	HEAT EXCHANGER	WH155
1	100147338	HEAT EXCHANGER	WH199
1	100147339	HEAT EXCHANGER	WH285
1	100147340	HEAT EXCHANGER	WH399
CONTROLS			
2	100167581	LOW VOLTAGE CONNECTION BOARD	ALL
3	100167833	INTEGRATED CONTROL	WH55 -110
3	100167834	INTEGRATED CONTROL	WH155
3	100167835	INTEGRATED CONTROL	WH199
3	100167836	INTEGRATED CONTROL	WH285
3	100167837	INTEGRATED CONTROL	WH399
3	100167838	HIGH ALTITUDE INTEGRATED CONTROL	WH55 -110
3	100167839	HIGH ALTITUDE INTEGRATED CONTROL	WH155
3	100167840	HIGH ALTITUDE INTEGRATED CONTROL	WH199
3	100167841	HIGH ALTITUDE INTEGRATED CONTROL	WH285
3	100167842	HIGH ALTITUDE INTEGRATED CONTROL	WH399
4	100167575	USER INTERFACE CONTROL	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)			
5	100170551	INLET SENSOR	ALL
6	100170550	OUTLET SENSOR/ HIGH LIMIT	ALL
7	100145003	FAN ASSEMBLY	WH55-155
7	100145006	FAN ASSEMBLY	WH199 & 285
7	100145008	FAN ASSEMBLY	WH399
8	100146541	BLOWER GASKET	ALL
GAS VALVES			
9	100171944	GAS VALVE ASSEMBLY	WH55
9	100171945	GAS VALVE ASSEMBLY	WH85
9	100171946	GAS VALVE ASSEMBLY	WH110
9	100171947	GAS VALVE ASSEMBLY	WH155
9	100171948	GAS VALVE ASSEMBLY	WH199
9	100171949	GAS VALVE ASSEMBLY	WH285
9	100171950	GAS VALVE ASSEMBLY	WH399
10	100146546	GASKET, VENTURI	WH55 - 285
10	100146547	GASKET, VENTURI	WH399
11	100162949	GAS VALVE SWITCH	WH55-285
12	100163211	AIR INLET KIT	WH55 & 85
12	100163212	AIR INLET KIT	WH110-285
12	100163213	AIR INLET KIT	WH399
PILOT & BURNER ASSEMBLIES			
13	100165930	FLAME SENSOR W/ GASKET	ALL
14	100146550	GASKET, FLAME SENSOR	ALL
15	100165925	IGNITOR W/ GASKET	ALL
16	100146549	GASKET, IGNITOR	ALL
17	100135264	BURNER W/ GASKET	WH55
17	100135265	BURNER W/ GASKET	WH85
17	100135266	BURNER W/ GASKET	WH110
17	100135267	BURNER W/ GASKET	WH155
17	100135268	BURNER W/ GASKET	WH199
17	100135269	BURNER W/ GASKET	WH285 & 399
18	100173750	HEAT EXCHANGER ACCESS DOOR	WH55 & 85
18	100173751	HEAT EXCHANGER ACCESS DOOR	WH110
18	100173752	HEAT EXCHANGER ACCESS DOOR	WH155
18	100173753	HEAT EXCHANGER ACCESS DOOR	WH199
18	100173755	HEAT EXCHANGER ACCESS DOOR	WH285
18	100173754	HEAT EXCHANGER ACCESS DOOR	WH399
MISCELLANEOUS			
19	100163214	SIGHT GLASS W/ GASKET	ALL
20	100145380	BURNER PLATE, INSULATION, DOOR	WH55 & 85
20	100145384	BURNER PLATE, INSULATION, DOOR	WH110
20	100145381	BURNER PLATE, INSULATION, DOOR	WH155
20	100145382	BURNER PLATE, INSULATION, DOOR	WH199
20	100145408	BURNER PLATE, INSULATION, DOOR	WH285
20	100145383	BURNER PLATE, INSULATION, DOOR	WH399
21	100162947	DISPLAY BEZEL	WH55-285
21	100162605	DISPLAY BEZEL	WH399
22	100167442	RELIEF VALVE 30 PSI	ALL
23	100170535	FLUE SENSOR	ALL
24	100166513	FLUE CONNECTION 2"	WH55 & 85
24	100166514	FLUE CONNECTION 3"	WH110-285
24	100166515	FLUE CONNECTION 4"	WH399
25	100170172	TRANSFORMER, 24V, 40VA	ALL
26	100162600	KNOB, FLUTED W/ SKIRT	ALL
27	100166098	PRESSURE SWITCH	WH55 & 85
27	100166115	PRESSURE SWITCH	WH110 & 155
27	100166100	PRESSURE SWITCH	WH199 & 285
27	100166116	PRESSURE SWITCH	WH399
28	100163210	CONDENSATE TRAP ASSEMBLY	ALL
-	100146374	CONNECTION SET, GAS VALVE	ALL
29	100146366	GASKET SET (BURNER, HEAT EXCHANGER, SIGHT GLASS)	WH55 & 85
29	100146367	GASKET SET (BURNER, HEAT EXCHANGER, SIGHT GLASS)	WH110
29	100146368	GASKET SET (BURNER, HEAT EXCHANGER, SIGHT GLASS)	WH155
29	100146369	GASKET SET (BURNER, HEAT EXCHANGER, SIGHT GLASS)	WH199
29	100146383	GASKET SET (BURNER, HEAT EXCHANGER, SIGHT GLASS)	WH285
29	100146371	GASKET SET (BURNER, HEAT EXCHANGER, SIGHT GLASS)	WH399
30	100146377	GASKET, SIGHT GLASS TOP	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
31	100138383	COUPLING, AIR INLET	WH55 & 85
31	100138380	COUPLING, AIR INLET	WH110-285
31	100138381	COUPLING, AIR INLET	WH399
32	100170781	OUTLET WATER PIPE 1"	WH55-155
32	100170782	OUTLET WATER PIPE 1 1/4"	WH199 & 285
32	100170783	OUTLET WATER PIPE 1 1/2"	WH399
33	100170714	INLET WATER PIPE 1"	WH55-155
33	100170717	INLET WATER PIPE 1 1/4"	WH199 & 285
33	100170719	INLET WATER PIPE 1 1/2"	WH399
34	100150436	MIRROR, SIGHT GLASS	ALL
35	100169476	SWITCH, ON/OFF	ALL
36	100167445	AIR VENT VALVE	ALL
	100146148	GAS COCK 3/4"	WH399
	100172814	HARNESS, CONNECTION BOARD	ALL
	100172847	HARNESS, FLAME SENSE ELECTRODE	ALL
	100172848	HARNESS, SPARK ELECTRODE	ALL
	100172850	HARNESS, FAN	WH55 & 85
	100172881	HARNESS, CONTROL POWER	ALL
	100172884	HARNESS, UNIT CONTROL	WH55-285
	100172883	HARNESS, UNIT CONTROL	WH399
	100173088	CABLE, RIBBON	ALL
	100173091	HARNESS, GAS VALVE	WH399
	100162552	CATCH, DOOR	ALL
	100162929	STRIKE, DOOR	ALL
	100170590	BULB WELL, 1/4"	ALL
	100170581	SYSTEM SENSOR	ALL
	100157718	KIT, SYSTEM SENSOR	ALL
	100149680	WALL MOUNT BRACKET	ALL
	100146010	FUSE, 0.8 AMP	ALL
	100146012	FUSE, 3.15 AMP	ALL
	100146013	FUSE, 5 AMP	ALL
	100173696	FLOW SWITCH	ALL
	100170604	OUTDOOR AIR SENSOR	ALL
	100146999	GAUGE TRIOMETER, 75# PSI	ALL
	100173646	MRLWCO WITH TEST	ALL
	100157721	NEUTRALIZER KIT	ALL
	100157719	ALARM BELL	ALL
	100158936	LP CONVERSION KIT	WH55
	100158941	LP CONVERSION KIT	WH85
	100158938	LP CONVERSION KIT	WH110
	100158940	LP CONVERSION KIT	WH155
	100158942	LP CONVERSION KIT	WH199
	100158939	LP CONVERSION KIT	WH285
	100159011	LP CONVERSION KIT	WH399
PUMPS			
	100166410	PUMP	WH55-155
	100166434	PUMP	WH199
	100166435	PUMP	WH285
	100166414	PUMP	WH399
JACKET ASSEMBLY			
37	100150372	JACKET, TOP	WH55 & 85
37	100150383	JACKET, TOP	WH110 & 155
37	100150386	JACKET, TOP	WH199 & 285
37	100150393	JACKET, TOP	WH399
38	100149696	JACKET, FRONT DOOR ASSEMBLY	WH55 & 85
38	100149697	JACKET, FRONT DOOR ASSEMBLY	WH110-285
38	100149698	JACKET, FRONT DOOR ASSEMBLY	WH399
39	100149903	JACKET, RIGHT SIDE ASSEMBLY	WH55 & 85
39	100149904	JACKET, RIGHT SIDE ASSEMBLY	WH110-285
39	100149905	JACKET, RIGHT SIDE ASSEMBLY	WH399
40	100150371	JACKET, LEFT SIDE	WH55 & 85
40	100150382	JACKET, LEFT SIDE	WH110-285
40	100150392	JACKET, LEFT SIDE	WH399

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

HIGH EFFICIENCY COMMERCIAL CONDENSING BOILERS



SMART SYSTEM

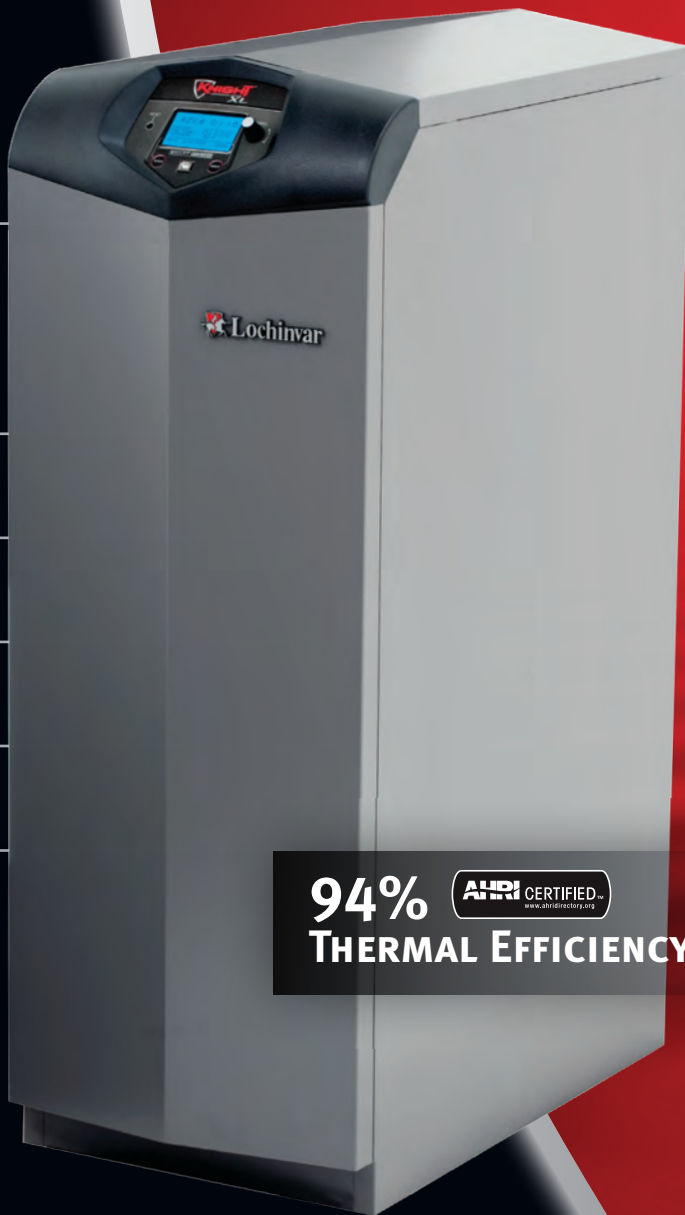
OPERATING CONTROL FEATURING
A BUILT-IN CASCADING SEQUENCER

5 MODELS: 399,000 – 800,000 BTU/HR

5:1 TURNDOWN RATIO

LESS THAN 20 ppm NOx

DIRECT VENT FLEXIBILITY TO 100 FEET



94%  **THERMAL EFFICIENCY**



DESIGNED ★ ENGINEERED ★ ASSEMBLED

USA



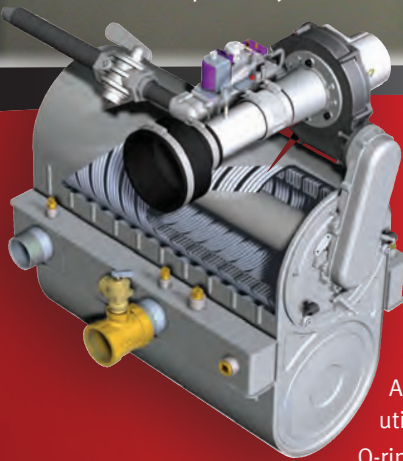
THE SMARTEST CHOICE FOR CONDENSING BOILER PERFORMANCE

The KNIGHT® XL, engineered with Lochinvar's exclusive SMART SYSTEM™ control and an array of other innovative features, places it far ahead of any commercial heating boiler in its class. It promises and delivers ultimate ease of installation and maintenance. With up to 94.6% thermal efficiency, low-NOx emissions and a fully modulating burner, it is the best "green choice" for today's environmentally focused market.

Five modulating/condensing stainless steel KNIGHT XL boilers are available with 399,000–800,000 Btu/hr inputs and remarkably small space-saving footprints. All are equipped for direct-vent installation with air intake and exhaust runs up to 100 feet using PVC, CPVC, Polypropylene or AL29-4C vent materials. This range of choices is ideal for light-duty applications such as small hotels, schools and office buildings. For higher-demand applications, up to eight KNIGHT XL units can be installed utilizing the built-in cascading sequencer to deliver up to 6.4 million Btu/hr heating capacity.

THE KNIGHT XL BOILER reflects Lochinvar's constant commitment to providing all the options you need to serve every application.

*KNIGHT XLs installed
and commissioned by
Black & M^cDonald*



ADVANCED NEGATIVE REGULATION TECHNOLOGY

KNIGHT XL safely and reliably operates with supply gas pressure as low as 4 inches water column. Negative Regulation (Neg/Reg) technology automatically adjusts fan speed that ensures the correct volume and mix of fuel and air throughout the firing range.

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.

FULLY MODULATING BURNER

The SMART SYSTEM allows fully modulating combustion with 5:1 turndown. The burner can fire as low as 20% of maximum input and modulates the firing rate up to 100% as demand increases. The burner is a single stainless steel assembly covered with woven steel mesh and fires in a 360° pattern along the entire length of the primary heat exchanger. This allows the compact KNIGHT XL to exceed the capacity of units with larger multiple burners.

DIRECT VENTING UP TO 100 FEET



SIDEWALL VENT TERMINATION

KNIGHT XL offers 7 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. A sidewall vent termination kit is shipped standard with every KNIGHT boiler.

Sidewall Vent Termination



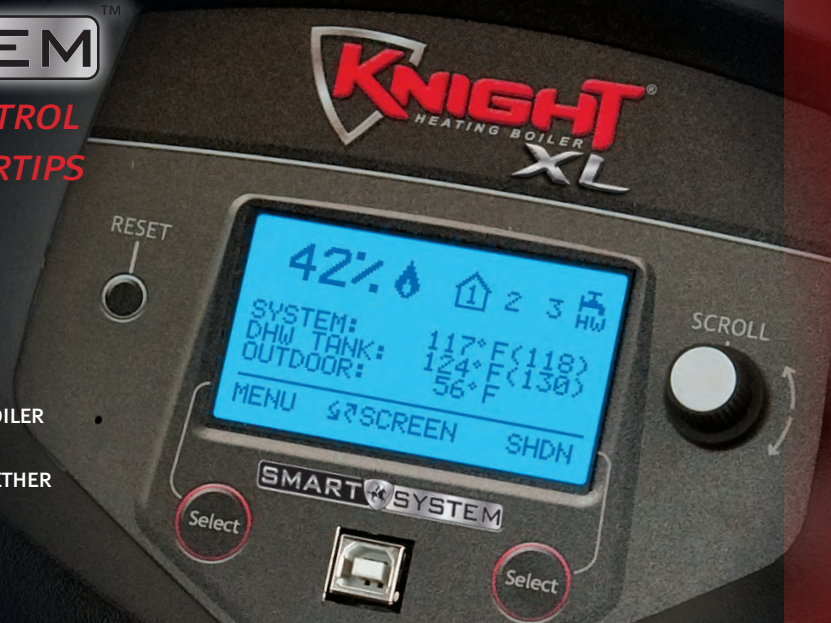
SMART SYSTEM™

REFINED DESIGN PUTS MORE CONTROL AND INFORMATION AT YOUR FINGERTIPS

Advanced features include:

- MULTI-COLOR GRAPHIC LCD DISPLAY
- NAVIGATION DIAL
- USB PORT
- ABILITY TO CONTROL UP TO THREE DIFFERENT SETPOINT TEMPERATURES
- COMPATIBILITY WITH COPPER-FIN II NON-CONDENSING BOILER TO CREATE A FRONT-END LOADING SYSTEM
- BOILERS WITH DIFFERENT INPUTS CAN BE CASCADED TOGETHER TO MAXIMIZE BOILER PLANT TURNDOWN
- MODBUS CAPABILITY (OPTIONAL)
- DHW MODULATION LIMITING
- DHW NIGHT SETBACK*
- 0-10 VDC BOILER RATE OUTPUT
- 0-10 VDC SIGNAL TO CONTROL VARIABLE SPEED BOILER PUMP*
- 0-10 VDC SYSTEM PUMP SIGNAL INPUT*
- HEAT DEMAND FROM 0-10V INPUT
- INSTALLER CAN PROGRAM NAME AND NUMBER INTO THE BOILER
- INSTALLER ADJUSTABLE FREEZE PROTECTION PARAMETERS
- SEPARATELY ADJUSTABLE SH/DHW SWITCHING TIMES*
- INSTALLER ACCESS TO BMS AND RAMP DELAY SETTINGS

**EXCLUSIVE TO LOCHINVAR SMART SYSTEM*



AT-A-GLANCE COLOR CODING



BLUE SCREEN
Normal system operation.



YELLOW SCREEN
Maintenance due - shows the installer's name and number on the display.

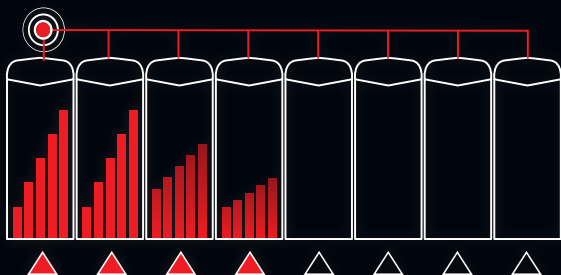


RED SCREEN
Lockout mode.

NEW SELECTABLE CASCADE OPTIONS

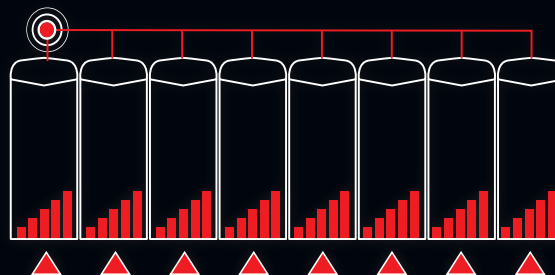
When multiple KNIGHT boilers are installed together, the SMART SYSTEM built-in sequencer can be set for "Lead-Lag" cascade or "Efficiency Optimized" cascade operation.

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.

7 FLEXIBLE VENTING OPTIONS

Direct Vent Sidewall

Direct Vent Vertical

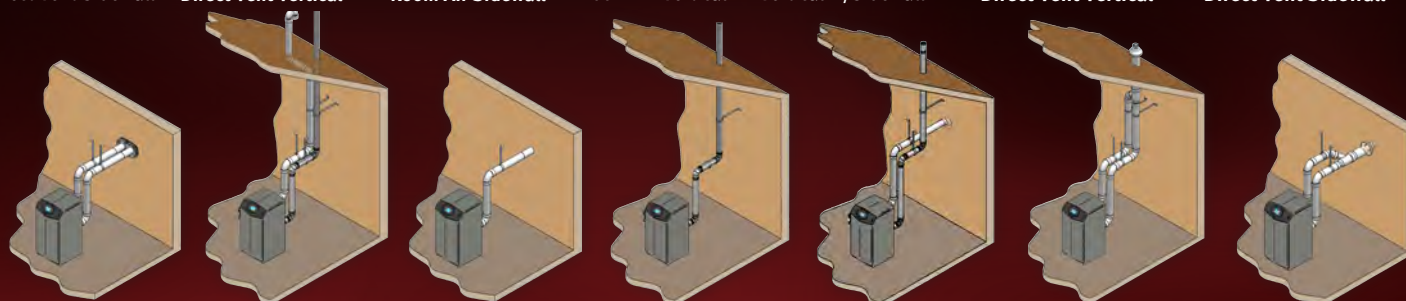
Room Air Sidewall

Room Air Vertical

Vertical w/Sidewall Air

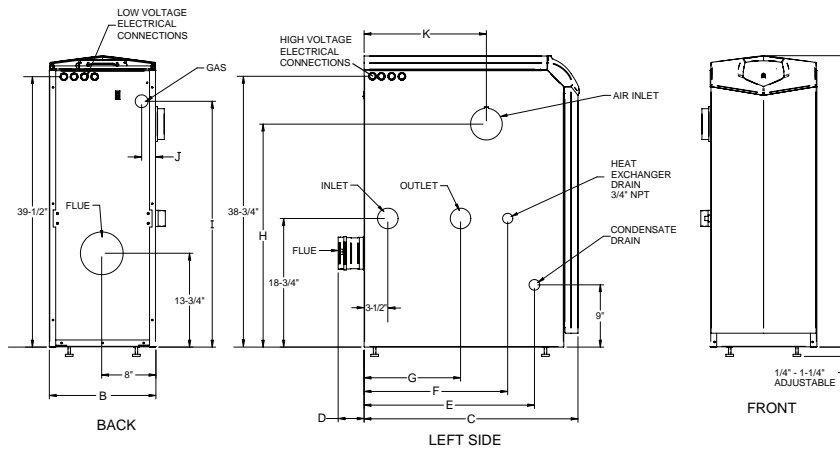
Direct Vent Vertical*

Direct Vent Sidewall*



**Optional Concentric Vent Kit Sold Separately (for 400-601 Models)*

KNIGHT® XL BOILER DIMENSIONS AND SPECIFICATIONS



Model Number Guide				
KB	N	701	M13	
Model	Natural Gas	Btu/hr Input	Firing Controls	

*Knight XL Boiler,
Natural Gas,
700,000 Btu/hr input,
M13 firing controls*

KNIGHT XL HEATING BOILER					
Model Number	Input Min MBH	Input Max MBH	Thermal Efficiency	Output MBH	Net AHRI Rating MBH
KBN400	80	399	94.0%	376	327
KBN501	100	500	94.0%	470	409
KBN601	120	600	94.0%	564	490
KBN701	140	700	94.0%	658	572
KBN801	160	800	94.0%	752	654

DIMENSIONS AND SPECIFICATIONS																
A	B	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)	
42-1/2"	15-1/2"	27-3/4"	3-3/4"	20-3/4"	21"	14"	34"	34"	2"	18-3/4"	1"	1-1/2"	4"	4"	280	
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	
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	
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	
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.

STANDARD FEATURES

- › **94% 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, Polypropylene 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-Color 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**
 - Multiple Size Boiler Cascade
 - Front end loading capability with Copper Fin II 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**
 - 0-10 VDC Input to Control Modulation or Set Point
 - 0-10 VDC Input Signal from Variable Speed System Pump*
 - 0-10 VDC Modulation Rate Output
 - 0-10 VDC 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
 - 0-10 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
 - › **Other Features**
 - Low Water Flow Safety Control & Indication
 - Password Security
 - Inlet & Outlet Temperature Readout
 - Customizable Freeze Protection Parameters
 - Custom Maintenance Reminder with Contractor Info
- *Exclusive feature, available only from Lochinvar*

FIRING CODES

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

OPTIONAL EQUIPMENT

- Alarm Bell
- Condensate Neutralization Kit
- Concentric Vent Kit (KB400-KB601)
- BMS Gateway to LON or BacNet
- High & Low Gas Pressure Switches w/ Manual Reset (KB501-KB801)
- Variable Speed Boiler Circulation Pump

- MODBUS Communication
- Multi Temperature Loop Control
- Low Water Cutoff w/Manual Reset & Test
- Constant Speed Boiler Circulation Pump
- Stainless Steel Vent Kits (KB701-KB801)
- Stack Frame



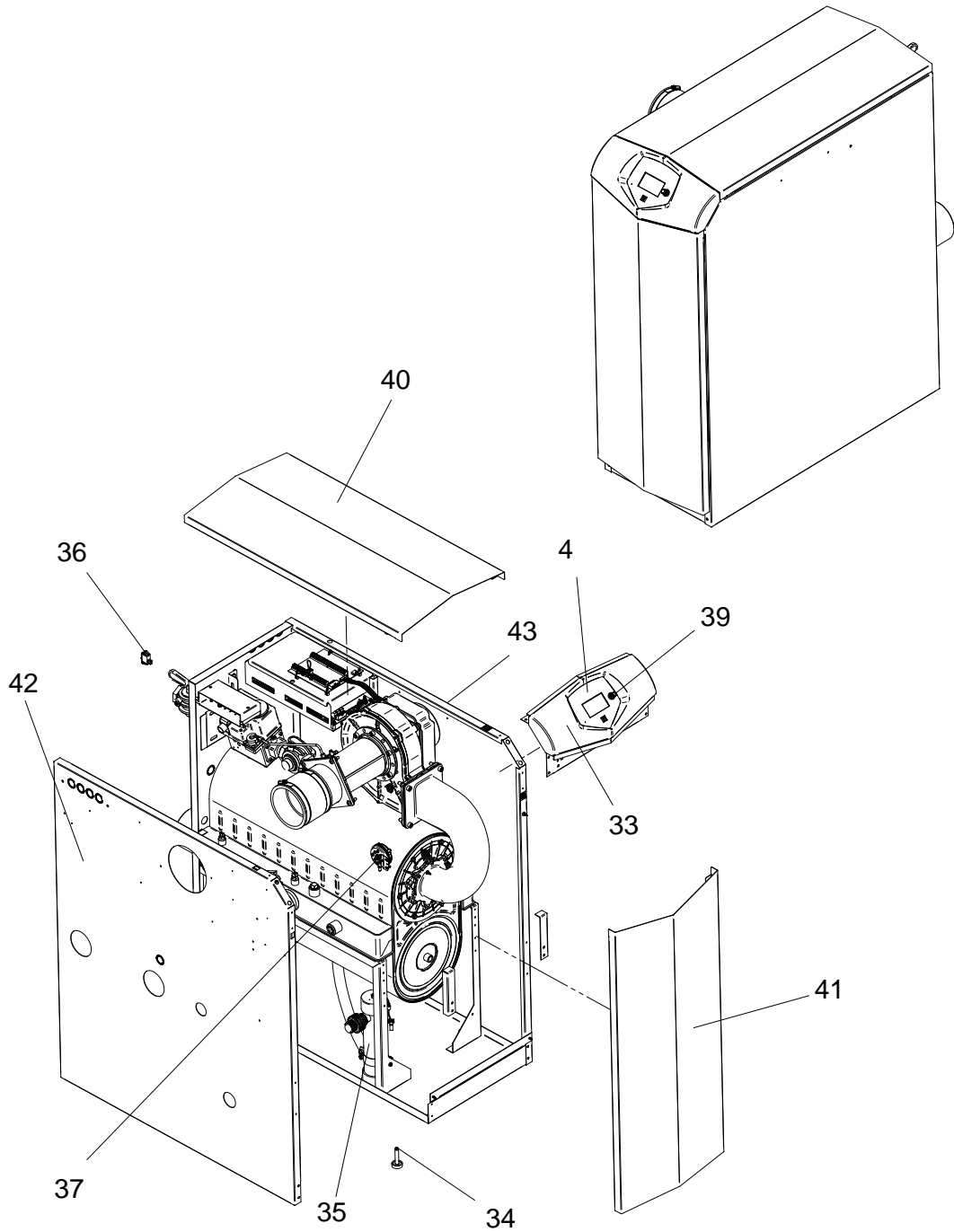
Registered Under
U.S. Patents
#7824178 and
7506617



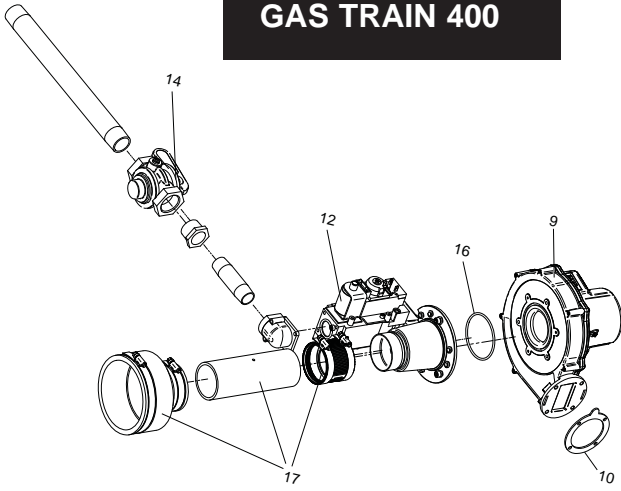


Replacement Parts List

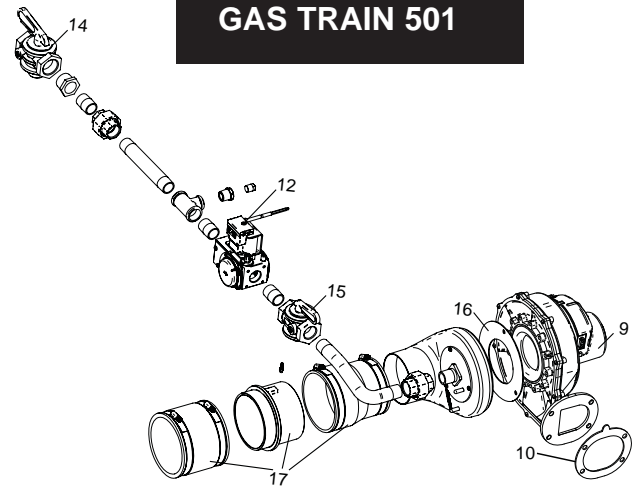
**Knight XL
Heating Boilers
KB 400 thru 801**



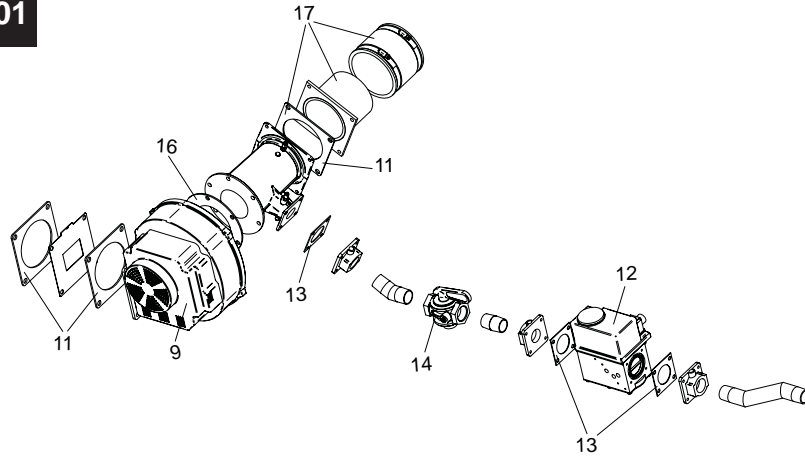
GAS TRAIN 400



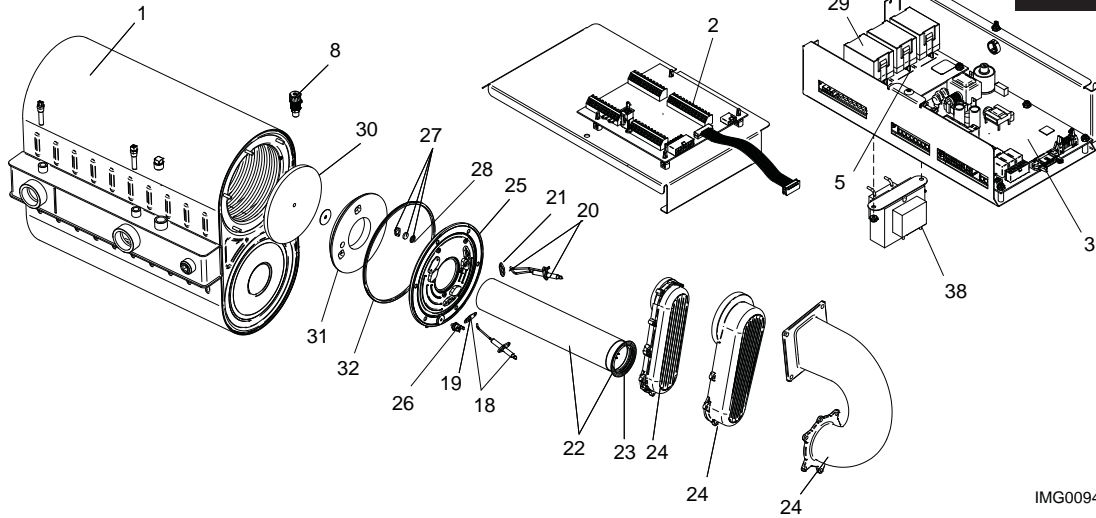
GAS TRAIN 501



GAS TRAIN 601-801



HEAT EXCHANGER 400-801



CONTROL PANEL

IMG00949

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX3081	HEAT EXCHANGER	KBN400
1	HEX3082	HEAT EXCHANGER	KBN501
1	HEX3088	HEAT EXCHANGER	KBN601
1	HEX3089	HEAT EXCHANGER	KBN701
1	HEX3090	HEAT EXCHANGER	KBN801
CONTROLS			
2	RLY20062	LOW VOLTAGE CONNECTION BOARD	ALL
3	RLY30037	INTEGRATED CONTROL PRIOR TO SERIAL H10	KBN400
3	RLY30065	INTEGRATED CONTROL BEGINNING SERIAL H10	KBN400

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)			
3	RLY30038	INTEGRATED CONTROL PRIOR TO H10	KBN501
3	RLY30066	INTEGRATED CONTROL BEGINNING H10	KBN501
3	RLY30039	INTEGRATED CONTROL PRIOR TO H10	KBN601 - 801
3	RLY30067	INTEGRATED CONTROL BEGINNING H10	KBN601 - 801
3	RLY30040	HIGH ALTITUDE INTEGRATED CONTROL PRIOR TO H10	KBN400
3	RLY30068	HIGH ALTITUDE INTEGRATED CONTROL BEGINNING H10	KBN400
3	RLY30041	HIGH ALTITUDE INTEGRATED CONTROL PRIOR TO H10	KBN501
3	RLY30069	HIGH ALTITUDE INTEGRATED CONTROL BEGINNING H10	KBN501
3	RLY30042	HIGH ALTITUDE INTEGRATED CONTROL PRIOR TO H10	KBN601 - 801
3	RLY30070	HIGH ALTITUDE INTEGRATED CONTROL BEGINNING H10	KBN601 - 801
4	RLY20058	USER INTERFACE CONTROL	ALL
	LBL20136	USER INTERFACE OVERLAY	ALL
5	RLY2085	RELAY BOARD, 1.5 HP PUMP	ALL
6	TST2060	INLET SENSOR	ALL
7	TST20009	OUTLET SENSOR/ HIGH LIMIT	ALL
8	RLV30000	AIR VENT VALVE	ALL
9	FAN3035	FAN ASSEMBLY	KBN400
9	FAN3037	FAN ASSEMBLY	KBN501
9	FAN30001	FAN ASSEMBLY	KBN601 - 801
10	GKT2436	BLOWER/AIR ARM GASKET	KBN400
10	GKT2438	BLOWER/AIR ARM GASKET	KBN501
11	GKT2034	BLOWER/AIR ARM GASKET	KBN601-801
GAS VALVES			
12	VAL3204	GAS VALVE ASSEMBLY	KBN400
12	VAL3207	GAS VALVE ASSEMBLY NAT	KBN501
12	VAL3212	GAS VALVE ASSEMBLY NAT	KBN601
12	VAL30006	GAS VALVE ASSEMBLY NAT	KBN701
12	VAL3213	GAS VALVE ASSEMBLY NAT	KBN801
12	VAL30011	GAS VALVE ASSEMBLY LP	KBL501
12	VAL30012	GAS VALVE ASSEMBLY LP	KBL601
12	VAL30013	GAS VALVE ASSEMBLY LP	KBL701
12	VAL30014	GAS VALVE ASSEMBLY LP	KBL801
13	GKT2050	GAS VALVE GASKET	KBN601 - 801
14	GAC2029	GAS CUT OFF VALVE 1X1	ALL
15	GAC2028	GAS CUT OFF VALVE 3/4 X 3/4	KBN501
16	GKT2444	GASKET, VENTURI	KBN400
16	GKT2080	AIR SHROUD GASKET	KBN501
16	GKT2049	GASKET, VENTURI	KBN601 - 801
17	MSC3185	AIR INLET KIT	KBN400
17	MSC3187	AIR INLET KIT	KBN501
17	MSC3186	AIR INLET KIT	KBN601-801
PILOT & BURNER ASSEMBLIES			
18	PLT3022	FLAME SENSOR W/ GASKET	KBN400/501
18	PLT3023	FLAME SENSOR W/ GASKET	KBN601 - 801
19	GKT2450	GASKET, FLAME SENSOR	ALL
20	PLT3021	IGNITOR W/ GASKET	KBN400/501
20	PLT30000	IGNITOR W/ GASKET	KBN601 - 801
21	GKT2449	GASKET, IGNITOR	ALL
22	BNR3429	BURNER W/ GASKET	KBN400/501
22	BNR3432	BURNER W/ GASKET	KBN601
22	BNR3433	BURNER W/ GASKET	KBN701
22	BNR3434	BURNER W/ GASKET	KBN801
23	GKT2451	GASKET, BURNER	KBN400/501
23	GKT2062	GASKET, BURNER	KBN601 - 801
24	WTR3078	GAS/AIR ARM ASSEMBLY W/GASKET	KBN400
24	WTR3079	GAS/AIR ARM ASSEMBLY W/GASKET	KBN501
24	WTR3085	GAS/AIR ARM ASSEMBLY W/GASKET	KBN601 - 801
25	WTR3080	HEAT EXCHANGER ACCESS DOOR KIT	KBN400/501
25	WTR3086	HEAT EXCHANGER ACCESS DOOR KIT	KBN601 - 801
26	HLC20005	HEX DOOR TEMP SWITCH BEGINNING SERIAL F14	ALL
MISCELLANEOUS			
27	MSC3180	SIGHT GLASS	ALL
28	GKT2453	GASKET, SIGHT GLASS	ALL
29	RLY2222	RELAY, 1.5 HP PUMP	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
30	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
31	FIB2168	BURNER PLATE, INSULATION, DOOR	KBN400/501
31	FIB2146	BURNER PLATE, INSULATION, DOOR	KBN601 - 801
32	GKT2455	GASKET DOOR RUBBER	KBN400/501
32	GKT2063	GASKET DOOR RUBBER	KBN601 - 801
33	MSC2177	DISPLAY BEZEL	ALL
34	BLT2104	LEVELING LEGS	ALL
35	MSC30050	CONDENSATE TRAP	ALL
-	SWT2011	BLOCKED DRAIN SWITCH	ALL
36	SWT2006	ON/OFF SWITCH	ALL
37	PRS20002	PRESSURE SWITCH	KBN400
37	PRS20020	PRESSURE SWITCH	KBN501
37	PRS20019	PRESSURE SWITCH	KBN601-801
38	TRF20000	TRANSFORMER, 40VA	KBN400 - 701
38	TRF20002	TRANSFORMER, 60VA	KBN801
39	MSC20123	KNOB, FLUTED W / SKIRT	ALL
-	RLV2084	RELIEF VALVE 50 PSI	KBN400-601
-	RLV2001	RELIEF VALVE 50 PSI	KBN701/801
-	FUS20001	0.8 AMP	ALL
-	FUS2001	3.15 AMP	ALL
-	FUS2002	5 AMP	ALL
-	WTR2040	FLOW SWITCH	ALL
-	MSC2514	HIGH VOLTAGE CONNECTION BOARD	ALL
-	TST2311	OUTDOOR AIR SENSOR	ALL
-	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
-	TST30011	FLUE TEMP SENSOR KIT	ALL
-	JKB30111	KIT, COLLAR FLUE 4"	KBN400-601
-	KIT3078	SYSTEM SENSOR	ALL
-	WTR20009	MRLWCO WITH TEST	ALL
-	KIT3087	NEUTRALIZER KIT	KBN400/501
-	KIT3046	NEUTRALIZER KIT	KBN601-801
-	KIT3085	ALARM BELL	ALL
-	LPK3949	LP CONVERSION KIT	KBN400
-	LPK3950	LP CONVERSION KIT (AFTER SERIAL# J07 FOR KBN500)	KBN501-801
-	TST2032	SYSTEM SENSOR	ALL
-	TST2044	BULB WELL 1/4"	ALL
-	HLC30000	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
-	WRE20052	HARNESS, POWER	ALL
-	WRE20054	HARNESS, CONNECTION BOARD	ALL
-	WRE30005	HARNESS, UNIT	ALL
-	WRE2200	HARNESS, SPARK ELECTRODE	KBN400 & 501
-	WRE2230	HARNESS, SPARK ELECTRODE	KBN601-801
-	WRE2203	CABLE, RIBBON	KBN400 & 501
-	WRE2229	CABLE, RIBBON	KBN601-801
-	WRE2206	HARNESS, GAS VALVE	KBN400
-	WRE30000	HARNESS, GAS VALVE	KBN500
-	WRE2021	HARNESS, GAS VALVE	KBN601-801
-	WRE2211	HARNESS, FLAME SENSE ELECTRODE	ALL
JACKET ASSEMBLY			
40	JKB40043	JACKET, TOP	KBN400
40	JKB30015	JACKET, TOP	KBN501
40	JKB40045	JACKET, TOP	KBN601
40	JKB40046	JACKET, TOP	KBN701
40	JKB40030	JACKET, TOP	KBN801
41	JKB30014	JACKET, FRONT	ALL
42	JKB40096	JACKET, LEFT SIDE	KBN400
42	JKB40083	JACKET, LEFT SIDE	KBN501
42	JKB40082	JACKET, LEFT SIDE	KBN601
42	JKB40081	JACKET, LEFT SIDE	KBN701
42	JKB40080	JACKET, LEFT SIDE	KBN801
43	JKB60192	JACKET, RIGHT SIDE	KBN400
43	JKB60194	JACKET, RIGHT SIDE	KBN501
43	JKB60196	JACKET, RIGHT SIDE	KBN601
43	JKB60198	JACKET, RIGHT SIDE	KBN701
43	JKB60199	JACKET, RIGHT SIDE	KBN801
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

OUTDOOR CONDENSING GAS BOILERS



All of the features and benefits that have made the Knight Boiler a favorite among building owners and contractors are now available in a model equipped for outdoor use.

You can now have the reliability, efficiency, and control that you require with a product designed and certified for outdoor installations.



**UP TO 99%
EFFICIENCY**

The outdoor certified Knight operates with efficiencies up to 99% with a modulation rate turndown of 5:1. SMART SYSTEM™ operating controls offer features like cascade, outdoor reset, domestic hot water priority, and external setpoint control through the building management system utilizing 0-10 volts DC.

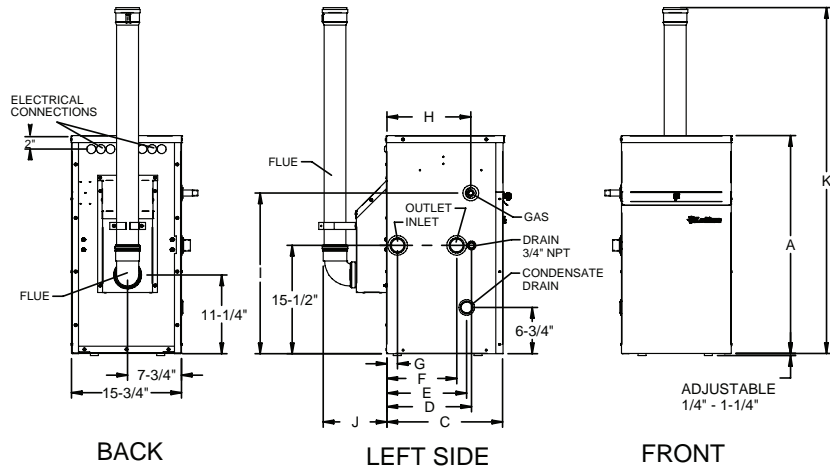
Lochinvar also offers custom package systems incorporating the Knight which can ease installation costs along with reducing the footprint over field fabricated equipment. They are pre-piped, skid mounted, and factory tested before leaving Lochinvar. Information on custom packaged solutions can be found at www.Lochinvar.com.

For more information on the newest member of the Knight family reference the Knight Boiler literature or visit our website www.Lochinvar.com.

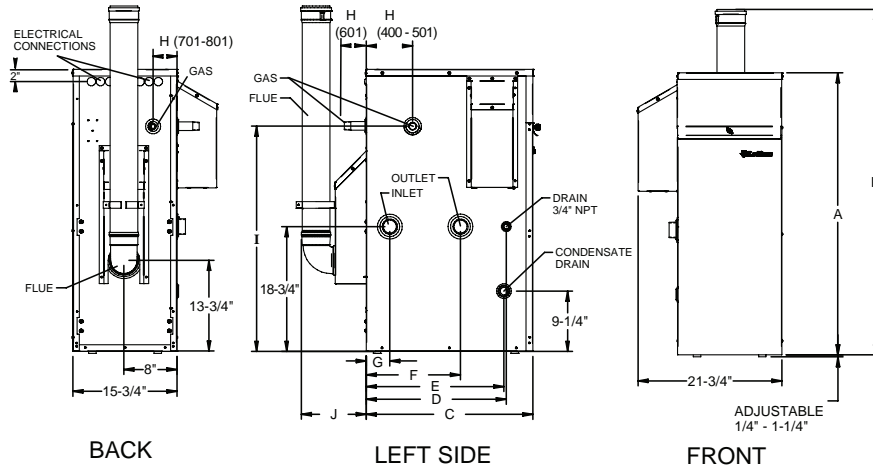


OUTDOOR KNIGHT® BOILER DIMENSIONS AND SPECIFICATIONS

Models:
KBN 151-286



Models:
KBN 400-801



OUTDOOR KNIGHT HEATING BOILER			DIMENSIONS AND SPECIFICATIONS													
Model Number	Input Min. MBH	Input Max. MBH	A	C	D	E	F	G	H	I	J	K	Gas Conn.	Water Conn.	Vent Size	Shipping Wt. (lbs.)
OKN151	30	150	31-1/4"	16-3/4"	12"	11-1/2"	10"	1-3/4"	12"	23"	9"	49-1/2"	1/2"	1"	3"	157
OKN211	42	210	31-1/4"	20-1/4"	16-1/2"	15-3/4"	14-1/2"	5-1/4"	16-1/2"	23"	9-1/4"	49-3/4"	1/2"	1"	3"	172
OKN286	57	285	42-1/2"	17-3/4"	13-1/4"	13-1/2"	6-1/4"	2-1/2"	14"	35-3/4"	9-1/4"	52"	3/4"	1-1/4"	4"	224
OKN400	80	399	42-1/2"	25-1/4"	21"	20-3/4"	14-1/4"	3-1/2"	7"	34"	9-3/4"	52"	1"	1-1/2"	4"	280
OKN501	100	500	42-1/2"	31-1/2"	21-1/4"	25"	14-1/4"	3-3/4"	3-1/2"	35-1/4"	9-3/4"	52-3/4"	1"	1-1/2"	4"	310
OKN601	120	600	42-1/2"	35"	21"	25"	14-1/4"	3-1/2"	4-1/2"	32-3/4"	9-1/2"	52"	1"	2"	4"	340
OKN701	140	700	42-1/2"	41-1/4"	23-1/4"	29-1/4"	17-1/4"	3-1/2"	3"	32-3/4"	12"	49-1/2"	1"	2"	6"	370
OKN801	160	800	42-1/2"	43-1/4"	23-1/4"	33-1/2"	17-1/4"	3-1/2"	3-1/4"	33"	12-1/4"	50-1/2"	1"	2"	6"	405

Notes: Outdoor installation only. All information subject to change. Change "N" to "L" for LP gas models.

OUTDOOR STANDARD FEATURES

- > Energy Star™ Qualified (151-286)
- > Up to 99% Efficiency
- > SMART SYSTEM™ Operating Control
- > 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 (151-286)
 - > 50 psi ASME Relief Valve (400-801)
- > Outdoor Rated Vent System
 - > UV Resistant Polypropylene (151-601)
 - > Stainless Steel (701-801)

- > Condensate Trap
- > Other Features
 - > Automatic Reset High Limit
 - > Adjustable High Limit w/Manual Reset
 - > Adjustable Leveling Legs
 - > Zero Clearances to Combustible Materials
 - > 12-Year Limited Warranty (151-286)
 - > 10-Year Limited Warranty (400-801)

OPTIONAL EQUIPMENT

- > Modbus Communication
- > Condensate Neutralization Kit
- > Multi Temperature Loop Control (Indoor install only)
- > Flow Switch
- > Low-Water Cutoff w/Manual Reset & Test
- > Alarm Bell
- > Boiler Circulation Pump and Pump Cover
- > SMART SYSTEM PC Software
- > BMS Gateway to LON or BacNet
- > High & Low Gas Pressure Switches (501-801)

FIRING CODES

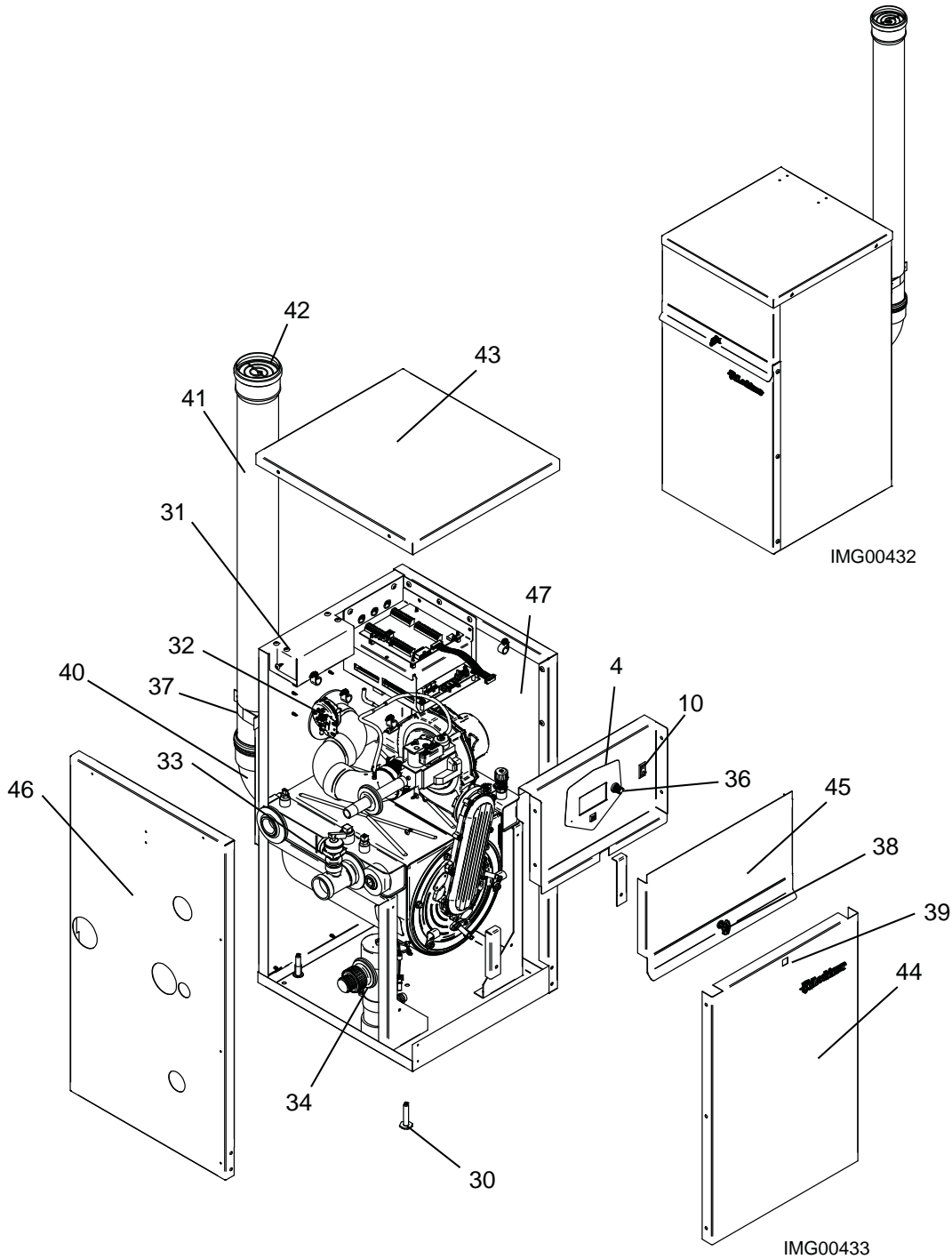
- > M9 Standard Construction
- > M7 California Code
- > M13 CSD-1 / FM / GE Gap (501-801)



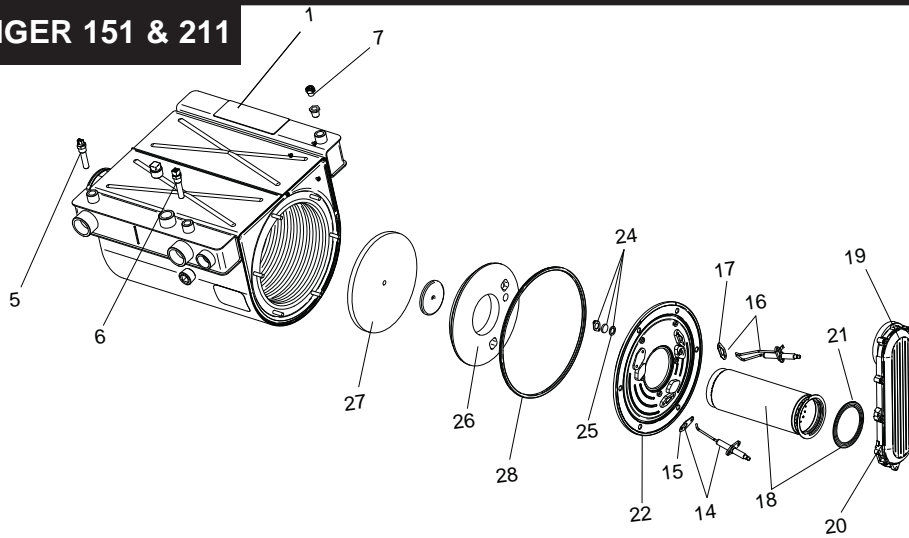


Replacement Parts List

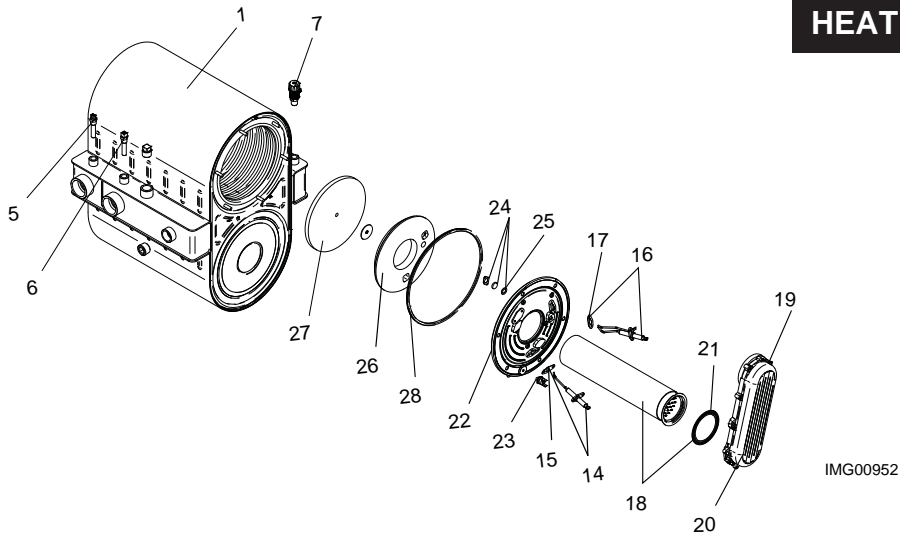
**Outdoor Knight
Heating Boilers
OK 151 thru 286**



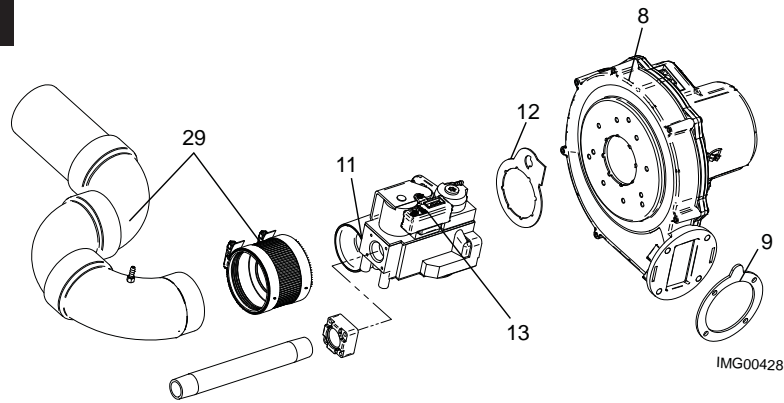
HEAT EXCHANGER 151 & 211



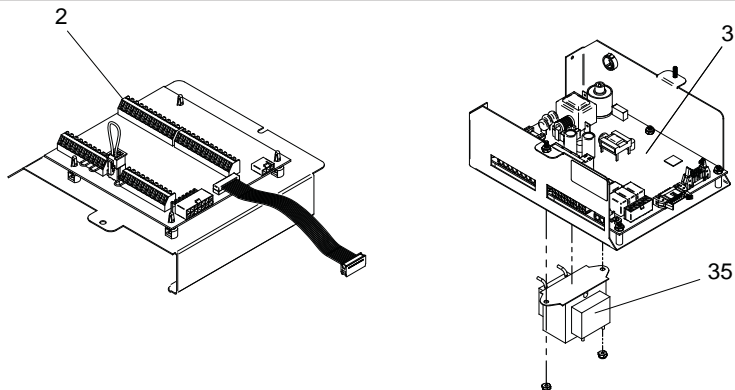
HEAT EXCHANGER 286



GAS TRAIN



CONTROL PANEL



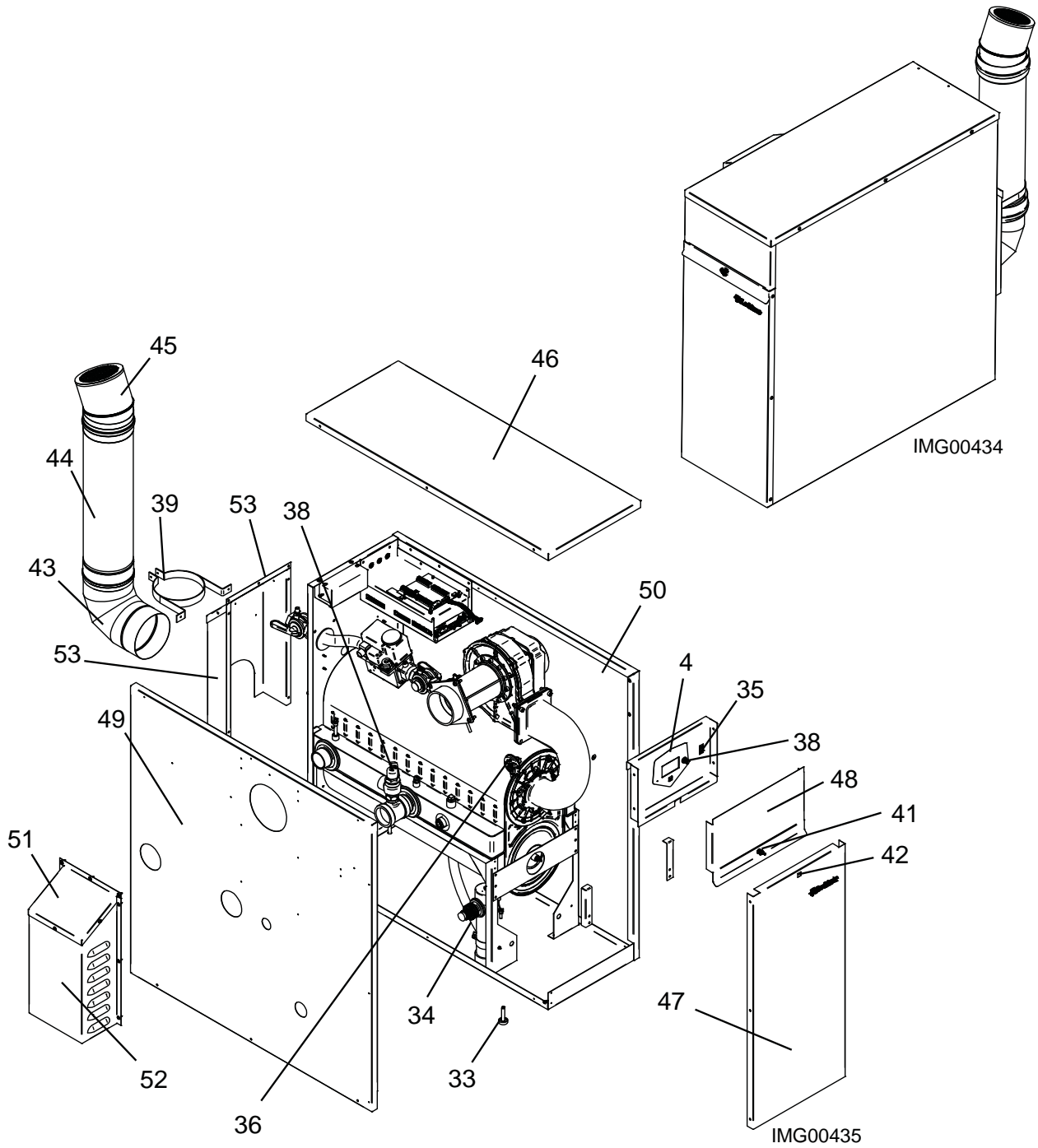
ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX3078	HEAT EXCHANGER	OK 151
1	HEX3079	HEAT EXCHANGER	OK 211
1	HEX3080	HEAT EXCHANGER	OK 286
CONTROLS			
2	RLY20062	LOW VOLTAGE CONNECTION BOARD	ALL
3	RLY30061	INTEGRATED CONTROL	ALL
4	RLY20058	USER INTERFACE CONTROL	ALL
	LBL20307	USER INTERFACE OVERLAY	ALL
5	TST2060	INLET SENSOR	ALL
6	TST20009	OUTLET/HIGH LIMIT SENSOR	ALL
7	RLV30000	AIR VENT VALVE	ALL
8	FAN3031	FAN ASSEMBLY	OK 151
8	FAN3032	FAN ASSEMBLY	OK 211
8	FAN3033	FAN ASSEMBLY	OK 286
9	GKT2456	GASKET/ BLOWER	OK 211
9	GKT2436	GASKET/ BLOWER	OK 151 & 286
10	SWT2006	ON/OFF SWITCH	ALL
GAS VALVES			
11	VAL3201	GAS VALVE ASSEMBLY	OK 151
11	VAL3202	GAS VALVE ASSEMBLY	OK 211
11	VAL3203	GAS VALVE ASSEMBLY	OK 286
12	GKT2443	GAS VALVE GASKET	ALL
13	MSC2233	GAS VALVE SWITCH	ALL
PILOT & BURNER ASSEMBLIES			
14	PLT3022	FLAME SENSOR W/GASKET	ALL
15	GKT2450	GASKET, FLAME SENSOR	ALL
16	PLT3021	IGNITER W/GASKET	ALL
17	GKT2449	GASKET, IGNITER	ALL
18	BNR3426	BURNER W/ GASKET	OK 151
18	BNR3427	BURNER W/ GASKET	OK 211
18	BNR3428	BURNER W/ GASKET	OK 286
19	WTR3082	GAS/AIR ARM ASSEMBLY W/GASKET	OK 151
19	WTR3078	GAS/AIR ARM ASSEMBLY W/GASKET	OK 211/286
20	GKT2454	GASKET - GAS / AIR ARM ASSEMBLY	ALL
21	GKT2451	GASKET, BURNER	ALL
22	WTR3080	HEAT EXCHANGER ACCESS DOOR KIT	ALL
23	HLC20005	HEX DOOR TEMP SWITCH BEGINNING SERIAL #F14	OK286
MISCELLANEOUS			
24	MSC3180	SIGHT GLASS	ALL
25	GKT2453	GASKET/ SIGHT GLASS	ALL
26	FIB2168	BURNER PLATE, INSULATION, DOOR	ALL
27	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
28	GKT2455	GASKET DOOR RUBBER	ALL
29	MSC30036	AIR INLET KIT	OK 151
29	MSC30037	AIR INLET KIT	OK 211
29	MSC30038	AIR INLET KIT	OK 286
30	BLT2104	LEVELING LEG	ALL
31	MSC2514	HIGH VOLTAGE CONNECTION BOARD	ALL
32	PRS20001	PRESSURE SWITCH	OK 151 & 286
32	PRS20002	PRESSURE SWITCH	OK 211
33	RLV2005	RELIEF VALVE 30 PSI	ALL
34	MSC30048	CONDENSATE TRAP	OK 151-211
34	MSC30050	CONDENSATE TRAP	OK 286
	SWT2011	BLOCKED DRAIN SWITCH	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
35	TRF20000	TRANSFORMER	ALL
36	MSC20123	KNOB, FLUTED W/ SKIRT	ALL
37	MSC20285	FLUE STRAP 3"	OK 151 & 211
37	MSC20286	FLUE STRAP 4"	OK 286
38	MSC20297	DOOR LATCH	ALL
	MSC20299	LATCH RETAINER	ALL
39	MSC20298	DOOR LATCH RECEPTACLE	ALL
40	PVC20075	ELBOW, 3" 90 DEG	OK 151 & 211
40	PVC20076	ELBOW, 4" 90 DEG	OK 286
41	PVC20078	PIPE, 3"	OK 151 & 211
41	PVC20077	PIPE, 4"	OK 286
42	MSC20283	BIRD SCREEN, FLUE PIPE	OK 151 & 211
42	MSC20284	BIRD SCREEN, FLUE PIPE	OK 286
	WTR30024	MRLWCO KIT W/ TEST	ALL
	KIT3085	ALARM BELL KIT	ALL
	GKT2032	GASKET STRIP, AIR INLET & FLUE	ALL
	GKT2427	GASKET, ESCUTCHEON, 3/4" CONDENSATE TRAP	ALL
	GKT2007	GASKET, ESCUTCHEON, 1/2" GAS CONNECTION	OK 151 & 211
	GKT2427	GASKET, ESCUTCHEON, 3/4" GAS CONNECTION	OK286
	GKT20089	GASKET, ESCUTCHEON, 1" WATER CONNECTION	OK 151 & 211
	GKT20090	GASKET, ESCUTCHEON, 1 1/2" WATER CONNECTION	OK 286
	GKT20091	GASKET, ESCUTCHEON, 2" AIR INLET	ALL
	PUM30027	PUMP WITH COVER	OK 151 & 211
	PUM30030	PUMP WITH COVER	OK 286
	WRE20054	HARNESS, CONNECTION BOARD	ALL
	WRE20063	HARNESS, POWER	ALL
	WRE20068	HARNESS, GAS VALVE	ALL
	WRE20092	HARNESS, UNIT	OK 151 & 211
	WRE30004	HARNESS, UNIT	OK286
	WRE20164	HARNESS, WIRE,ON/OFF	ALL
	WRE2203	CABLE, RIBBON	ALL
	WRE2210	HARNESS, SPARK ELECTRODE	OK 151 & 211
	WRE2209	HARNESS, SPARK ELECTRODE	OK 286
	WRE2211	HARNESS, FLAME SENSE ELECTRODE	ALL
JACKET ASSEMBLY			
43	JKB30077	JACKET, TOP	OK 151
43	JKB30078	JACKET, TOP	OK 211
43	JKB30079	JACKET, TOP	OK 286
44	JKB30075	JACKET, FRONT, LOWER	OK 151 & 211
44	JKB30076	JACKET, FRONT, LOWER	OK 286
45	JKB30080	JACKET, FRONT, UPPER	ALL
46	JKB30083	JACKET, LEFT SIDE	OK 151
46	JKB30084	JACKET, LEFT SIDE	OK 211
46	JKB30085	JACKET, LEFT SIDE	OK 286
47	JKB60487	JACKET, RIGHT SIDE	OK 151
47	JKB60678	JACKET, RIGHT SIDE	OK 211
47	JKB60663	JACKET, RIGHT SIDE	OK 286
	JKB30082	COVER, FLUE BOX	ALL
	JKB30081	COVER, FLUE BOX TOP	ALL
	JKB30090	COVER, PUMP TOP AND BOTTOM	ALL
PLEASE HAVE SERIAL NUMBER WHEN ORDERING PARTS			

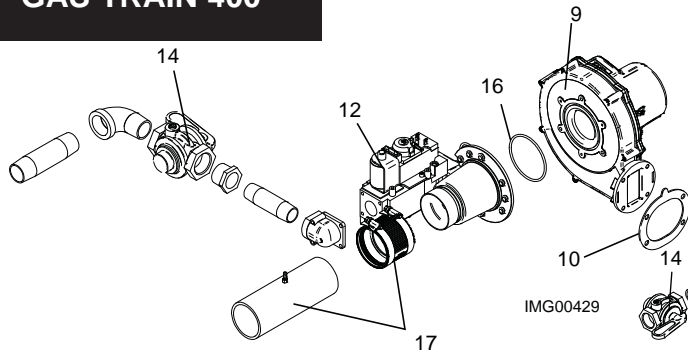


Replacement Parts List

Outdoor Knight XL Heating Boilers OK 400 thru 801

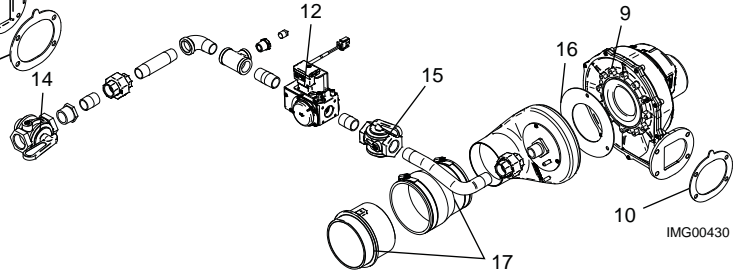


GAS TRAIN 400



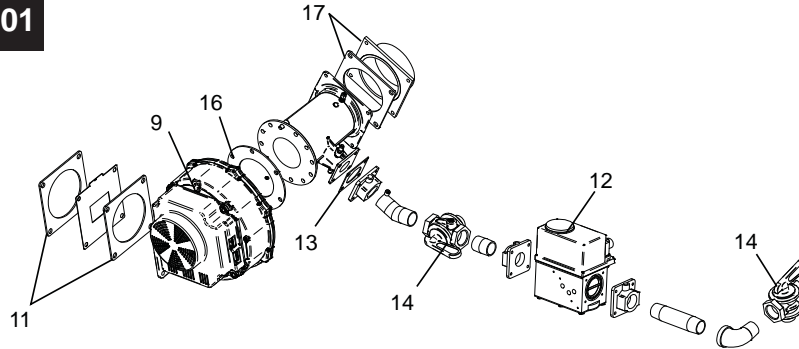
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GAS TRAIN 501



