

# **THERMOTRON**

**Thermo-Dynamics**

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[www.thermodynamicsboiler.com](http://www.thermodynamicsboiler.com)

**Operation  
Maintenance  
and  
Installation  
Instructions**

Models OTF / ITF



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## **General Information**

- 1) Please read all instructions and review all diagrams prior to proceeding with installation.
- 2) Instructions and diagrams are intended only as guidelines.
- 3) Installations must conform with all applicable national, state and local codes.
- 4) Additional guidelines are available from National Fire Protection Association (NFPA), American society of Mechanical Engineers (ASME) and Building Officials and Code Administrators (BOCA).

## **Service Policy**

Congratulations on the purchase of your new pool heater. Here at Thermo-Dynamics Boiler Company we pride ourselves on the design and construction of our product. Our intent is to furnish you with a high quality appliance that will provide you and your family with years of trouble free service.

In order to maintain peak performance of your pool heater, it is recommended that the unit be winterized at the end of the season and that the burner/boiler be serviced annually. Servicing of your appliance must be performed by a qualified heating technician. You should utilize a qualified heating technician familiar with your installation to manage your heater and perform periodic maintenance. Proper care and maintenance of your pool heater will allow you to enjoy the benefits of your new purchase as well as extend its long useful life.

In the event that your serviceman encounters difficulty with the pool heater, he/she shall contact the distributor from which the product was purchased. The distributor shall, in turn, contact the Thermo-Dynamics sales representative for your area. By adhering to this protocol, Thermo-Dynamics wishes to provide you with responsive and unparalleled service. We realize the importance that our product means to you and your family and our goal is to get your heater up and running as quickly as possible.

Thank you for purchasing the Thermo-Dynamics pool heater. Again, it is our intent to provide you with a high quality trouble free product that will be part of your family for many years to come. Please consider Thermo-Dynamics Boiler Company in the future for all of your home heating needs.

# Section I. Installation Instructions

## (1) Locating The Heater:

Before uncrating the unit prepare the location. It should be placed upon a good level concrete floor or pad. Care should be taken to locate the unit for easy accessibility. Please maintain the following clearances to combustible materials:

- OTF  
(Outdoor Pool Heaters)
  - Front 24 inches
  - Back 24 inches
  - Sides 12 inches
- ITF  
(Indoor Pool Heaters)
  - Front 24 inches
  - Back 12 inches
  - Sides 12 inches

In addition, the air openings in the cabinet shall have adequate clearance to allow for sufficient air intake to the burner. Uncrate the unit as close to its permanent location as possible to prevent handling damage.

## (2) Connections:

Do not run any piping along the front access panel of heater as they may interfere with servicing. The tapings for connecting the unit to the pool circulation lines are at the back of the heater. These connections are 1-1/2" NPT. Connections should be made as per the piping illustration on page 4. Install unions at the heat exchanger so it can be readily removed for service. If plastic pipe is used, make connection to the unit with metal piping and run metal piping to the floor line before joining to plastic pipe. This will act as a "heat-trap" and reduce possible damage to the plastic pipes from overheating. Install positive check valve on inlet side. Install a Tee joint at the coil where the PIPING FROM the pool filter/pump ENTERS the coil. Install the copper well provided into the piping Tee and insert the remote sensing bulb from the L-4031 pool thermostat.

An adjustable by-pass around the heat-exchanger is required. The by-pass is an important and necessary

component to obtaining optimum performance (see piping diagram on page 4). In order to properly adjust the flowrate through the system, please adhere to the following steps:

### By-Pass Set-Up

a) Use piping and full-size valve to connect the "In" and "Out" streams of the pool coil.

b) With the bypass valve wide open take a pressure reading at the gauge on the pool filter.

c) Pressure reading with bypass valve full open is the baseline pressure.

d) Slowly close the bypass valve so that the pressure increases.

e) Stop when pressure reaches 2 to 4 psi above the baseline at the filter.

Alternatively, flowrate may be set by comparing the temperature difference between the "In" and "Out" streams of the pool coil.

a) Use full size piping and valve to connect the "In" and "Out" streams of the pool coil.

b) Allow the boiler to fire continuously for a period of ten (10) to fifteen (15) minutes.

c) With the bypass valve wide open take temperature readings for the coil.

d) Note: surface temperature readings taken on a cold day will vary significantly from test data.

e) Slowly close the bypass valve and continue to take temperature readings.

f) Stop when the temperature difference between the "In" and "Out" streams reaches forty-five (45) to fifty (50) degrees Fahrenheit.

g) Flowrate should correspond to six (6) gallons per minute. (See chart page 7).

## (3) Flue Connections:

### (A) OTF Series (Outdoor Units)

The OTF heaters are provided with an outdoor vent cap to be installed directly on top of the cabinet at the flue outlet. This vent cap provides for a waterproof unit as well as proper con-

Control of combustion draft.

## (B) ITF Series (Indoor Units)

### (a) General:

Oil fired units must be connected to a flue having sufficient draft at all times to assure proper operation.

