M24E & M36E
ELECTRICALLY OPERATED BOILERS
PARTS AND SERVICE MANUAL

EFFECTIVE SEPTEMBER 2, 2014

Superseding All Previous Parts Lists.
The Company reserves the right to make substitution in the event that items specified are not available.
ERRORS: Descriptive and/or typographic errors are subject to correction.

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P/N 14-0310 Rev A (9/14)

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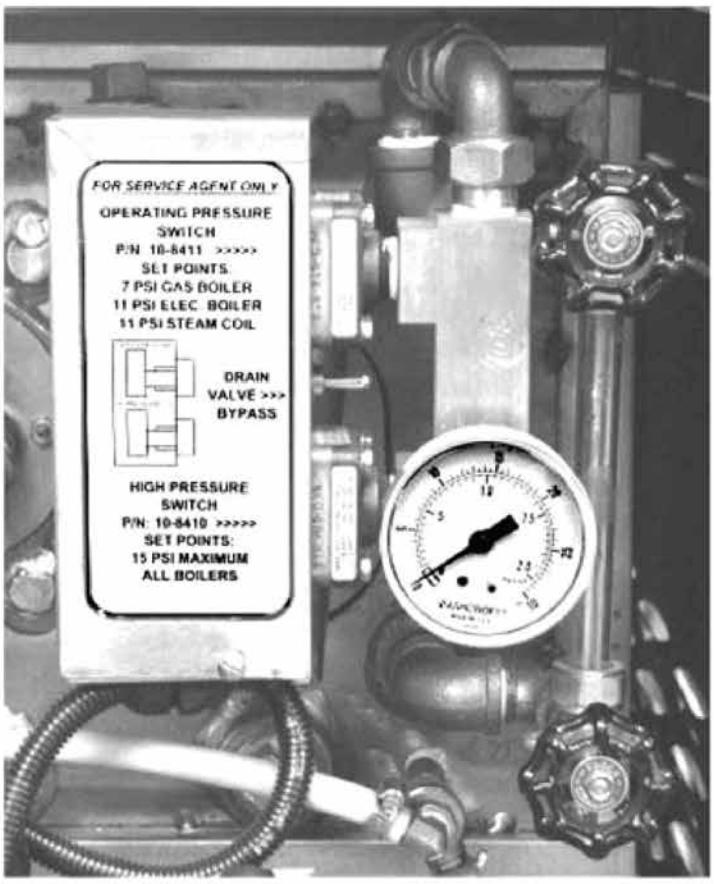
GENERAL TROUBLESHOOTING

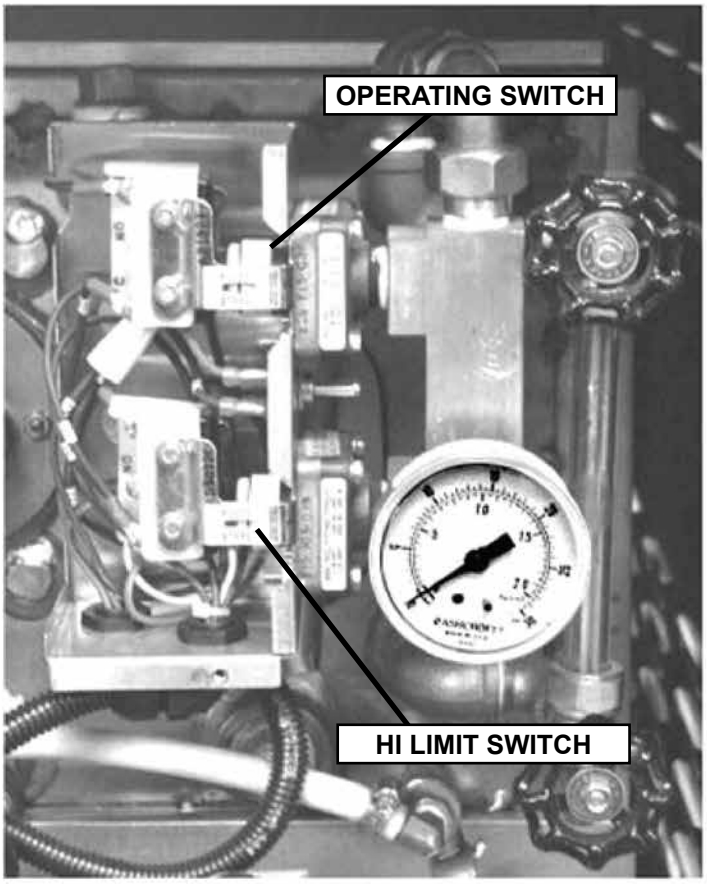
TROUBLE	POSSIBLE CAUSE	REMEDY
Water does not enter the boiler.	Water main shut-off	Turn on
	Power not reaching unit	Check main fuse or circuit
	Probes dirty	Remove and clean
	Water level control board defective	Refer to test procedure in this manual
	Solenoid valve defective	If 120V is verified at solenoid coil, but fails to open, replace solenoid
Boiler fails to build up pressure when water level is proper and fuel switch is turned on.	Check to see that circuit breaker in main is turned on	Check for voltage at terminal block
	Check to see that contactors are pulling in	Check continuity of coil, if open replace
	Current flow is broken at water level control (ascertain with continuity check)	Check for voltage at L1 and L2, replace if defective
	Current flow is broken at pressure control or high limit control switches due to maladjustment or defect (ascertain with continuity check)	Readjust - to proper setting - refer to instructions for readjustment, replace if defective
	Heating elements are defective	Replace if continuity check through the circuit of each element shows defective
Boiler fails to reach full operating pressure of 5 lbs. or 15 lbs.	Pressure gauge reads inaccurately	Replace
	Pressure control and high limit control switches are out of adjustment	Follow instructions for readjusting or replace if defective
	Safety valve not seating properly	Clean or replace
	Contactor coils (one or both) not energizing and closing circuit to the heating elements	Check - replace either contactor coils or complete contactor – if found defective. Measure amperage at terminal block check to be sure there is an even draw on all three phases - see wiring diagrams for correct AMP draw. If uneven or zero amperage draw is found on one of the three phases, check for blown fuse. If fuse is OK, shut off power, remove wires from heating elements and run continuity check - replace if defective.
Water enters boiler very slowly.	Dirty Strainer screen in solenoid valve.	Clean or replace strainer screen, part no. 08-4871.
Water level in gauge glass fluctuates up and down.	Top shut off on water gauge is closed.	Open
Contactor chatters	Incorrect supply voltage.	Check to see that it matches it with coil contactors
	Dirty or worn contactor points.	Clean or replace contactor
	Weak coil	Replace with correct voltage coil
15 lbs. safety valve blows off prematurely	Pressure set too high	Readjust
	Pressure gauge reads incorrectly	Replace
	Mineral build-up or dirt on seat of valve	Clean
	Weak spring valve	Replace valve
Boiler build up to pressure, shuts down and fails to come on	High limit switch set too low or operating pressure control switch set too high	Follow instructions in this document for readjusting, or replace if defective

GENERAL TROUBLESHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
Air vent leaking	Not closing	Replace
Cold water condenser does not function	Main water line shut off	Turn on
	Thermostat defective	Replace if defective
	Tighten coil nut	Tighten coil nut
	Check solenoid coil for continuity, if open replace	Check coil for continuity, if open replace
Product in cooker does not cook properly on first cycle, but cooks alright after first cycle is exhausted	Air vent is closing	Replace
Contactor chatters	Low voltage	Check voltage condition. Check momentary voltage dip during starting. Low voltage prevents magnet sealing. Check coil voltage rating
	Defective or incorrect coil	Replace coil, rating of coil must match the line voltage
Welding or freezing	Abnormal spike in current	Check for grounds or shorts in system
	Low voltage preventing magnet from sealing	Correct voltage condition
	Short circuit	Remove short fault and check to be sure fuse or breaker size is correct
Short contact button life and / or overheating of contacts	Filling or dressing	Do not file silver tips. Rough spots or discoloration will not harm tips or impair their efficiency
	Interrupting excessively high current	Check for grounds, shorts or excessive current
	Discolored contacts caused by insufficient contact pressure, loose connection, etc.	Check contact carrier for deformation or damage, clean and tighten connections
	Dirt or foreign matter on contact surface	Clean with Acetone
	Short circuit	Remove fault and check to be sure fuse or breaker size is correct
Open circuit	Mechanical damage	Handle and store carefully. Do not handle coils by the leads
	Burnt-out coil due to overvoltage or defect	Replace coil
Overheated Coil	Over-voltage or high ambient temperature	Check application and circuit
	Wrong coil	Check rating (voltage and frequency) if incorrect, replace with proper coil
	Shorted turns caused	Replace coil
	Under voltage, failure of magnet to seal in	Correct system voltage. Install new coil

PRESSURE ADJUSTMENT





If boiler fails to maintain steam pressure in operating range, pressure control switch may require adjustment.

