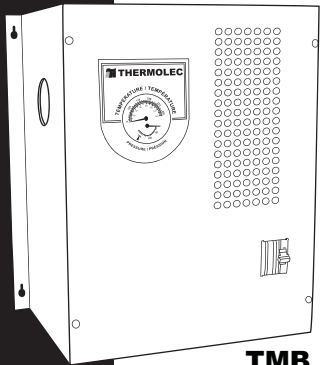
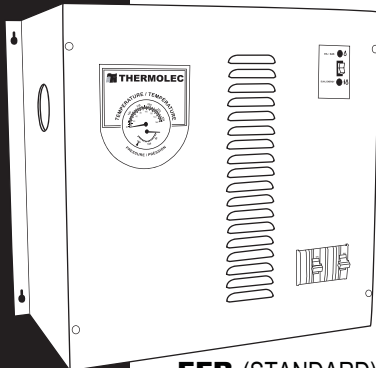


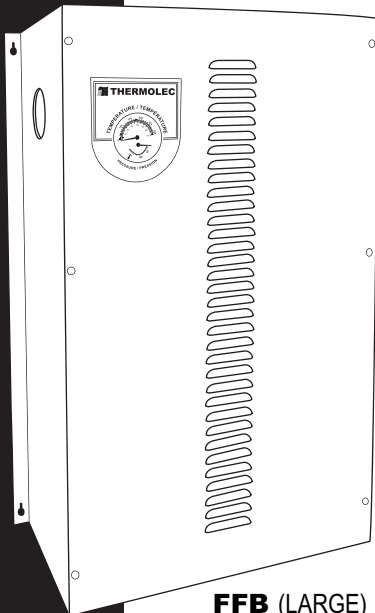
THERMOLEC



TMB



FFB (STANDARD)



FFB (LARGE)

TB
(TANDEM)

Installation Instructions for Electric Boilers (USA)



June 2018
Version 12

ATTENTION

Under normal conditions additives or treatments for the system water is not required, however extreme water conditions may void the warranty.

To be sure that this is not the case, when installing the boiler make sure that the source water:

- does not contain a high level of chlorine
- is not contaminated with excessive sediment
- is close to a neutral pH of 7.0 ± 1.0

To correct any water issues, consult a local water treatment professional.

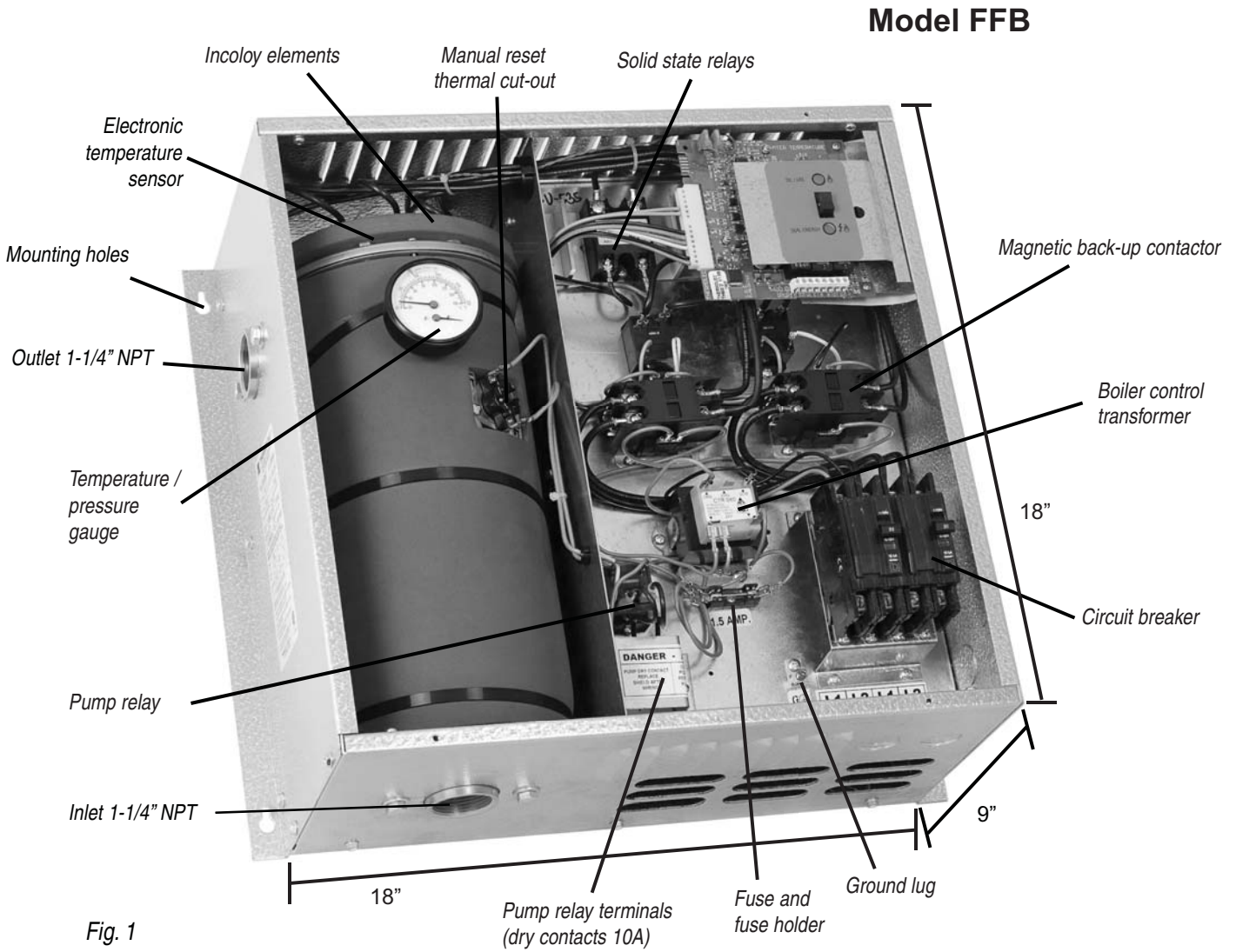
Sections label with **TB** apply specifically to Tandem Boilers. Tandem Boiler setups consist of two boilers connected in series to meet the total kW requirements.

- I. Table of Contents
- II. Warning Section
 - 1. Instructions
 - 2. Licensing
 - 3. Servicing
 - 4. Operation
 - 5. unpacking
- III. Boiler Components
- IV. Before you begin
 - 1. Water condition
 - 2. Clearances/location
 - 3. Installation/Piping
 - 4. Wiring
- V. Sequence of operations
 - 1. FFB
 - 2. TMB
- VI. Troubleshooting
 - 1. FFB
 - 2. TMB
- VII. Wiring Diagrams
- VIII. Piping Diagrams
- IX. Maintenance
- X. Warranty

II. Warning Section

- A. Read all instructions before installing boiler
- B. Boilers must be wired by a licensed electrician
- C. When servicing boiler
 - 1. To avoid electrical shock, disconnect electrical supply before performing maintenance.
 - 2. To avoid severe burns, allow boiler to cool before performing maintenance.
- D. Boiler operation
 - 1. Do not block the top and bottom vents on boiler (could cause components to overheat).
 - 2. Make sure the system is completely filled and purged of air before turning on the boiler.
- E. Unpacking
 - 1. Inspect the unit and check for missing parts. Box includes boiler, pressure relief valve, temperature/pressure gauge and outdoor sensor.
 - 2. Report any damage or claims to the carrier immediately.
 - 3. In order for all returns to be accepted, they must be authorized by the manufacturer.

III. Boiler Components



Note : The model shown above is a typical FFB boiler 15kW / 240 Volts / 1 phase.
 Model shown below is a TMB boiler 11kW / 240 / 1 phase.



Outdoor reset sensor Fig. 3

Model TMB

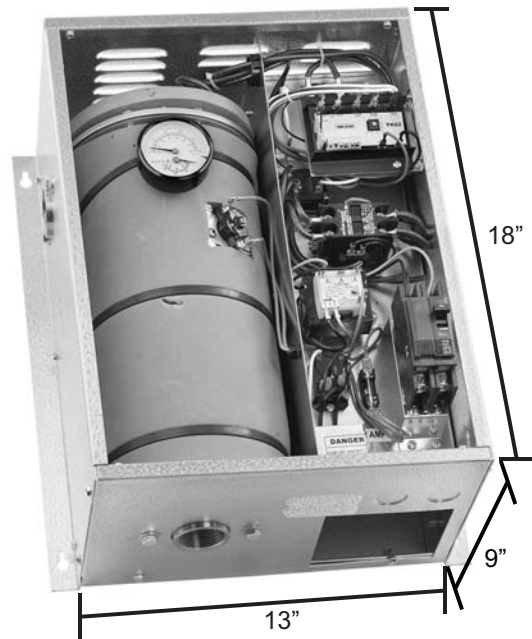


Table 2

		B-5U-FFB	B-6U-FFB	B-8U-FFB	B-9U-FFB	B-10U-FFB	B-12U-FFB	B-15U-FFB	B-18U-FFB	B-20U-FFB	B-23U-FFB
	Kw	5	5.75	8	9	10	12/11.5	15	18	20	23
	BTU/H	17060	19619	27296	30708	34120	39238	51180	61416	68242	78479
208/3	Total Amps					27.76	33.3	41.64	48		
	Supplies & Breaker Size					1 x 40A 3P	1 x 50A 3P	1 x 60A 3P	1 x 60A		
240/1	Total Amps	20.83	25	33.33	37.5	41.67	47.92	62.5	75	83.37	95.83
	Supplies & Breaker Size	1 x 30A	1 x 40A	1 x 50A	1 x 50A	1 x 60A	1 x 60A	1 x 60A	1 x 60A 1 x 30A	1 x 60A 1 x 50A	2 x 60A
240/3	Total Amps				21.65		28.87	36.09	43.3		
	Supplies & Breaker Size				1 x 30A 3P		1 x 40A 3P	1 x 50A 3P	1 x 60A 3P		
480/3	Total Amps					12.03	14.4	18.04	21.7		
	Disconnect Switch					1 x 30A 3P	1 x 30A 3P	1 x 30A 3P	1 x 30A 3P		