IMG00430

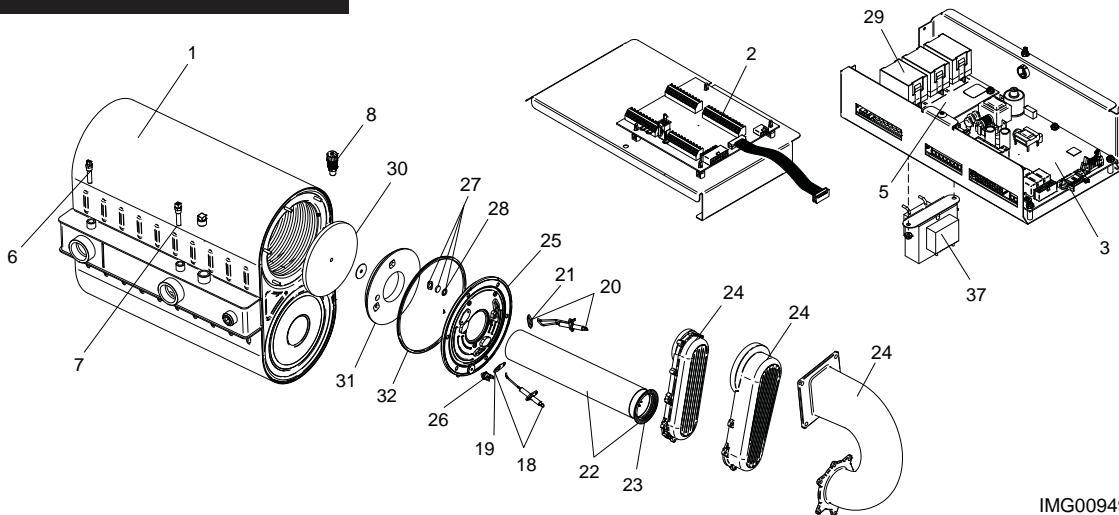
GAS TRAIN 601-801



IMG00431

CONTROL PANEL

HEAT EXCHANGER 400-801



IMG00949

ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	HEX3081	HEAT EXCHANGER	OK 400
1	HEX3082	HEAT EXCHANGER	OK 501
1	HEX3088	HEAT EXCHANGER	OK 601
1	HEX3089	HEAT EXCHANGER	OK 701
1	HEX3090	HEAT EXCHANGER	OK 801
CONTROLS			
2	RLY20062	LOW VOLTAGE CONNECTION BOARD	ALL
3	RLY30065	INTEGRATED CONTROL	OK 400
3	RLY30038	INTEGRATED CONTROL	OK 501
3	RLY30067	INTEGRATED CONTROL	OK 601 - 801
4	RLY20058	USER INTERFACE CONTROL	ALL
-	LBL20136	USER INTERFACE OVERLAY	ALL
5	RLY2085	RELAY BOARD, 1.5 HP PUMP	ALL
6	TST2060	INLET SENSOR	ALL
7	TST20009	OUTLET SENSOR/ HIGH LIMIT	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)			
8	RLV30000	AIR VENT VALVE	ALL
9	FAN3035	FAN ASSEMBLY	OK 400
9	FAN3037	FAN ASSEMBLY	OK 501
9	FAN30001	FAN ASSEMBLY	OK 601 - 801
10	GKT2436	BLOWER/AIR ARM GASKET	OK 400
10	GKT2438	BLOWER/AIR ARM GASKET	OK 501
11	GKT2034	BLOWER/AIR ARM GASKET	OK 601-801
GAS VALVES			
12	VAL3204	GAS VALVE ASSEMBLY	OKN400
12	VAL3207	GAS VALVE ASSEMBLY NAT	OKN501
12	VAL3212	GAS VALVE ASSEMBLY NAT	OKN601
12	VAL30006	GAS VALVE ASSEMBLY NAT	OKN701
12	VAL3213	GAS VALVE ASSEMBLY NAT	OKN801
12	VAL30011	GAS VALVE ASSEMBLY LP	OKL501
12	VAL30012	GAS VALVE ASSEMBLY LP	OKL601
12	VAL30013	GAS VALVE ASSEMBLY LP	OKL701
12	VAL30014	GAS VALVE ASSEMBLY LP	OKL801
13	GKT2050	GAS VALVE GASKET	OK 601 - 801
14	GAC2029	GAS CUT OFF VALVE 1X1	ALL
15	GAC2028	GAS CUT OFF VALVE 3/4 X 3/4	OK 501
16	GKT2444	GASKET, VENTURI	OK 400
16	GKT2080	AIR SHROUD GASKET	OK 501
16	GKT2049	GASKET, VENTURI	OK 601 - 801
17	MSC30033	AIR INLET KIT	OK 400
17	MSC30034	AIR INLET KIT	OK 501
17	MSC30035	AIR INLET KIT	OK 601-801
PILOT & BURNER ASSEMBLIES			
18	PLT3022	FLAME SENSOR W/ GASKET	OK 400/501
18	PLT3023	FLAME SENSOR W/ GASKET	OK 601 - 801
19	GKT2450	GASKET, FLAME SENSOR	ALL
20	PLT3021	IGNITOR W/ GASKET	OK 400/501
20	PLT30000	IGNITOR W/ GASKET	OK 601 - 801
21	GKT2449	GASKET, IGNITOR	ALL
22	BNR3429	BURNER W/ GASKET	OK 400/501
22	BNR3432	BURNER W/ GASKET	OK 601
22	BNR3433	BURNER W/ GASKET	OK 701
22	BNR3434	BURNER W/ GASKET	OK 801
23	GKT2451	GASKET, BURNER	OK 400/501
23	GKT2062	GASKET, BURNER	OK 601 - 801
24	WTR3078	GAS/AIR ARM ASSEMBLY W/GASKET	OK 400
24	WTR3079	GAS/AIR ARM ASSEMBLY W/GASKET	OK 501
24	WTR3085	GAS/AIR ARM ASSEMBLY W/GASKET	OK 601 - 801
25	WTR3080	HEAT EXCHANGER ACCESS DOOR KIT	OK 400/501
25	WTR3086	HEAT EXCHANGER ACCESS DOOR KIT	OK 601 - 801
26	HLC20005	HEX DOOR TEMP SWITCH BEGINNING SERIAL #F14	ALL
MISCELLANEOUS			
27	MSC3180	SIGHT GLASS	ALL
28	GKT2453	GASKET, SIGHT GLASS	ALL
29	RLY2222	RELAY, 1.5 HP PUMP	ALL
30	FIB2167	DIVIDER PLATE, INSULATION BAFFLE	ALL
31	FIB2168	BURNER PLATE, INSULATION, DOOR	OK 400/501
31	FIB2146	BURNER PLATE, INSULATION, DOOR	OK 601 - 801
32	GKT2455	GASKET DOOR RUBBER	OK 400/501
32	GKT2063	GASKET DOOR RUBBER	OK 601 - 801
33	BLT2104	LEVELING LEGS	ALL
34	MSC30050	CONDENSATE TRAP	ALL
-	SWT2011	BLOCKED DRAIN SWITCH	ALL
35	SWT2006	ON/OFF SWITCH	ALL
36	PRS20002	PRESSURE SWITCH	OK 400
36	PRS20020	PRESSURE SWITCH	OK 501
36	PRS20019	PRESSURE SWITCH	OK 601-801
37	TRF20000	TRANSFORMER, 40VA	OK 400 - 701
37	TRF20002	TRANSFORMER, 60VA	OK 801
38	MSC20123	KNOB, FLUTED W / SKIRT	ALL
39	RLV2084	RELIEF VALVE 50 PSI	OK 400-601
39	RLV2001	RELIEF VALVE 50 PSI	OK 701/801
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
40	MSC20286	FLUE STRAP 4"	OK 400-601
40	MSC20302	FLUE STRAP 6"	OK 701 & 801
41	MSC20297	DOOR LATCH	ALL
-	MSC20299	LATCH RETAINER	ALL
42	MSC20298	DOOR LATCH RECEPTACLE	ALL
43	PVC20076	ELBOW, 4" 90 DEG	OK 400-601
43	DRH20006	ELBOW, 6" 90 DEG	OK 701 & 801
44	PVC20077	PIPE, 4"	OK 400-601
44	DRH20007	PIPE, 6"	OK 701 & 801
45	MSC2763	VENT TERMINATION	OK 701 & 801
-	GKT2032	GASKET STRIP, AIR INLET & FLUE	ALL
-	GKT2427	GASKET, ESCUTCHEON, 3/4" CONDENSATE TRAP	ALL
-	GKT2427	GASKET, ESCUTCHEON, 3/4" GAS CONNECTION	OK501
-	GKT2431	GASKET, ESCUTCHEON, 1" GAS CONNECTION	OK 400, 601-801
-	GKT2028	GASKET, ESCUTCHEON, 2" WATER CONNECTION	ALL
-	GKT2028	GASKET, ESCUTCHEON, 2" AIR INLET	OK 400
-	GKT20092	GASKET, ESCUTCHEON, 4" AIR INLET	OK601-801
-	FUS20001	0.8 AMP	ALL
-	FUS2001	3.15 AMP	ALL
-	FUS2002	5 AMP	ALL
-	WTR2211	FLOW SWITCH	ALL
-	MSC2514	HIGH VOLTAGE CONNECTION BOARD	ALL
-	TST2311	OUTDOOR AIR SENSOR	ALL
-	GTP2900	GAUGE TRIOMETER, 75# PSI	ALL
-	TST30011	FLUE TEMP SENSOR KIT	ALL
-	KIT3078	SYSTEM SENSOR KIT	ALL
-	TST2032	SYSTEM SENSOR	ALL
-	TST2044	BULB WELL 1/4"	ALL
-	WTR30024	MRLWCO WITH TEST	ALL
-	KIT3087	NEUTRALIZER KIT	OK 400/501
-	KIT3046	NEUTRALIZER KIT	OK 601-801
-	KIT3085	ALARM BELL	ALL
-	LPK3949	LP CONVERSION KIT	OK 400
-	LPK3950	LP CONVERSION KIT (AFTER SERIAL #J07 FOR OK 500)	OK 501-801
-	HLC30000	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
-	WRE20052	HARNESS, POWER	ALL
-	WRE20054	HARNESS, CONNECTION BOARD	ALL
-	WRE30005	HARNESS, UNIT	ALL
-	WRE20164	HARNESS, WIRE, ON/OFF	OK 400
-	WRE20165	HARNESS, WIRE, ON/OFF	OK 501-801
-	WRE2200	HARNESS, SPARK ELECTRODE	OK400/501
-	WRE2230	HARNESS, SPARK ELECTRODE	OK 601-801
-	WRE2206	HARNESS, GAS VALVE	OK 400
-	WRE30000	HARNESS, GAS VALVE	OK 501
-	WRE2021	HARNESS, GAS VALVE	OK 601-801
-	WRE2211	HARNESS, FLAME SENSE ELECTRODE	ALL
-	WRE2229	CABLE, RIBBON	ALL
JACKET ASSEMBLY			
46	JKB30033	JACKET, TOP	OK 400
46	JKB30034	JACKET, TOP	OK 501
46	JKB30035	JACKET, TOP	OK 601
46	JKB30036	JACKET, TOP	OK 701
46	JKB30037	JACKET, TOP	OK 801
47	JKB30032	JACKET, FRONT, LOWER	OK 400-801
48	JKB30038	JACKET, FRONT, UPPER	ALL
49	JKB30041	JACKET, LEFT SIDE	OK 400
49	JKB30042	JACKET, LEFT SIDE	OK 501
49	JKB30043	JACKET, LEFT SIDE	OK 601
49	JKB30044	JACKET, LEFT SIDE	OK 701
49	JKB30045	JACKET, LEFT SIDE	OK 801
50	JKB60633	JACKET, RIGHT SIDE	OK 400
50	JKB60629	JACKET, RIGHT SIDE	OK 501
50	JKB60499	JACKET, RIGHT SIDE	OK 601
50	JKB60637	JACKET, RIGHT SIDE	OK 701
50	JKB60533	JACKET, RIGHT SIDE	OK 801
51	JKB60674	COVER, AIR INLET BOX TOP	OK 400
51	JKB60522	COVER, AIR INLET BOX TOP	OK 501-801
52	JKB30069	COVER, AIR INLET BOX	OK 400
52	JKB30070	COVER, AIR INLET BOX	OK 501-801
53	JKB60505	COVER, FLUE BOX	OK 400-601
53	JKB60580	COVER, FLUE BOX	OK 701/801
54	JKB30039	COVER, FLUE BOX TOP	OK 400-601
54	JKB30040	COVER, FLUE BOX TOP	OK 701/801

PLEASE HAVE SERIAL NUMBER WHEN ORDERING PARTS

HIGH EFFICIENCY COMMERCIAL BOILERS

POWER-fin®


CONXUS®

REMOTE CONNECT NOW AVAILABLE


SMART TOUCH™

TOUCHSCREEN LCD DISPLAY NOW AVAILABLE

500,000 TO 2,000,000 BTU/HR

MODELS AVAILABLE IN ON/OFF
AND MODULATING UP TO 5:1

CASCADING SEQUENCER WITH
CASCADE REDUNDANCY



Up to 85%
Thermal Efficiency

 AHRI CERTIFIED™
www.ahricertified.org

 **Lochinvar®**
HIGH EFFICIENCY BOILERS & WATER HEATERS

DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA



CONXUS[®]

REMOTE CONNECT



CONTROL FEATURES

BUILT IN WIFI CAPABILITY TO REMOTELY MONITOR AND CONTROL BOILER PLANT

CASCADE COMPATIBILITY WITH CREST CONDENSING BOILER TO CREATE A FRONT END LOADING SYSTEM

PROGRAMMABLE SYSTEM EFFICIENCY OPTIMIZERS

3-PUMP CONTROL FOR OPERATION OF BOILER PUMP, SYSTEM PUMP, DOMESTIC HOT WATER PRIORITIZATION PUMP

OUTDOOR RESET ADJUSTS SETPOINT BASED ON AN OUTDOOR TEMPERATURE

COMPATIBLE WITH LOCHINVAR'S INDIRECT PLATE AND FRAME WATER HEATER AS WELL AS OUR STORAGE TYPE HOT WATER GENERATORS - ONE BOILER IN THE SYSTEM CAN BE ASSIGNED FOR DOMESTIC HOT WATER PRIORITIZATION (DHWP) TO MEET DOMESTIC WATER DEMAND

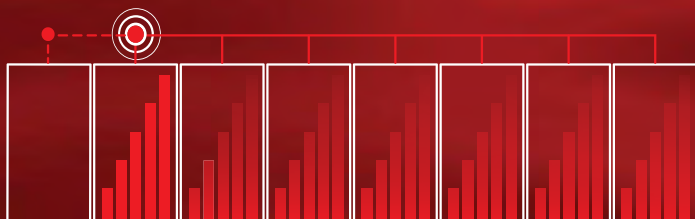
0-10 VDC BMS INPUT FOR EASY INTEGRATION INTO BUILDING MANAGEMENT SYSTEMS

RED LOCKOUT SCREEN DISPLAYING THE FAULT CODE IN PLAIN ENGLISH

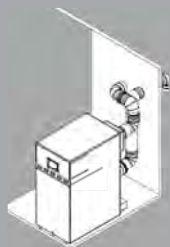
PEACE OF MIND, WHEN IT MATTERS MOST

Cascade Redundancy provides peace of mind because it helps ensure that a Power-Fin boiler system will always deliver reliable performance with no downtime. If the lead boiler is turned off for maintenance, Cascade Redundancy automatically shifts the lead role to the second sequenced boiler. Up to eight Power-Fin boilers can be sequenced using a 2-wire daisy-chain connection. Cascade sequencing can be programmed for Lead-Lag or Efficiency Optimized operation.

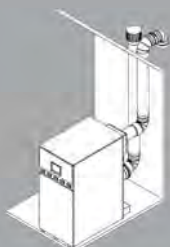
With Lead-Lag operation, one lead boiler modulates to capacity on demand. As load increases, the system then cascades to additional lag boilers in sequence. The first-on role shifts daily, distributing equal runtimes to each unit.



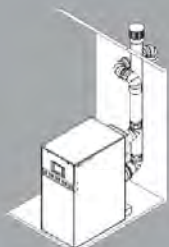
In an Efficiency Optimized system (see illustration left), all boilers fire and modulate simultaneously at the same Btu/hr input rates, maximizing thermal efficiency.



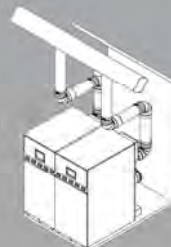
DIRECT VENT SIDEWALL



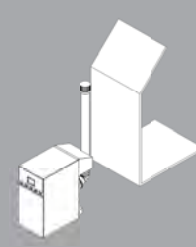
DIRECT VENT VERTICAL



VERTICAL SIDEWALL AIR



COMMON VENTING



OUTDOOR

POWER-FIN®

THE ORIGINAL BOILER CONTINUES TO SET THE STANDARD

In 1986, Power-Fin® redefined the industry with its space-saving design, groundbreaking efficiency and venting flexibility. Now, over 30 years later, we continue to raise the standard with an easy to operate user interface, remote boiler control and enhanced communications. The advanced Smart Touch color display includes CON•X•US remote connectivity via WiFi or Ethernet for easy control at your fingertips, from anywhere. A simple drop in Modbus or BACnet card allows for easy integration into a building Automation System.

Enhanced Operating Control

The Power-Fin now offers the industry-best SmartTouch™ 8" LCD full color touchscreen with easy-to-understand infographics. It is equipped with CON•X•US® connectivity that lets you remotely monitor and optimize the performance of the entire boiler plant.



Starting with the introduction of Power-Fin product line in 1986, we were able to provide something that other companies weren't focused on, efficiency and footprint.

BURNER MODULATION BOOSTS EFFICIENCY AND LOWERS COSTS

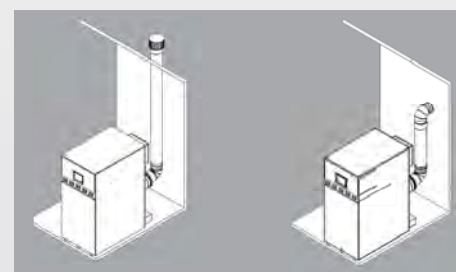
With thermal efficiency of 85%, Power-Fin boilers feature a 5:1 turndown ratio that will precisely match the firing rate to heating load requirements—at any point from 20% to full firing rate. This results in less equipment cycling for greater efficiency and cost savings.

READY FOR OUTDOOR INSTALLATION

In warm-weather sites where the mechanical room is overcrowded, the Power-Fin can be easily installed either outdoors or on a rooftop. Its optional hood and screen protector make outdoor installation fast and trouble free.

VENTING SOLUTIONS

The Power-Fin offers seven venting options for ease of installation and venting flexibility to meet the most challenging installation requirements. The Power-Fin permits air intake and exhaust terminations to be horizontal through a sidewall or vertical through a roof. Consult the installation and operations manual for detailed venting guidelines.

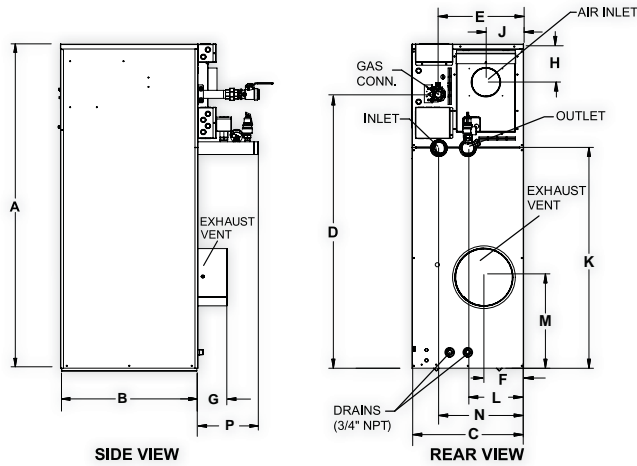


ROOM AIR VERTICAL

ROOM AIR SIDEWALL



POWER-FIN® BOILER DIMENSIONS AND SPECIFICATIONS



Model Number Guide

PB	N	1501	M9
Model	Natural Gas	Btu/hr Input	Firing Controls

Power-Fin Boiler,
Natural Gas,
1,500,000 Btu/hr input,
M9 firing controls

POWER-FIN BOILER								DIMENSIONS AND SPECIFICATIONS							
Model Number	Input MBH	(B)/(F) Thermal Efficiency	Net AHRI Rating (M)		Output MBH	Net AHRI Rating MBH		A	B	C	D	(B)/(F) E	(M) E	F	G
			Output MBH	Thermal Efficiency											
PBN0502	500	85.0%	425	370	425	370	44-1/2"	28-1/2"	23-1/4"	34"	17-3/4"	19-1/2"	6-1/2"	6"	
PBN0752	750	85.0%	638	554	638	554	52"	28-1/2"	23-1/4"	41-1/2"	17-3/4"	19-1/2"	6-3/4"	6"	
PBN1002	999	85.0%	850	739	850	739	59-1/4"	28-1/2"	23-1/4"	48-3/4"	17-3/4"	19-1/2"	7-1/4"	6"	
PBN1302	1,300	85.0%	1,105	961	1,105	961	67-3/4"	28-1/2"	23-1/4"	57-1/4"	17-3/4"	19-1/2"	8-1/4"	6"	
PBN1501	1,500	84.0%	1,260	1,096	1,275	1,109	65-1/2"	29-3/4"	27-1/4"	58-3/4"	21"	21"	13-1/2"	8"	
PBN1701	1,700	84.0%	1,428	1,242	1,445	1,257	70"	29-3/4"	27-1/4"	63-1/4"	21"	21"	13-1/2"	8"	
PBN2001	2,000	84.0%	1,680	1,461	1,700	1,478	76-3/4"	29-3/4"	27-1/4"	70"	21"	21"	13-1/2"	8"	

Model Number	H	J	K	L	M	N	(B)/(F) P	(M) P	Gas Conn.	Air Inlet	(B)/(F) Cat I	(M) Cat II	(M) Cat IV	Shipping Wt. (lbs)
PBN0502	8"	7-3/4"	23"	11-1/2"	11-1/4"	17-1/2"	15-1/4"	15-1/4"	1"	5"	7"	7"	4"	505
PBN0752	8"	7-3/4"	30-1/2"	11-1/2"	11-1/4"	17-1/2"	15-1/4"	15-1/4"	1-1/4"	5"	9"	9"	5"	554
PBN1002	8"	7-3/4"	37-3/4"	11-1/2"	11-1/4"	17-1/2"	15-1/4"	15-1/4"	1-1/4"	6"	10"	10"	6"	603
PBN1302	8"	7-3/4"	46-1/4"	11-1/2"	19-1/2"	17-1/2"	15-1/4"	15-1/4"	1-1/4"	6"	12"	12"	8"	652
PBN1501	10"	9-1/2"	43-1/2"	5-3/4"	22-1/4"	21-1/2"	24-1/2"	19-1/2"	1-1/2"	6"	12"	8"	6"	1,065
PBN1701	10"	9-1/2"	48"	5-3/4"	25"	21-1/2"	24-1/2"	19-1/2"	1-1/2"	7"	14"	9"	7"	1,100
PBN2001	10"	9-1/2"	54-3/4"	5-3/4"	27-1/2"	21-1/2"	24-1/2"	19-1/2"	1-1/2"	8"	14"	10"	8"	1,127

Notes: Change 'N' to 'L' for LP Gas Model. No deration on LP models. All water connections are 2-1/2" *w/CAT II conversion kit

STANDARD FEATURES

- Up to 85% Thermal Efficiency (AHRI)
- On/Off and Modulating up to 5:1
- Outdoor Ready
- Hot Surface Ignition
- Low NOx Operation
- Sealed Combustion
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Condensate Trap w/Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High-Voltage Terminal Strip
- Low-Voltage Terminal Strip
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

SMART TOUCH™ FEATURES

- CON-X-US Remote Connect
- Full-Color 8" Touchscreen LCD Display
- Built-in Cascading Sequencer for up to 8 Boilers

- Built-in Redundancy
- Cascade Multiple Sized Boilers

- Lead/Lag Cascade
- Efficiency Optimized Cascade
- Front-End Loading Capability with Crest Boilers Building Management System Integration with 0-10 VDC Input
- Outdoor Reset Control
- Password Security
- 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

- Low Water Flow Safety Control & Indication
- Inlet & Outlet Temperature Readout
- Freeze Protection
- Service Reminder
- Time Clock
- Data Logging
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Hours Running, Modulation Rate
 - Ignition Attempts
 - Last 10 Lockouts
- Programmable System Efficiency Optimizers
 - Night Setback
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Ramp Delay

- Boost Temperature & Time
- Modulation Factor Control
- Three Pump Control Contacts
 - System Pump
 - Boiler Pump
 - Domestic Hot Water Pump
- High-Voltage Terminal Strip
 - 120V/60 Hertz/1 Phase Power Supply
- Low-Voltage Terminal Strip
 - 24 VAC Auxiliary Device Relay
 - Auxiliary Proving Switch Contacts
 - Alarm on Any Failure Contacts
 - Runtime Contacts
 - DHW Thermostat Contacts
 - Unit Enable Contacts
 - Louver Proving Contacts
 - System Sensor Contacts
 - DHW Tank Sensor Contacts
 - Outdoor Air Sensor Contacts
 - Cascade Contacts
 - 0-10V DC BMS External Control Contact
 - 3 Way Valve Contacts

Firing Codes

- M Indicates 5:1 Turndown, Category IV
- B Indicates 2:1 Turndown, Category I
- F Indicates 100% On/Off Fire, Category I
- M9 Standard
- B9 or F9 Special Order, Factory Trimmed

OPTIONAL EQUIPMENT

- Cupro-Nickel Heat Exchanger
- High and Low Gas Pressure Switches w/Manual Reset (required for CSD-1/FM/GE Gap)
- Low Temperature Valve
- Motorized Mixing Valve
- Outdoor Kit
- Low Water Cutoff w/Manual Reset & Test (required for Cali. Code)
- Alarm Bell
- Modbus Communications
- BACnet MSTP Communications
- BMS Gateway to LON or BacNet IP
- Wireless Outdoor Sensor
- Vent Kit
 - Horizontal Exhaust Cap
 - Horizontal Air Intake Cap
 - Horizontal Direct Vent Cap
 - Category IV to Category II
 - Conversion Kit

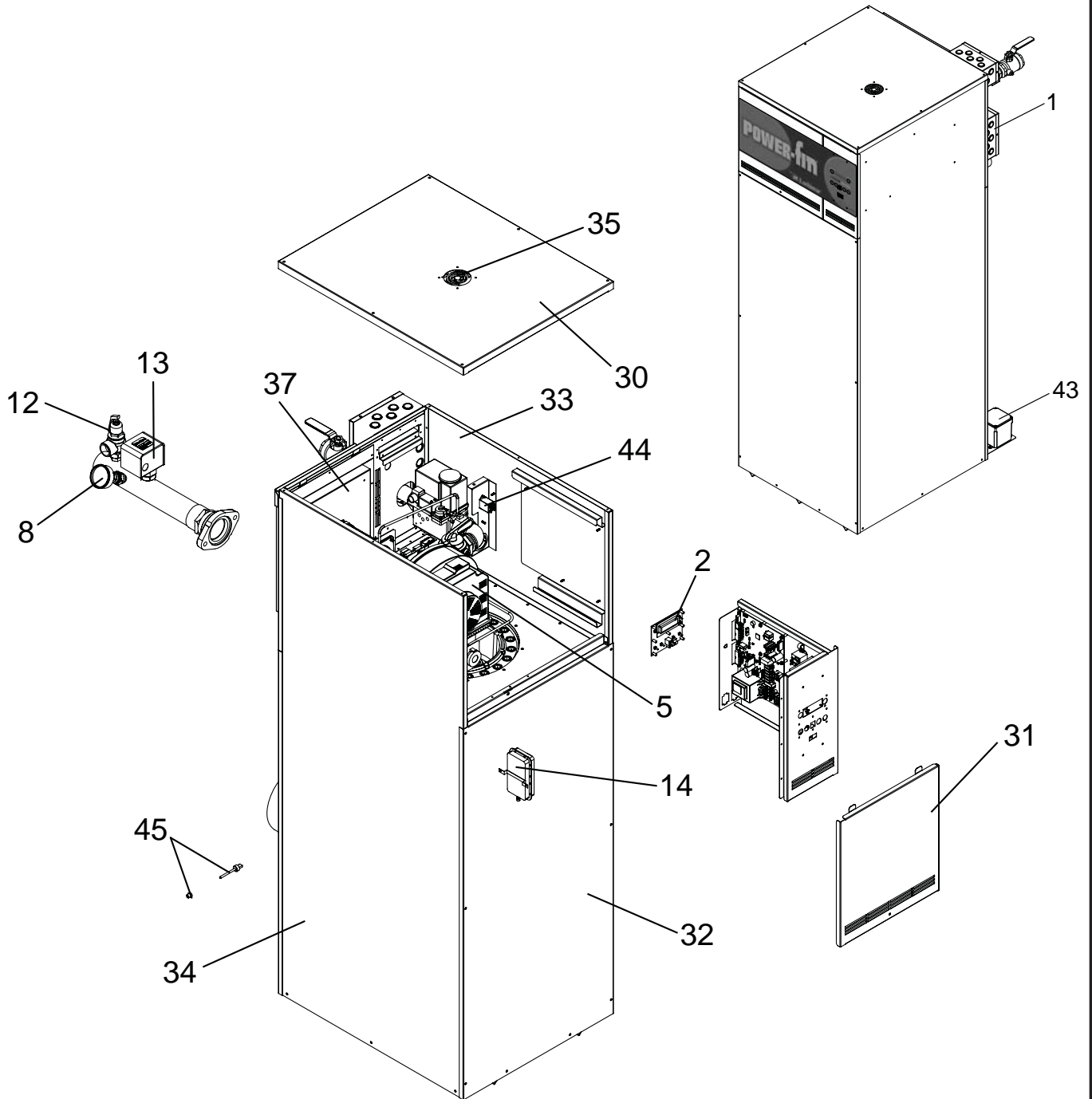


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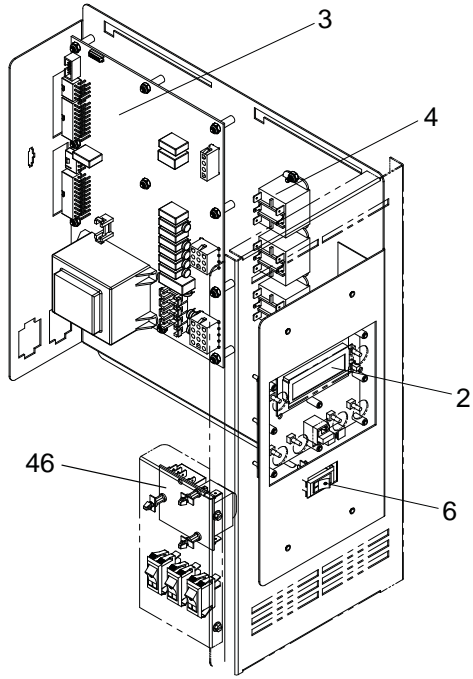


Replacement Parts List

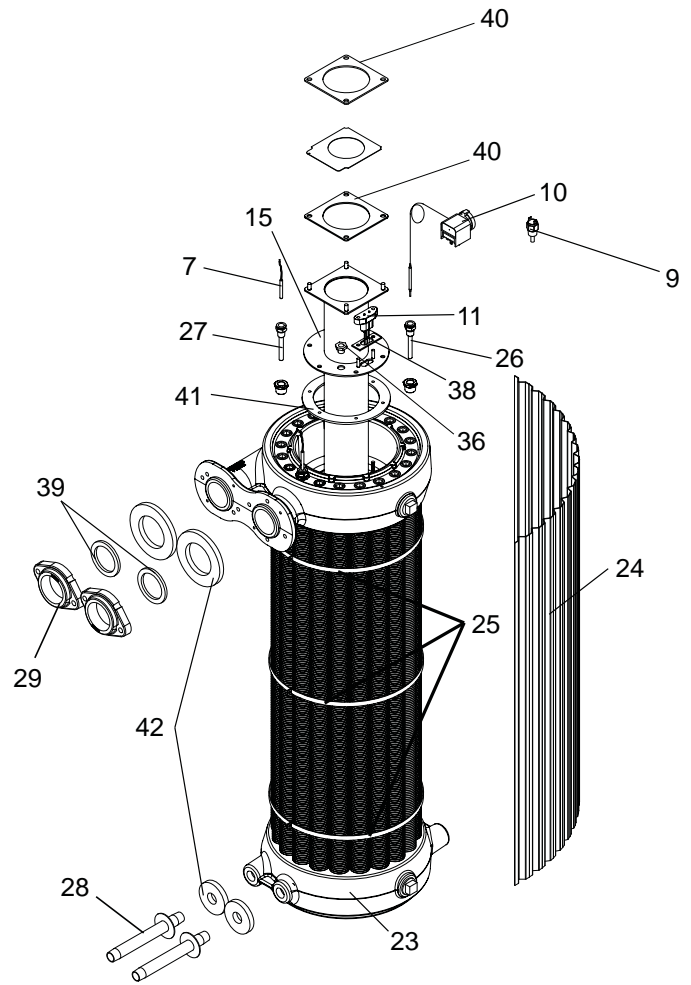
Power-Fin[®] Heating Boilers & Hot Water Supply Boilers PB/PF 502 thru 1302



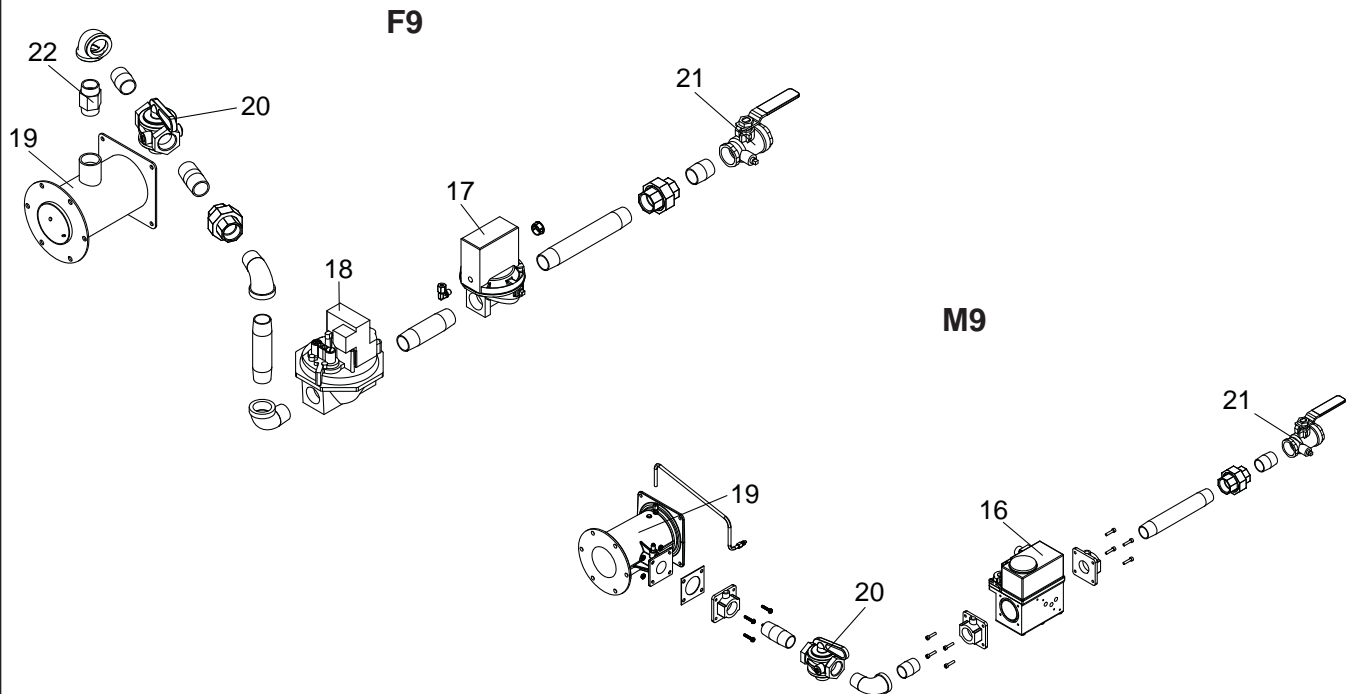
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLIES



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
CONTROLS & GAUGES			
1	100208498	CONNECTION BOARD	ALL
2	100208461	BOARD, CONTROL ,USER INTERFACE	ALL
3	100208494	BOARD, CONTROL, MAIN	ALL
4	100208509	PUMP RELAY	ALL
5	100145023	FAN, COMBUSTION AIR	ALL
6	100208242	ON/OFF SWITCH	ALL
7	100208552	THERMOSTAT SENSOR	F9
8	100208152	GAUGE, TEMP AND PRESSURE	PB
9	100208173	THERMOSTAT, HI LIMIT 200 DEGREE	PF
10	100208179	THERMOSTAT, HI LIMIT W/ AUTO RESET	ALL
11	100165937	IGNITOR, HOT SURFACE	ALL
12	100208442	RELIEF VALVE, PRESSURE ONLY	PB 502-1002
12	100208448	RELIEF VALVE, PRESSURE ONLY	PB 1302
12	100208444	RELIEF VALVE, TEMPERATURE & PRESSURE	PF
13	100208653	FLOW SWITCH	ALL
14	100166176	SWITCH, LOW AIR	502 - LP - F9
14	100208398	SWITCH, LOW AIR	502 - NAT - F9
14	100166178	SWITCH, LOW AIR	752 - LP - F9
14	100208399	SWITCH, LOW AIR	752 - NAT - F9
14	100166180	SWITCH, LOW AIR	1002 - LP - F9
14	100208400	SWITCH, LOW AIR	1002 - NAT - F9
14	100166182	SWITCH, LOW AIR	1302-F9
14	100166222	SWITCH, LOW AIR BEFORE D08	502 - LP - M9
14	100208376	SWITCH, LOW AIR AFTER D08	502 - LP - M9
14	100166221	SWITCH, LOW AIR BEFORE D08	502 NAT & 752-1302-M9 NAT/LP
14	100208379	SWITCH, LOW AIR AFTER D08	502 NAT & 752-1302-M9 NAT/LP
GAS TRAIN ASSEMBLIES			
15	100135326	BURNER	502
15	100135327	BURNER	752
15	100135328	BURNER	1002
15	100135329	BURNER	1302
16	100172027	VALVE, GAS NAT	502-M9 NAT
16	100172028	VALVE, GAS NAT	752-M9 NAT
16	100172029	VALVE, GAS NAT	1002-M9 NAT
16	100172030	VALVE, GAS NAT	1302-M9 NAT
16	100171935	VALVE, GAS LP	502-M9 LP
16	100171936	VALVE, GAS LP	752-M9 LP
16	100171937	VALVE, GAS LP	1002-M9 LP
16	100171938	VALVE, GAS LP	1302-M9 LP
17	100171767	VALVE, GAS DIAPHRAGM 1"	502-F9 NAT & LP
17	100171768	VALVE, GAS DIAPHRAGM 1 1/4"	752-1002-1302 - NAT & LP - F9
18	100171769	VALVE, MAIN GAS 1"	502 - NAT - F9
18	100209812	VALVE, MAIN GAS 1"	502 - LP - F9
18	100171770	VALVE, MAIN GAS 1 1/4"	752-1002-1302 - NAT - F9
18	100171881	VALVE, MAIN GAS 1 1/4"	752-1002-1302 - LP - F9
19	100171877	VALVE, VENTURI	502-M9
19	100171878	VALVE, VENTURI	752-1002-M9
19	100171879	VALVE, VENTURI	1302-M9
19	100159747	VALVE, VENTURI	ALL F9
20	100146149	GAS COCK	502
20	100146150	GAS COCK	752-1002-1302
21	100171788	VALVE, BALL	ALL 502
21	100171789	VALVE, BALL	752-1002-F9 & 752-1002-1302-M9
22	100164130	ORIFICE, BURNER	502 - NAT - F9
22	100164131	ORIFICE, BURNER	752 - NAT - F9
22	100164132	ORIFICE, BURNER	1002 - NAT - F9
22	100164133	ORIFICE, BURNER	1302 - NAT - F9
22	100164134	ORIFICE, BURNER	502 - LP - F9
22	100164135	ORIFICE, BURNER	752 - LP - F9
22	100164136	ORIFICE, BURNER	1002 - LP - F9
22	100164137	ORIFICE, BURNER	1302 - LP - F9

PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
HEAT EXCHANGER ASSEMBLIES			
23	100147510	HEAT EXCHANGER(HLW)	PF 502
23	100147518	HEAT EXCHANGER (H)	PB 502
23	100147511	HEAT EXCHANGER(HLW)	PF 752
23	100147519	HEAT EXCHANGER (H)	PB 752
23	100147512	HEAT EXCHANGER(HLW)	PF 1002
23	100147520	HEAT EXCHANGER (H)	PB 1002
23	100147513	HEAT EXCHANGER(HLW)	PF 1302
23	100147521	HEAT EXCHANGER (H)	PB 1302
24	100153830	V BAFFLE (20 REQ.)	502
24	100153831	V BAFFLE (20 REQ.)	752
24	100208235	V BAFFLE (20 REQ.)	1002
24	100153833	V BAFFLE (20 REQ.)	1302
25	100154587	V BAFFLE STRAP (3 REQ.)	ALL
26	100233613	HIGH LIMIT BULBWELL	ALL
27	100233695	THERMOSTAT BULBWELL 3/8"	ALL
28	100141607	DRAIN PIPE ASSEMBLY	PB
28	100141603	DRAIN PIPE ASSEMBLY	PF
29	100173833	HEAT EXCHANGER FLANGE	ALL
JACKET/DOOR ASSEMBLIES			
30	100144981	JACKET TOP, WITH VENTILATION FAN	ALL
31	100154269	JACKET, OUTER FRONT UPPER LEFT	ALL
32	100154265	JACKET, OUTER FRONT LOWER	502
32	100154266	JACKET, OUTER FRONT LOWER	752
32	100154267	JACKET, OUTER FRONT LOWER	1002
32	100154268	JACKET, OUTER FRONT LOWER	1302
33	100153951	JACKET, OUTER RIGHT	502
33	100153952	JACKET, OUTER RIGHT	752
33	100153953	JACKET, OUTER RIGHT	1002
33	100153954	JACKET, OUTER RIGHT	1302
34	100154448	JACKET, OUTER LEFT	502
34	100154449	JACKET, OUTER LEFT	752
34	100154450	JACKET, OUTER LEFT	1002
34	100154451	JACKET, OUTER LEFT	1302
MISCELLANEOUS			
35	100233489	FAN, VENTILATION	ALL
36	100208332	BURNER SIGHT GLASS	ALL
37	100208064	AIR FILTER	ALL
38	100208087	IGNITOR GASKET	ALL
39	100233690	FLANGE GASKET	ALL
40	100208089	BURNER/BLOWER GASKET	ALL
41	100208096	BURNER/ HEX GASKET	ALL
42	100208109	HEX/DIVIDER PANEL GASKET	ALL
43	100208337	CONDENSATE TRAP	ALL
44	100167753	RELAY, LOUVER	ALL
45	100170647	FLUE SENSOR	ALL
46	100208666	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) PRIOR TO H08H00211095	ALL
46	100173747	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) BEGINNING H08H00211095	ALL
46	100208665	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) PRIOR TO H08H00211095	ALL
46	100173748	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) BEGINNING H08H00211095	ALL
-	100208662	LOW WATER CUT-OFF PROBE (OPTIONAL)	ALL
-	100173640	LOW WATER CUT-OFF BOOT (OPTIONAL)	ALL
-	100208231	FUSE, 3.15A 5X22MM	ALL
-	100208232	FUSE, 5A 5X22MM	ALL
-	100208809	FUSE, 1.6A 5X20MM	ALL
-	100166433	PUMP	ALL PF
-	100166406	PUMP (OPTIONAL)	ALL PB
-	100146472	JACKET GASKET	ALL
-	100146588	GASKET, PVC 1/4 X 5/8 X 25'	ALL
-	100157742	KIT, OUTDOOR AIR RESET	ALL
-	100157739	KIT, ALARM ON ANY FAILURE WITH BELL	ALL
-	100157740	KIT, MANUAL RESET LOW WATER CUTOFF PRIOR TO H08H00211095	ALL
-	100157607	KIT, MANUAL RESET LOW WATER CUTOFF BEGINNING H08H00211095	ALL
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS			

HIGH EFFICIENCY COMMERCIAL BOILERS

POWER-fin[®]


CONXUS[®]

REMOTE CONNECT NOW AVAILABLE


SMART TOUCH[™]

TOUCHSCREEN LCD DISPLAY NOW AVAILABLE

5 NEW MODELS: 2.5 TO 5.0 MILLION BTU/HR

5:1 TURNDOWN RATIO

OUTDOOR INSTALLATION APPROVED

CASCADING SEQUENCER WITH
CASCADE REDUNDANCY



87%  **CERTIFIED**
THERMAL EFFICIENCY



Lochinvar[®]
HIGH EFFICIENCY BOILERS & WATER HEATERS

DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA

POWER-fin®

A LEGENDARY BOILER HAS MORE THAN DOUBLED ITS OUTPUT

In 1986, Power-Fin® redefined the industry with its space-saving design, groundbreaking efficiency and venting flexibility. Now we're raising the bar again by more than doubling its maximum input capacity from 2 to 5 million BTU/hr. The Power-Fin's new heat exchanger features an innovative double row of swept fins that delivers 2.5 times the output of the original model. The Power-Fin continues to offer a space-saving footprint and all models will pass through a 36" wide door.*

Enhanced Operating Control

The Power-Fin now offers the industry-best SmartTouch™ 8" LCD full color touchscreen with easy-to-understand infographics. It is equipped with CON-X-US® connectivity that lets you remotely monitor and optimize the performance of the entire boiler plant.



Starting with the introduction of Power-Fin product line in 1986, we were able to provide something that other companies weren't focused on, efficiency and footprint. Now, 30 years later, we are proud to continue that tradition and provide some of the most efficient products on the market.



*Verify door & boiler height.

BURNER MODULATION BOOSTS EFFICIENCY AND LOWERS COSTS

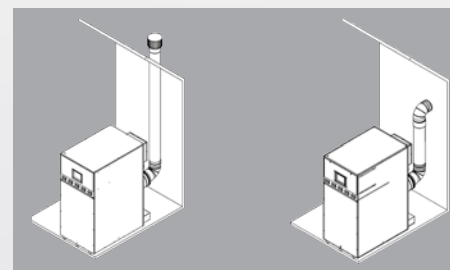
With thermal efficiency of 87%, Power-Fin boilers feature a 5:1 turndown ratio that will precisely match the firing rate to heating load requirements—at any point from 20% to full firing rate. This results in less equipment cycling for greater efficiency and cost savings.

READY FOR OUTDOOR INSTALLATION

In warm-weather sites where the mechanical room is overcrowded, the Power-Fin can be easily installed either outdoors or on a rooftop. Its optional hood and screen protector make outdoor installation fast and trouble free.

VENTING SOLUTIONS

The Power-Fin offers seven venting options for ease of installation and venting flexibility to meet the most challenging installation requirements. The Power-Fin permits air intake and exhaust lengths up to 100 ft, allowing terminations to be horizontal through a sidewall or vertical through a roof. If floor space is limited, the Power-Fin can be installed outdoors with the addition of the outdoor kit.



ROOM AIR VERTICAL

ROOM AIR SIDEWALL



CONXUS[®]

REMOTE CONNECT



CONTROL FEATURES

BUILT IN WIFI CAPABILITY TO REMOTELY MONITOR AND CONTROL BOILER PLANT

CASCADE COMPATIBILITY WITH CREST CONDENSING BOILER TO CREATE A FRONT END LOADING SYSTEM

PROGRAMABLE SYSTEM EFFICIENCY OPTIMIZERS

3-PUMP CONTROL FOR OPERATION OF BOILER PUMP, SYSTEM PUMP, DOMESTIC HOT WATER PRIORITIZATION PUMP

OUTDOOR RESET ADJUSTS SETPOINT BASED ON A OUTDOOR TEMPERATURE

COMPATIBLE WITH LOCHINVAR'S INDIRECT PLATE AND FRAME WATER HEATER AS WELL AS OUR STORAGE TYPE HOT WATER GENERATORS - ONE BOILER IN THE SYSTEM CAN BE ASSIGNED FOR DOMESTIC HOT WATER PRIORITIZATION (DHWP) TO MEET DOMESTIC WATER DEMAND

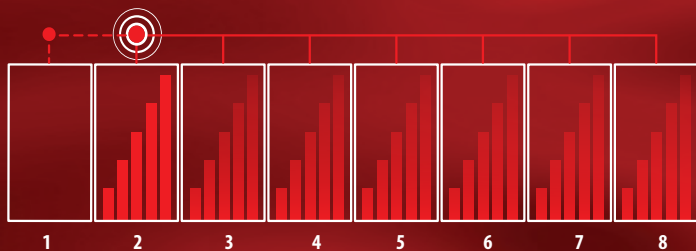
0-10 Vdc BMS INPUT FOR EASY INTEGRATION INTO BUILDING MANAGEMENT SYSTEMS

RED LOCKOUT SCREEN DISPLAYING THE FAULT CODE IN PLAIN ENGLISH

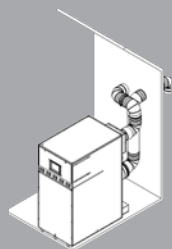
PEACE OF MIND, WHEN IT MATTERS MOST

Cascade Redundancy provides peace of mind because it helps ensure that a Power-Fin boiler system will always deliver reliable performance with no downtime. If the lead boiler is turned off for maintenance, Cascade Redundancy automatically shifts the lead role to the second sequenced boiler. Up to eight Power-Fin boilers can be sequenced using a 2-wire daisy-chain connection. Cascade sequencing can be programmed for Lead-Lag or Efficiency Optimized operation.

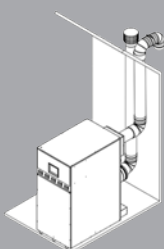
With Lead-Lag operation, one lead boiler modulates to capacity on demand. As load increases, the system then cascades to additional lag boilers in sequence. The first-on role shifts daily, distributing equal runtimes to each unit.



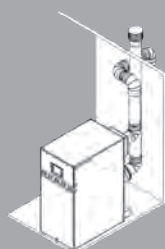
In an Efficiency Optimized system (see illustration below), all boilers fire and modulate simultaneously at the same Btu/hr input rates, maximizing thermal efficiency.



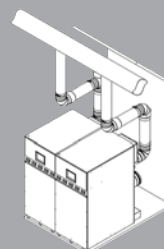
DIRECT VENT SIDEWALL



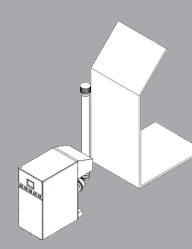
DIRECT VENT VERTICAL



VERTICAL SIDEWALL AIR

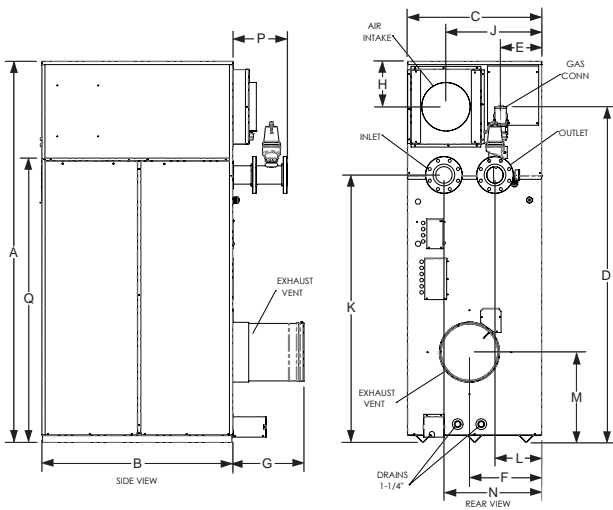


COMMON VENTING



OUTDOOR

POWER-FIN® BOILER DIMENSIONS AND SPECIFICATIONS



Model Number Guide

PB	N	2500	M9
Model	Natural Gas	Btu/hr Input	Firing Controls

Power-Fin Boiler,
Natural Gas,
2,500,000 Btu/hr input,
M9 firing controls

POWER-FIN BOILER

DIMENSIONS AND SPECIFICATIONS

Model Number	Input MBH	AHRI Thermal %	Output MBH	Net AHRI Rating MBH	A	B	C	D	E	F
PBN2500	2,500	87.0%	2,175	1,891	59"	44-1/2"	29-3/4"	49-3/4"	4"	15"
PBN3000	3,000	87.0%	2,610	2,270	65"	44-1/2"	29-3/4"	55-3/4"	4"	15"
PBN3500	3,500	87.0%	3,045	2,648	70-1/4"	47-1/4"	29-3/4"	62-1/2"	8-1/4"	15"
PBN4000	4,000	87.0%	3,480	3,026	79-3/4"	47-1/4"	29-3/4"	68-3/4"	8-1/4"	15"
PBN5000	5,000	87.0%	4,350	3,783	93-1/4"	46-3/4"	32-3/4"	82-1/4"	10"	17-3/4"

Model Number	G	H	J	K	L	M	N	P	Q	Gas Conn	Air Inlet	Vent Outlet	Shipping Weight
PBN2500	16"	9"	20-1/4"	37"	8-3/4"	23"	21-1/4"	12"	N/A	2"	9"	9"	1470
PBN3000	16-1/4"	9"	20-1/4"	43"	8-3/4"	23"	21-1/4"	12"	N/A	2"	9"	10"	1550
PBN3500	16-1/4"	9"	20-1/4"	48-1/2"	9"	23"	21-1/2"	12"	N/A	2"	10"	10"	1696
PBN4000	16-1/4"	10-1/2"	20"	54"	8-3/4"	22-1/4"	21-1/4"	12"	58-1/2"	2-1/2"	10"	12"	1841
PBN5000	17-1/2"	11"	23-1/2"	65-1/2"	11-1/2"	22"	24"	13-1/4"	69-1/2"	2-1/2"	12"	14"	2152

Note: Change "N" to "L" for LP Gas Model. All Water Connections are 4"

STANDARD FEATURES

- 87% Thermal Efficiency (AHRI)
- Modulating Burner with 5:1 Turndown
- Outdoor Ready
- CSD-1 Compliant
- Direct-Spark Ignition
- Low NOx Operation
- Sealed Combustion
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Condensate Trap w/Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High-Voltage Terminal Strip
- Low-Voltage Terminal Strip
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- Low & High Manual Reset Gas Pressure Switches
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

SMART TOUCH- FEATURES

- CON-X-US Remote Connect**
- Full-Color 8" Touchscreen LCD Display**
- Built-in Cascading Sequencer for up to 8 Boilers**
 - › Built-in Redundancy
 - › Cascade Multiple Sized Boilers
 - › Lead/Lag Cascade
 - › Efficiency Optimized Cascade
- Front-End Loading Capability with Crest Boilers**
- Building Management System Integration with 0-10 VDC Input**
- Outdoor Reset Control**
- Password Security**
- 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
- Low Water Flow Safety Control & Indication**
- Inlet & Outlet Temperature Readout**
- Freeze Protection**
- Service Reminder**
- Time Clock**
- Data Logging**
 - › Hours Running, Space Heating
 - › Hours Running, Domestic Hot Water
 - › Hours Running, Modulation Rate
 - › Ignition Attempts

- › Last 10 Lockouts
- Programmable System Efficiency Optimizers**
 - › Night Setback
 - › Anti-Cycling
 - › Outdoor Air Reset Curve
 - › Ramp Delay
 - › Boost Temperature & Time
 - › Modulation Factor Control
- Three Pump Control**
 - › System Pump
 - › Boiler Pump
 - › Domestic Hot Water Pump
- High-Voltage Terminal Strip**
 - › 240V/60 Hertz/1 Phase Power Supply (PB2500-PB3000)
 - › 208V/60 Hertz/3 Phase Power Supply (PB3500-PB4000)
 - › 480V/60 Hertz/3 Phase Power Supply (PB5000)
 - › System Pump, Boiler Pump and DHW Pump Power
- Low-Voltage Terminal Strip**
 - › 24 VAC Auxiliary Device Relay
 - › Auxiliary Proving Switch Contacts
 - › Alarm on Any Failure Contacts
 - › Runtime Contacts
 - › DHW Thermostat Contacts
 - › Unit Enable/Disable Contacts
 - › System Sensor Contacts
 - › DHW Tank Sensor Contacts
 - › Outdoor Air Sensor Contacts
 - › Cascade Contacts
 - › 0-10V DC BMS External Control Contact
 - › 3 Way Valve Contacts

CODES & REGISTRATIONS

ANSI Z21.13/CSA Certified
ASME Certified, "H" Stamp / National Board
California Code Compliant
CSD1 / Factory Mutual / GE Gap Compliant
Canadian Registration Number (CRN)
AHRI Certified

FIRING CODES

M9 Standard Construction
M7 California Code

OPTIONAL EQUIPMENT

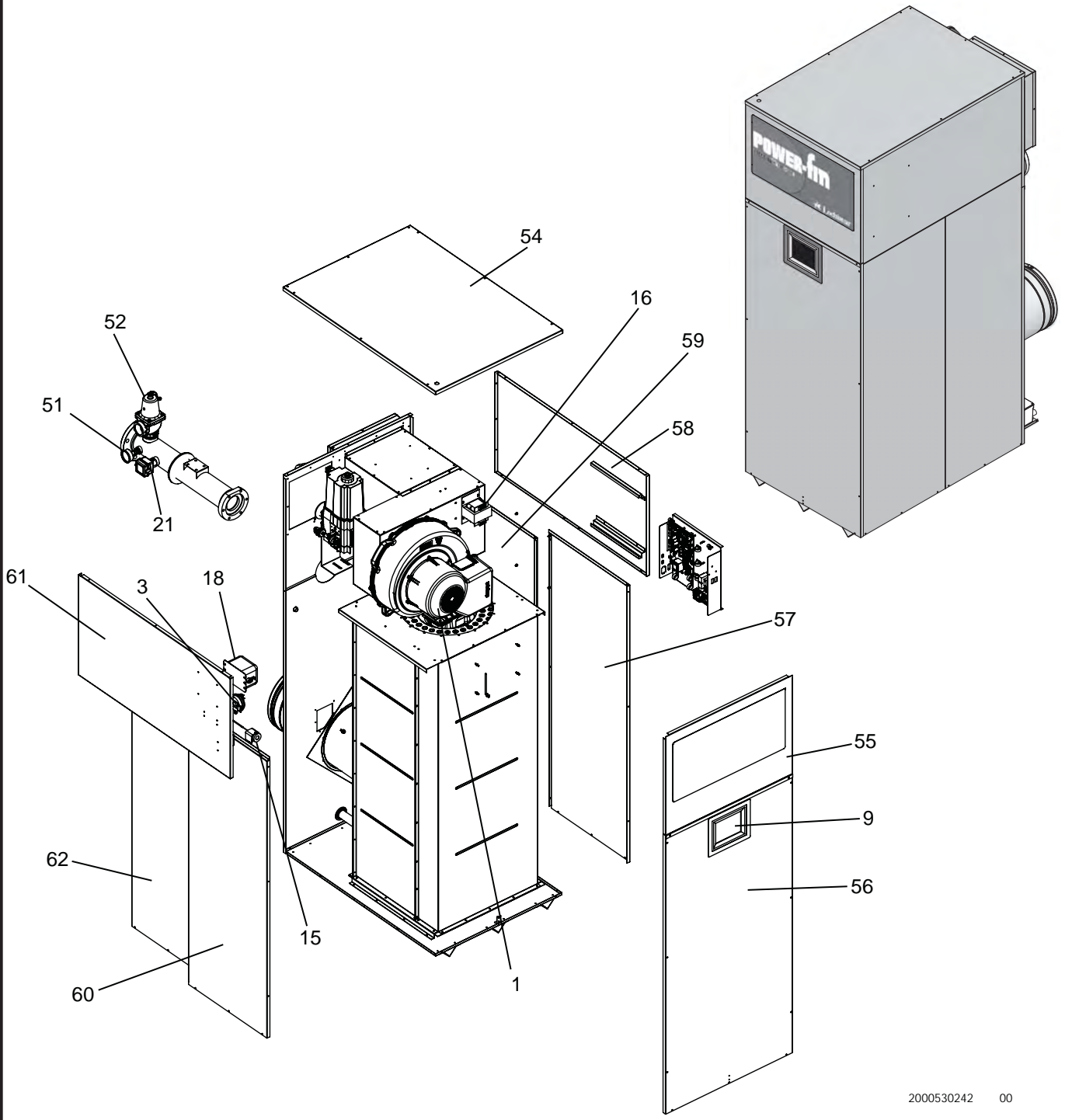
- Alarm Bell
- Outdoor Kit
- Low Temperature Valve
- Motorized Mixing Valve
- BMS Gateway to LON or BacNet IP
- BACnet MSTP Communications
- Modbus Communications
- Cupro-Nickel Heat Exchanger
- Wireless Outdoor Sensor
- Low Water Cutoff w/ Manual Reset & Test
- Electrical Options (shipped loose)
 - › 208V/3PH/60 Hz
 - › 480V/3PH/60 Hz
 - › 600V/3PH/60 Hz



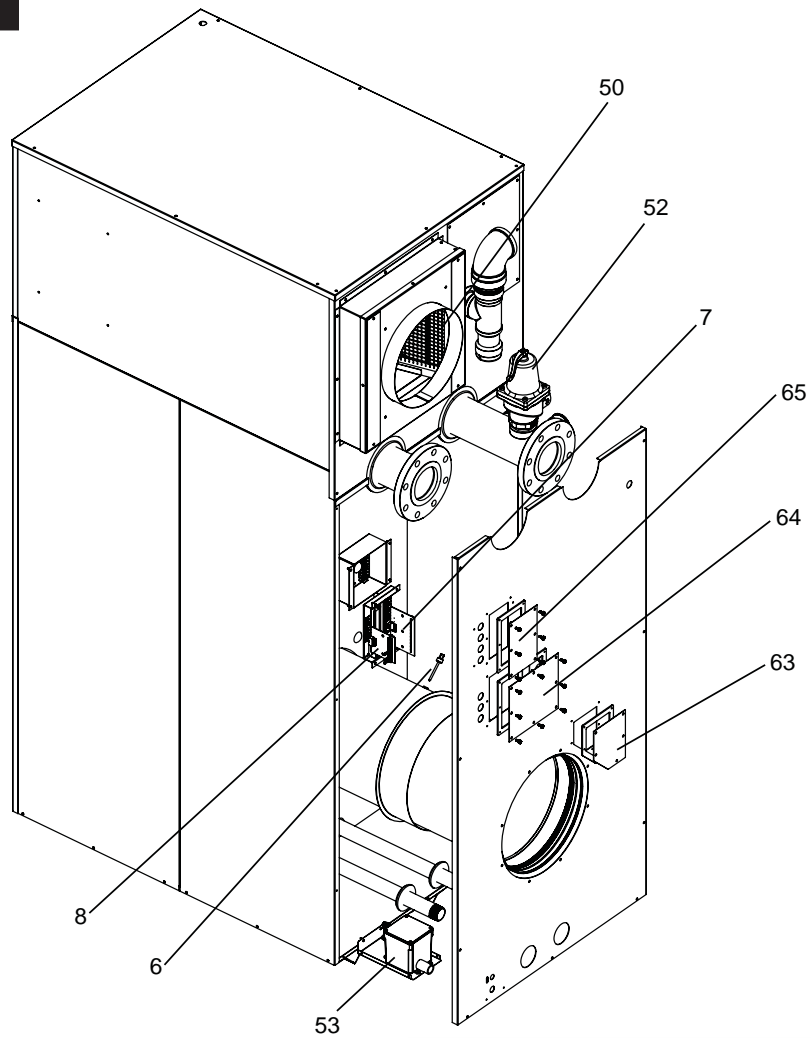


Replacement Parts List

**Power-Fin®
Heating Boiler
PB 2500 - 5000**



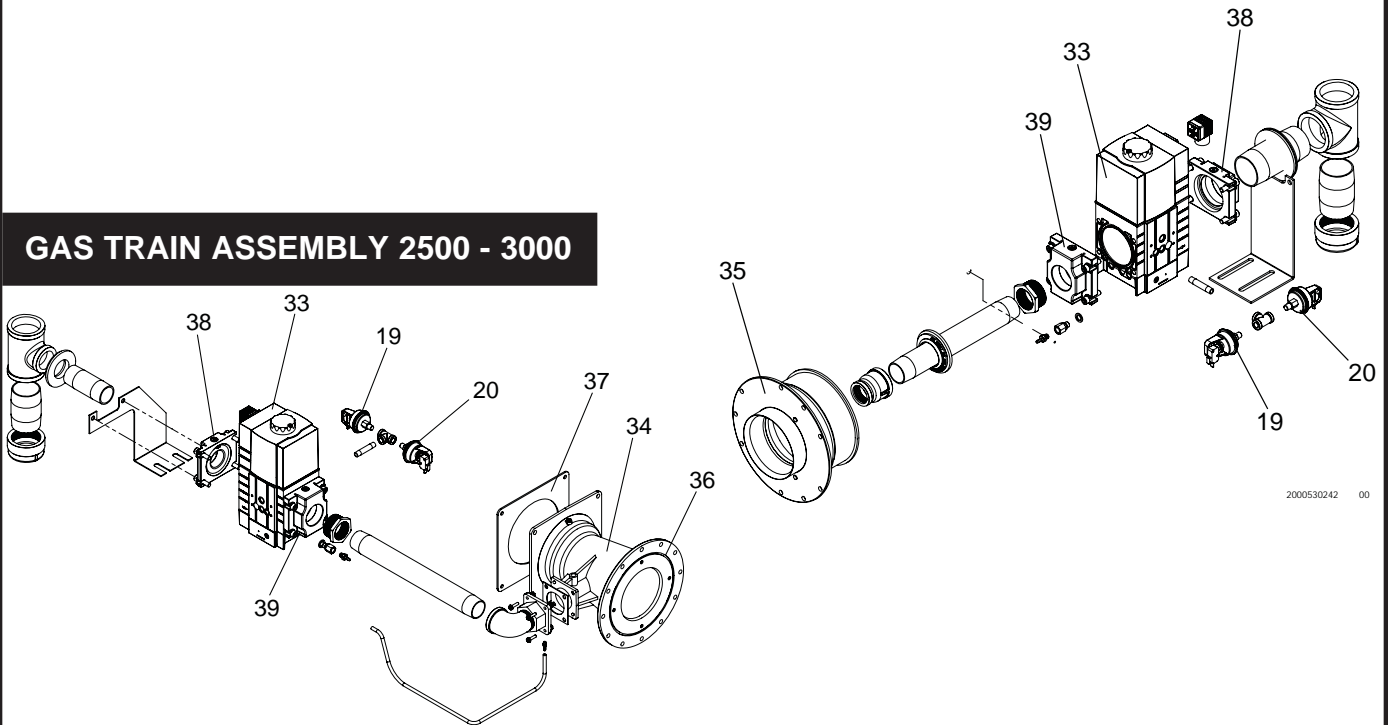
BACK VIEW



2000530242 00

GAS TRAIN ASSEMBLY 3500 - 5000

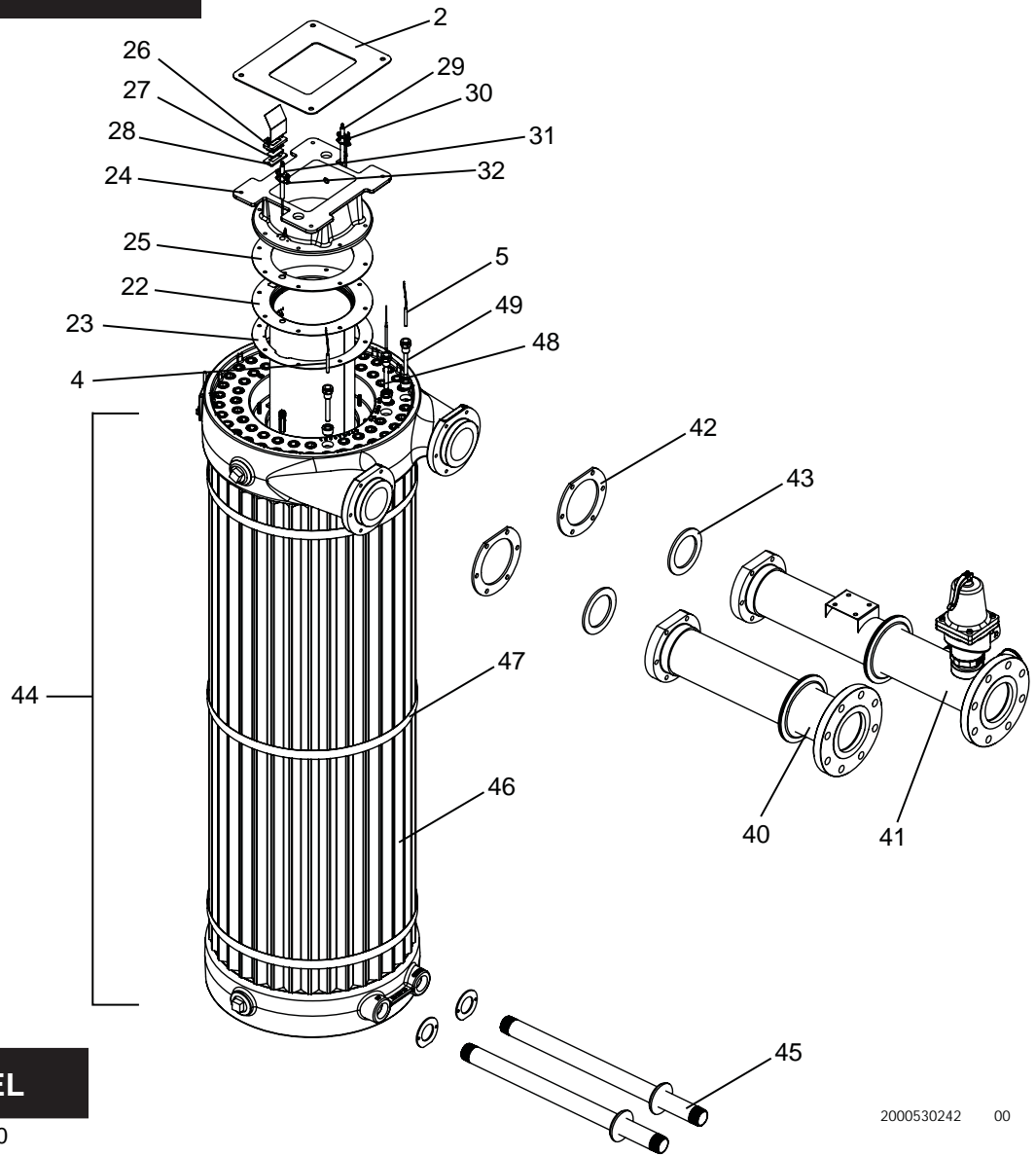
GAS TRAIN ASSEMBLY 2500 - 3000



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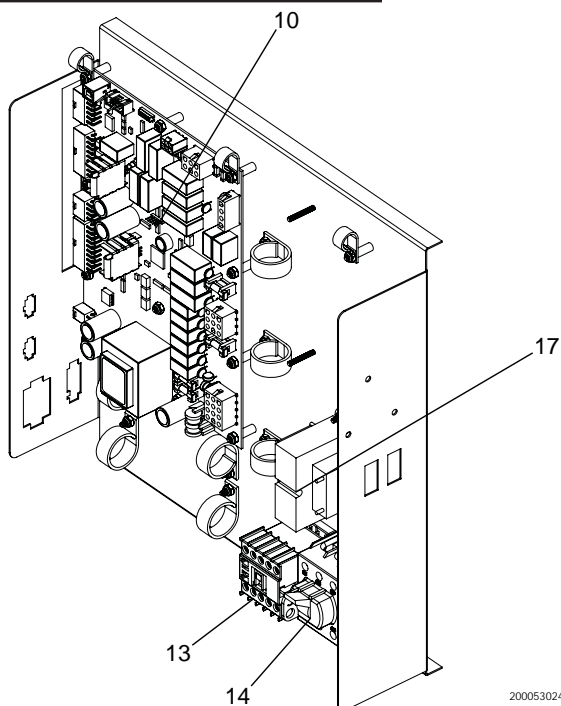
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HEAT EXCHANGER ASSEMBLY



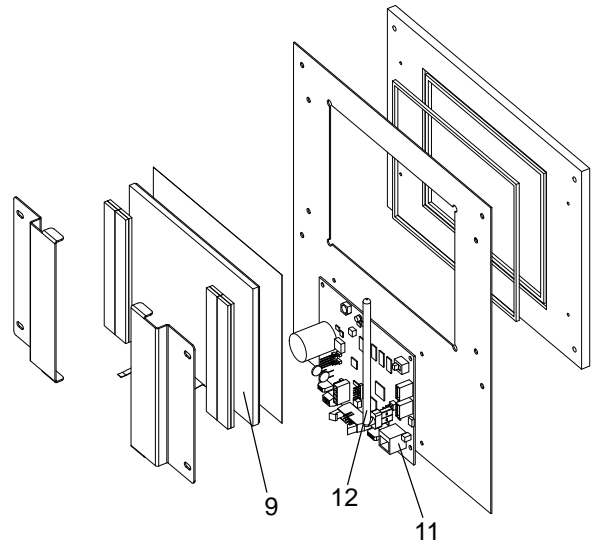
2000530242 00

CONTROL PANEL



2000530242 00

DISPLAY



2000530242 00

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
CONTROLS			
1	100274101	FAN REPLACEMENT ASSEMBLY	PB 2500 & 3000
1	100274103	FAN REPLACEMENT ASSEMBLY	PB 3500 & 4000
1	100274104	FAN REPLACEMENT ASSEMBLY	PB 5000
2	100274709	GASKET, FAN	PB 2500 - 4000
2	100274838	GASKET, FAN	PB 5000
3	100274710*	SWITCH, PRESSURE	PB 3000 - 5000
4	100274731*	SENSOR, INLET	ALL
5	100274733*	SENSOR, OUTLET	ALL
6	100274734*	SENSOR, FLUE	ALL
7	100274735	LOW VOLTAGE CONNECTION BOARD, CONN. POINTS 1 - 16	ALL
8	100274823	LOW VOLTAGE CONNECTION BOARD, CONN. POINTS 17 - 40	ALL
9	100274225	BOARD, CONTROL, DISPLAY	ALL
10	100274221	BOARD, CONTROL, MAIN	ALL
11	100274736	BOARD, CONXUS	ALL
12	100274737	CONXUS ANTENNA	ALL
13	100274738	RELAY CONTACTOR	ALL
14	100274739	SWITCH, ON/OFF	ALL
15	100274740*	HIGH LIMIT, MANUAL RESET	ALL
16	100274222	TRANSFORMER, HIGH VOLTAGE	PB 5000
17	100274741	TRANSFORMER, LOW VOLTAGE	ALL
18	100274743	SPARK TRANSFORMER	ALL
19	100274744	GAS PRESSURE SWITCH, HIGH	ALL
20	100274746	GAS PRESSURE SWITCH, LOW	ALL
21	100274747*	SWITCH, FLOW	ALL
GAS TRAIN ASSEMBLIES			
22	100274096	MAIN BURNER ASSEMBLY	PB 2500
22	100274097	MAIN BURNER ASSEMBLY	PB 3000
22	100274098	MAIN BURNER ASSEMBLY	PB 3500
22	100274099	MAIN BURNER ASSEMBLY	PB 4000
22	100274100	MAIN BURNER ASSEMBLY	PB 5000
23	100274837*	GASKET, BURNER	ALL
24	100274748	FAN / BURNER TRANSITION ADAPTER	PB 2500 - 4000
24	100274836	FAN / BURNER TRANSITION ADAPTER	PB 5000
25	100274749*	GASKET, FAN / BURNER TRANSITION ADAPTER	ALL
26	100274750	SIGHT GLASS	ALL
27	100274751	GASKET, SIGHT GLASS	ALL
28	100274752	GASKET, SIGHT GLASS	ALL
29	100274105*	IGNITOR, SPARK W/ GASKET	ALL
30	100274753*	GASKET, IGNITOR	ALL
31	100274106*	FLAME ROD W/ GASKET	ALL
32	100274754*	GASKET, FLAME ROD	ALL
33	100275044	GAS VALVE ASSEMBLY, NAT.	PBN2500
33	100275045	GAS VALVE ASSEMBLY, NAT.	PBN3000
33	100275046	GAS VALVE ASSEMBLY, NAT.	PBN3500
33	100274122	GAS VALVE ASSEMBLY, NAT.	PBN4000
33	100274123	GAS VALVE ASSEMBLY, NAT.	PBN5000
33	100274124	GAS VALVE ASSEMBLY, LP	PBL2500
33	100274125	GAS VALVE ASSEMBLY, LP	PBL3000
33	100274126	GAS VALVE ASSEMBLY, LP	PBL3500
33	100274127	GAS VALVE ASSEMBLY, LP	PBL4000
33	100274128	GAS VALVE ASSEMBLY, LP	PBL5000

PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.