1. Start boiler and allow pressure to build up to operating level - 15 PSI (1kg/cm²).
2. Check boiler pressure gauge. If gauge indicates 12 to 14 PSI, pressure control switches are properly adjusted.
3. If boiler does not come on when pressure gauge reads 7 PSI and does not go off when pressure gauge reads 14 PSI, proceed as follows:

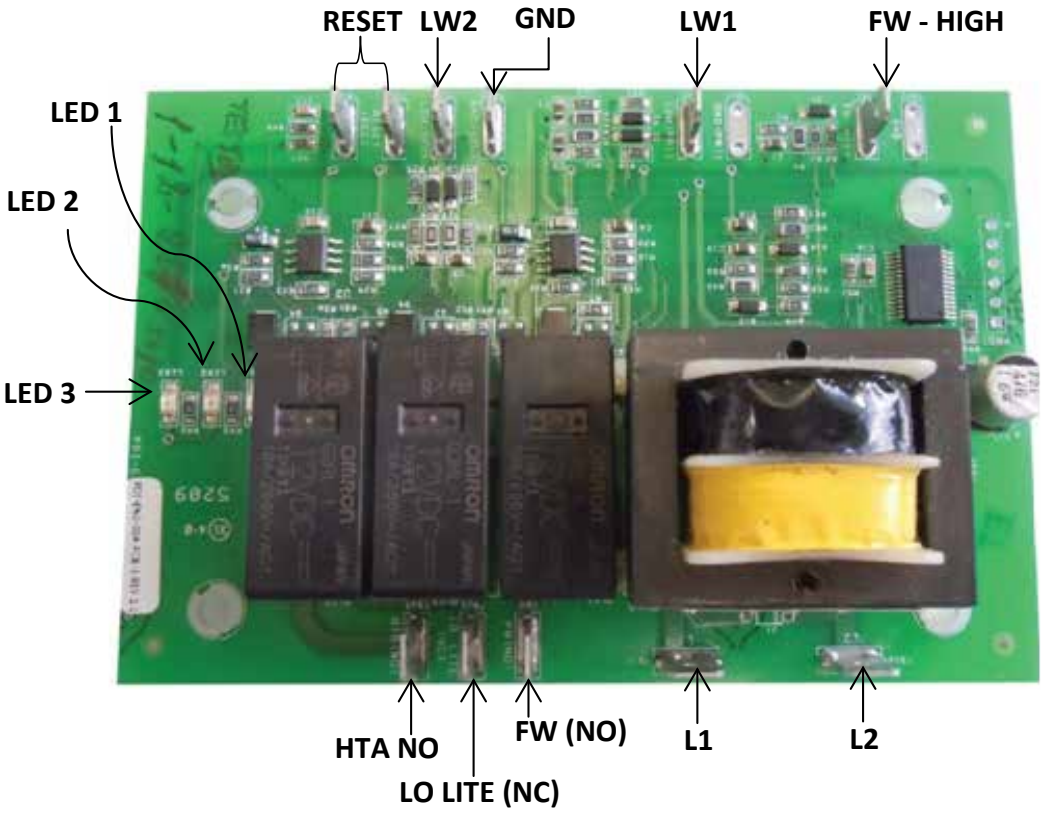
Pressure Switch Adjustment

WARNING

Because power must be on to adjust pressure switches, be sure to protect against electrical shock.

1. Remove screw and lift front cover off control box.
2. Hand adjust operating pressure control switch and high limit pressure control switch by turning adjusting nut (Knurled knob) clockwise to raise and counter clockwise to lower actuation point. Switch should be set so that boiler comes on when boiler pressure gauge reads 12 PSI and goes off when gauge reads 14 PSI. Hi limit switch should be set so that boiler will shut off if pressure reaches 15 PSI.
3. The actuation value (differential) is factory set and cannot be changed.
4. The cold water condenser thermostat is preset at factory.
5. Repeat steps, 1, 2, and 3. If 12 to 14 PSI boiler pressure gauge reading is obtained during boiler operation, adjustment is correct. If proper adjustment cannot be made consult Trouble-Shooting Guide in this manual.
6. After making adjustments, replace cover on pressure switch box and screw.

WATER CONTROL BOARD TESTING PROCEDURE



This test procedure is to be used to determine if the control is working properly. It is not intended to determine why the control may have failed.

If testing shows that the control is operating properly, check all probe and solenoid wiring and the condition of the electrodes in the steam chamber.

Contact the factory if the boiler still does not operate properly after completing the testing.

Tools Needed:

- Digital or Analog V-O-M meter.
- Alligator clip type test jumpers (2 sets min.).

Turn Off Power to Control:

- Use V-O-M to verify there is no power at terminals L 1 & L2.
- Use V-O-M to verify that there is no power at terminals ‘FW(NO)’, ‘LO LITE(NC)’ & ‘HTR(NO)’. If there is power at any of these terminals, you will need to find the source and turn it off.

Remove Wires from Probe and Relay Switch Terminals:

- DO NOT remove wires from L 1 & L2 terminals.
- Tag wires and remove from probe and relay contact terminals including ‘GND’ terminal.
- Tag and remove wires from ‘RESET’ terminals.
- Connect jumper wire to both ’RESET’ terminals.

Turn Power On to Terminals L 1 & L2:

- ‘LED l’ should turn on.
- ‘LED 2’ should be off.
- ‘LED 3’ should be off.
- Use V-O-M to verify that there is power at ‘FW(NO)’ & ‘LO LITE(NC)’ terminals and no power ‘HTR(NO)’ terminals

Test Feedwater Function:

- Connect jumper wire to ‘FW HIGH and ‘GND’ terminals.
- ‘LED l’ should turn off after a 10 second delay.
- Use V-O-M to verify that there is no power at the ‘FW (NO)’ terminal.
- Remove jumper from ‘FW HIGH’ and ‘GND’ terminals. . ‘LED l’ should turn on.
- Use V-O-M to verify that there is power at the ‘FW(NO)’ terminal.

WATER CONTROL BOARD TESTING PROCEDURE

Test Primary Low Water Function:

- Connect jumper wire to ‘LW(1) and‘GND’ terminals.
- ‘LED 2’ should turn on.
- Remove jumper wire from ‘LW(1)’ and ‘GND’ terminals.
- ‘LED 2’ should turn off after a 3 second delay.
- Connect jumper wire to ‘LW(1)’ and ‘GND’ terminals.
- ‘LED 2’ should turn on.

IMPORTANT

Jumper wire between ‘LW(1) and ‘GND’ terminals must remain in place to test secondary low water function.

Test Secondary Low Water Function:

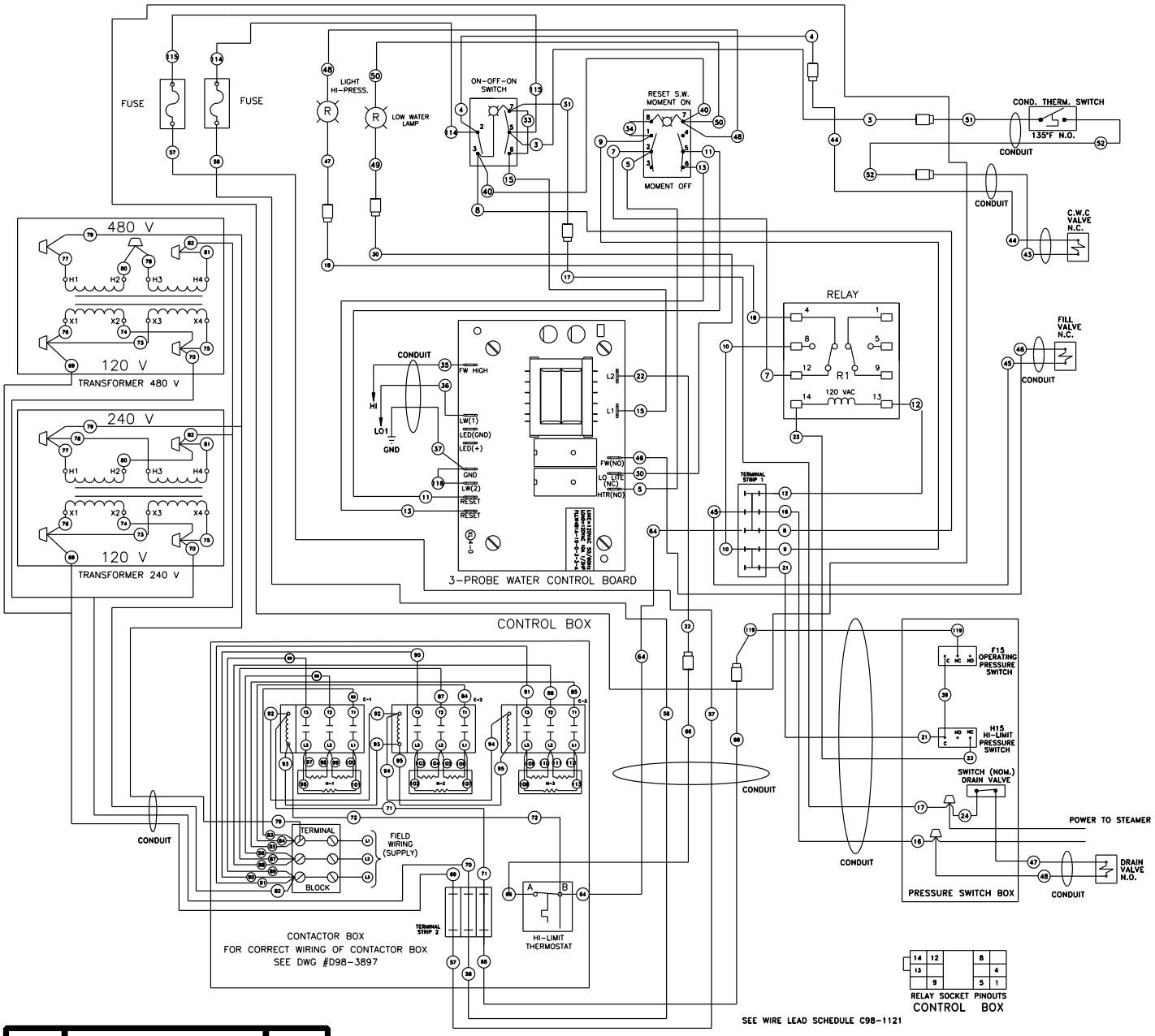
- Connect jumper wire to ‘LW(2)’ and ‘GND’ terminals.
- ‘LED 3’ should remain off.
- Use V-O-M to verify that there is power at the ‘LO LITE(NC)’terminal and no power at the ‘HTR(NO)’ terminal.
- Remove the jumper wires from the ‘RESET’ terminals.
- ‘LED 3’ should turn on.
- Use V-O-M to verify that there is no power at the ‘LO LITE(NC)’ terminal and power at the ‘HTR(NO)’ terminal.
- Connect jumper wire to ‘RESET’ terminals.
- Remove jumper wire from ‘LW(2)’ and ‘GND’ terminals.
- ‘LED 3’ should turn off after a 3 second delay.
- USE V-O-M to verify that there is power at the ‘LO LITE(NC)’ terminal and no power at the ‘HTR(NO)’ terminal.
- Connect jumper wire from ‘LW(2)’ and ‘GND’ terminals.
- ‘LED 3’ should remain off.