		B-24U-FFB	B-27U-FFB	B-30U-FFB	B-35U-FFB	B-40U-FFB
	Kw	24	27	30	35	40
	BTU/H	81888	92128	102360	119420	136480
208/3	Total Amps	66.69		83.37	96	
	Supplies & Breaker Size	2 x 50A		2 x 60A	2 x 60A	
240/1	Total Amps		112.5	125	145.83	166.67
	Supplies & Breaker Size		2 x 50A 1 x 60A	3 x 60A	4 x 50A	4 x 60A
240/3	Total Amps			72.17	84.2	
	Supplies & Breaker Size			2 x 50A 3P	2 x 60A 3P	
480/3	Total Amps	28.9		36.1	42.15	48
	Disconnect Switch	1 x 30A 3P		1 x 60A 3P	1 x 60A 3P	1 x 60A 3P



TANDEM BOILER CONFIGURATIONS

MODEL	CONFIG.	208/3	240/1	240/3	480/3
B42	30 +12	X	X	X	X
B44	35+9			X	
B45	35+10	X	X		X
B47	35+12	X		X	
B48	40+8		X		
B50	35+15	X		X	
B50	40+10		X		X
B52	40+12				X
B53	35+18	X		X	
B55	40+15				X
B58	40+18				X

TMB MONO Model Specifications @ 240V / 1ph (U.S.A)				
Mono Models	B-3TMBU	B-6TMBU	B-9TMBU	B-11TMBU
kW	3	6	9	11
BTU/H	10,236	20,472	30,708	37,532
Total Amps	12.5	25.0	37.5	45.8
Breaker size	1 x 20A	1 x 40A	1 x 50A	1 x 60A

NOTE: Tandem boilers consist of two boilers connected in series. Consult the tables for details of individual boilers

NOTE: Other models, voltages and capacities available upon request. Please contact the factory. Please use Table 3 below to select the wire size for the power supply.

Table 3

Cable Amps Capacity vs Wire Size											
Wire Size	12	10	8	6	4	3	2	1	0	00	000
Amps @ 75°C (167°F)	20	30	45	65	85	100	115	130	150	175	200
Amps @ 90°C (194°F)	20	30	45	65	85	105	120	140	155	185	210
Notes :											
1- This table should be used as a guide only. Always select the wire size according to the local Electrical Code.											
2- Always use wire suitable for 75°C (167°F) minimum, 300V or 600V as required.											
3- All models with suffix "U" over 12 kW at 240V / 1 ph require two feeders. Divide the Total Amps by 2 to select the proper wire size.											
4- COPPER WIRE ONLY.											



TANDEM BOILER CONFIGURATION DETAILS

Model	BTU/H	Voltage	Total Amp.	Primary	Amperage	Breaker	Disconnect
				Secondary			
TB42	141598	208/3	116.67	B30	83.37	2 X 60A	-
				B12	33.3	1 X 50	-
		240/1 ^{A/B}	172.92	B30	125	3 X 60	-
				B12	47.92	1 X 60	-
		240/3	101.04	B30	72.17	2 X 50	-
				B12	28.87	1 X 40	-
480/3	50.5	B30	36.1	-	1 X 60		
		B12	14.4	-	1 X 30		
TB44	150128	240/3	105.85	B35	84.2	2 X 60	-
				B9	21.65	1 X 30	-
TB45	153540	208/3	123.76	B35	96	2 X 60	-
				B10	27.76	1 X 40	-
		240/1	187.5	B35	145.83	4 X 50	-
				B10	41.67	1 X 60	-
		480/3	54.18	B35	42.15	-	1 X 60
B10	12.03			-	1 X 30		
TB47	158658	208/3	129.3	B35	96	2 X 60	-
				B12	33.3	1 X 50	-
		240/3	113.07	B35	84.2	2 X 60	-
				B12	28.87	1 X 40	-
TB48	163776	240/1	192.67	B40	166.67	4 X 60	-
				B8	33.33	1 X 50	-
TB50	170600	208/3	137.64	B35	96	2 X 60	-
				B15	41.64	1 X 60	-
		240/1	208.34	B40	166.67	4 X 60	-
				B10	41.67	1 X 60	-
		240/3	120.29	B35	84.2	2 X 60	-
				B15	36.09	1 X 50	-
480/3	60.03	B40	48	-	1 X 60		
		B10	12.03	-	1 X 30		
TB52	175718	480/3	62.4	B40	48	-	1 X 60
				B12	14.4	-	1 X 30
TB53	180836	208/3	144	B35	96	2 X 60	-
				B18	48	1 X 60	-
		240/3	127.5	B35	84.2	2 X 60	-
				B18	43.3	1 X 60	-
TB55	187660	480/3	66.04	B40	48	-	1 X 60
				B15	18.04	-	1 X 30
TB58	197896	480/3	69.7	B40	48	-	1 X 60
				B18	21.7	-	1 X 30

IV. Before You Begin

- 1) Water Condition
 - a) Freeze protection can be used, no greater than 50% solution. Any non-automotive Glycol can be used.
 - b) Any time water hardness is greater than 9 (ph), water additives, in line filters or filling with distilled water should be used.

- 2) Clearances/location
 - a) Boiler is designed for wall mounting with zero clearance to combustibile materials.
 - b) Refer to Table 1 for dimensions and clearances.
 - c) Boiler room should be well ventilated, recommended room temperature below 77 degrees.
 - d) Boiler must be mounted level on a vertical wall with supply water outlet fitting on the left side, return water fitting on bottom.
 - e) Mounting brackets are located on the sides of the boiler.

Table 1

Dimensions and Clearances									
Models	Overall dimensions			Clearances					
	Width	Height	Depth	Front	Back	Top	Right	Others	
<u>Short Models</u> up to 23 kW 1ph up to 18 kW 3ph	18"	18"	9"	36"	0"	12"	6"	12"	
<u>Long Models</u> up to 40 kW	18"	28"	9"	36"	0"	24"	6"	12"	
TMB	13"	18"	9"	36"	0"	12"	6"	12"	

TB Tandem boiler installations have two individual boilers in series.
 Use the table for information on each boiler individually

3) Piping section

a) The system is designed to operate with a maximum output temperature of 190°F or lower and a temperature rise across the unit of 20°F or lower. Please refer to Table 4 for the minimum flow rate versus the capacity of the boiler.

Table 4

Minimum Water Flow Rate vs Capacity	
Capacity (kW)	US Gallons / min
3	1.1
5	1.8
6	2.0
8	2.8
9	3.1
10	3.5
11	3.9
12	4.2
15	5.3
18	6.2
20	7.0
23	8.0
27	8.8
30	10.4
35	12.2
40	13.9



Minimum Water Flow Rate vs Capacity	
Capacity (kW)	US Gallons / min
42	14.6
44	15.3
45	15.7
47	16.4
48	16.7
50	17.5
52	18.1
53	18.4
55	19.2
58	20.1

If the system has multiple zones, minimum flow rate in Table 4 applies when smallest zone is calling. This is best accomplished with primary/secondary piping.

b) Pressure loss (referred as “Head”) caused by water friction in the system should not exceed the capacity of the pump.

c) Please refer to Table 5 below to find the copper pipe diameter (type L) recommended to accommodate the water flow found in Table 4 above.

Table 5

Maximum Flow Rate @ 15 psi	
Maximum Flow Rate US Gallons / min	Pipe Diameter (Type L Copper)
4.3	3/4"
10.1	1"
17.3	1-1/4"

d) Elbows and valves will greatly add to the head loss in the system. An appropriate water flow rate must be maintained to avoid tripping manual Highlimit. Pipes with diameters larger than specified in Table 5 will not help to increase water flow.

e) Head loss through the boiler tank is negligible and should not affect calculations of flow rates. Head loss is 5' of Head

f) First supply water fitting must be 90° elbow pointing up to assure no air buildup in top of tank.