*ITEMS DENOTE SUGGESTED INVENTORY PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
GAS TRAIN ASSEMBLIES (CONTINUED)			
34	100274223	VENTURI	PB 2500 & 3000
35	100274224	GAS AIR MIXER WHIRLWIND	PB 3500 - 5000
36	100274755	GASKET, FAN / VENTURI	PB 2500 & 3000
37	100274840	GASKET, VENTURI / AIRBOX	PB 2500 & 3000
38	100274756	FLANGE, GAS INLET	PB 2500 - 3500
38	100274757	FLANGE, GAS INLET	PB 4000 - 5000
39	100274758	FLANGE, GAS MANIFOLD W/ SHUTTER	ALL
HEAT EXCHANGERS			
40	100274759	FLANGE, INLET	ALL
41	100274760	FLANGE, OUTLET	ALL
42	100274771*	GASKET, FLANGE - CHAMBER	ALL
43	100274772*	GASKET, FLANGE - WATER	ALL
44	100274089	HEAT EXCHANGER	PB 2500
44	100274090	HEAT EXCHANGER	PB 3000
44	100274092	HEAT EXCHANGER	PB 3500
44	100274094	HEAT EXCHANGER	PB 4000
44	100274095	HEAT EXCHANGER	PB 5000
45	100274773	DRAIN PIPE	ALL
46	100274839	V-BAFFLE, HEAT EXCHANGER	PB 2500
46	100274282	V-BAFFLE, HEAT EXCHANGER	PB 3000
46	100274294	V-BAFFLE, HEAT EXCHANGER	PB 3500
46	100274304	V-BAFFLE, HEAT EXCHANGER	PB 4000
46	100274315	V-BAFFLE, HEAT EXCHANGER	PB 5000
47	100274316	RETAINER, V-BAFFLE	ALL
48	100274774	BULBWELL, HIGH LIMIT	ALL
49	100274778	BULBWELL, INLET / OUTLET SENSOR	ALL
MISCELLANEOUS			
50	100274764	FILTER, AIR, HEAVY DUTY	PB 2500 - 3500
50	100274765	FILTER, AIR, HEAVY DUTY	PB 4000 & 5000
51	100274770	GAUGE, TEMPERATURE AND PRESSURE	ALL
52	100274781	VALVE, PRESSURE RELIEF	PB 2500 - 3000
52	100274785	VALVE, PRESSURE RELIEF	PB 3500 - 4000
52	100274786	VALVE, PRESSURE RELIEF	PB 5000
53	100274766*	CONDENSATE TRAP	ALL
	100274767*	SENSOR, SYSTEM	ALL
	100274768*	KIT, SYSTEM SENSOR	ALL
	100274769	SENSOR, OUTDOOR AIR	ALL
	100274789	TUBING, ALUMINUM (ORDER BY THE FOOT)	ALL
	100274791	TUBING, EPDM - 3/8" (ORDER BY THE FOOT)	ALL
	100274792	TUBING, CONDENSATE HOSE (ORDER BY THE FOOT)	ALL
	100274793	REFERENCE HOSE (ORDER BY THE FOOT)	ALL
JACKET/DOOR ASSEMBLIES			
54	100274416	JACKET TOP	PB 2500 - 3000
54	100274417	JACKET TOP	PB 3500 - 4000
54	100274418	JACKET TOP	PB 5000
55	100274129	JACKET, OUTER FRONT UPPER	PB 2500 - 3000
55	100274130	JACKET, OUTER FRONT UPPER	PB 3500
55	100274131	JACKET, OUTER FRONT UPPER	PB 4000
55	100274132	JACKET, OUTER FRONT UPPER	PB 5000
56	100274133	JACKET, OUTER FRONT LOWER	PB 2500
56	100274134	JACKET, OUTER FRONT LOWER	PB 3000

PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.

*ITEMS DENOTE SUGGESTED INVENTORY PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
JACKET/DOOR ASSEMBLIES (CONTINUED)			
56	100274135	JACKET, OUTER FRONT LOWER	PB 3500
56	100274136	JACKET, OUTER FRONT LOWER	PB 4000
56	100274138	JACKET, OUTER FRONT LOWER	PB 5000
57	100274139	JACKET, OUTER RIGHT	PB 2500
57	100274140	JACKET, OUTER RIGHT	PB 3000
57	100274141	JACKET, OUTER RIGHT	PB 3500
57	100274146	JACKET, OUTER RIGHT LOWER	PB 4000
57	100274411	JACKET, OUTER RIGHT LOWER FRONT	PB 5000
58	100274145	JACKET, OUTER RIGHT UPPER	PB 4000
58	100274147	JACKET, OUTER RIGHT UPPER	PB 5000
59	100274412	JACKET, OUTER RIGHT LOWER BACK	PB 5000
60	100274142	JACKET, OUTER LEFT	PB 2500
60	100274143	JACKET, OUTER LEFT	PB 3000
60	100274144	JACKET, OUTER LEFT	PB 3500
60	100274149	JACKET, OUTER LEFT LOWER	PB 4000
60	100274413	JACKET, OUTER LEFT LOWER FRONT	PB 5000
61	100274148	JACKET, OUTER LEFT UPPER	PB 4000
61	100274150	JACKET, OUTER LEFT UPPER	PB 5000
62	100274415	JACKET, OUTER LEFT LOWER BACK	PB 5000
63	100274419	JACKET, FLUE SENSOR COVER	ALL
64	100274420	JACKET, LOW VOLTAGE BOARD COVER	ALL
65	100274421	JACKET, HIGH VOLTAGE COVER	ALL
INSULATION			
	100274794	INSULATION, WRAP	PB 2500
	100274795	INSULATION, WRAP	PB 3000
	100274797	INSULATION, WRAP	PB 3500
	100274798	INSULATION, WRAP	PB 4000
	100274799	INSULATION, WRAP	PB 5000
	100274800	INSULATION, FRONT	PB 2500
	100274802	INSULATION, FRONT	PB 3000
	100274803	INSULATION, FRONT	PB 3500
	100274804	INSULATION, FRONT	PB 4000
	100274805	INSULATION, FRONT	PB 5000
	100274422	INSULATION, TOP	ALL
	100274806	INSULATION, SIDE	PB 5000

PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.

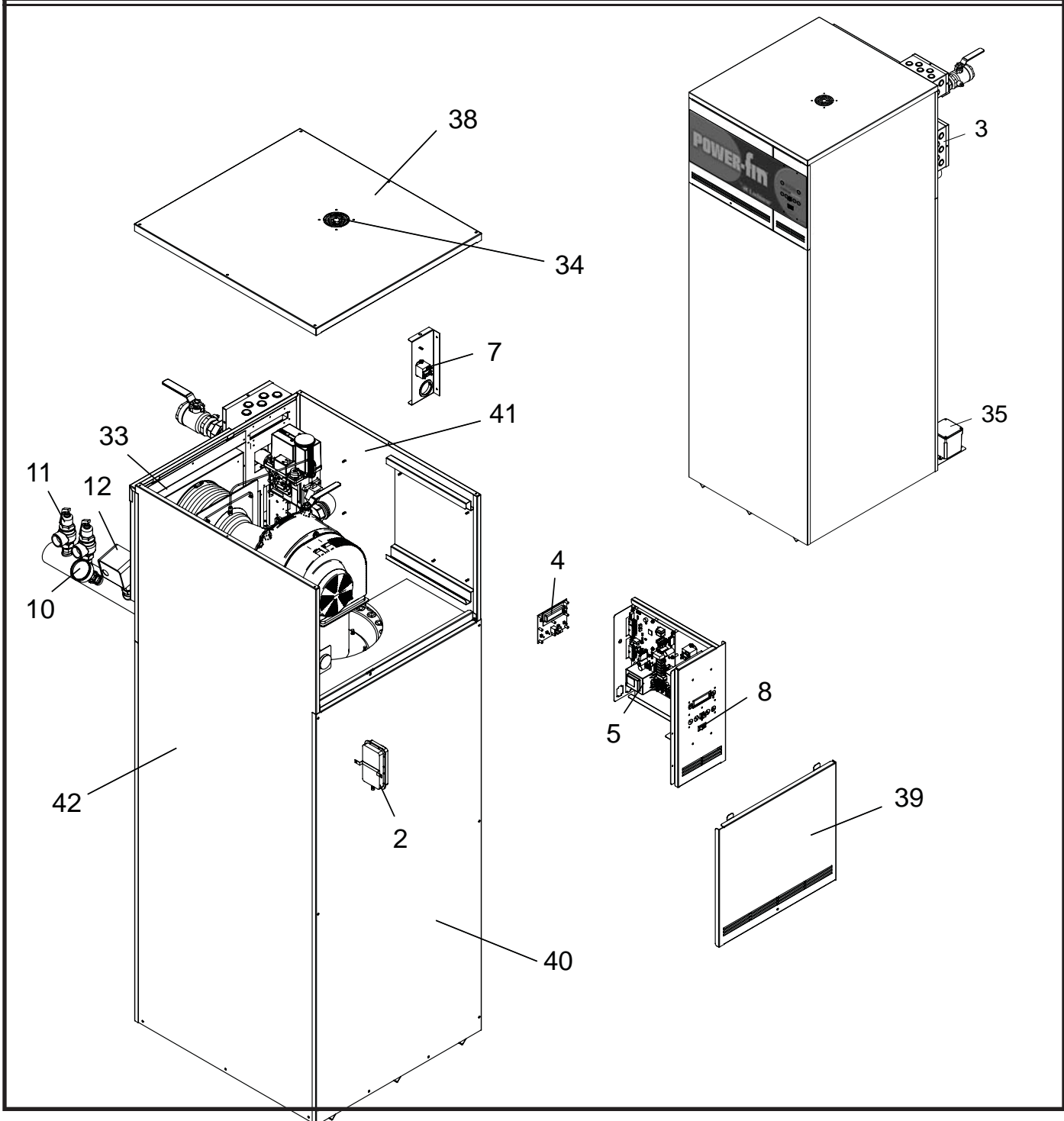
*ITEMS DENOTE SUGGESTED INVENTORY PARTS

NOTES



Replacement Parts List

Power-Fin® Heating Boilers & Hot Water Supply Boilers PB/PF 1501, 1701, 2001



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
CONTROLS			
1	100145022	FAN REPLACEMENT ASSEMBLY	PB/PF 1501-2001
2	100166222	SWITCH, PRESSURE BEFORE D08	PB/PF 1501-2001-M9
2	100208376	SWITCH, PRESSURE AFTER D08	PB/PF 1501-2001-M9
2	100166223	SWITCH, PRESSURE BEFORE D08	PB/PF 1501/2001-B9
2	100208380	SWITCH, PRESSURE AFTER D08	PB/PF 1501/2001-B9
2	100166224	SWITCH, PRESSURE BEFORE D08	PB/PF 1701-B9
2	100166108	SWITCH, PRESSURE AFTER D08	PB/PF 1701-B9
3	100208498	CONNECTION BOARD	ALL
4	100208461	BOARD, CONTROL, USER INTERFACE	ALL
5	100208494	BOARD, CONTROL, MAIN	ALL
6	100208509	RELAY, PUMP	ALL
7	100208495	RELAY, 24VAC COIL	ALL
8	100208242	SWITCH, ON, OFF	ALL
9	100208174	HIGH LIMIT W/MANUAL RESET	ALL PB
9	100208179	HIGH LIMIT AUTO RESET	ALL PF
10	100208152	GAUGE, TEMPERATURE AND PRESSURE	ALL PB
11	100208448	VALVE, PRESSURE RELIEF, 1", 50#	PB 1501/1701
11	100208442	VALVE, PRESSURE RELIEF, 3/4", 50#	PB 2001
11	100208453	VALVE, T & P RELIEF, 1", 150#	All PF
12	100208653	SWITCH, FLOW	ALL
GAS TRAIN ASSEMBLIES			
13	100135330	MAIN BURNER ASSEMBLY	PF/PB 1501
13	100135331	MAIN BURNER ASSEMBLY	PF/PB 1701
13	100135332	MAIN BURNER ASSEMBLY	PF/PB 2001
14	100208332	SIGHT GLASS, 1/2"	ALL
15	100165937	IGNITOR, HOT SURFACE KIT	ALL
16	100208087	GASKET, IGNITER	ALL
17	100208102	GASKET, BURNER, FAN	ALL
18	100208094	GASKET, BURNER	ALL
19	100172024	GAS VALVE ASSEMBLY, NAT	PF/PB 1501
19	100172025	GAS VALVE ASSEMBLY, NAT	PF/PB 1701
19	100172026	GAS VALVE ASSEMBLY, NAT	PF/PB 2001
19	100171939	GAS VALVE ASSEMBLY, LP	PF/PB 1501
19	100171940	GAS VALVE ASSEMBLY, LP	PF/PB 1701
19	100171941	GAS VALVE ASSEMBLY, LP	PF/PB 2001
20	100171780	VALVE, VENTURI	PF/PB 1501-1701
20	100171763	VALVE, VENTURI	PF/PB 2001
21	100233698	GASKET FAN, VENTURI	ALL
22	100208105	GASKET, GAS TRAIN	ALL
23	100171912	VALVE, BALL, 1.5"	ALL
24	100169749	FLANGE, GAS 1 1/4" NPT	ALL
HEAT EXCHANGERS			
25	100173872	FLANGE	ALL
26	100233672	GASKET, TOP HEADER FLANGE 1/4"	ALL
27	100147436	HEAT EXCHANGER (HLW)	PF 1501
27	100147437	HEAT EXCHANGER (HLW)	PF 1701
27	100147438	HEAT EXCHANGER (HLW)	PF 2001
27	100147444	HEAT EXCHANGER (H)	PB 1501
27	100147445	HEAT EXCHANGER (H)	PB 1701
27	100147446	HEAT EXCHANGER (H)	PB 2001
28	100141598	DRAIN VALVE KIT	PB
28	100141604	DRAIN VALVE KIT	PF

PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
MISCELLANEOUS (CONTINUED)			
29	100233613	BULBWELL, EMMEN CONTROL	ALL
30	100233695	BULBWELL, HIGH LIMIT	ALL
31	100153827	V-BAFFLE, HEAT EXCHANGER (24)	PF/PB 1501
31	100153828	V-BAFFLE, HEAT EXCHANGER (24)	PF/PB 1701
31	100153829	V-BAFFLE, HEAT EXCHANGER (24)	PF/PB 2001
32	100154193	RETAINER ,V-BAFFLE	ALL
33	100208063	FILTER, AIR, HEAVY DUTY	ALL
34	100233489	FAN, VENTILATION	ALL
35	100208337	CONDENSATE TRAP	ALL
36	100208552	THERMISTOR SENSOR	ALL
37	100135503	3/4X3/8 BRASS BUSHING	ALL
-	100157742	OUTDOOR AIR SENSOR	ALL
-	100170647	FLUE SENSOR	ALL
-	100163160	ALUMINUM TUBING (Order by the foot)	ALL
-	100171006	TUBING, EPDM 3/8" (Order by the foot)	ALL
PUMPS			
-	100133622	PUMP ASSEMBLY	PF
-	100133623	PUMP (OPTIONAL)	PB
JACKET/DOOR ASSEMBLIES			
38	100153852	JACKET TOP, WITHOUT VENTILATION FAN	ALL
39	100154374	JACKET, OUTER FRONT UPPER LEFT	ALL
40	100154396	JACKET, OUTER FRONT LOWER	PF/PB 1501
40	100154397	JACKET, OUTER FRONT LOWER	PF/PB 1701
40	100154398	JACKET, OUTER FRONT LOWER	PF/PB 2001
41	100153938	JACKET, OUTER RIGHT	PF/PB 1501
41	100153939	JACKET, OUTER RIGHT	PF/PB 1701
41	100153940	JACKET, OUTER RIGHT	PF/PB 2001
42	100154399	JACKET, OUTER LEFT	PF/PB 1501
42	100154400	JACKET, OUTER LEFT	PF/PB 1701
42	100154401	JACKET, OUTER LEFT	PF/PB 2001
INSULATION			
-	100145460	INSULATION, SIDES	PF/PB 1501
-	100145461	INSULATION, SIDES	PF/PB 1701
-	100145462	INSULATION, SIDES	PF/PB 2001
-	100145580	INSULATION, BACK	PF/PB 1501
-	100145581	INSULATION, BACK	PF/PB 1701
-	100145582	INSULATION, BACK	PF/PB 2001
-	100145447	INSULATION, FRONT	PF/PB 1501
-	100145448	INSULATION, FRONT	PF/PB 1701
-	100145449	INSULATION, FRONT	PF/PB 2001
-	100145450	INSULATION, FRONT DOOR	PF/PB 1501
-	100145451	INSULATION, FRONT DOOR	PF/PB 1701
-	100145452	INSULATION, FRONT DOOR	PF/PB 2001
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.			

CONDENSING COMMERCIAL GAS WATER HEATERS



EIGHT MODELS FROM
125,000 TO 500,000 BTU/HR

NO EFFICIENCY LOSS FROM LIME SCALE

VIRTUALLY SILENT OPERATION

ADVANCED SMART CONTROL™

VENTING UP TO 100 FEET



96% THERMAL EFFICIENCY



DESIGNED ★ ENGINEERED ★ ASSEMBLED

USA



SHIELD – THE BETTER IDEA

The Shield™ commercial water heater features an advanced water heating system beautifully packaged for the smallest possible footprint. The Shield is available in eight models in standard and ASME construction. All utility connections are located at the top of the appliance to reduce equipment room footprint and increase installation flexibility. The Smart Control™ offers a bright, clear LCD display with soft-key buttons and a wide variety of advanced control functions. Additionally, a large removable pump access panel as well as the control can be found in the front of the cabinet making serviceability a snap.

96% EFFICIENCY – LIME SCALE FREE FOR LIFE

The Shield water heater operates at 96% thermal efficiency and provides 100% effective defense against a water heater’s worst enemy – lime scale buildup on the tank and heating surfaces.

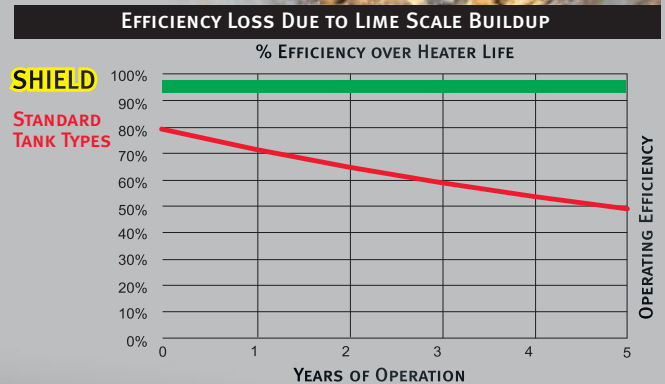
Tank type water heaters suffer from one thing the Shield does not, lime scale buildup. Lime scale insulates the water from the heat source, decreasing thermal efficiency and increasing operating costs. Just a 1/4” of lime scale will increase fuel consumption and raise operating costs as much as 25%.

Shield has no flue tubes inside the tank. The water is heated in

a separate stainless steel heat exchanger mounted above the tank. By controlling and creating high water velocity through the heat exchanger, the heat surface areas are kept clean so thermal efficiency remains high, for life.

The chart below illustrates Shield’s sustained long life efficiency compared to standard, tank type water heaters.

“In-tank” flue tubes and heat exchangers suffer from lime scale buildup beginning from the first hours of operation.



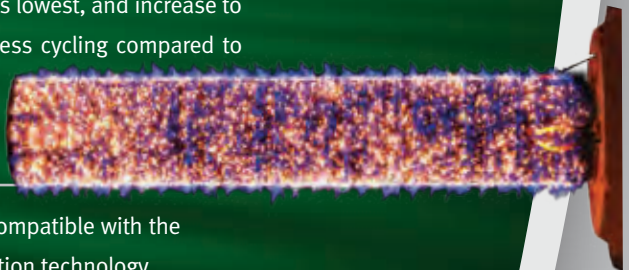
NOTE: The chart is based on limescale build-up of 1/16 inch per year which reduces operating efficiency approximately 8-10% per year.

FULLY MODULATING BURNER WITH 5:1 TURNDOWN

SHIELD can fire as low as 20% of maximum input when water heating demand is lowest, and increase to 100% for peak-demand periods. This results in better overall efficiency and less cycling compared to “on-off” tank-type units that can only fire at 100%.

‘NEG/REG’ SEALED COMBUSTION TECHNOLOGY

SHIELD utilizes an advanced combustion system which provides NOx ratings compatible with the most stringent air quality standards. Additionally, the NEG/REG sealed combustion technology allows the unit to operate with inlet gas pressure as low as 4 inches water column.



ADVANCED ELECTRONIC CONTROL

SHIELD features the ultimate water heater control which makes system setup, service and operation a breeze. A backlit LCD display gives readouts of setup, system status and diagnostic information. SMART CONTROL™ also includes:

- › Night Setback
- › Runtime Contacts
- › Security Protection
- › Time Clock
- › Enable/Disable Contacts
- › Adjustable Pump Delay
- › Alarm Contacts
- › Last 10 Lock-Outs
- › Contacts for Louvers

SMART CONTROL™



8 FT. POWER CORD

PUMP

CONDENSATE TRAP

CONSTANT WATER CIRCULATION DRIVES LIME SCALE FREE PERFORMANCE

ELECTRONIC CONTROL

STAINLESS STEEL HEAT EXCHANGER

STORAGE TANK

DUAL ANODE ROD PROTECTION

7 VENTING OPTIONS!

Room Air Vertical



Room Air Sidewall



Direct Vent Vertical



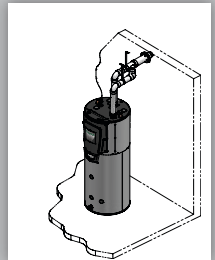
Vertical w/ Sidewall Air



Direct Vent Vertical*



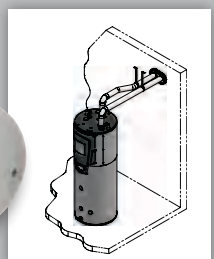
Direct Vent Sidewall*



Sidewall Vent Termination Factory Supplied and Shipped Standard with Every Model!



**Optional Concentric Vent Kit Sold Separately*



INSTALLATION FLEXIBILITY

As always, multiple SHIELD water heaters can be manifolded together to meet large demands. Now, with new optional Side Tappings, a SHIELD can be connected to an additional heat source, such as an ARMOR water heater.





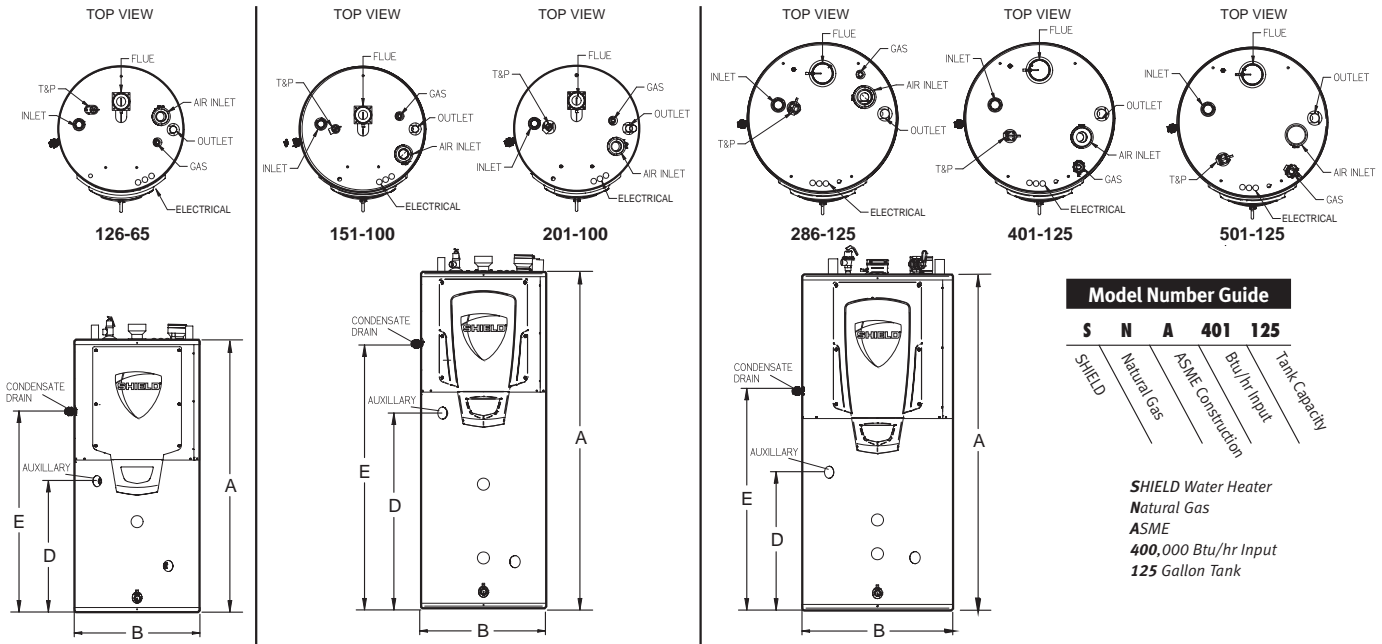
SHIELD™ PAYBACK CALCULATOR

SHIELD™ innovation makes the difference! The following estimated comparisons show the effects of lime scale buildup on thermal efficiency and yearly operating cost for the 96% efficient SHIELD and a standard 80% efficient tank-type commercial water heater. Comparison is based on 200,000 Btu/hr units delivering 2,000 gallons of hot water per day, 365 days per year, at an 80°F temperature rise, with a natural gas rate of \$1.22 per therm. (Based on DOE Energy Guide price per therm).

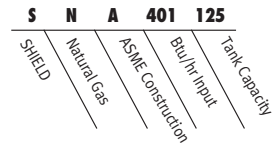
Bottom line, these numbers show that because of its 96% efficiency and lime scale free performance, SHIELD will pay back the initial cost difference in energy savings alone in less than 1.5 years!

	SHIELD WATER HEATER		STANDARD 80% EFFICIENT UNIT		OPERATING COST DIFFERENCE	
	Efficiency	Operating Cost	Efficiency	Operating Cost	Yearly	Cumulative
Year 1	96%	\$6,123	72%	\$8,164	\$2,041	\$2,041
Year 2	96%	\$6,123	65%	\$9,043	\$2,920	\$4,961
Year 3	96%	\$6,123	58%	\$10,134	\$4,011	\$8,972
Year 4	96%	\$6,123	52%	\$11,304	\$5,181	\$14,153
Year 5	96%	\$6,123	47%	\$12,506	\$6,383	\$20,536

SHIELD™ WATER HEATER DIMENSIONS AND SPECIFICATIONS



Model Number Guide



SHIELD Water Heater
Natural Gas
ASME
400,000 Btu/hr Input
125 Gallon Tank

Model Number	Btu/hr Input	Capacity (Gal)	GPH @ 100° Rise	First Hour	A	B	D	E	Gas Conn.	Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
SNR126-065	125,000	65	145	197	60-1/4"	28"	29-1/2"	45-1/4"	1/2"	1-1/2"	3"	3"	508
SNR151-100	150,000	90	175	247	75-1/2"	28"	44"	59-1/2"	1/2"	1-1/2"	3"	3"	588
SNR201-100	199,999	90	233	305	75-1/2"	28"	44"	59-1/2"	1/2"	1-1/2"	3"	3"	601
SNA151-100*	150,000	90	175	247	75-1/2"	28"	44"	59-1/2"	1/2"	1-1/2"	3"	3"	645
SNA201-100*	199,999	90	233	305	75-1/2"	28"	44"	59-1/2"	1/2"	1-1/2"	3"	3"	657
SNA286-125*	285,000	120	332	428	75-1/2"	34"	31"	49"	3/4"	2"	4"	4"	831
SNA401-125*	399,999	120	465	561	75-1/2"	34"	31"	49"	1"	2"	4"	4"	889
SNA501-125*	500,000	120	582	678	75-1/2"	34"	31"	49"	1"	2"	4"	4"	909

Change N to L for LP gas. Field convertible to LP Gas *A = ASME Construction Electrical Requirements: 120 VAC/60Hz/Phase All Information is subject to change.

STANDARD FEATURES

- ▶ 96% Thermal Efficiency (AHRI Certified)
- ▶ Modulating Burner with 5:1 Turndown
- ▶ Operates at Temperatures up to 180°F for Sanitizing Applications
- ▶ Stainless Steel Heat Exchanger
- ▶ Glass-Lined Steel Tank
- ▶ Magnesium Anode Rods
- ▶ 150 PSI Working Pressure
- ▶ ASME Construction (SNA151-501)
- ▶ ASME Temperature and Pressure Relief Valve
- ▶ Zero Clearances to Combustible Material
- ▶ Certified for Installation on Combustible Floors
- ▶ PVC, CPVC, Polypropylene and Stainless Steel Venting up to 100 Equivalent Feet

- ▶ Direct-Vent Sealed Combustion
- ▶ Rooftop and Sidewall Venting
- ▶ Sidewall Vent Termination
- ▶ Advanced SMART CONTROL, with:
 - LCD Display
 - Time Clock
 - Night Setback
 - Alarm Contacts
 - Runtime Contacts
 - Manual Reset High Limit
 - 3 Water Temperature Sensors
 - Flue Temperature Sensor
 - Contacts for Louvers
 - Adjustable Pump Delay
 - Security Protection

- ▶ Enable/Disable Contacts
- ▶ Low-NOx Operation, meets SCAQMD Rule 1146.2
- ▶ Low Gas Pressure Operation
- ▶ Direct-Spark Ignition
- ▶ Full Port Brass Drain Valve
- ▶ 8-Foot Power Cord
- ▶ 3-Year Limited Warranty
- ▶ 1-Year Parts Warranty

OPTIONAL EQUIPMENT

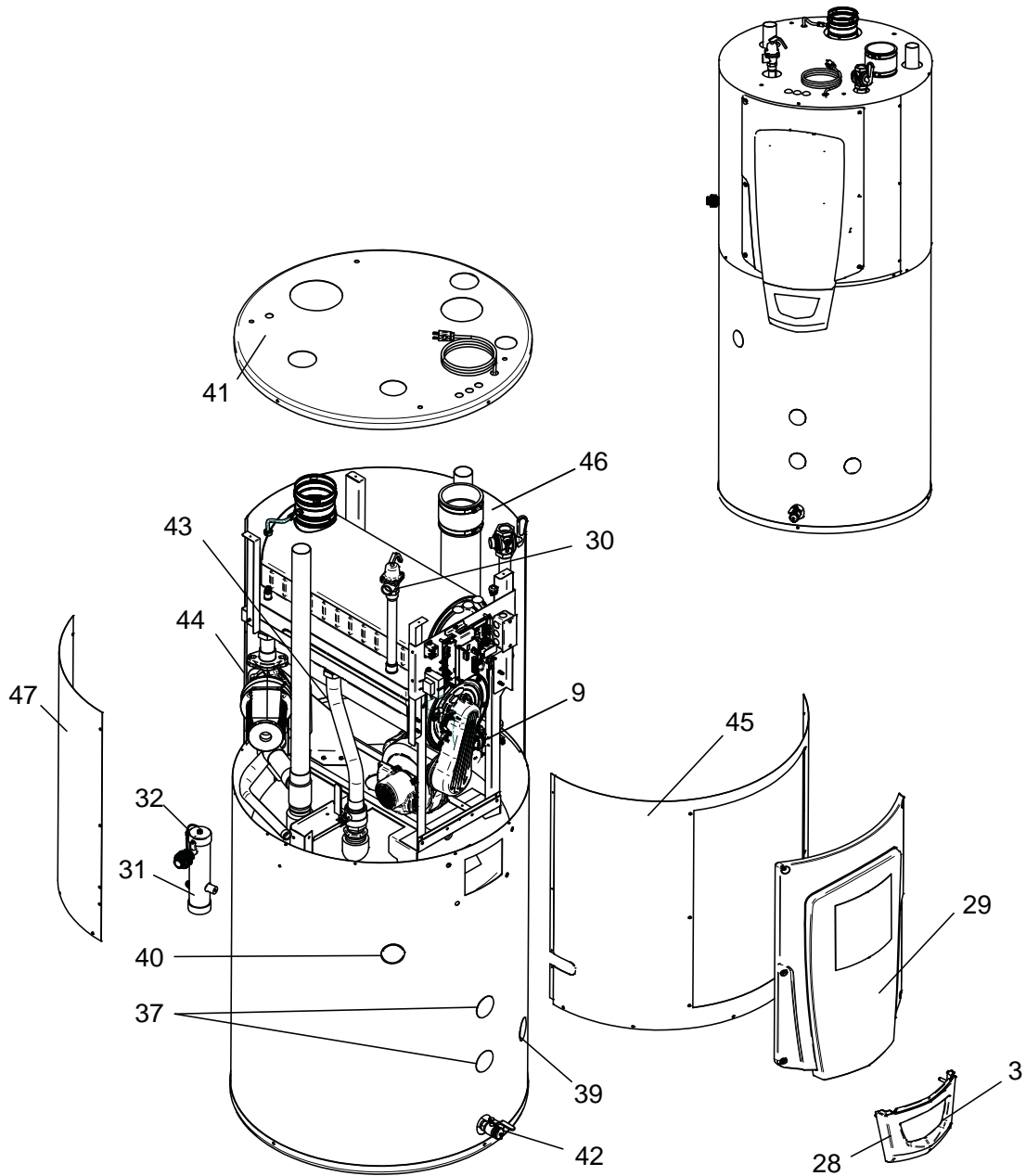
- ▶ Alarm Bell
- ▶ Concentric Vent Kit
- ▶ Condensate Neutralization Kit
- ▶ Low Water Cutoff
- ▶ Tank Side Tappings for Alternate Heat Source



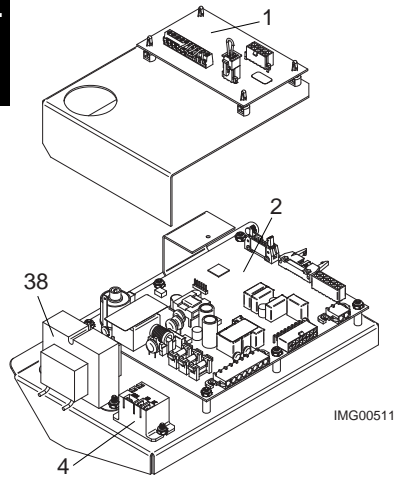


Replacement Parts List

SHIELD™
Water Heater
SNR126-065, 151-100, 201-100
SNA151-100, 201-100, 286-125, 401-125, 501-125

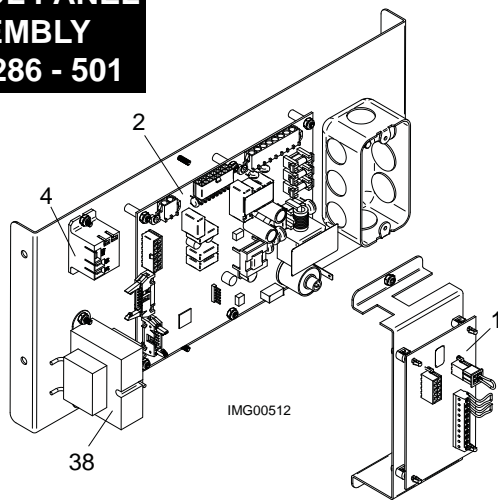


**CONTROL PANEL
ASSEMBLY
SNR/A 126 - 201**



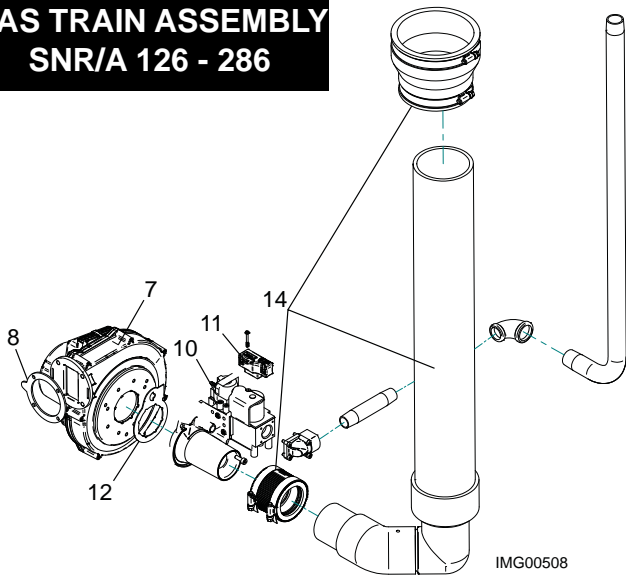
IMG00511

**CONTROL PANEL
ASSEMBLY
SNR/A 286 - 501**



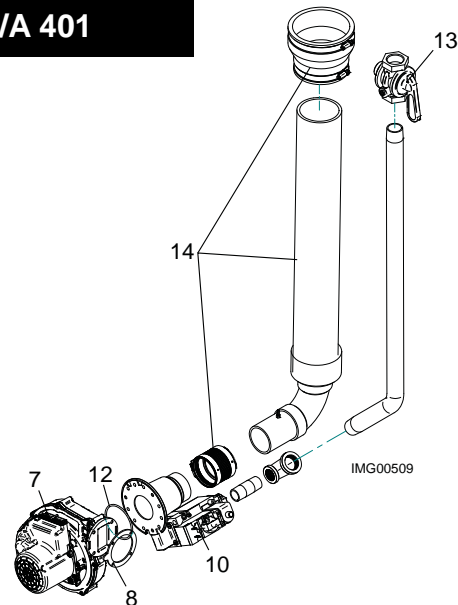
IMG00512

**GAS TRAIN ASSEMBLY
SNR/A 126 - 286**



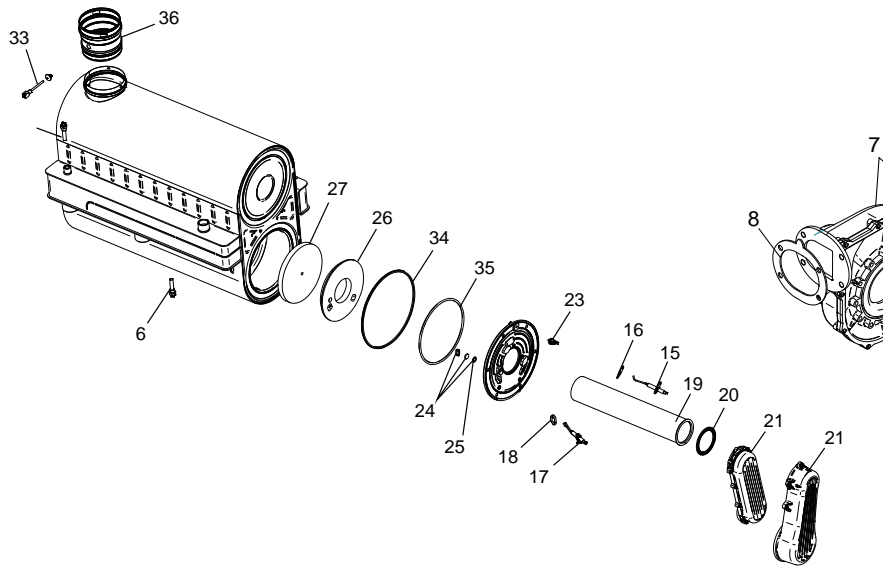
IMG00508

**GAS TRAIN ASSEMBLY
SNR/A 401**



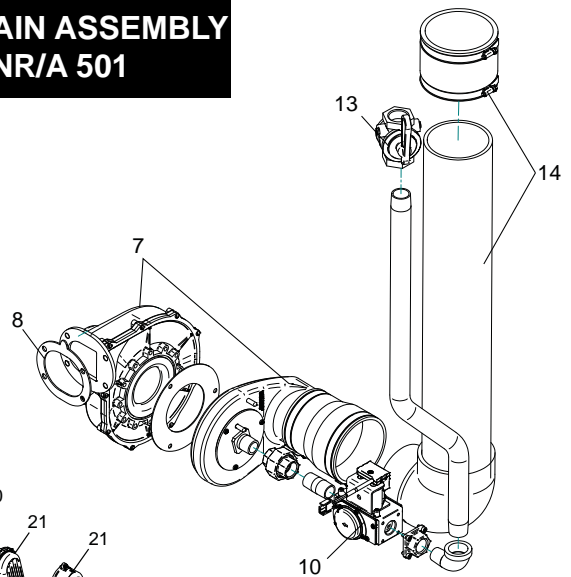
IMG00509

**HEAT EXCHANGER
ASSEMBLY**



IMG00514

**GAS TRAIN ASSEMBLY
SNR/A 501**



ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS			
1	100167623	CONNECTION BOARD	ALL
2	100167865	INTEGRATED CONTROL	SNR126, SNR/A151 &201
2	100167866	INTEGRATED CONTROL	SNA401
2	100167867	INTEGRATED CONTROL	SNA286 & 501
2	100167868	HIGH ALTITUDE INTEGRATED CONTROL	SNR126, SNR/A151 &201
2	100167869	HIGH ALTITUDE INTEGRATED CONTROL	SNA401
2	100167870	HIGH ALTITUDE INTEGRATED CONTROL	SNA286 & 501
3	100167627	USER INTERFACE CONTROL	ALL
4	100208509	PUMP RELAY	ALL
5	100208565	WATER TEMP SENSOR, INLET	ALL
6	100208566	OUTLET SENSOR/ HIGHT LIMIT	ALL
7	100145003	FAN ASSEMBLY	SNR126
7	100145004	FAN ASSEMBLY	SNR/A151
7	100145005	FAN ASSEMBLY	SNR/A201
7	100145006	FAN ASSEMBLY	SNA286
7	100145008	FAN ASSEMBLY	SNA401
7	100144984	FAN ASSEMBLY	SNA501
8	100208764	GASKET / BLOWER	SNR151
8	100208101	GASKET / BLOWER	SNR126, SNR/A201-401
8	100208759	GASKET / BLOWER	SNA501
9	100208381	PRESSURE SWITCH	SNR126, SNR/A151
9	100166111	PRESSURE SWITCH	SNR/A201
9	100166099	PRESSURE SWITCH	SNA286
9	100208378	PRESSURE SWITCH	SNA401
9	100166116	PRESSURE SWITCH	SNA501
GAS VALVES			
10	100171985	GAS VALVE ASSEMBLY	SNR126
10	100171986	GAS VALVE ASSEMBLY	SNR/A151
10	100171987	GAS VALVE ASSEMBLY	SNR/A201
10	100171988	GAS VALVE ASSEMBLY	SNA286
10	100171989	GAS VALVE ASSEMBLY	SNA401
10	100171990	GAS VALVE ASSEMBLY, NAT	SNA501
10	100171991	GAS VALVE ASSEMBLY, LP	SLA501
11	100208324	GAS VALVE ON/OFF SWITCH	SNR126, SNR/A151, 201 & SNA286
12	100208760	GAS VALVE GASKET	SNR126, SNR/A151 & 201, SNA286
12	100208761	GAS VALVE GASKET	SNA401
13	100146149	GAS CUT OFF VALVE 1X1	SNA401-501
14	100163233	AIR INLET KIT	SNR126 & SNR/A201
14	100163234	AIR INLET KIT	SNR/A151
14	100163235	AIR INLET KIT	SNA286
14	100163236	AIR INLET KIT	SNA401
14	100163237	AIR INLET KIT	SNA501
PILOT & BURNER ASSEMBLIES			
15	100165930	FLAME SENSOR W/ GASKET	ALL
16	100208091	FLAME SENSOR GASKET	ALL
17	100165929	IGNITOR W/ GASKET	ALL
18	100208086	IGNITOR GASKET	ALL
19	100135278	BURNER W/ GASKET	SNR126
19	100135308	BURNER W/ GASKET	SNR/A151
19	100135309	BURNER W/ GASKET	SNR/A201
19	100135310	BURNER W/ GASKET	SNA286
19	100135311	BURNER W/ GASKET	SNA401-501
20	100208085	BURNER GASKET	ALL
21	100173796	GAS/AIR ARM ASSEMBLY W/ GASKET	SNR126
21	100173791	GAS/AIR ARM ASSEMBLY W/ GASKET	SNR/A151
21	100173792	GAS/AIR ARM ASSEMBLY W/ GASKET	SNR/A201, SNA286-401
21	100173793	GAS/AIR ARM ASSEMBLY W/ GASKET	SNA501
22	100173749	HEAT EXCHANGER ACCESS DOOR KIT	ALL
23	100094572	HEX DOOR TEMP SWITCH BEGINNING SERIAL #F14	SNA286-501
PLEASE HAVE SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
24	100163249	SIGHT GLASS W/ GASKET	ALL
25	100208762	SIGHT GLASS GASKET	ALL
26	100145602	INSULATION, BURNER PLATE DOOR	ALL
27	100208061	INSULATION BAFFLE, DIVIDER PLATE	ALL
28	100162509	DISPLAY BEZEL LOWER	ALL
29	100189211	DISPLAY BEZEL UPPER	SNR126, SNR/A151 & 201
29	100189212	DISPLAY BEZEL UPPER	SNA286-501
30	100208446	T & P RELIEF 150#	SNR126
30	100167359	T & P RELIEF 150#	SNR/A151 & 201
30	100167403	T & P RELIEF 150#	SNA286-501
31	100208315	CONDENSATE TRAP	ALL
32	100208243	BLOCKED DRAIN SWITCH	ALL
33	100208556	FLUE TEMP SENSOR KIT	SNR126, SNR/A151 & 201
33	100170642	FLUE TEMP SENSOR KIT	SNA286-501
34	100208088	GASKET, DOOR RUBBER	ALL
35	100208107	GASKET, DOOR ROPE	ALL
36	100166586	FLUE COLLAR	SNR126, SNR/A151 & 201
36	100189054	KIT, FLUE COLLAR 4"	SNA286-501
37	100208654	ANODE ROD, MAGNESIUM	ALL
38	100208230	TRANSFORMER	ALL
39	100208552	TANK SENSOR	ALL
-	100233695	BULB WELL	ALL
40	100163033	SEAL, KNOCK OUT	ALL
41	100208330	SEAL, KNOCK OUT 2 1/2"	ALL
42	100141595	VALVE, DRAIN BRASS	ALL
43	100233625	COPPER TUBE GASKET	SNR126, SNR/A151 & 201
43	100146372	COPPER TUBE GASKET	SNA286
43	100146373	COPPER TUBE GASKET	SNA401-501
-	100208807	FUSE, 1.25 AMP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100208652	MRLWCO WITH TEST	ALL
-	100157721	NEUTRALIZER KIT	ALL
-	100148402	LIMIT, HEAT EXCHANGER OVER TEMP	SNA286-501
-	100172915	HARNESS, UNIT	SNR126, SNR/A151 & 201
-	100072938	HARNESS, UNIT	SNA286-501
-	100172916	HARNESS, POWER	SNR126, SNR/A151 & 201
-	100172933	HARNESS, POWER	SNA286-501
-	100172774	CORD, POWER	ALL
-	100172936	HARNESS, CONNECTION BOARD	SNR126, SNR/A151 & 201
-	100172945	HARNESS, CONNECTION BOARD	SNA286-501
-	100208620	HARNESS, ELECTRODE SPARK	ALL
-	100208622	HARNESS, ELECTRODE, FLAME SENSOR	ALL
-	100208636	CABLE, RIBBON	SNR126, SNR/A151 & 201
-	100208638	CABLE, RIBBON	SNA286-501
-	100173091	HARNESS, GAS VALVE	SNA401
-	100173314	HARNESS, GAS VALVE	SNA501
-	100159008	LP CONVERSION KIT	SNR126, SNR/A151
-	100159009	LP CONVERSION KIT	SNR/A201
-	100159010	LP CONVERSION KIT	SNA286
-	100159011	LP CONVERSION KIT	SNA401
PUMPS			
44	100208410	PUMP W/ HARDWARE	SNR125, SNR/A151 & 201
44	100166384	PUMP W/ HARDWARE	SNA286
44	100166374	PUMP W/ HARDWARE	SNA401 & 501
JACKET ASSEMBLY			
45	100149767	JACKET, OUTER, TOP, FRONT	SNR126, SNR/A151 & 201
45	100149768	JACKET, OUTER, TOP, FRONT	SNA286-501
46	100149769	JACKET, OUTER, UPPER, REAR	SNR126, SNR/A151 & 201
46	100149770	JACKET, OUTER, UPPER, REAR	SNA286-501
47	100149771	JACKET, OUTER, UPPER, SIDE	SNR126, SNR/A151 & 201
47	100149772	JACKET, OUTER, UPPER, SIDE	SNA286-501

PLEASE HAVE SERIAL NUMBER WHEN ORDERING PARTS

RESIDENTIAL COPPER TUBE BOILERS



TWO STAGE OPERATING CONTROL

OUTDOOR RESET WITH SENSOR

DOMESTIC HOT WATER PRIORITIZATION

GASKETLESS HEAT EXCHANGER

7 MODELS: 45,000 – 260,000 BTU/HR

BUILT-IN PERFORMANCE LOOP



DESIGNED ★ ENGINEERED ★ ASSEMBLED

USA



The Solution to Your Home Heating Boiler Needs

Hot water has been a Lochinvar tradition since 1919. With over 90 years of commercial sales, manufacturing and engineering expertise to rely upon, all Lochinvar products, including the Solution™ boiler, are designed to the highest standards of quality, safety, and reliability using the latest in technology.

The Right Investment

If you're looking for a heating system for your new home, replacing an old boiler, or thinking about converting from expensive electric heat, Lochinvar's Solution boiler is the right heating investment for you. You rarely think about heating your home, that is unless you can't get warm enough, or your monthly heating bill just surpassed your house payment. A reliable and efficient heating system is the key to keeping your family comfortable when the weather turns cold. That's why Lochinvar developed the Solution. This gas-fired boiler stands above any other boiler in its class in terms of comfort, quality, efficiency, flexibility and dependability.

Built For Dependability

Every Lochinvar boiler is made in the USA. Built to commercial grade standards, the Solution boiler is better designed and better built. And every Solution boiler is quality checked throughout the manufacturing process, giving you a boiler built for dependability. When you select Solution, you get home heating that is economical, reliable, flexible, safe and dependable and made here at home in the heartland of the USA. And we back it all up with our exclusive 20-year Limited Warranty.

Cost Savings High Efficiency

Often times old boilers operate as low as 50% efficiency. This means that 1/2 of your fuel dollars are wasted up the chimney. A Solution boiler, with an annual fuel utilization efficiency (AFUE) of up to 84%, can reduce your heating bills by over 30%. This means that the Solution boiler can actually pay for itself in just a few short years with the money the old system is wasting. If you are currently spending \$2,000 each year to heat your home with your old inefficient boiler, your fuel savings could be as much as \$800 per year by switching to the 84% efficient Solution boiler. Lochinvar's Solution boiler makes heating your home with gas a smart investment that you'll appreciate for years.

Other products available

KNIGHT AND CADET HEATING BOILERS

Need higher efficiency? KNIGHT Heating Boilers are available in sizes from 55,000 to 399,000 Btu/hr and rated up to 98% efficiency in low temperature applications. Cadet Heating Boilers are available in sizes from 40,000 to 120,000 Btu/hr and rated up to 94% AFUE efficiency.



Built-In Features

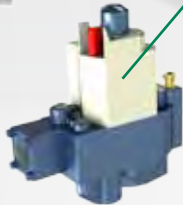
PVC or CPVC Vent Kit (optional)
Vent up to 25 feet out a sidewall or rooftop with inexpensive PVC/CPVC (CB 45-135).



Built-in Performance Loop
Ideal for replacing a cast iron boiler, the performance loop saves time and simplifies installation.



Two-Stage Gas Valve
The two-stage gas valve enables the boiler to start on low fire and continue on to high fire.



Lo/Hi/Lo Temperature Control
Since full boiler capacity is only needed 20% of the heating season the lo/hi/lo temperature control increases overall system efficiency by only turning the boiler on high fire when extra capacity is needed.



Domestic Hot Water Prioritization and Outdoor Temperature Reset
Allows the water temperature produced to vary with the demand of the outdoor conditions and provides domestic hot water production when paired with an indirect storage tank.

Ignition Control Module
Controls ignition and includes self diagnostic indicator lights.



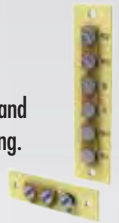
Stainless Steel Burners
Ensure long life without rusting.



Intermittent Spark Ignition
The system safely shuts down on loss of pilot flame in less than one second.



Terminal Strips
Auxiliary power contacts for remote control of louvers and fans; or remote control of single stage or two stage firing.



Combustible Floor Base
Design certified for combustible floor installations. (Do not install directly on carpeting.)

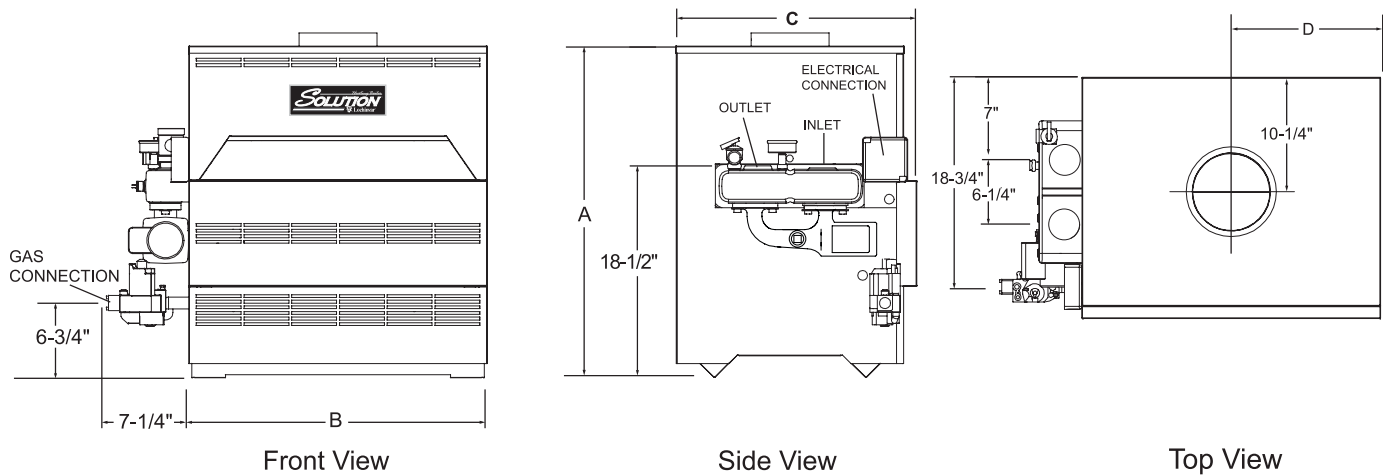
Unique Heat Exchanger Design
You will enjoy years of reliable performance because the Solution is constructed with cast iron headers and a gasketless copper-tube heat exchanger. The combination of a copper heat exchanger with cast iron headers has the unique ability to absorb and transfer heat quickly and efficiently while providing unmatched durability.



Installation Flexibility

Lochinvar designed the Solution to make installations a snap in any home with all piping and venting connections made conveniently from the top of the unit. The Solution is also pre-piped with a pumped performance loop for easy hookup. Lightweight and compact, the Solution's flexibility allows the contractor to spend less time installing your new boiler, which results in savings to you.

SOLUTION BOILER DIMENSIONS AND SPECIFICATIONS



SOLUTION HEATING BOILER					DIMENSIONS AND SPECIFICATIONS							
Model Number	Input MBH	AFUE %	Heating Capacity MBH	Net AHRI Rating MBH	A	B	C	D	Gas Conn.	Vent Size	Shipping Weight	
CBN045	45	84.0	37	32	29-1/2"	11-1/2"	21-1/2"	5-3/4"	1/2"	4"	145	
CBN075	75	84.0	62	54	29-1/2"	15-1/2"	21-1/2"	7-3/4"	1/2"	5"	155	
CBN090	90	84.0	75	65	29-1/2"	15-1/2"	21-1/2"	7-3/4"	1/2"	5"	155	
CBN135	135	84.0	112	97	29-1/2"	19-1/2"	21-1/2"	9-3/4"	1/2"	6"	175	
CBN180	180	84.0	149	130	29-1/2"	23-1/2"	21-1/2"	11-3/4"	3/4"	7"	195	
CBN215	215	84.0	178	155	29-1/2"	26-1/2"	21-1/2"	13-1/4"	3/4"	7"	220	
CBN260	260	84.0	216	188	29-1/2"	29-1/2"	21-1/2"	14-3/4"	3/4"	8"	225	

Notes: Change 'N' to 'L' to denote L.P. gas models
 Net ratings based on piping and pick-up allowance of 1.15
 *The Net AHRI Water Ratings shown are based on a piping and pick-up allowance of 1.15.

Electrical Requirements: 120 VAC / 2 AMP
 Approved for indoor installation only

Water connections are 1-1/2" NPT
 Performance data based on manufacturer test results.

STANDARD FEATURES

- ASME Copper Finned Tube Heat Exchanger
- Gasketless Heat Exchanger Design
- Built-In Performance Loop
- Vertical Water Connections
- 24 Volt Control System
- Self Diagnostic Ignition Control
- Terminal Strip
- Intermittent Electronic Ignition
- Two Stage Solid State Temperature Control
- Outdoor Reset with Outdoor Sensor
- Domestic Hot Water Prioritization
- Two Stage Gas Valve w/ Built In Manual Shut-Off
- 160 PSI Working Pressure
- Pump Relay
- Automatic Reset High Limit
- ASME Pressure Relief Valve
- Temperature & Pressure Gauge
- Automatic Vent Damper
- Built-In Draft Diverter
- Stainless Steel Burners
- Loch-Heat Ceramic Tile Combustion Chamber
- CSA Design Certified for Installation on Combustible Floors
- CSA Design Certified for Alcove Installation
- 20 Year Limited Warranty on the Heat Exchanger (see warranty for details)
- 2 Year Parts Warranty

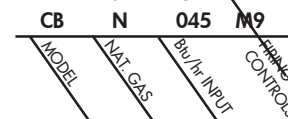
OPTIONAL EQUIPMENT

- Adjustable High Limit w/ Manual Reset
- Flow Switch
- Low Water Cut-Off
- Stack Frame
- Pump Delay w/ Freeze Protection
- MP2 Sequencer
- PVC/CPVC Venting Kit (CB 45-135)
- O2 Barrier Waterways

FIRING CONTROL SYSTEMS

- M9 Two Stage, Intermittant Spark Ignition (Standard)
- M7 California Code (CB 215-260 only)

FOR EASE IN ORDERING BY MODEL NUMBER



This model is a 45,000 Btu/hr, natural gas Solution boiler. It has M9 firing controls

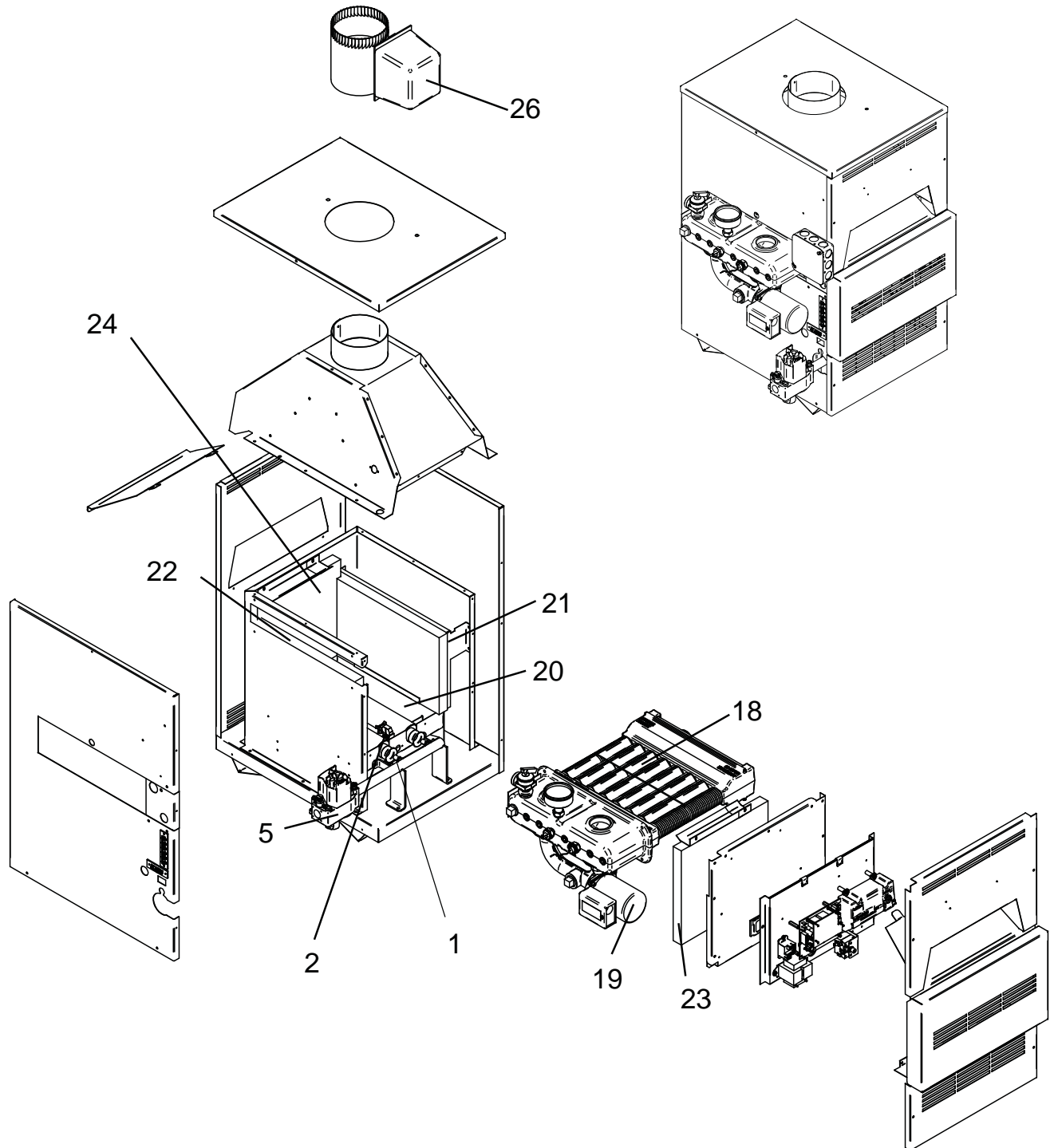
*Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pick-up requirements, such as intermittent system operation, extensive piping systems, etc.



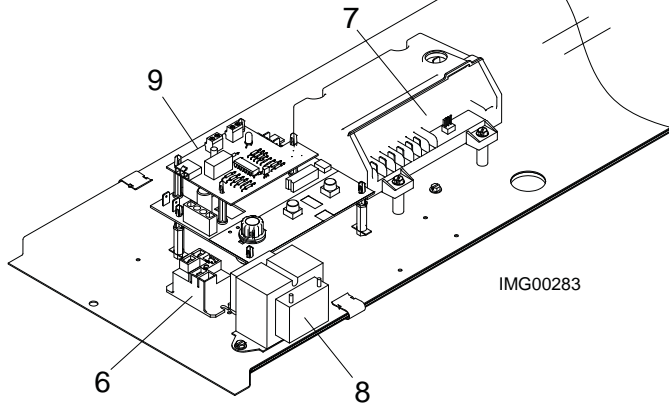


Replacement Parts List

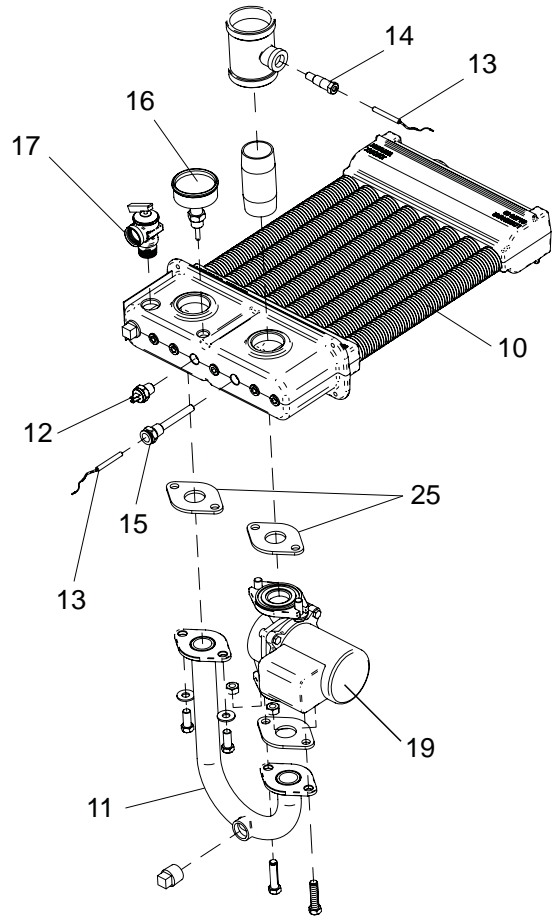
Solution Boilers CB 45-260



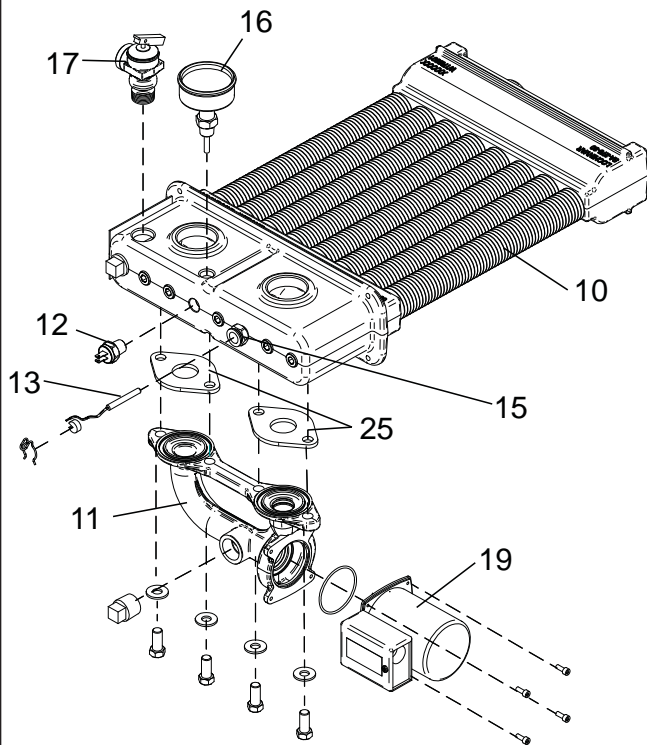
CONTROL PANEL



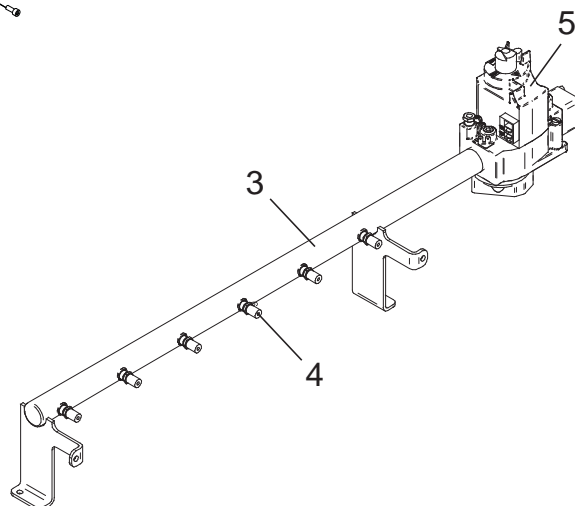
HEAT EXCHANGER ASSEMBLY PRIOR TO SERIAL #E10H00226216



HEAT EXCHANGER ASSEMBLY BEGINNING WITH SERIAL #E10H00226216



GAS TRAIN



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
PILOT & BURNER ASSEMBLIES			
1	BNR2903	MAIN BURNER	ALL
2	PLT2303	PILOT, INTERMITTENT, NAT. M9	CBN045
2	PLT3303	PILOT, INTERMITTENT, LP. M9	CBL045
2	PLT2908	PILOT, INTERMITTENT, NAT. M9	CBN075-260
2	PLT2909	PILOT, INTERMITTENT, LP. M9	CBL075-260
3	MAN2934	GAS MANIFOLD	CB045
3	MAN2935	GAS MANIFOLD	CB075/090
3	MAN2936	GAS MANIFOLD	CB135
3	MAN2937	GAS MANIFOLD	CB180
3	MAN2938	GAS MANIFOLD	CB215
3	MAN2939	GAS MANIFOLD	CB260
4	ORF2419	ORIFICE, MAIN BNR. NAT.3.2MM	CB045-180
4	ORF2402	ORIFICE, MAIN BNR. LP 2.0MM	CB045-180
4	ORF2422	ORIFICE, MAIN BNR. NAT. 3.1MM	CB215-260
4	ORF2423	ORIFICE, MAIN BNR. LP. 1.9MM	CB215-260
GAS VALVES			
5	VAL2932	GAS VALVE, LPG. M9	CB045-135
5	VAL2933	GAS VALVE, LPG. M9	CB180-260
5	VAL2939	GAS VALVE, NAT. M9	CB045-135
5	VAL2940	GAS VALVE, NAT. M9	CB180-260
CONTROLS			
6	RLY2105	RELAY, PUMP	ALL
7	RLY2023	IGNITION MODULE	ALL
8	TRF2002	TRANSFORMER 50V.A.	ALL
9	TST2314	THERMOSTAT, TWO STAGE M9 PRIOR TO SERIAL I12	ALL
9	TST30017	THERMOSTAT, TWO STAGE M9 BEGINNING SERIAL I12	ALL
-	HLC2906	ROLLOUT SWITCH 200 DEG.	CB045
-	HLC2907	ROLLOUT SWITCH 220 DEG.	CB075
-	HLC2908	ROLLOUT SWITCH 280 DEG	CB215-260
-	HLC2903	ROLLOUT SWITCH 250 DEG.	CB090-180
-	HLC2906	SPILL SWITCH 200 DEG.	CB260
-	HLC2903	SPILL SWITCH 250 DEG.	CB090/135/215
-	HLC2907	SPILL SWITCH 220 DEG	CB045/075
-	HLC2908	SPILL SWITCH 280 DEG	CB180
HEAT EXCHANGERS			
10	HEX3857	HEAT EXCHANGER H	CB045
10	HEX3858	HEAT EXCHANGER H	CB075/090
10	HEX3859	HEAT EXCHANGER H	CB135
10	HEX3860	HEAT EXCHANGER H	CB180
10	HEX3861	HEAT EXCHANGER H	CB215
10	HEX3862	HEAT EXCHANGER H	CB260
11	BKP2074	BYPASS PIPE PRIOR TO SERIAL E10H00226216	ALL
11	WTR20010	BYPASS PIPE BEGINNING SERIAL E10H00226216	ALL
12	HLC2909	HIGH LIMIT	ALL
13	TST2032	THERMOSTAT SENSOR	ALL
14	TST2044	SENSOR BULB WELL PRIOR TO SERIAL B08	ALL
15	TST2306	SENSOR BULB WELL BEGINNING SERIAL B08	ALL
16	GTP2900	TRIOMETER GAUGE 75# PSI	ALL
17	RLV2005	RELIEF VALVE, PRESSURE 30 PSI	ALL
17	RLV2001	RELIEF VALVE, PRESSURE 50 PSI	ALL
18	JKR2059	V-BAFFLE	CB045
18	JKR2060	V-BAFFLE	CB075/090
18	JKR2061	V-BAFFLE	CB135
18	JKR2062	V-BAFFLE	CB180
18	JKR2179	V-BAFFLE	CB215
18	JKR2180	V-BAFFLE	CB260
PUMPS			
19	ARM3007PBF	PUMP, BOILER BYPASS PRIOR TO SERIAL E10H00226216	ALL
19	PUM20018	PUMP, BEGINNING SERIAL E10H00226216	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
LOCH-HEAT® TILE			
20	FIB2963	INSULATION, BOTTOM	CB045
20	FIB2964	INSULATION, BOTTOM	CB075/090
20	FIB2965	INSULATION, BOTTOM	CB135
20	FIB2966	INSULATION, BOTTOM	CB180
20	FIB2967	INSULATION, BOTTOM	CB215
20	FIB2968	INSULATION, BOTTOM	CB260
21	FIB2973	LOCH-HEAT TILE, SIDE RIGHT	ALL
22	FIB2942	LOCH-HEAT TILE, SIDE LEFT	ALL
23	FIB2943	LOCH-HEAT TILE, FRONT	CB045
23	FIB2945	LOCH-HEAT TILE, FRONT	CB075/090
23	FIB2947	LOCH-HEAT TILE, FRONT	CB135
23	FIB2949	LOCH-HEAT TILE, FRONT	CB180
23	FIB2951	LOCH-HEAT TILE, FRONT	CB215
23	FIB2953	LOCH-HEAT TILE, FRONT	CB260
24	FIB2944	LOCH-HEAT TILE, BACK	CB045
24	FIB2946	LOCH-HEAT TILE, BACK	CB075/090
24	FIB2948	LOCH-HEAT TILE, BACK	CB135
24	FIB2950	LOCH-HEAT TILE, BACK	CB180
24	FIB2952	LOCH-HEAT TILE, BACK	CB215
24	FIB2954	LOCH-HEAT TILE, BACK	CB260
MISCELLANEOUS			
25	GKT2910	GASKET, PUMP FLANGE	ALL
-	TST2311	SENSOR, OUTDOOR AIR BEGINNING SERIAL I12	ALL
FLUE DAMPERS			
26	DRH2934	FLUE DAMPER - 4"	CB045
26	DRH2935	FLUE DAMPER - 5"	CB075/090
26	DRH2936	FLUE DAMPER - 6"	CB135
26	DRH2937	FLUE DAMPER - 7"	CB180/215
26	DRH2938	FLUE DAMPER - 8"	CB260
OPTIONS (NOT PICTURED)			
-	WTR2040	FLOW SWITCH	ALL
-	KIT3051	OUTDOOR AIR RESET PRIOR TO SERIAL I12	ALL
-	KIT3052	ADJUSTABLE MANUAL RESET HIGH LIMIT	ALL
-	WTR20004	LOW PRESSURE AUTO RESET LOW WATER CUT OFF	ALL
-	WTR20009	MANUAL RESET LOW WATER CUT OFF w/TEST	ALL
-	KIT3058	PUMP DELAY	ALL
-	LPK3937	NAT - LP CONVERSION KIT M9	CB045
-	LPK3915	NAT - LP CONVERSION KIT M9	CB075-135
-	LPK3916	NAT - LP CONVERSION KIT M9	CB180
-	LPK3940	NAT - LP CONVERSION KIT M9	CB215/260
PLEASE HAVE MODEL AND SERIAL NUMBER AVAILABLE WHEN ORDERING PARTS			

HIGH EFFICIENCY COMMERCIAL BOILERS

CONDENSING BOILER

 **SMART TOUCH**™

TOUCHSCREEN OPERATING CONTROL
FEATURING A BUILT-IN CASCADING SEQUENCER

1.0, 1.3 AND 1.5 MILLION BTU/HR

FIRING RATE MODULATION TO 10:1

LESS THAN 20 ppm NO_x

DIRECT-VENT FLEXIBILITY TO 100 FEET



UP TO 96.2%
THERMAL EFFICIENCY



BUILDING ON A TRADITION OF INNOVATION

Lochinvar's commitment to research and development brings innovation to the industry! The SYNC Commercial Boiler combines stainless steel heat exchanger technology with **Modulating Condensing** combustion to deliver efficiencies as high as 98% in low-temperature applications.