IF ANY OF THE FUNCTIONS DO NOT WORK, REPLACE THE BOARD!

IF ALL FUNCTIONS WORK, TROUBLE-SHOOTING OTHER COMPONENTS WILL BE REQUIRED!

NEW GENERATION ELECTRIC BOILERS

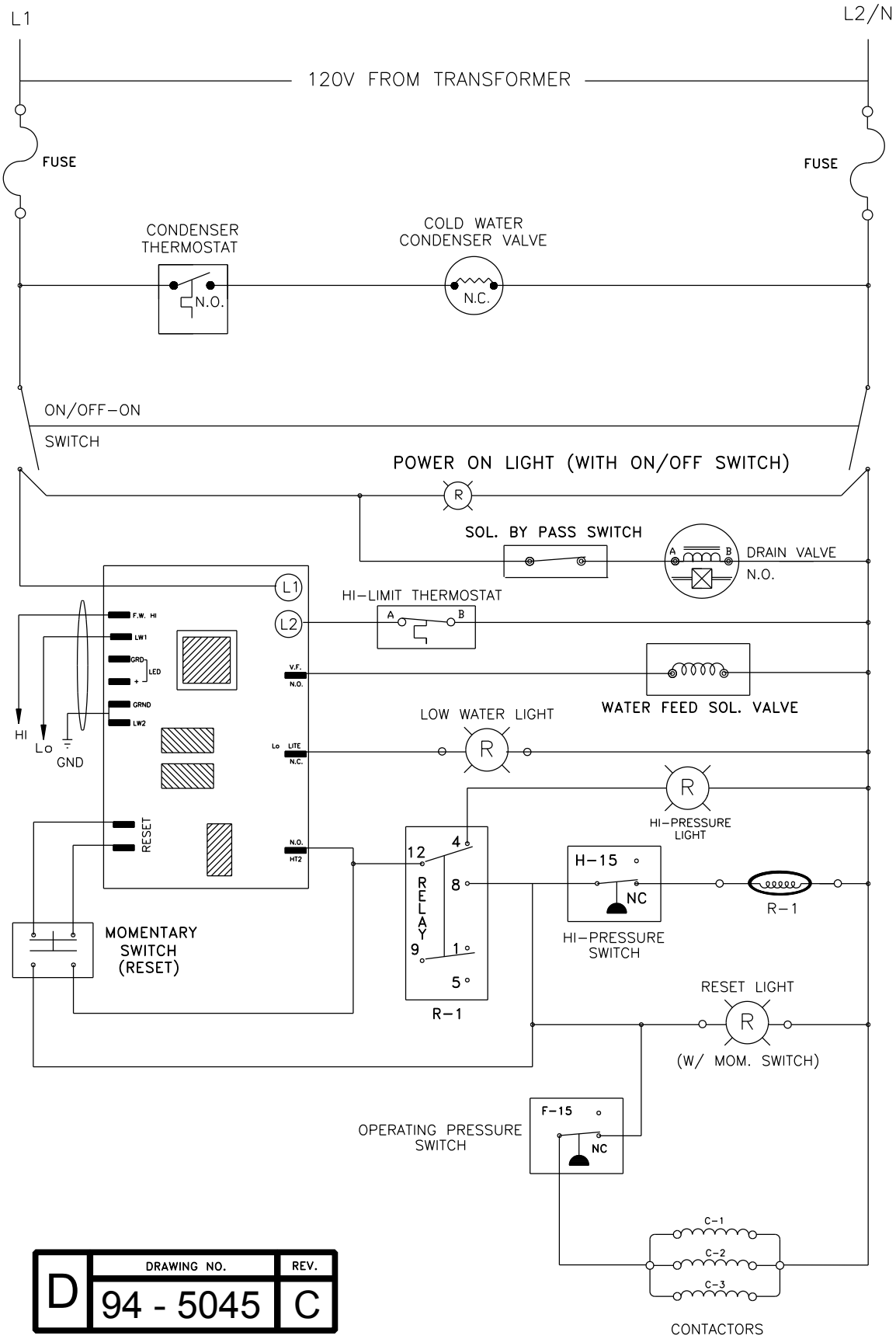
WIRING DIAGRAM



D	DRAWING NO.	REV.
	94 - 5045	C

NEW GENERATION ELECTRIC BOILERS

SCHEMATIC DIAGRAM

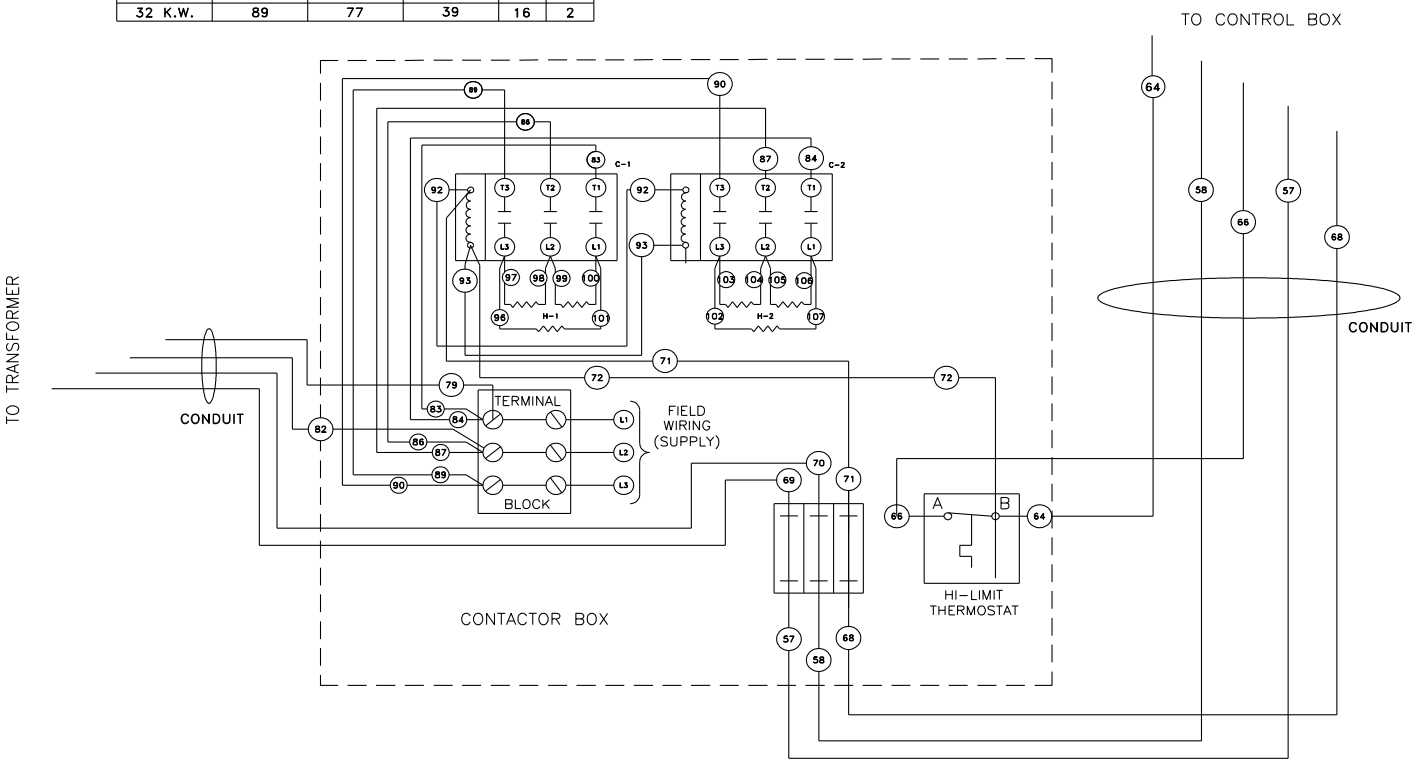


D	DRAWING NO.	REV.
	94 - 5045	C