The installation must have a drain valve, an expansion tank and maintenance valves must be installed at the supply outlet of the unit. This "T" must be equipped with a reducing bushing 1-1/4" to 3/4" NPT, facing upwards, to accept a 3/4" NPT pressure relief valve. This safety valve must be installed vertically. Except for the pressure relief valve, the above plumbing supplies are not supplied with the unit. Please refer to illustrations A, B and C at the end of this manual.

g) The automatic pressure relief valve supplied with the boiler is required to prevent dangerous pressure build-ups in the system in case of system malfunction and may under certain conditions vent hot water. Do not install the system where water could damage rugs, furniture, etc. When piping the relief valve to a drain, check with local authority for recommended method of installation. Do not open or tamper with the relief valve. If operated frequently or used to drain or flush the system, the valve could fail to seat properly and thus leak. Important safety notice : This safety valve is mandatory and must be installed as shown in the illustrations A, B and C at the end of this manual. The omission of the safety valve installation will create a very serious safety hazard and will void all warranties.

h) A system air separator and vent should be installed at the highest point of the installation and above the level of the boiler tank, ideally on all radiator units for best results or at points where air could possibly be trapped in the system. Caution : Make sure the system has been properly vented before starting the unit.

i) Mounting brackets are located on the sides of the boiler. Depending on the size of the unit, four or six holes are provided. The unit may be attached directly to a combustible surface.

j) Use a circulator pump of appropriate capacity for the intended application. The pump should be placed as close as possible to the boiler. Ensure that the water direction is correct. An arrow indicating the circulation direction is generally visible on the pump casing.

k) Install supply and return water piping.

l) Install air vents, valves, the pressure relief valve supplied with the unit, expansion tank, etc.

m) When everything is finished, install the temperature / pressure gauge.

IV Wiring Section

- a) Disconnect all power sources before opening the main panel and working within.
- b) Read the nameplate and other markings carefully and wire strictly in accordance with the wiring diagram.
- c) Wires and protective equipment must be sized according to the applicable Electrical Code.
- d) Use only wires suitable for minimum 167°F.
- e) Install the outdoor sensor on an exterior North wall and connect it with 18/2 wire to terminals "OT / OT" on the electronic board (TH-600 series controller).
- f) On the electronic aquastat (marked "WATER TEMPERATURE"), select the maximum water temperature required (1-10) by the type of installation. Please see Table 6 below for the temperature obtained according to the knob position. The minimum water temperature is reset automatically by the outdoor sensor. Please see the variation graph in Fig 5.

Table 6

Water Temperature controlled by Electronic Aquastat											
Set-point		10	9	8	7	6	5	4	3	2	1
Maximum temperature	°C	88	81	75	67	58	50	45	42	39	36
	°F	190	178	167	153	137	122	113	107	102	97
Minimum temperature	°C	48	48	48	45	40	38	34	31	29	28
	°F	118	118	118	113	104	100	93	88	84	82

Electronic Aquastat

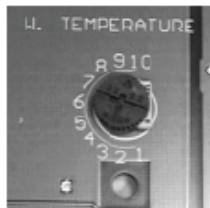


Fig. 4

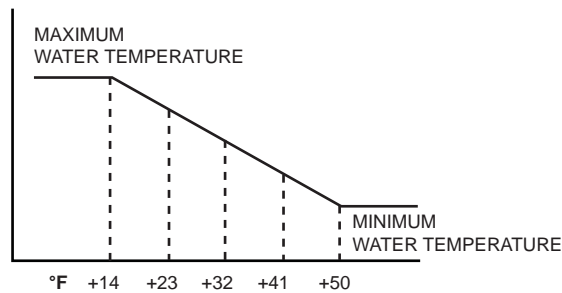


Fig. 5

g) The outdoor sensor will :

- Maintain the selected maximum water temperature when the outdoor temperature is at +14° F or colder.
- Automatically and proportionally compensate by varying the water temperature between the maximum and minimum when the outdoor temperature is between +14°F and +50°F.
- Maintain the minimum water temperature when the outdoor temperature is between +50°F and +68°F.
- Prevent boiler operation above +68°F.

NOTE : The outdoor sensor is not required for the boiler to operate. If the outdoor sensor is not installed, with a call for heat, the boiler will modulate to maintain the temperature selected on the aquastat regardless of the outdoor temperature.

- h) Connect the thermostat or the zone valve end switch wires to “C” and “W1” terminals on the electronic board. Power stealing thermostats require an isolation relay (not included) and should not be powered by the W1 and C terminals.
- i) Circulating Pump Control. The “P / P” terminals are connected to dry contacts of a relay (capacity up to 1 HP) and are used to start the pump. This relay is switched ON with the first heating step and OFF after the last one. A separate 120V / 1Ø service must be provided from the electrical panel to the boiler for the pump. For Electric Boiler only systems, refer to the wiring diagram. For Electric Boiler with fossil fuel backup, see the diagram on page 23 labeled ‘PUMP WIRING WITH FOSSIL FUEL BACKUP BOILER’ as the pump must also run when another source of heat is selected. Follow the extra steps dedicated to a FFB installation in the start-up sequence.
- j) If the system is used with Load Management control, connect the Utility signal to “S1 / S2” terminals. A closed contact enables the boiler, an open contact disables the boiler.
- k) The installation is now ready for start-up procedure and testing.

Extra test steps for Electric with Fossil Fuel Backup Boiler installation

- a) Disconnect the room thermostat wires from the existing boiler and connect them to “C” and “W1” terminals on the electronic board of the electric boiler.
- b) Connect two (2) wires from “B / B” control terminals of the electronic board on the electric boiler to the T T (thermostat) terminals of the existing boiler.
- c) Terminals “S1 / S2” on the electronic board should receive the utility Load Management Control wires.
- d) Connect the pump terminals “P / P” in parallel to the existing thermostatic pump control as per wiring diagram on page 23 to allow the operation of the pump in any of the “Dual-Energy” modes selected.
- e) When the system is operating in Fossil Fuel mode, the supply water temperature of the fossil fuel boiler should never exceed 190°F which may trip the manual high limit in the electric boiler.

V. Sequence of operations

- 1) FFB Model sequence of operations:
 - a) Power wires connected to circuit breaker(s), control wires connected to C/W1 (thermostat, aqua stat, zone valve or end switches), load management relay or jumper connected to S1/S2, outdoor sensor connected to OT/OT. If installed with a gas back-up boiler, wire BB terminals on electric boiler to TT terminals on back-up boiler.
 - b) Boiler is supplied with a three position switch factory set to Dual Energy. In this position, with S1/S2 closed and a call for heat to C/W1, electric boiler will start. When set to Oil/Gas, with a call for heat, back-up boiler will start. Middle position is also Dual Energy. A green pilot light indicates the mode that has been selected.
 - c) Breakers turned on at boiler. When Feeder 1 is turned on, transformer is powered. As long as the fuse is good and the hi-limit has not been tripped, the back-up contactor will energize and close/pull in.
 - d) Call for heat: C/W1 is closed, monitor light will flash (upper left hand corner of PC board); the board will energize the pump relay and close the P.P. terminals switching on the pump. First element relay LED on board will light (bottom LED next to wiring harness on left side of PC board), indicating that 24VDC is sent to coil of first element relay (SSR), contact of relay will close and start first element.
 - e) After 30 seconds, if boiler has not reached temperature set on aqua stat, second element relay LED on board will light (second from bottom LED next to wiring harness on left side of PC board) indicating that 24VDC is sent to coil of second element relay (DC relay), contact of relay will close and start second element.
 - f) Depending on the size of the boiler and number of elements in the tank, the board may energize the second, third and fourth element relays.
 - g) Once temperature set on aqua stat has been achieved, board will control water temperature by modulation. First element relay will be pulsed on and off and remaining elements will be turned off or on 100% to maintain the desired supply water temperature.

- h) After the call for heat is satisfied, the elements will be sequenced off and the pump relay will be de-energized.
- i) With a call for heat, the outdoor sensor will vary the supply water temperature based on outdoor temperature and will disable the boiler any time the outdoor temperature is above 68°F.
- j) If there is a call for heat and S1/S2 terminals are open, electric boiler will shut down. If system includes a gas back-up boiler, with a call for heat and S1/S2 terminals are open, B/B terminals will close, T/T on gas back-up boiler will close and back-up boiler will start.

TB

The primary boiler in a tandem setup will operate like an FFB boiler and will activate the slave boiler when extra heating capacity is required.

- 2) TMB model sequence of operations:
 - a) On a call for heat, the monitor light will flash every time the control board detects a command.
 - b) After the heat call is recognized, the pump LED light will illuminate and the pump will be turned on. CD1, CD2, and STG3 lights will illuminate indicating that the corresponding elements are staged on and/or modulating (this will vary depending on the # of elements in the boiler).
 - c) After the call for heat is satisfied, the elements will be sequenced off and the pump relay will be de-energized.
 - d) With a call for heat, the outdoor sensor will vary the supply water temperature based on outdoor temperature and will disable the boiler any time the outdoor temperature is above 68°F.