With models at 1.0, 1.3 and 1.5 million BTU/hr inputs, SYNC will serve a large range of commercial applications and add the "green" touch that building owners and facility managers desire.

SYNC also reaches high levels of innovation with SMART TOUCH™... touchscreen technology that puts total operational control at your fingertips! With SMART TOUCH, it's easier than ever to set up a perfectly synchronized "green" system, and access a complete onboard database of real-time operational data and performance history.

Other features in SYNC with your needs include space-saving footprints, direct-vent design with intake and exhaust runs up to 100 feet, and a built-in cascading sequencer for up to 8 boilers, delivering up to 12 million BTU/hr heating capacity.

Link up with SYNC...the mod/con boiler that's touched by innovation in every way.



THE SYNC COMBUSTION SYSTEM

ADVANCED NEGATIVE REGULATION TECHNOLOGY

SYNC safely and reliably operates with supply gas pressure as low as 4 inches water column, because Negative Regulation (Neg/Reg) technology automatically adjusts fan speed to ensure the correct volume of fuel and air entering the burner.

"FAIL-SAFE" DIRECT-SPARK IGNITION

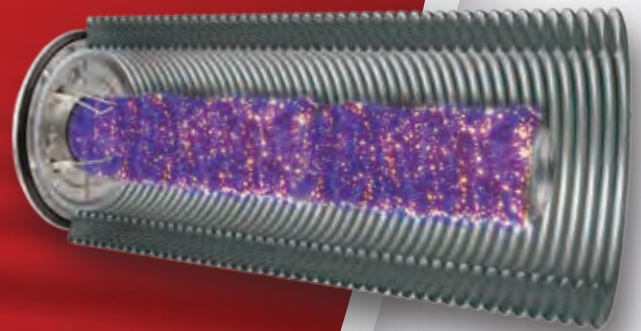
With each call for heat, two electrodes ignite the fuel/gas mixture. A third electrode then senses for flame. SMART TOUCH will lock out and display the fault if ignition does not occur.

TWO-IN-ONE STAINLESS STEEL HEAT EXCHANGER

A primary heat exchanger combined with a secondary heat exchanger captures flue gas heat and eliminates low temperature requirements. 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.

FULLY MODULATING BURNER

SMART TOUCH allows fully modulating combustion with 10:1 turndown. The combustion system can fire as low as 10% of maximum input, and modulates the firing rate up to 100% as demand increases. The burner design incorporates a woven steel mesh sleeve over a stainless steel burner tube and fires in a 360° pattern along the entire length of the primary heat exchanger. These together allow SYNC's compact size to excel compared to units with larger multiple burners.



Lochinvar SMART TOUCH™



UNEQUALED CONTROL AND MONITORING FUNCTIONS THAT ARE EASY TO USE

TOTAL CONTROL, AT YOUR FINGERTIPS

The full-color SMART TOUCH Main Menu screen is your gateway to complete control of all SYNC functions, and total access to system performance data and history. Do it all and see it all right here, with or without connecting to a separate PC using our SMART TOUCH software.

- MODBUS COMMUNICATION
- PASSWORD SECURITY
- PRODUCT SERVICE INDICATOR
- FREEZE PROTECTION
- LOW WATER FLOW INDICATOR
- NIGHT TEMPERATURE SETBACK
- BUILDING MANAGEMENT SYSTEM CONTROL
- HOT WATER GENERATOR COMPATIBILITY
- SYSTEM AND BOILER PUMP CONTROLS
- OUTDOOR RESET
- PC CONNECTION

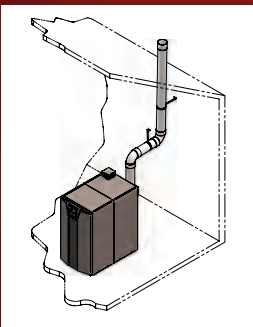
BUILT-IN CASCADING SEQUENCER

Sequences up to an 8-boiler system using simple 2-wire daisy-chain connection, eliminating cost and uncertainty of separate "third party" sequencers. On demand, one boiler functions as the leader, and modulates to capacity. Increasing load then "cascades" to additional "lag" boilers in sequence as needed. Lead-lag rotation shifts "first on" boiler role every 24 hours, distributing equal lead-lag runtimes to each unit.

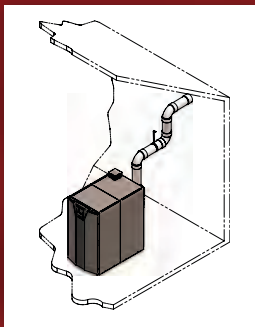


DIRECT-VENTING UP TO 100 FEET - SYNC offers 6 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using either PVC, CPVC, Polypropylene or AL29-4C stainless steel vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof.

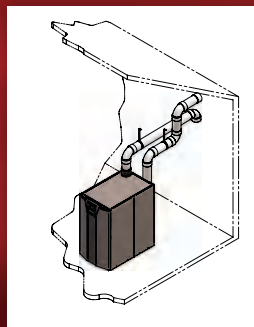
Room Air Vertical



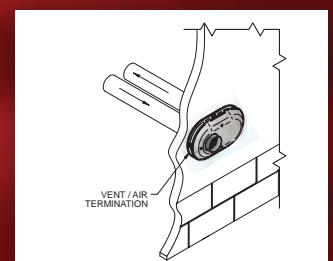
Room Air Sidewall



Direct Vent

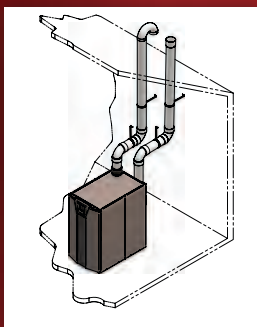


Sidewall Vent Termination

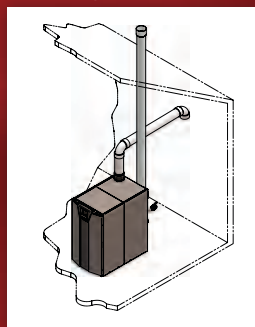


FACTORY SUPPLIED AND SHIPPED STANDARD WITH EVERY MODEL

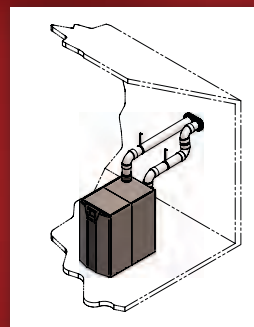
Direct Vent Vertical



Vertical w/Sidewall Air

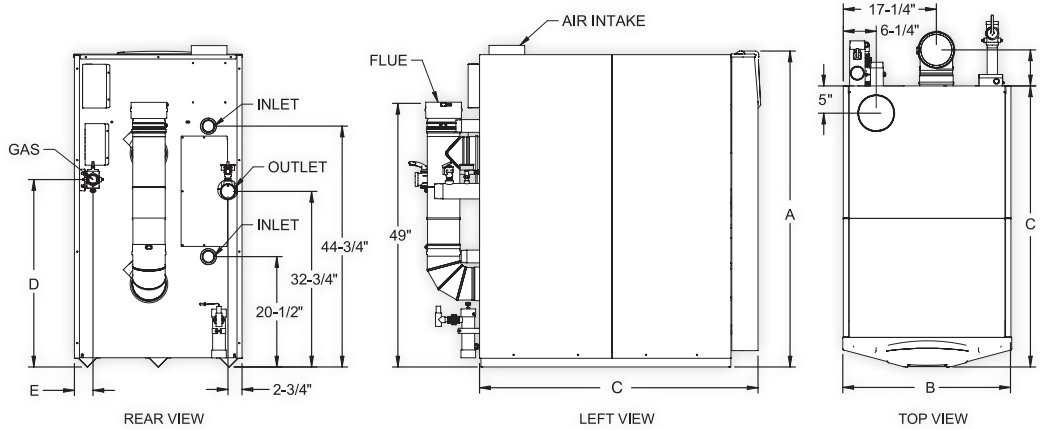


Direct Vent Sidewall



SIDEWALL VENT TERMINATION

SYNC BOILER DIMENSIONS AND SPECIFICATIONS



Model Number Guide

SB	N	1500	M13
Model	Natural Gas	Blue/HR Input	Firing Controls

SYNC Boiler,
Natural Gas,
1,500,000 Btu/hr input,
M13 firing controls

SYNC HEATING BOILER						DIMENSIONS AND SPECIFICATIONS											
Model Number	Input		Thermal Efficiency	Gross Output MBH	Net AHRI Rating MBH	A	B	C	D	E	F	Gas Conn.	Inlet Water Conn.	Outlet Water Conn.	Air Inlet	Vent Size	Shipping Wt. (lbs.)
	Min. MBH	Max. MBH															
SBN1000	100	999	94.1%	941	818	58-3/4"	31"	48"	35"	4-1/2"	15"	1-1/2"	2" x 2"	3"	6"	6"	786
SBN1300	130	1,300	95.4%	1,240	1,078	58-3/4"	31"	52-1/4"	34-3/4"	3-1/2"	6-3/4"	1-1/2"	2" x 2"	3"	6"	6"	856
SBN1500	150	1,500	96.2%	1,443	1,255	58-3/4"	31"	56-1/2"	34-3/4"	3-1/2"	6-3/4"	1-1/2"	2" x 2"	3"	6"	6"	926

Notes: Change 'N' to 'L' for L.P. Gas Model. No deration on L.P. models. Performance data based on manufacturer test results. 120 VAC / 15 AMP circuit required. All dimensions shown in inches. *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.

STANDARD FEATURES

- › Up to 96.2% Thermal Efficiency
- › Modulating Burner with 10:1 Turndown
 - Direct-Spark Ignition
 - Low NOx Operation
 - Sealed Combustion
 - Low Gas Pressure Operation
- › Vertical & Horizontal Venting
 - Category IV Venting up to 100 Feet
 - PVC, CPVC, Polypropylene or AL29-4C Vent Material
 - Sidewall Vent Terminations Provided
- › ASME Stainless Steel Heat Exchanger
 - ASME Certified, "H" Stamped
 - Gasketless Design
 - 160 psi Working Pressure
- › On/Off Switch
- › Adjustable High Limit with Manual Reset
- › Low Water Cutoff with Manual Reset & Test
- › Low Air Pressure Switch
- › High & Low Gas Pressure Switches with Manual Reset
- › Inlet & Outlet Temperature Sensors
- › Two Easy Access Terminal Strips
- › Downstream Test Cocks
- › 50 psi ASME Relief Valve
- › Temperature & Pressure Gauge
- › Zero Clearance to Combustible Material
- › Approved for Combustible Floor Installation
- › 1 Year Warranty on Parts
- › 10 Year Limited Warranty (see warranties for details)

SMART TOUCH™ FEATURES

- › SMART TOUCH™ Touchscreen Operating Control
 - Full-Color Touchscreen LCD Display
 - Built-in Cascading Sequencer for up to 8 Boilers
 - Building Management System Integration with 0-10 VDC Input
 - Outdoor Reset Control with Outdoor Air Sensor
 - Dual Level Password Security
 - Domestic Hot Water Prioritization
 - Low Water Flow Safety Control & Indication
 - Inlet & Outlet Temperature Readout
 - Freeze Protection
 - Service Reminder
 - Time Clock
- › Data Logging
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Ignition Attempts
 - Last 10 Lockouts
- › Programmable System Efficiency Optimizers
 - Night Setback
 - Ramp Delay
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Boost Temperature & Time
- › Three Pump Control
 - System Pump
 - Boiler Pump(s)
 - Domestic Hot Water Pump(s)

- › High Voltage Terminal Strip
 - 120 VAC / 60 Hertz / 1-Phase Power Supply
 - Three Sets of Pump Contacts
- › Low Voltage Terminal Strip
 - 24 VAC Auxiliary Device Relay
 - Auxiliary Proving Switch Contacts
 - Flow Switch Contacts
 - Alarm on Any Failure Contacts
 - Runtime Contacts
 - DHW Thermostat Contacts
 - Unit Enable/Disable Contacts
 - System Sensor Contacts
 - DHW Tank Sensor Contacts
 - Outdoor Air Sensor Contacts
 - Cascade Contacts

OPTIONAL EQUIPMENT

- Alarm Bell
- BMS Gateway to BACnet and LonWorks
- Condensate Neutralization Kit
- SMART SYSTEM PC Software
- Modbus Communications
- Stainless Steel Vent Kits

CODES & REGISTRATIONS

- ANSI Z21.13 compliant
- ASME certified, "H" stamp
- California Code compliant
- CSD1 / Factory Mutual / GE Gap compliant
- Massachusetts Code compliant
- South Coast Air Quality Management District Registered

*Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc.
 *The ratings have been determined under the provisions governing forced draft burners.



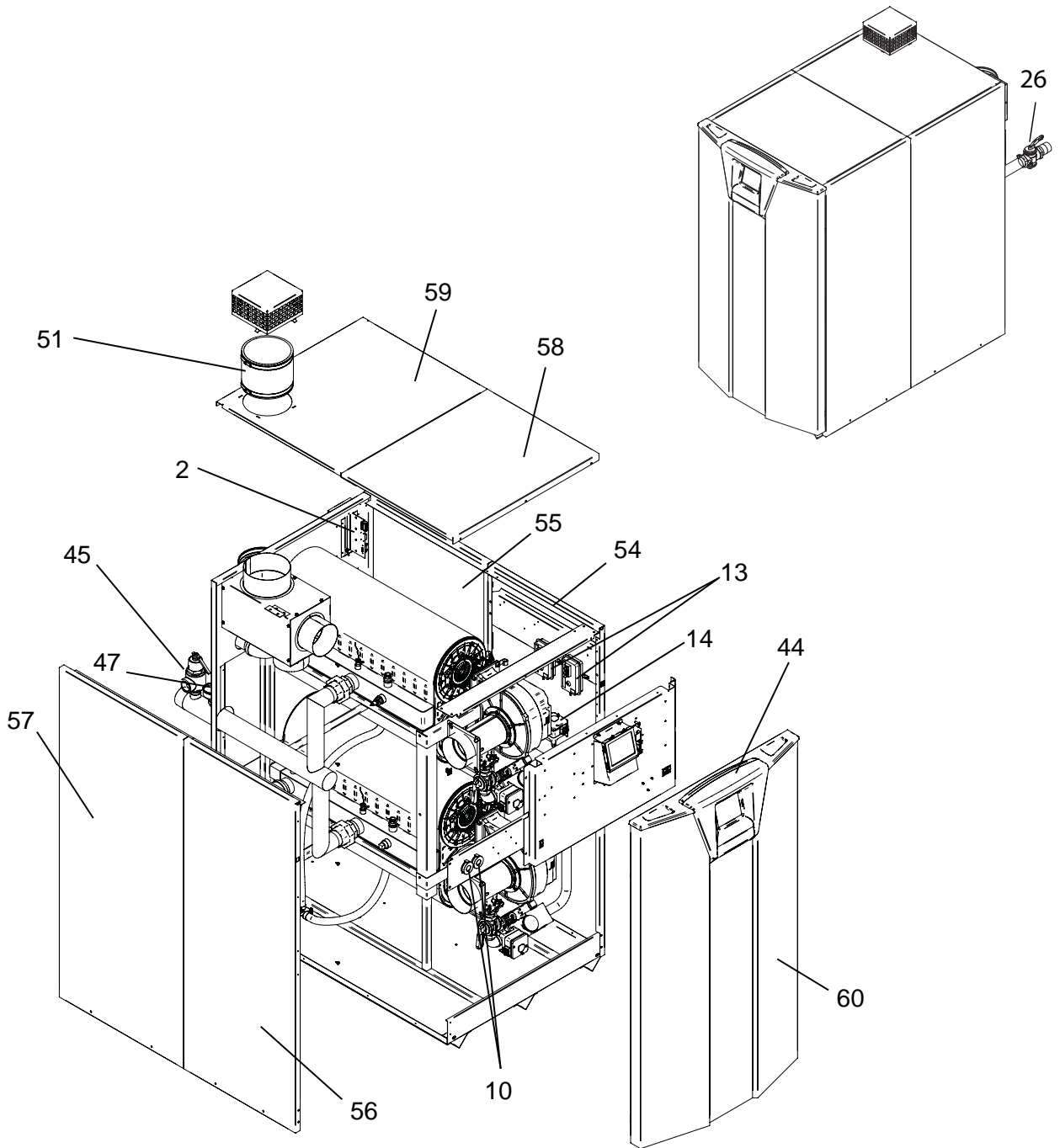
Patent # 7,506,617 and #8,371,252



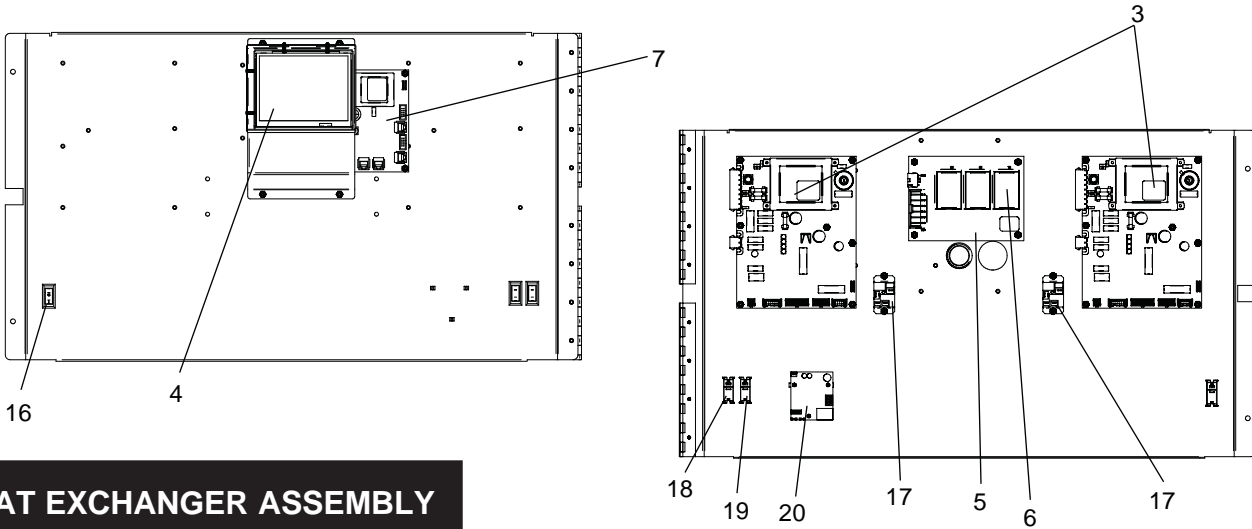


Replacement Parts List

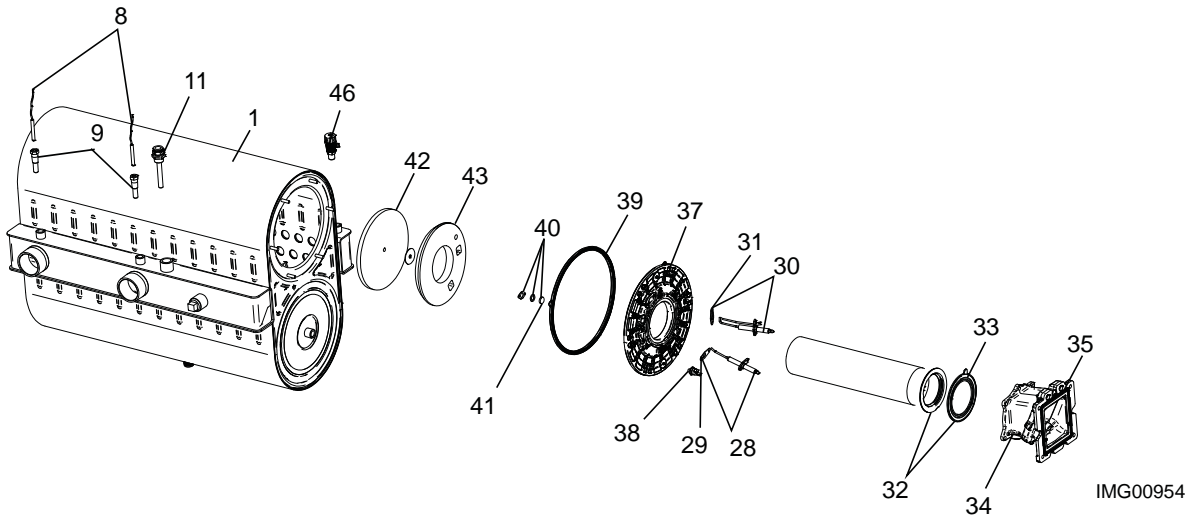
SYNC® Condensing Boilers SB 1000 - 1500



CONTROL PANEL ASSEMBLY

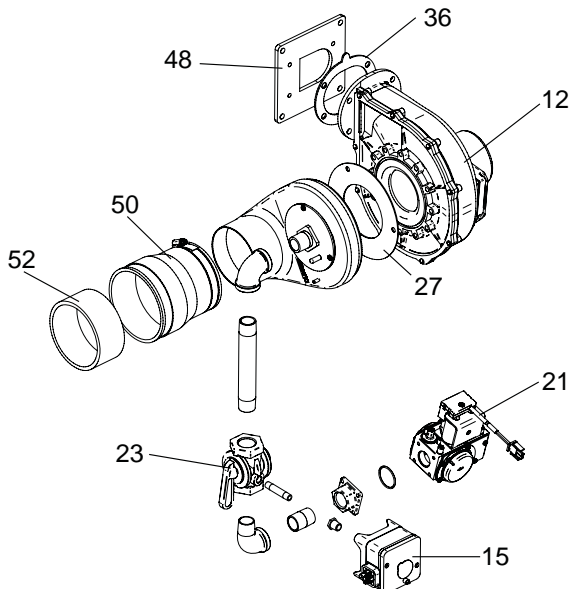


HEAT EXCHANGER ASSEMBLY

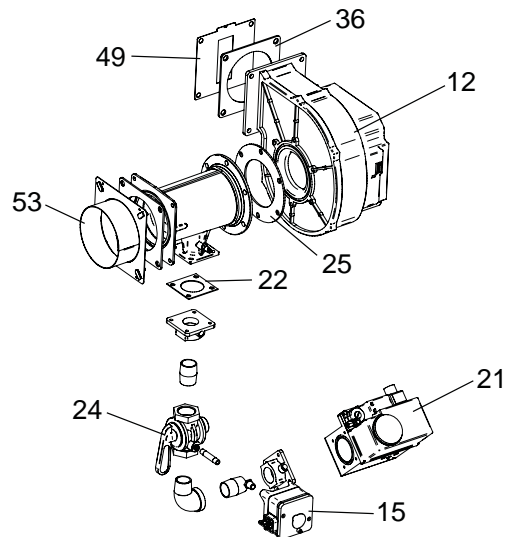


IMG00954

GAS TRAIN SB 1000



GAS TRAIN SB 1300, 1500



ITEM NO.	PART NO.	DESCRIPTION	MODEL
HEAT EXCHANGER ASSEMBLY			
1	100147302	HEAT EXCHANGER	SB 1000
1	100147303	HEAT EXCHANGER	SB 1300
1	100147304	HEAT EXCHANGER	SB 1500
CONTROLS			
2	100208467	LOW VOLTAGE CONNECTION BOARD	ALL
3	100167550	INTEGRATED CONTROL PRIOR TO SERIAL #L09	SB 1000
3	100208466	INTEGRATED CONTROL PRIOR TO SERIAL #L09	SB 1300-1500
3	100208471	INTEGRATED CONTROL BEGINNING SERIAL #L09	SB 1000
3	100208470	INTEGRATED CONTROL BEGINNING SERIAL #L09	SB 1300-1500
3	100167764	INTEGRATED CONTROL, HIGH ALTITUDE PRIOR TO SERIAL #L09	SB 1000
3	100167763	INTEGRATED CONTROL, HIGH ALTITUDE PRIOR TO SERIAL #L09	SB 1300-1500
3	100167790	INTEGRATED CONTROL, HIGH ALTITUDE BEGINNING SERIAL #L09	SB 1000
3	100167789	INTEGRATED CONTROL, HIGH ALTITUDE BEGINNING SERIAL #L09	SB 1300-1500
4	100167788	LCD DISPLAY PRIOR TO SERIAL L09	ALL
4	100167787	LCD DISPLAY BEGINNING SERIAL L09	ALL
5	100208493	PUMP RELAY BOARD	ALL
6	100208502	1.5HP PUMP RELAY	ALL
7	100167544	ECS CONTROL BOARD PRIOR TO SERIAL L09	ALL
7	100167571	ECS CONTROL BOARD BEGINNING SERIAL L09	ALL
8	100208552	INLET/OUTLET SENSOR	ALL
9	100208569	BULB WELL, INLET/OUTLET SENSOR	ALL
10	100208179	MANUAL RESET HIGH LIMIT	ALL
11	100233695	BULB WELL, HIGH LIMIT	ALL
12	100144985	FAN ASSEMBLY PRIOR TO SERIAL C09	SB 1000
12	100144984	FAN ASSEMBLY BEGINNING SERIAL C09	SB 1000
12	100145010	FAN ASSEMBLY PRIOR TO SERIAL C09	SB 1300-1500
12	100144980	FAN ASSEMBLY BEGINNING SERIAL C09	SB 1300-1500
13	100208393	AIR PRESSURE SWITCH	ALL
13	100166112	AIR PRESSURE SWITCH, HIGH ALTITUDE	ALL
14	100208392	GAS PRESSURE SWITCH, LOW	ALL
15	100166148	GAS PRESSURE SWITCH, HIGH	ALL
16	100208242	ON/OFF SWITCH	ALL
17	100208495	RELAY, 24VAC	ALL
18	100169472	MOMENTARY OFF SWITCH, RED	ALL
19	100169473	MOMENTARY OFF SWITCH, BLACK	ALL
20	100173747	LOW WATER CUT-OFF, MANUAL RESET	ALL
20	100173748	LOW WATER CUT-OFF, AUTO RESET	ALL
-	100173648	PROBE, LWCO	ALL
-	100173640	BOOT, LWCO	ALL
GAS VALVES			
21	100171924	GAS VALVE ASSEMBLY, NAT	SBN1000
21	100171925	GAS VALVE ASSEMBLY, NAT	SBN1300
21	100171926	GAS VALVE ASSEMBLY, NAT	SBN1500
21	100171932	GAS VALVE ASSEMBLY, LP	SBL1000
21	100171933	GAS VALVE ASSEMBLY, LP	SBL1300
21	100171934	GAS VALVE ASSEMBLY, LP	SBL1500
22	100208105	GAS VALVE GASKET	SB 1300-1500
23	100146148	GAS CUT OFF VALVE - 3/4"	SB 1000
24	100146149	GAS CUT OFF VALVE - 1X1	SB 1300-1500
25	100233705	GASKET, VENTURI	SB 1300-1500
26	100171912	GAS CUT OFF VALVE - 1 1/2"	ALL
27	100233703	AIR SHROUD GASKET	SB 1000

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
PILOT & BURNER ASSEMBLIES			
28	100165931	FLAME SENSOR W/ GASKET	ALL
29	100208091	GASKET, FLAME SENSOR	ALL
30	100165920	IGNITOR W/ GASKET	ALL
31	100208086	GASKET, IGNITOR	ALL
32	100135261	BURNER W/ GASKET	SB 1000
32	100135262	BURNER W/ GASKET	SB 1300
32	100135263	BURNER W/ GASKET	SB 1500
33	100233594	GASKET, BURNER	ALL
34	100173641	FLAPPER VALVE ASSEMBLY & STABILITOR	ALL
35	100233609	GASKET, FLAPPER VALVE	ALL
36	100208089	GASKET, FAN	SB 1300-1500
36	100208759	GASKET, FAN	SB 1000
37	100173799	HEAT EXCHANGER ACCESS DOOR KIT	ALL
38	100094572	HEX DOOR TEMP SWITCH BEGINNING SERIAL #F14	ALL
39	100208093	GASKET DOOR, RUBBER	ALL
MISCELLANEOUS			
40	100163249	SIGHT GLASS	ALL
41	100208762	GASKET, SIGHT GLASS	ALL
42	100208061	DIVIDER PLATE, INSULATION BAFFLE	ALL
43	100208059	BURNER PLATE, INSULATION, DOOR	ALL
44	100162957	DISPLAY BEZEL	ALL
45	100208448	RELIEF VALVE, 50 PSI	ALL
46	100167445	AIR VENT VALVE	ALL
47	100208152	GAUGE, TRIOMETER, 75# PSI	ALL
48	100149666	ADAPTER, FAN	SB 1000
49	100150174	AIR SHUTTER	SB 1300
50	100138385	COUPLING - 4"	SB 1000
51	100138301	COUPLING - 6"	ALL
52	100166490	INLET STIFFENER	SB 1000
53	100151317	INLET ADAPTER	SB 1300-1500
-	100208807	FUSE, 1.25 AMP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100208834	OUTDOOR AIR SENSOR	ALL
-	100163242	CONDENSATE TRAP	ALL
-	100208243	BLOCKED DRAIN SWITCH	ALL
-	100170652	FLUE TEMP SENSOR KIT	ALL
-	100157700	NEUTRALIZER KIT	ALL
-	100157719	ALARM BELL KIT	ALL
-	100157612	SIDEWALL VENT KIT	ALL
-	100157628	HEAT EXCHANGER CLEANING KIT	ALL
-	100208308	DOOR CATCH	ALL
-	100208818	DOOR STRIKE	ALL
-	100148402	LIMIT, HEAT EXCHANGER OVER TEMP	ALL
-	100072940	HARNES, UNIT	ALL
JACKET ASSEMBLIES			
54	100149703	JACKET, OUTER SIDE, RIGHT FRONT	ALL
55	100151023	JACKET, OUTER SIDE, RIGHT REAR	SB 1000
55	100151025	JACKET, OUTER SIDE, RIGHT REAR	SB 1300
55	100151027	JACKET, OUTER SIDE, RIGHT REAR	SB 1500
56	100149704	JACKET, OUTER SIDE, LEFT FRONT	ALL
57	100150469	JACKET, OUTER SIDE, LEFT REAR	SB 1000
57	100150470	JACKET, OUTER SIDE, LEFT REAR	SB 1300
57	100150471	JACKET, OUTER SIDE, LEFT REAR	SB 1500
58	100151052	JACKET, OUTER FRONT TOP	ALL
59	100150167	JACKET, OUTER REAR TOP	SB 1000
59	100150159	JACKET, OUTER REAR TOP	SB 1300
59	100150166	JACKET, OUTER REAR TOP	SB 1500
60	100149685	JACKET, FRONT DOOR ASSEMBLY	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			



Efficiency Pac[®]

**High Efficiency
Commercial Gas
Water Heaters**

Commercial Water Heating

Traditional tank-type water heaters build up lime scale deposits when they heat water. This makes the water heater work harder, which leads to reduced efficiency, increased fuel costs, and shorter tank life. Lime scale build-up can cause a typical tank-type unit to fail in as few as 4–5 years. Sometimes less!

The Efficiency Pac from Lochinvar combines the high efficiency of an Efficiency+ (EW series) water heater with the durability of a Lock-Temp baffled storage tank to create a water heating system that performs at peak efficiency year after year.

- **Thermal Efficiency** – the Efficiency Pac delivers a remarkable 84% thermal efficiency. Most tank-type units peak at 80%.
- **No Lime Scale Build-up** – the Efficiency Pac limits lime scale build-up with the scrubbing action of water flow through the solid copper-tube heat exchanger.
- **Unsurpassed Delivery** – the Lock-Temp storage tank employs a baffle that allows 80% tank draw down without a drop in temperature. When combined with an 84% efficient water heater, the results are a First Hour Delivery that can't be beat - 272 gallons for an EPN200-85.
- **Direct-Venting Convenience** – The Efficiency Pac can draw its combustion air directly from outdoors. This feature prevents contamination from airborne dirt particles and chemicals, while isolating the water heater from negative air pressures often found in restaurants and mechanical rooms.
- **Warranty** – 3 year limited warranty on heat exchanger.
5 year limited warranty on tank.
1 year limited warranty on parts.

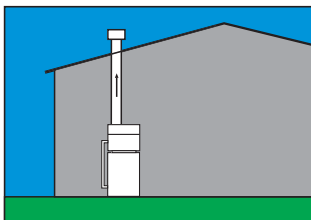


Fuel Savings Chart

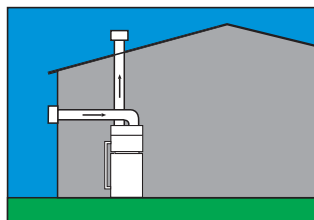
Gallons Per Day Water Usage	Btu required @75% Thermal Efficiency	Btu required @84% Thermal Efficiency	Btu Savings Per Day	Yearly Fuel Savings	Fuel Savings Over 5 Years
500	550,000	491,071	58,929	\$262	\$1,312
750	825,000	736,607	88,393	\$394	\$1,968
1,500	1,650,000	1,473,214	176,786	\$787	\$3,936
3,000	3,300,000	2,946,429	353,571	\$1,574	\$7,872
5,000	5,500,000	4,910,714	589,286	\$2,624	\$13,120

Fuel Savings calculated at \$1.22 per therm at a 100°F temperature rise.

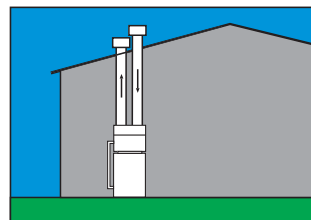
Venting Options



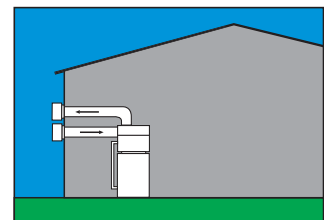
Conventional
Vents into conventional flue or vent breaching using type B double wall vent.



E+ DirectAire Vent*
Draws fresh combustion air from outside and vents combustion by-products through a vertical flue.



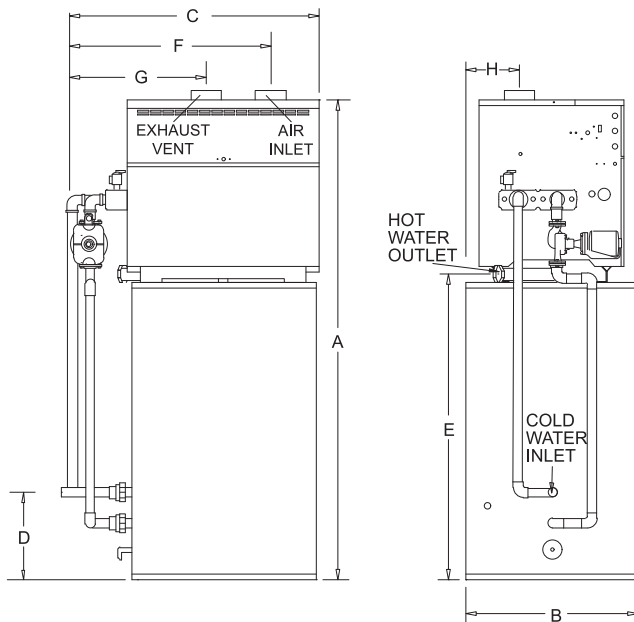
Direct Vent Vertical
Draws fresh combustion air from outside, and vents combustion by-products through a vertical flue.



Direct Vent Horizontal*
Draws fresh combustion air from outside, and vents combustion by-products through a side wall.

* Requires factory supplied vent kit.

Efficiency Pac® Water Heater Dimensions & Specifications



FOR EASE IN ORDERING
By Model Number

EP	N	150	85
Model	Fuel Type	Btu/hr Input	Tank Capacity

This heater is a 150,000 Btu/hr natural gas Efficiency Pac water heater with an 85 gallon storage tank.

Model Number	Btu/hr Input	Gallon Capacity	GPH @ 100°F Rise	A	B	C	D	E	F	G	H	Vent Size	Shipping Weight
EPN150-085	150,000	85	153	78-1/2"	28"	40"	14-1/2"	50-1/4"	30-1/2"	21-3/4"	9"	5"	728
EPN200-085	199,999	85	204	78-1/2"	28"	40"	14-1/2"	50-1/4"	34-1/2"	23-3/4"	9"	5"	716
EPN200-100	199,999	100	204	75"	32"	44"	16-1/2"	47"	34-1/2"	23-3/4"	11"	5"	811
EPN250-100	250,000	100	255	75"	32"	44"	16-1/2"	47"	38-1/4"	25-1/2"	11"	6"	839
EPN300-100	300,000	100	305	75"	32"	45-3/4"	16-1/2"	47"	42"	27-1/2"	11"	6"	857

Note: Change 'N' to 'L' for LP gas models. (no deration for LP).

Air inlet dimensions equal vent diameter.

Vent size denotes conventional vent.

Performance data is based on manufacturer test results.

Cold water inlet is 2" copper.

Hot water outlet is 1-1/2" copper.

Gas connections are 3/4" NPT.

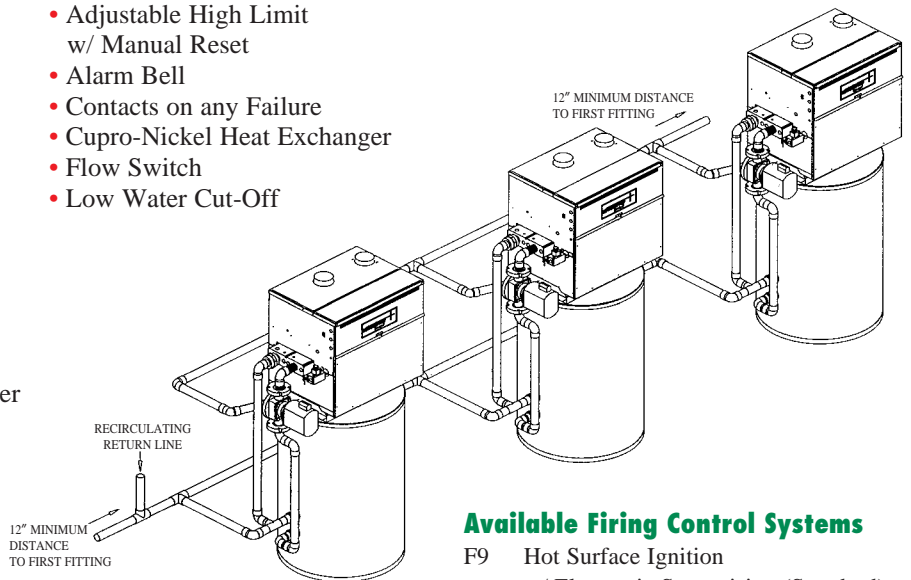
Note: Agency certification applies to EW water heater.

Standard Features

- 84% Thermal Efficiency
- Sealed Combustion Chamber
- Stainless Steel Burners
- Low NOx Operation Exceeds the most Stringent Air Quality Requirements
- ASME Copper Finned Tube Heat Exchanger
- 160 psi Working Pressure
- Gasketless Heat Exchanger Design
- All Bronze Circulating Pump
- Pump Delay w/ Freeze Protection
- Manual Reset High Limit
- Automatic Reset High Limit
- Glass-Lined Water Surfaces
- Loch-Heat Ceramic Tile Combustion Chamber
- Hot Surface Ignition
- ASME Pressure Relief Valve (Heater)
- ASME Temperature & Pressure Relief Valve (Tank)
- Foam Insulated, Glass-Lined Storage Tank
- 24 Volt Control System
- Brass Drain Valve (Tank)
- 3 Year Limited Warranty on Heat Exchanger
- 5 Year Limited Warranty on Tank
- 1 Year Limited Warranty on Parts

Optional Equipment

- Adjustable High Limit w/ Manual Reset
- Alarm Bell
- Contacts on any Failure
- Cupro-Nickel Heat Exchanger
- Flow Switch
- Low Water Cut-Off



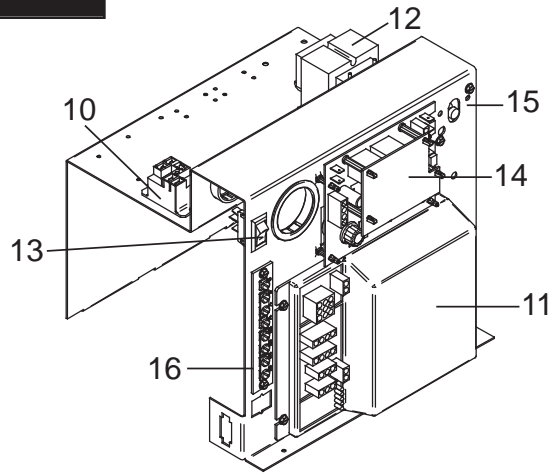
Available Firing Control Systems

- F9 Hot Surface Ignition w/ Electronic Supervision (Standard)
- F7 California Code

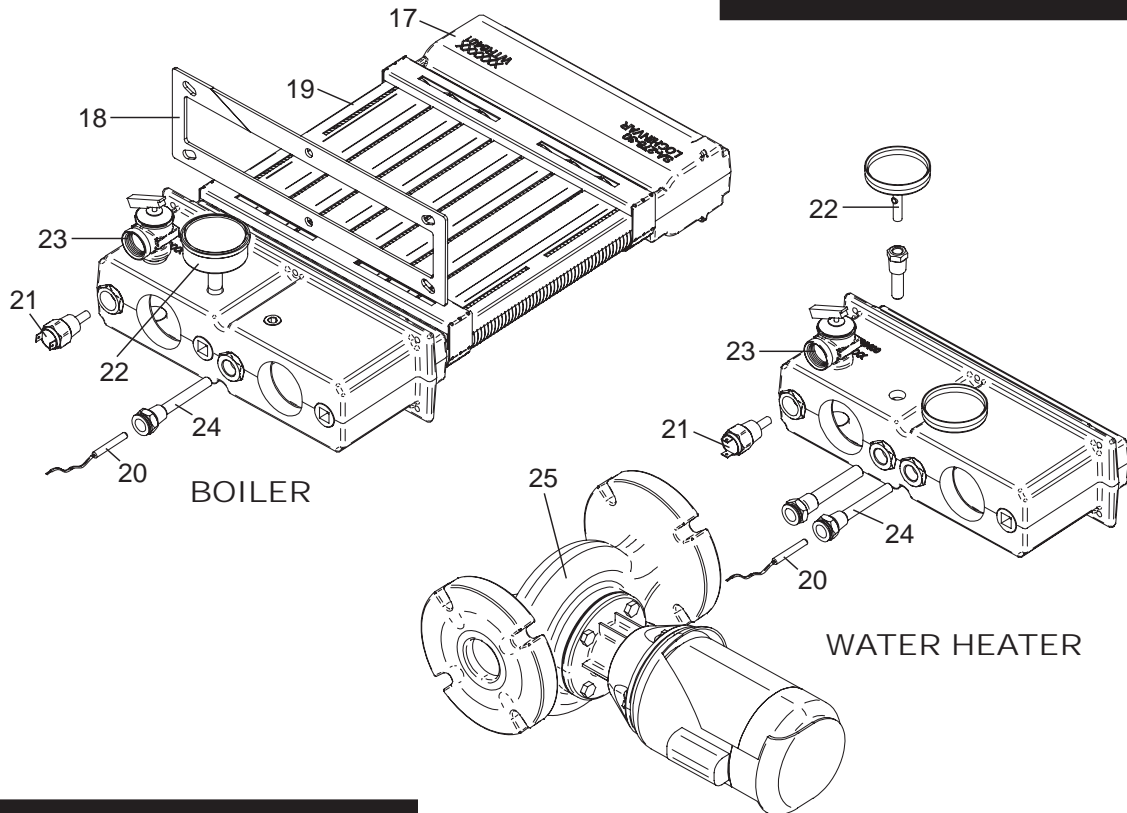
US and Foreign Patents 5,989,020



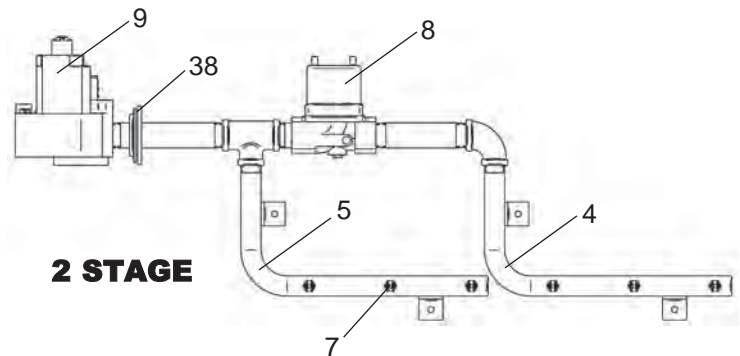
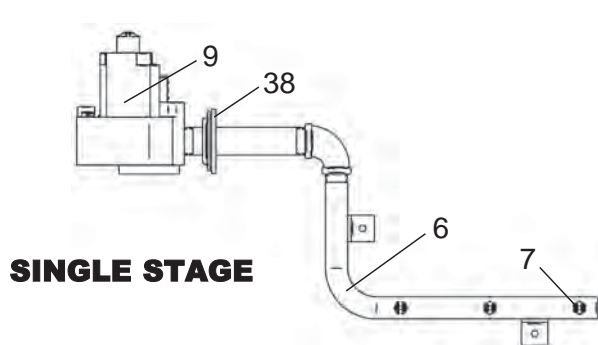
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLIES



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
PILOT & BURNER ASSEMBLIES			
1	BNR3417 IS MAIN BURNER BNR3416 IS MAIN BURNER WITH PRESSURE TAP (BURNERS INCLUDE BURNER GASKET)	Model	BNR3417
		150	2
		200	3
		250	4
		300	5
2	GKT2429	GASKET, BURNER	ALL
3	PLT3400	HOT SURFACE IGNITOR	ALL
4	MAN2441	GAS MANIFOLD, RIGHT	EB 150
4	MAN2440	GAS MANIFOLD, RIGHT	EB 200 - 250
4	MAN2439	GAS MANIFOLD, RIGHT	EB 300
5	MAN2440	GAS MANIFOLD, LEFT	EB 150 - 200
5	MAN2439	GAS MANIFOLD, LEFT	EB 250 - 300
6	MAN2439	GAS MANIFOLD	EW 150
6	MAN2442	GAS MANIFOLD	EW 200
6	MAN2443	GAS MANIFOLD	EW 250
6	MAN2444	GAS MANIFOLD	EW 300
7	ORF2406	ORIFICE, MAIN BURNER NAT.	ALL
7	ORF2407	ORIFICE, MAIN BURNER LPG	ALL
GAS VALVES			
8	VAL2409	GAS VALVE, HIGH FIRE	EB 150 - 300
9	VAL2412	GAS VALVE, NAT. MAIN	EB/EW 150 - 300
9	VAL2411	GAS VALVE, LPG MAIN	EB/EW 150 - 300
CONTROLS			
10	RLY2105	RELAY, PANEL MOUNT, 24 VAC, COIL	EB
10	RLY2052	RELAY, PANEL MOUNT, 24 VDC, COIL	EW
11	RLY2400	IGNITION MODULE	ALL
12	TRF2004	TRANSFORMER 50V.A.	ALL
13	MSC2426	SWITCH, ROCKER ON-OFF	ALL
14	TST2314	THERMOSTAT	EB
14	TST5314	THERMOSTAT	EW
15	KIT3117	MANUAL RESET HIGH LIMIT	EW
16	MSC2016	TERMINAL BOARD	ALL
HEAT EXCHANGER			
17	HEX3445	HEAT EXCHANGER	EB 150
17	HEX3028	HEAT EXCHANGER	EW 150
17	HEX3446	HEAT EXCHANGER	EB 200
17	HEX3029	HEAT EXCHANGER	EW 200
17	HEX3447	HEAT EXCHANGER	EB 250
17	HEX3030	HEAT EXCHANGER	EW 250
17	HEX3448	HEAT EXCHANGER	EB 300
17	HEX3031	HEAT EXCHANGER	EW 300
18	GKT2400	GASKET, FRONT HEADER	EB/EW 150 - 300
19	JKA2000	V-BAFFLE	EB/EW 150
19	JKA2001	V-BAFFLE	EB/EW 200
19	JKA2002	V-BAFFLE	EB/EW 250
19	JKA2003	V-BAFFLE	EB/EW 300
20	TST2032	SENSOR	ALL
21	HLC2500	HIGH LIMIT	EB 150 - 300
21	HLC2510	HIGH LIMIT	EW 150 - 300
22	GTP2900	GAUGE, T & P	EB
22	GTP3000	GAUGE, TEMPERATURE	EW
23	RLV2005	RELIEF VALVE, PRESSURE ONLY	EB
23	RLV2006	RELIEF VALVE, T & P	EW
24	TST2301	BULB WELL	ALL
NOTE: EB = BOILER / EW = WATER HEATER PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS (BURNERS INCLUDE BURNER GASKET)			

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
PUMPS			
25	ARM3044PAB	PUMP WATER HEATER	EW 150-300
LOCH-HEAT® TILE			
26	FIB2800	LOCH-HEAT TILE, TOP	EB/EW 150
26	FIB2801	LOCH-HEAT TILE, TOP	EB/EW 200
26	FIB2802	LOCH-HEAT TILE, TOP	EB/EW 250
26	FIB2803	LOCH-HEAT TILE, TOP	EB/EW 300
27	FIB2420	LOCH-HEAT TILE, FRONT HEAD SIDE	EB/EW 150 - 300
28	FIB2421	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
29	FIB2264	LOCH-HEAT TILE, FRONT	EB/EW 150
29	FIB2265	LOCH-HEAT TILE, FRONT	EB/EW 200
29	FIB2266	LOCH-HEAT TILE, FRONT	EB/EW 250
29	FIB2267	LOCH-HEAT TILE, FRONT	EB/EW 300
30	FIB2484	LOCH-HEAT TILE, BACK	EB/EW 150
30	FIB2485	LOCH-HEAT TILE, BACK	EB/EW 200
30	FIB2486	LOCH-HEAT TILE, BACK	EB/EW 250
30	FIB2487	LOCH-HEAT TILE, BACK	EB/EW 300
31	FIB2488	LOCH-HEAT TILE, BOTTOM LEFT	EB/EW 150
31	FIB2489	LOCH-HEAT TILE, BOTTOM LEFT	EB/EW 200
31	FIB2490	LOCH-HEAT TILE, BOTTOM LEFT	EB/EW 250
31	FIB2491	LOCH-HEAT TILE, BOTTOM LEFT	EB/EW 300
32	FIB2806	LOCH-HEAT TILE, DIVIDER	ALL
33	FIB2804	LOCH-HEAT TILE, BOTTOM RIGHT	EB/EW 150
33	FIB2489	LOCH-HEAT TILE, BOTTOM RIGHT	EB/EW 200
33	FIB2805	LOCH-HEAT TILE, BOTTOM RIGHT	EB/EW 250
33	FIB2491	LOCH-HEAT TILE, BOTTOM RIGHT	EB/EW 300
MISCELLANEOUS			
34	FAN2724	ASSEMBLY, FAN	EB/EW 150
34	FAN2410	ASSEMBLY, FAN	EB/EW 200 - 300
35	GKT2009	GASKET, FAN	EB/EW 150
35	GKT2416	GASKET, FAN	EB/EW 200 - 300
36	PRS30009	SWITCH, AIR PRESSURE	EB/EW 150 - 200
36	PRS30010	SWITCH, AIR PRESSURE	EB/EW 250 - 300
37	JKA6510	COVER, DUST AIR INTAKE	ALL
38	GKT2427	GASKET, ESCUTCHEON PLUG	ALL
39	GKT3408	GASKET, MANNING GLASS (INNER COMBUSTION CHAMBER WALL) 45"	ALL
40	GKT30001	GASKET, SILICONE (INSIDE OUTER JACKET LOWER DOOR) 15' ROLL	ALL
41	GKT2401	GASKET, SIGHT GLASS	ALL
42	MSC3415	KIT, SIGHT GLASS	ALL
43	JKA6506	MIRROR, INSPECTION	ALL
--	DRH2722	BELL INCREASER (NOT PICTURED)	EB/EW 150 & 200
--	DRH2729	BELL INCREASER (NOT PICTURED)	EB/EW 250 & 300
--	MSC3001	KIT, TUBING EPDM	EB/EW 150 - 200
--	MSC3002	KIT, TUBING EPDM	EB/EW 250 - 300
--	MSC2075	TUBE, INLET AIR	EB/EW 150 - 200
--	MSC2076	TUBE, INLET AIR	EB/EW 250 - 300
--	MSC2077	CLAMP, INLET AIR	EB/EW 150 - 300
--	WTR2041	FLOW SWITCH	ALL
--	WTR2530	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) PRIOR TO H08H00211826	ALL
--	WTR30000	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) BEGINNING H08H00211286	ALL
--	WTR2528	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) PRIOR TO H08H00211286	ALL
--	WTR30001	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) BEGINNING H08H00211286	ALL
--	WTR2222	LOW WATER CUT-OFF PROBE (OPTIONAL)	ALL
--	WTR20000	LOW WATER CUT-OFF BOOT (OPTIONAL)	ALL

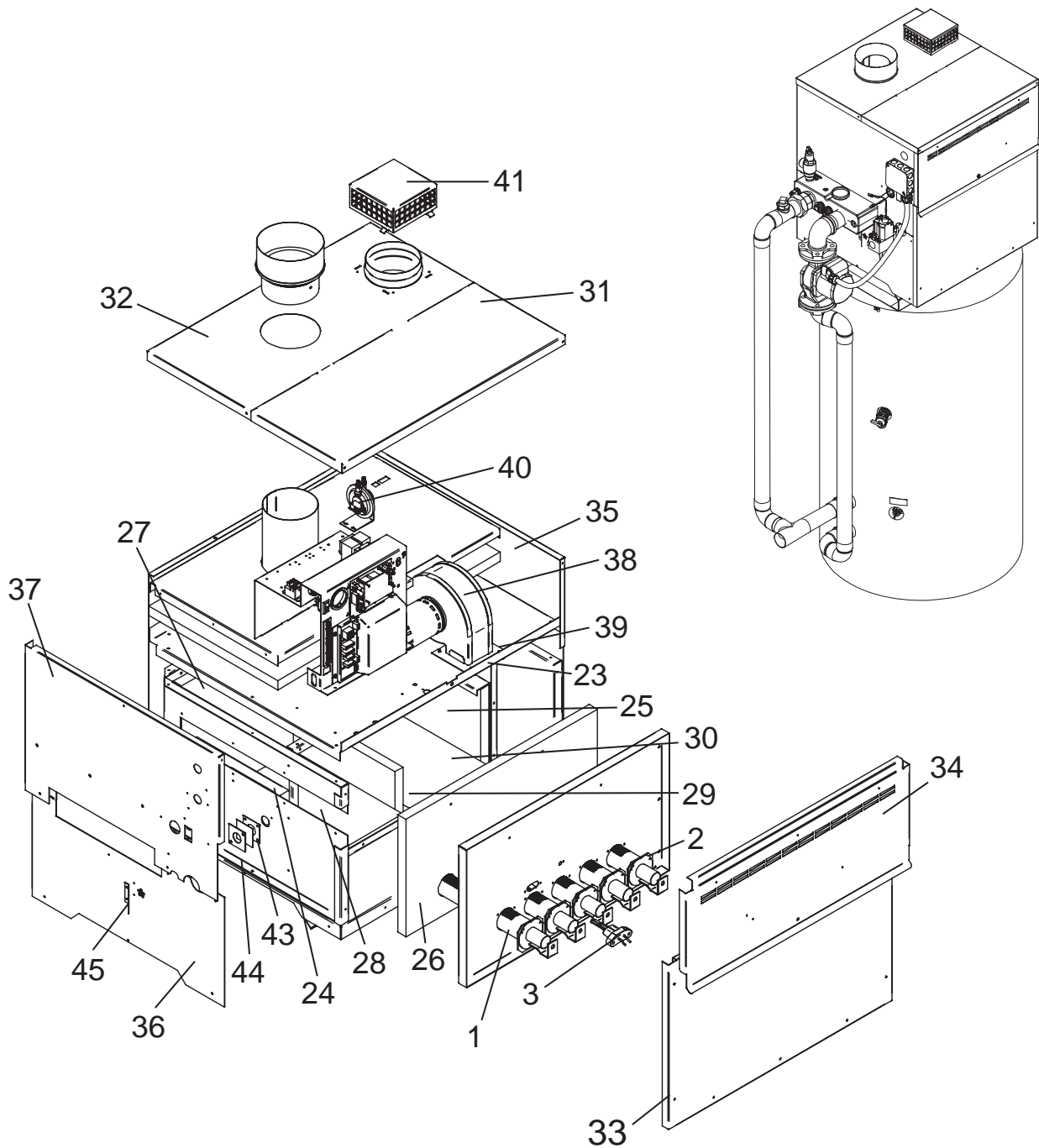
NOTE: EB = BOILER / EW = WATER HEATER
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS
(BURNERS INCLUDE BURNER GASKET)



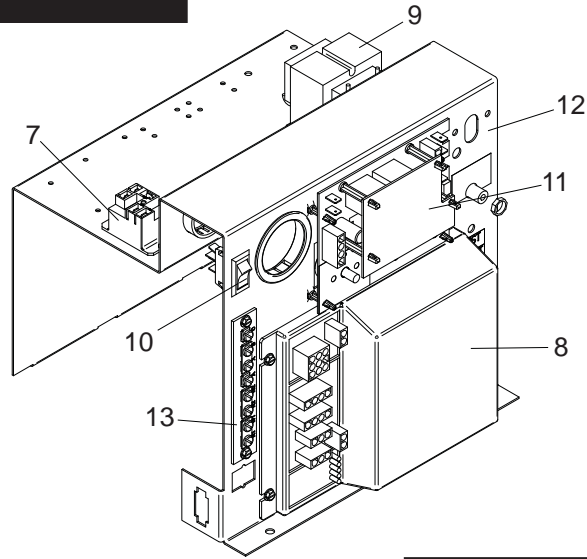
Replacement Parts List

Efficiency-Pac® EP 150 – 300 Water Heaters

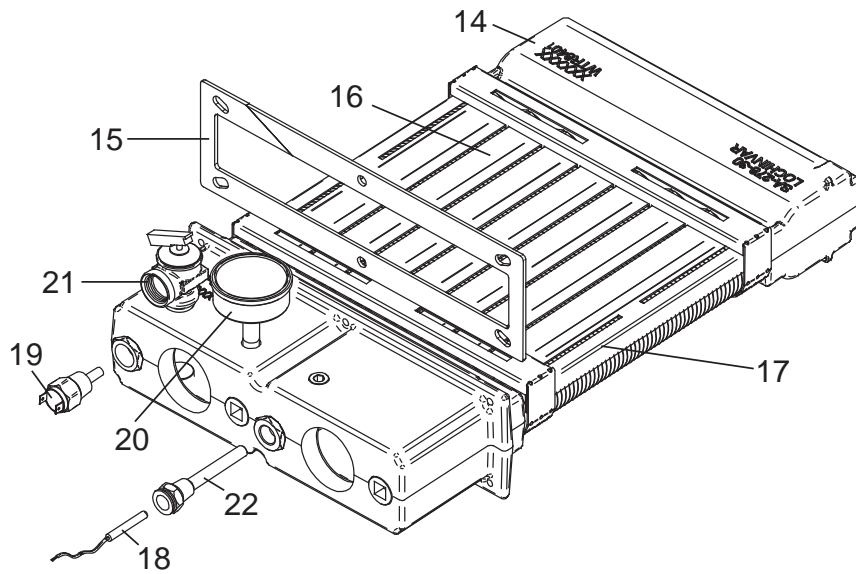
Starting Serial Number A05H00172365



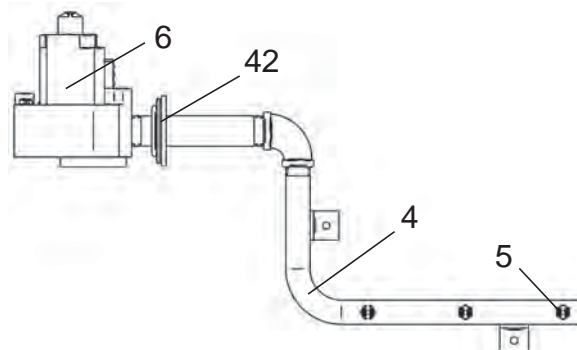
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
PILOT & BURNER ASSEMBLIES			
1	BNR3417 IS MAIN BURNER	Model	BNR3417
	BNR3416 IS MAIN BURNER W/ PRESSURE TAP (BURNERS INCLUDE BURNER GASKET)	150	2
		200	3
		250	4
		300	5
2	GKT2429	GASKET, BURNER	ALL
3	PLT3400	HOT SURFACE IGNITOR	ALL
4	MAN2439	GAS MANIFOLD	150
4	MAN2442	GAS MANIFOLD	200
4	MAN2443	GAS MANIFOLD	250
4	MAN2444	GAS MANIFOLD	300
5	ORF2406	ORIFICE, MAIN BNR. NAT.	ALL
5	ORF2407	ORIFICE, MAIN BNR. LPG.	ALL
GAS VALVES			
6	VAL2412	GAS VALVE, NAT. MAIN	ALL
6	VAL2411	GAS VALVE, LPG. MAIN	ALL
CONTROLS			
7	RLY2052	RELAY,PANEL MOUNT,24VDC,COIL	ALL
8	RLY2400	IGNITION MODULE	ALL
9	TRF2004	TRANSFORMER 50V.A.	ALL
10	MSC2426	SWITCH, ROCKER ON-OFF	ALL
11	TST5314	THERMOSTAT	ALL
12	KIT3117	MANUAL RESET HIGH LIMIT	ALL
13	MSC2016	TERMINAL BOARD	ALL
HEAT EXCHANGER			
14	HEX3028	HEAT EXCHANGER	150
14	HEX3029	HEAT EXCHANGER	200
14	HEX3030	HEAT EXCHANGER	250
14	HEX3031	HEAT EXCHANGER	300
15	GKT2400	GASKET, FRONT HEADER	ALL
16	JKA2000	V-BAFFLE (5 REQ'D)	150
16	JKA2001	V-BAFFLE (5 REQ'D)	200
16	JKA2002	V-BAFFLE (5 REQ'D)	250
16	JKA2003	V-BAFFLE (5 REQ'D)	300
17	JKA6525	FRAME RUNNER (2 REQ'D)	150
17	JKA6526	FRAME RUNNER (2 REQ'D)	200
17	JKA6527	FRAME RUNNER (2 REQ'D)	250
17	JKA6528	FRAME RUNNER (2 REQ'D)	300
18	TST2032	SENSOR	ALL
19	HLC2510	HIGH LIMIT	ALL
20	GTP3000	GAUGE, TEMPERATURE	ALL
21	RLV2013	RELIEF VALVE, 3/4, 150#	ALL
22	TST2301	BULB WELL	ALL
PUMPS			
--	ARM3074PAB	PUMP WATER HEATER	ALL
LOCH-HEAT® TILE			
23	FIB2800	LOCH-HEAT TILE, TOP	150
23	FIB2801	LOCH-HEAT TILE, TOP	200
23	FIB2802	LOCH-HEAT TILE, TOP	250
23	FIB2803	LOCH-HEAT TILE, TOP	300
24	FIB2420	LOCH-HEAT TILE, FRONT HEAD SIDE	ALL
25	FIB2421	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
26	FIB2264	LOCH-HEAT TILE, FRONT	150
26	FIB2265	LOCH-HEAT TILE, FRONT	200
26	FIB2266	LOCH-HEAT TILE, FRONT	250
26	FIB2267	LOCH-HEAT TILE, FRONT	300
27	FIB2484	LOCH-HEAT TILE, BACK	150
27	FIB2485	LOCH-HEAT TILE, BACK	200
27	FIB2486	LOCH-HEAT TILE, BACK	250
27	FIB2487	LOCH-HEAT TILE, BACK	300
28	FIB2488	LOCH-HEAT TILE, BOTTOM LEFT	150
28	FIB2489	LOCH-HEAT TILE, BOTTOM LEFT	200
28	FIB2490	LOCH-HEAT TILE, BOTTOM LEFT	250
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
LOCH-HEAT® TILE (CONTINUED)			
28	FIB2491	LOCH-HEAT TILE, BOTTOM LEFT	300
29	FIB2806	LOCH-HEAT TILE DIVIDER	ALL
30	FIB2804	LOCH-HEAT TILE, BOTTOM RIGHT	150
30	FIB2489	LOCH-HEAT TILE, BOTTOM RIGHT	200
30	FIB2805	LOCH-HEAT TILE, BOTTOM RIGHT	250
30	FIB2491	LOCH-HEAT TILE, BOTTOM RIGHT	300
JACKET/DOOR ASSEMBLIES			
31	JKA6094	JACKET, OUTER TOP FRONT	150
31	JKA6095	JACKET, OUTER TOP FRONT	200
31	JKA6096	JACKET, OUTER TOP FRONT	250
31	JKA6097	JACKET, OUTER TOP FRONT	300
32	JKA6102	JACKET, OUTER TOP REAR	150
32	JKA6103	JACKET, OUTER TOP REAR	200
32	JKA6104	JACKET, OUTER TOP REAR	250
32	JKA6105	JACKET, OUTER TOP REAR	300
33	JKA6232	JACKET, OUTER FRONT LOWER	150
33	JKA6233	JACKET, OUTER FRONT LOWER	200
33	JKA6234	JACKET, OUTER FRONT LOWER	250
33	JKA6235	JACKET, OUTER FRONT LOWER	300
34	JKA6236	JACKET, OUTER FRONT UPPER DOOR	150
34	JKA6237	JACKET, OUTER FRONT UPPER DOOR	200
34	JKA6238	JACKET, OUTER FRONT UPPER DOOR	250
34	JKA6239	JACKET, OUTER FRONT UPPER DOOR	300
35	JKA6505	JACKET, OUTER RIGHT SIDE	ALL
36	JKA6241	JACKET, OUTER LEFT SIDE LOWER	ALL
37	JKA6240	JACKET, OUTER LEFT SIDE UPPER	ALL
MISCELLANEOUS			
38	FAN2724	ASSEMBLY, FAN	150
38	FAN2410	ASSEMBLY, FAN	200-300
39	GKT2009	GASKET, FAN	150
39	GKT2416	GASKET, FAN	200-300
40	PRS30009	SWITCH, AIR PRESSURE	150-200
40	PRS30010	SWITCH, AIR PRESSURE	250-300
41	JKA6510	COVER, DUST AIR INTAKE	ALL
42	GKT2427	GASKET, ESCUTCHEON PLUG	ALL
43	GKT2401	GASKET, SIGHT GLASS	ALL
44	MSC3415	KIT, SIGHT GLASS	ALL
45	JKA6506	MIRROR, INSPECTION	ALL
--	GKT3408	GASKET, MANNING GLASS (INNER COMBUSTION CHAMBER WALL)	ALL
--	GKT30001	GASKET, SILICONE (INSIDE OUTER JACKET LOWER DOOR) 15' ROLL	ALL
--	DRH2722	BELL INCREASER (NOT PICTURED)	150 - 200
--	DRH2729	BELL INCREASER (NOT PICTURED)	250 - 300
--	MSC3001	KIT, TUBING EPDM	150 - 200
--	MSC3002	KIT, TUBING EPDM	250 - 300
--	MSC2075	TUBE, INLET AIR	150 - 200
--	MSC2076	TUBE, INLET AIR	250 - 300
--	MSC2077	CLAMP, INLET AIR	150 - 300
--	WTR2040	FLOW SWITCH	ALL
--	WTR2530	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) PRIOR TO H08H00211826	ALL
--	WTR30000	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) BEGINNING H08H00211286	ALL
--	WTR2528	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) PRIOR TO H08H00211286	ALL
--	WTR30001	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) BEGINNING H08H00211286	ALL
--	WTR2222	LOW WATER CUT-OFF PROBE (OPTIONAL)	ALL
--	WTR20000	LOW WATER CUT-OFF BOOT (OPTIONAL)	ALL
WATER STORAGE TANK			
--	WTR1013	ANODE, MAGNESIUM	ALL
--	WTR1041	ANODE, ALUMINUM	OPTIONAL
--	WTR1016	HANDHOLE CLEANOUT COVER	ALL
--	GKT1010	GASKET, HANDHOLE	ALL
--	RJS-085	TANK, COMPLETE	ALL
--	RJS-100	TANK, COMPLETE	ALL
--	MSC2050	TUBE BAFFLE, INLET	ALL
--	RLV1002	RELIEF VALVE, T & P, 150#, TANK	ALL
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

HIGH EFFICIENCY COMMERCIAL POOL HEATERS

COPPER-FIN²[®]



 **SMART SYSTEM[™]**

ADVANCED OPERATING CONTROL

8 MODELS - 500,000 - 2,070,000 BTU/HR

PROPORTIONAL FIRING UP TO 4:1

LESS THAN 20 ppm NO_x

VENT FLEXIBILITY TO 100 FEET

UP TO 89%
THERMAL EFFICIENCY

COPPER-FIN²[®]

THE FOUNDATION OF LOCHINVAR BECOMES STRONGER

Copper-finned tube, non-condensing appliances are the foundation of Lochinvar's success. In 1993, Lochinvar introduced the Copper-Fin², the first horizontal chassis, copper-finned tube pool heater to operate with fan-assisted combustion. Now, the Copper-fin² is even better. Along with high thermal efficiency, gasketless heat exchangers and multiple venting options we have added Lochinvar's exclusive SMART SYSTEM™ control.

Eight models from 500,000 to 2,070,000 Btu/hr input provide you with exceptional products with a long list of new features in addition to the established features that redefined the industry. The Copper-fin² was the first proportional fired, fan assisted pool heater on the market. Every model features a small footprint for easy passage through a 36" door, low NOx – third party tested to less than 20 PPM, Stack Frames that can put twice the Btu/hr input in the same space and vent diameters up to 8" smaller than conventional atmospheric pool heaters.

THERMAL EFFICIENCY

Copper-Fin² pool heaters offer a remarkably high 89% thermal efficiency. This means that 89¢ out of every fuel dollar goes into heating the water, dramatically reducing the operating cost of the equipment. Copper-Fin² achieves this efficiency through the combination of an advanced fan assisted combustion system and a gasketless heat exchanger. The heat energy from the combustion process is transferred to the water as it passes through the copper finned tube heat exchanger. The sealed combustion design of the Copper-Fin² eliminates external heat losses, this means the energy dollars heat the water, not the mechanical room.

GASKETLESS HEAT EXCHANGER

In 1989, Lochinvar was the first manufacturer to offer gasketless copper-finned tube heat exchangers. Our unique gasketless design enhances reliability by eliminating o-rings and gaskets found on other brands. The heat exchanger features glass lined headers and copper-finned tubes with extruded integral fins spaced 7 fins per inch for exceptional heat transfer. The heat exchanger is built to ASME construction standards for 160 psi working pressure and is backed by a five year warranty.

SPACE SAVING, SERVICE FRIENDLY DESIGN

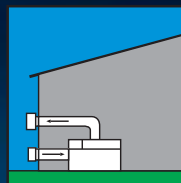
Our enhanced Copper-fin² models offer the same reliable operation in a new service friendly design. The gas inlet, internal controls and Building Management connections have been repositioned to the front of the appliance for easier service and simpler installation. The built-in air filter reduces maintenance and improves performance with a field convertible option to install the air intake on the rear or the right side of the pool heater. In addition, Lochinvar was the first manufacturer to offer factory welded Stack Frames that allow you to put two pool heaters in the space for one.

**STACK
FRAME**

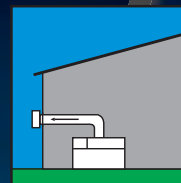
MULTIPLE VENTING OPTIONS

The Copper-fin² offers **eight venting options** to meet the most challenging installation requirements. The Copper-fin² can vent vertically in Category I with double wall "B" vent or horizontally in Category IV with AL29-4C stainless steel vent material. Vent termination can be Rooftop or Sidewall with combustion air drawn naturally from the equipment room or via dedicated air intake piping. And if floor space is limited, the Copper-fin² pool heater can be installed outdoors with an optional Outdoor Vent Cap.

Aire-Lock[®] Direct Vent



Sidewall



High Efficiency Commercial Pool Heaters

Lochinvar™ SMART SYSTEM™

REFINED DESIGN PUTS MORE CONTROL AND INFORMATION AT YOUR FINGERTIPS

The most exciting addition to the Copper-fin² is the SMART SYSTEM™ control. The SMART SYSTEM is an advanced, state of the art integrated operating control. We introduced the SMART SYSTEM control in 2005 and it has delivered proven operation in thousands of demanding commercial applications. The control provides the installer, owners and operators with precise temperature control and diagnostic information.

Advanced features include:

- 2-LINE, 16 CHARACTER LCD DISPLAY OF SETUP, SYSTEM STATUS AND DIAGNOSTIC DATA IN WORDS, NOT CODES
- BUILT-IN CASCADE SEQUENCER CONTROLLING UP TO 8 POOL HEATERS
- MODBUS PROTOCOL - OPTIONAL



PROPORTIONAL FIRING

Proportional firing divides a single manifold of multiple burners into smaller, independent stages.

With up to four stages of individual operation, the Smart System control can reduce the firing rate down to approximately 25% Btu/hr input. This simple but effective design matches the pool heater's firing capacity to the heat loss of the pool or spa. Full Fire or On/Off combustion systems often fire the entire gas train in short, inefficient bursts. Stage firing delivers the Btu's required in smoother and longer burn cycles which will improve operation and reduce component fatigue.