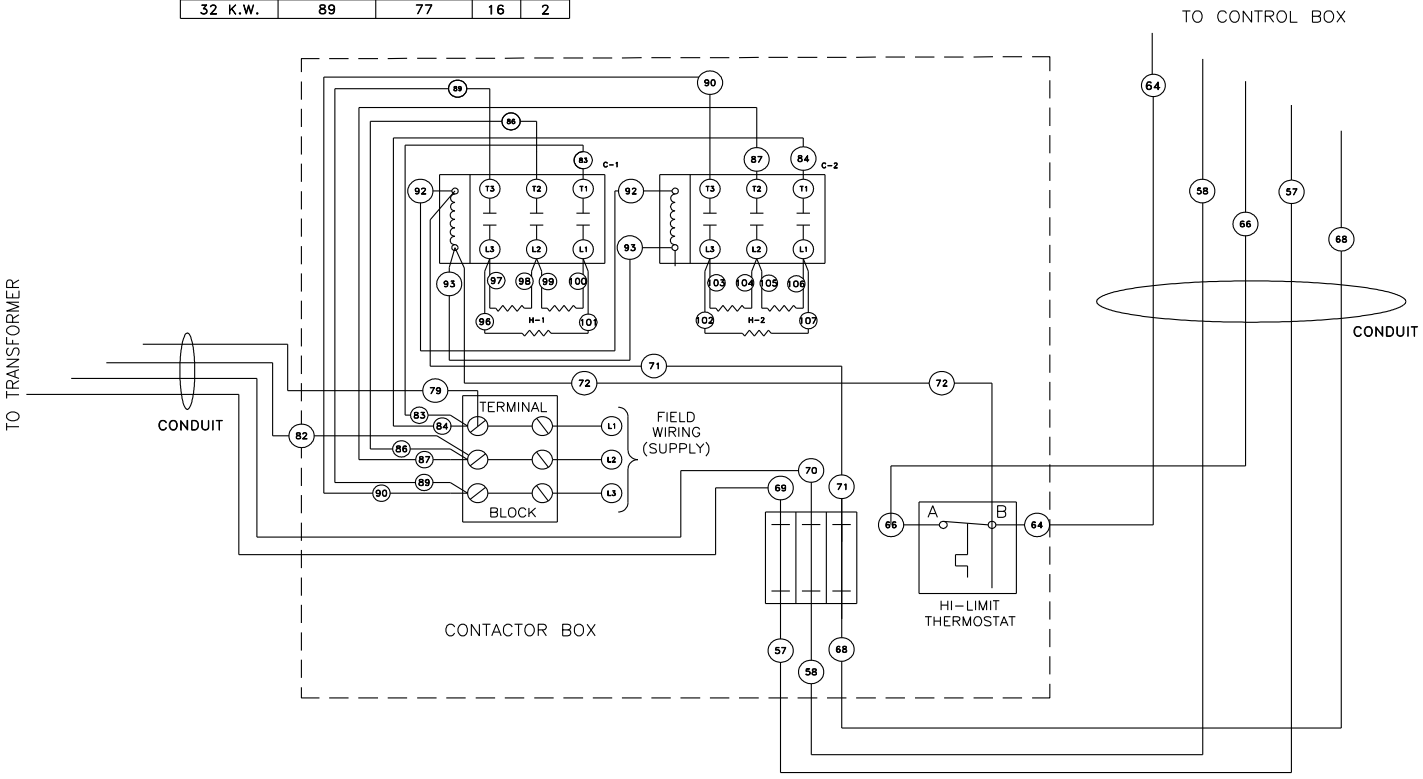
18 KW, 24 KW

WIRING

CONNECTED LOAD	AMPS. PER LINE WIRE			HEATER	
	208V. 3PH.	240V. 3PH.	480V. 3PH.	K.W.	QTY.
18 K.W.	50	43	22	9	2
24 K.W.	67	58	29	12	2
32 K.W.	89	77	39	16	2



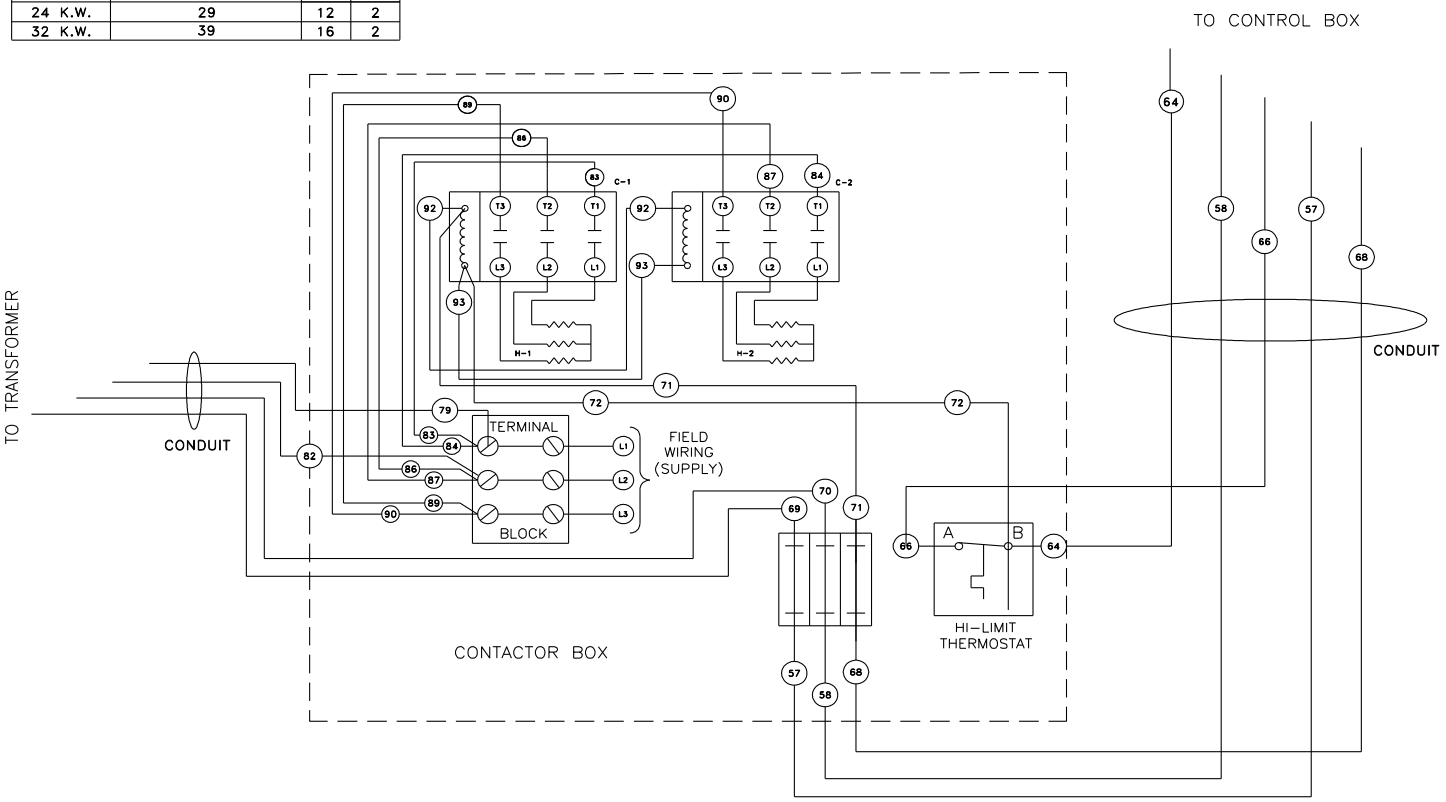
CONNECTED LOAD	AMPS. PER LINE WIRE		HEATER	
	208V. 3PH.	240V. 3PH.	K.W.	QTY.
24 K.W.	67	58	12	2
32 K.W.	89	77	16	2