VI. Trouble shooting Section

Troubleshooting Guide - FFB model

Call for heat and boiler doesn't start, no lights on circuit board. Try the following:

1. Confirm that the boiler is connected to 240/1 power, main panel breakers are ON, breakers supplying boiler in panel are ON.
2. Boiler circuit breakers are ON.
3. Check line side of transformer for 240 volts. If yes, continue. If no, check for 240VAC at circuit breaker.
4. Check low voltage side of transformer for 24 VAC. If yes, continue. If no, change transformer.
5. Check for 24 VAC from fuse to circuit board. If yes, continue. If no, change fuse.
6. If outdoor sensor is attached to OT/OT on boiler circuit board, is outdoor temperature below 68°F? If outdoor temperature is 68°F or more, disconnect one leg of wires to OT/OT. Do not jumper OT/OT.
7. Confirm that load management control contact is wired to S1/S2 terminals on boiler circuit board and load management contact is closed, or jumper S1/S2. Boiler will not start if S1/S2 is open.
8. Confirm that thermostat or zone valve end switch is wired to C/W1 terminals on boiler circuit board and that boiler is getting a good call for heat, or jumper C/W1.
9. Turn OFF circuit breakers at boiler. On upper left corner of circuit board are two red wires connected to supply water sensor on boiler tank. Carefully disconnect red wire connections from board. Turn ON circuit breakers. If boiler starts, turn OFF circuit breakers and replace supply water sensor. If boiler doesn't start, replace circuit board.

Call for heat, circuit board lights come on but no heat or insufficient heat. Try the following:

1. Check amp draw at boiler circuit breakers. If amp draw is less than rating on boiler label, continue to next step. If amp draw is correct, turn OFF circuit breakers and check pump operation, confirm system design, heat loss, boiler sizing, system water level, etc.
2. Check back-up contactor. Set meter to volts AC and measure for voltage on power wires out of contactor going to elements/relays. If 240VAC, go to next step. If not 240VAC, check for 24VAC at coil of back-up contactor. If no 24VAC, check for 24VAC across high limit sensor on tank. If 24VAC, reset manual high limit or, if auto high limit, change high limit. If no 24VAC, check wiring at high limit.
3. Check for 24V DC from circuit board to coil of element relays - smaller two screws on solid state relay, terminals labeled coil on DC relays. Make sure + probe on meter to + terminal on SSR and – to –. If no DC voltage to relays, check wiring harness connection to circuit board. If DC voltage at relay, set meter to volts AC and check contact side of relay. If solid state relay, put probes on SSR L1 and T1 – larger two screws on SSR. If DC relays, put probes on terminals labeled contacts. If 0 voltage, relay contact is closed, go to step 4. If 240VAC at relay contact, it is failed open, change relay.
4. Turn OFF circuit breakers. Check for continuity at boiler elements. If no continuity, change element.

Call for heat, boiler starts and back-up contactor is noisy. Try the following:

1. Check for 24VAC out of transformer to contactor. If less than 24VAC, change transformer. If 24VAC, contactor is defective or contacts are dirty. Continue.
2. Turn OFF boiler circuit breakers. Disconnect wires to contactor, remove contactor from boiler, remove two screws from bottom metal plate on contactor, carefully remove coil and magnetic core, carefully clean surface of magnetic contacts with emery cloth. Reassemble and reinstall contactor. Remove all debris, metal shavings, etc. from inside of boiler cabinet. Restart boiler. If contactor noise continues, replace contactor.

Call for heat, boiler starts but pump doesn't run. Try the following:

1. Check for 120VAC from main electrical panel to pump. Pump must get power from the panel.
2. Route 120VAC from panel to pump through boiler. Run line leg of 120VAC through PP terminal on boiler. When boiler starts, relay connected to PP will close and start pump.
3. If pump is powered from panel and run through PP as described above and pump does not start when boiler starts, check for continuity on contact side of PP relay. If not closed, replace PP relay.

Call for heat, boiler starts, call for heat ends (no lights on board) and boiler continues to heat. Try the following:

1. Confirm that the call for heat has ended, disconnect wires to C/W1.
2. Check for amp draw at each element circuit. If there is amp draw, check for 240V AC on contact side of element relay. If there is 0 voltage, relay has failed closed, change relay.
3. Check for amp draw and if some amp draw but less than full rated amp draw: Set meter to ohms and check element drawing amps. If element reads less than rated ohms, change element. If element reads proper ohms, change relay.

Call for heat and boiler tank is "noisy". Hissing, percolating or knocking noise from tank:

1. Most common cause of boiler tank noise is improper flow. Refer to installation manual for proper GPM based on kW size of boiler.
2. If proper GPM flow rate through boiler, noise can be caused by sediment build-up on elements. Check for build-up on outside surface of elements.

Troubleshooting Guide - TMB model

A. Boiler will not start, no lights on the board

1. Confirm 24vac to the board. If no, check main power at breakers, from the transformer, and through the fuse.
2. If Yes, Confirm heat call at control board by installing a jumper at W1 and C. If the boiler starts, check thermostat.
3. If No, confirm there's a factory installed jumper at S1 and S2. Main control board will not start if S1 and S2 are open. If boiler starts, check off peak relay.
4. If No, remove outdoor sensor wires at OT and OT. If the boiler starts the outdoor temperature is above 68 degrees or the sensor has failed. Sensor could also be getting a false read in direct sunlight. To disable the outdoor reset, remove wires at OT and OT and leave open.
5. If No, remove/unplug the water temperature sensor S and S on the control board. If board starts, replace sensor, if not, replace control board.

B. Call for heat, indicator lights on the board are on but no heat or insufficient heat.

1. Using multi-meter, when all lights on the control board are on, check amp draw at each circuit breaker. Compare amp draw to rated amps for the model being tested. If actual boiler amp draw matches rated amp draw, boiler is operating properly. Issue could be with boiler sizing, water flow through boiler, cold slab, etc.
2. Confirm 240vac at breakers and through the contactor. With a call for heat, L1 and LD1, L2 and LD2 should all read 0vac. Stg. 3 relay should have 24vdc at the coil. See page 26 for element configuration, meter should read 240vac between the 2 posts of the element.
3. If voltage is present at the elements but still no heat check for proper Ohms at the element (see page ___ in manual). If element does not read proper ohms replace the element.

C. Call for heat, boiler starts but pump will not run

1. PP terminals inside the TMB are DRY and only act as a switch. 120vac MUST be brought in from the main panel to power the pump.
2. Set meter to volts DC and check for 24vdc at the coil of the pump relay. If there is 24vdc at the coil, check for continuity across the contacts of the relay. If no continuity replace the pump relay.

D. Call for heat ends (no lights on board) and boiler continues to heat

1. Turn OFF boiler circuit breaker. Check for Ohms at each element. If Ohms reading does not match rated Ohms, change element. If Ohms reading is correct and element continues to draw amps, replace control board.

IMPORTANT:
 WIRE IN ACCORDANCE TO LOCAL & NATIONAL ELECTRIC
 CODES. READ CAREFULLY INSTALLATION INSTRUCTION BEFORE
 WIRING AND OPERATING.