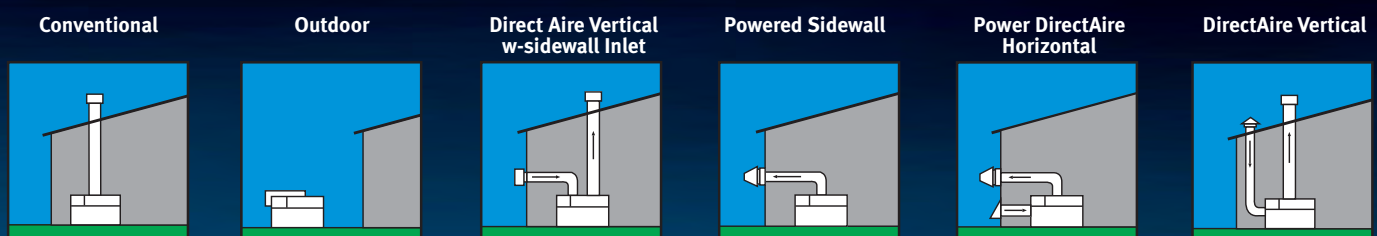
AUTOMATIC PUMPED BYPASS

All Copper-fin² pool heaters are equipped with an automatic pumped bypass ensuring proper flow and return water temperatures to the heat exchanger resulting in longer life and trouble free operation.

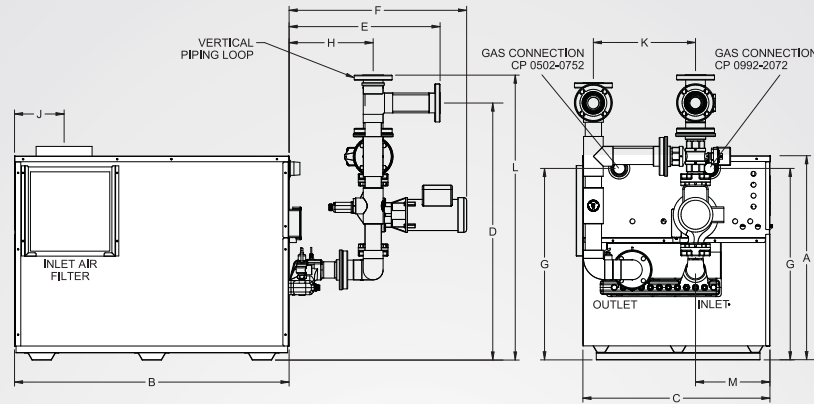
The automatic pumped bypass is provided as standard equipment in a horizontal configuration. A vertical configuration* is also available offering the flexibility to meet mechanical room space requirements or piping constraints.



* Horizontal shown



COPPER-FIN² Commercial Gas Pool Heater Dimensions & Specifications



Model Number	Input MBH	Output MBH	A	B	C	D	E	F	G	H	J	K	L	M	Vent Size	Air Inlet	Gas Conn	Shipping Weight
CPN0502	500	445	31-1/2"	45-1/2"	22-1/4"	38"	20-1/4"	26-1/2"	29"	9-3/4"	7"	12-3/4"	41-1/4"	9"	6"	6"	1-1/4"	523
CPN0652	650	579	31-1/2"	56-3/4"	22-1/4"	38"	20-1/4"	26-1/2"	29"	9-3/4"	8-1/2"	12-3/4"	41-1/4"	9"	8"	8"	1-1/4"	665
CPN0752	750	668	31-1/2"	64"	22-1/4"	38"	20-1/4"	26-1/2"	29"	9-3/4"	8-1/2"	12-3/4"	41-1/4"	9"	8"	8"	1-1/4"	713
CPN0992	990	881	36"	48-1/4"	33-1/2"	47"	26-3/4"	30-1/4"	33-1/4"	13-3/4"	8-1/2"	18-1/4"	52"	13"	10"	10"	2"	864
CPN1262	1,260	1,121	36"	58-1/2"	33-1/2"	47"	26-3/4"	30-1/4"	33-1/4"	13-3/4"	10-1/2"	18-1/4"	52"	13"	12"	12"	2"	954
CPN1442	1,440	1,282	36"	68-3/4"	33-1/2"	47"	26-3/4"	30-1/4"	33-1/4"	13-3/4"	10-1/2"	18-1/4"	52"	13"	12"	12"	2"	1,042
CPN1802*	1,800	1,602	36"	82-1/4"	33-1/2"	47"	26-3/4"	30-1/4"	33-1/4"	13-3/4"	11"	18-1/4"	52"	13"	14"	12"	2"	1,233
CPN2072*	2,070	1,842	36"	92-1/2"	33-1/2"	47"	26-3/4"	30-1/4"	33-1/4"	13-3/4"	11"	18-1/4"	52"	13"	14"	12"	2"	1,285

Notes: Change 'N' to 'L' for LP gas models.

Water connections for models CP 0502-0752 are 2" flanged.

Performance data is based on manufacturer test results.

No deration on LP models.

Water connections for models CP 0992-2072 are 2-1/2" flanged

*Cupro-Nickel Heat Exchanger is standard on these models.

STANDARD FEATURES

- › Up to 89% Thermal Efficiency
- › Proportional Firing up to 4:1 Turndown
 - › Hot Surface Ignition
 - › Low NOx Operation
 - › Sealed Combustion
 - › Low Gas Pressure Operation
- › Vertical & Horizontal Venting
 - › Category I Venting
 - › Double Wall "B" Vent Material
 - › Category IV Venting
 - › AL29-4C Stainless Steel Vent Material
- › ASME Copper Finned Tube Heat Exchanger
 - › ASME Certified, "HLW" Stamped
 - › Gasketless design
 - › 160 psi working pressure
- › On/Off Switch
- › Adjustable High Limit w/ Manual Reset
- › Combustible Floor Rated (0992-2072)
- › Flow Switch
- › All Bronze Pump
- › Low Air Pressure Switch
- › Inlet & Outlet Temperature Sensors
- › Easy Access Terminal Strips
- › Downstream Test Cocks
- › 150 psi ASME Temperature & Pressure Relief Valve
- › 1 Year Warranty on Parts (See Warranty for Details)
- › 5 Year Limited Warranty (See Warranty for Details)

SMART SYSTEM™ FEATURES

- › SMART SYSTEM™ Operating Control
 - › 2 Line/16 Character LCD Display
 - › Built in Cascading Sequencer for up to 8 heaters
 - › Password Security
 - › Low Water Flow Control & Indication
 - › Inlet & Outlet Temperature Readout
 - › Freeze Protection
 - › Service Reminder
 - › Time Clock
- › Data Logging
 - › Hours Running
 - › Ignition Attempts
 - › Last 10 Lockouts
- › Pump Control
 - › Pool Heater Pump
- › High Voltage Terminal Strip
 - › 120 VAC / 60 Hertz / 1 Phase Power Supply
 - › Pump Contacts with Pump Relay
- › Low Voltage Terminal Strip
 - › 24 VAC Auxiliary Device Relay Output - Louvers
 - › Auxiliary Proving Switch Contacts - Louvers
 - › Alarm on Any Failure Contacts
 - › Runtime Contacts
 - › Contacts on Any Failure
 - › Contacts for Air Louvers
 - › Unit Enable/Disable Contacts
 - › 0-10V Rate Contacts
 - › Pool Sensor Contacts
 - › Pool Supply Sensor Contacts
 - › Cascade Contacts

OPTIONAL EQUIPMENT

- › Alarm
- › High & Low Gas Pressure Switches w/ Manual Reset
- › Cupro-Nickel Heat Exchanger
- › Low Water Cut Off, Probe Type w/ Manual Reset & Test
- › Texas Pool Code (Outdoor Flow Switch and T&P Gauge)
- › Modbus Communications
- › Combustible Floor Kit (0502-0752)
- › Stack Frame

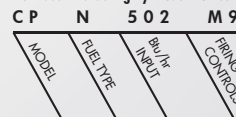
FIRING CODES

- › M7 Firing Code - California Code
- › M9 Firing Code - Hot surface ignition with Electronic Supervision

CERTIFICATIONS

- › ANSI Z21.10.3/CSA 4.3 certified
- › South Coast Air Quality Management District registered
- › Texas Commission on Environmental Quality

For Ease In Ordering By Model Number



This heater is 500,000 Btu/hr natural gas Copper-Fin 2 Pool Heater. It has M9 firing controls.

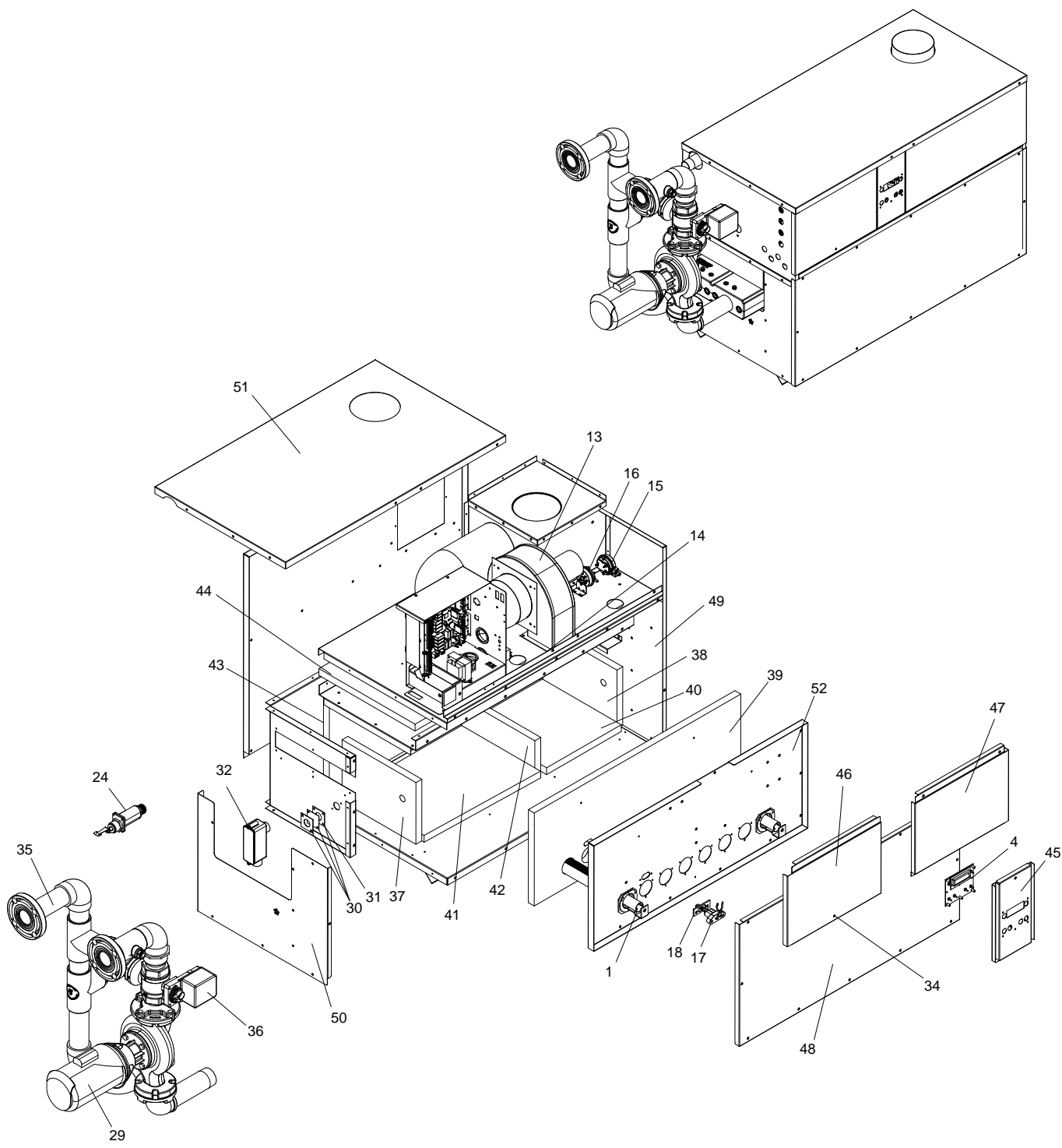
Registered under U.S. Patent # 5,989,020



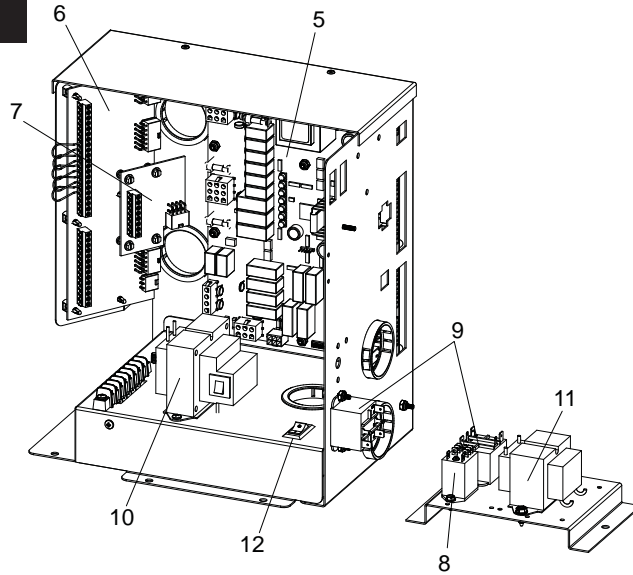


Replacement Parts List

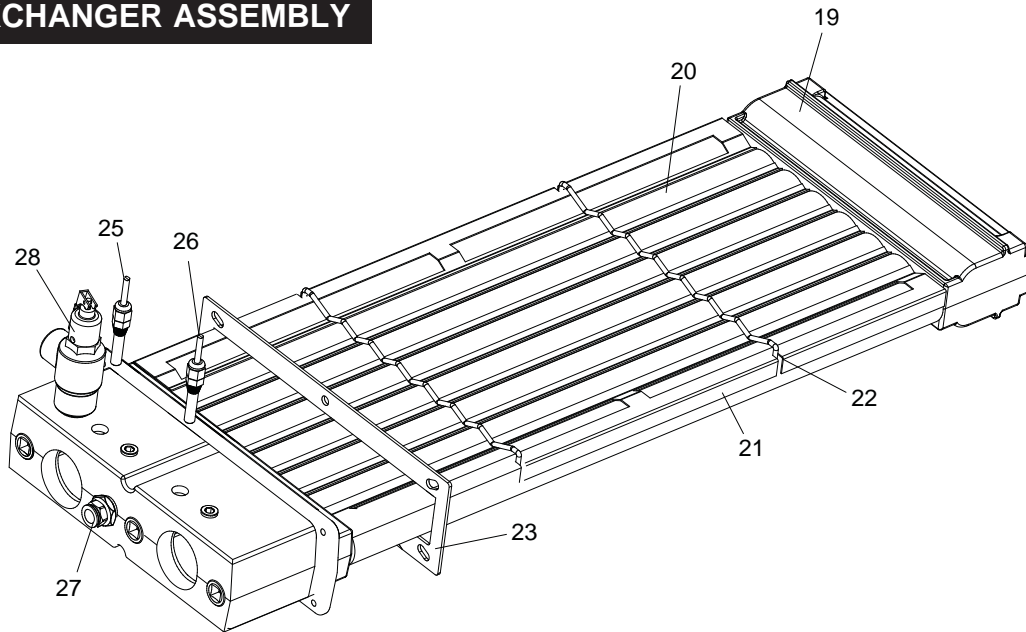
Copper-Fin² Commercial Pool Heaters CP 502 -752



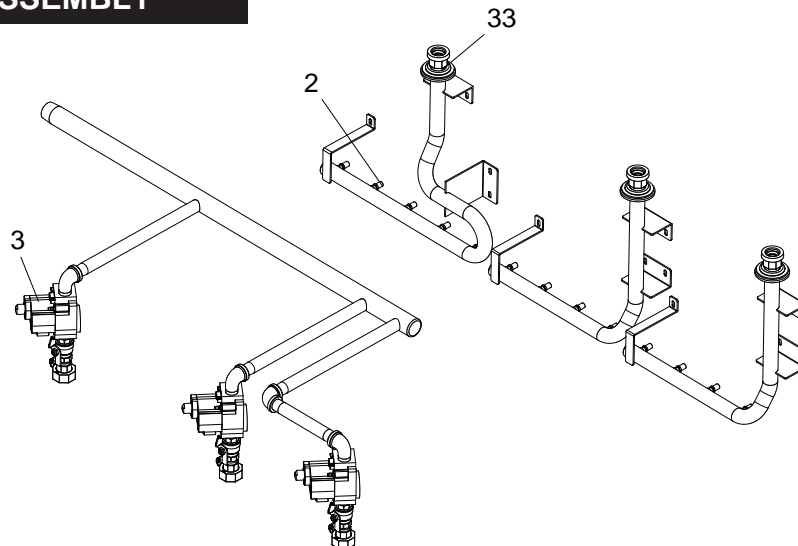
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY



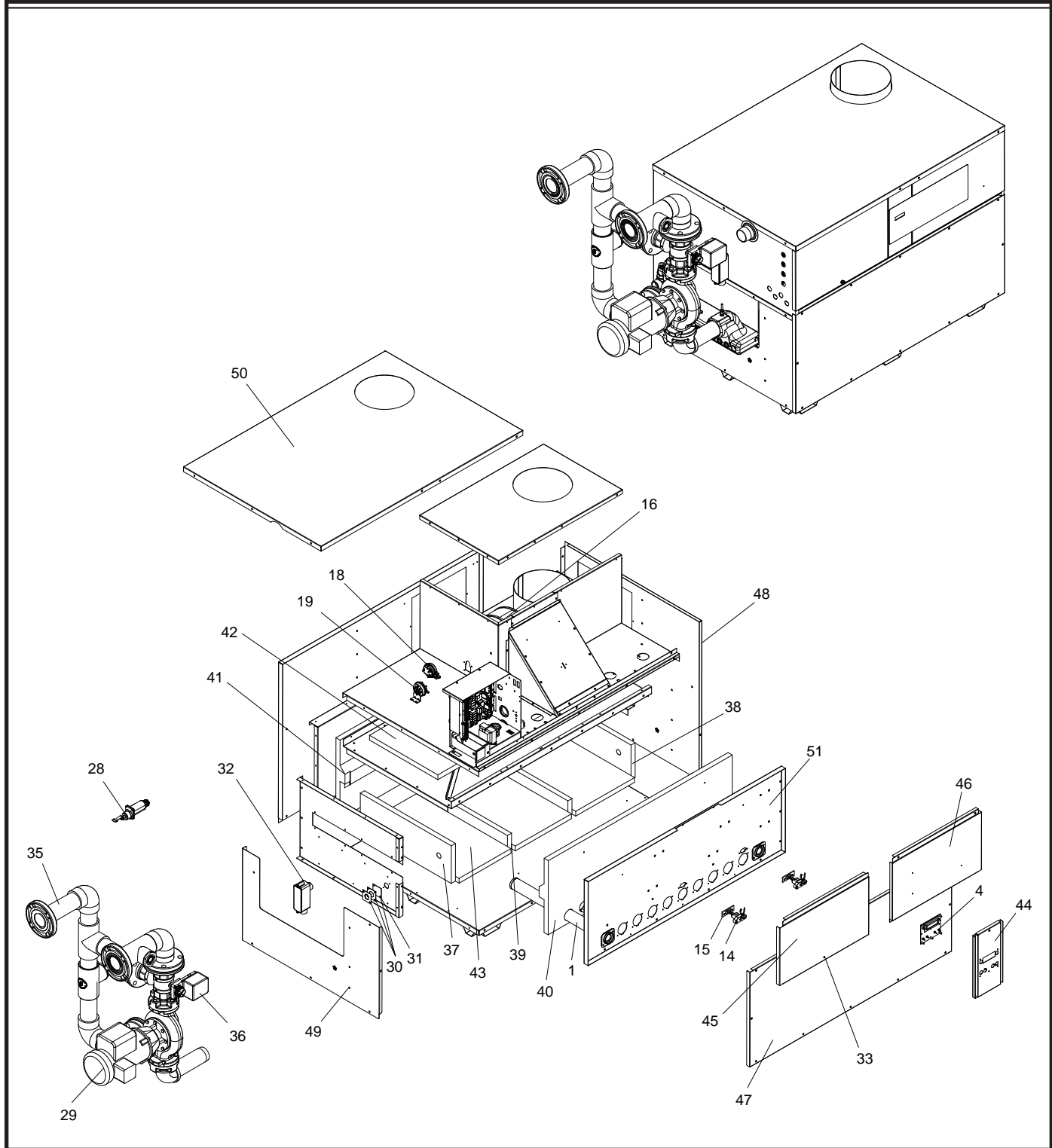
ITEM NO.	PART	NO.	DESCRIPTION	MODEL NO.
BURNERS				
1	BNR3417 is Main Burner	Model	BNR30011	BNR3417
		502	1 ea	9 ea
	BNR30011 is Main Burner w/ compression fitting.	652	1 ea	12 ea
		752	1 ea	14 ea
GAS TRAIN ASSEMBLIES				
2	ORF2050	ORIFICE, NAT		ALL
2	ORF2051	ORIFICE, LP		ALL
3	VAL2412	GAS VALVE ASSEMBLY, NAT		ALL
3	VAL2413	GAS VALVE ASSEMBLY, LP		ALL
CONTROLS & GUAGES				
4	RLY20031	USER INTERFACE CONTROL		ALL
5	RLY20032	BOARD, MAIN CONTROL		ALL
6	RLY20066	BOARD, CONNECTOR		ALL
7	RLY30093	BOARD, SENSOR		ALL
8	RLY2051	RELAY, DPDT		ALL
9	RLY2706	RELAY, 120VAC, 60HZ 10.8 AMP		ALL
10	TRF20002	TRANSFORMER, 24V, 60VA		ALL
11	TRF2002	TRANSFORMER, 50VA		502
11	TRF20002	TRANSFORMER, 24V, 60VA		652 & 752
12	SWT2006	SWITCH, ON/OFF		ALL
13	FAN2010	FAN		ALL
14	GKT2023	GASKET, FAN		ALL
15	PRS20024	AIR PRESSURE SWITCH, BLOCKED FLUE		ALL
16	PRS20028	AIR PRESSURE SWITCH		ALL
17	PLT3400	HOT SURFACE IGNITOR		ALL
18	GKT2012	GASKET, IGNITOR		ALL
HEAT EXCHANGER				
19	HEX30040	HEAT EXCHANGER HLW		502
19	HEX30042	HEAT EXCHANGER HLW		652
19	HEX30044	HEAT EXCHANGER HLW		752
20	JKD20001	V-BAFFLE (5 REQ.)		502
20	JKD20002	V-BAFFLE (5 REQ.)		652
20	JKD20003	V-BAFFLE (5 REQ.)		752
21	JKD60102	V-BAFFLE FRAME RUNNER (2 REQ)		502
21	JKD60103	V-BAFFLE FRAME RUNNER (2 REQ)		652
21	JKD60104	V-BAFFLE FRAME RUNNER (2 REQ)		752
22	MSC2969	V-BAFFLE RETAINER (2 REQ)		ALL
23	GKT2400	GASKET, HEAT SHIELD		ALL
24	WTR20003	FLOW SWITCH		ALL
25	TST20017	SENSOR,DUAL IMMERSION, OUTLET		ALL
26	TST2050	SENSOR, IMMERSION, INLET		ALL
27	TST2305	BULBWELL 3/4" NPT X .382 ID		ALL
28	RLV2017	RELIEF VALVE, TEMPERATURE & PRESSURE		ALL
PUMP				
29	ARM3044PABTE	PUMP		ALL
MISCELLANEOUS				
30	MSC3415	SIGHT GLASS KIT		ALL
31	GKT2401	GASKET, SIGHT GLASS		ALL
32	MSC20176	CONDUIT BODY		ALL
33	GKT2427	GASKET, ESCUTCHEON, 3/4"		ALL
34	MSC2413	SCREW, KNURLED HEAD		ALL
35	PVC30033	CPVC PIPING LOOP 2" HORIZONTAL		ALL
35	PVC30032	CPVC PIPING LOOP 2" VERTICAL		ALL
36	VAL20007	VALVE, BYPASS, 3-WAY		ALL
-	FIL2075	FILTER 12X12X1		ALL
-	GKT3408	GASKET, STRIP		ALL
-	FUS2001	FUSE, 3.15AMP		ALL
-	FUS2002	FUSE, 5 AMP		ALL
-	GKT2037	GASKET, ESCUTCHEON, 1 1/4"		ALL
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS				

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
MISCELLANEOUS CONTINUED			
-	GKT2429	GASKET, BURNER	ALL
-	GKT30000	GASKET, PVC 1/4" X 5/8" X 25'	ALL
-	MSC2155	TEE, 3/16" HOSE MENDER, NYLON	ALL
-	MSC2156	CAP, 3/16" TEE FITTING, SILICONE	ALL
-	TUB2002	TUBING, GRAY 3/16" X 5/16"	ALL
-	TUB2004	TUBING, ALUMINUM, 1/8"	ALL
-	WTR30000	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL)	ALL
-	WTR30001	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL)	ALL
-	WTR2222	LOW WATER CUT-OFF PROBE (OPTIONAL)	ALL
-	WTR20000	LOW WATER CUT-OFF BOOT (OPTIONAL)	ALL
LOCH-HEAT TILE			
37	FIB2420	LOCH-HEAT TILE, FRONT HEAD SIDE	ALL
38	FIB2130	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
39	FIB2132	LOCH-HEAT TILE, FRONT DOOR	502
39	FIB20100	LOCH-HEAT TILE, FRONT DOOR	652
39	FIB20101	LOCH-HEAT TILE, FRONT DOOR	752
40	FIB2502	LOCH-HEAT TILE, RIGHT BOTTOM	502
40	FIB2503	LOCH-HEAT TILE, RIGHT BOTTOM	652
40	FIB2504	LOCH-HEAT TILE, RIGHT BOTTOM	752
-	FIB20067	LOCH-HEAT TILE, MIDDLE BOTTOM	652
-	FIB2505	LOCH-HEAT TILE, MIDDLE BOTTOM	752
41	FIB2502	LOCH-HEAT TILE, LEFT BOTTOM	502
41	FIB20066	LOCH-HEAT TILE, LEFT BOTTOM	652
41	FIB2504	LOCH-HEAT TILE, LEFT BOTTOM	752
42	FIB2806	LOCH-HEAT TILE, DIVIDER	ALL
43	FIB2402	LOCH-HEAT TILE, BACK	502
43	FIB2403	LOCH-HEAT TILE, BACK	652
43	FIB2404	LOCH-HEAT TILE, BACK	752
44	FIB2480	INSULATION PAD, TOP	502
44	FIB2481	INSULATION PAD, TOP	652
44	FIB2482	INSULATION PAD, TOP	752
JACKET ASSEMBLIES			
45	JKD30017	JACKET, OUTER FRONT UPPER MIDDLE	ALL
46	JKD60069	JACKET, OUTER FRONT UPPER LEFT	502
46	JKD60070	JACKET, OUTER FRONT UPPER LEFT	652 & 752
47	JKD30018	JACKET, OUTER FRONT UPPER RIGHT	502
47	JKD30019	JACKET, OUTER FRONT UPPER RIGHT	652
47	JKD30020	JACKET, OUTER FRONT UPPER RIGHT	752
48	JKD60061	JACKET, OUTER FRONT LOWER	502
48	JKD60062	JACKET, OUTER FRONT LOWER	652
48	JKD60063	JACKET, OUTER FRONT LOWER	752
49	JKD60054	JACKET, OUTER REAR HEAD	502
49	JKD60074	JACKET, OUTER REAR HEAD	652 & 752
50	JKD60052	JACKET, OUTER FRONT LOWER HEAD	ALL
51	JKD60057	JACKET, OUTER TOP	502
51	JKD60058	JACKET, OUTER TOP	652
51	JKD60059	JACKET, OUTER TOP	752
52	JKD30014	DOOR, COMBUSTION CHAMBER	502
52	JKD30015	DOOR, COMBUSTION CHAMBER	652
52	JKD30016	DOOR, COMBUSTION CHAMBER	752
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS			

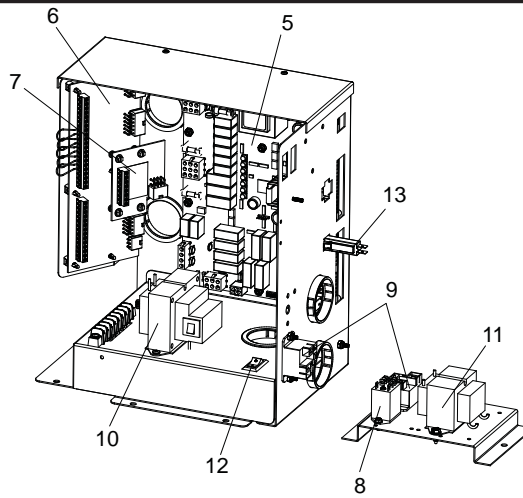


Replacement Parts List

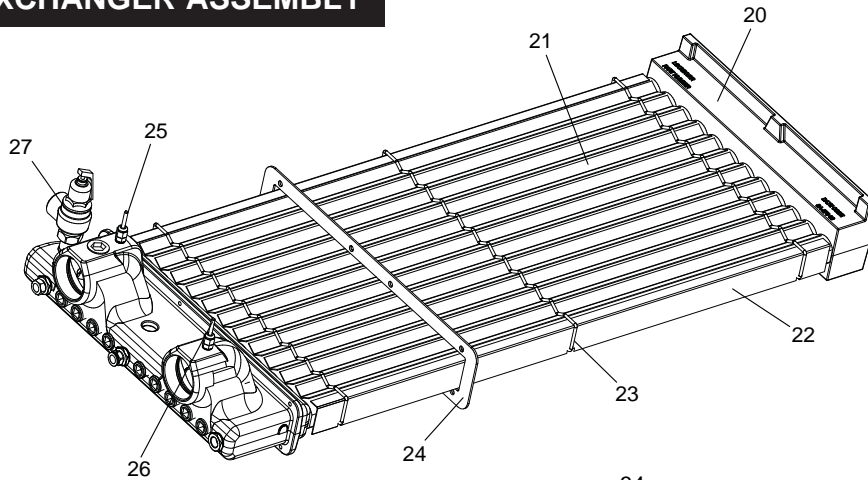
Copper-Fin² Commercial Pool Heaters CP 992 -2072



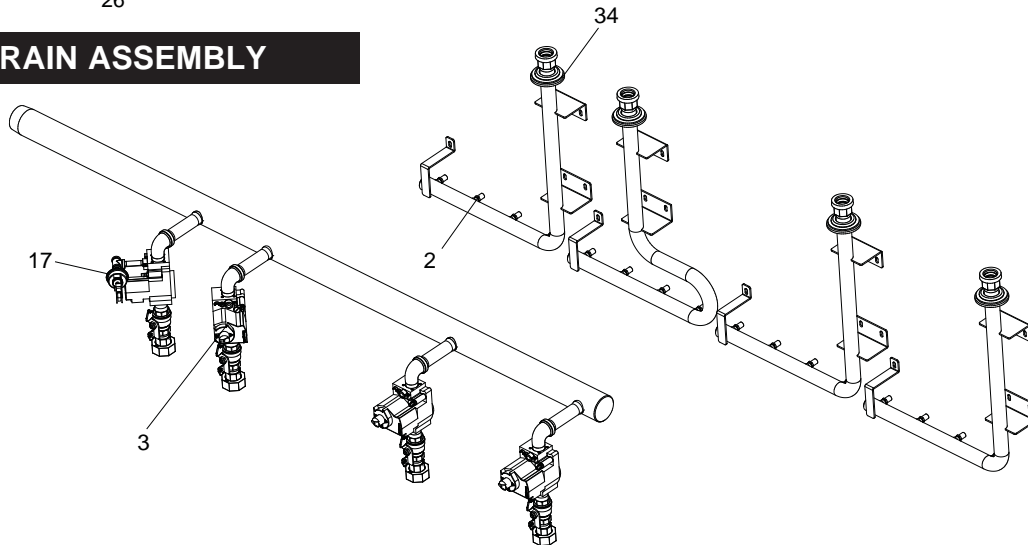
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
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BURNERS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
1	Model	BNR3422	BNR3430
	992	10 ea	1 ea
BNR3422 is Main Burner	1262	13 ea	1 ea
	1442	15 ea	1 ea
BNR3430 is Main Burner w/ compression fitting.	1802	19 ea	1 ea
	2072	22 ea	1 ea

GAS TRAIN ASSEMBLIES

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
2	ORF20004	ORIFICE, NAT	ALL
2	ORF20005	ORIFICE, LP	ALL
3	VAL2076	GAS VALVE, NAT	ALL
3	VAL2413	GAS VALVE, LP	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
CONTRLS & GAUGES			
4	RLY20031	USER INTERFACE CONTROL	ALL
5	RLY20032	BOARD, MAIN CONTROL	ALL
6	RLY20066	BOARD, CONNECTOR	ALL
7	RLY30093	BOARD, SENSOR	ALL
8	RLY2051	RELAY, DPDT	ALL
9	RLY2706	RELAY, 120VAC, 60HZ, 10.8AMP	ALL
10	TRF20002	TRANSFORMER, 24V, 60VA	ALL
11	TRF20002	TRANSFORMER, 24V, 60VA	992
11	TRF2005	TRANSFORMER,75VA, 120V TO 24V	1262 & 1442
11	TRF2010	TRANSFORMER,120V, 50/60 HZ	1802 &2072
12	SWT2006	SWITCH, ON / OFF	ALL
13	MSC2465	CIRCUIT BREAKER, 5 AMP	1802-2072
14	PLT3400	HOT SURFACE IGNITOR	ALL
15	GKT2012	GASKET, IGNITOR	ALL
16	FAN2010	FAN ASSEMBLY	992 -1442
16	FAN20004	FAN ASSEMBLY	1802 &2072
17	PRS2004	GAS PRESSURE SWITCH, NAT ONLY	ALL
18	PRS20023	PRESSURE SWITCH, BLOCKED FLUE	992
18	PRS20024	PRESSURE SWITCH, BLOCKED FLUE	1262
18	PRS20025	PRESSURE SWITCH, BLOCKED FLUE	1442
18	PRS20026	PRESSURE SWITCH, BLOCKED FLUE	1802
18	PRS20027	PRESSURE SWITCH, BLOCKED FLUE	2072
19	PRS20028	AIR PRESSURE SWITCH	ALL
HEAT EXCHANGERS			
20	HEX30009	HEAT EXCHANGER, HLW	992
20	HEX30010	HEAT EXCHANGER, HLW	1262
20	HEX30011	HEAT EXCHANGER, HLW	1442
20	HEX30022	HEAT EXCHANGER, HLW, CN	1802
20	HEX30023	HEAT EXCHANGER, HLW, CN	2072
21	JKE20000	V-BAFFLE (11 REQ.)	992
21	JKE20001	V-BAFFLE (11 REQ.)	1262
21	JKE20002	V-BAFFLE (11 REQ.)	1442
21	JKE20003	V-BAFFLE (11 REQ.)	1802
21	JKE20004	V-BAFFLE (11 REQ.)	2072
22	JKE60162	FRAME RUNNER (2 REQ.)	992
22	JKE60163	FRAME RUNNER (2 REQ.)	1262
22	JKE60164	FRAME RUNNER (2 REQ.)	1442
22	JKE60165	FRAME RUNNER (2 REQ.)	1802
22	JKE60166	FRAME RUNNER (2 REQ.)	2072
23	MSC20129	RETAINER V-BAFFLE (3 REQ.)	ALL
24	GKT20032	GASKET, FRONT HEADER	ALL
25	TST20017	SENSOR, DUAL IMMERSION, OUTLET	ALL
26	TST2050	SENSOR, IMMERSION, INLET	ALL
27	RLV2017	RELIEF VALVE, TEMPERATURE & PRESSURE	ALL
28	WTR20003	FLOW SWITCH	ALL
PUMPS			
29	ARM3024PABTE	PUMP	992-1442
29	ARM3072PABTE	PUMP	1802 - 2072
MISCELLANEOUS			
30	MSC3415	SIGHT GLASS AND GASKET KIT	ALL
31	GKT2401	GASKET, SIGHT GLASS	ALL
32	MSC20176	CONDUIT COVER	ALL
33	MSC2413	SCREW, KNURLED HEAD	ALL
34	GKT2427	GASKET, ESCUTCHEON, 3/4"	ALL
35	PVC30034	CPVC PIPING LOOP 2 1/2" HORIZONTAL	ALL
35	PVC30035	CPVC PIPING LOOP 2 1/2" VERTICAL	ALL
36	VAL20009	BYPASS VALVE	ALL
-	VAL20048	ACTUATOR, 3-WAY VALVE	ALL
-	VAL20049	LINKAGE, 3-WAY VALVE	ALL
-	VAL20050	STEM KIT, 3-WAY VALVE	ALL
-	FUS2001	FUSE, 3.15 AMP	ALL
-	FUS2002	FUSE, 5 AMP	ALL
-	GKT2028	GASKET, ESCUTCHEON, 2"	ALL
-	GKT3408	GASKET, STRIP 45"	ALL
-	TUB2002	TUBING, GRAY, 3/16" X 5/16"	ALL
-	TUB2004	TUBING, ALUMINUM, 1/8"	ALL
-	FIL2000	FILTER	ALL
-	GKT2429	GASKET, BURNER	ALL
-	GKT30000	GASKET, BLACK PVC, 1/4 X 5/8 X 25'	ALL
-	MSC2155	TEE, 3/16" HOSE MENDER, NYLON	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
MISCELLANEOUS CONTINUED			
-	MSC2156	CAP, 3/16" TEE FITTING, SILICONE	ALL
-	TST2305	BULB WELL	ALL
-	WTR30000	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL)	ALL
-	WTR30001	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL)	ALL
-	WTR2222	LOW WATER CUT-OFF PROBE (OPTIONAL)	ALL
-	WTR20000	LOW WATER CUT-OFF BOOT (OPTIONAL)	ALL
LOCH-HEAT TILE			
37	FIB20041	LOCH-HEAT TILE, FRONT HEAD SIDE	ALL
38	FIB20042	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
39	FIB20044	LOCH-HEAT TILE, DIVIDER	ALL
40	FIB20049	LOCH-HEAT TILE, FRONT DOOR	992
40	FIB20050	LOCH-HEAT TILE, FRONT DOOR	1262
40	FIB20051	LOCH-HEAT TILE, FRONT DOOR LEFT	1442
40	FIB20052	LOCH-HEAT TILE, FRONT DOOR RIGHT	1442
40	FIB20102	LOCH-HEAT TILE, FRONT DOOR LEFT	1802
40	FIB20054	LOCH-HEAT TILE, FRONT DOOR RIGHT	1802
40	FIB20055	LOCH-HEAT TILE, FRONT DOOR LEFT	2072
40	FIB20056	LOCH-HEAT TILE, FRONT DOOR RIGHT	2072
41	FIB20035	LOCH-HEAT TILE, BACK	992
41	FIB20036	LOCH-HEAT TILE, BACK	1262
41	FIB20037	LOCH-HEAT TILE, BACK LEFT	1442
41	FIB20038	LOCH-HEAT TILE, BACK LEFT	1802
41	FIB20039	LOCH-HEAT TILE, BACK LEFT	2072
41	FIB20040	LOCH-HEAT TILE, BACK RIGHT	1442 - 2072
42	FIB20000	INSULATION PAD, TOP	992
42	FIB20002	INSULATION PAD, TOP	1262
42	FIB2257	INSULATION PAD, TOP	1442
42	FIB20004	INSULATION PAD, TOP	1802
42	FIB2259	INSULATION PAD, TOP	2072
43	FIB20043	LOCH-HEAT TILE, LEFT BOTTOM	992
43	FIB20045	LOCH-HEAT TILE, MIDDLE BOTTOM	992
43	FIB20046	LOCH-HEAT TILE, RIGHT BOTTOM	992
43	FIB20047	LOCH-HEAT TILE, LEFT BOTTOM	1262
43	FIB20045	LOCH-HEAT TILE, MIDDLE BOTTOM (2)	1262
43	FIB20048	LOCH-HEAT TILE, RIGHT BOTTOM	1262
43	FIB20059	LOCH-HEAT TILE, LEFT BOTTOM	1442
43	FIB20045	LOCH-HEAT TILE, MIDDLE BOTTOM (2)	1442
43	FIB20060	LOCH-HEAT TILE, RIGHT BOTTOM	1442
43	FIB20061	LOCH-HEAT TILE, LEFT BOTTOM	1802
43	FIB20045	LOCH-HEAT TILE, MIDDLE BOTTOM (3)	1802
43	FIB20062	LOCH-HEAT TILE, RIGHT BOTTOM	1802
43	FIB20063	LOCH-HEAT TILE, LEFT BOTTOM	2072
43	FIB20045	LOCH-HEAT TILE, MIDDLE BOTTOM (3)	2072
43	FIB20064	LOCH-HEAT TILE, MIDDLE BOTTOM (1)	2072
43	FIB20065	LOCH-HEAT TILE, RIGHT BOTTOM	2072
JACKET ASSEMBLIES			
44	JKE30023	JACKET, OUTER FRONT UPPER MIDDLE	ALL
45	JKE60136	JACKET, OUTER FRONT UPPER LEFT	ALL
46	JKE30024	JACKET, OUTER FRONT UPPER RIGHT	992
46	JKE30025	JACKET, OUTER FRONT UPPER RIGHT	1262
46	JKE30026	JACKET, OUTER FRONT UPPER RIGHT	1442
46	JKE30027	JACKET, OUTER FRONT UPPER RIGHT	1802
46	JKE30028	JACKET, OUTER FRONT UPPER RIGHT	2072
47	JKE60124	JACKET, OUTER FRONT LOWER	992
47	JKE60125	JACKET, OUTER FRONT LOWER	1262
47	JKE60126	JACKET, OUTER FRONT LOWER	1442
47	JKE60127	JACKET, OUTER FRONT LOWER	1802
47	JKE60128	JACKET, OUTER FRONT LOWER	2072
48	JKE60117	JACKET, OUTER REAR HEAD	ALL
49	JKE60114	JACKET, OUTER LEFT LOWER HEAD	ALL
50	JKE60119	JACKET, OUTER TOP	992
50	JKE60120	JACKET, OUTER TOP	1262
50	JKE60121	JACKET, OUTER TOP	1442
50	JKE60122	JACKET, OUTER TOP	1802
50	JKE60123	JACKET, OUTER TOP	2072
51	JKE30018	DOOR, COMBUSTION CHAMBER	992
51	JKE30019	DOOR, COMBUSTION CHAMBER	1262
51	JKE30020	DOOR, COMBUSTION CHAMBER	1442
51	JKE30021	DOOR, COMBUSTION CHAMBER	1802
51	JKE30022	DOOR, COMBUSTION CHAMBER	2072

NOTE: CP = POOL HEATER
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS



Copper-Fin[®] Commercial Gas Boilers

Energy Efficient, Cost Effective Boilers

Lochinvar first introduced Copper-Fin technology to the boiler industry some 50 years ago. Since then, we've continued to refine and perfect it - adding advanced fan-assisted combustion, hot surface ignition, a unique gasketless copper finned tube heat exchanger and highly efficient insulating materials.

Installation Flexibility and Cost-Savings

With compact sizes that use less floor space than ever before, all Copper-Fin units are narrow enough to fit through a standard 36" doorway - an advantage most commercial boilers can't provide. Plus, thanks to special insulating materials, Copper-Fin units require only 3" clearance from combustible walls. What's more, our Stack Frame allows you to install two units in the area normally required for one. This makes it easier to fit multiple Copper-Fin boilers into cramped mechanical rooms. And you can even use a smaller diameter vent stack - up to 8" smaller than typically required for comparable atmospheric boilers - so it saves money as well as valuable mechanical room space.

Unique Copper-Fin Heat Exchanger



The Lochinvar Copper-Fin boiler design uses a two pass heat exchanger. Water is circulated through a row of highly-efficient, finned copper tubes.

The high rate of water flow creates a scouring action that prevents sediment and lime-scale buildup, common in conventional boilers, and the finned copper tubes allow maximum heat transfer efficiency.

To create this special heat transfer capability,

Lochinvar extrudes the fins from thick wall copper tubing to precise specifications - exactly 7 fins per

inch. The result is an integrally-finned tube with a heat transfer ratio 9 times greater than a plain copper tube.

Heavy-Duty Gasketless Design

What's more, advanced casting processes allowed Lochinvar to develop a unique one-piece header system. This gasketless design provides enhanced reliability, improved durability and optimum performance - without the problems or failures common with O-rings and gaskets.

Meets the Toughest Air Quality Standards



Because of our unique fan-assisted combustion process, the Copper-Fin exceeds today's toughest NO_x emissions requirements. An independent certification laboratory test gave us a rating of less than 20 ppm - corrected to 3% O₂. And less NO_x means a cleaner environment.



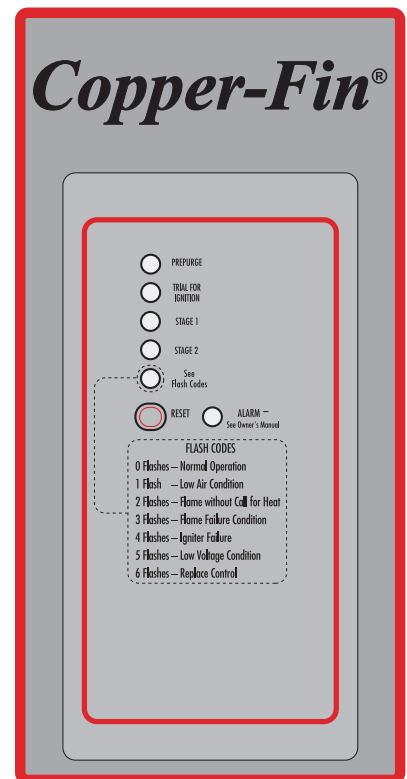
Enhanced to Provide Performance and Serviceability

Our enhanced Copper-Fin models offer the same reliable operation, and feature a more service friendly design. The down stream test valves and referenced gas valves are now in the upper deck for easier access, and the electrical and BMS connections have been repositioned to the front of the unit for easier installation.

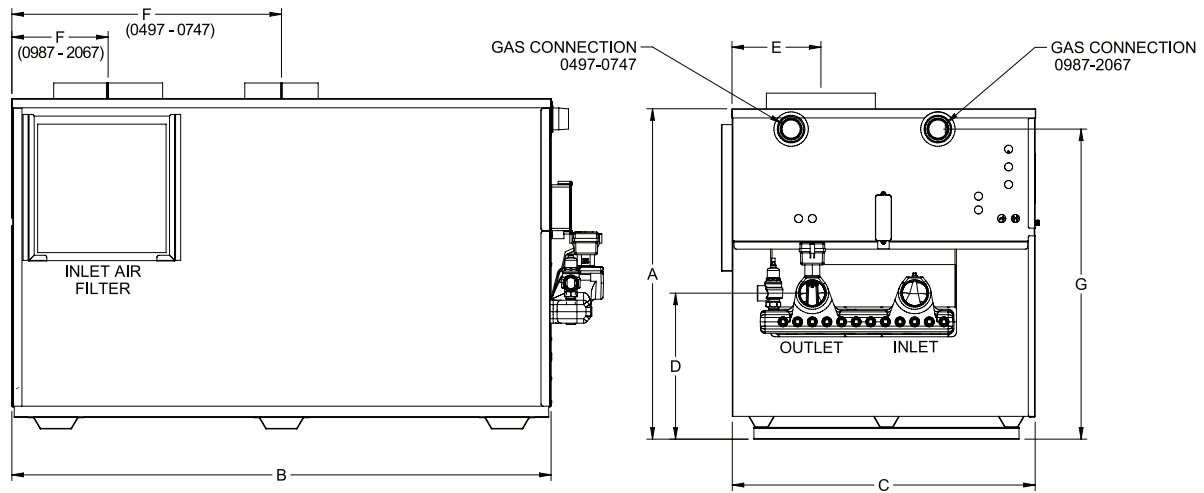
The gas valves, which are referenced to the sealed combustion chamber, improve operational performance by monitoring the pressure in the sealed combustion chamber and adjusting gas flow to maintain the optimum air/fuel mixture. And the built-in air inlet filter reduces maintenance and improves performance by trapping dust and airborne particulates that can foul the burners and blowers.

With dual sight glasses (one on each end), you can easily monitor burner performance and flame characteristics throughout the entire combustion chamber.

The operator interface panel provides two-stage electronic temperature control and comprehensive diagnostic status without opening the control panel. Its user friendly design simplifies service while providing additional diagnostic information through a series of LEDs.



Copper-Fin® Boiler Dimensions & Specifications



Copper-Fin Heating Boiler					Dimensions & Specifications									
Model Number	Input Max MBH	Thermal Efficiency	Heating Capacity MBH	NetAHRI Rating MBH	A	B	C	D	E	F	G	Gas Conn.	Vent Size	Shipping Weight
CBN0497	495	81%	401	349	31-1/2"	45-1/4"	22-1/4"	12-1/2"	9-1/2"	22-3/4"	29-1/2"	1-1/4"	6"	440
CBN0647	645	81%	522	454	31-1/2"	56-3/4"	22-1/4"	12-1/2"	9-1/2"	28-1/2"	29-1/2"	1-1/4"	8"	510
CBN0747	745	81%	603	524	31-1/2"	64"	22-1/4"	12-1/2"	9-1/2"	32"	29-1/2"	1-1/4"	8"	550
CBN0987	985	81%	798	694	36"	48-1/4"	33-1/2"	15-3/4"	8-1/2"	8-1/2"	33-3/4"	2"	10"	845
CBN1257	1255	81%	1,017	884	36"	58-1/2"	33-1/2"	15-3/4"	9-1/2"	10-1/2"	33-3/4"	2"	12"	905
CBN1437	1435	81%	1,162	1,010	36"	68-3/4"	33-1/2"	15-3/4"	10-1/2"	10-1/2"	33-3/4"	2"	12"	1050
CBN1797	1795	81%	1,454	1,264	36"	82-1/4"	33-1/2"	15-3/4"	11"	11"	33-3/4"	2"	14"	1193
CBN2067	2065	81%	1,673	1,455	36"	92-1/2"	33-1/2"	15-3/4"	11"	11"	33-3/4"	2"	14"	1350

Notes: Change 'N' to 'L' for LP gas models.
 No deration on LP models.
 Performance data based on manufacturer test results.

Water connections for models CB 0497-747 are 2" NPT on 6-1/2" centers.
 Water connections for models CB 0987-2067 are 2-1/2" NPT on 11-1/4" centers.

Standard Features

- 81% Thermal Efficiency
- Electronic Temperature Control
- Fan Assisted Combustion
- Sealed Combustion Chamber
- Stainless Steel Burners
- Low NOx Operation Exceeds the most Stringent Air Quality Requirements
- ASME Copper Finned Tube Heat Exchanger
- 160 psi Working Pressure
- Gasketless Heat Exchanger Design
- Pump Relay w/ Delay
- Down Stream Test Valve
- Referenced Gas Valves
- Loch-Heat Ceramic Tile Combustion Chamber
- Hot Surface Ignition
- Adjustable High Limit w/ Manual Reset
- ASME Pressure Relief Valve
- Temperature & Pressure Gauge

- Flow Switch
- 24 Volt Control System
- BMS Terminal Strip
- Combustion Air Filter
- Freeze Protection
- 10 Year Limited Warranty on Heat Exchanger (See warranty for details)

Optional Equipment

- Alarm Bell
- Contacts on any Failure
- Contacts for Air Louvers
- Cupro-Nickel Heat Exchanger
- High & Low Gas Pressure Switch w/ Manual Reset
- Outdoor Reset Control
- Manual Reset Low Water Cut-Off w/ test
- Stack Frame
- MP² Sequencer

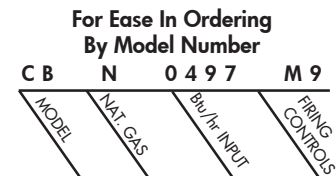
Available Firing Systems

- M9 Hot Surface Ignition with Electronic Supervision (Standard)
- M13 GE GAP/FM/CSD1
- M7 California Code

Venting

- Outdoor Vent Cap

Registered under U.S. Patent # 5,989,020



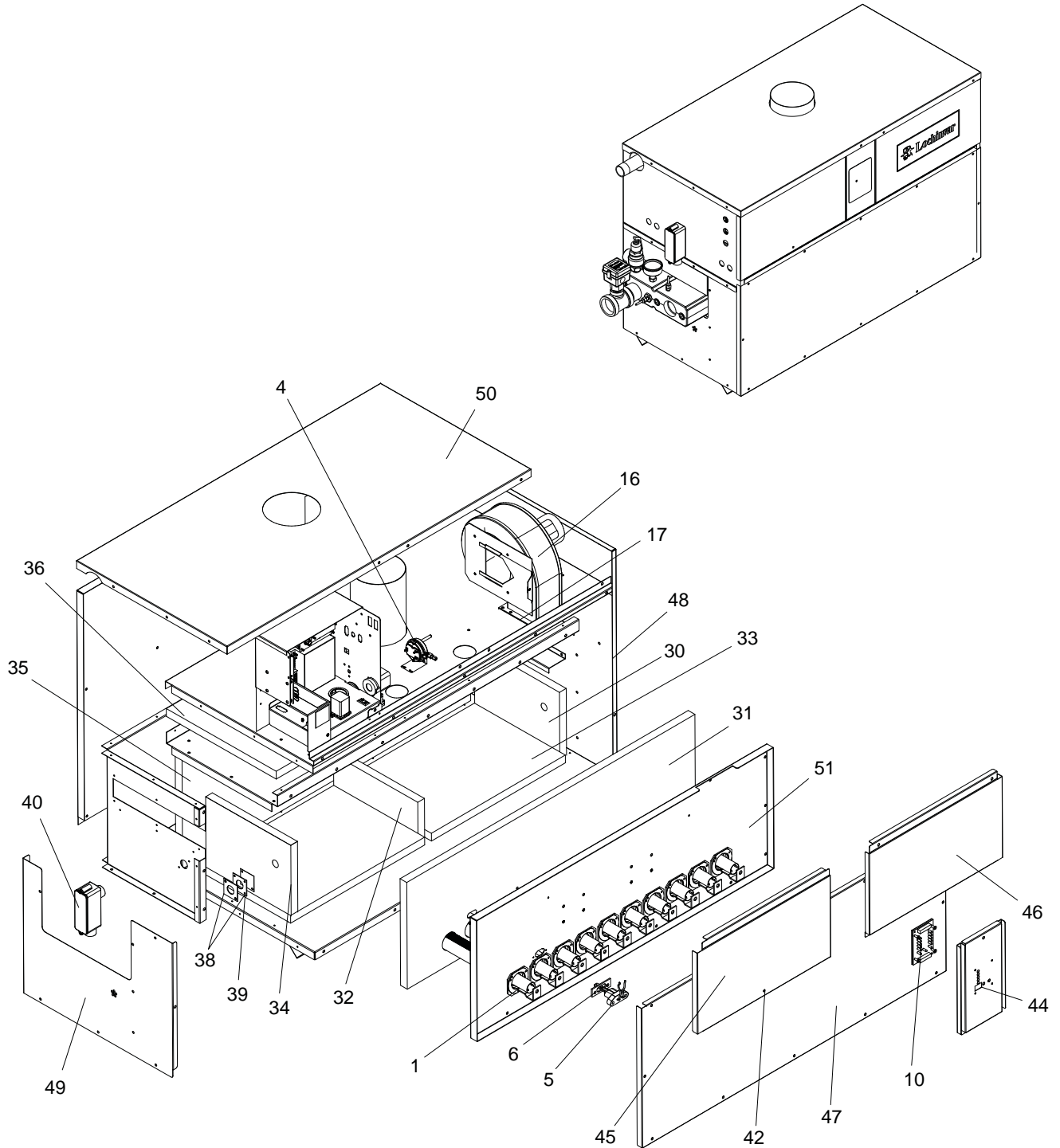
This boiler is a 495,000 Btu/hr, natural gas Copper-Fin. It has M9 firing controls



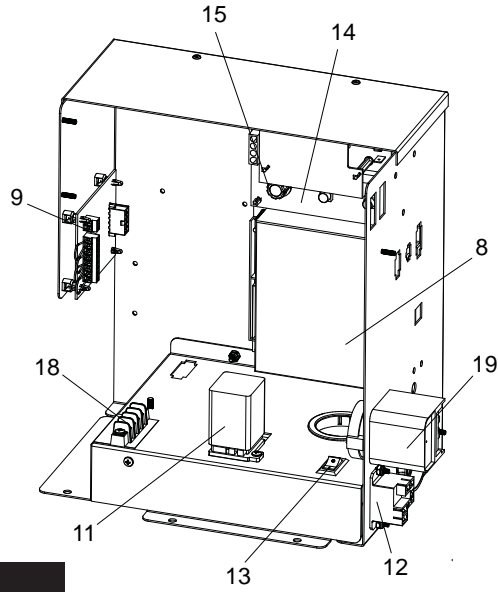
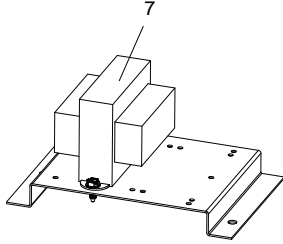


Replacement Parts List

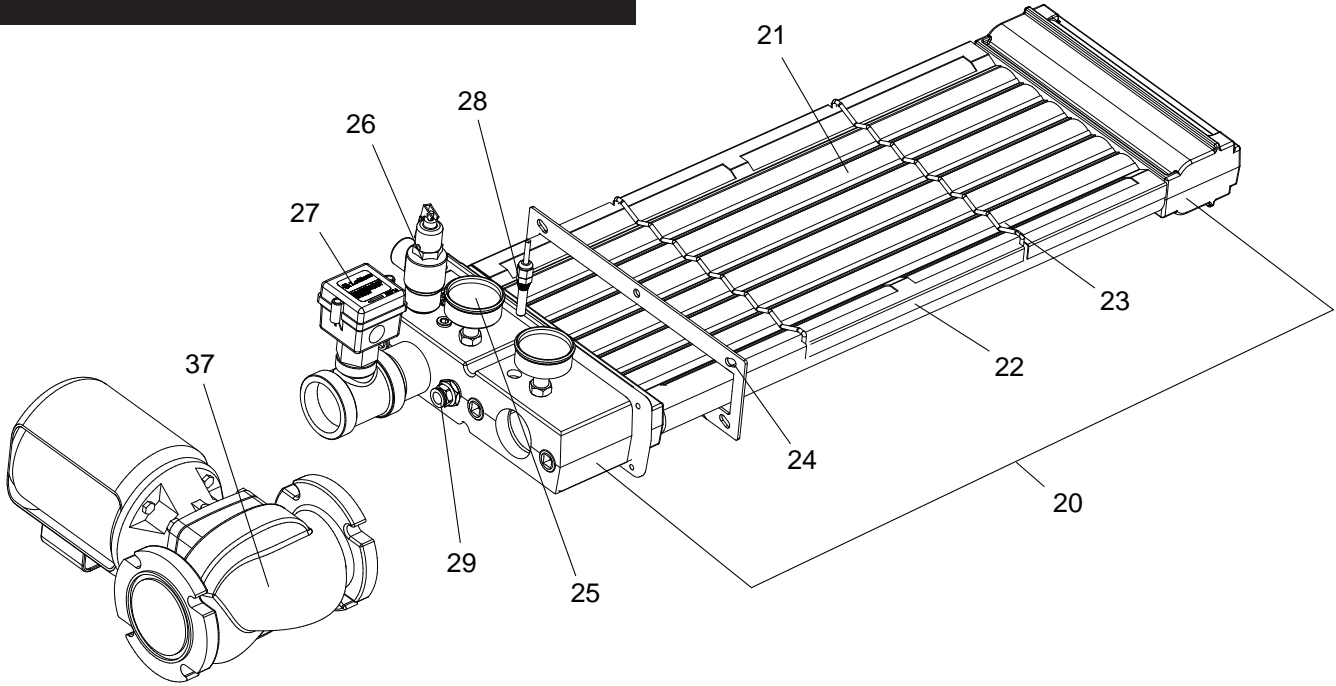
Copper-Fin®
Boilers — Water Heaters
CB—CW 497 -747



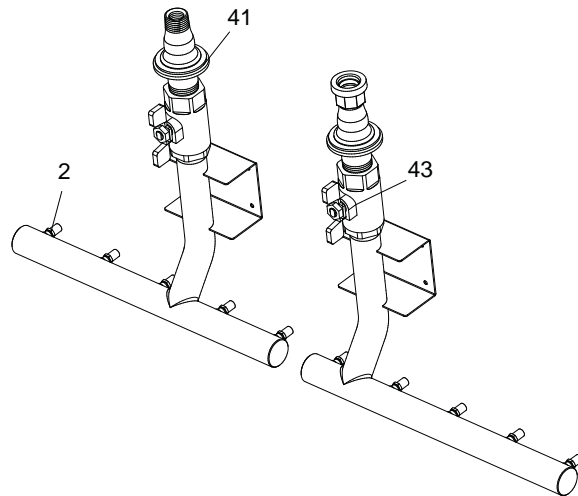
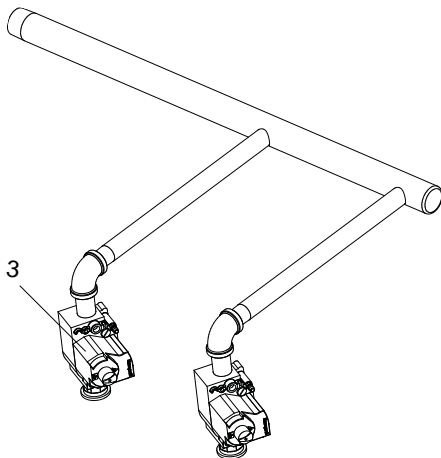
CONTROL PANEL



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
BURNERS			
1	100135300 Main Burner	Model 100135300	100135270
		497	9 ea
	100135270 Main Burner w/ compression fitting	647	12 ea
		747	14 ea
GAS TRAIN ASSEMBLIES			
2	100208348	ORIFICE, NAT.	ALL
2	100208345	ORIFICE, LPG.	ALL
3	100172018	GAS VALVE, NAT.	ALL
3	100172019	GAS VALVE, LPG.	ALL
CONTROLS			
4	100208387	SWITCH, LOW AIR PRESSURE	ALL
5	100165937	IGNITOR ,HOT SURFACE	ALL
6	100208087	GASKET, IGNITOR	ALL
7	100208251	TRANSFORMER - 75 VA	ALL
8	100208464	IGNITION MODULE	ALL
9	100167588	BOARD, CONNECTOR	ALL
10	100208486	BOARD, DISPLAY	ALL
11	100208504	RELAY, 24V	ALL
12	100208491	RELAY , PUMP DELAY	ALL
13	100208242	SWITCH, ON/OFF	ALL
14	100208835	THERMOSTAT OPERATOR	CB
14	100208555	THERMOSTAT OPERATOR	CW
15	100208318	KNOB, FLUTED W/ SKIRT	ALL
16	100137145	FAN	ALL
17	100233678	GASKET, FAN	ALL
18	100162980	TERMINAL STRIP	ALL
19	100208174	HIGH LIMIT, MANUAL RESET	ALL
HEAT EXCHANGERS			
20	100147344	HEAT EXCHANGER (H)	CB 497
20	100147347	HEAT EXCHANGER (H)	CB 647
20	100147349	HEAT EXCHANGER (H)	CB 747
20	100147346	HEAT EXCHANGER (HLW)	CW 497
20	100147348	HEAT EXCHANGER (HLW)	CW 647
20	100147350	HEAT EXCHANGER (HLW)	CW 747
21	100151232	V-BAFFLE (5 REQ.)	497
21	100151233	V-BAFFLE (5 REQ.)	647
21	100151234	V-BAFFLE (5 REQ.)	747
22	100151525	FRAME RUNNER V-BAFFLE (2 REQ.)	497
22	100151526	FRAME RUNNER V-BAFFLE (2 REQ.)	647
22	100151527	FRAME RUNNER V-BAFFLE (2 REQ.)	747
23	100163183	FRAME END (2 REQ.)	ALL
24	100208106	GASKET HEAT SHIELD	ALL
25	100208152	GAUGE, TEMPERATURE AND PRESSURE	CB
25	100147003	GAUGE, TEMPERATURE - 2"	CW
26	100208446	RELIEF VALVE, TEMPERATURE AND PRESSURE	CW
26	100208442	RELIEF VALVE, PRESSURE ONLY	CB
27	100232493	FLOW SWITCH, OUTDOOR	ALL
27	100208653	FLOW SWITCH, INDOOR	ALL
28	100208553	SENSOR, INLET	ALL
29	100233613	BULB WELL, HIGH LIMIT	ALL
LOCH-HEAT TILE			
30	100145466	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
31	100145468	LOCH-HEAT TILE, FRONT DOOR	497
31	100145619	LOCH-HEAT TILE, FRONT DOOR	647
31	100233547	LOCH-HEAT TILE, FRONT DOOR	747
32	100233575	LOCH-HEAT TILE, DIVIDER	ALL
33	100145694	LOCH-HEAT TILE, BOTTOM - LEFT & RIGHT	497
33	100145474	LOCH-HEAT TILE, BOTTOM - RIGHT	647
33	100145475	LOCH-HEAT TILE, BOTTOM - LEFT	647
33	100145472	LOCH-HEAT TILE, BOTTOM - RIGHT	747
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS NOTE: CB = BOILER CW = WATER HEATER			

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
LOCH-HEAT TILE CONTINUED			
33	100145473	LOCH-HEAT TILE, BOTTOM - LEFT	747
34	100233555	LOCH-HEAT TILE, FRONT HEAD SIDE	ALL
35	100145613	LOCH-HEAT TILE, REAR	497
35	100145614	LOCH-HEAT TILE, REAR	647
35	100145615	LOCH-HEAT TILE, REAR	747
36	100145702	INSULATION PAD, TOP	497
36	100145703	INSULATION PAD, TOP	647
36	100145704	INSULATION PAD, TOP	747
PUMP			
37	100133610	PUMP FOR COPPER-FIN WATER HEATER	CW
37	100133612	PUMP FOR COPPER-FIN BOILER	CB
MISCELLANEOUS			
38	100163259	KIT, SIGHT GLASS	ALL
39	100233729	GASKET, SIGHT GLASS	ALL
40	100162714	CONDUIT COVER	ALL
41	100208090	GASKET, ESCUTCHEON, 1"	ALL
42	100162999	SCREW, KNURLED HEAD	ALL
43	100171866	VALVE, GAS CUT OFF	ALL
--	100146461	GASKET, ESCUTCHEON, 1 1/4"	ALL
--	100233577	FILTER - 12" X 12" X 1"	ALL
--	100146604	GASKET STRIP, FIBERGLASS WHITE	ALL
--	100233587	GASKET, BURNER	ALL
--	100146588	GASKET, PVC - 1/4" X 5/8" BLACK	ALL
--	100170644	KIT, TANK SENSOR	CW
--	100170645	KIT, SYSTEM SENSOR	CB
--	100162892	TEE, 3/16" HOSE	ALL
--	100208319	CAP, 3/16" TEE FITTING	ALL
--	100208572	TUBING - 3/16" X 5/16" GRAY	ALL
--	100208573	TUBING - 1/8" ALUMINUM	ALL
--	100208552	SENSOR, SYSTEM / TANK	ALL
--	100233695	BULB WELL	ALL
JACKET ASSEMBLIES			
44	100151248	JACKET, OUTER FRONT UPPER MIDDLE	ALL
45	100151493	JACKET, OUTER FRONT UPPER LEFT	ALL
46	100151249	JACKET, OUTER FRONT UPPER RIGHT	497
46	100151250	JACKET, OUTER FRONT UPPER RIGHT	647
46	100151251	JACKET, OUTER FRONT UPPER RIGHT	747
47	100151482	JACKET, OUTER FRONT LOWER	497
47	100151483	JACKET, OUTER FRONT LOWER	647
47	100151484	JACKET, OUTER FRONT LOWER	747
48	100151511	JACKET, OUTER REAR HEAD	ALL
49	100151472	JACKET, OUTER LEFT LOWER HEAD	ALL
50	100151512	JACKET, OUTER TOP	497
50	100151514	JACKET, OUTER TOP	647
50	100151515	JACKET, OUTER TOP	747
51	100151252	DOOR, COMBUSTION CHAMBER	497
51	100151253	DOOR, COMBUSTION CHAMBER	647
51	100151254	DOOR, COMBUSTION CHAMBER	747
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			
NOTE: CB = BOILER CW = WATER HEATER			



Copper-Fin[®] Gas Fired Boilers

Lightweight, Flexible and Energy Efficient

Copper-Fin gas-fired boilers are high-efficiency boilers that save space, save money, are lightweight, and are simple to service and install. Copper-Fin boilers are equipped with a built-in draft hood, a highly efficient copper tube heat exchanger, our own specially designed two-stage electronic control system, and they are approved for installation on combustible floors. Models are available with inputs from 315,000 to 500,000 Btu/hr.

Two-Stage Control System

The boiler's two-stage electronic temperature control provides flexibility and saves fuel by closely matching heat output to system demand. On colder days the boiler fires at full output, and in warmer conditions the boiler reduces heat output to save energy and reduce boiler cycling.

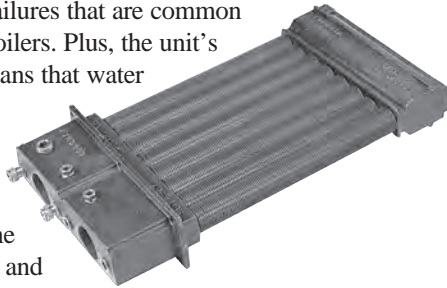
During the majority of the heating season, less than full boiler output is required to satisfy the heat load. For this reason, Lochinvar has developed a two-stage firing system. Two-stage firing - standard equipment on all Copper-Fin boilers, provides dramatic fuel savings by reducing the firing rate 50%. And the two-stage firing control is ideal for applications utilizing outdoor reset.*

**Outdoor reset is available as an option.*

Copper Finned Tube Heat Transfer

The heart of the Copper-Fin boiler is its copper finned tube heat exchanger. With this unique gasketless design, we've combined the best of both worlds: cast iron headers for long-lasting durability, and a copper finned-tube heat exchanger for high efficiencies and fast heat transfer. The gasketless heat exchanger design reduces the risk of leaks or system failures that are common with conventional boilers. Plus, the unit's low-mass design means that water gets heated quickly.

Not only is heat up time nearly instantaneous with these boilers, the energy consumption and operating costs are lower too.



Intermittent Ignition Device

The Intermittent Ignition Device is a solid-state electronic spark-to-pilot ignition system that reduces fuel consumption. It's electronic circuitry continuously monitors the system and provides pilot gas only when there is a call for heat, eliminating the need for a continuously burning pilot, and providing an additional measure of operational safety.

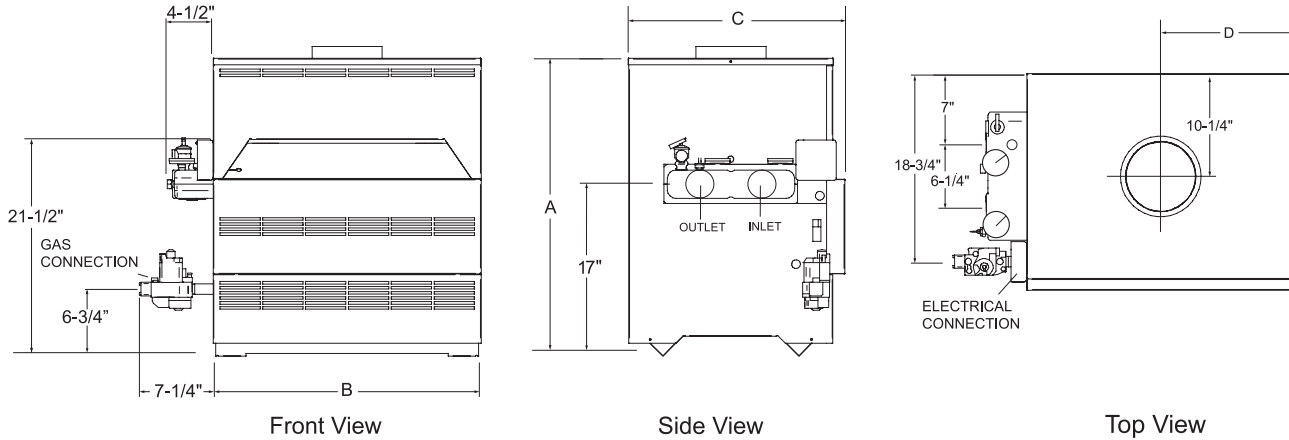
Built-In Draft Hood

The lower overall height of the draft hood makes it easier to install the Copper-Fin boiler in all applications, especially in those instances where overhead space is limited and headroom restrictions exist.

Serviceability

This boiler is as flexible and convenient to install and service as it is efficient and compact. The heavy-duty stainless steel burners can easily be adapted for use with either natural or liquefied petroleum (LP) gas, and the boiler's design allows for easy access to all major components for servicing. The heat exchanger is designed to slide out the front of the boiler for faster maintenance, and Lochinvar backs it up with an exclusive 10-year Limited Warranty. For more information, call your Lochinvar dealer today.

Copper-Fin® Boiler Dimensions & Specifications



Copper-Fin Boiler					Dimensions & Specifications							
Model Number	Input MBH	Thermal Efficiency %	Output MBH	Net AHRI Rating MBH	A	B	C	D	Gas Conn.	Vent Size	Ship. Weight	
CBN315	315	82.0	258	224	29-1/2"	32-1/4"	21-1/2"	16-1/4"	3/4"	8"	245	
CBN360	360	82.0	295	257	29-1/2"	35-1/4"	21-1/2"	17-3/4"	1"	9"	255	
CBN399	399	82.0	328	285	29-1/2"	44-1/2"	22"	22-1/4"	1"	10"	320	
CBN500	500	82.0	410	357	34-1/2"	52-1/2"	22"	26-1/4"	1"	10"	345	

Notes: Change 'N' to 'L' to denote L.P. gas models
 No deration for L.P. models.
 Water Connections are 2" NPT on 6-1/4" centers.
 Performance data is based on manufacturer test results.