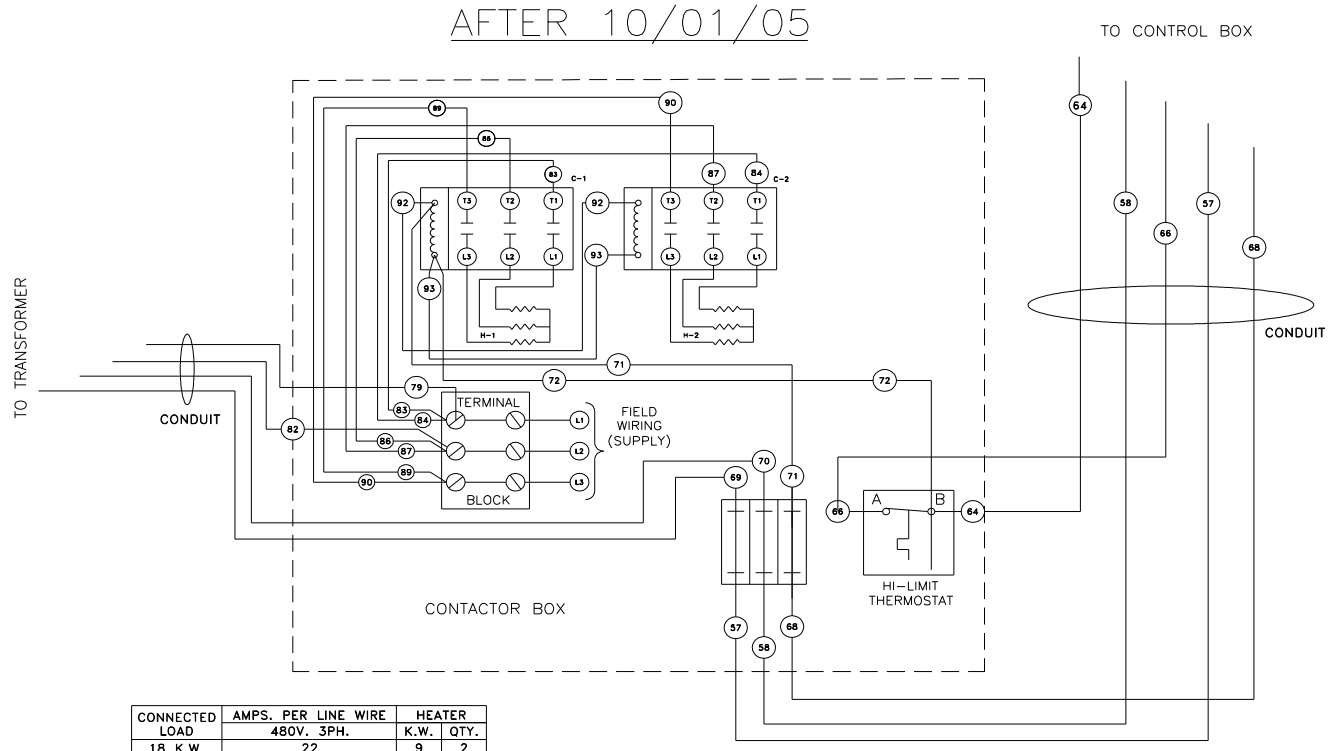
18 KW, 24 KW

WIRING

CONNECTED LOAD	AMPS. PER LINE WIRE 480V. 3PH.	HEATER K.W.	HEATER QTY.
24 K.W.	29	12	2
32 K.W.	39	16	2



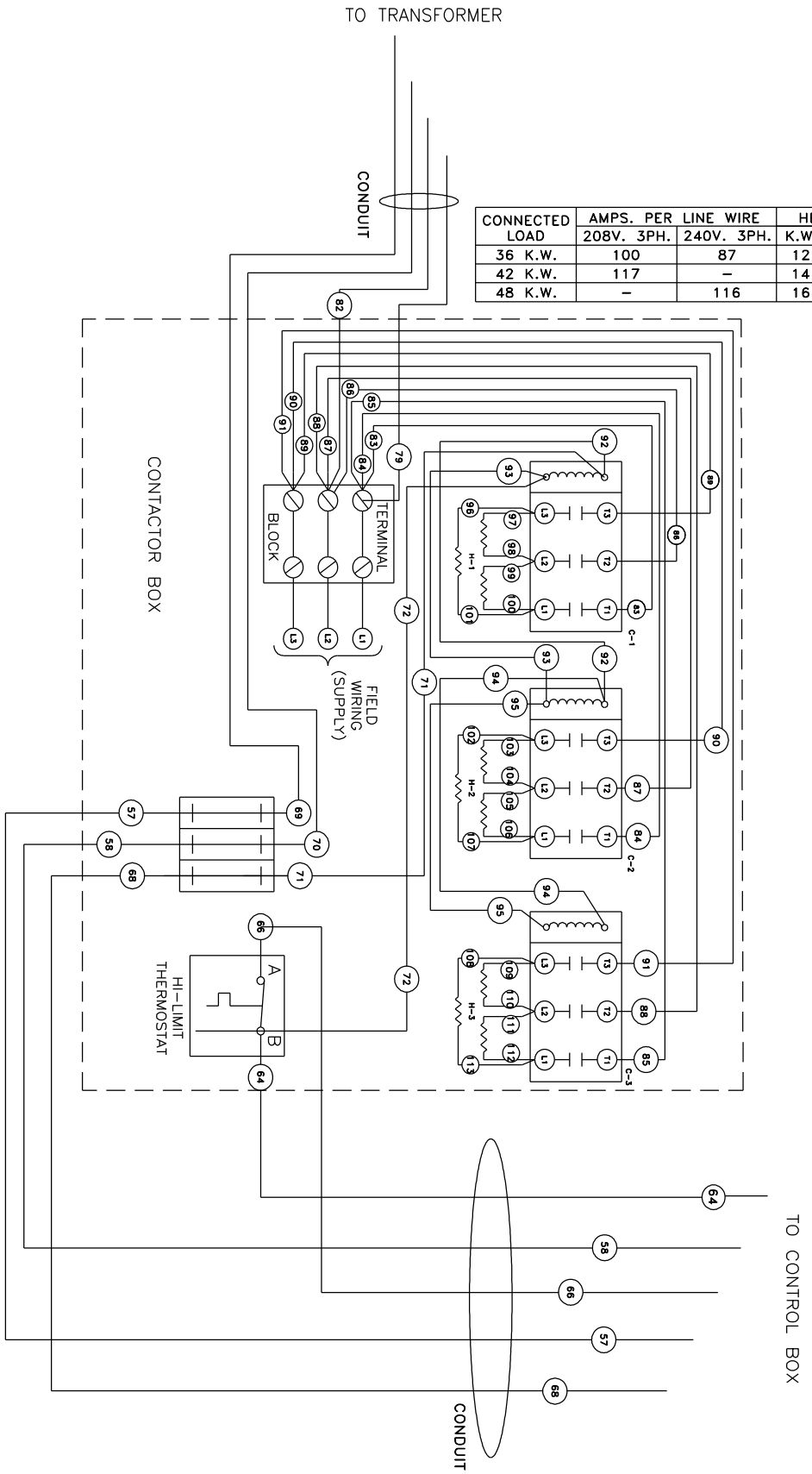
ALTERNATE WIRING 480V AFTER 10/01/05



CONNECTED LOAD	AMPS. PER LINE WIRE 480V. 3PH.	HEATER K.W.	HEATER QTY.
18 K.W.	22	9	2
24 K.W.	29	12	2
32 K.W.	39	16	2

36 KW, 42 KW, 48 KW

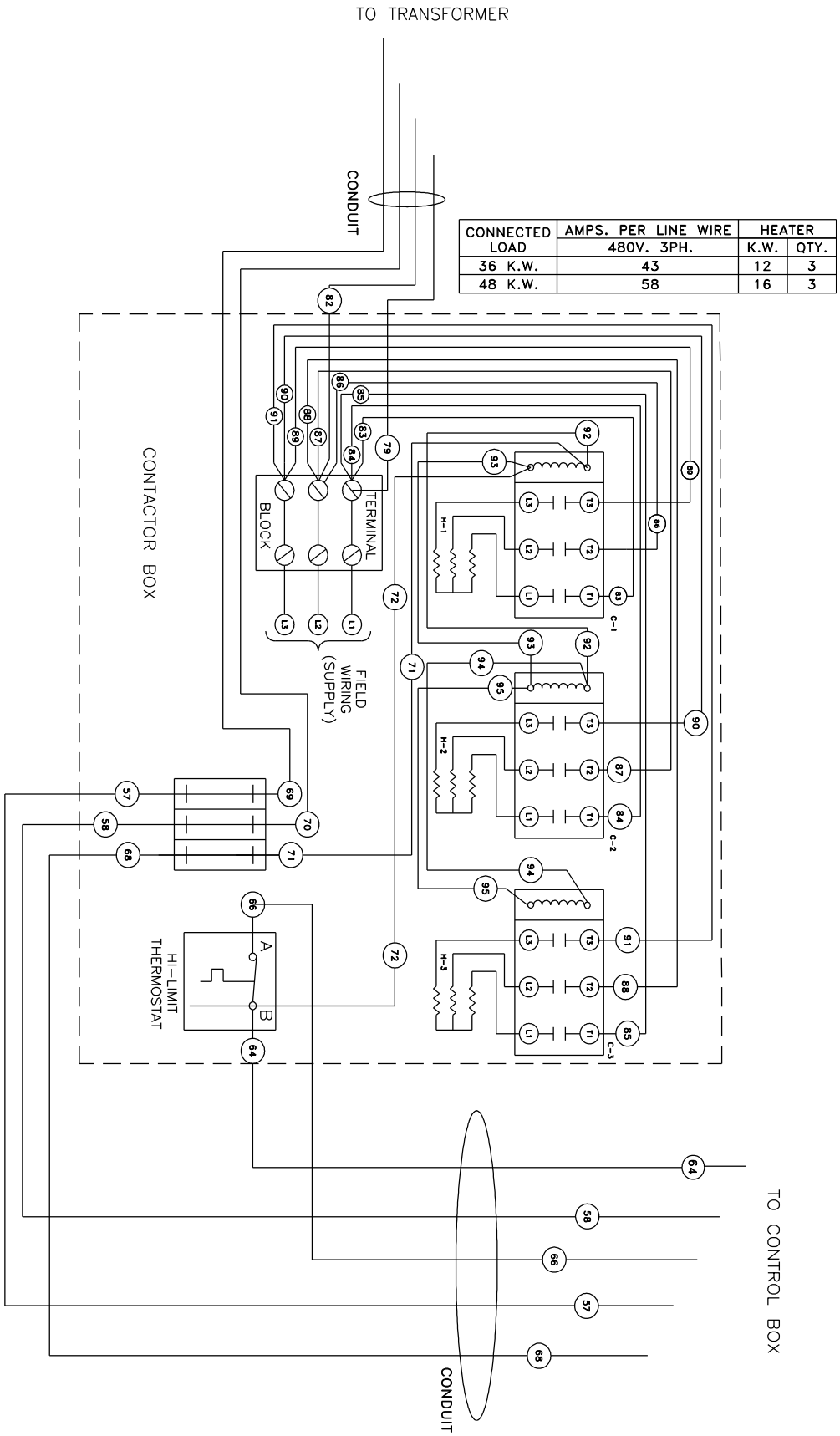
WIRING



CONNECTED LOAD	AMPS. PER LINE WIRE		HEATER	
	208V. 3PH.	240V. 3PH.	K.W.	QTY.
36 K.W.	100	87	12	3
42 K.W.	117	–	14	3
48 K.W.	–	116	16	3

36 KW, 48 KW

WIRING