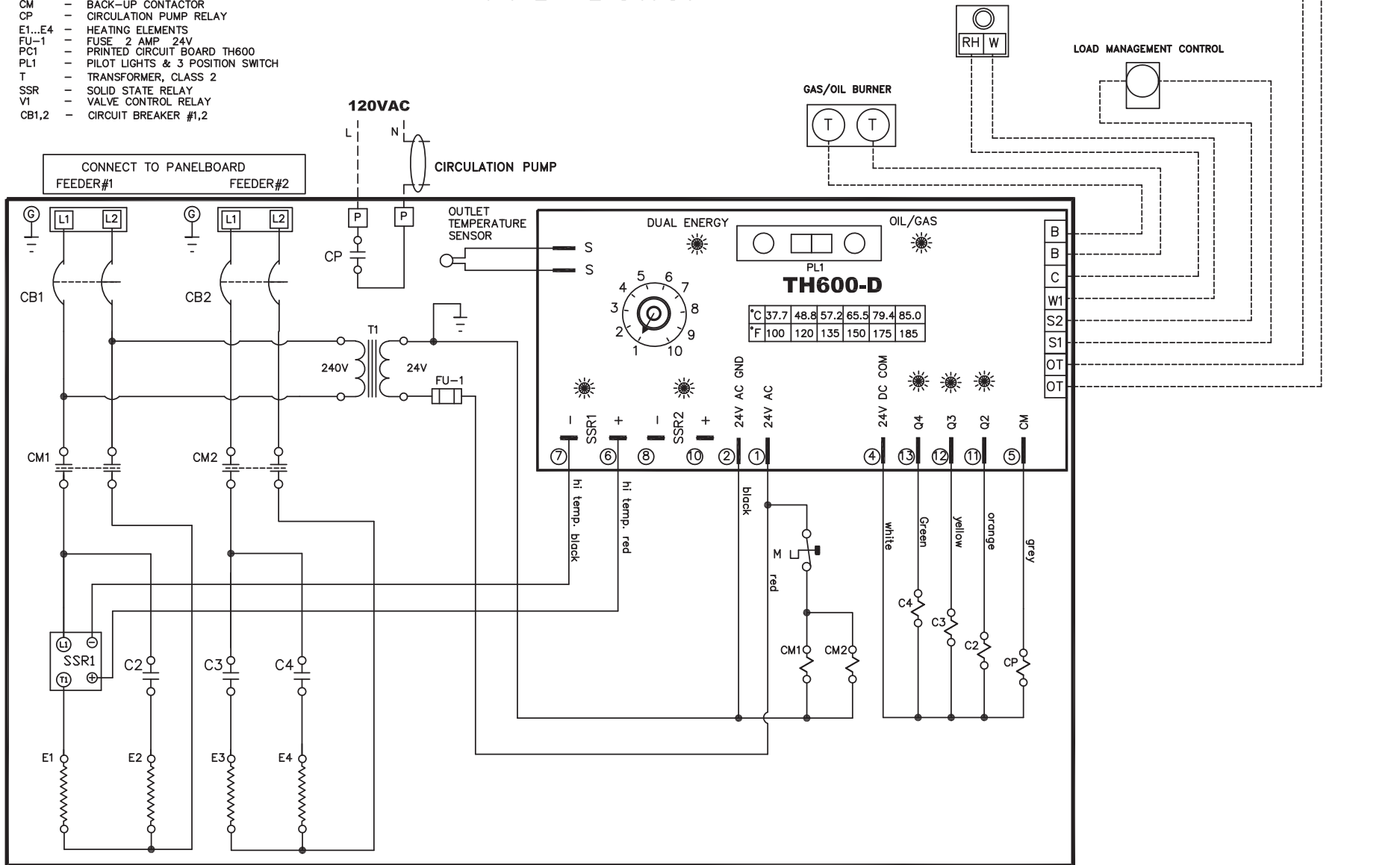
B18-B20 FFB Boiler

- LEGEND**
- M - MANUAL RESET CUT-OUT
 - CM - BACK-UP CONTACTOR
 - CP - CIRCULATION PUMP RELAY
 - E1...E4 - HEATING ELEMENTS
 - FU-1 - FUSE 2 AMP 24V
 - PC1 - PRINTED CIRCUIT BOARD TH600
 - PL1 - PILOT LIGHTS & 3 POSITION SWITCH
 - T - TRANSFORMER, CLASS 2
 - SSR - SOLID STATE RELAY
 - VI - VALVE CONTROL RELAY
 - CB1,2 - CIRCUIT BREAKER #1,2

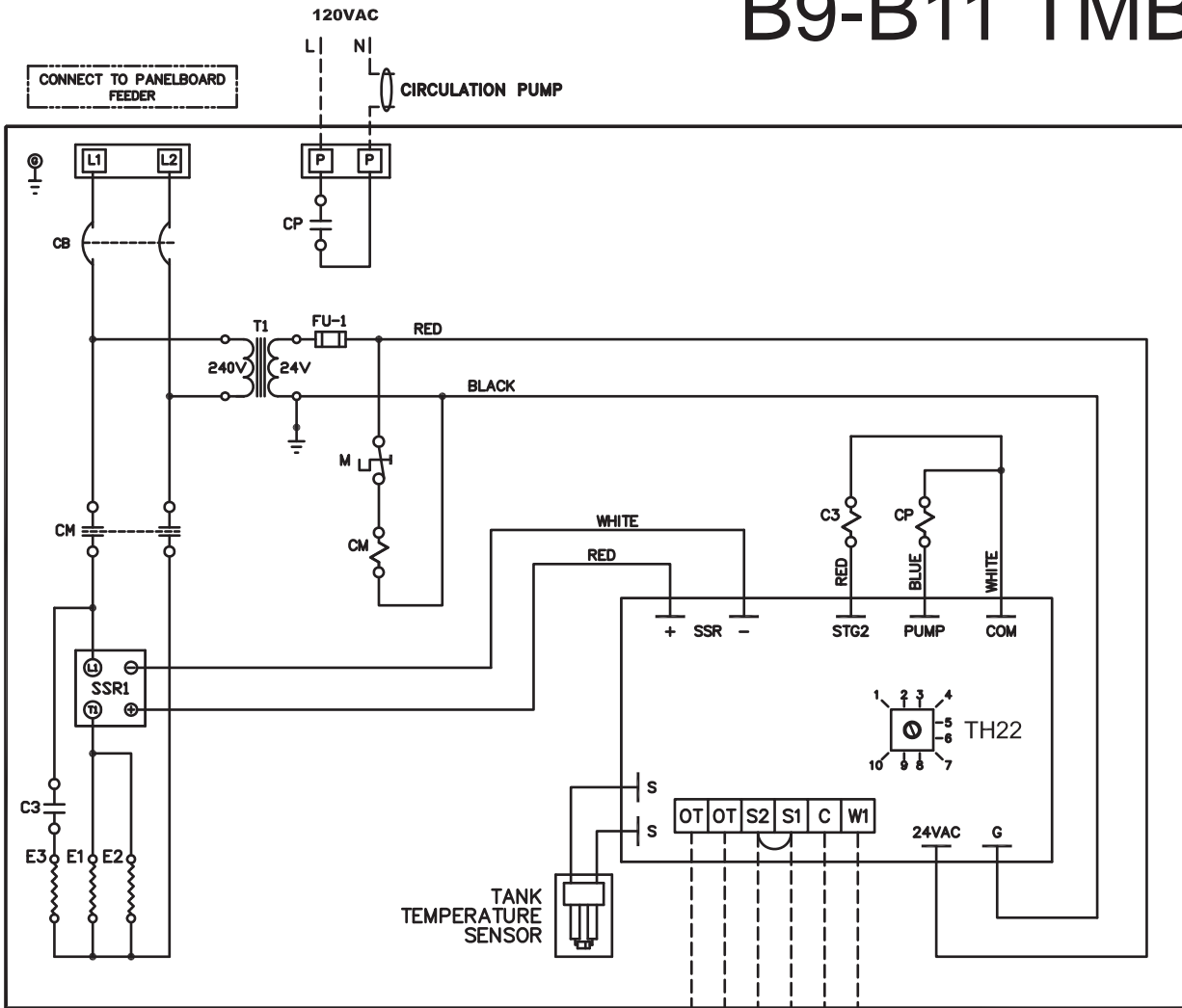
Note: If power stealing thermostat is used,
 thermostat must be powered by separate 24V
 source and add relay

ROOM THERMOSTAT (SET ANTICIPATOR (0.2AMP.)

OUTDOOR TEMPERATURE SENSOR



B9-B11 TMB



LEGEND

CM	Back-up Contactor to Manual
TH22	Solid State Controller
FU-1	Fuse 2 Amp 24VAC
M	Manual Reset Cut Out
CP	Circulation Pump Relay
SSR	Solid State Relay
T1	Transformer Class 2
E1-E3	Heating Element
C3	Stage 2 Relay
CB	Circuit Breaker

IMPORTANT

Wire in accordance with Local Electrical codes. Read instructions carefully before wiring and operating.

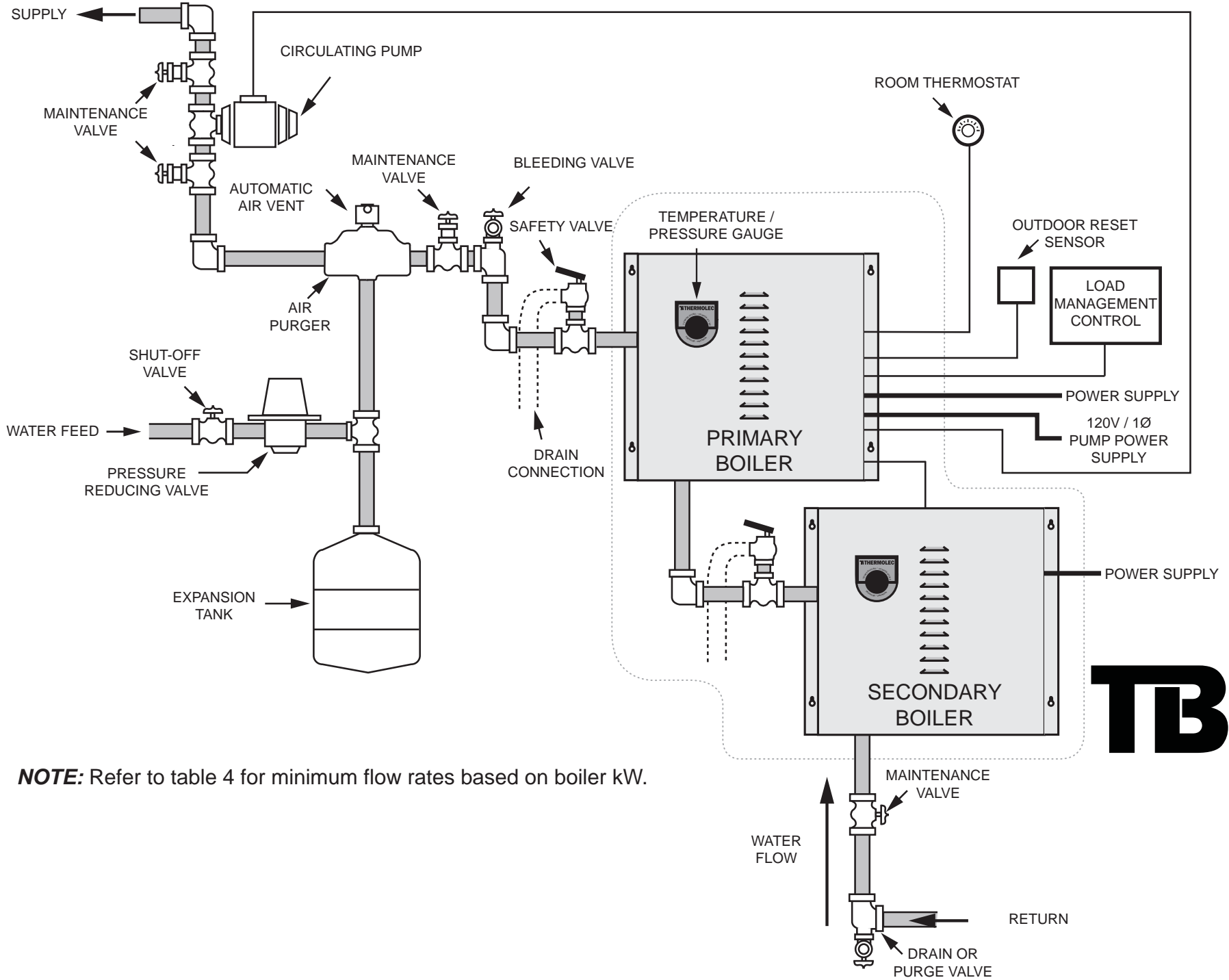
Note: Remove jumper between "S1" & "S2" when using Load Management Control