Standard Features

- 82% Thermal Efficiency
- ASME Copper Finned Tube Heat Exchanger
- Gasketless Heat Exchanger Design
- Two Stage Intermittent Electronic Ignition
- 160 PSI Working Pressure
- Pump Relay
- Two Stage Solid State Temperature Control
- Two Stage Gas Valve with Built-In Manual Shut-Off
- Automatic Reset High Limit
- ASME Pressure Relief Valve
- Temperature & Pressure Gauge

- Diagnostic Flash Codes
- Built-In Draft Diverter
- CSA Design Certified for Alcove Installation
- CSA Design Certified for Installation on Combustible Floor
- Stainless Steel Burners
- Loch-Heat Ceramic Tile Combustion Chamber
- 24 Volt Control System
- 10 Year Limited Warranty on Heat Exchanger (See warranty for details)

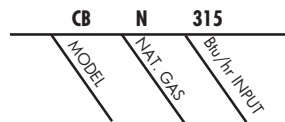
Optional Equipment

- Adjustable High Limit w/ Manual Reset
- Contacts on any Failure
- Contacts for Air Louvers
- Flow Switch
- Outdoor Air Reset Control
- Low Water Cut-Off
- Multi-Stack Frame
- Pump Delay/Freeze Protection
- MP² Sequencer
- 3-Way Low Temperature Valve

Firing Controls

- M9 - Two-Stage Intermittent Spark Ignition (Standard)
- M13 - GE GAP/FM/IRI
- M7 - California Code

FOR EASE IN ORDERING
 BY MODEL NUMBER



This model is a 315,000 Btu/hr, natural gas Copper-Fin boiler. It has M9 firing controls

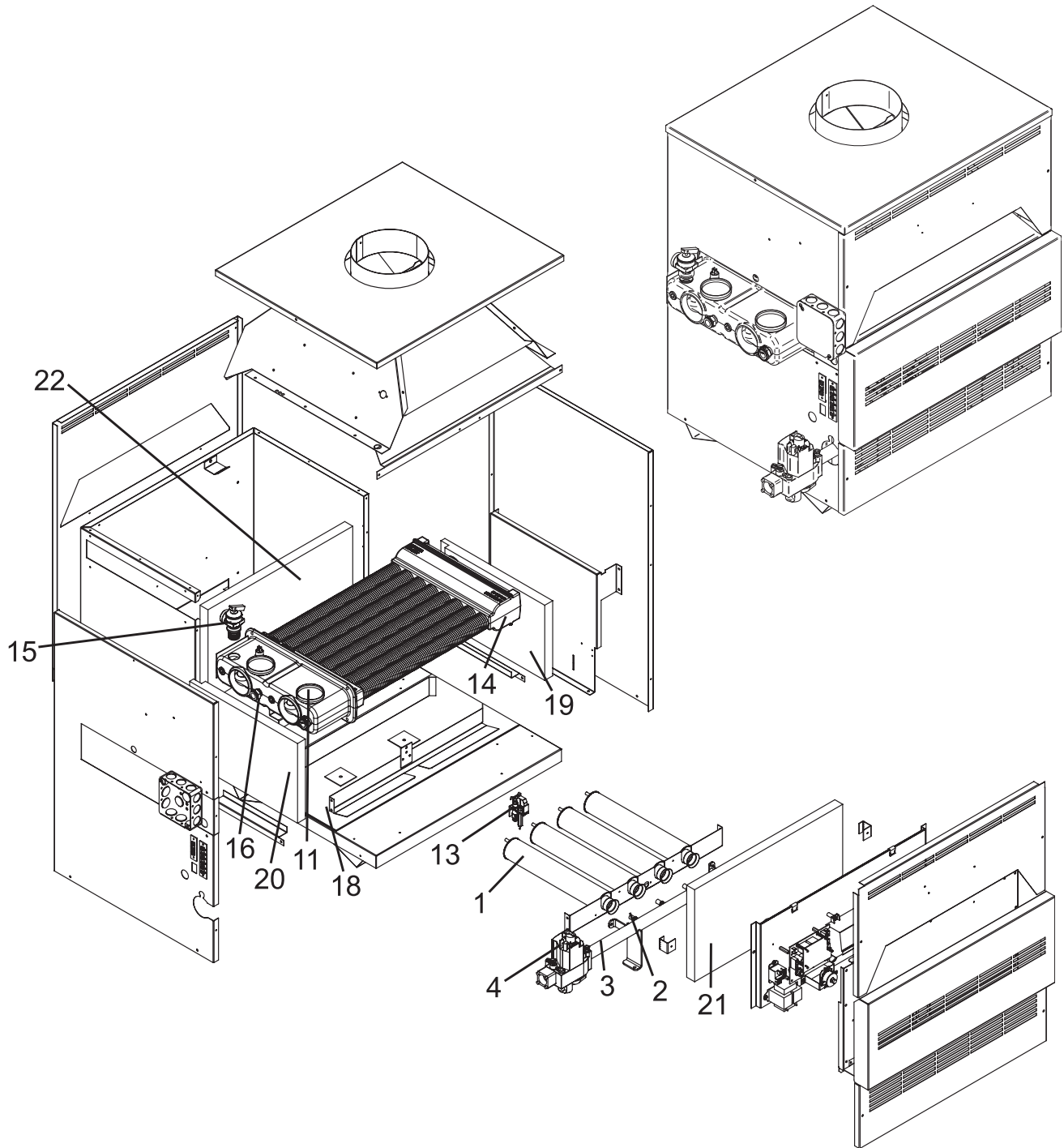
**STACK
 FRAME**



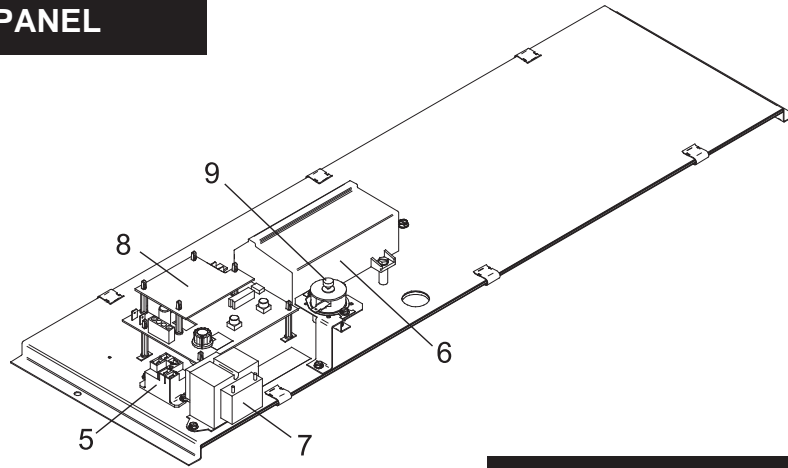


Replacement Parts List

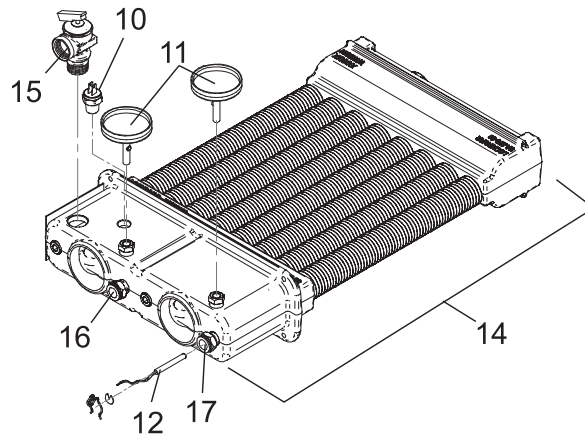
Copper-Fin® Boilers - CB 315-500 Water Heaters - CW 90-500



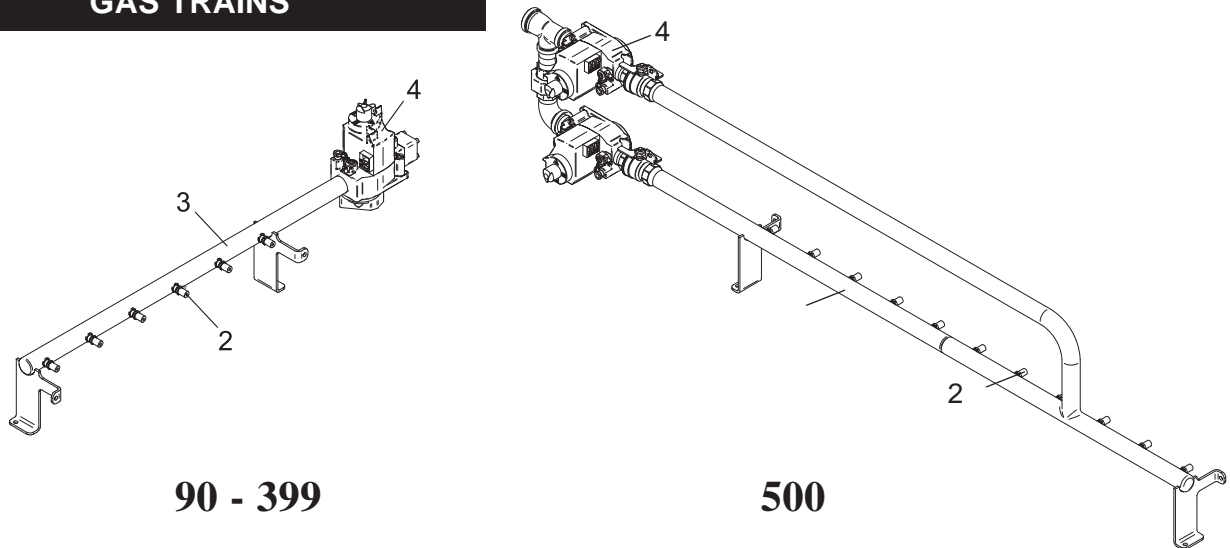
CONTROL PANEL



HEAT EXCHANGER ASSEMBLY



GAS TRAINS



90 - 399

500

ITEM NO. PART NO. DESCRIPTION MODEL NO.

BURNERS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.	
			Model	Quantity
1	BNR2903	MAIN BURNER	90	2 ea
			135	3 ea
			180	4 ea
			199	5 ea
			225	5 ea
			270	6 ea
			315	7 ea
			360	8 ea
			399	9 ea
			500	11 ea

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
GAS TRAIN ASSEMBLIES			
2	ORF2419	ORIFICE, NAT	ALL
2	ORF2402	ORIFICE, LP	ALL
3	MAN2935	GAS MANIFOLD	CW090
3	MAN2936	GAS MANIFOLD	CW135
3	MAN2937	GAS MANIFOLD	CW180
3	MAN2938	GAS MANIFOLD	CW199/225
3	MAN2939	GAS MANIFOLD	CW270
3	MAN2940	GAS MANIFOLD	CB/CW315
3	MAN2941	GAS MANIFOLD	CB/CW 360
3	MAN2115	GAS MANIFOLD	CB/CW399
3	MAN2114	GAS MANIFOLD	CB/CW500
4	VAL2922	GAS VALVE, NAT. F1	CWN90-135
4	VAL2927	GAS VALVE, NAT. F1	CWN199
4	VAL2920	GAS VALVE, NAT. F1	CWN180, 225, 270
4	VAL2940	GAS VALVE, NAT. M9	CBN315-399
4	VAL2904	GAS VALVE, NAT. F9	CWN90-135
4	VAL4934	GAS VALVE, NAT. F9	CWN199
4	VAL2928	GAS VALVE, NAT. F9	CWN180, 225-500 & CBN500-M9
4	VAL4901	GAS VALVE, LPG. F1	CWL90-135
4	VAL2921	GAS VALVE, LPG. F1	CWL180, 225, 270
4	VAL4936	GAS VALVE, LPG. F1	CWL199
4	VAL2933	GAS VALVE, LPG. M9	CBL315-399
4	VAL2905	GAS VALVE, LPG. F9	CWL90-135
4	VAL4935	GAS VALVE, LPG. F9	CWL199
4	VAL2929	GAS VALVE, LPG. F9	CWL180, 225-500 & CBL500-M9
CONTROLS & GAUGES			
5	RLY2052	RELAY, PUMP	ALL CW
5	RLY2105	RELAY, PUMP	ALL CB
6	RLY3007	IGNITION MODULE	CW90-270 & CB / CW315-399
6	RLY3006	IGNITION MODULE	CB / CW500
7	TRF2002	TRANSFORMER 50V.A.	ALL
8	TST2314	THERMOSTAT BOARD	ALL CB
8	TST5314	THERMOSTAT BOARD	ALL CW
9	KIT3117	OVERHEAT, LIMIT MANUAL RESET	ALL CW
10	HLC2909	HIGH LIMIT	CB315-500
10	HLC2303	HIGH LIMIT	CW90-500
11	GTP2900	TRIOMETER GAUGE 75# PSI	ALL CB
11	GTP2002	TEMP, GAUGE	ALL CW
12	TST2032	TEMPERATURE SENSOR	ALL
13	PLT2016	PILOT, INTERMITTENT, NAT. F1	CWN090-270
13	PLT3028	PILOT, INTERMITTENT, LP. F1	CWL090-270
13	PLT2908	PILOT, INTERMITTENT, NAT. F9/M9	CBN/CWN315-500
13	PLT2909	PILOT, INTERMITTENT, LP. F9/M9	CBL/CWL315-500
-	PLT2903	THERMOCOUPLE F-1	CW090 & 135
-	PLT2904	THERMOCOUPLE F-1	CW180-270
-	HLC2903	ROLLOUT SWITCH 250 DEG	CW90-180 / CB & CW315-360
-	HLC2908	ROLLOUT SWITCH 280 DEG	CW199-270 / CB & CW399-500
-	HLC2903	SPILL SWITCH 250 DEG	CW90,135,199-270 / CB & CW399-500
-	HLC2908	SPILL SWITCH 280 DEG	CW180, CB/CW 315-360
HEAT EXCHANGERS			
14	HEX3863	HEAT EXCHANGER H	CB315
14	HEX3864	HEAT EXCHANGER H	CB360
14	HEX3865	HEAT EXCHANGER H	CB399
14	HEX3866	HEAT EXCHANGER H	CB500
14	HEX3867	HEAT EXCHANGER HLW	CW090
14	HEX3868	HEAT EXCHANGER HLW	CW135
14	HEX3869	HEAT EXCHANGER HLW	CW180
14	HEX3896	HEAT EXCHANGER HLW	CW199
14	HEX3870	HEAT EXCHANGER HLW	CW225
14	HEX3871	HEAT EXCHANGER HLW	CW270
14	HEX3872	HEAT EXCHANGER HLW	CW315
14	HEX3873	HEAT EXCHANGER HLW	CW360
14	HEX3874	HEAT EXCHANGER HLW	CW399
14	HEX3875	HEAT EXCHANGER HLW	CW500
-	JKR2060	V-BAFFLE	CW90
-	JKR2061	V-BAFFLE	CW135
-	JKR2062	V-BAFFLE	CW180
-	JKR2179	V-BAFFLE	CW225 - 199
-	JKR2180	V-BAFFLE	CW270
-	JKR2181	V-BAFFLE	CB/CW315
-	JKR2182	V-BAFFLE	CB/CW360
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
HEAT EXCHANGERS (CONT'D)			
-	JKR2307	V-BAFFLE	CB/CW399
-	JKR2308	V-BAFFLE	CB/CW500
15	RLV2006	RELIEF VALVE, T&P	CW090-360
15	RLV2005	RELIEF VALVE, PRESSURE 30 PSI	CB315-360
15	RLV2002	RELIEF VALVE, PRESSURE 30 PSI	CB500
15	RLV2017	RELIEF VALVE, T&P	CW399-500
15	RLV2001	RELIEF VALVE, PRESSURE 50 PSI	CB315-360
15	RLV2084	RELIEF VALVE, PRESSURE 50 PSI	CB399-500
16	TST2300	BULB WELL	ALL CB
16	TST2306	BULB WELL	ALL CW
17	TST2306	BULB WELL	ALL
LOCH-HEAT® TILE			
18	FIB2964	INSULATION, BOTTOM	90
18	FIB2965	INSULATION, BOTTOM	135
18	FIB2966	INSULATION, BOTTOM	180
18	FIB2967	INSULATION, BOTTOM	199-225
18	FIB2968	INSULATION, BOTTOM	270
18	FIB2969	INSULATION, BOTTOM	315
18	FIB2970	INSULATION, BOTTOM	360
18	FIB2971	INSULATION, BOTTOM	399
18	FIB2972	INSULATION, BOTTOM	500
19	FIB2973	LOCH-HEAT TILE, SIDE RIGHT	ALL
20	FIB2942	LOCH-HEAT TILE, SIDE LEFT	ALL
21	FIB2945	LOCH-HEAT TILE, FRONT	90
21	FIB2947	LOCH-HEAT TILE, FRONT	135
21	FIB2949	LOCH-HEAT TILE, FRONT	180
21	FIB2951	LOCH-HEAT TILE, FRONT	199-225
21	FIB2953	LOCH-HEAT TILE, FRONT	270
21	FIB2955	LOCH-HEAT TILE, FRONT	315
21	FIB2957	LOCH-HEAT TILE, FRONT	360
21	FIB2959	LOCH-HEAT TILE, FRONT	399
21	FIB2961	LOCH-HEAT TILE, FRONT	500
22	FIB2946	LOCH-HEAT TILE, BACK	90
22	FIB2948	LOCH-HEAT TILE, BACK	135
22	FIB2950	LOCH-HEAT TILE, BACK	180
22	FIB2952	LOCH-HEAT TILE, BACK	199-225
22	FIB2954	LOCH-HEAT TILE, BACK	270
22	FIB2956	LOCH-HEAT TILE, BACK	315
22	FIB2958	LOCH-HEAT TILE, BACK	360
22	FIB2960	LOCH-HEAT TILE, BACK	399
22	FIB2962	LOCH-HEAT TILE, BACK	500
PUMPS			
-	ARM3045PAB	PUMP, WTR. HEATER	ALL CW
OPTIONS (NOT PICTURED)			
-	DRH2935	FLUE DAMPER - 5"	90
-	DRH2936	FLUE DAMPER - 6"	135
-	DRH2937	FLUE DAMPER - 7"	180/199/225
-	DRH2938	FLUE DAMPER - 8"	270/315
-	DRH2939	FLUE DAMPER - 10"	360-500
-	WTR2040	FLOW SWITCH	ALL
-	KIT3051	OUTDOOR AIR RESET	ALL CB
-	KIT3052	ADJUSTABLE MRHL	ALL
-	KIT3053	CONTACTS ON ANY FAILURE	CB/CW315-500
-	KIT3054	LOUVER CONTACTS	CB/CW315-500
-	KIT3056	HIGH PRESSURE AUTO RESET LWCO	CB315-500 / ALL CW
-	WTR20009	MRLWCO w/TEST	CB315-500 / ALL CW
-	KIT3058	PUMP DELAY	ALL CB
-	LPK3910	NAT-LP CONVERSION KIT-F1	CW090-135
-	LPK3931	NAT-LP CONVERSION KIT-F1	CW199
-	LPK3911	NAT-LP CONVERSION KIT-F1	CW180, 225, 270
-	LPK3912	NAT-LP CONVERSION KIT-F9	CW090-135
-	LPK3934	NAT-LP CONVERSION KIT-F9	CW199
-	LPK3913	NAT-LP CONVERSION KIT-F9	CW180, 225-500 & CB500-M9
-	LPK3916	NAT-LP CONVERSION KIT-M9	CB315-399
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

HIGH EFFICIENCY COMMERCIAL BOILERS

COPPER-FIN II[®]



SMART SYSTEM[™]

ADVANCED OPERATING CONTROL
FEATURING A BUILT-IN CASCADING SEQUENCER

9 MODELS - 400,000 - 2,070,000 BTU/HR

PROPORTIONAL FIRING UP TO 4:1

LESS THAN 20 ppm NO_x

VENT FLEXIBILITY TO 100 FEET



85%
THERMAL EFFICIENCY



Lochinvar[®]
HIGH EFFICIENCY BOILERS & WATER HEATERS

COPPER-FIN II®

THE FOUNDATION OF LOCHINVAR BECOMES STRONGER

Copper-finned tube, non-condensing appliances are the foundation of Lochinvar's success. In 1993, Lochinvar introduced the Copper-Fin II, the first horizontal chassis, copper-finned tube boiler to operate with fan-assisted combustion. Now, the Copper-fin II is even better. Along with high thermal efficiency, gasketless heat exchangers and multiple venting options we have added Lochinvar's exclusive SMART SYSTEM™ control.

Nine models from 399,999 to 2,070,000 Btu/hr input provide you with exceptional products with a long list of new features in addition to the established features which redefined the industry. The Copper-fin II was the first proportional fired, fan-assisted boiler on the market. Every model features a small footprint for easy passage through a 36" door, low NOx – third party tested to less than 20 PPM, Stack Frames that can put twice the Btu/hr input in the same space and vent diameters up to 8" smaller than conventional atmospheric boilers.

THERMAL EFFICIENCY

Copper-Fin II boilers offer a remarkably high 85% thermal efficiency. This means that 85¢ out of every fuel dollar goes into heating the water, dramatically reducing the operating cost of the equipment. Copper-Fin II achieves this efficiency through the combination of an advanced fan assisted combustion system and gasketless heat exchanger. The heat energy from the combustion process is transferred to the water as it passes through the solid copper finned tube heat exchanger. The sealed combustion design of the Copper-Fin II eliminates external heat losses, this means that the energy dollars heat the water, not the mechanical room.

GASKETLESS HEAT EXCHANGER

In 1989, Lochinvar was the first water heater manufacturer to offer gasketless cast iron & copper-finned tube heat exchangers. Our unique gasketless design enhances reliability by eliminating o-rings and gaskets found on other brands. The heat exchanger features glass lined headers and copper-finned tubes with extruded integral fins spaced 7-fins per inch for exceptional heat transfer. The heat exchanger is built to ASME construction standards for 160 psi working pressure and is backed by a ten year limited warranty.



SPACE SAVING, SERVICE FRIENDLY DESIGN

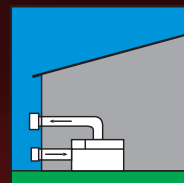
Our enhanced Copper-fin II models offer the same reliable operation in a new service friendly design. The gas inlet, internal controls and Building Management connections have been repositioned to the front of the appliance for easier service and simpler installation. The built-in air filter reduces maintenance and improves performance with a field convertible option to install the air intake on the rear or the right side of the boiler. In addition, Lochinvar was the first manufacturer to offer factory welded Stack Frames that allow you to put two boilers in the space for one.

**STACK
FRAME**

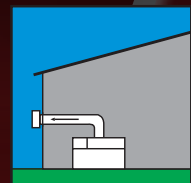
MULTIPLE VENTING OPTIONS

The Copper-fin II offers **eight venting options** to meet the most challenging installation requirements. The Copper-fin II can vent vertically in Category I with double wall "B" vent or horizontally in Category IV with AL29-4C stainless steel vent material. Vent termination can be Rooftop or Sidewall with combustion air drawn naturally from the equipment room or via dedicated air intake piping. And if floor space is limited, the Copper-fin II boiler can be installed outdoors with an optional Outdoor Vent Cap.

Aire-Lock® Direct Vent



Sidewall



High Efficiency Commercial Boilers



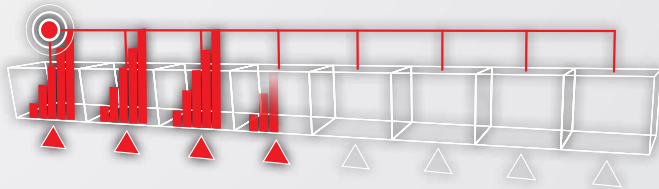
REFINED DESIGN PUTS MORE CONTROL AND INFORMATION AT YOUR FINGERTIPS

The most exciting addition to the Copper-Fin II is the SMART SYSTEM™ control. The SMART SYSTEM is an advanced, state of the art integrated operating control. We introduced the SMART SYSTEM control in 2005 and it has delivered proven operation in thousands of demanding commercial applications. The control provides the installer, owners and operators with precise temperature control and diagnostic information.

Advanced features include:

- 2-LINE, 16 CHARACTER LCD DISPLAY OF SETUP, SYSTEM STATUS AND DIAGNOSTIC DATA IN WORDS, NOT CODES
- BUILT-IN CASCADE SEQUENCER CONTROLLING UP TO 8 BOILERS
- FRONT END LOADING CAPABILITY WITH CREST OR KNIGHT BOILERS
- OUTDOOR RESET ADJUSTS SETPOINT BASED ON RESET CURVE
- DOMESTIC HOT WATER PRIORITIZATION ALLOWS THE BOILER TO PROVIDE SPACE HEATING AND PRODUCE DOMESTIC HOT WATER ALL IN ONE SYSTEM
- 0-10 VDC BMS INPUT TO CONTROL BOILER OPERATION
- MODBUS PROTOCOL - OPTIONAL

CASCADE OPTIONS



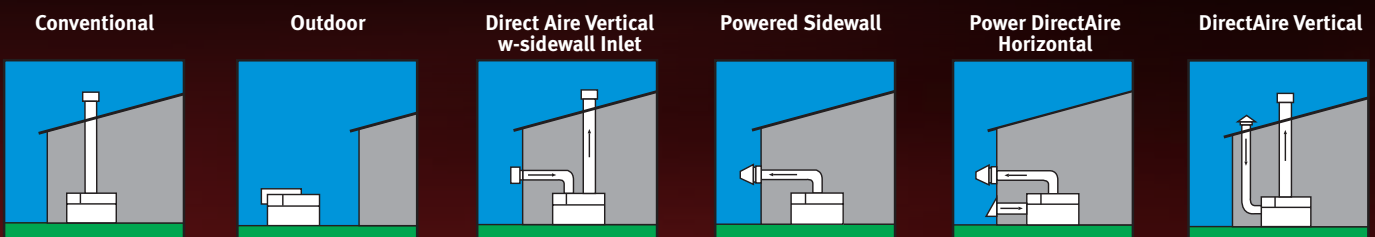
The “lead unit” boiler modulates with demand to capacity. As demand increases, additional boilers fire and modulate to capacity. This continues, with additional boilers firing and modulating to capacity until all units are operating. Every 24 hours, the SMART SYSTEM automatically shifts the lead boiler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



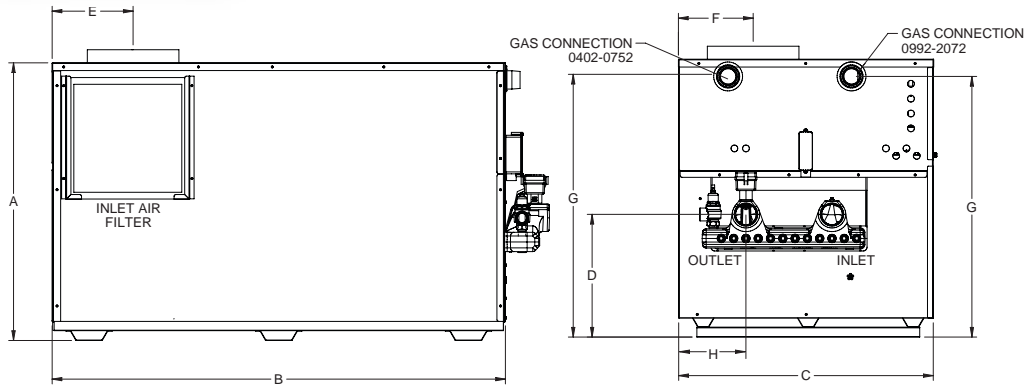
PROPORTIONAL FIRING

Proportional firing divides a single manifold of multiple burners into smaller, independent stages.

With up to four stages of individual operation, the Smart System control can reduce the firing rate down to approximately 25% Btu/hr input. This simple but effective design matches the boiler’s firing capacity to the constantly changing system demand. Full Fire or On/Off combustion systems often fire the entire gas train in short, inefficient bursts. Stage firing delivers the Btu’s required in smoother and longer burn cycles which will improve operation and reduce component fatigue.



COPPER-FIN II® Commercial Gas Boiler Dimensions & Specifications



Copper-Fin II Heating Boiler					Dimensions & Specifications											
Model Number	Input MBH	Thermal Efficiency	Net AHRI Output Rating		A	B	C	D	E	F	G	H	Vent Size	Air Inlet	Gas Conn	Shipping Weight
			MBH	MBH												
CHN0402	399	85%	339	295	31-1/2"	37-3/4"	22-1/4"	12-1/2"	7"	7"	29"	6-1/2"	6"	6"	1-1/4"	378
CHN0502	500	85%	425	370	31-1/2"	45-1/2"	22-1/4"	12-1/2"	7"	7"	29"	6-1/2"	6"	6"	1-1/4"	414
CHN0652	650	85%	553	481	31-1/2"	56-3/4"	22-1/4"	12-1/2"	8-1/2"	8-1/4"	29"	6-1/2"	8"	8"	1-1/4"	500
CHN0752	750	85%	638	555	31-1/2"	64"	22-1/4"	12-1/2"	8-1/2"	8-1/4"	29"	6-1/2"	8"	8"	1-1/4"	543
CHN0992	990	85%	842	732	36"	48-1/4"	33-1/2"	15-3/4"	8-1/2"	8-1/2"	33-3/4"	8-3/4"	10"	10"	2"	773
CHN1262	1,260	85%	1,071	931	36"	58-1/2"	33-1/2"	15-3/4"	10-1/2"	9-1/2"	33-3/4"	8-3/4"	12"	12"	2"	863
CHN1442	1,440	85%	1,224	1,064	36"	68-3/4"	33-1/2"	15-3/4"	10-1/2"	10-1/2"	33-3/4"	8-3/4"	12"	12"	2"	965
CHN1802	1,800	85%	1,530	1,330	36"	82-1/4"	33-1/2"	15-3/4"	11"	11"	33-3/4"	8-3/4"	14"	12"	2"	1,100
CHN2072	2,070	85%	1,760	1,530	36"	92-1/2"	33-1/2"	15-3/4"	11"	11"	33-3/4"	8-3/4"	14"	12"	2"	1,219

Notes: Change 'N' to 'L' for LP gas models. No deration on LP models. Water connections for models CH 0402-0752 are 2" NPT on 6-1/2" centers. Header increases "B" dimension 3-1/2" for models CH 0402-0752 and 6-1/4" for models CH 0992-2072. Water connections for models CH 0992-2072 are 2-1/2" NPT on 11-1/4" centers.

STANDARD FEATURES

- ▶ **85% Thermal Efficiency (AHRI Certified)**
- ▶ **Proportional Firing up to 4:1 Turndown**
 - Hot Surface Ignition
 - Low NOx Operation
 - Sealed Combustion
 - Low Gas Pressure Operation
- ▶ **Vertical & Horizontal Venting**
 - ▶ Category I Venting
 - Double Wall "B" Vent Material
 - ▶ Category IV Venting
 - AL29-4C Stainless Steel Vent Material
- ▶ **ASME Copper Finned Tube Heat Exchanger**
 - ASME Certified, "H" Stamped
 - Gasketless design
 - 160 psi working pressure
 - On/Off Switch
 - Combustible Floor Rated (CH 0992 - 2072)
 - Adjustable High Limit w/ Manual Reset
 - Flow Switch
 - Low Air Pressure Switch
 - Inlet & Outlet Temperature Sensors
 - Easy Access Terminal Strips
 - Downstream Test Cocks
 - 50 psi ASME Pressure Relief Valve
 - Temperature & Pressure Gauge
 - 1 Year Warranty on Parts (See Warranty for Details)
 - 10 Year Limited Warranty (See Warranty for Details)

OPTIONAL EQUIPMENT

- Alarm
- High & Low Gas Pressure Switches w/ Manual Reset
- Cupro-Nickel Heat Exchanger
- Low Water Cut Off, Probe Type w/ Manual Reset & Test
- Modbus Communications
- BMS Gateway - BACnet or LonWorks
- Combustible Floor Kit (CH 0402-0752)
- Stack Frame
- Low Temperature Protection Valve

SMART SYSTEM™ FEATURES

- ▶ **SMART SYSTEM™ Operating Control**
 - 2 Line/16 Character LCD Display
 - Built in Cascading Sequencer for up to 8 boilers
 - Front End Loading Capability with Crest or Knight Boilers
 - Building Management System Integration
 - with 0-10 VDC Input
 - Outdoor Reset Control with Outdoor Air Sensor
 - Password Security
 - Domestic Hot Water Prioritization
 - Low Water Flow Control & Indication
 - Inlet & Outlet Temperature Readout
 - Freeze Protection
 - Service Reminder
 - Time Clock
 - 0-10 VDC Rate Output
 - Condensing Protection
 - 0-10 VDC System Pump Speed Input
- ▶ **Data Logging**
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Ignition Attempts
 - Last 10 Lockouts
- ▶ **Programmable System Efficiency Optimizers**
 - Night Setback
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Boost Temperature & Time

FIRING CODES

- M7 Firing Code - California Code
- M9 Firing Code - Hot Surface Ignition with Electronic Supervision
- M13 Firing Code - CSD1 / Factory Mutual / GE Gap

CERTIFICATIONS

- ANSI Z21.13/CSA 4.9 certified
- South Coast Air Quality Management District
- Texas Commission on Environmental Quality

Three Pump Control

- System Pump
- Boiler Pump
- Domestic Hot Water Pump
- ▶ **High Voltage Terminal Strip**
 - 120 VAC / 60 Hertz / 1 Phase Power Supply
 - Pump Contacts with Pump Relay
- ▶ **Low Voltage Terminal Strip**
 - 24 VAC Auxiliary Device Relay Output - Louvers
 - Auxiliary Proving Switch Contacts - Louvers
 - 3-way Valve Contacts for Low Temperature Protection
 - Alarm on Any Failure Contacts
 - 0-10 VDC System Pump Speed Contacts
 - Runtime Contacts
 - DHW Thermostat Contacts
 - DHW Tank Sensor Contacts
 - Unit Enable/Disable Contacts
 - System Sensor Contacts - Supply and Return
 - Outdoor Air Sensor Contacts
 - Contacts for Air Louvers
 - Contacts on Any Failure
 - Cascade Contacts
 - 0-10 VDC BMS External Control Contact
 - 0-10 VDC Rate Contacts

Registered under U.S. Patent # 5,989,020

For Ease In Ordering By Model Number



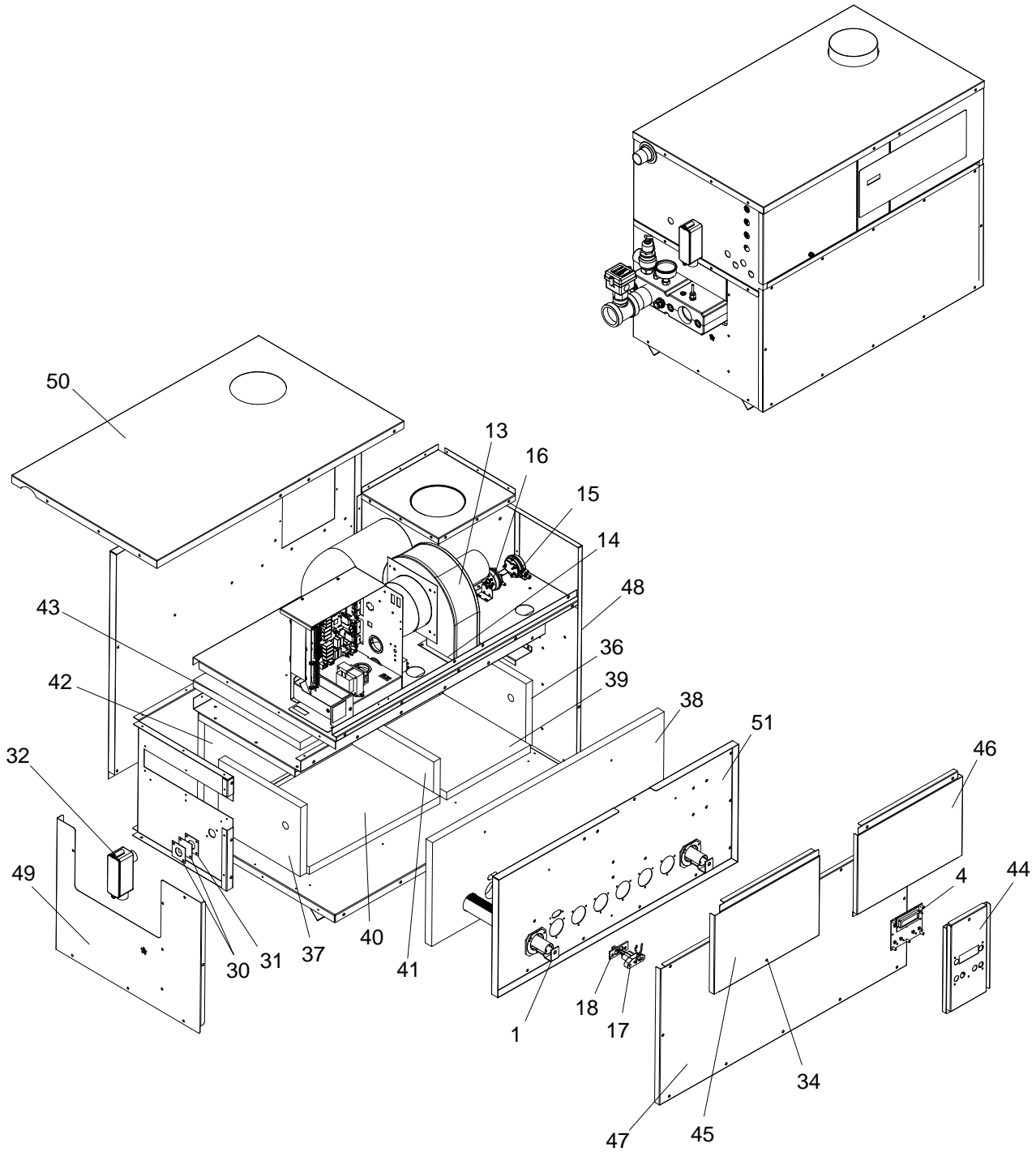
This heater is 500,000 Btu/hr natural gas Copper-Fin® II boiler. It has M9 firing controls.



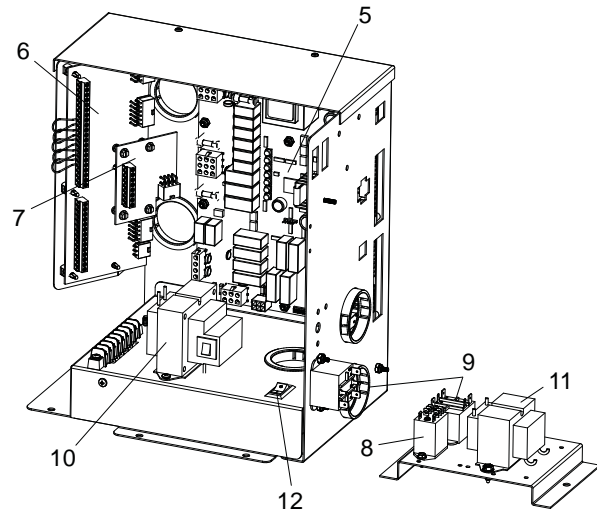


Replacement Parts List

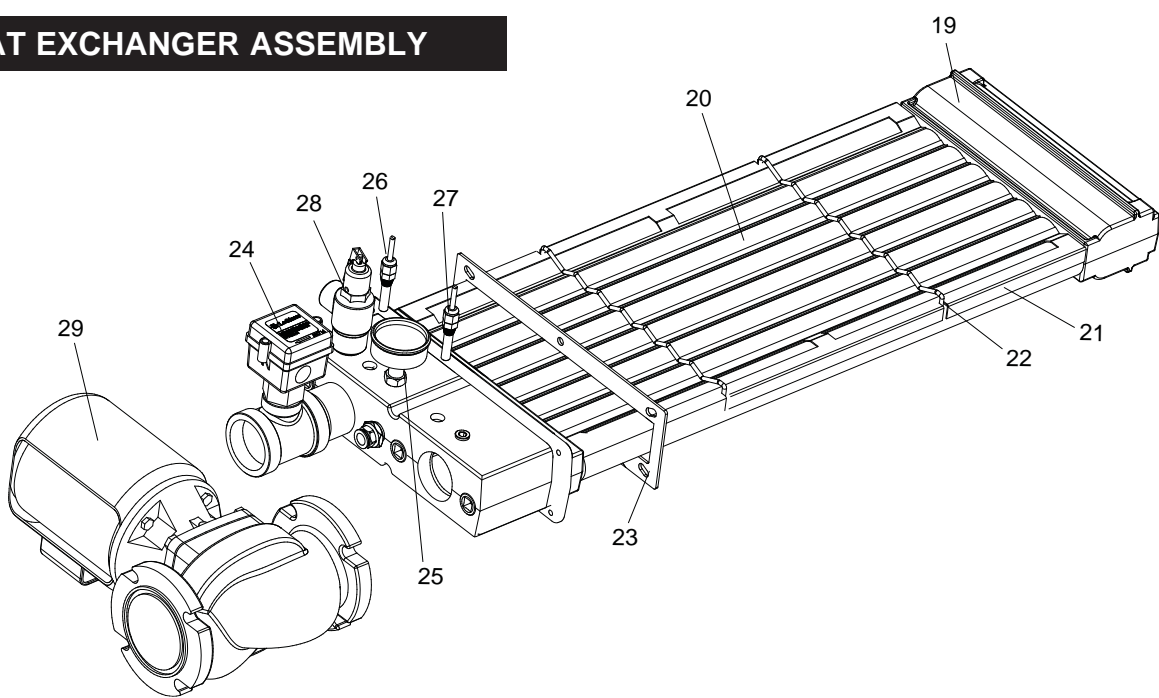
Copper-Fin II® Boilers — Water Heaters CH — CF 402 -752



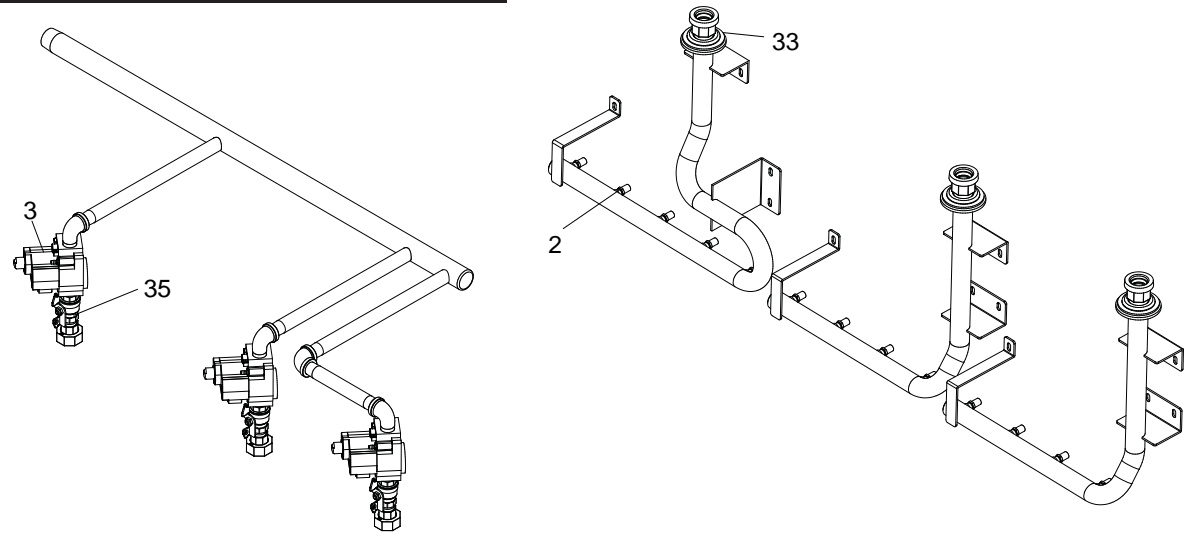
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
BURNERS			
1		Model	100135270 100135300
		402	1 ea 7 ea
	100135300 is Main Burner	502	1 ea 9 ea
	100135270 is Main Burner w/ compression fitting.	652	1 ea 12 ea
		752	1 ea 14 ea
GAS TRAIN ASSEMBLIES			
2	100208344	ORIFICE, NAT	ALL
2	100208345	ORIFICE, LP	ALL
3	100208601	GAS VALVE ASSEMBLY, NAT	ALL
3	100208608	GAS VALVE ASSEMBLY, LP	ALL
CONTROLS & GAUGES			
4	100208468	USER INTERFACE CONTROL	ALL
5	100208469	BOARD, MAIN CONTROL	ALL
6	100208475	BOARD, CONNECTOR	ALL
7	100167583	BOARD, SENSOR	CH
8	100208490	RELAY, DPDT	ALL
9	100208509	RELAY, 120VAC, 60HZ, 10.8 AMP	ALL
10	100208246	TRANSFORMER, 24V, 60VA	ALL
11	100208249	TRANSFORMER, 50VA	402 & 502
11	100208246	TRANSFORMER, 24V, 60VA	652 & 752
12	100208242	SWITCH, ON/OFF	ALL
13	100233485	FAN	ALL
14	100233678	GASKET, FAN	ALL
15	100166118	AIR PRESSURE SWITCH	ALL
16	100208384	AIR PRESSURE SWITCH	ALL
17	100165937	HOT SURFACE IGNITOR	ALL
18	100208087	GASKET, IGNITOR	ALL
HEAT EXCHANGER			
19	100147343	HEAT EXCHANGER, H	CH 402
19	100147344	HEAT EXCHANGER, H	CH 502
19	100147347	HEAT EXCHANGER, H	CH 652
19	100147349	HEAT EXCHANGER, H	CH 752
19	100147342	HEAT EXCHANGER, HLW	CF 402
19	100147346	HEAT EXCHANGER, HLW	CF 502
19	100147348	HEAT EXCHANGER, HLW	CF 652
19	100147350	HEAT EXCHANGER, HLW	CF 752
20	100151231	V-BAFFLE (5 REQ.)	402
20	100151232	V-BAFFLE (5 REQ.)	502
20	100151233	V-BAFFLE (5 REQ.)	652
20	100151234	V-BAFFLE (5 REQ.)	752
21	100151524	V-BAFFLE FRAME RUNNER (2 REQ.)	402
21	100151525	V-BAFFLE FRAME RUNNER (2 REQ.)	502
21	100151526	V-BAFFLE FRAME RUNNER (2 REQ.)	652
21	100151527	V-BAFFLE FRAME RUNNER (2 REQ.)	752
22	100163183	V-BAFFLE RETAINER (2 REQ.)	ALL
23	100208106	GASKET, HEAT SHIELD	ALL
24	100232493	FLOW SWITCH, OUTDOOR	ALL
24	100208653	FLOW SWITCH, INDOOR	ALL
25	100208152	GAUGE, TEMPERATURE & PRESSURE	ALL CH
26	100208559	SENSOR, DUAL IMMERSION, OUTLET	ALL
27	100208553	SENSOR, IMMERSION, INLET	ALL
28	100208443	RELIEF VALVE, TEMPERATURE & PRESSURE	CF 402
28	100208446	RELIEF VALVE, TEMPERATURE & PRESSURE	CF 502 - 752
28	100208442	RELIEF VALVE, PRESSURE ONLY	ALL CH
PUMP			
29	100133610	PUMP FOR COPPER-FIN II CF WATER HEATER	CF
29	100133612	PUMP FOR COPPER-FIN II CH BOILER	CH
MISCELLANEOUS			
30	100163259	SIGHT GLASS KIT	ALL
31	100233729	GASKET, SIGHT GLASS	ALL
32	100162714	CONDUIT BODY	ALL
33	100208097	GASKET, ESCUTCHEON, 3/4"	ALL
34	100162999	SCREW, KNURLED HEAD	ALL

PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS

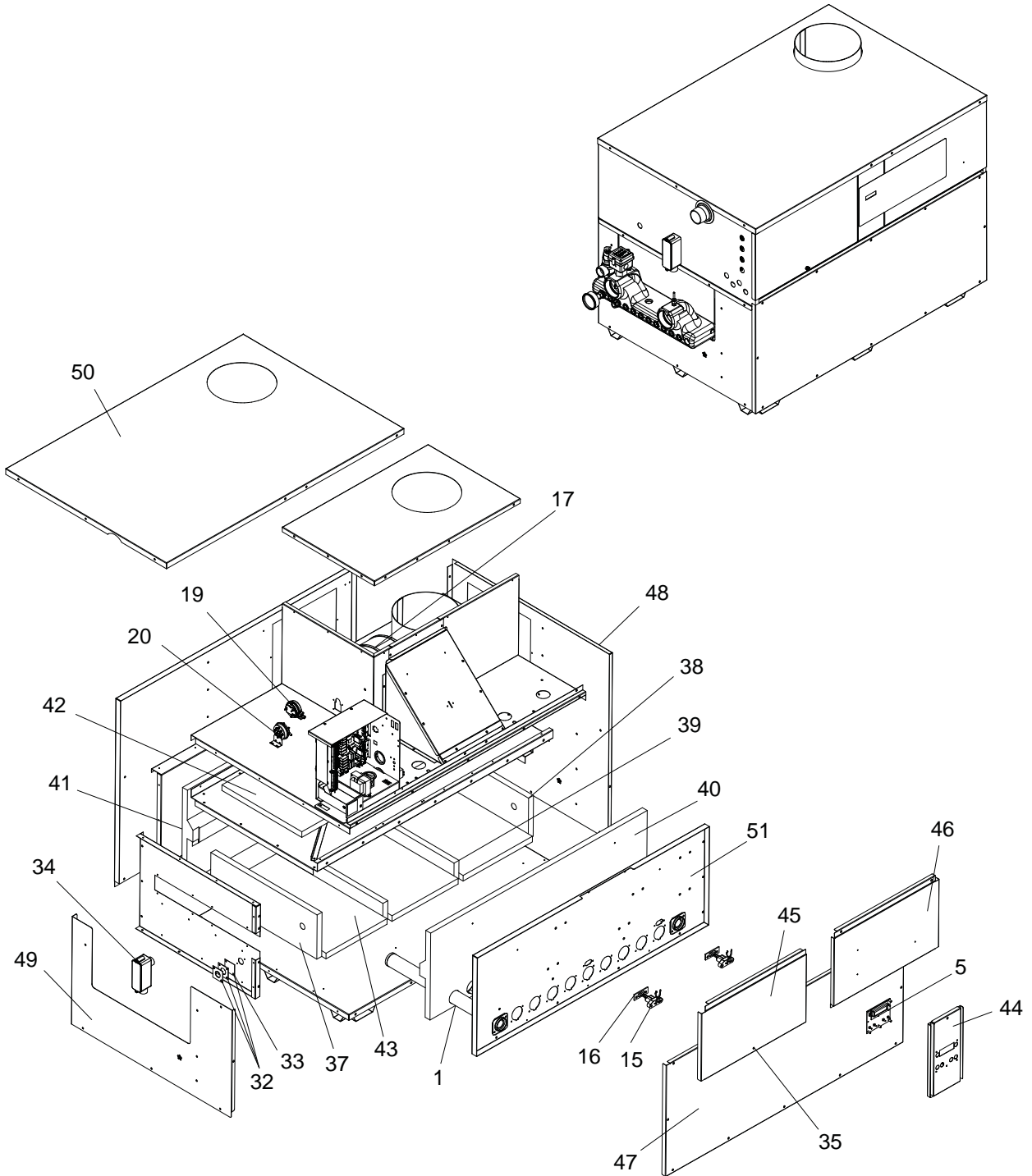
NOTE: CH = BOILER, CF = WATER HEATER

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
MISCELLANEOUS CONTINUED			
35	100171800	VALVE, BALL	CH 502 - 752
-	100233577	FILTER	ALL
-	100146604	GASKET, STRIP	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100146461	GASKET, ESCUTCHEON,1 1/4"	ALL
-	100233587	GASKET, BURNER	ALL
-	100146588	GASKET, PVC 1/4 X 5/8 X 25'	ALL
-	100162892	TEE, 3/16" HOSE MENDER, NYLON	ALL
-	100208319	CAP, 3/16" TEE FITTING, SILICONE	ALL
-	100208572	TUBING, GRAY 3/16" X 5/16"	ALL
-	100208573	TUBING, ALUMINUM, 1/8"	ALL
LOCH-HEAT TILE			
36	100233555	LOCH-HEAT TILE, FRONT HEAD SIDE	ALL
37	100145466	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
38	100145467	LOCH-HEAT TILE, FRONT DOOR	402
38	100145468	LOCH-HEAT TILE, FRONT DOOR	502
38	100145399	LOCH-HEAT TILE, FRONT DOOR	652
38	100145400	LOCH-HEAT TILE, FRONT DOOR	752
39	100145693	LOCH-HEAT TILE, RIGHT BOTTOM	402
39	100145694	LOCH-HEAT TILE, RIGHT BOTTOM	502
39	100145695	LOCH-HEAT TILE, RIGHT BOTTOM	652
39	100233571	LOCH-HEAT TILE, RIGHT BOTTOM	752
-	100145369	LOCH-HEAT TILE, MIDDLE BOTTOM	652
-	100145697	LOCH-HEAT TILE, MIDDLE BOTTOM	752
40	100145692	LOCH-HEAT TILE, LEFT BOTTOM	402
40	100145694	LOCH-HEAT TILE, LEFT BOTTOM	502
40	100145368	LOCH-HEAT TILE, LEFT BOTTOM	652
40	100233571	LOCH-HEAT TILE, LEFT BOTTOM	752
41	100233575	LOCH-HEAT TILE, DIVIDER	ALL
42	100145612	LOCH-HEAT TILE, BACK	402
42	100145613	LOCH-HEAT TILE, BACK	502
42	100145614	LOCH-HEAT TILE, BACK	652
42	100145615	LOCH-HEAT TILE, BACK	752
43	100145674	INSULATION PAD, TOP	402
43	100145675	INSULATION PAD, TOP	502
43	100145676	INSULATION PAD, TOP	652
43	100145677	INSULATION PAD, TOP	752
JACKET ASSEMBLIES			
44	100151255	JACKET, OUTER FRONT UPPER MIDDLE	ALL
45	100151490	JACKET, OUTER FRONT UPPER LEFT	402 & 502
45	100151492	JACKET, OUTER FRONT UPPER LEFT	652 & 752
46	100151256	JACKET, OUTER FRONT UPPER RIGHT	402
46	100151258	JACKET, OUTER FRONT UPPER RIGHT	502
46	100151259	JACKET, OUTER FRONT UPPER RIGHT	652
46	100151260	JACKET, OUTER FRONT UPPER RIGHT	752
47	100151481	JACKET, OUTER FRONT LOWER	402
47	100151482	JACKET, OUTER FRONT LOWER	502
47	100151483	JACKET, OUTER FRONT LOWER	652
47	100151484	JACKET, OUTER FRONT LOWER	752
48	100151474	JACKET, OUTER REAR HEAD	402 & 502
48	100151496	JACKET, OUTER REAR HEAD	652 & 752
49	100151472	JACKET, OUTER LEFT LOWER HEAD	ALL
50	100151476	JACKET, OUTER TOP	402
50	100151477	JACKET, OUTER TOP	502
50	100151478	JACKET, OUTER TOP	652
50	100151479	JACKET, OUTER TOP	752
51	100151261	DOOR, COMBUSTION CHAMBER	402
51	100151262	DOOR, COMBUSTION CHAMBER	502
51	100151263	DOOR, COMBUSTION CHAMBER	652
51	100151264	DOOR, COMBUSTION CHAMBER	752
PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS			
NOTE: CH = BOILER, CF = WATER HEATER			

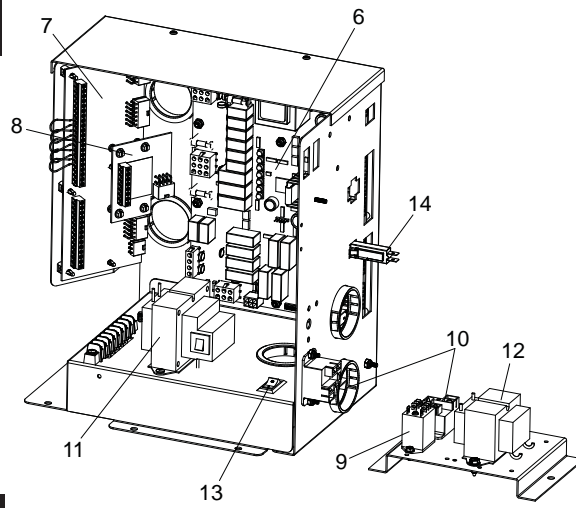


Replacement Parts List

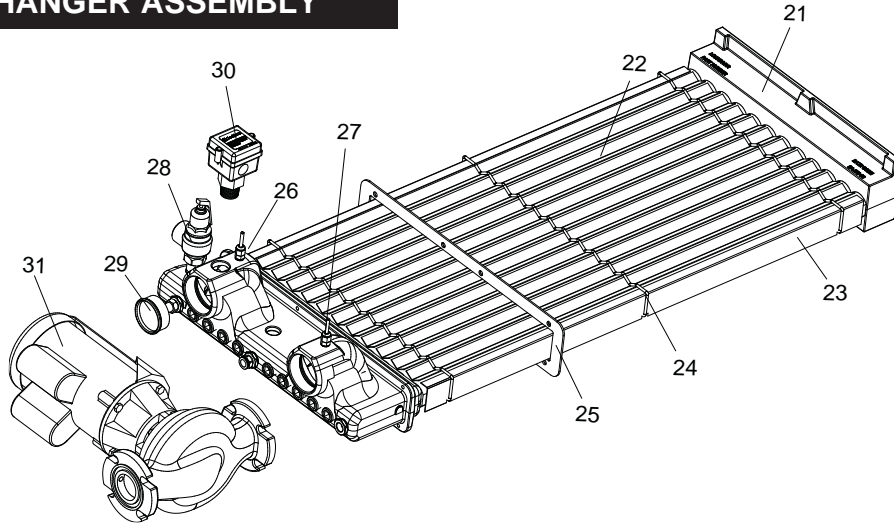
Copper-Fin II® Boilers — Water Heaters CH — CF 992 -2072



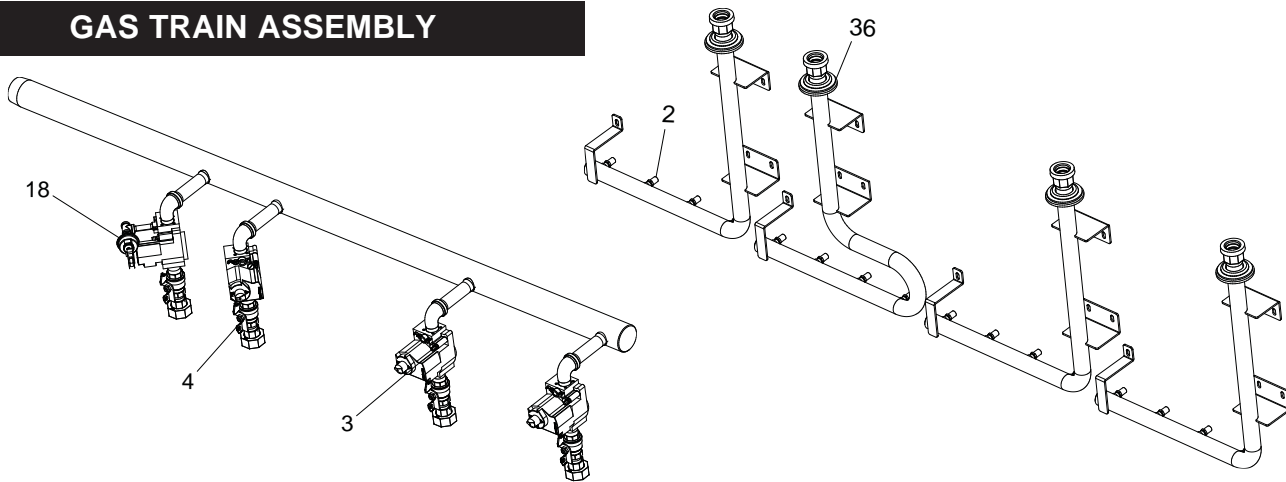
CONTROL PANEL ASSEMBLY



HEAT EXCHANGER ASSEMBLY



GAS TRAIN ASSEMBLY



ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
BURNERS			
1	Model	100135304	100135312
	992	10 ea	1 ea
100135304 is Main Burner	1262	13 ea	1 ea
	1442	15 ea	1 ea
100135312 is Main Burner w/ compression fitting.	1802	19 ea	1 ea
	2072	22 ea	1 ea
GAS TRAIN ASSEMBLIES			
2	100208343	ORIFICE, NAT	ALL
2	100208342	ORIFICE, LP	ALL
3	100208604	GAS VALVE, NAT	ALL
3	100208608	GAS VALVE, LP	ALL
4	100171800	BALL VALVE	CH

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
CONTROLS & GAUGES			
5	100208468	USER INTERFACE CONTROL	ALL
6	100208469	BOARD, MAIN CONTROL	ALL
7	100208475	BOARD, CONNECTOR	ALL
8	100167583	BOARD, SENSOR	CH
9	100208490	RELAY, DPDT	ALL
10	100208509	RELAY, 120VAC, 60HZ, 10.8AMP	ALL
11	100208246	TRANSFORMER, 24V, 60VA	ALL
12	100208246	TRANSFORMER, 24V, 60VA	992
12	100208251	TRANSFORMER, 120V TO 24V, 75VA	1262 & 1442
12	100170188	TRANSFORMER, 120V, 50/60 HZ	1802 & 2072
13	100208242	SWITCH, ON / OFF	ALL
14	100163042	CIRCUIT BREAKER, 5 AMP	1802 & 2072
15	100165937	HOT SURFACE IGNITOR	ALL
16	100208087	GASKET, IGNITOR	ALL
17	100233485	FAN ASSEMBLY	992 - 1442
17	100144904	FAN ASSEMBLY	1802 & 2072
18	100208389	PRESSURE SWITCH, GAS, NAT ONLY	ALL
19	100166117	PRESSURE SWITCH	992
19	100166118	PRESSURE SWITCH	1262
19	100166119	PRESSURE SWITCH	1442
19	100166120	PRESSURE SWITCH	1802
19	100166121	PRESSURE SWITCH	2072
20	100208384	PRESSURE SWITCH	ALL
HEAT EXCHANGERS			
21	100147311	HEAT EXCHANGER, HLW	CF992
21	100147313	HEAT EXCHANGER, HLW	CF1262
21	100147314	HEAT EXCHANGER, HLW	CF1442
21	100147315	HEAT EXCHANGER, HLW	CF1802
21	100147316	HEAT EXCHANGER, HLW	CF2072
21	100147317	HEAT EXCHANGER, H	CH992
21	100147318	HEAT EXCHANGER, H	CH1262
21	100147319	HEAT EXCHANGER, H	CH1442
21	100147320	HEAT EXCHANGER, H	CH1802
21	100147321	HEAT EXCHANGER, H	CH2072
22	100152280	V-BAFFLE (11 REQ.)	992
22	100152281	V-BAFFLE (11 REQ.)	1262
22	100152282	V-BAFFLE (11 REQ.)	1442
22	100152283	V-BAFFLE (11 REQ.)	1802
22	100152284	V-BAFFLE (11 REQ.)	2072
23	100152598	FRAME RUNNER (2 REQ.)	992
23	100152599	FRAME RUNNER (2 REQ.)	1262
23	100152600	FRAME RUNNER (2 REQ.)	1442
23	100152601	FRAME RUNNER (2 REQ.)	1802
23	100152602	FRAME RUNNER (2 REQ.)	2072
24	100208313	RETAINER V-BAFFLE (3 REQ.)	ALL
25	100233660	GASKET, FRONT HEADER	ALL
26	100208559	SENSOR, DUAL IMMERSION, OUTLET	ALL
27	100208553	SENSOR, IMMERSION, INLET	ALL
28	100208442	RELIEF VALVE, PRESSURE ONLY	CH
28	100208446	RELIEF VALVE, TEMPERATURE & PRESSURE	CF
29	100208152	GAUGE, TEMPERATURE & PRESSURE	CH
30	100232493	FLOW SWITCH, OUTDOOR	ALL
30	100208653	FLOW SWITCH, INDOOR	ALL
PUMPS			
31	100133601	PUMP FOR COPPER-FIN II CF WATER HEATER	CF
31	100133603	PUMP FOR COPPER-FIN II CH BOILER	CH
MISCELLANEOUS			
32	100163259	SIGHT GLASS AND GASKET KIT	ALL
33	100233729	GASKET, SIGHT GLASS	ALL
34	100162714	CONDUIT COVER	ALL
35	100162999	SCREW, KNURLED HEAD	ALL
36	100208097	GASKET, ESCUTCHEON, 3/4"	ALL
-	100208231	FUSE, 3.15 AMP	ALL
-	100208232	FUSE, 5 AMP	ALL
-	100146455	GASKET, ESCUTCHEON, 2"	ALL
-	100146604	GASKET, STRIP 45"	ALL
-	100208572	TUBING, GRAY, 3/16" X 5/16"	ALL
-	100208573	TUBING, ALUMINUM, 1/8"	ALL
-	100208063	FILTER	ALL
-	100233587	GASKET, BURNER	ALL
-	100146588	GASKET, BLACK PVC, 1/4 X 5/8 X 25'	ALL
-	100170644	KIT, TANK SENSOR	CF

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS
NOTE: CH = BOILER, CF= WATER HEATER

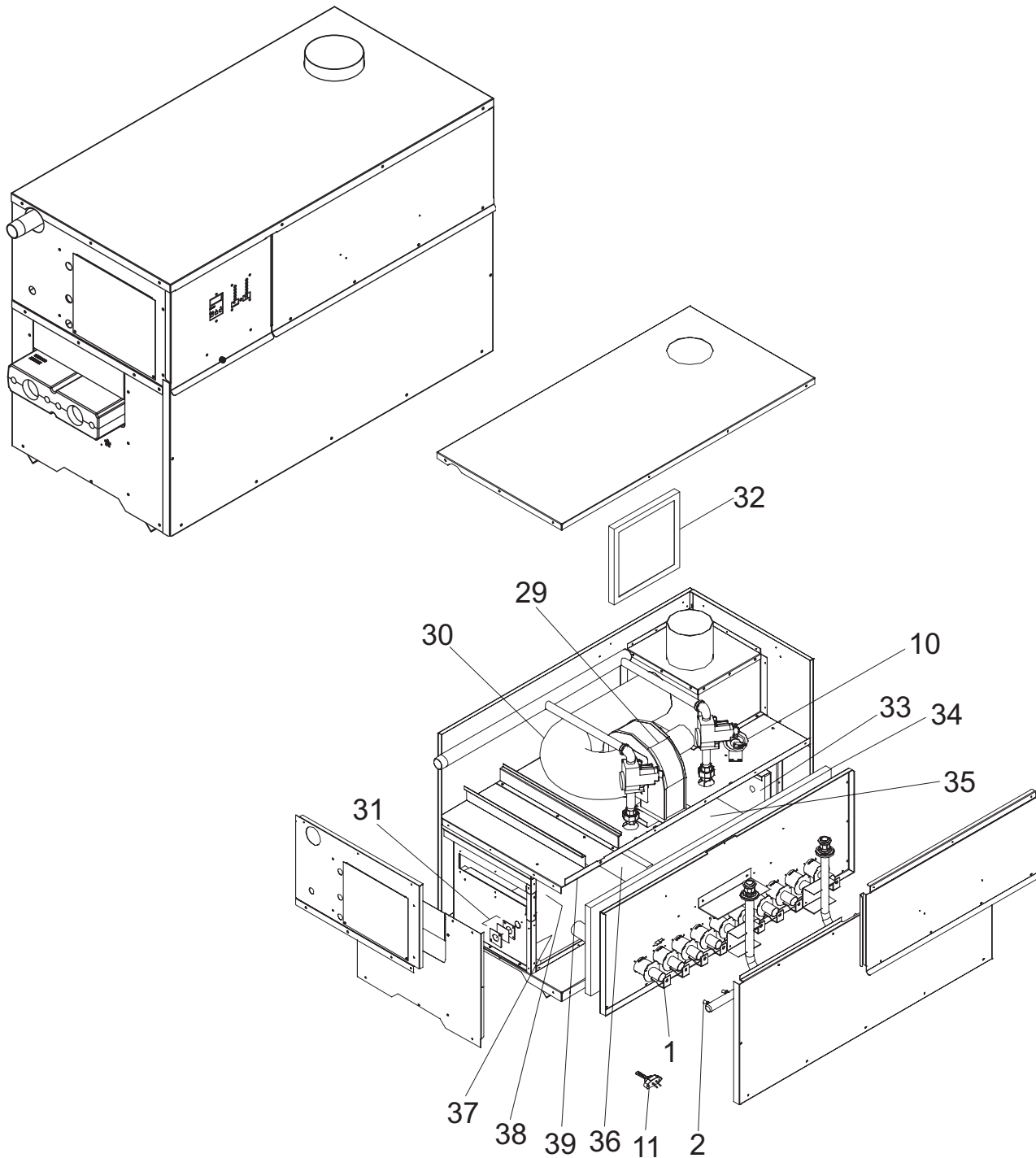
ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
MISCELLANEOUS CONTINUED			
-	100170645	KIT, SYSTEM SENSOR	CH
-	100162892	TEE, 3/16" HOSE MENDER, NYLON	ALL
-	100208319	CAP, 3/16" TEE FITTING, SILICONE	ALL
-	100208552	SENSOR, SYSTEM/TANK	ALL
-	100233695	BULBWELL	ALL
-	100173747	LOW WATER CUT-OFF, MANUAL RESET, (OPTIONAL)	ALL
-	100173748	LOW WATER CUT-OFF, AUTO RESET, (OPTIONAL)	ALL
-	100208662	LOW WATER CUT-OFF PROBE, (OPTIONAL)	ALL
-	100173640	LOW WATER CUT-OFF BOOT, (OPTIONAL)	ALL
LOCH-HEAT TILE			
37	100145343	LOCH-HEAT TILE, FRONT HEAD SIDE	ALL
38	100145344	LOCH-HEAT TILE, REAR HEAD SIDE	ALL
39	100145346	LOCH-HEAT TILE, DIVIDER	ALL
40	100145351	LOCH-HEAT TILE, FRONT DOOR	992
40	100145352	LOCH-HEAT TILE, FRONT DOOR	1262
40	100145353	LOCH-HEAT TILE, FRONT DOOR LEFT	1442
40	100145354	LOCH-HEAT TILE, FRONT DOOR RIGHT	1442
40	100145401	LOCH-HEAT TILE, FRONT DOOR LEFT	1802
40	100145356	LOCH-HEAT TILE, FRONT DOOR RIGHT	1802
40	100145357	LOCH-HEAT TILE, FRONT DOOR LEFT	2072
40	100145358	LOCH-HEAT TILE, FRONT DOOR RIGHT	2072
41	100145337	LOCH-HEAT TILE, BACK	992
41	100145338	LOCH-HEAT TILE, BACK	1262
41	100145339	LOCH-HEAT TILE, BACK LEFT	1442
41	100145340	LOCH-HEAT TILE, BACK LEFT	1802
41	100145341	LOCH-HEAT TILE, BACK LEFT	2072
41	100145342	LOCH-HEAT TILE, BACK RIGHT	1442 - 2072
42	100145312	INSULATION PAD, TOP	992
42	100145314	INSULATION PAD, TOP	1262
42	100145568	INSULATION PAD, TOP	1442
42	100145316	INSULATION PAD, TOP	1802
42	100145570	INSULATION PAD, TOP	2072
43	100145345	LOCH-HEAT TILE, LEFT BOTTOM	992
43	100145347	LOCH-HEAT TILE, MIDDLE BOTTOM	992
43	100145348	LOCH-HEAT TILE, RIGHT BOTTOM	992
43	100145349	LOCH-HEAT TILE, LEFT BOTTOM	1262
43	100145347	LOCH-HEAT TILE, MIDDLE BOTTOM (2)	1262
43	100145350	LOCH-HEAT TILE, RIGHT BOTTOM	1262
43	100145361	LOCH-HEAT TILE, LEFT BOTTOM	1442
43	100145347	LOCH-HEAT TILE, MIDDLE BOTTOM (2)	1442
43	100145362	LOCH-HEAT TILE, RIGHT BOTTOM	1442
43	100145363	LOCH-HEAT TILE, LEFT BOTTOM	1802
43	100145347	LOCH-HEAT TILE, MIDDLE BOTTOM (3)	1802
43	100145364	LOCH-HEAT TILE, RIGHT BOTTOM	1802
43	100145365	LOCH-HEAT TILE, LEFT BOTTOM	2072
43	100145347	LOCH-HEAT TILE, MIDDLE BOTTOM (3)	2072
43	100145366	LOCH-HEAT TILE, MIDDLE BOTTOM (1)	2072
43	100145367	LOCH-HEAT TILE, RIGHT BOTTOM	2072
JACKET ASSEMBLIES			
44	100152307	JACKET, OUTER FRONT UPPER MIDDLE	ALL
45	100152572	JACKET, OUTER FRONT UPPER LEFT	ALL
46	100152308	JACKET, OUTER FRONT UPPER RIGHT	992
46	100152309	JACKET, OUTER FRONT UPPER RIGHT	1262
46	100152310	JACKET, OUTER FRONT UPPER RIGHT	1442
46	100152311	JACKET, OUTER FRONT UPPER RIGHT	1802
46	100152312	JACKET, OUTER FRONT UPPER RIGHT	2072
47	100152560	JACKET, OUTER FRONT LOWER	992
47	100152561	JACKET, OUTER FRONT LOWER	1262
47	100152562	JACKET, OUTER FRONT LOWER	1442
47	100152563	JACKET, OUTER FRONT LOWER	1802
47	100152564	JACKET, OUTER FRONT LOWER	2072
48	100152553	JACKET, OUTER REAR HEAD	ALL
49	100152550	JACKET, OUTER LEFT LOWER HEAD	ALL
50	100152555	JACKET, OUTER TOP	992
50	100152556	JACKET, OUTER TOP	1262
50	100152557	JACKET, OUTER TOP	1442
50	100152558	JACKET, OUTER TOP	1802
50	100152559	JACKET, OUTER TOP	2072
51	100152313	DOOR, COMBUSTION CHAMBER	992
51	100152314	DOOR, COMBUSTION CHAMBER	1262
51	100152315	DOOR, COMBUSTION CHAMBER	1142
51	100152316	DOOR, COMBUSTION CHAMBER	1802
51	100152317	DOOR, COMBUSTION CHAMBER	2072

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS
NOTE: CH = BOILER. CF = WATER HEATER