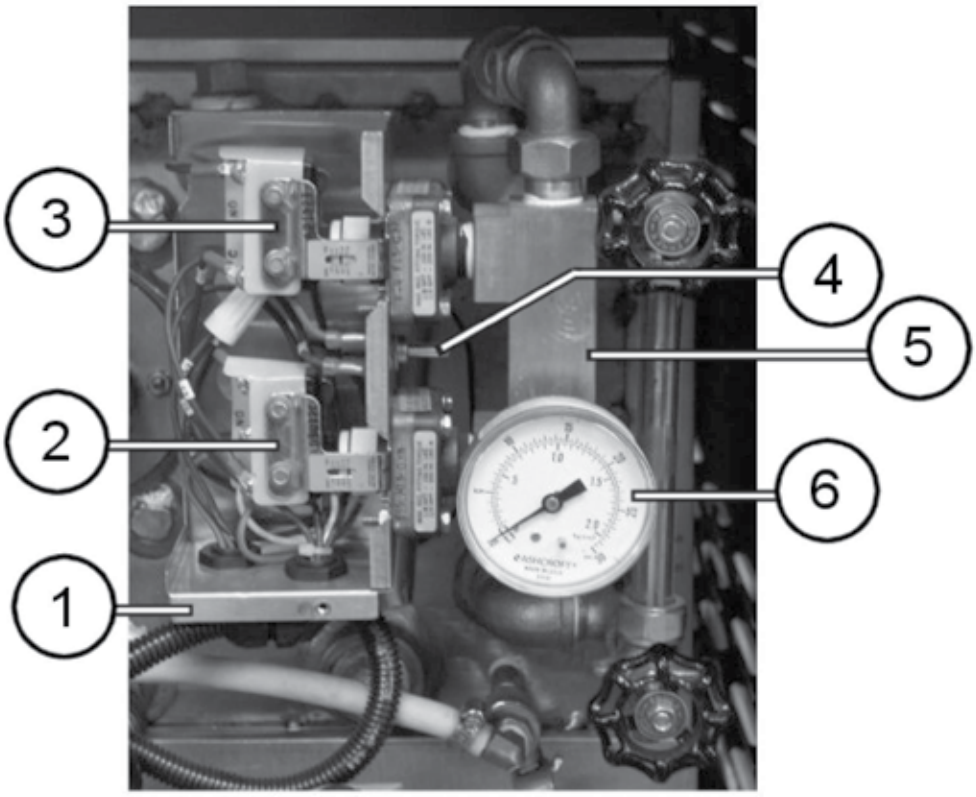


CONNECTED LOAD	AMPS. PER LINE WIRE 480V. 3PH.	HEATER K.W.	HEATER QTY.
36 K.W.	43	12	3
48 K.W.	58	16	3

24" BOILER BASE

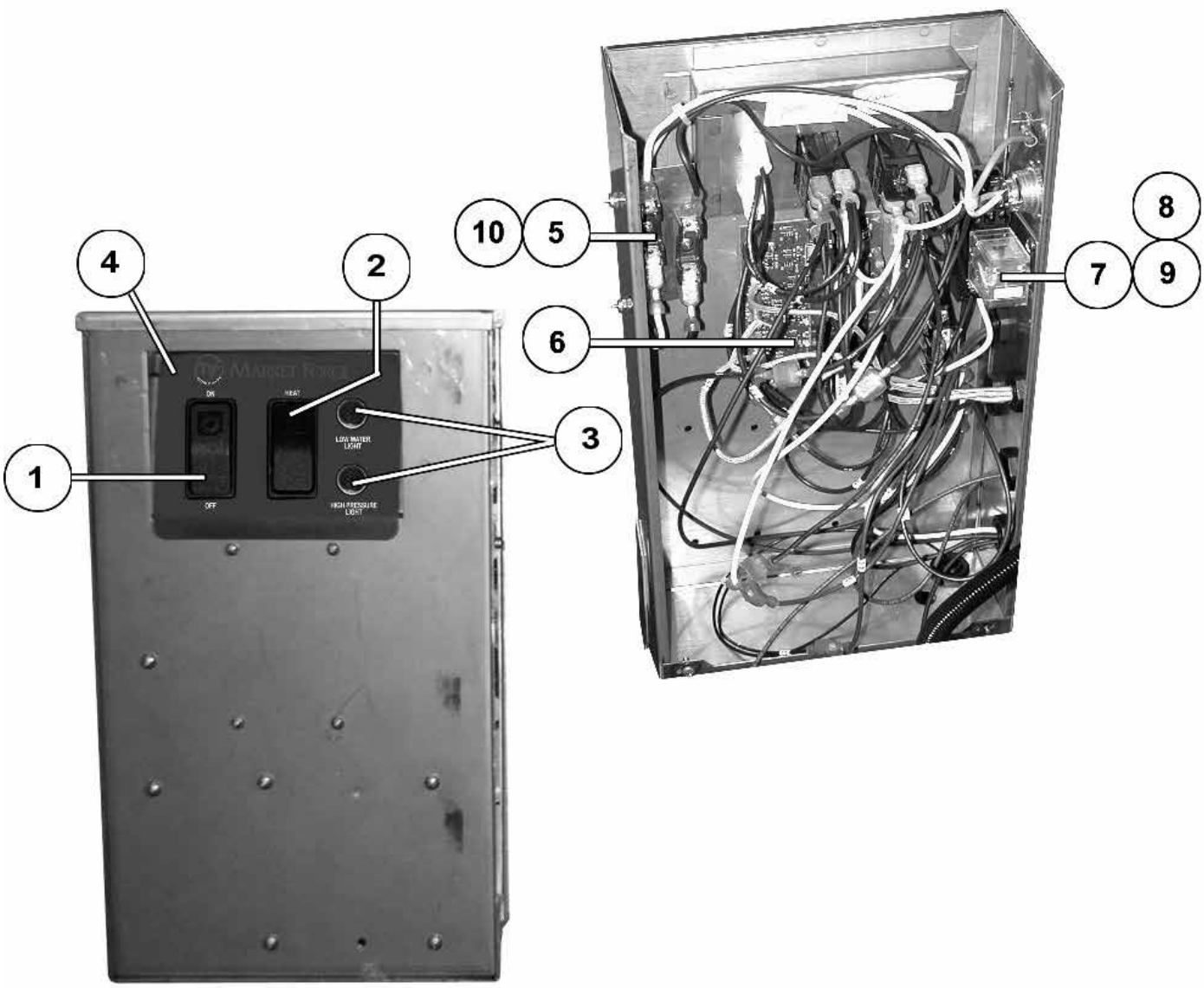
ITEM	PART NO.	DESCRIPTION
1	08-5894	Market Forge Nameplate Log
2	91-5795	Handle, Front
3	98-3992	Panel, Front Assy, 24”
	98-3993	Panel, Front Assy, 36”
4	10-0631	Leg, 6”
	08-5211	Leg, 10”
	08-5208	Leg, Flanged 6”
	08-5206	Leg, 8”
	10-0326	Caster, 5”
5	98-3968	Trim, Edge
6	98-3978	Glass
7	98-3991	Gasket, Adhesive
8	98-3994	Panel, Side Assy
9	98-3995	Panel, Rear Assy, 24”
	98-3996	Panel, Rear Assy, 36”