OUTDOOR TEMPERATURE SENSOR

LOAD MANAGEMENT CONTROL

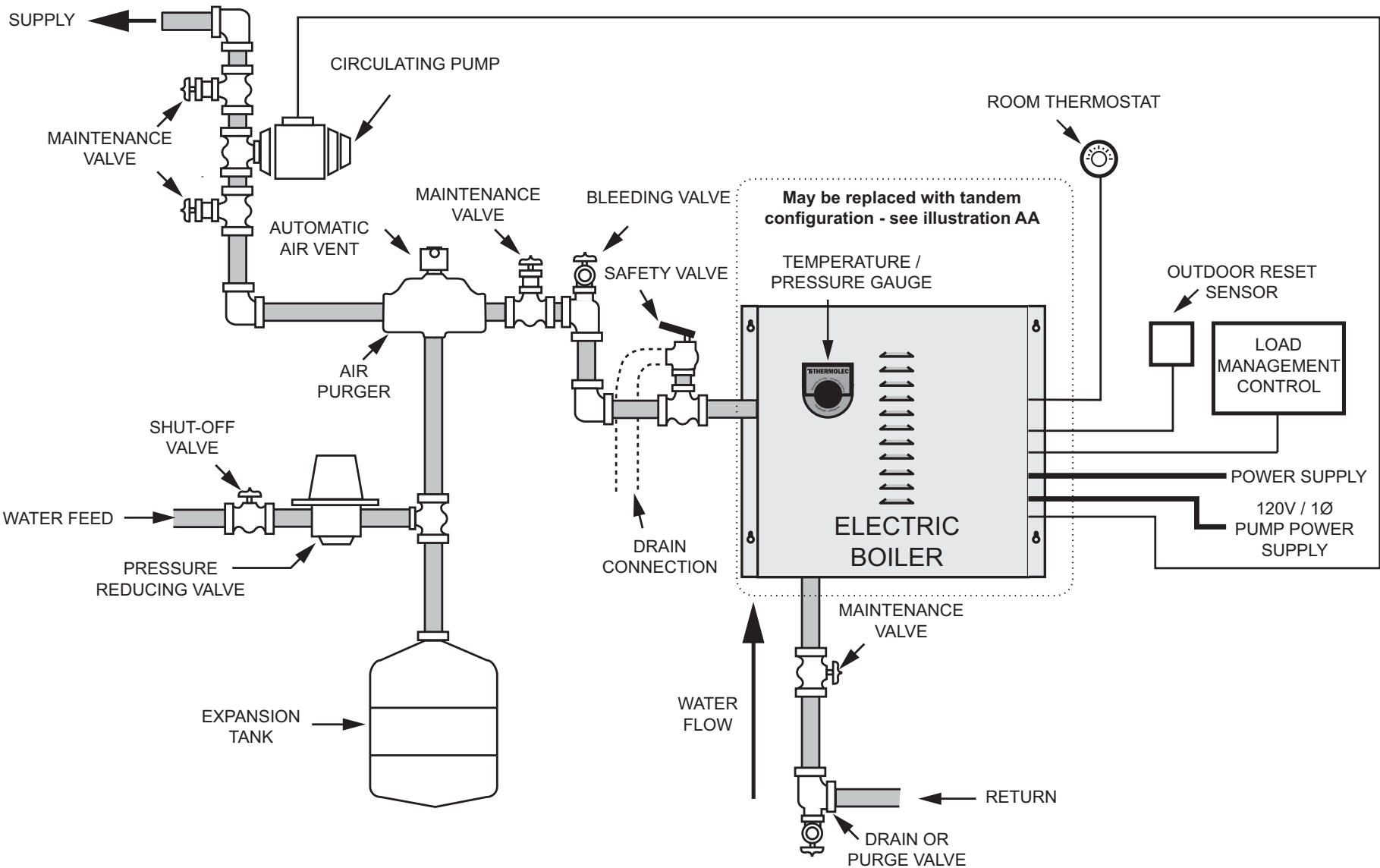
ROOM THERMOSTAT (SET ANTICIPATOR © 0.2 AMP)

Note: If power-stealing thermostat is used, the thermostat must be powered by a separate 24V source and additional relay



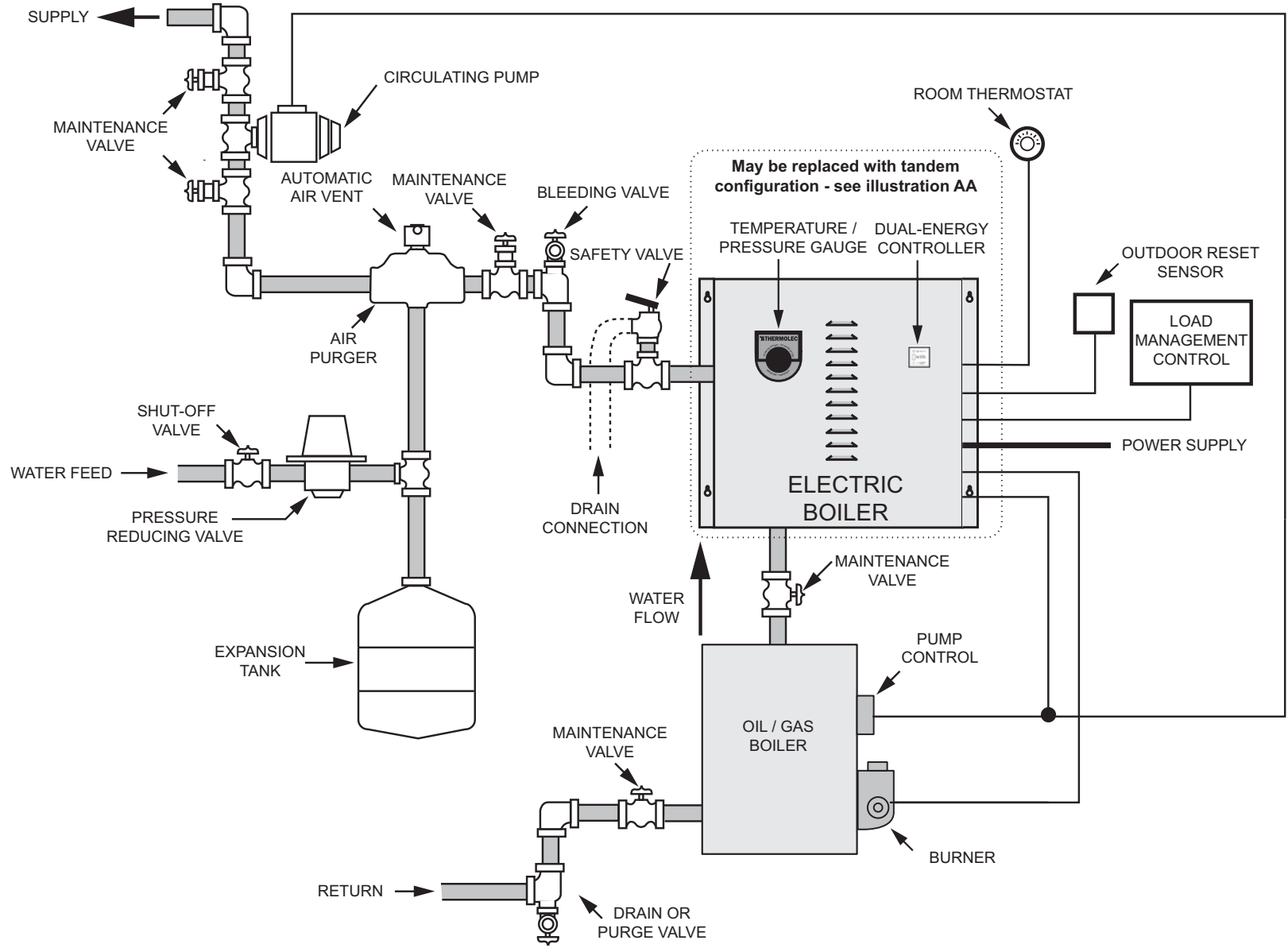
NOTE: Refer to table 4 for minimum flow rates based on boiler kW.