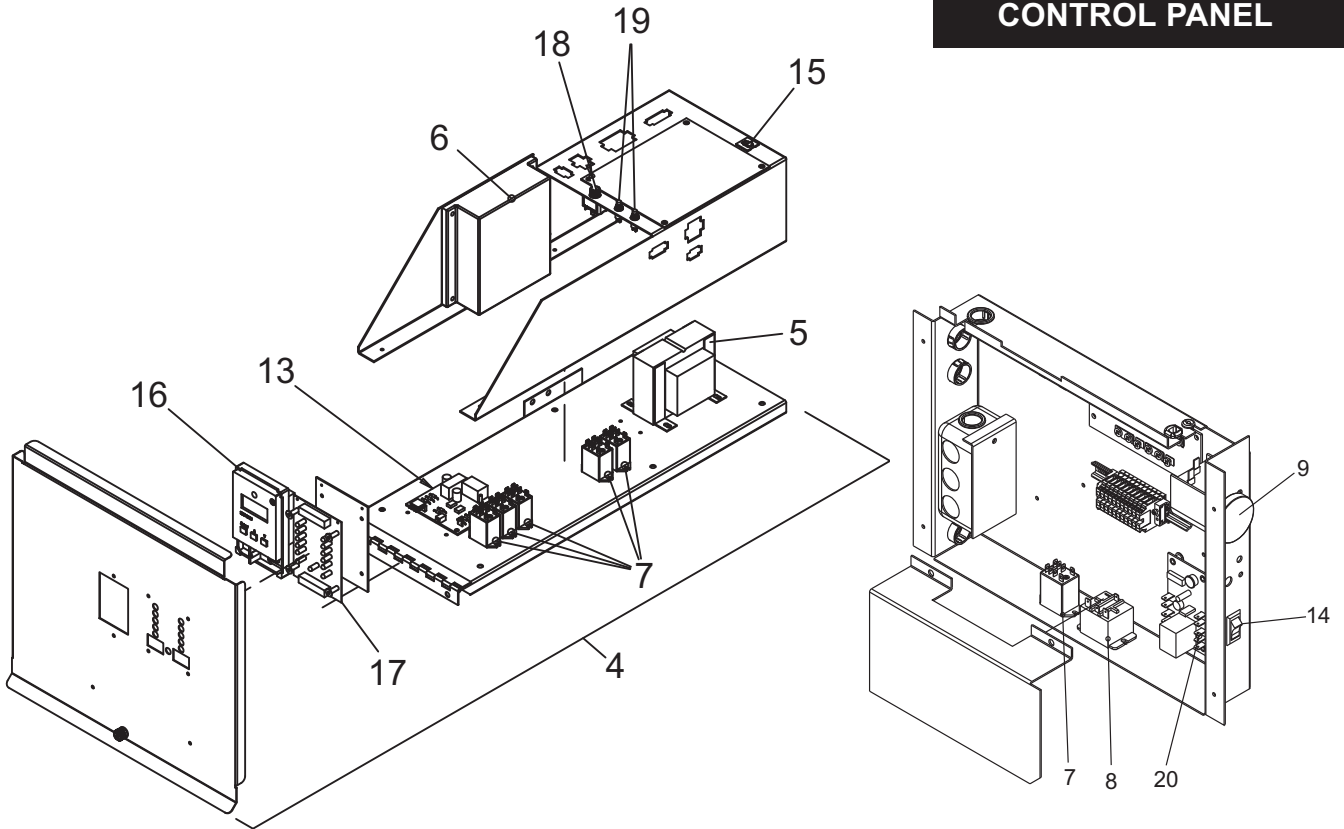


Replacement Parts List

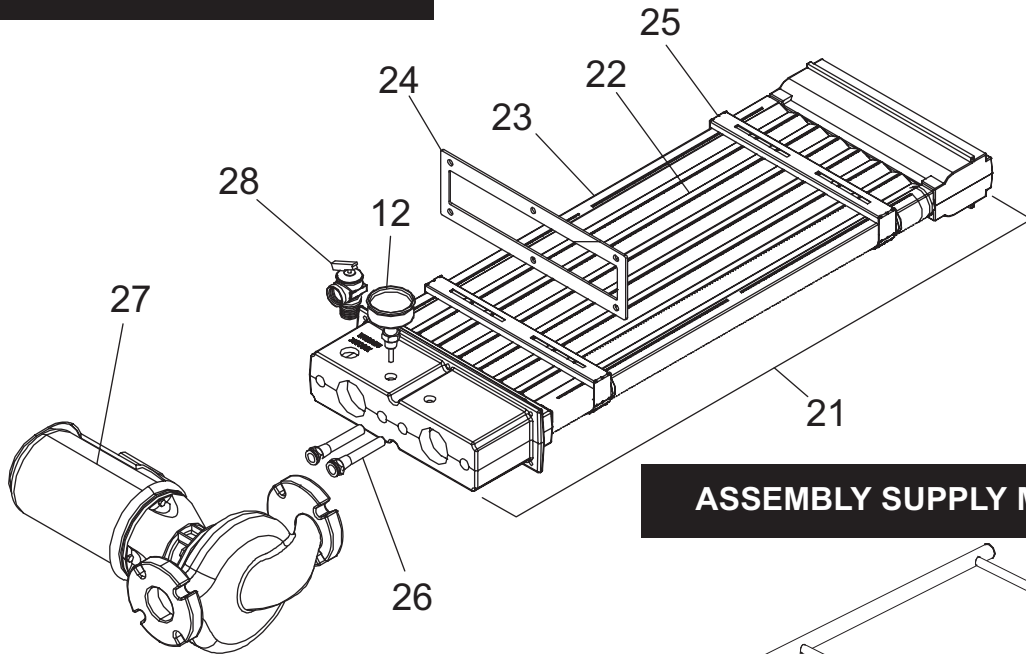
**Copper-Fin II®
Boilers/Water Heaters
CH/CF 401-751
After serial # L03H00160759**



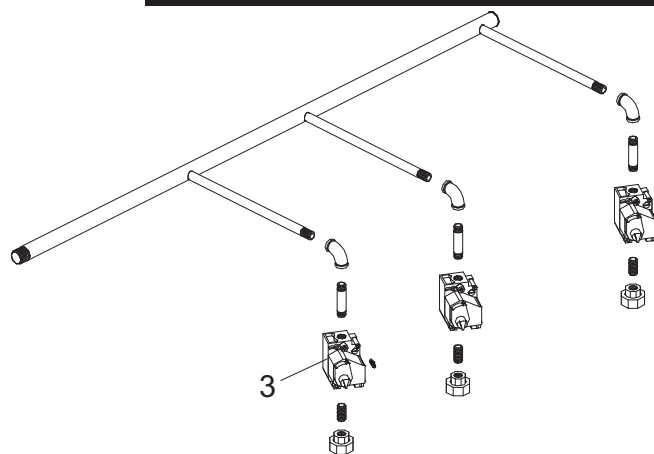
CONTROL PANEL



HEAT EXCHANGER ASSEMBLY



ASSEMBLY SUPPLY MANIFOLD



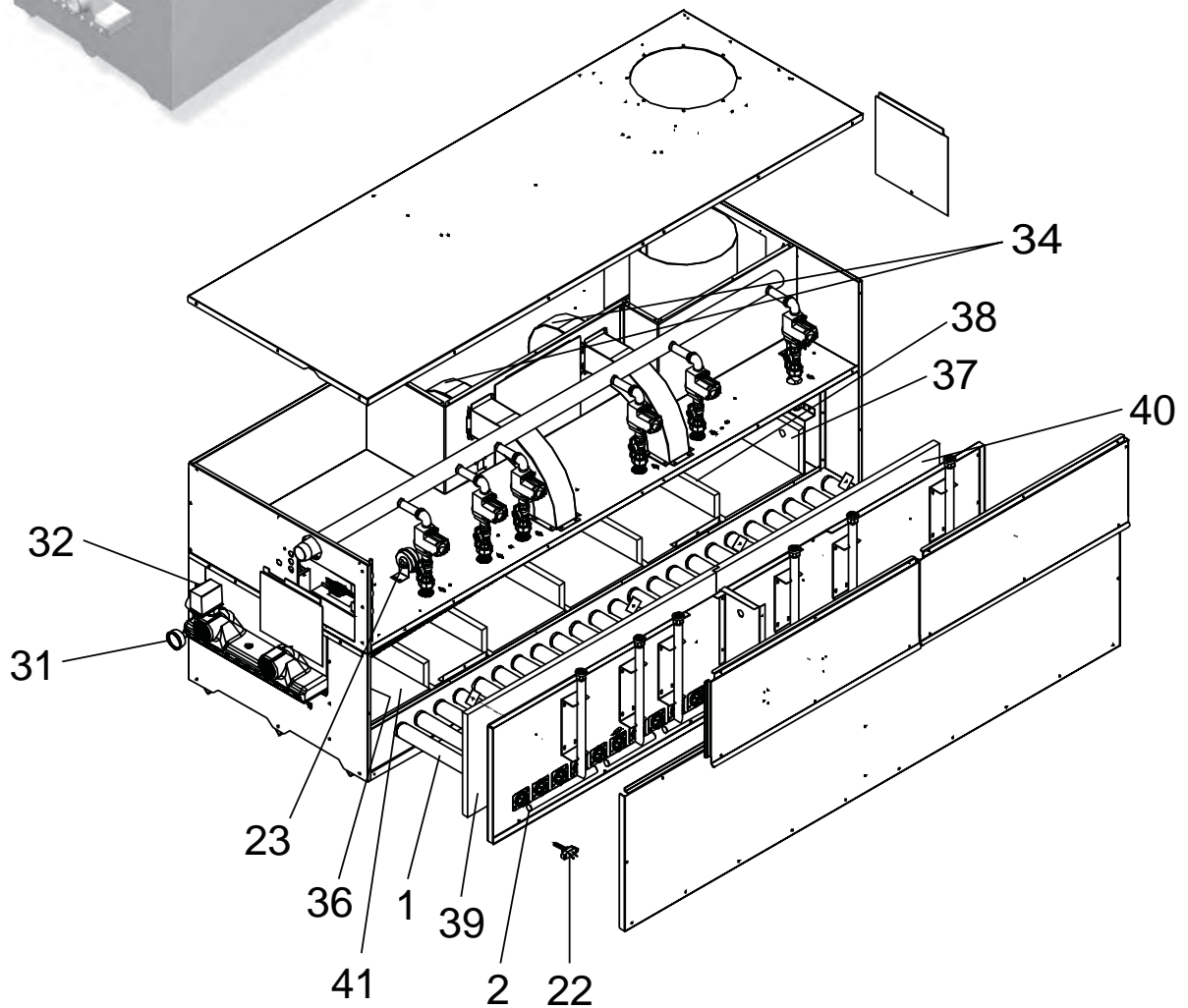
ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.															
BURNERS																		
1	BNR3417 IS MAIN BURNER. BNR3416 IS MAIN BURNER W//BARB PRESSURE TAP.																	
		<table border="1"> <thead> <tr> <th>Model</th> <th>BNR3416</th> <th>BNR3417</th> </tr> </thead> <tbody> <tr> <td>401</td> <td>1 ea</td> <td>7 ea</td> </tr> <tr> <td>501</td> <td>1 ea</td> <td>9 ea</td> </tr> <tr> <td>651</td> <td>1 ea</td> <td>12 ea</td> </tr> <tr> <td>751</td> <td>1 ea</td> <td>14 ea</td> </tr> </tbody> </table>	Model	BNR3416	BNR3417	401	1 ea	7 ea	501	1 ea	9 ea	651	1 ea	12 ea	751	1 ea	14 ea	
Model	BNR3416	BNR3417																
401	1 ea	7 ea																
501	1 ea	9 ea																
651	1 ea	12 ea																
751	1 ea	14 ea																
GAS TRAIN ASSEMBLIES																		
2	ORF2050	NATURAL GAS ORIFICE	ALL															
2	ORF2051	LP GAS ORIFICE	ALL															
3	VAL2412	NATURAL GAS VALVE ASSEMBLY	ALL															
3	VAL2413	LP GAS VALVE ASSEMBLY	ALL															
CONTROLS & GAUGES																		
4	PAN3014	COMPLETE CONTROL PANEL	401-501															
4	PAN3016	COMPLETE CONTROL PANEL	651-751															
5	TRF2010	120V/24V TRANSFORMER 100 VA	ALL															
6	RLY2402	IGNITION MODULE	ALL															
7	RLY2903	24V RELAY	ALL															
8	RLY2708	RELAY 24VAC	ALL															
9	HLC2702	HIGH LIMIT-MR	ALL															
10	PRS2421	AIR PRESSURE SWITCH BEFORE SERIAL # A04	ALL															
10	PRS2424	AIR PRESSURE SWITCH BEGINNING SERIAL # A04	ALL															
11	PLT3400	HOT SURFACE IGNITOR	ALL															
12	GTP2900	TEMPERATURE AND PRESSURE GAUGE	ALL CH															
13	WTR2530	LOW WATER CUTOFF, MANUAL RESET (OPTIONAL) PRIOR TO H08H00211366	ALL															
13	WTR30000	LOW WATER CUTOFF, MANUAL RESET (OPTIONAL) BEGINNING H08H00211366	ALL															
13	WTR2528	LOW WATER CUTOFF, AUTO RESET (OPTIONAL) PRIOR TO H08H00211366	ALL															
13	WTR30001	LOW WATER CUTOFF, AUTO RESET (OPTIONAL) BEGINNING H08H00211366	ALL															
-	WTR2532	LOW WATER CUTOFF PROBE (OPTIONAL) PRIOR TO H08H00211366	ALL															
-	WTR2222	LOW WATER CUTOFF PROBE (OPTIONAL) BEGINNING H08H00211366	ALL															
-	WTR2533	LOW WATER CUTOFF BOOT (OPTIONAL) PRIOR TO H08H00211366	ALL															
-	WTR20000	LOW WATER CUTOFF BOOT (OPTIONAL) BEGINNING H08H00211366	ALL															
14	SWT2006	SWITCH, ON/OFF	ALL															
15	MSC2465	CIRCUIT BREAKER 5 AMP	ALL															
16	RLY2082	ELECTRONIC TEMPERATURE CONTROL BEGINNING SERIAL # A05H00173023	401-501															
16	RLY2083	ELECTRONIC TEMPERATURE CONTROL BEGINNING SERIAL # A05H00173023	651-751															
16	RLY2046	ELECTRONIC TEMPERATURE CONTROL BEFORE SERIAL # A05H00173023	ALL															
17	RLY2044	DISPLAY BOARD	ALL															
-	TST2313	TEMPERATURE SENSOR, INLET/OUTLET - NOT SHOWN	ALL															
18	MSC2507	SWITCH -PILOT	OPT															
19	MSC2702	MOMENT SWITCH	ALL															
20	RLY2714	ADJUSTABLE RELAY	OPT															
HEAT EXCHANGER																		
21	HEX3011	HEAT EXCHANGER (CF AFTER SERIAL F00)	CF401															
21	HEX3012	HEAT EXCHANGER (CF AFTER SERIAL F00)	CF501															
21	HEX3013	HEAT EXCHANGER (CF AFTER SERIAL F00)	CF651															
21	HEX3014	HEAT EXCHANGER (CF AFTER SERIAL F00)	CF751															
21	HEX3016	HEAT EXCHANGER CUPRO NICKEL (CF AFTER SERIAL F00)	CF401															
21	HEX3017	HEAT EXCHANGER CUPRO NICKEL (CF AFTER SERIAL F00)	CF501															
21	HEX3018	HEAT EXCHANGER CUPRO NICKEL (CF AFTER SERIAL F00)	CF651															
21	HEX3019	HEAT EXCHANGER CUPRO NICKEL (CF AFTER SERIAL F00)	CF751															
21	HEX3401	HEAT EXCHANGER (CF BEFORE SERIAL F00 & ALL CH)	CF/CH401															
21	HEX3402	HEAT EXCHANGER (CF BEFORE SERIAL F00 & ALL CH)	CF/CH501															
21	HEX3403	HEAT EXCHANGER (CF BEFORE SERIAL F00 & ALL CH)	CF/CH651															
21	HEX3404	HEAT EXCHANGER (CF BEFORE SERIAL F00 & ALL CH)	CF/CH751															
21	HEX3441	HEAT EXCHANGER CUPRO NICKEL (CF BEFORE SERIAL F00 & ALL CH)	CF/CH401															
21	HEX3442	HEAT EXCHANGER CUPRO NICKEL (CF BEFORE SERIAL F00 & ALL CH)	CF/CH501															
21	HEX3443	HEAT EXCHANGER CUPRO NICKEL (CF BEFORE SERIAL F00 & ALL CH)	CF/CH651															
21	HEX3444	HEAT EXCHANGER CUPRO NICKEL (CF BEFORE SERIAL F00 & ALL CH)	CF/CH751															
NOTE: CH = BOILER, CF = WATER HEATER PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.																		

ITEM NO.	PART NO.	DESCRIPTION	MODEL NO.
HEAT EXCHANGER (Continued)			
22	JKD2251	V-BAFFLE (5 REQUIRED)	401
22	JKD2252	V-BAFFLE (5 REQUIRED)	501
22	JKD2253	V-BAFFLE (5 REQUIRED)	651
22	JKD2254	V-BAFFLE (5 REQUIRED)	751
23	JKD6449	V-BAFFLE FRAME RUNNER (2 REQUIRED)	401
23	JKD6450	V-BAFFLE FRAME RUNNER (2 REQUIRED)	501
23	JKD6451	V-BAFFLE FRAME RUNNER (2 REQUIRED)	651
23	JKD6452	V-BAFFLE FRAME RUNNER (2 REQUIRED)	751
24	GKT2400	HEATSHIELD GASKET	ALL
25	JKD6186	V-BAFFLE FRAME END	ALL
MISCELLANEOUS			
26	TST2305	THERMOSTAT BULB WELL	ALL
27	ARM3044PAB	PUMP COMPLETE	CF
28	RLV2006	TEMPERATURE & PRESSURE RELIEF VALVE	401 ONLY
28	RLV2007	TEMPERATURE & PRESSURE RELIEF VALVE	501-751
28	RLV2001	PRESSURE ONLY RELIEF VALVE	ALL CH
29	FAN2010	FAN	ALL
30	MSC2078	TUBE, AIR INLET	ALL
-	MSC2079	BAND CLAMP (2) - NOT SHOWN	ALL
31	MSC3415	SIGHT GLASS KIT	ALL
32	FIL2075	FILTER	ALL
LOCH-HEAT® TILE			
33	FIB2130	REAR HEAD SIDE	ALL
34	FIB2131	FRONT PANEL	401
34	FIB2132	FRONT PANEL	501
34	FIB2133	FRONT PANEL	651
34	FIB2134	FRONT PANEL	751
35	FIB2501	BOTTOM RIGHT PANEL	401
35	FIB2502	BOTTOM RIGHT PANEL	501
35	FIB2503	BOTTOM RIGHT PANEL	651
35	FIB2504	BOTTOM RIGHT PANEL	751
36	FIB2806	BOTTOM DIVIDER PANEL	ALL
37	FIB2420	FRONT HEAD SIDE	ALL
-	FIB2505	BOTTOM CENTER PANEL - NOT SHOWN	651/751
38	FIB2401	BACK PANEL	401
38	FIB2402	BACK PANEL	501
38	FIB2403	BACK PANEL	651
38	FIB2404	BACK PANEL	751
39	FIB2500	BOTTOM LEFT PANEL	401
39	FIB2502	BOTTOM LEFT PANEL	501
39	FIB2503	BOTTOM LEFT PANEL	651
39	FIB2504	BOTTOM LEFT PANEL	751
-	FIB2479	TOP PANEL - NOT SHOWN	401
-	FIB2480	TOP PANEL - NOT SHOWN	501
-	FIB2481	TOP PANEL - NOT SHOWN	651
-	FIB2482	TOP PANEL - NOT SHOWN	751
-	FIB2261	INSULATION PAD - BACK - NOT SHOWN	401/501
-	FIB2262	INSULATION PAD - BACK - NOT SHOWN	651/751
-	FIB2263	INSULATION PAD - BACK - NOT SHOWN	ALL
NOTE: CH = BOILER, CF = WATER HEATER PLEASE HAVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS.			



Replacement Parts List

Copper-Fin II® Boilers & Water Heaters CH - CF 991-2071



ITEM NO.	PART NO.	DESCRIPTION				MODEL NO.
Burners						
1	PRIOR TO SERIAL #E05H00176040			BEGINNING SERIAL #E05H00176040		
	MODEL	BNR3422	BNR3423	MODEL	BNR3422	BNR3430
	991	9 ea	2 ea	991	9 ea	2 ea
	1261	12 ea	2 ea	1261	12 ea	2 ea
	1441	14 ea	2 ea	1441	14 ea	2 ea
	1801	18 ea	2 ea	1801	18 ea	2 ea
	2071	21 ea	2 ea	2071	21 ea	2 ea
GAS TRAIN ASSEMBLIES						
2	ORF2421	ORIFICE, NAT				ALL
2	ORF2418	ORIFICE, LP				ALL
3	VAL2076	GAS VALVE, NAT				ALL
3	VAL2413	GAS VALVE, LP				ALL
4	VAL2421	BALL VALVE				ALL
CONTRLS & GAUGES						
5	PAN3008	CONTROL PANEL				ALL
6	HLC2701	HIGH LIMIT, AUTO RESET (OPTIONAL)				ALL
7	HLC2702	HIGH LIMIT, MANUAL RESET				ALL
8	SWT2006	SWITCH, ON / OFF				ALL
9	RLY2708	RELAY, 24V PUMP				ALL
10	RLY2903	RELAY, 24V				ALL
11	RLY2714	RELAY, TIME DELAY				ALL
12	RLY2051	RELAY, 120VAC LOUVER/VENTER				ALL
13	RLY2402	IGNITION MODULE				ALL
14	RLY2049	RELAY BOARD				ALL
15	RLY2050	RELAY, 115VAC				ALL
16	TRF2701	TRANSFORMER, 150VA				ALL
17	MSC2447	CIRCUIT BREAKER, 7AMP				ALL
18	RLY2046	ELECTRONIC CONTROL (PRIOR TO SERIAL #A05H00173023)				991
18	RLY2083	ELECTRONIC CONTROL (BEGINNING SERIAL #A05H00173023)				991
18	RLY2046	ELECTRONIC CONTROL				1261-2071
19	RLY2044	DISPLAY BOARD				ALL
20	MSC2527	SWITCH, TOGGLE (OPTIONAL)				ALL
21	SWT2004	BUTTON, TEST / RESET				ALL
22	PLT3400	HOT SURFACE IGNITOR				ALL
23	PRS30012	PRESSURE SWITCH, NAT (PRIOR TO SERIAL #E05H00176040)				991-1261
23	PRS30030	PRESSURE SWITCH, NAT (BEGINNING SERIAL #E05H00176040)				991-1261
23	PRS30015	PRESSURE SWITCH, NAT (PRIOR TO SERIAL #E05H00176040)				1441-2071
23	PRS30029	PRESSURE SWITCH, NAT (BEGINNING SERIAL #E05H00176040)				1441-2071
23	PRS30008	PRESSURE SWITCH, LP (PRIOR TO SERIAL #E05H00176040)				991-2071
23	PRS30029	PRESSURE SWITCH, LP (BEGINNING SERIAL #E05H00176040)				991-2071
HEAT EXCHANGERS						
24	HEX3000	HEAT EXCHANGER, HLW				CF991
24	HEX3001	HEAT EXCHANGER, HLW				CF1261
24	HEX3002	HEAT EXCHANGER, HLW				CF1441
24	HEX3003	HEAT EXCHANGER, HLW				CF1801
24	HEX3004	HEAT EXCHANGER, HLW				CF2071
24	HEX3420	HEAT EXCHANGER, H				CH991
24	HEX3421	HEAT EXCHANGER, H				CH1261
24	HEX3422	HEAT EXCHANGER, H				CH1441
24	HEX3423	HEAT EXCHANGER, H				CH1801
24	HEX3424	HEAT EXCHANGER, H				CH2071
25	JKE2004	V-BAFFLE (9 REQ)				991
25	JKE2005	V-BAFFLE (9 REQ)				1261
25	JKE2006	V-BAFFLE (9 REQ)				1441
25	JKE2007	V-BAFFLE (9 REQ)				1801
25	JKE2008	V-BAFFLE (9 REQ)				2071
26	JKE6159	FRAME RUNNER (2 REQ)				991
26	JKE6160	FRAME RUNNER (2 REQ)				1261
26	JKE6161	FRAME RUNNER (2 REQ)				1441
26	JKE6162	FRAME RUNNER (2 REQ)				1801
26	JKE6163	FRAME RUNNER (2 REQ)				2071
27	JKD6187	FRAME END				ALL
28	GKT2418	GASKET, HEAT SHIELD				ALL
29	TST2300	BULBWELL				ALL
30	RLV2001	RELIEF VALVE, PRESSURE ONLY				CH991-2071
30	RLV2017	RELIEF VALVE, TEMPERATURE & PRESSURE				CF991-2071
31	GTP2900	GAUGE, TEMPERATURE & PRESSURE				CH991-2071
31	GTP3000	GAUGE, TEMPERATURE				CF991-2071
32	WTR2041	FLOW SWITCH, OUTDOOR				ALL
32	WTR2040	FLOW SWITCH, INDOOR				ALL

PUMPS			
33	ARM3024PAB	PUMP	CF991-2071
MISCELLANEOUS			
34	FAN2009	FAN ASSEMBLY	991-1261
34	FAN2010	FAN ASSEMBLY	1441-2071
-	JKE6411	AIR SHUTTER	ALL
35	WTR2530	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) PRIOR TO SERIAL #H08H00211349	ALL
35	WTR30000	LOW WATER CUT-OFF, MANUAL RESET (OPTIONAL) BEGINNING SERIAL #H08H00211349	ALL
35	WTR2528	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) PRIOR TO SERIAL #H08H00211349	ALL
35	WTR30001	LOW WATER CUT-OFF, AUTO RESET (OPTIONAL) BEGINNING SERIAL #H08H00211349	ALL
-	WTR2222	LOW WATER CUT-OFF PROBE (OPTIONAL)	ALL
-	WTR20000	LOW WATER CUT-OFF BOOT (OPTIONAL)	ALL
-	MSC3415	SIGHT GLASS AND GASKET KIT	ALL
-	GKT3408	GASKET, STRIP 45"	ALL
-	PRS2701	PRESSURE TAP, ALUMINUM	ALL
-	TUB2002	TUBING, AIR PRESSURE SWITCH (PRIOR TO SERIAL #E05H00176040)	ALL
-	TUB2004	TUBING, AIR PRESSURE SWITCH (BEGINNING SERIAL #E05H00176040)	ALL
-	MSC2155	TEE, AIR PRESSURE TUBE	ALL
-	MSC2156	TEE FITTING, AIR PRESSURE TUBE CAP	ALL
-	TST2313	TEMPERATURE SENSOR	ALL
-	MSC2461	TUBING, SILICONE, 1/8" CLEAR	ALL
-	MSC2406	TUBING, EPDM, 1/8" BLACK	ALL
-	MSC7119	BULB WELL CLIP	ALL
-	GKT2023	TRANSITION GASKET	ALL
-	FIL2000	FILTER, 16 X 16 X 1	ALL
LOCH-HEAT TILE			
36	FIB2204	HEAD SIDE PANEL, FRONT	ALL
37	FIB2205	HEAD SIDE PANEL, REAR	ALL
38	FIB2228	DIVIDER PANEL	ALL
39	FIB2202	INSULATION PAD, FRONT	991
39	FIB2210	INSULATION PAD, FRONT	1261
39	FIB2214	INSULATION PAD, FRONT LEFT	1441
39	FIB2220	INSULATION PAD, FRONT LEFT	1801
39	FIB2224	INSULATION PAD, FRONT LEFT	2071
40	FIB2215	INSULATION PAD, FRONT RIGHT	1441
40	FIB2221	INSULATION PAD, FRONT RIGHT	1801
40	FIB2225	INSULATION PAD, FRONT RIGHT	2071
-	FIB2472	BACK PANEL	991
-	FIB2456	BACK PANEL	1261
-	FIB2457	BACK PANEL, LEFT	1441
-	FIB2458	BACK PANEL, LEFT	1801
-	FIB2459	BACK PANEL, LEFT	2071
-	FIB2455	BACK PANEL, RIGHT	1441-2071
-	FIB2258	INSULATION PAD, BACK	991-1441
-	FIB2260	INSULATION PAD, BACK	1801-2071
-	FIB2257	INSULATION PAD, TOP	991-1441
-	FIB2259	INSULATION PAD, TOP	1801-2071
-	FIB2256	INSULATION PAD, RIGHT SIDE	ALL
LOCH-HEAT TILE BOTTOM PANELS			
41	FIB2206	BOTTOM PANEL POSITION 1*	991
41	FIB2207	BOTTOM PANEL POSITION 2*	991
41	FIB2208	BOTTOM PANEL POSITION 3*	991
41	FIB2211	BOTTOM PANEL POSITION 1*	1261
41	FIB2212	BOTTOM PANEL POSITION 2 & 3*	1261
41	FIB2207	BOTTOM PANEL POSITION 4*	1261
41	FIB2218	BOTTOM PANEL POSITION 1*	1441
41	FIB2207	BOTTOM PANEL POSITION 2 & 3*	1441
41	FIB2219	BOTTOM PANEL POSITION 4*	1441
41	FIB2222	BOTTOM PANEL POSITION 1*	1801
41	FIB2207	BOTTOM PANEL POSITION 2, 3, & 4*	1801
41	FIB2223	BOTTOM PANEL POSITION 5*	1801
41	FIB2226	BOTTOM PANEL POSITION 1*	2071
41	FIB2212	BOTTOM PANEL POSITION 2*	2071
41	FIB2207	BOTTOM PANEL POSITION 3, 4, & 5*	2071
41	FIB2227	BOTTOM PANEL POSITION 6*	2071
*Denotes placement order of combustion chamber bottom tile from left to right (front to rear heat exchanger head) PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			

HIGH EFFICIENCY COMMERCIAL BOILERS

CREST[®]

CONDENSING BOILER

SMART  TOUCH[™]

CON-X-US[®] REMOTE CONNECT

MODBUS AND BACnet MSTP PROTOCOL

CASCADING SEQUENCER WITH
CASCADE REDUNDANCY

6 INPUTS FROM 750,000 TO 2.0 MILLION BTU/HR

UP TO 25:1 TURNDOWN RATIO

DIRECT-VENTING UP TO 100 FEET USING PVC, CPVC,
POLYPROPYLENE OR STAINLESS STEEL

FLEXIBLE FLOW RATES UP TO 350 GPM

FRONT END LOADING CAPABILITY



96.2% 
THERMAL EFFICIENCY

 **Lochinvar[®]**
HIGH EFFICIENCY BOILERS & WATER HEATERS

DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA

CREST[®]

CONDENSING BOILER

RIDE THE LOCHINVAR WAVE™ TO 96.2% EFFICIENCY

With the exclusive **Wave** fire-tube design, advancements in Lochinvar combustion technology and the SMART TOUCH™ control with CON·X·US[®], CREST changed how the industry thinks about fire-tube boilers. Now, six new CREST boilers, with 750,000, 1.0 million, 1.25 million, 1.5 million, 1.75 million and 2.0 million Btu/hr inputs, deliver **96.2% thermal efficiency**.

THE CREST COMBUSTION SYSTEM

CREST boilers are equipped with a top-mounted micro-metal fiber burner, engineered specifically for fire-tube technology. The system is designed to ensure smooth, quiet modulating combustion with up to 25:1 turndown. A FBN-2001 fires at its maximum 2,000,000 Btu/hr rate when the heat load is highest, and then gradually turns down to as low as 4% (80,000 Btu/hr) as load decreases. A modulating system runs smoothly and efficiently, without frequent on/off cycling. When the system is zoned, CREST's high turndown works to match the actual system demand. In return, CREST reduces the customer's fuel bill and provides better comfort by load-matching the heat loss of the system.

REDUCE INSTALLATION COST WITH VARIABLE FLOW TECHNOLOGY

CREST can operate over a wide range of flow rates with very low pressure drop. This permits installation of a *full flow* (variable primary) system. Installation is streamlined, without the time and materials cost of primary/secondary piping, and pumps needed to maintain flow in a water-tube boiler. Variable flow also makes CREST more flexible at handling frequent fluctuations in the system flow rate.

HIGH EFFICIENCY WITH MINIMUM SUPPLY PRESSURE

CREST operates reliably with supply gas pressure as low as 4 inches water column. Negative Regulation technology draws gas into a pre-mix combustion system, instead of relying on utility pressure through the gas valve. Operation is steady in low gas pressure systems or when peak gas supply demand occurs. Plus, Neg/Reg fan control fine-tunes the fuel/air ratio entering the burner, providing an even, cleaner-burning flame, achieving high combustion efficiency.

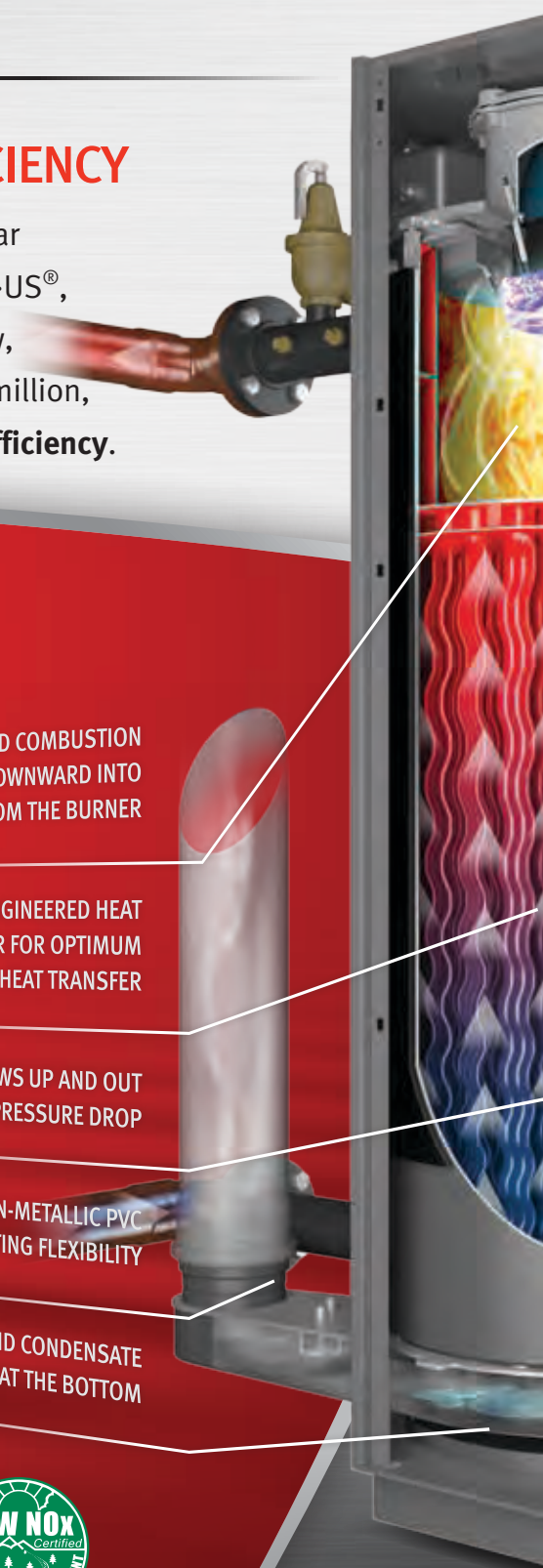
HEAT ENERGY AND COMBUSTION PRODUCTS FLOW DOWNWARD INTO FIRE TUBES FROM THE BURNER

FLOW-ENGINEERED HEAT EXCHANGER FOR OPTIMUM HEAT TRANSFER

HEATED WATER FLOWS UP AND OUT WITH MINIMAL PRESSURE DROP

NON-METALLIC PVC VENTING FLEXIBILITY

FLUE OUTLET AND CONDENSATE DRAIN AT THE BOTTOM





INTRODUCING BOILER PLANT CONTROL, FROM ANYWHERE.

Crest features the next generation of Lochinvar's all-in-one SMART TOUCH™ operating control with the integration of the CON-X-US® advanced technology. SMART TOUCH with CON-X-US provides outstanding functionality, and can be integrated directly into a Building Automation Systems via Modbus and BACnet MSTP as standard equipment.

And now, the CON-X-US mobile communication platform allows the SMART TOUCH to go where no other boiler has gone before.

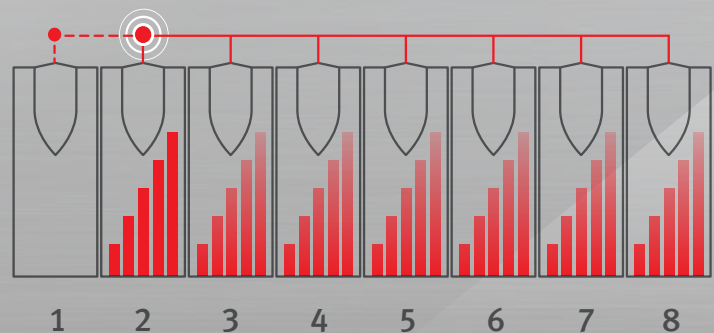
CON-X-US provides the ability to monitor and manage multiple Crest boiler plants without ever stepping into the mechanical rooms. CON-X-US will send alerts via text or email notifying of changes in system status, and anytime, from anywhere, a user can check system status and re-program any boiler function. Once downloaded, the free CON-X-US mobile application allows for remote access to all SMART TOUCH functions using any internet-capable device.

PEACE OF MIND, WHEN IT MATTERS MOST

Cascade Redundancy provides peace of mind because it helps ensure that a CREST boiler system will always deliver reliable performance with no downtime. If the lead boiler is turned off for maintenance, Cascade Redundancy automatically shifts the lead role to the second sequenced boiler. Up to eight CREST boilers can be sequenced using a 2-wire daisy-chain connection. Cascade sequencing can be programmed for **Lead-Lag** or **Efficiency Optimized** operation.

With Lead-Lag operation, one lead boiler modulates to capacity on demand. As load increases, the system then cascades to additional lag boilers in sequence. The first-on role shifts daily, distributing equal runtimes to each unit.

In an Efficiency Optimized system (see illustration below), all boilers fire and modulate simultaneously at the same Btu/hr input rates, maximizing thermal efficiency.





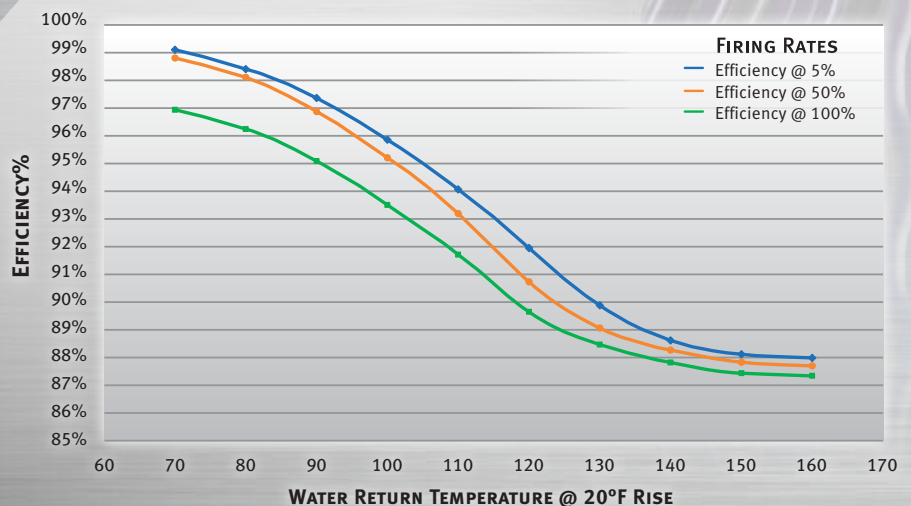
SUPERIOR FIRE-TUBE HEAT EXCHANGER DESIGN BOOSTS THERMAL EFFICIENCY

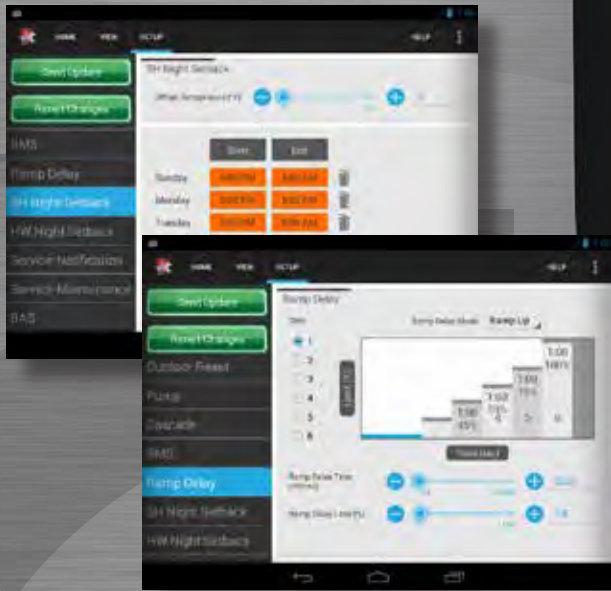
The CREST boiler takes fire-tube technology to a new level. The patented Wave™ configuration creates turbulence as flue gas products flow down the tube, scrubbing the energy from the flue products. The Wave design also enhances the life of the heat exchanger by allowing the tubes to flex, so they operate stress free with none of the adverse effects suffered by traditional fire-tube boilers.

Each fire tube is welded into the heat exchanger and surrounded by water, and the heat transfer process is enhanced by the water's counterflow. As water flows up inside the vessel, super-heated flue products flow down the fire tube. With one pass, heat is effectively captured, reaching condensing temperatures. At the top of the vessel, the combustion chamber is also water-backed for additional heat transfer.



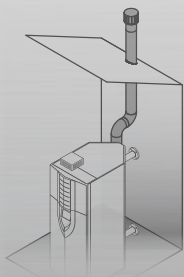
CREST BOILER EFFICIENCY



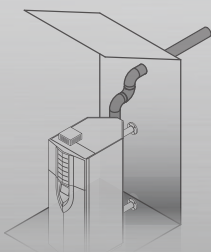


FLEXIBLE VENTING OPTIONS

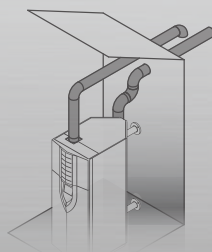
CREST offers 6 venting options, and permits direct-vent air intake and exhaust runs up to 100 equivalent feet, using PVC, CPVC, polypropylene or stainless steel pipe. Plus, multiple units can be common-vented to reduce time and materials cost.



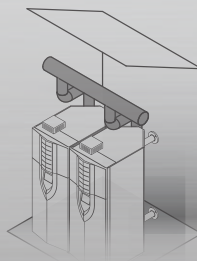
Room Air Vertical



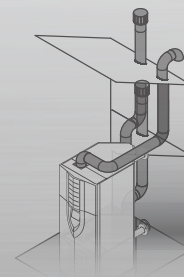
Room Air Sidewall



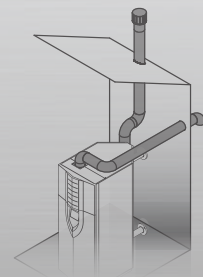
Direct-Vent



Common-Vent*



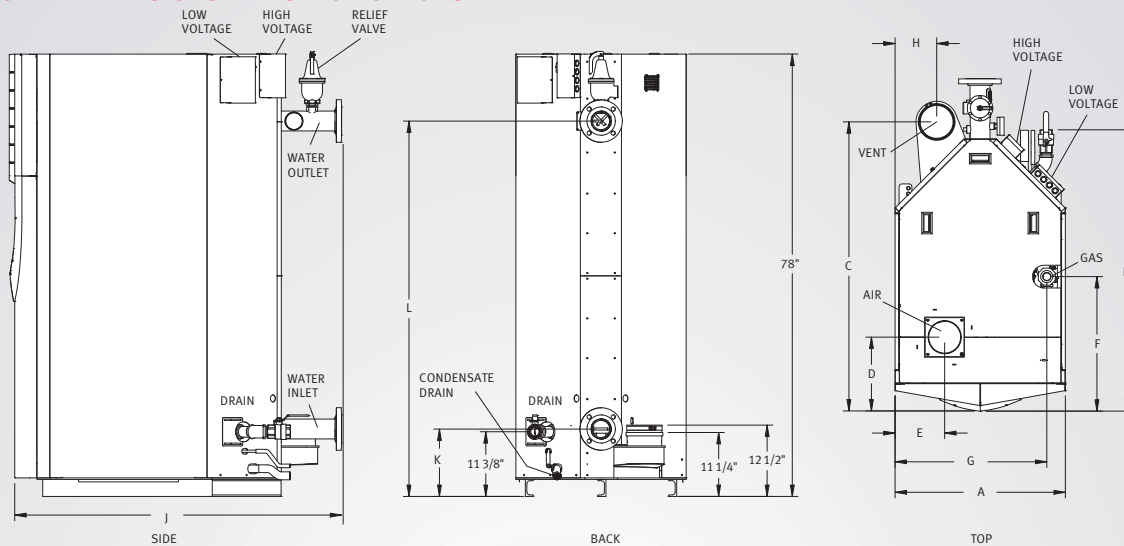
Direct-Vent Vertical



Vertical w/Sidewall Air

*Contact Lochinvar for information on common venting of CREST boilers.

CREST® BOILER DIMENSIONS AND SPECIFICATIONS



CREST HEATING BOILER							DIMENSIONS AND SPECIFICATIONS																
Model Number	Input MBH		AHRI Thermal %	Gross Output MBH	Net AHRI Rating MBH	Turndown	A	B	C	D	E	F	G	H	J	K	L	Water				Oper. Weight	Ship. Weight
	Min	Max																Gas Conn.	Inlet/Outlet	Air Intake	Vent Size		
FBN0751	50	750	96.2%	722	627	15:1	30"	49-1/2"	51"	13"	8-3/4"	23-3/4"	26-3/4"	7-3/8"	57-5/8"	11-7/8"	66-1/8"	1-1/4"	3"	6"	6"	1,768	1,560
FBN1001	50	1,000	96.2%	962	837	20:1	30"	49-1/2"	51"	13"	8-3/4"	23-1/8"	26-3/4"	6-1/2"	57-5/8"	11-7/8"	66-1/8"	1-1/4"	3"	6"	6"	1,838	1,596
FBN1251	63	1,250	96.2%	1,203	1,046	20:1	30"	49-1/2"	51-3/8"	13"	8-3/4"	21-5/8"	26-3/4"	6-1/2"	57-3/4"	11-7/8"	66-1/8"	1-1/4"	3"	6"	8"	1,975	1,648
FBN1501	60	1,500	96.2%	1,443	1,255	25:1	30"	59-1/4"	62-3/8"	15-7/8"	9"	27-7/8"	26-7/8"	5-1/8"	68"	12-3/8"	65-3/8"	1-1/2"	4"	8"	8"	2,307	1,961
FBN1751	70	1,750	96.2%	1,684	1,464	25:1	30"	58-3/4"	61-1/2"	15-7/8"	9"	27-1/8"	27"	5-1/8"	68"	12-3/8"	65-3/8"	1-1/2"	4"	8"	8"	2,458	2,017
FBN2001	80	1,999	96.2%	1,924	1,673	25:1	30"	58-3/4"	61-1/2"	15-7/8"	9"	26-3/4"	27"	5-1/8"	68"	12-3/8"	65-3/8"	1-1/2"	4"	8"	8"	2,570	2,087

NOTES: Indoor installation only. Change "N" to "L" for LP gas models and to "D" for dual fuel models. (Consult factory for availability of Dual Fuel models)
 *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15. *Information subject to change without notice.

SMART TOUCH™ FEATURES

- CON-X-US Remote Connect**
- SMART TOUCH Touchscreen Operating Control**
- Full-Color 8" Touchscreen LCD Display**
- Built-in Cascading Sequencer for up to 8 Boilers**
 - Built-in Redundancy
 - Cascade Multiple Sized Boilers
 - Lead/Lag Cascade
 - Efficiency Optimized Cascade
- Front-End Loading Capability with Copper-Fin II® and Power-Fin® Boilers**
- Building Management System Integration with 0-10 VDC Input**
- BACnet MSTP Communications**
- Modbus Communication**
- Outdoor Reset Control with Outdoor Air Sensor**
- Password Security**
- 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
- Low Water Flow Safety Control & Indication**
- Inlet & Outlet Temperature Readout**
- Freeze Protection**
- Service Reminder**
- Time Clock**
- Data Logging**
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Hours Running, Modulation Rate
 - Ignition Attempts
 - Last 10 Lockouts
- Programmable System Efficiency Optimizers**
 - Night Setback
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Ramp Delay
 - Boost Temperature & Time
 - Modulation Factor Control

Three Pump Control

- System Pump
- Boiler Pump
- Domestic Hot Water Pump

High-Voltage Terminal Strip

- 120 VAC / 60 Hertz / 1 Phase Power Supply
- System Pump, Boiler Pump and DHW Pump Power

Low-Voltage Terminal Strip

- 24 VAC Auxiliary Device Relay
- Auxiliary Proving Switch Contacts
- Alarm on Any Failure Contacts
- Runtime Contacts
- DHW Thermostat Contacts
- Unit Enable/Disable Contacts
- System Sensor Contacts
- DHW Tank Sensor Contacts
- Outdoor Air Sensor Contacts
- Cascade Contacts
- 0-10 VDC BMS External Control Contact
- 0-10 VDC Variable Speed Boiler Pump Control Contact

OPTIONAL EQUIPMENT

- Alarm Bell
- BMS Gateway - BACnet IP or LonWorks
- Wireless Outdoor Temperature Sensor
- Condensate Neutralization Kit
- SMART TOUCH PC Software
- Common Vent Kits
- Dual Fuel Gas Train
- Motorized Isolation Valve
- Variable Speed Boiler Pump
- Electrical Options (Shipped Loose):
 - 208V/3Ø/60Hz
 - 480V/3Ø/60Hz
 - 600V/3Ø/60Hz

*Lochinvar should be consulted before selecting a boiler for installations having unusual piping and pickup requirements, such as intermittent system operation, extensive piping systems, etc. *The ratings have been determined under the provisions governing forced draft burners.

CODES & REGISTRATIONS

- ANSI Z21.13/CSA Certified
- ASME Certified, "H" Stamp / National Board
- California Code Compliant
- CSD1 / Factory Mutual / GE Gap Compliant
- Canadian Registration Number (CRN)
- South Coast Air Quality Management District Qualified
- AHRI Certified

STANDARD FEATURES

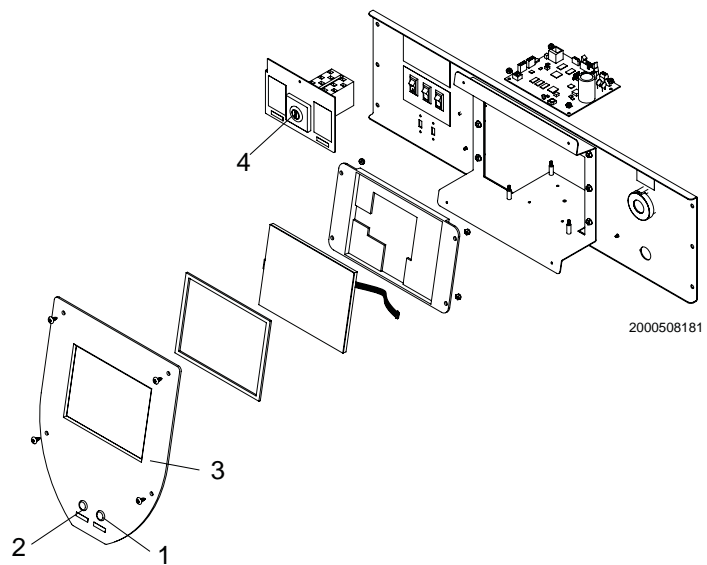
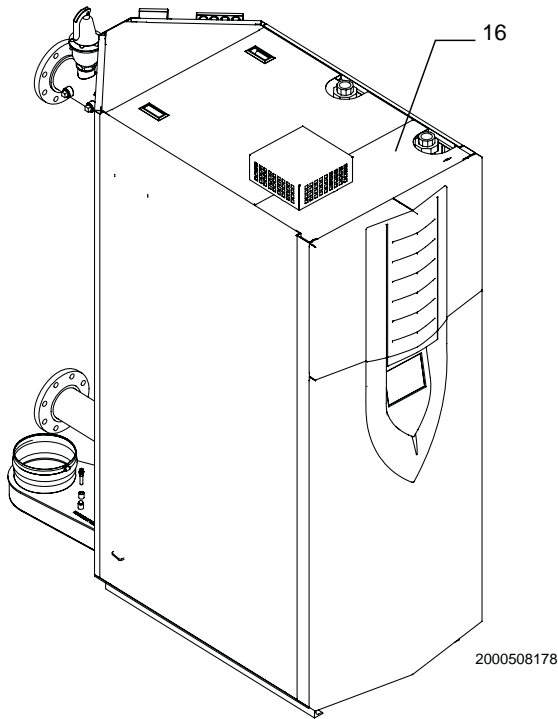
- 96.2% Thermal Efficiency (AHRI)
- Up to 99% Thermal Efficiency in Low-Temp. Applications
- Modulating Burner with up to 25:1 Turndown
- Direct-Spark Ignition
- Low NOx Operation
- Sealed Combustion
- Air Inlet Filter w/Replacement Reminder
- Low Gas Pressure Operation
- Vertical and Horizontal Direct Venting
 - Direct Vent up to 100 Feet
 - PVC, CPVC, Polypropylene or AL29-4C
- ASME "H" Stamped Heat Exchanger
- 316L Stainless Steel Fire Tubes
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Low Water Cutoff with Manual Reset & Test
- High & Low Gas Pressure Switches w/Manual Reset
- Low Air Pressure Switches
- Condensate Trap w/Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High-Voltage Terminal Strip
- Low-Voltage Terminal Strip
- Downstream Gas Test Cocks
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)





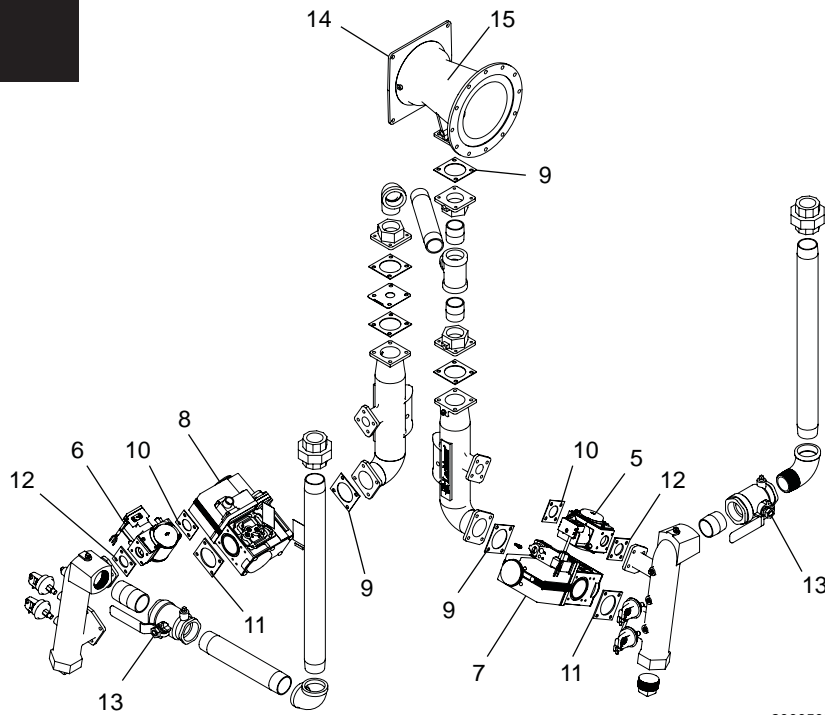
Dual Fuel Supplemental Replacement Parts List

Crest® Heating Boilers FBD 751 - 2001



DISPLAY PANEL

GAS TRAIN



2000508182

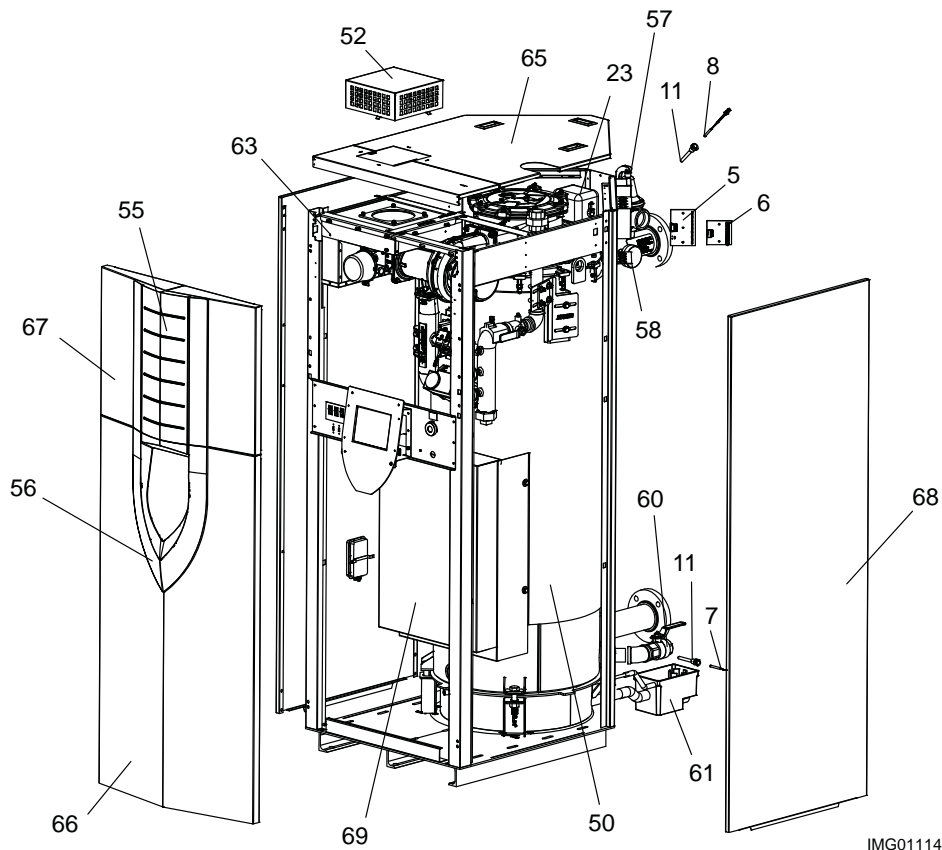
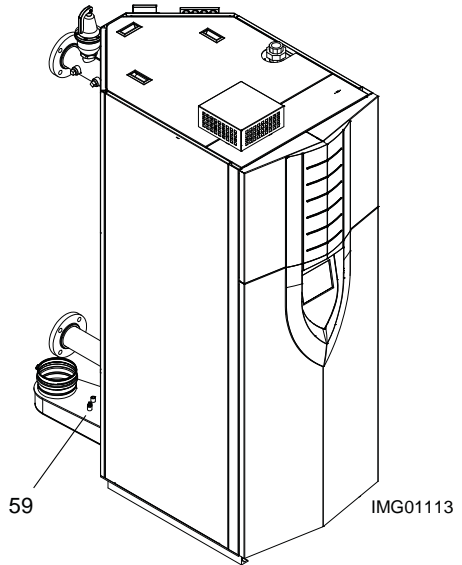
ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS			
1	100162723	INDICATOR LIGHT RED	ALL
2	100162738	INDICATOR LIGHT GREEN	ALL
3	100163270	DISPLAY MOUNTING PLATE	ALL
4	100172874	KEY ASSEMBLY	ALL
-	100267270	KIT, RE-SPARK RETROFIT (PRIOR TO SERIAL #4015)	FB 751-1251
-	100267301	KIT, RE-SPARK RETROFIT (PRIOR TO SERIAL #4015)	FB 1501-2001
GAS TRAIN ASSEMBLIES			
5	100073358	GAS VALVE ASSEMBLY, NAT - SMALL	FBD751
5	100073359	GAS VALVE ASSEMBLY, NAT - SMALL	FBD1001
5	100073360	GAS VALVE ASSEMBLY, NAT - SMALL	FBD1251
5	100267412	GAS VALVE ASSEMBLY, NAT - SMALL	FBD1501
5	100267413	GAS VALVE ASSEMBLY, NAT - SMALL	FBD1751
5	100267414	GAS VALVE ASSEMBLY, NAT - SMALL	FBD2001
6	100073364	GAS VALVE ASSEMBLY, LP - SMALL	FBD751
6	100073365	GAS VALVE ASSEMBLY, LP - SMALL	FBD1001
6	100073366	GAS VALVE ASSEMBLY, LP - SMALL	FBD1251
6	100267415	GAS VALVE ASSEMBLY, LP - SMALL	FBD1501
6	100267416	GAS VALVE ASSEMBLY, LP - SMALL	FBD1751
6	100267417	GAS VALVE ASSEMBLY, LP - SMALL	FBD2001
7	100073370	GAS VALVE ASSEMBLY, NAT - LARGE	FBD751
7	100073371	GAS VALVE ASSEMBLY, NAT - LARGE	FBD1001
7	100073372	GAS VALVE ASSEMBLY, NAT - LARGE	FBD1251
7	100267418	GAS VALVE ASSEMBLY, NAT - LARGE	FBD1501
7	100267419	GAS VALVE ASSEMBLY, NAT - LARGE	FBD1751
7	100267420	GAS VALVE ASSEMBLY, NAT - LARGE	FBD2001
8	100073549	GAS VALVE ASSEMBLY, LP - LARGE	FBD751
8	100073550	GAS VALVE ASSEMBLY, LP - LARGE	FBD1001
8	100073551	GAS VALVE ASSEMBLY, LP - LARGE	FBD1251
8	100267421	GAS VALVE ASSEMBLY, LP - LARGE	FBD1501
8	100267422	GAS VALVE ASSEMBLY, LP - LARGE	FBD1751
8	100267423	GAS VALVE ASSEMBLY, LP - LARGE	FBD2001
9	100146470	GASKET, FLANGE VENTURI	ALL
10	100060683	GASKET, GAS TRAIN	ALL
11	100060685	GASKET, GAS TRAIN	ALL
12	100060687	GASKET, GAS TRAIN	ALL
13	100171789	VALVE, BALL	FB 751-1251
13	100171912	VALVE, BALL	FB 1501-2001
14	100146458	GASKET, VENTURI	ALL
15	100171878	VALVE, VENTURI	FB 751
15	100072925	VALVE, VENTURI	FB 1001-1251
15	100171780	VALVE, VENTURI	FB 1501-1751
15	100171763	VALVE, VENTURI	FB 2001
JACKET ASSEMBLIES			
16	100267137	JACKET, OUTER TOP, FRONT	FB 751-1251
16	100267138	JACKET, OUTER TOP, FRONT	FB 1501-2001

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS



Replacement Parts List

Crest® Heating Boilers FBN(L) 751 - 2001



ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)			
19	100169472	MOMENTARY OFF SWITCH, RED	ALL
20	100169473	MOMENTARY OFF SWITCH, BLACK	ALL
21	100169464	ON/OFF SWITCH	ALL
22	100170172	TRANSFORMER, 24V, 40VA	ALL
23	100170181	TRANSFORMER, SPARK	ALL
24	100191023	BACNET BOARD (BEGINNING SERIAL #4015)	ALL
25	100173747	LOW WATER CUTOFF, MANUAL RESET	ALL
26	100173648	PROBE, LWCO	ALL
-	100173640	BOOT, LWCO	ALL
GAS TRAIN ASSEMBLIES			
27	100073358	GAS VALVE ASSEMBLY, NAT - SMALL	FB 751
27	100073359	GAS VALVE ASSEMBLY, NAT - SMALL	FB 1001
27	100073360	GAS VALVE ASSEMBLY, NAT - SMALL	FB 1251
27	100267412	GAS VALVE ASSEMBLY, NAT - SMALL	FB 1501
27	100267413	GAS VALVE ASSEMBLY, NAT - SMALL	FB 1751
27	100267414	GAS VALVE ASSEMBLY, NAT - SMALL	FB 2001
27	100073364	GAS VALVE ASSEMBLY, LP - SMALL	FB 751
27	100073365	GAS VALVE ASSEMBLY, LP - SMALL	FB 1001
27	100073366	GAS VALVE ASSEMBLY, LP - SMALL	FB 1251
27	100267415	GAS VALVE ASSEMBLY, LP - SMALL	FB 1501
27	100267416	GAS VALVE ASSEMBLY, LP - SMALL	FB 1751
27	100267417	GAS VALVE ASSEMBLY, LP - SMALL	FB 2001
28	100073370	GAS VALVE ASSEMBLY, NAT - LARGE	FB 751
28	100073371	GAS VALVE ASSEMBLY, NAT - LARGE	FB 1001
28	100073372	GAS VALVE ASSEMBLY, NAT - LARGE	FB 1251
28	100267418	GAS VALVE ASSEMBLY, NAT - LARGE	FB 1501
28	100267419	GAS VALVE ASSEMBLY, NAT - LARGE	FB 1751
28	100267420	GAS VALVE ASSEMBLY, NAT - LARGE	FB 2001
28	100073549	GAS VALVE ASSEMBLY, LP - LARGE	FB 751
28	100073550	GAS VALVE ASSEMBLY, LP - LARGE	FB 1001
28	100073551	GAS VALVE ASSEMBLY, LP - LARGE	FB 1251
28	100267421	GAS VALVE ASSEMBLY, LP - LARGE	FB 1501
28	100267422	GAS VALVE ASSEMBLY, LP - LARGE	FB 1751
28	100267423	GAS VALVE ASSEMBLY, LP - LARGE	FB 2001
29	100146470	GASKET, FLANGE VENTURI	ALL
30	100060683	GASKET, GAS TRAIN	ALL
31	100060685	GASKET, GAS TRAIN	ALL
32	100060687	GASKET, GAS TRAIN	ALL
33	100171789	VALVE, BALL	FB 751-1251
33	100171912	VALVE, BALL	FB 1501-2001
34	100146458	GASKET, VENTURI	ALL
35	100171878	VALVE, VENTURI	FB 751
35	100072925	VALVE, VENTURI	FB 1001-1251
35	100171780	VALVE, VENTURI	FB 1501-1751
35	100171763	VALVE, VENTURI	FB 2001
PILOT AND BURNER ASSEMBLIES			
36	100073343	SENSOR, FLAME W/ GASKET	ALL
37	100146376	GASKET, FLAME SENSOR	ALL
38	100073342	IGNITOR W/GASKET	FB 751-1251
38	100265150	IGNITOR W/GASKET	FB 1501-2001
39	100279407	SENSOR, FLAME, REAR W/ GASKET	ALL
40	100146375	GASKET, IGNITOR	ALL
41	100072640	BURNER W/GASKET	FB 751
41	100072641	BURNER W/GASKET	FB 1001
41	100073280	BURNER W/GASKET	FB 1251
41	100073281	BURNER W/GASKET	FB 1501
41	100073282	BURNER W/GASKET	FB 1751
41	100073283	BURNER W/GASKET	FB 2001
42	100188935	GASKET, BURNER	ALL
43	100073768	GAS/AIR MANIFOLD W/ GASKET	FB 751-1251
43	100073794	GAS/AIR MANIFOLD W/ GASKET	FB 1501-2001
44	100190526	MANIFOLD COVER	ALL
45	100060121	GASKET, MANIFOLD COVER	ALL
46	100075411	DOOR, HEAT EXCHANGER ASSEMBLY	FB 751
46	100075413	DOOR, HEAT EXCHANGER ASSEMBLY	FB 1001
46	100076515	DOOR, HEAT EXCHANGER ASSEMBLY	FB 1251
46	100267481	DOOR, HEAT EXCHANGER ASSEMBLY	FB 1501
46	100267482	DOOR, HEAT EXCHANGER ASSEMBLY	FB 1751
46	100267483	DOOR, HEAT EXCHANGER ASSEMBLY	FB 2001
47	100161834	AIR METERING VALVE	FB 751
47	100161835	AIR METERING VALVE	FB 1001
47	100161837	AIR METERING VALVE	FB 1251
47	100161836	AIR METERING VALVE	FB 1501-1751
47	100161838	AIR METERING VALVE	FB 2001

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS			
48	100163214	SIGHT GLASS KIT	ALL
49	100188893	FIBERBOARD, BURNER	FB 751
49	100188894	FIBERBOARD, BURNER	FB 1001
49	100188895	FIBERBOARD, BURNER	FB 1251
49	100188896	FIBERBOARD, BURNER	FB 1501
49	100188897	FIBERBOARD, BURNER	FB 1751
49	100188898	FIBERBOARD, BURNER	FB 2001
50	100188907	INSULATION, HEX WRAP	FB 751
50	100188908	INSULATION, HEX WRAP	FB 1001
50	100188909	INSULATION, HEX WRAP	FB 1251
50	100188910	INSULATION, HEX WRAP	FB 1501
50	100188911	INSULATION, HEX WRAP	FB 1751
50	100188912	INSULATION, HEX WRAP	FB 2001
51	100146377	GASKET, SIGHT GLASS TOP	ALL
52	100153531	AIR INLET COVER	ALL
53	100163269	DISPLAY MOUNTING PLATE	ALL
54	100266649	HOLDER, LCD	ALL
55	100162582	TOP BEZEL	ALL
56	100162579	DISPLAY BEZEL	ALL
57	100167409	RELIEF VALVE 50 PSI	ALL
58	100146978	GAUGE, TEMPERATURE & PRESSURE	ALL
59	100170554	FLUE TEMP SENSOR	ALL
60	100173733	VALVE, DRAIN	ALL
61	100162617	CONDENSATE TRAP	ALL
62	100188929	KIT, GASKET SET (SIGHT GLASS / AIR MANIFOLD / HEX PLATE)	FB 751
62	100188930	KIT, GASKET SET (SIGHT GLASS / AIR MANIFOLD / HEX PLATE)	FB 1001
62	100188931	KIT, GASKET SET (SIGHT GLASS / AIR MANIFOLD / HEX PLATE)	FB 1251
62	100188932	KIT, GASKET SET (SIGHT GLASS / AIR MANIFOLD / HEX PLATE)	FB 1501
62	100188933	KIT, GASKET SET (SIGHT GLASS / AIR MANIFOLD / HEX PLATE)	FB 1751
62	100188934	KIT, GASKET SET (SIGHT GLASS / AIR MANIFOLD / HEX PLATE)	FB 2001
63	100188913	FILTER, AIR	FB 751-1251
63	100188914	FILTER, AIR	FB 1501-2001
64	100172888	CABLE, USB	ALL
-	100146379	GASKET, AIR INLET COVER	ALL
-	100153196	INLET ADAPTER (SQUARE TO ROUND)	ALL
-	100172865	RIBBON CABLE	ALL
-	100172918	HARNESS, ELECTRODE, SPARK	ALL
-	100172854	HARNESS, ELECTRODE, FLAME SENSOR	ALL
-	100146009	FUSE, 1.25 AMP	ALL
-	100146012	FUSE, 3.15 AMP	ALL
-	100146013	FUSE, 5 AMP	ALL
-	100170604	OUTDOOR AIR SENSOR	ALL
-	100157652	NEUTRALIZER KIT	ALL
-	100162635	HOSE, CONDENSATE 3/8"	ALL
-	100162636	HOSE, CONDENSATE 1"	ALL
-	100163038	TUBING, SILICONE 1/8"	ALL
-	100163160	TUBING, ALUMINUM 1/4"	ALL
-	100162552	DOOR CATCH	ALL
-	100162929	DOOR STRIKE	ALL
-	100072546	ANTENNA, USB ADAPTER, WIRELESS (BEGINNING SERIAL #4015)	ALL
-	100266650	CABLE, USB, 2.0, 12" (BEGINNING SERIAL #4015)	ALL
-	100266666	CABLE, USB, 2.0, 60" (BEGINNING SERIAL #4015)	ALL
-	100072933	CABLE, CAT 5 (BEGINNING SERIAL #4015)	ALL
-	100267270	KIT, RE-SPARK RETROFIT (PRIOR TO SERIAL #4015)	FB 751-1251
-	100267301	KIT, RE-SPARK RETROFIT (PRIOR TO SERIAL #4015)	FB 1501-2001
JACKET ASSEMBLIES			
65	100161436	JACKET, OUTER TOP	FB 751
65	100161428	JACKET, OUTER TOP	FB 1001
65	100161437	JACKET, OUTER TOP	FB 1251
65	100161429	JACKET, OUTER TOP	FB 1501
65	100161438	JACKET, OUTER TOP	FB 1751
65	100161430	JACKET, OUTER TOP	FB 2001
66	100161426	JACKET, OUTER FRONT LOWER DOOR	ALL
67	100161435	JACKET, OUTER FRONT UPPER DOOR	ALL
68	100161439	JACKET, OUTER LEFT & RIGHT SIDE	FB 751-1251
68	100267484	JACKET, OUTER LEFT & RIGHT SIDE	FB 1501-2001
69	100161427	CONTROL PANEL COVER	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

HIGH EFFICIENCY COMMERCIAL BOILERS

CREST[®]

CONDENSING BOILER

SMART  TOUCH[™]

CON-X-US[®] REMOTE CONNECT

MODBUS AND BACnet MSTP PROTOCOL

CASCADING SEQUENCER WITH
CASCADE REDUNDANCY

6 INPUTS FROM 2.5 TO 6.0 MILLION BTU/HR

UP TO 20:1 TURNDOWN RATIO

DIRECT-VENTING UP TO 100 FEET

FLEXIBLE FLOW RATES UP TO 550 GPM

FRONT END LOADING CAPABILITY



up to **93%**  **THERMAL EFFICIENCY**

 **Lochinvar**
HIGH EFFICIENCY BOILERS & WATER HEATERS

DESIGNED ★ ENGINEERED ★ ASSEMBLED
USA

CREST[®]

CONDENSING BOILER

FIRE TUBE INNOVATION UP TO 6.0 MILLION BTU

Lochinvar[®] has taken the fire-tube concept in an innovative new direction with the CREST[®] modulating-condensing boiler. With sizes that range from 2.5 to 6.0 million Btu/hr, you have the opportunity to utilize Lochinvar leading-edge technology in your largest applications. With thermal efficiencies up to 99% in low water temperature applications, CREST is positioned to provide exceptional energy-saving performance.

The advanced CREST introduces a combustion system with a unique burner design with up to 20:1 turndown. The burner fires into an array of 316L stainless steel fire-tubes that transfer the heat to the surrounding water with exceptionally high efficiency.

CREST communicates seamlessly and in real time with building management systems by utilizing an on-board Modbus protocol and BACnet MSTP. The SMART TOUCH[™] control with CON-X-US[®] has a built-in cascading component that communicates with up to eight units, providing total command without an external control or complex and expensive control logic programming by the BMS integrator.

With the added feature of CON-X-US remote connectivity, the CREST boiler can be monitored from anywhere even if your building does not have a Building Management System.

Yes, innovative fire-tube boiler technology integrated with our SMART TOUCH[™] operating control makes the CREST a genuine game-changer among commercial boilers.

ADVANCED NEGATIVE REGULATION TECHNOLOGY

CREST safely and reliably operates with supply gas pressure as low as 4 inches water column. Because Negative Regulation (Neg/Reg) technology draws fuel gas into a pre-mix combustion system instead of relying on utility pressure through the gas valve, operation is steady in low gas pressure systems or when peak demands occur on supply lines. Plus, Neg/Reg automatic fan speed control fine-tunes the correct fuel/air ratio entering the burner, providing even, consistent combustion for a cleaner burning flame achieving high combustion efficiency.