PRESSURE SWITCH BOX, WITHOUT COVER



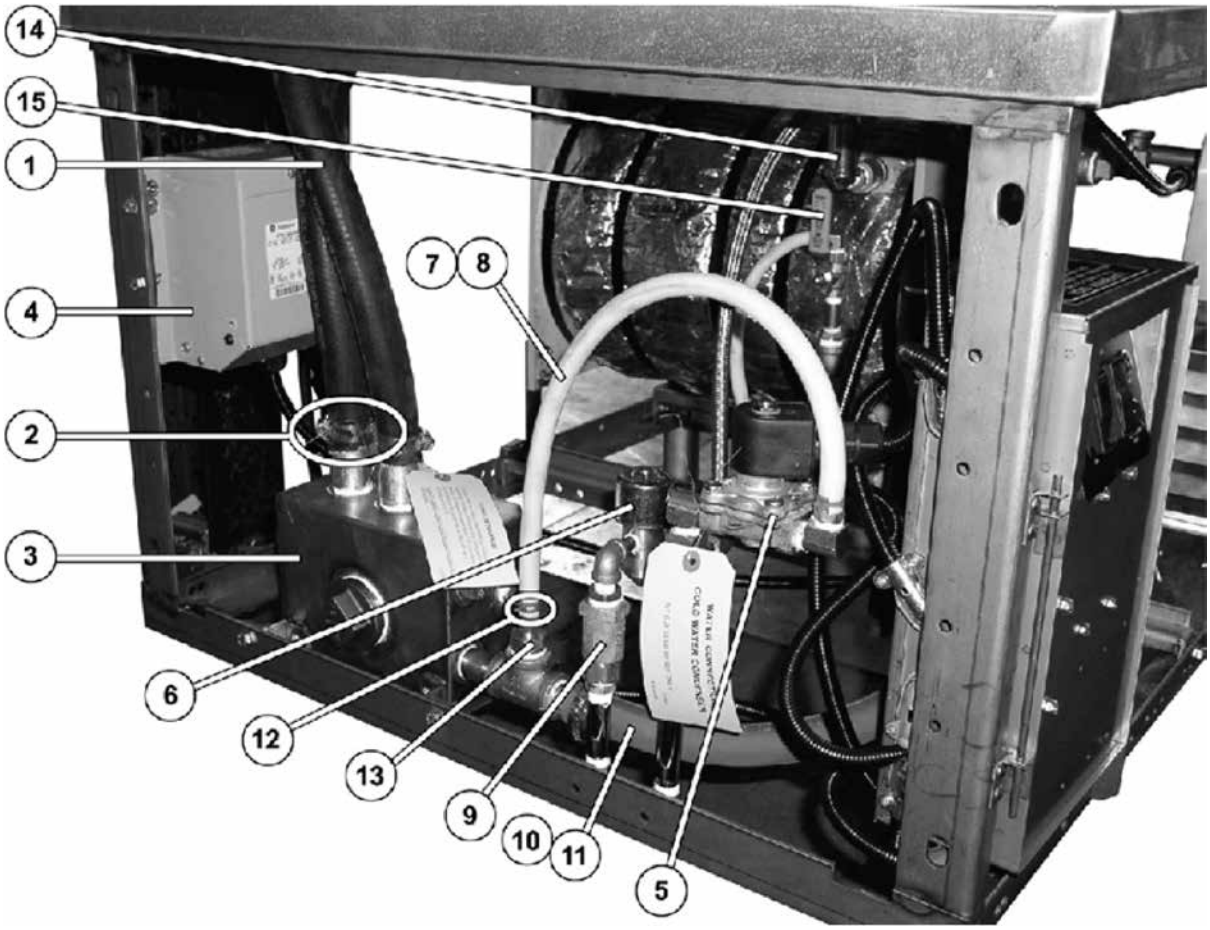
ITEM	PART NO.	DESCRIPTION
1	94-5064	Box, Pressure Switch
2	10-8410	Pressure Switch, Hi-Limit
3	10-8411	Pressure Switch, Operating
4	98-3875	Switch, Drain By-Pass
5	08-7933	Manifold, Pressure Switches
6	10-4804	Pressure Gauge

CONTROL BOX ASEMBLY, WITH & WITHOUT COVER



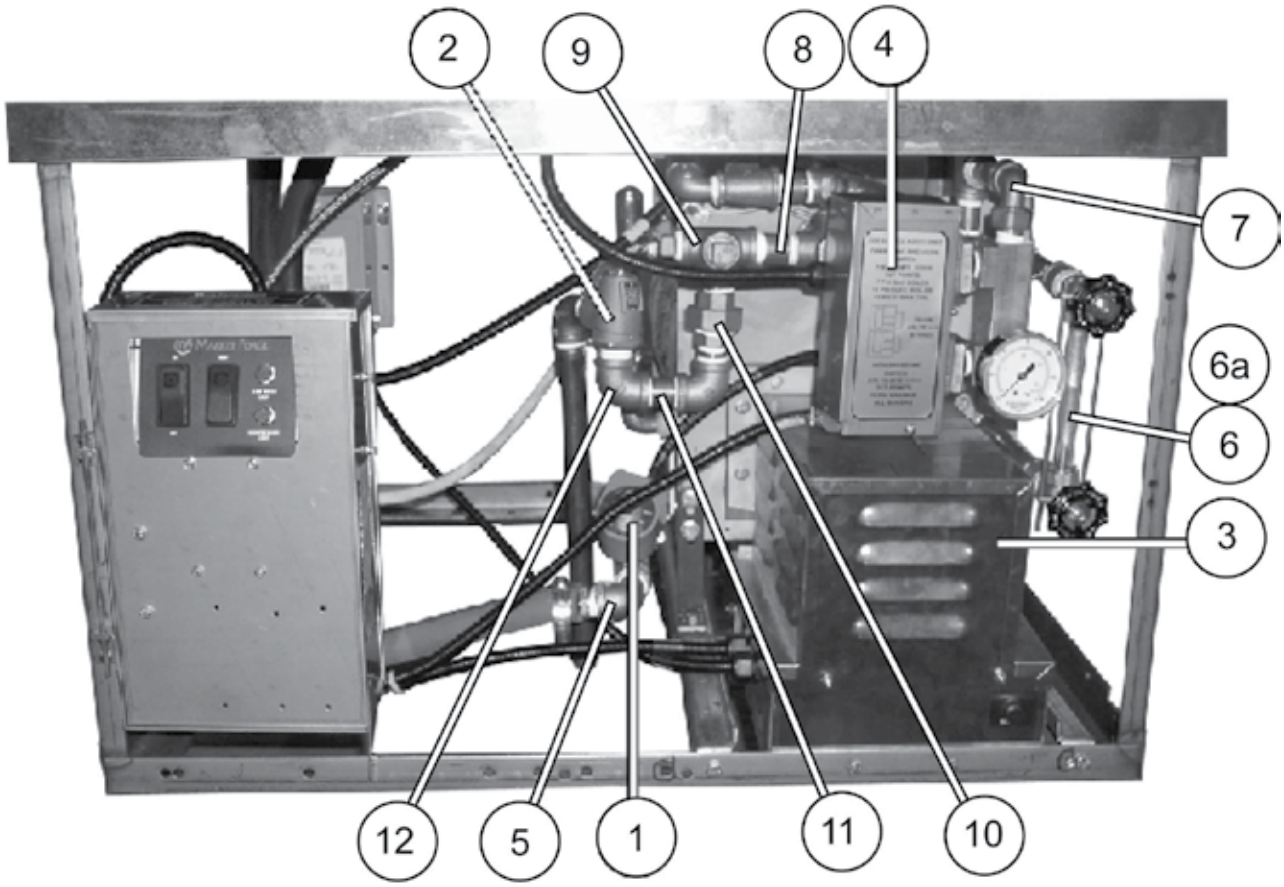
ITEM	PART NO.	DESCRIPTION
1	08-6549	Switch, Power
2	94-5127	Switch, Manual Reset
3	10-5052	Light, Red
4	94-5003	Control Box Lexan
5	08-6469	Fuse Holder
6	98-1680	Board, Water Level Control
7	08-6472	Relay Tube
8	08-6475	Relay Base
9	98-3877	Relay Bracket
10	08-6468	Fuse, 5A

ELECTRIC BOILER, LEFT SIDE VIEW – 36”