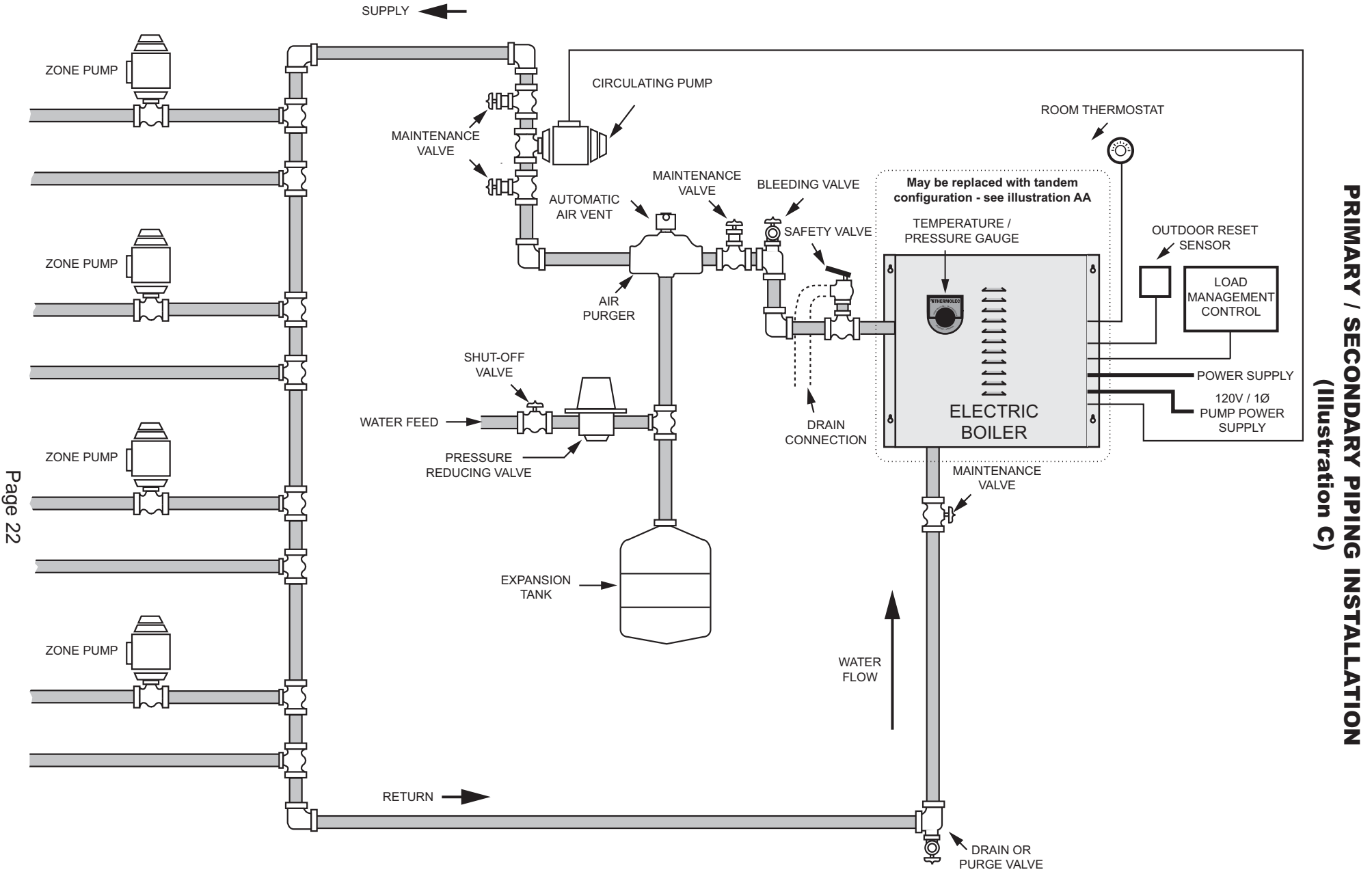
ALL-ELECTRIC INSTALLATION
(Illustration A)

NOTE: Refer to table 4 for minimum flow rates based on boiler kW. Primary/secondary boiler piping is recommended when system has more than two equally sized zones.



DUAL-ENERGY SERIES INSTALLATION
(Illustration B)

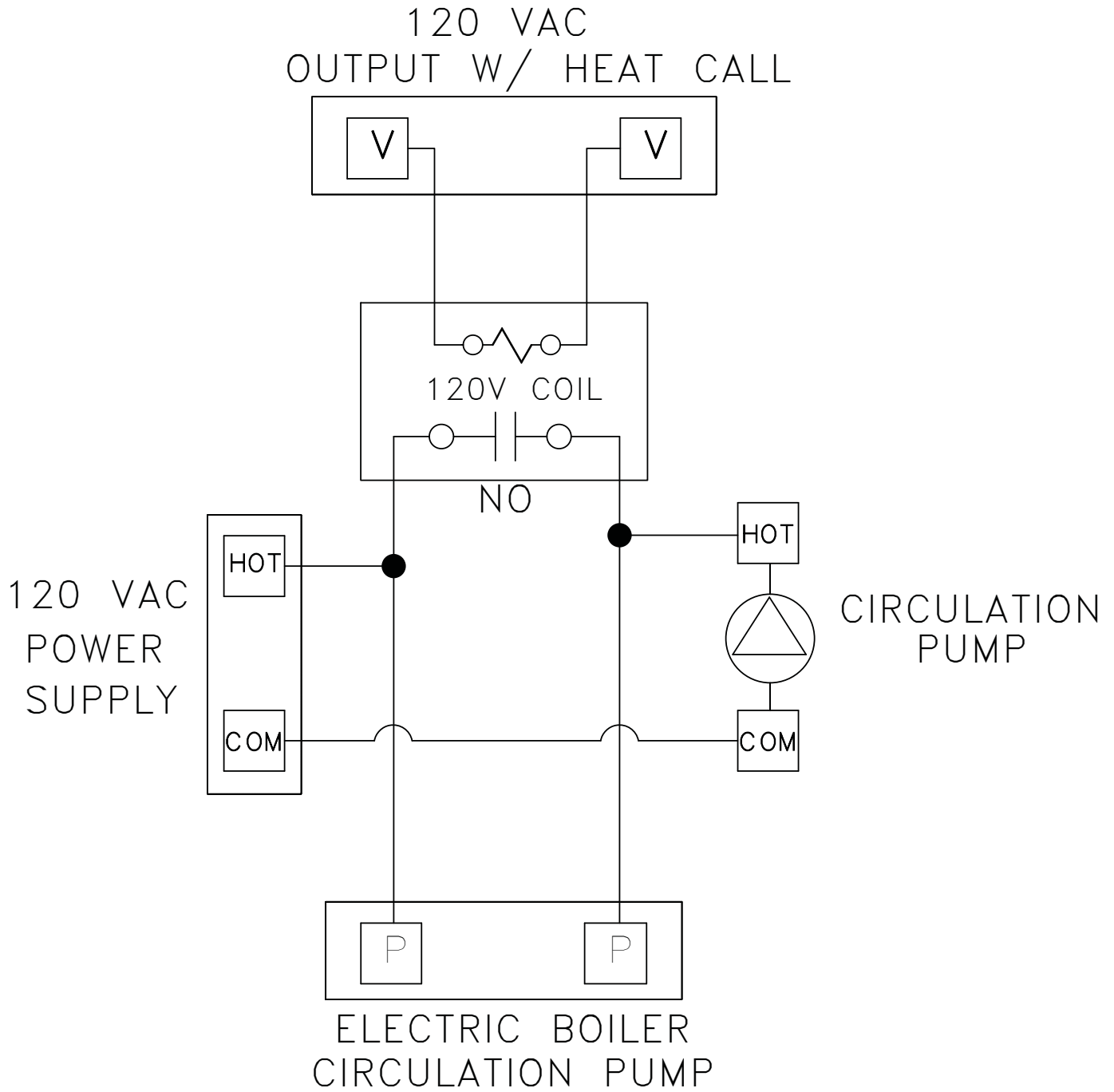
NOTE: Refer to table 4 for minimum flow rates based on boiler kW. Primary/secondary boiler piping is recommended when system has more than two equally sized zones.



PRIMARY / SECONDARY PIPING INSTALLATION
(Illustration C)

NOTE: Refer to table 4 for minimum flow rates based on boiler kW. Primary/secondary boiler piping is recommended when system has more than two equally sized zones.

PUMP WIRING WITH FOSSIL FUEL BACKUP BOILER



IX. Maintenance Section

1. As with any home heating system, Thermolec recommends periodic maintenance of your boiler by a qualified technician. This includes but is not limited to; tightening wire connections, check water level, pressure and condition, and make sure system is free of air, periodic cleaning of elements (this will vary upon water condition), thermostats and/or zone valves end switches and pump operation.

Position and electric values of heating elements

Standard values of heating elements at 240 Volts are 3kW, 5kW, 5.75kW, 8.75kW & 10 kW. Please refer to the following sketches and tables to find the position and test value in ohms of each element. Please ensure you disconnect the element wires completely before you make the resistance reading.

Replacement of heating elements

Heating elements nuts and cover bolts have been factory torqued with a calibrated tool. Please make sure you have a torque driver and the proper sockets handy before you open the boiler tank.