FULLY MODULATING UP TO 20:1 TURNDOWN

20:1 turndown means the burner can fire at a rate as low as 5% of its maximum input. For example, a 2.5 million Btu/hr CREST unit can modulate from 125,000 up to 2,500,000 Btu/hr depending on demand. High turndown greatly reduces "short cycling" when demand is low. All boiler systems are designed to provide enough heat to maintain a facility's heat loss on the coldest days. When the system is zoned, the CREST's high turndown works to match the actual system demand and, in return, reduces the customer's fuel bill and provides better comfort by load matching the heat loss of the system. Greater seasonal efficiencies will be realized due to the extremely large turndown offered by CREST.

AS LOW AS 25 GPM* TO FULL 550 GPM FLOW RATES

CREST allows system designers tremendous flexibility to vary the flow rate through the boiler. It can service systems that operate with widely fluctuating flow rates depending on demand. CREST can be installed with primary/secondary piping or in a full-flow arrangement. Typical design techniques include full-flow systems or variable flow systems using variable frequency drives on the system pumps. In either case, CREST excels in these applications and allows the flow through the boiler to vary based on system demand.

* 25 GPM min. flow on FB2500-3000 models, 45 GPM on FB3500-4000 models, 50 GPM on FB5000 and 60 GPM on FB6000.





THE CREST COMBUSTION SYSTEM

CREST's top-mounted, single micro metal fiber burner is actually "two combustion systems in one," each with its own blower/gas valve assembly to power the combustion process from air/gas intake to driving heat energy down and through the fire-tubes to exhaust venting through the bottom of the unit.

IN A 2.5 MILLION BTU/HR CREST BOILER

The upper portion of the burner fires first and, with 5:1 turndown, modulates from 125,000 to 625,000 Btu/hr.

When demand exceeds 625,000 Btu/hr., the lower portion of the burner fires and modulates from 470,000 to 1,875,000 Btu/hr.

With the entire burner firing at capacity, the total input is $625,000 + 1,875,000 = 2,500,000$ Btu/hr.

The CREST's patent-pending dual-system design is truly an industry first!

THE CREST HEAT EXCHANGER

HEAT ENERGY AND COMBUSTION PRODUCTS FLOW DOWNWARD INTO FIRE-TUBES FROM THE BURNER.

ENERGY FROM INSIDE FIRE-TUBES HEATS WATER FLOWING THROUGH THE HEATING VESSEL.

AS WATER IS HEATED, IT FLOWS UP THROUGH THE HEATING VESSEL AND OUT INTO THE SYSTEM.

COLD WATER RETURNING FROM THE SYSTEM ENTERS THE HEATING VESSEL TO MAXIMIZE EFFICIENCY.

CONDENSATE IS DRAINED INTO A STAINLESS STEEL COLLECTOR, TO BE PIPED TO A SUITABLE FLOOR DRAIN.

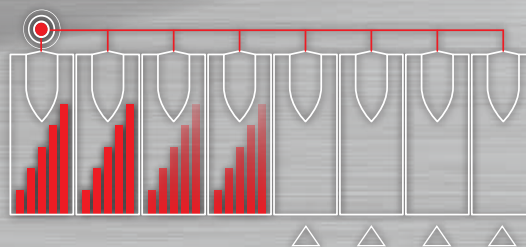
THE FLUE OUTLET IS LOCATED AT THE BOTTOM OF THE UNIT.

PEACE OF MIND, WHEN IT MATTERS MOST

Cascade Redundancy provides peace of mind because it helps ensure that a CREST boiler system will always deliver reliable performance with no downtime. If the lead boiler is turned off for maintenance, Cascade Redundancy automatically shifts the lead role to the second sequenced boiler.

Sequences up to an 8-boiler system using simple 2-wire daisy-chain connection, eliminating cost and uncertainty of separate "third party" sequencer. On demand, one boiler functions as the leader and modulates to capacity. Increasing load then "cascades" to additional "lag" boilers in sequence as needed. Lead-lag rotation shifts "first on" boiler role every 24 hours, distributing equal lead-lag runtimes to each unit.

CREST's ability to sequence up to eight units that each have as much as 20:1 turndown means that the combined system has the potential of operating with modulation of up to 160:1 turndown. A bank of eight 2.5M Btu CRESTs would be able to provide as little as 125,000 Btu/hr and as much as 20,000,000 Btu/hr of



heating output. In addition, the CREST Cascade can be set for "Efficiency Optimization" with each boiler firing at the same low BTU/hr input rates to receive the benefits of the highest thermal efficiency.



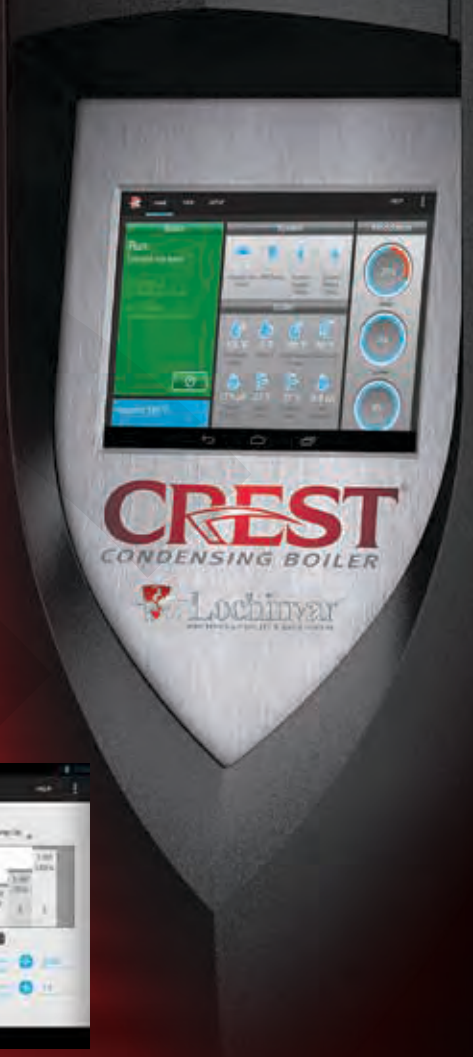
BOILER PLANT CONTROL, FROM ANYWHERE.

Crest features the next generation of Lochinvar's all-in-one SMART TOUCH™ operating control with the integration of the CON-X-US® advanced technology. SMART TOUCH with CON-X-US provides outstanding functionality, and can be integrated directly into a Building Automation Systems via Modbus or BACnet MSTP as standard equipment.

And now, the CON-X-US mobile communication platform allows the SMART TOUCH to go where no other boiler has gone before.

CON-X-US provides the ability to monitor and manage multiple Crest boiler plants without ever stepping into the mechanical rooms.

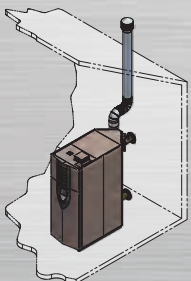
CON-X-US will send alerts via text or email notifying of changes in system status, and anytime, from anywhere, a user can check system status and re-program any boiler function. Once downloaded, the free CON-X-US mobile application allows for remote access to all SMART TOUCH functions using any internet-capable device.



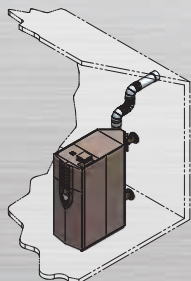
CON-X-US®

DIRECT-VENTING UP TO 100 FEET

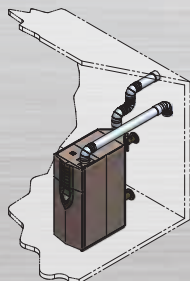
CREST offers 6 venting options and tremendous flexibility for placement of units within the building, because it permits direct-vent air intake and exhaust runs up to 100 equivalent feet using AL29-4C stainless steel (Category IV) vent pipe. Intake and exhaust runs can terminate horizontally through a sidewall or vertically through the roof. Additionally, CREST boilers installed in multiples of 2 or more can be common-vented, eliminating much of the time and material cost of venting multiple boilers individually.



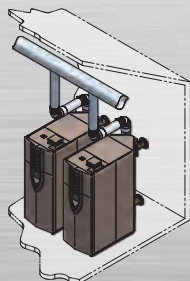
Room Air Vertical



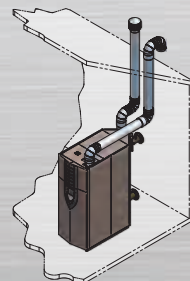
Room Air Sidewall



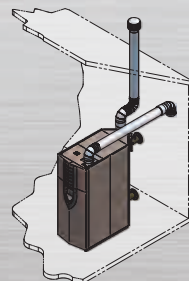
Direct-Vent Sidewall



Common-Vent*



Direct-Vent Vertical

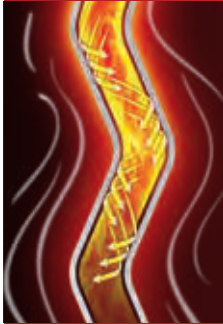


Vertical w/Sidewall Air

*Contact Lochinvar for information on common venting of CREST boilers.

THE INDUSTRY'S FIRST WAVE™ FIRE-TUBE BOILER IS ALSO THE INDUSTRY'S BEST

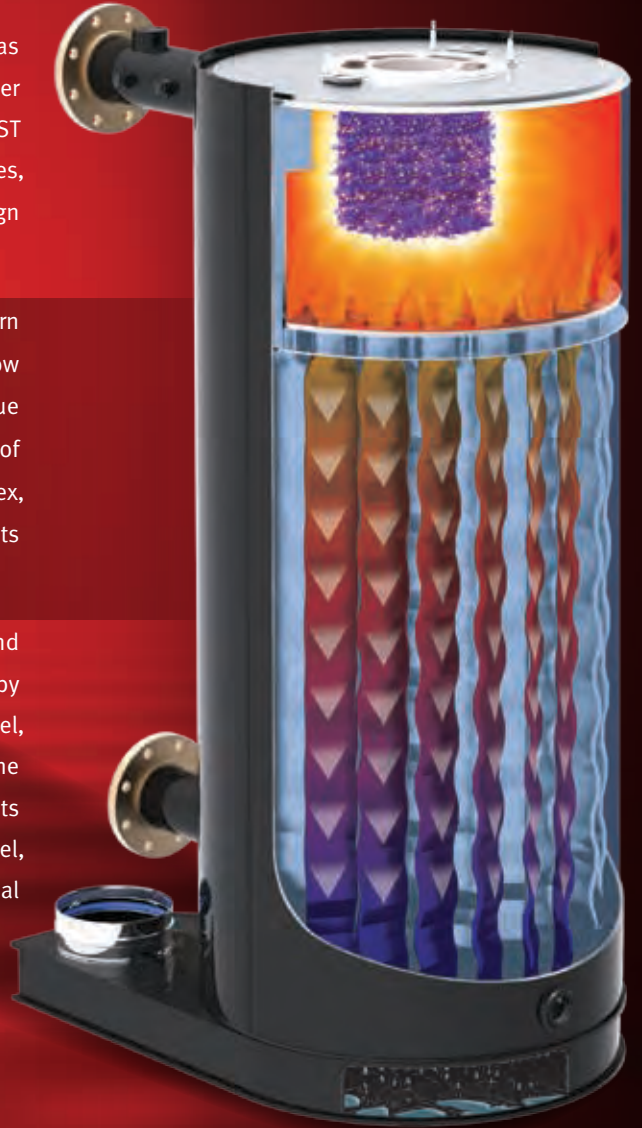
Through an extensive research and design program, Lochinvar has taken fire-tube boiler technology to a new level. The CREST® boiler features the Wave™ 316L stainless steel fire-tube. Each CREST Fire Tube has a larger input capacity than other industry fire-tubes, which means fewer tubes and welds. This exclusive, new design provides superior heat transfer in every fire-tube.



The Wave™ fire-tube employs a unique wave pattern that creates turbulence as the flue gas products flow down the tube, scrubbing the energy from the flue products. The Wave™ design also enhances the life of the heat exchanger by allowing the fire-tubes to flex, operating stress-free with none of the adverse effects suffered by traditional fire-tube boilers.

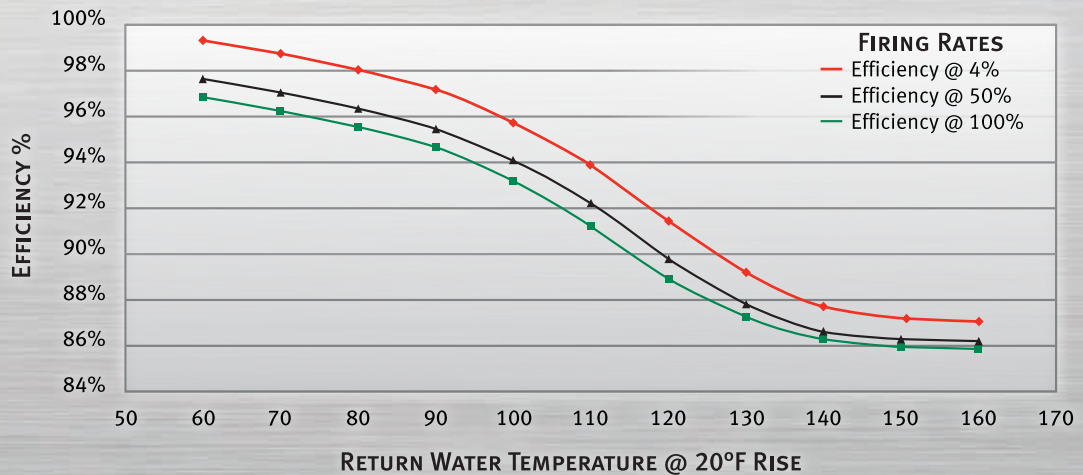
Each fire-tube is welded into the heat exchanger vessel and surrounded by water. The heat transfer process is enhanced by the water's counterflow. As the water flows up inside the vessel, the super-heated flue products flow down the fire-tube. With one pass, the heat is effectively captured from the flue products reaching condensing temperatures. At the top of the vessel, the combustion chamber is also water-backed for additional heat transfer.

Finally, the CREST heat exchanger can operate with flow rates from as low as 25 GPM* to 550 GPM, comfortably suited to a wide variety of boiler system designs.

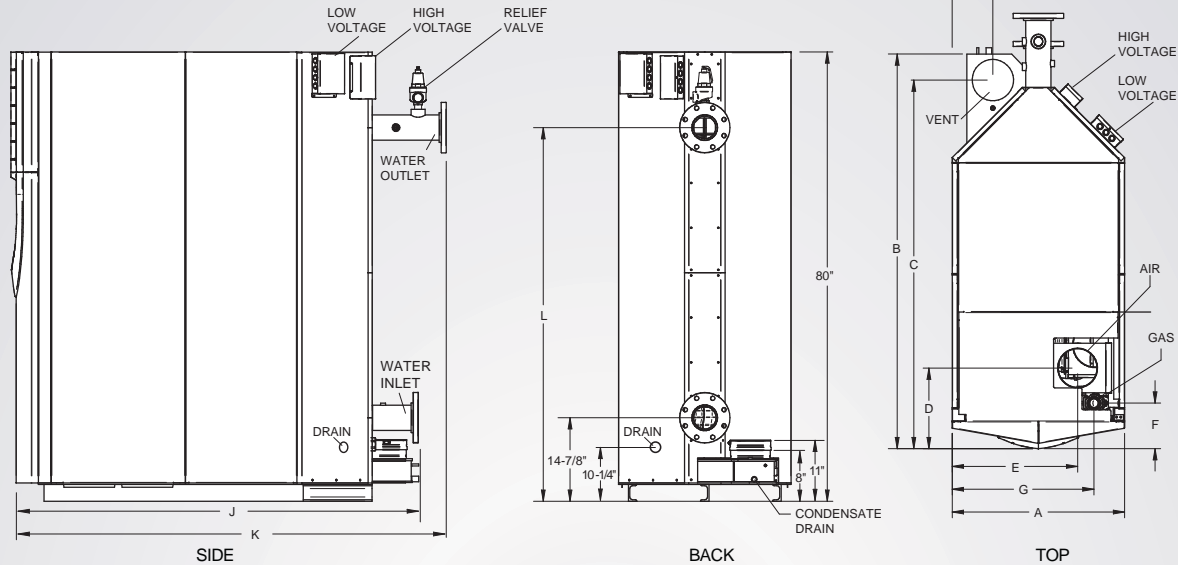


* 25 GPM min. flow on FB2500-3000 models, 45 GPM on FB3500-4000 models, 50 GPM on FB5000 and 60 GPM on FB6000.

CREST BOILER EFFICIENCY



CREST® BOILER DIMENSIONS AND SPECIFICATIONS



CREST HEATING BOILER							DIMENSIONS AND SPECIFICATIONS																
Model Number	Input MBH Min.	Input MBH Max.	AHRI Thermal %	Gross Output MBH	NET AHRI Rating MBH	Turn down*	A	B	C	D	E	F	G	H	J	K	L	Water Conn. Size	Gas Conn.	Air Inlet	Vent Size	Oper Wt. (lbs.)	Ship Wt. (lbs.)
FB*2500	125	2,500	92.0%	2,300	2,000	20:1	34-1/4"	76-3/8"	70-1/4"	17-3/4"	26-1/8"	9-3/4"	27-3/8"	6-1/4"	78"	83"	66-5/8"	4"	2"	8"	9"	3,652	2,560
FB*3000	150	3,000	92.0%	2,760	2,400	20:1	40-1/2"	83-5/8"	76-3/8"	17-3/8"	31-3/8"	9-7/8"	34-3/4"	8-1/2"	82-1/8"	87-1/8"	66-5/8"	4"	2"	10"	10"	4,126	2,920
FB*3500	200	3,500	92.0%	3,220	2,800	18:1	40-1/2"	83-1/4"	75-5/8"	17-1/4"	31-3/8"	9-7/8"	34-3/4"	7-1/4"	81-1/8"	86-1/8"	66-5/8"	4"	2"	10"	10"	4,744	3,225
FB*4000	335	4,000	93.0%	3,720	3,235	12:1	53-1/2"	109"	100-3/4"	31-1/4"	40-3/4"	14-1/2"	45-3/4"	12-1/2"	104-1/4"	108-1/4"	66-5/8"	4"	2-1/2"	12"	12"	6,900	4,750
FB*5000	500	5,000	93.0%	4,650	4,043	10:1	53-1/2"	107"	100-3/4"	28"	40-3/4"	11"	45-1/2"	9"	104"	108-1/4"	66-5/8"	4"	2-1/2"	14"	14"	8,000	5,550
FB*6000	600	6,000	92.0%	5,520	4,799	10:1	53-1/2"	107"	100-3/4"	28"	40-3/4"	11"	45-1/2"	9"	104"	108-1/4"	65-5/8"	6"	2-1/2"	14"	14"	8,100	5,650

NOTES: Indoor installation only. All information subject to change. Change "N" to "L" for LP gas models and to "D" for dual fuel models. For Low NOx on FB2500 - FB6000 models, consult factory. *Turndown rate reduced on LP gas models. *The Net AHRI Water Ratings shown are based on a piping and pickup allowance of 1.15.

SMART TOUCH™ FEATURES

- CON-X-US Remote Connect
- SMART TOUCH™ Touchscreen Operating Control
- Full-Color 8" Touchscreen LCD Display
- Built-in Cascading Sequencer for up to 8 Boilers
 - Built-in Redundancy
 - Cascade Multiple Sized Boilers
 - Lead/Lag Cascade
 - Efficiency Optimized Cascade
- Front-End Loading Capability with Copper-Fin II® and Power-fin® Boilers
- Building Management System Integration with 0-10 VDC Input
- BACnet MSTP Communications
- Modbus Communications
- Outdoor Reset Control with Outdoor Air Sensor
- Password Security
- 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
- Low Water Flow Safety Control & Indication
- Inlet & Outlet Temperature Readout
- Freeze Protection
- Service Reminder
- Time Clock
- Data Logging
 - Hours Running, Space Heating
 - Hours Running, Domestic Hot Water
 - Hours Running, Modulation Rate
 - Ignition Attempts
 - Last 10 Lockouts
- Programmable System Efficiency Optimizers
 - Night Setback
 - Anti-Cycling
 - Outdoor Air Reset Curve
 - Ramp Delay
 - Boost Temperature & Time
- Three Pump Control
 - System Pump
 - Boiler Pump
 - Domestic Hot Water Pump

High-Voltage Terminal Strip

- > 120 VAC / 60 Hertz / 1 Phase Power Supply (FB2500-3500)
- > 208 VAC / 60 Hertz / 3 Phase Power Supply (FB4000-6000)
- > System Pump, Boiler Pump and DHW Pump Power

Low-Voltage Terminal Strip

- > 24 VAC Auxiliary Device Relay
- > Auxiliary Proving Switch Contacts
- > Alarm on Any Failure Contacts
- > Runtime Contacts
- > DHW Thermostat Contacts
- > Unit Enable/Disable Contacts
- > System Sensor Contacts
- > DHW Tank Sensor Contacts
- > Outdoor Air Sensor Contacts
- > Cascade Contacts
- > 0-10 VDC BMS External Control Contact

OPTIONAL EQUIPMENT

- Alarm Bell
- BMS Gateway - BACnet IP or LonWorks
- Wireless Outdoor Temperature Sensor
- Condensate Neutralization Kit
- SMART TOUCH PC Software
- Common Vent Kits
- Dual Fuel Gas Train
- Air Filter Box
- Motorized Isolation Valve
- Variable Speed Boiler Pump
- Electrical Options (Shipped Loose):
 - > 208V/3Ø/60Hz (Models FB2500-3500 only)
 - > 480V/3Ø/60Hz
 - > 600V/3Ø/60Hz

CODES & REGISTRATIONS

- ANSI Z21.13/CSA Certified
- ASME certified, "H" Stamp / National Board California Code Compliant
- CSD1 / Factory Mutual / GE Gap Compliant
- Canadian Registration Number (CRN)
- Bay Area Air Quality Management District Qualified (FB2500-FB5000)
- AHRI Certified

STANDARD FEATURES

- Up to 93% Thermal Efficiency (AHRI)
- Up to 99% Thermal Efficiency
 - in Low Temperature Applications
- Modulating Burner with up to 20:1 Turndown
- Proof of Closure Valve (FB6000)
- Direct-Spark Ignition
- Low NOx Operation
- Sealed Combustion
- Low Gas Pressure Operation
- Vertical or Horizontal Venting
- Category IV Venting up to 100 Feet
- ASME "H" Stamped Heat Exchanger
- 316L Stainless Steel Fire Tubes
- 160 psi Working Pressure
- On/Off Switch
- Adjustable High Limit with Manual Reset
- Low Water Cutoff with Manual Reset & Test
- High & Low Gas Pressure Switches w/Manual Reset
- Low Air Pressure Switches
- Condensate Trap w/ Blocked Drain Switch
- Drain Valve
- System Sensor
- Outdoor Air Sensor
- Inlet & Outlet Temperature Sensors
- High Voltage Terminal Strip
- Low Voltage Terminal Strip
- Downstream Gas Test Cocks
- 50 psi ASME Relief Valve
- Temperature & Pressure Gauge
- Zero Clearances to Combustible Materials
- 10-Year Limited Warranty (See Warranty for Details)
- 1-Year Warranty on Parts (See Warranty for Details)

Registered Under U.S. Patent #8286594

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

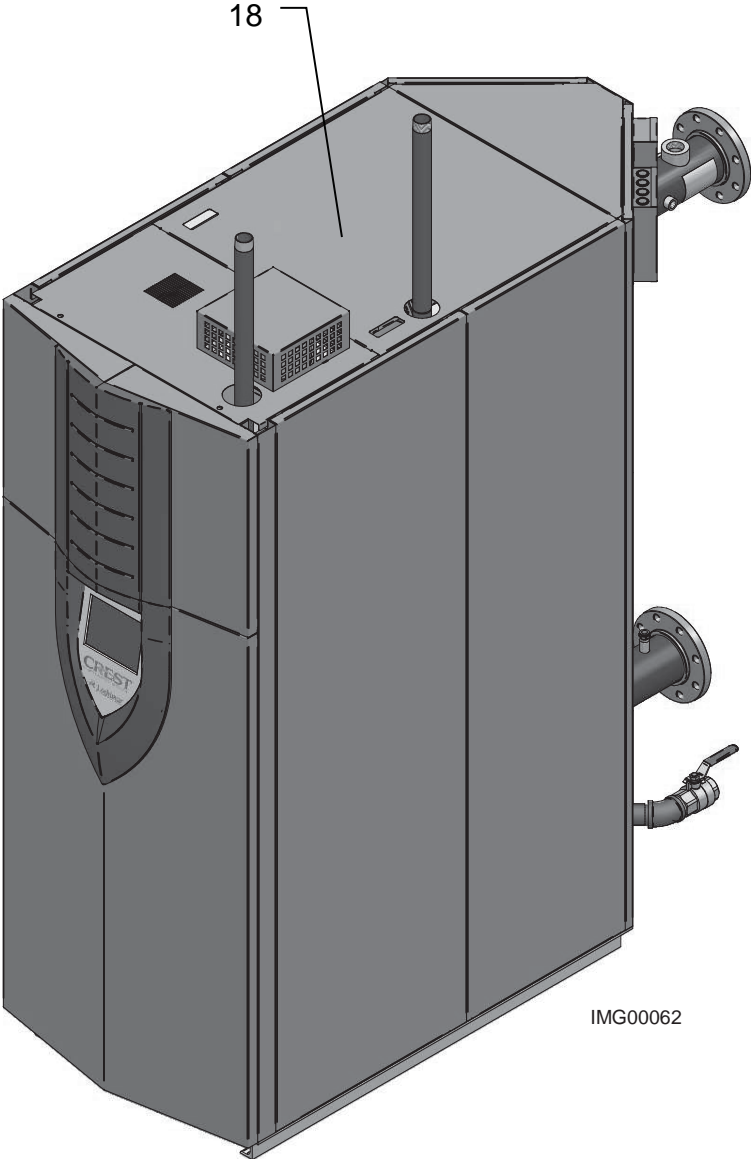
*The ratings have been determined under the provisions governing forced draft burners.



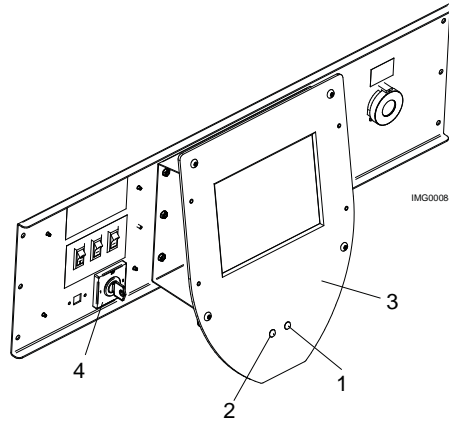


**Dual Fuel Supplemental
Replacement Parts List**

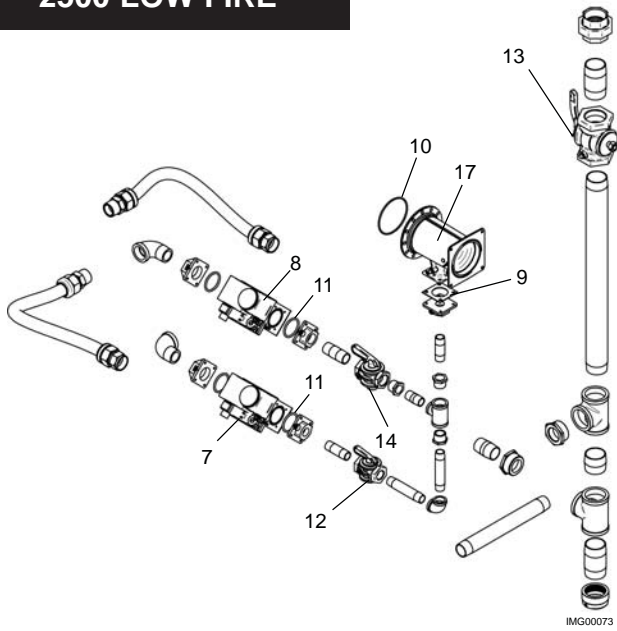
**Crest®
Heating Boilers
FBD 2500 - 5000**



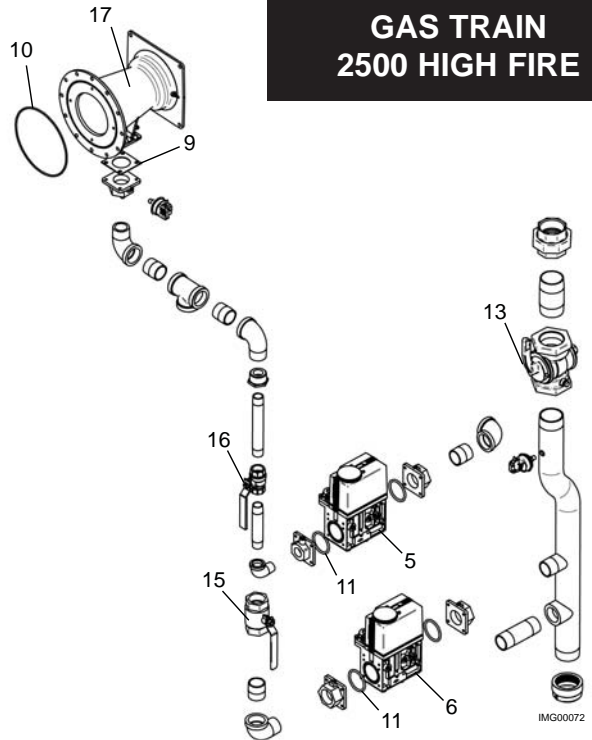
DISPLAY PANEL



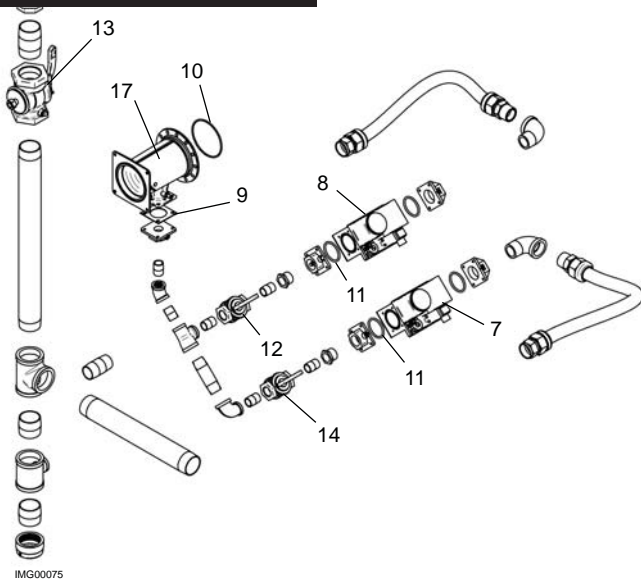
**GAS TRAIN
2500 LOW FIRE**



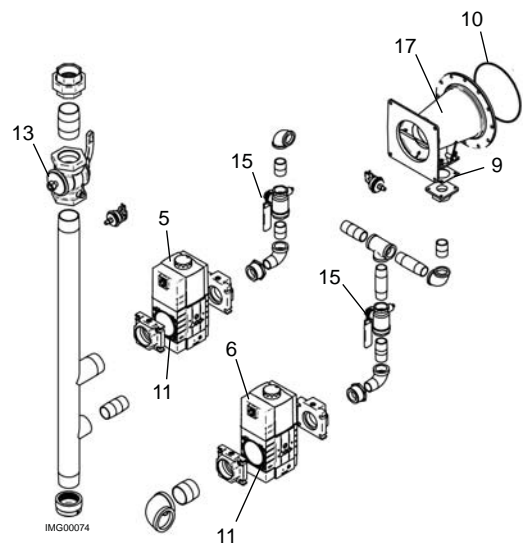
**GAS TRAIN
2500 HIGH FIRE**



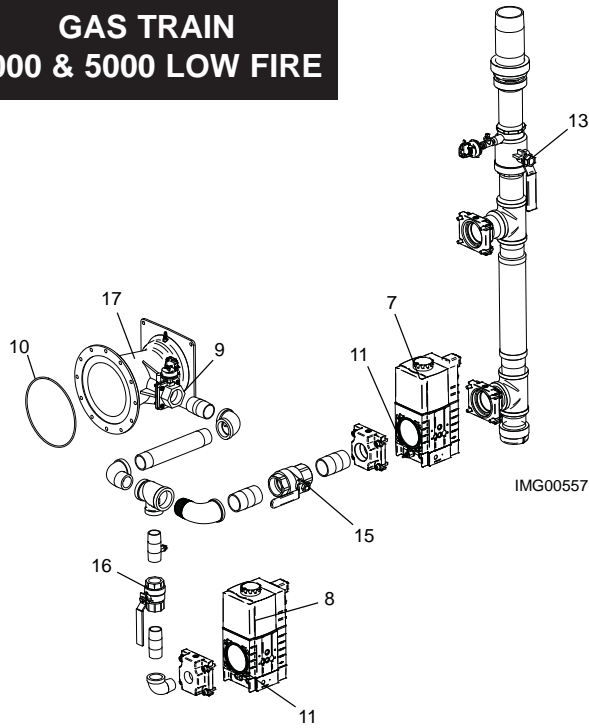
**GAS TRAIN
3000 & 3500 LOW FIRE**



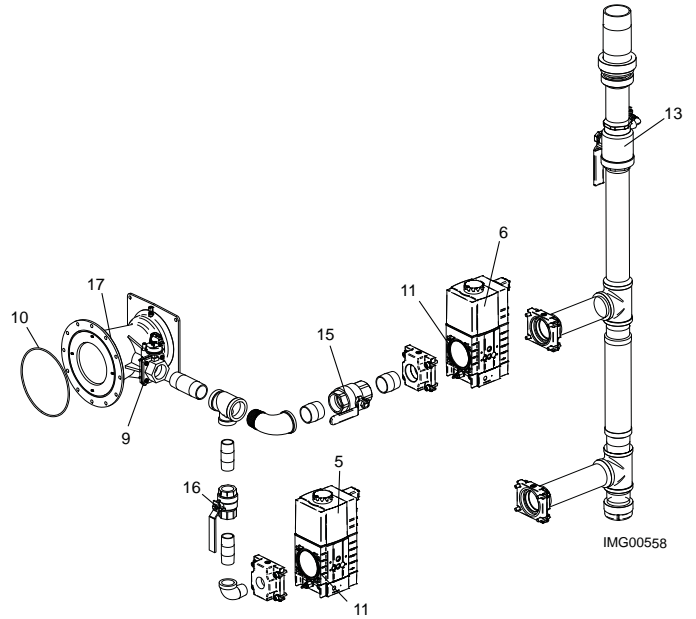
**GAS TRAIN
3000 & 3500 HIGH FIRE**



**GAS TRAIN
4000 & 5000 LOW FIRE**



**GAS TRAIN
4000 & 5000 HIGH FIRE**



ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS			
1	100162723	INDICATOR LIGHT RED	ALL
2	100162738	INDICATOR LIGHT GREEN	ALL
3	100163270	DISPLAY MOUNTING PLATE	ALL
4	100172874	KEY ASSEMBLY	ALL
GAS TRAIN ASSEMBLY			
5	100171956	GAS VALVE ASSEMBLY, NAT - HIGH FIRE	FBD2500
5	100171958	GAS VALVE ASSEMBLY, NAT - HIGH FIRE	FBD3000
5	100171960	GAS VALVE ASSEMBLY, NAT - HIGH FIRE	FBD3500
5	100171977	GAS VALVE ASSEMBLY, NAT - HIGH FIRE	FBD4000
5	100171974	GAS VALVE ASSEMBLY, NAT - HIGH FIRE	FBD5000
6	100171966	GAS VALVE ASSEMBLY, LP - HIGH FIRE	FBD2500
6	100171968	GAS VALVE ASSEMBLY, LP - HIGH FIRE	FBD3000
6	100171970	GAS VALVE ASSEMBLY, LP - HIGH FIRE	FBD3500
6	100171979	GAS VALVE ASSEMBLY, LP - HIGH FIRE	FBD4000
6	100171976	GAS VALVE ASSEMBLY, LP - HIGH FIRE	FBD5000
7	100171957	GAS VALVE ASSEMBLY, NAT - LOW FIRE	FBD2500
7	100171959	GAS VALVE ASSEMBLY, NAT - LOW FIRE	FBD3000
7	100171961	GAS VALVE ASSEMBLY, NAT - LOW FIRE	FBD3500
7	100171973	GAS VALVE ASSEMBLY, NAT - LOW FIRE	FBD4000
7	100171978	GAS VALVE ASSEMBLY, NAT - LOW FIRE	FBD5000
8	100171967	GAS VALVE ASSEMBLY, LP - LOW FIRE	FBD2500
8	100171969	GAS VALVE ASSEMBLY, LP - LOW FIRE	FBD3000
8	100171971	GAS VALVE ASSEMBLY, LP - LOW FIRE	FBD3500
8	100171975	GAS VALVE ASSEMBLY, LP - LOW FIRE	FBD4000
8	100171980	GAS VALVE ASSEMBLY, LP - LOW FIRE	FBD5000
9	100146470	GASKET, FLANGE VENTURI	ALL
10	100146476	GASKET, FAN/VENTURI	ALL
11	100146388	GASKET, O-RING (HIGH FIRE 3000-5000) (LOW FIRE 4000 & 5000)	FBD3000 - 5000
11	100146387	GASKET, O-RING (LOW FIRE 2500-3500) (HIGH FIRE 2500)	FBD2500 - 3500
12	100146148	GAS CUT OFF VALVE 3/4"	FBD2500 - 3000

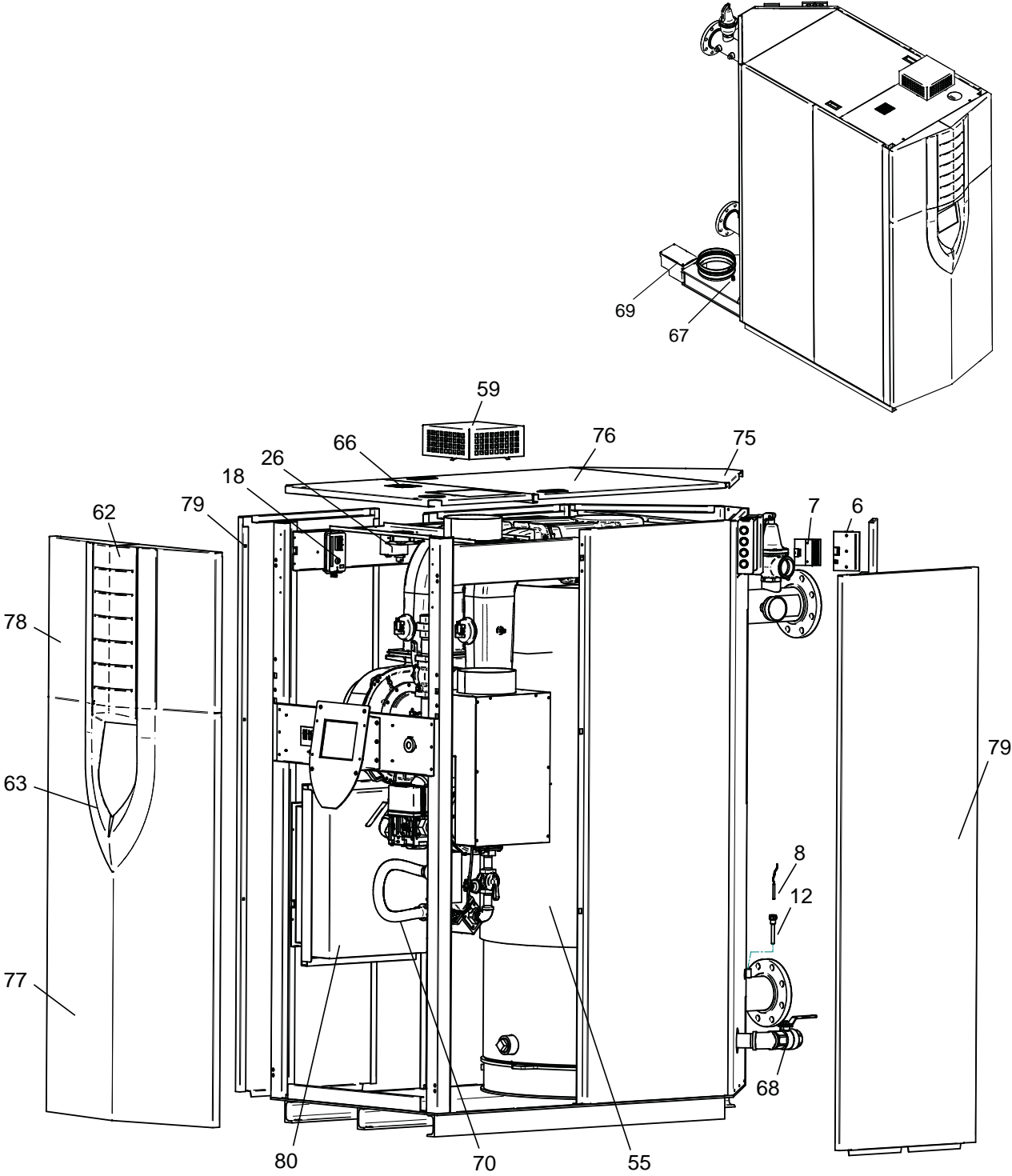
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
GAS TRAIN ASSEMBLY CONTINUED			
12	100173728	GAS CUT OFF VALVE 1"	FBD3500
13	100146146	GAS CUT OFF VALVE 2"	FBD2500 - 5000
14	100146148	GAS CUT OFF VALVE 3/4"	FBD3000
14	100146149	GAS CUT OFF VALVE 1"	FBD2500
14	100171788	GAS CUT OFF VALVE 1"	FBD3500
15	100171911	GAS CUT OFF VALVE 1 1/4"	FBD2500 & 3500
15	100171788	GAS CUT OFF VALVE 1"	FBD3000
15	100173733	GAS CUT OFF VALVE 1 1/2"	FBD4000 & 5000
16	100171744	GAS CUT OFF VALVE 3/4"	FBD2500
16	100173728	GAS CUT OFF VALVE 1"	FBD4000 & 5000
17	100171780	VALVE, VENTURI (HIGH FIRE 2500) (LOW FIRE 3500)	FBD2500 & 3500
17	100171878	VALVE, VENTURI LOW FIRE	FBD2500 & 3000
17	100171763	VALVE, VENTURI (HIGH FIRE 3000 - 5000) (LOW FIRE 4000 & 5000)	FBD3000 - 5000
JACKET ASSEMBLIES			
18	100153170	JACKET, OUTER TOP MIDDLE	FBD2500
18	100153171	JACKET, OUTER TOP MIDDLE	FBD3000
18	100153172	JACKET, OUTER TOP MIDDLE	FBD3500
18	100267485	JACKET, OUTER TOP MIDDLE	FBD4000 & 5000
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			



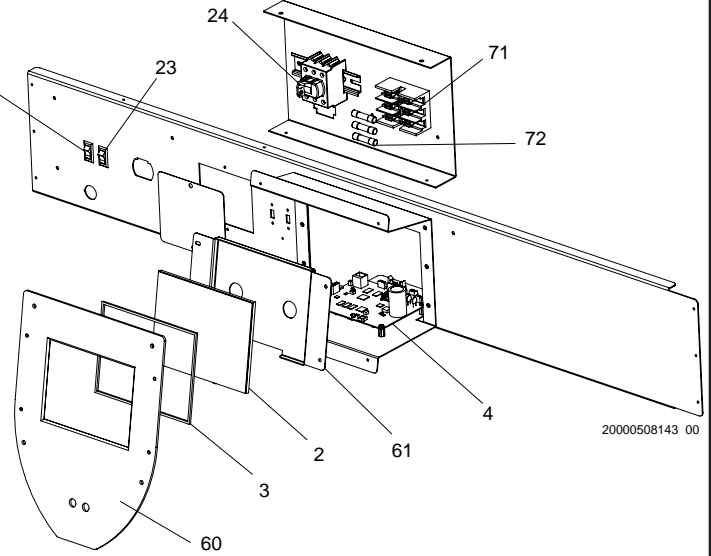
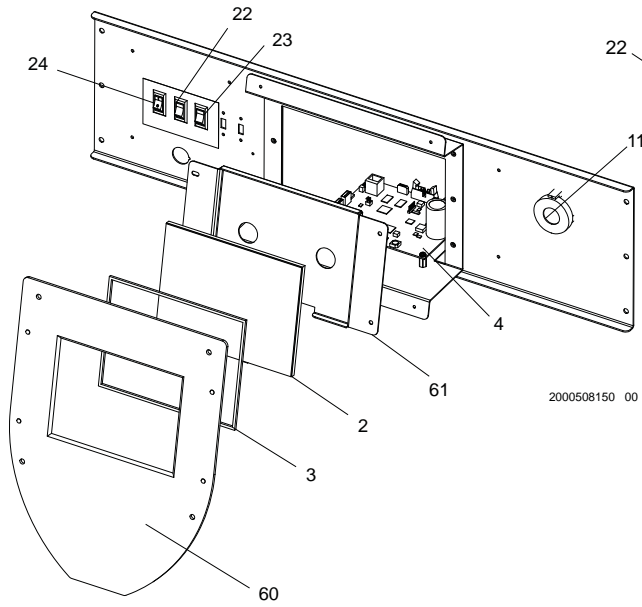
Replacement Parts List

Crest® Heating Boilers FBN(L) 2500 - 6000



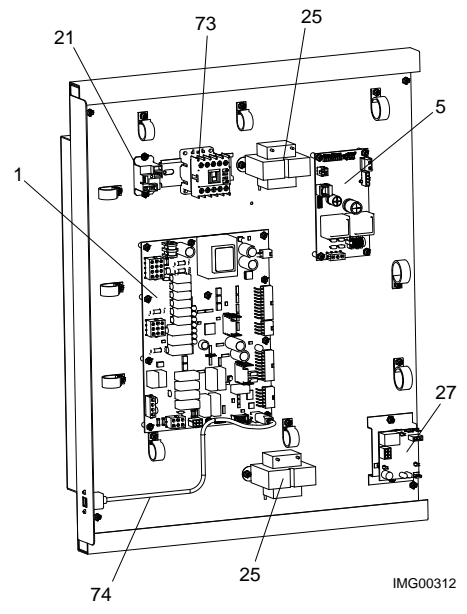
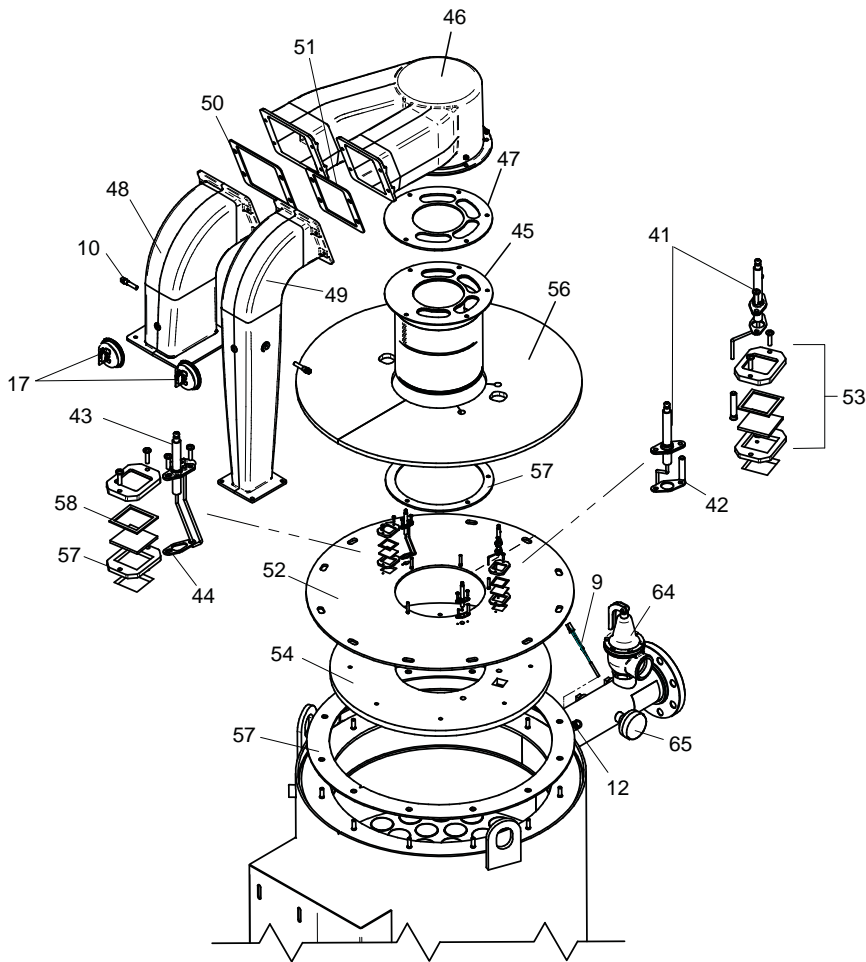
**DISPLAY PANEL
(FBN/L 2500 - 3500)**

**DISPLAY PANEL
(FBN/L 4000 - 6000)**

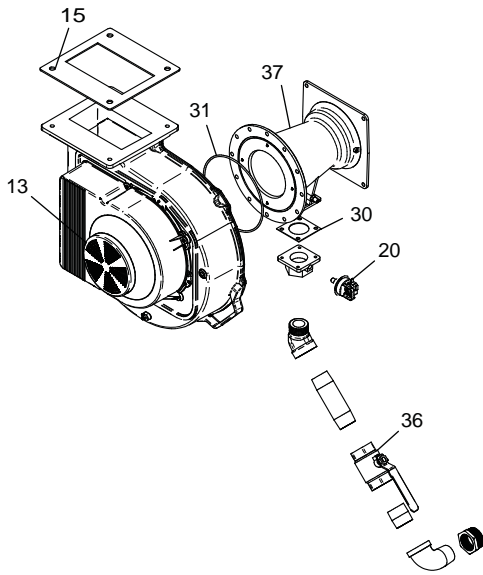


HEAT EXCHANGER

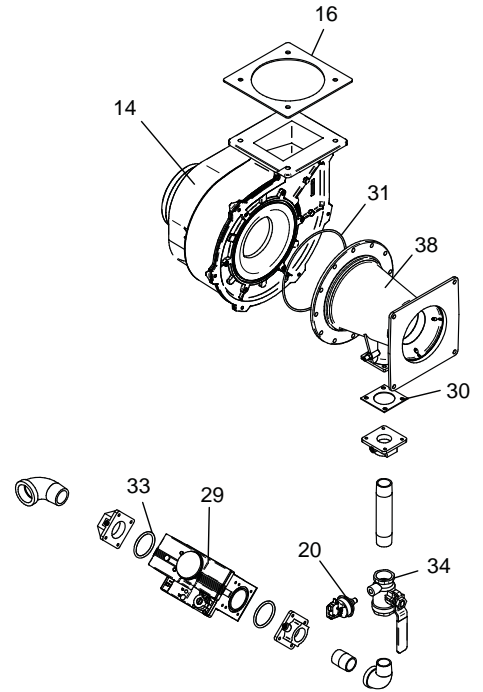
CONTROL PANEL



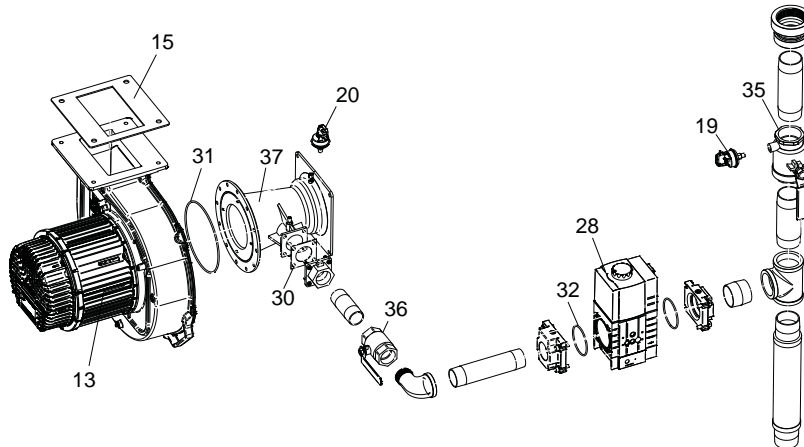
**GAS TRAIN - HIGH FIRE
(FBN/L 2500 - 3500)**



**GAS TRAIN - LOW FIRE
(FBN/L 2500 - 3500)**

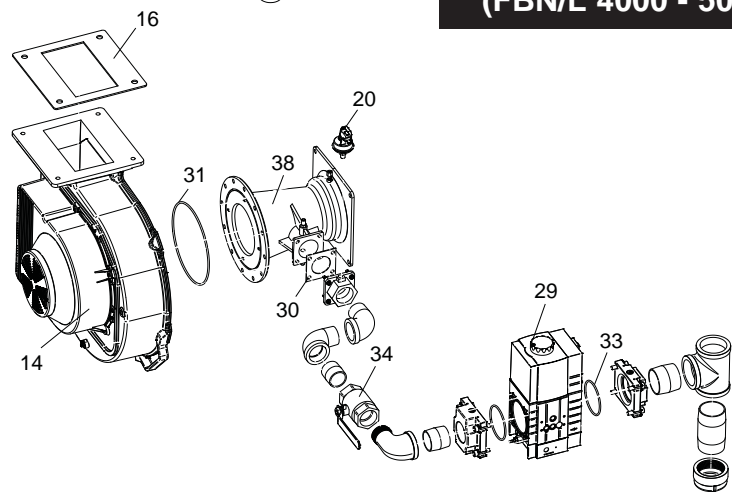


**GAS TRAIN - HIGH FIRE
(FBN/L 4000 - 5000)**



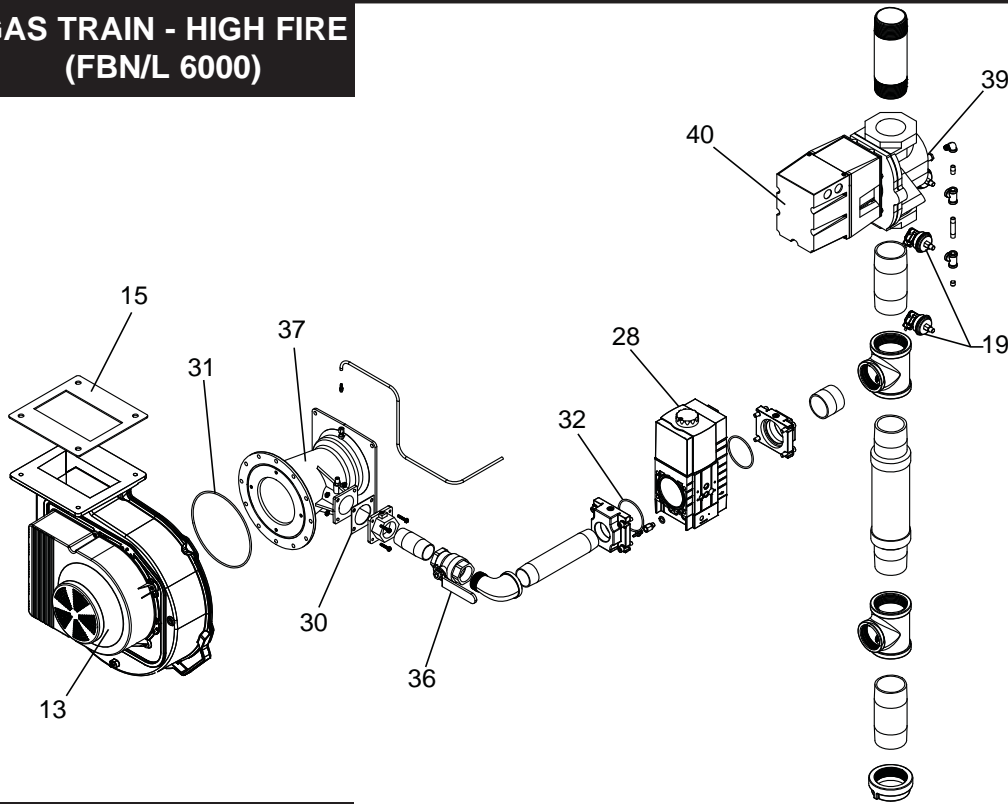
IMG00313

**GAS TRAIN - LOW FIRE
(FBN/L 4000 - 5000)**

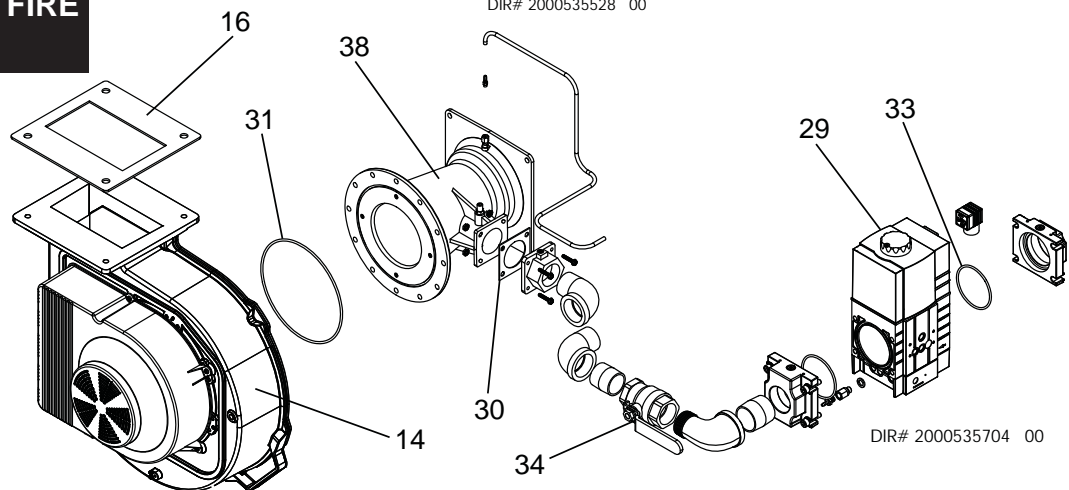


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**GAS TRAIN - HIGH FIRE
(FBN/L 6000)**



**GAS TRAIN - LOW FIRE
(FBN/L 6000)**



ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS			
1	100167576*	INTEGRATED CONTROL (BEGINNING SERIAL #4015)	FB 2500
1	100167592*	INTEGRATED CONTROL (BEGINNING SERIAL #4015)	FB 3000 & 3500
1	100167606*	INTEGRATED CONTROL (BEGINNING SERIAL #4015)	FB 4000 & 5000
1	100274234*	INTEGRATED CONTROL	FB 6000
2	100190853	LCD DISPLAY (BEGINNING SERIAL #4015)	ALL
3	100266673	GASKET, LCD DISPLAY	ALL
4	100094861	DISPLAY COMMUNICATION CONTROL (BEGINNING SERIAL #4015)	ALL
5	100191023	BACNET BOARD	ALL
6	100167609*	LOW VOLTAGE CONTROL BOARD	ALL
7	100167590*	LOW VOLTAGE CONTROL BOARD	ALL
8	100170581*	SENSOR, INLET / SYSTEM	ALL
9	100170539*	SENSOR, DUAL OUTLET	ALL
10	100170543	SENSOR, PREMIX GAS / AIR ARM	ALL
11	100148379*	HIGH LIMIT	ALL
12	100170603	BULB WELL	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS
*ITEMS DENOTE SUGGESTED INVENTORY PARTS

ITEM NO.	PART NO.	DESCRIPTION	MODEL
CONTROLS (CONTINUED)			
13	100144982	FAN ASSEMBLY	FB 2500 - 3500
13	100144990	FAN ASSEMBLY	FB 4000 - 6000
14	100144980	FAN ASSEMBLY	FB 2500 & 3000
14	100145022	FAN ASSEMBLY	FB 3500
14	100144982	FAN ASSEMBLY	FB 4000
14	100144990	FAN ASSEMBLY	FB 5000 & 6000
15	100146347*	GASKET, FAN	FB 2500 - 6000
16	100146458*	GASKET, FAN	FB 2500 & 3000
16	100146477*	GASKET, FAN	FB 3500
16	100146347*	GASKET, FAN	FB 4000 - 6000
17	100166127*	AIR PRESSURE SWITCH	ALL
18	100166186*	AIR PRESSURE SWITCH	ALL
19	100166123*	GAS PRESSURE SWITCH, LOW	ALL
20	100166125*	GAS PRESSURE SWITCH, HIGH	ALL
21	100167731*	RELAY, 120V	FB 2500 - 4000
22	100169472	MOMENTARY OFF SWITCH, RED	ALL
23	100169473	MOMENTARY OFF SWITCH, BLACK	ALL
24	100169464	SWITCH, ON / OFF	ALL
24	100169465	SWITCH, DISCONNECT	FB 4000 - 6000
25	100170172	TRANSFORMER, 24V, 40VA	ALL
26	100170181	TRANSFORMER, SPARK	ALL
27	100173747	LOW WATER CUT-OFF, MANUAL RESET	ALL
-	100173717	PROBE, LWCO	ALL
-	100173640	BOOT, LWCO	ALL
GAS TRAIN ASSEMBLY			
28	100171956	GAS VALVE ASSEMBLY, NAT	FBN2500
28	100171958	GAS VALVE ASSEMBLY, NAT	FBN3000
28	100171960	GAS VALVE ASSEMBLY, NAT	FBN3500
28	100171977	GAS VALVE ASSEMBLY, NAT	FBN4000
28	100171974	GAS VALVE ASSEMBLY, NAT	FBN5000
28	100277268	GAS VALVE ASSEMBLY, NAT	FBN6000
28	100171966	GAS VALVE ASSEMBLY, LP	FBL2500
28	100171968	GAS VALVE ASSEMBLY, LP	FBL3000
28	100171970	GAS VALVE ASSEMBLY, LP	FBL3500
28	100171979	GAS VALVE ASSEMBLY, LP	FBL4000
28	100171976	GAS VALVE ASSEMBLY, LP	FBL5000
28	100277270	GAS VALVE ASSEMBLY, LP	FBL6000
29	100171957	GAS VALVE ASSEMBLY, NAT	FBN2500
29	100171959	GAS VALVE ASSEMBLY, NAT	FBN3000
29	100171961	GAS VALVE ASSEMBLY, NAT	FBN3500
29	100171973	GAS VALVE ASSEMBLY, NAT	FBN4000
29	100171978	GAS VALVE ASSEMBLY, NAT	FBN5000
29	100277269	GAS VALVE ASSEMBLY, NAT	FBN6000
29	100171967	GAS VALVE ASSEMBLY, LP	FBL2500
29	100171969	GAS VALVE ASSEMBLY, LP	FBL3000
29	100171971	GAS VALVE ASSEMBLY, LP	FBL3500
29	100171975	GAS VALVE ASSEMBLY, LP	FBL4000
29	100171980	GAS VALVE ASSEMBLY, LP	FBL5000
29	100277311	GAS VALVE ASSEMBLY, LP	FBL6000
30	100146470*	GASKET, FLANGE VENTURI	ALL
31	100146476*	GASKET, FAN / VENTURI	ALL
32	100146387*	GASKET, O-RING	FB 2500
32	100146388*	GASKET, O-RING	FB 3000 - 6000
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			
*ITEMS DENOTE SUGGESTED INVENTORY PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
GAS TRAIN ASSEMBLY (CONTINUED)			
33	100146387*	GASKET, O-RING	FB 2500-3500
33	100146388*	GASKET, O-RING	FB 4000 - 6000
34	100146148	GAS CUT OFF VALVE - 3/4"	FB 2500 - 3000
34	100171788	VALVE, BALL	FB 3500
34	100171911	VALVE, BALL	FB 4000 - 6000
35	100146146	GAS CUT OFF VALVE - 2"	FB 2500 - 5000
35	100173738	GAS CUT OFF VALVE - 2 1/2"	FB 6000
36	100171911	VALVE, BALL	FB 2500 & 3500-6000
36	100171788	VALVE, BALL	FB 3000
37	100171780	VALVE, VENTURI	FB 2500
37	100171763	VALVE, VENTURI	FB 3000 - 6000
38	100171878	VALVE, VENTURI	FB 2500 & 3000
38	100171780	VALVE, VENTURI	FB 3500
38	100171763	VALVE, VENTURI	FB 4000 - 6000
39	100273737	VALVE, PROOF OF CLOSURE	FB 6000
40	100273736	VALVE, ACTUATOR, PROOF OF CLOSURE	FB 6000
PILOT & BURNER ASSEMBLIES			
41	100165923*	FLAME SENSOR W/ GASKET	FB 2500 - 5000
41	100277290*	FLAME SENSOR W/ GASKET	FB 6000
42	100146376	GASKET, FLAME SENSOR	ALL
43	100165924*	IGNITOR W/ GASKET	FB 2500 - 5000
43	100277283*	IGNITOR W/ GASKET	FB 6000
44	100146375	GASKET, IGNITOR	ALL
45	100188645	BURNER W/ GASKET	FB 2500
45	100188646	BURNER W/ GASKET	FB 3000
45	100188647	BURNER W/ GASKET	FB 3500
45	100135276	BURNER W/ GASKET	FB 4000
45	100135277	BURNER W/ GASKET	FB 5000
45	100277260	BURNER W/ GASKET	FB 6000
46	100189405	GAS / AIR MANIFOLD W/ GASKET	FB 2500 - 3500
46	100173767	GAS / AIR MANIFOLD W/ GASKET	FB 4000 - 6000
47	100190886*	KIT, MANIFOLD GASKET (BEGINNING SERIAL # D14)	FB 2500 - 3500
47	100191014*	KIT, MANIFOLD GASKET	FB 4000
47	100142506*	KIT, MANIFOLD GASKET	FB 5000 & 6000
48	100173658	GAS / AIR ARM	FB 2500 - 3500
48	100173668	GAS / AIR ARM	FB 4000 - 6000
49	100173660	GAS / AIR ARM	FB 2500 & 3000
49	100173661	GAS / AIR ARM	FB 3500
49	100173667	GAS / AIR ARM	FB 4000 - 6000
50	100146349	GASKET, GAS / AIR ARM	FB 2500 - 3500
50	100146401	GASKET, GAS / AIR ARM	FB 4000 - 6000
51	100146351	GASKET, GAS / AIR ARM	FB 2500 - 3500
51	100146401	GASKET, GAS / AIR ARM	FB 4000 - 6000
52	100190928	DOOR, HEAT EXCHANGER ASSEMBLY (BEGINNING SERIAL # D14)	FB 2500
52	100191016	DOOR, HEAT EXCHANGER ASSEMBLY (BEGINNING SERIAL # D14)	FB 3000
52	100189836	DOOR, HEAT EXCHANGER ASSEMBLY (BEGINNING SERIAL # D14)	FB 3500
52	100173769	DOOR, HEAT EXCHANGER ASSEMBLY	FB 4000
52	100173770	DOOR, HEAT EXCHANGER ASSEMBLY	FB 5000
52	100277313	DOOR, HEAT EXCHANGER ASSEMBLY	FB 6000
MISCELLANEOUS			
53	100163214	SIGHT GLASS	ALL
54	100145372	FIBERBOARD, BURNER	FB 2500
PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS			
*ITEMS DENOTE SUGGESTED INVENTORY PARTS			

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
54	100145373	FIBERBOARD, BURNER	FB 3000
54	100145374	FIBERBOARD, BURNER	FB 3500
54	100145413	FIBERBOARD, BURNER	FB 4000
54	100145414	FIBERBOARD, BURNER	FB 5000
54	100269234	FIBERBOARD, BURNER	FB 6000
55	100145377	INSULATION, HEX WRAP	FB 2500
55	100145378	INSULATION, HEX WRAP	FB 3000
55	100145379	INSULATION, HEX WRAP	FB 3500
55	100145416	INSULATION, HEX WRAP	FB 4000
55	100145417	INSULATION, HEX WRAP	FB 5000 & 6000
56	100145404	INSULATION, HEX TOP	FB 2500
56	100145405	INSULATION, HEX TOP	FB 3000
56	100145406	INSULATION, HEX TOP	FB 3500
56	100145418	INSULATION, HEX TOP	FB 4000
56	100145419	INSULATION, HEX TOP	FB 5000 - 6000
57	100146357*	GASKET SET(BNR, HEX, SIGHT GLASS) (PRIOR TO SERIAL # D14)	FB 2500
57	100188940*	GASKET SET(BNR, HEX, SIGHT GLASS) (BEGINNING SERIAL # D14)	FB 2500
57	100146358*	GASKET SET(BNR, HEX, SIGHT GLASS) (PRIOR TO SERIAL # D14)	FB 3000
57	100188941*	GASKET SET(BNR, HEX, SIGHT GLASS) (BEGINNING SERIAL # D14)	FB 3000
57	100146360*	GASKET SET(BNR, HEX, SIGHT GLASS) (PRIOR TO SERIAL # D14)	FB 3500
57	100188942*	GASKET SET(BNR, HEX, SIGHT GLASS) (BEGINNING SERIAL # D14)	FB 3500
57	100146396*	GASKET SET (BURNER, HEX, SIGHT GLASS)	FB 4000
57	100146397*	GASKET SET (BURNER, HEX, SIGHT GLASS)	FB 5000 - 6000
58	100146377	GASKET, SIGHT GLASS TOP	ALL
59	100153531	AIR INLET COVER	FB 2500
59	100153532	AIR INLET COVER	FB 3000 - 3500
59	100153656	AIR INLET COVER	FB 4000 - 6000
60	100163269	DISPLAY MOUNTING PLATE	ALL
61	100266649	HOLDER, LCD	ALL
62	100162582	TOP BEZEL	ALL
63	100162579	DISPLAY BEZEL	ALL
64	100167380	RELIEF VALVE - 50 PSI	FB 2500 - 3000
64	100167383	RELIEF VALVE - 50 PSI	FB 3500
64	100167400	RELIEF VALVE - 50 PSI	FB 4000 - 5000
64	100273762	RELIEF VALVE - 50 PSI	FB 6000
65	100146978*	GAUGE, TEMPERATURE & PRESSURE	ALL
66	100144926	VENTILATION FAN	ALL
67	100170554*	FLUE TEMP SENSOR	ALL
68	100173733	VALVE, DRAIN	ALL
69	100162617*	CONDENSATE TRAP	ALL
70	100170721	FLEX GAS PIPE - 1 1/4"	FB 2500 - 3500
70	100170741	FLEX GAS PIPE - 2" X 15.25	FB 4000 - 5000
70	100271720	FLEX GAS PIPE - 2 1/2" X 15.25	FB 6000
71	100027708	FUSE BLOCK	FB 4000 - 6000
72	100027712*	FUSE, 30A 480V CLASS G	FB 4000 - 6000
73	100140387	CONTACTOR	FB 4000 - 6000
74	100172888	CABLE, USB	ALL

PLEASE HAVE MODEL AND SERIAL NUMBER WHEN ORDERING PARTS

***ITEMS DENOTE SUGGESTED INVENTORY PARTS**

ITEM NO.	PART NO.	DESCRIPTION	MODEL
MISCELLANEOUS (CONTINUED)			
-	100146379	GASKET, AIR INLET COVER	FB 2500
-	100146381	GASKET, AIR INLET COVER	FB 3000 - 3500
-	100146407	GASKET, AIR INLET COVER	FB 4000
-	100146402	GASKET, AIR INLET COVER	FB 5000 - 6000
-	100153197	INLET ADAPTER (SQUARE TO ROUND)	FB 2500
-	100153198	INLET ADAPTER (SQUARE TO ROUND)	FB 3000 - 3500
-	100153298	INLET ADAPTER (SQUARE TO ROUND)	FB 4000
-	100153288	INLET ADAPTER (SQUARE TO ROUND)	FB 5000 - 6000
-	100172865	RIBBON CABLE	ALL
-	100172918	HARNESS, ELECTRODE, SPARK	FB 2500-3500 & 5000 - 6000
-	100172917	HARNESS, ELECTRODE, SPARK	FB 4000
-	100172854	HARNESS, ELECTRODE, FLAME SENSE	ALL
-	100146009*	FUSE, 1.25 AMP	ALL
-	100146012*	FUSE, 3.15 AMP	ALL
-	100146013*	FUSE, 5 AMP	ALL
-	100170604	OUTDOOR AIR SENSOR	ALL
-	100157652	NEUTRALIZER KIT	ALL
-	100162635	HOSE, CONDENSATE - 3/8"	ALL
-	100162636	HOSE, CONDENSATE - 1"	ALL
-	100163038	TUBING, SILICONE - 1/8"	ALL
-	100163160	TUBING, ALUMINUM - 1/4"	ALL
-	100162552*	DOOR CATCH	ALL
-	100162929*	DOOR STRIKE	ALL
-	100190940*	KIT, BURNER, GASKET	FB 2500
-	100190132*	KIT, BURNER, GASKET	FB 3000 - 3500
-	100190826*	KIT, BURNER, GASKET	FB 4000
-	100191054*	KIT, BURNER, GASKET	FB 5000 - 6000
-	100072546	ANTENNA, USB ADAPTER, WIRELESS (BEGINNING SERIAL #4015)	ALL
-	100266650	CABLE, USB 2.0 - 12" (BEGINNING SERIAL #4015)	ALL
-	100266666	CABLE, USB 2.0 - 60" (BEGINNING SERIAL #4015)	ALL
-	100072933	CABLE, CAT 5 (BEGINNING SERIAL #4015)	ALL
JACKET ASSEMBLIES			
75	100153412	JACKET, OUTER TOP REAR	FB 2500
75	100153414	JACKET, OUTER TOP REAR	FB 3000 - 3500
75	100153658	JACKET, OUTER TOP REAR	FB 4000 - 6000
76	100153160	JACKET, OUTER TOP MIDDLE	FB 2500
76	100153161	JACKET, OUTER TOP MIDDLE	FB 3000 - 3500
76	100267485	JACKET, OUTER TOP MIDDLE	FB 4000 - 6000
77	100153163	JACKET, OUTER FRONT LOWER DOOR	FB 2500
77	100153164	JACKET, OUTER FRONT LOWER DOOR	FB 3000 - 3500
77	100267486	JACKET, OUTER FRONT LOWER DOOR	FB 4000 - 6000
78	100153166	JACKET, OUTER FRONT UPPER DOOR	FB 2500
78	100153167	JACKET, OUTER FRONT UPPER DOOR	FB 3000 - 3500
78	100267487	JACKET, OUTER FRONT UPPER DOOR	FB 4000 - 6000
79	100153168	JACKET, OUTER LEFT AND RIGHT SIDE	FB 2500 - 3500
79	100267488	JACKET, OUTER LEFT AND RIGHT SIDE	FB 4000 - 6000
80	100153533	CONTROL PANEL COVER	ALL

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***ITEMS DENOTE SUGGESTED INVENTORY PARTS**