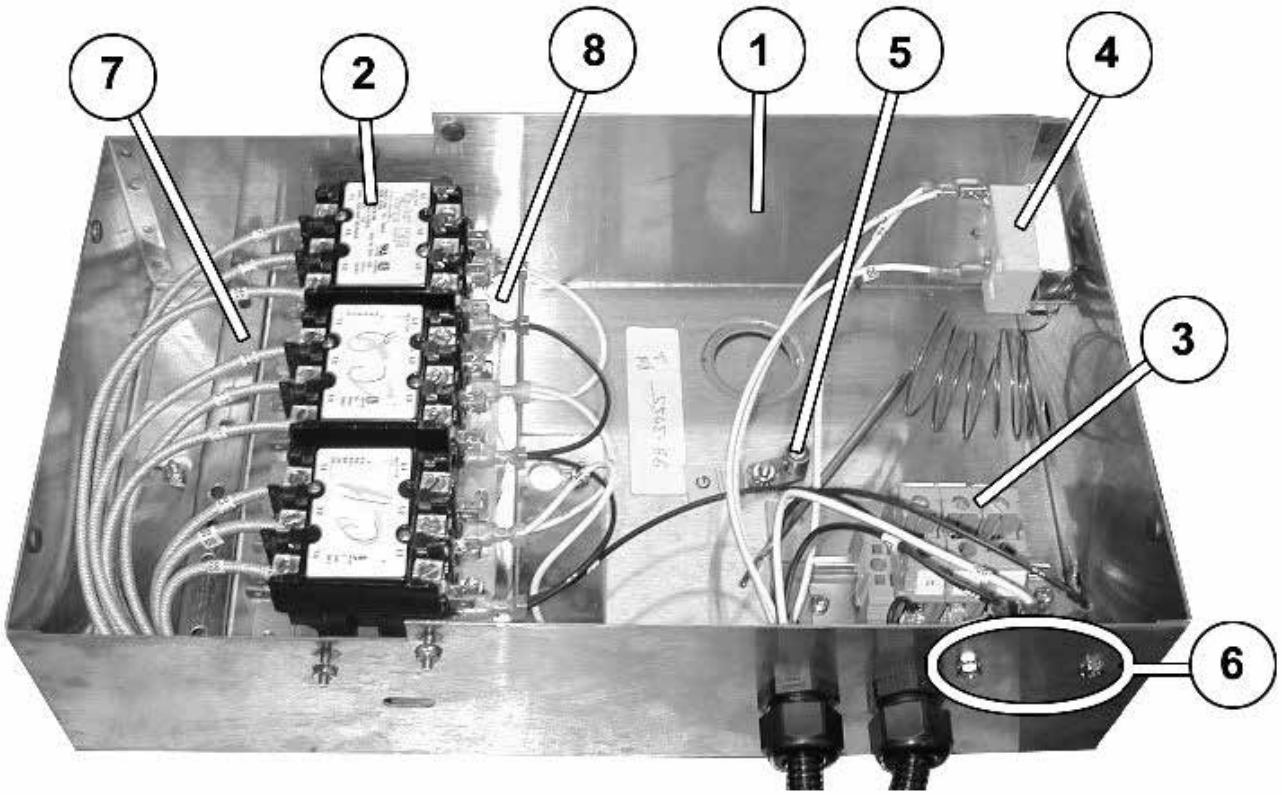
ITEM	PART NO.	DESCRIPTION
1	10-0239	Hose, Drain
2	10-4137	Clamp, Hose
3	91-6927	Box, Drain Assy.
4	10-5234	Transformer
5	10-1058	Valve, Cold Water Condenser, 120V
6	08-4822	Valve, Boiler Feed
7	08-7959	Hose, Condense
8	98-3894	Copper Nozzle
9	98-1401	Valve, Check
10	10-0287	Hose, Drain
11	10-4137	Clamp, Hose
12	08-7974	Clamp Hose
13	98-3914	Compression Fitting
14	10-4556	Air Vent
15	08-4900	Manual Valve, Water Inlet
16	98-3892	Thermostat, Cold Water Condenser

ELECTRIC BOILER, FRONT VIEW – 36”



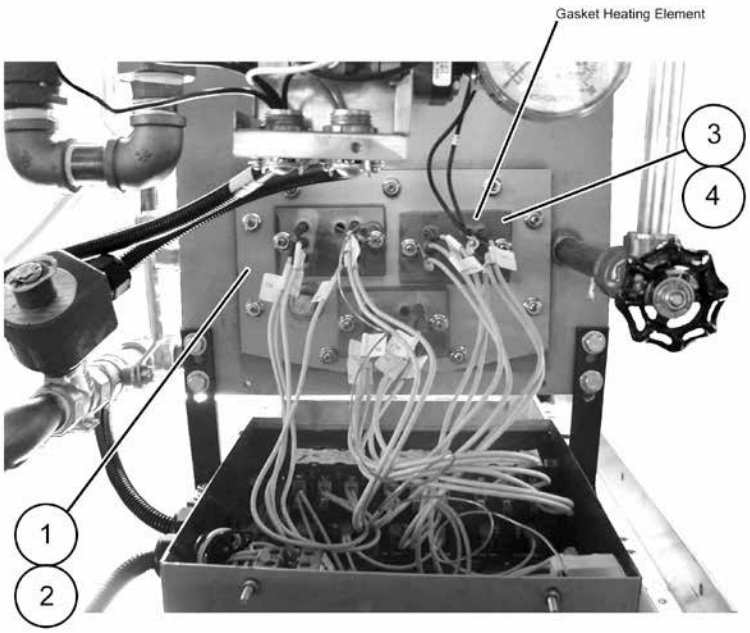
ITEM	PART NO.	DESCRIPTION
1	10-1311	Valve, Drain, 120V
2	10-5320	Valve, Safety, 15PSI
3	98-1667	Cover, Front, Contactor Box
4	94-5065	Cover, Pressure Switch Box
5	08-5447	3/4” NPT, Brass Street Elbow
6	10-2728	Water Gauge Glass Assembly
6a	10-4754	Water Gauge (Glass Only)
7	08-7933	Pressure Switch Manifold
8	08-5427	3/4” Br. Nipple, 2 1/2” Lg.
9	08-4991	3/4” Side Outlet Tee
10	10-7943	3/4” Brass Union
11	10-1126	3/4” Nipple, 2” Brass
12	10-3455	90O Elbow
Not Shown	98-1656	Cover, Rear, Contactor Box

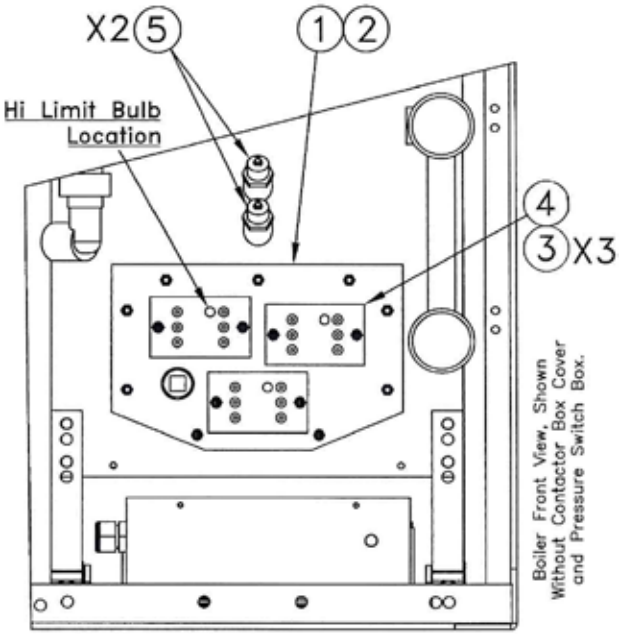
ELECTRIC BOILER, CONTACTOR BOX



ITEM	PART NO.	DESCRIPTION
1	98-1670	Box, Contactor
2	10-5944	Contactor
3	98-1720	Terminal Block
4	08-6553	Hi-Limit Thermostat
5	10-5220	Ground Lug
6	08-7981	Terminal Strip
7	98-1663	Bracket, Contactor Mounting
8	98-4014	Bracket, Contactor Tray

ELECTRIC BOILER, ELEMENTS





ITEM	PART NO.	DESCRIPTION
1	98-1659	Plate, Front
2	98-1673	Gasket, Front Plate
3	91-8660	Gasket, Htg. Element
4A	08-6485	Heating Element, 9kW, 208 Volts
4B	08-6486	Heating Element, 9kW, 240 Volts
4C	08-6487	Heating Element, 9kW, 480 Volts (a.k.a 277 Volts)
4D	08-6415	Heating Element, 12kW, 208 Volts
4E	08-6416	Heating Element, 12kW, 240 Volts
4F	08-6417	Heating Element, 12kW, 480 Volts (a.k.a 277 Volts)
4G	08-6491	Heating Element, 14kW, 208 Volts
4H	08-6418	Heating Element, 16kW, 208 Volts
4J	08-6419	Heating Element, 16kW, 240 Volts
4K	08-6420	Heating Element, 16kW, 480 Volts (a.k.a 277 Volts)
5	08-6337	Water Level Probe
6A	98-3936	Screw, 1/4-20 Socket Set Screw, Stainless Steel
6B	08-7840	Nut, 1/4-20 Flanged