Elements nuts should be torqued at :

130 inch-pound (in-lbs) or equivalent

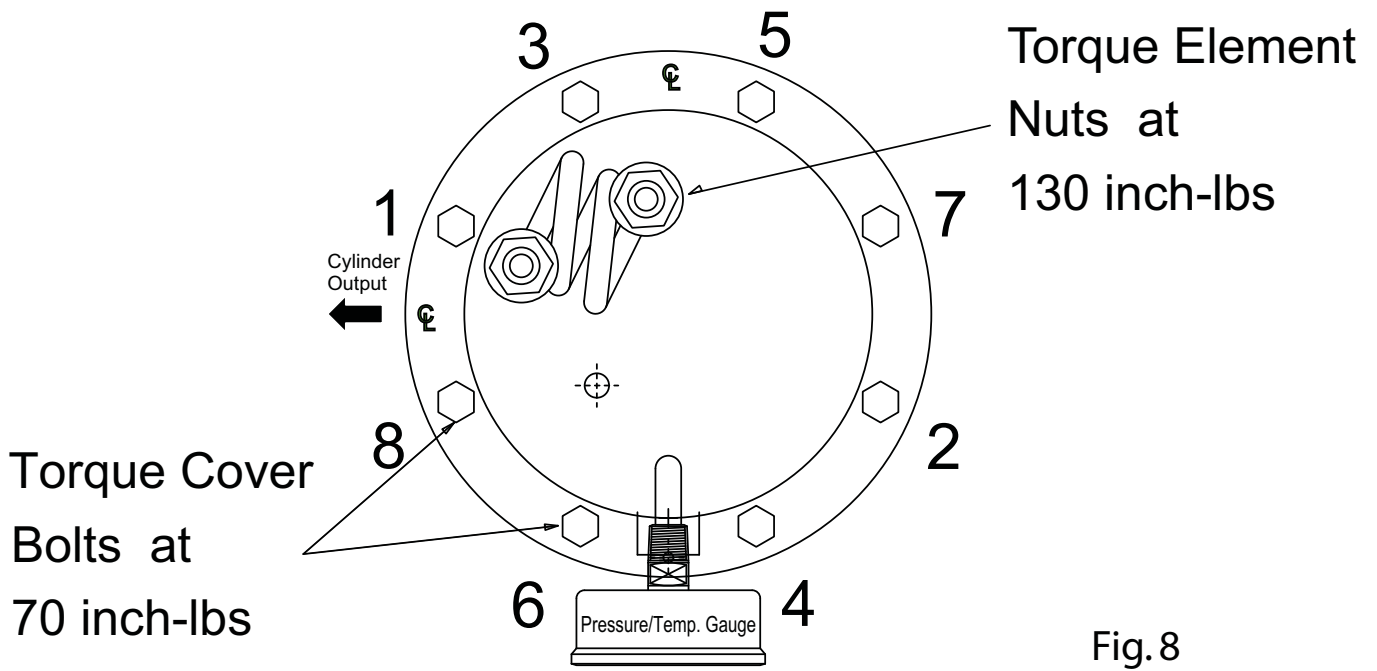
Please ensure you use the double wrench method (i.e. an open key inside of the tank to hold the element hexagon flange firmly and the torque wrench outside). Don't let the element turn while tightening or it may become damaged.

Cover hex bolts should be torqued at :

70 inch-pound (in-lbs) or equivalent

Please make sure to tighten all nuts by hand first, then tighten them as per fig. 8 and finally apply the proper torque with the torque wrench. Resist the feeling that the bolts could get torqued more (even if possible) because that action would simply squash the silicone gasket to the point where it would eventually lose all its resiliency and sealing properties.

Keep in mind that an equal torque is far more important.

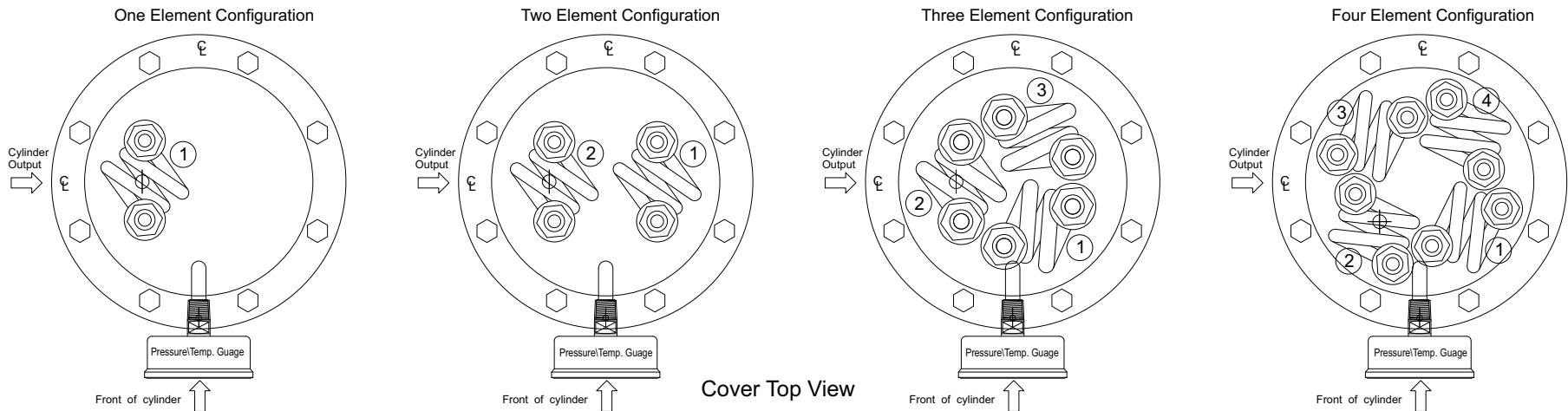


Three Phase Element configuration, Electric Data and Part

Height	Volts / Phases	Total KW	Volt / element	# élém.	Position 1, 2, 3			Configuration
					Watts	Ohms	Part #	
13" Cyl.	208/3	18.00	208	6	3000	14.4	CBLR051	
23" Cyl.		24.00		6	4000	10.8	CBLR052	
		30.00		6	5000	8.7	CBLR053	
		36.00		6	5750	7.5	CBLR054	
13" Cyl.	480/3	18.00	277	3	6000	12.8	CBLR056	
23" Cyl.		24.00		3	8000	9.6	CBLR061	
		30.00		3	10000	7.7	CBLR062	
		35.00		3	11600	6.6	CBLR063	
		40.00		3	13300	5.8	CBLR064	

Element configuration, Electric Data and Part

Height	Volts / Phases	Total KW	Position 1			Position 2			Position 3			Position 4			
			Watts	Ohms	Part #	Watts	Ohms	Part #	Watts	Ohms	Part #	Watts	Ohms	Part #	
13" Cylinder	240/1	3.00	3000	19.2	CBLR065										
		5.00	5000	11.5	CBLR055										
		6.00	5750	10.0	CBLR060										
		8.00	5000	11.5	CBLR055	3000	19.2	CBLR065							
		9.00	5750	10.0	CBLR060	3000	19.2	CBLR065							
		10.00	5000	11.5	CBLR055	5000	11.5	CBLR055							
		12.00	5750	10.0	CBLR060	5750	10.0	CBLR060							
		15.00	5000	11.5	CBLR055	5000	11.5	CBLR055	5000	11.5	CBLR055				
		18.00	5000	11.5	CBLR055	5000	11.5	CBLR055	5000	11.5	CBLR055	3000	19.2	CBLR065	
		20.00	5000	11.5	CBLR055	5000	11.5	CBLR055	5000	11.5	CBLR055	5000	11.5	CBLR055	
23.00	5750	10.0	CBLR060	5750	10.0	CBLR060	5750	10.0	CBLR060	5750	10.0	CBLR060			
23" Cylinder	240/1	27.00	8750	6.6	CBLR058	8750	6.6	CBLR058	5000	11.5	CBLR055	5000	11.5	CBLR055	
		30.00	10000	5.8	CBLR059	10000	5.8	CBLR059	5000	11.5	CBLR055	5000	11.5	CBLR055	
		35.00	8750	6.6	CBLR058	8750	6.6	CBLR058	8750	6.6	CBLR058	8750	6.6	CBLR058	
		40.00	10000	5.8	CBLR059	10000	5.8	CBLR059	10000	5.8	CBLR059	10000	5.8	CBLR059	
TMB 13" Cylinder	240/1	3.00	3000	19.2	CBLR065										
		6.00	3000	19.2	CBLR065	3000	19.2	CBLR065							
		9.00	3000	19.2	CBLR065	3000	19.2	CBLR065	3000	19.2	CBLR065				
		11.00	3000	19.2	CBLR065	3000	19.2	CBLR065	5000	11.5	CBLR055				



X. Warranty

Thermolec Ltd. warrants against defects in materials and workmanship the heat generator casing of its boiler and the heating elements for ten (10) years and all other components for two (2) years after date of original installation.

Any claim under this warranty shall be considered only if the product has been installed and operated in accordance with Thermolec's written instructions.

Any misuse of the system or any repair by persons other than those authorized by Thermolec, carried out without its written consent, voids this warranty.

Thermolec's responsibility shall be limited in any case to the replacement or repair, in its factory or in the field, by its own personnel or by others chosen by Thermolec, at its option, of such boiler or parts thereof, as shall prove to be defective within the warranty period.

Thermolec Ltd. will not be held responsible for labor, accidental or consequential damages, nor for delays, nor for damages caused by the replacement of the said defective boiler.