### (b) Draft:

A draft regulator should be installed in accordance with the manufacturer's instructions. Set the draft to a negative  $-.01$  to  $-.02$  max. WC over the fire.

### (c) Roof Clearances:

The flue gas exit of the venting system should be at least three (3) feet above the outside point where it passes through the roof and at least two (2) feet higher than any portion of a building within ten (10) feet of the venting system.

### (d) Chimney Connections:

The horizontal length of a chimney connector should not exceed ten (10) feet unless a draft booster is used. The connector should be pitched upward at least one-quarter (1/4) inch to the foot. Use only high quality lock seam smoke pipe. Each joint should be securely fastened with sheet metal screws. Chimney connections should be positioned to effect the shortest possible run of smoke pipe to the chimney.

### (e) Vent Cap:

Install a UL listed vent cap where the possibility of down draft exists.

# Section II Filling Instructions

The Thermotron Pool Heater is an indirect heater using primary water in the boiler shell to act as a heat transfer medium to the pool water flowing through the separate all copper/bronze heat exchanger coil. Therefore the pool heater, or boiler section, MUST be filled with fresh city water. DO NOT FILL WITH CHLORINATED OR WATER FROM THE SWIMMING POOL.

(1) Do not turn on electrical power to heater until boiler is properly filled with water.

(2) \* Connect the male end of a garden hose to the hose adapter of the heater drain valve.

(3) Open the vent at the top of the boiler section location as shown on page 4.

(4) Turn on water and open drain valve, allow water to flow into boiler section.

(5) When water flows out of boiler vent, close vent and leave heater drain valve open until pressure gauge reads approximately 10 PSI.

(6) Close drain valve and disconnect hose.

(7) Pool temperature control should be set at desired temperature.

(8) Burner can now be operated as per specified instructions.

\*You may choose to install permanent piping...filling instructions would be the same.

## IMPORTANT NOTICE

### Winterizing The Heater:

If the pool heater is installed in an area known to have a freezing climate it is necessary to COMPLETELY drain both the primary boiler and indirect heat exchanger (pool coil).

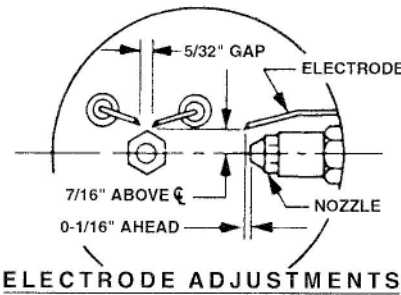
Connect a hose to the boiler drain at the bottom of the boiler section. Open the vent at the top of the boiler, as well as the drain valve and drain the boiler section completely. Disconnect the unions and the piping at the pool coil heat exchanger. Remove the 1/8" pipe plugs in the bottom of the pool coil heat exchanger header (to be completely certain that all water is out of the indirect heat exchanger, it may be advisable to remove the pool coil completely or force an anti-freeze solution into the pool coil.)

## Section III Start Up and Operation

### A Start Up:

(1) Make sure the electrical power is turned off.

(2) Check the Oil Burner ignition electrodes carefully and adjust if necessary.



(3) Check to be certain oil tank is full.

(4) Be certain unit is filled with water as per filling instructions.

(5) Turn on pool filter pump.

(6) Set limit control at 180°.

(7) Install pressure gauge in the nozzle port of the fuel pump. Do not take reading at the bleed port. The pressure gauge should have a minimum range of 100 PSI. Consult Fuel Pump specification sheet (shipped with Oil Burner).

(8) Turn on burner power switch.

(9) Push the safety reset button on the primary control and release.

(10) Bleed the fuel unit on one-pipe systems as soon as the burner motor starts. To bleed, attach a piece of 1/4" OD clear plastic tubing to the end of the bleed port. Loosen same and purge oil of air for at least 15 seconds after oil appears to be clear. If oil stream does not become clear and free of air bubbles or foam, check all fittings, filter and valve connections. Foam can also be caused by kinks in the oil line, causing an oil vacuum condition. High vacuum readings can also be caused by too high a "lift" or too small diameter tubing. Consult Fuel Pump specification sheet.

### B Equipment Adjustments:

Equipment Required:

(1) CO<sup>2</sup> Analyzer (absorption type)

(2) Draft Gauge

(3) Fuel Pressure

Gauge/Vacuum Gauge

(4) Stack Thermometer

(5) Smoke Tester (Bacharach Type)

**Allow the burner to operate continuously for at least 15 minutes and then make adjustments:**

(a) Combustion Samples:

Should be taken through the observation port above the burner, directly over the fire.

(b) Draft:

Take a draft reading over the fire (OTF outdoor equipment will range from "0" to -.01 negative minimum). (ITF indoor equipment should be adjusted to a -.01 draft minimum to a -.02 max.)

(c) Pump Pressure:

Adjust the pump discharge pressure to 100 PSI. Vacuum must not exceed 6" on one pipe and 10" on a two-pipe system.

(d) Combustion Settings/CO<sup>2</sup>

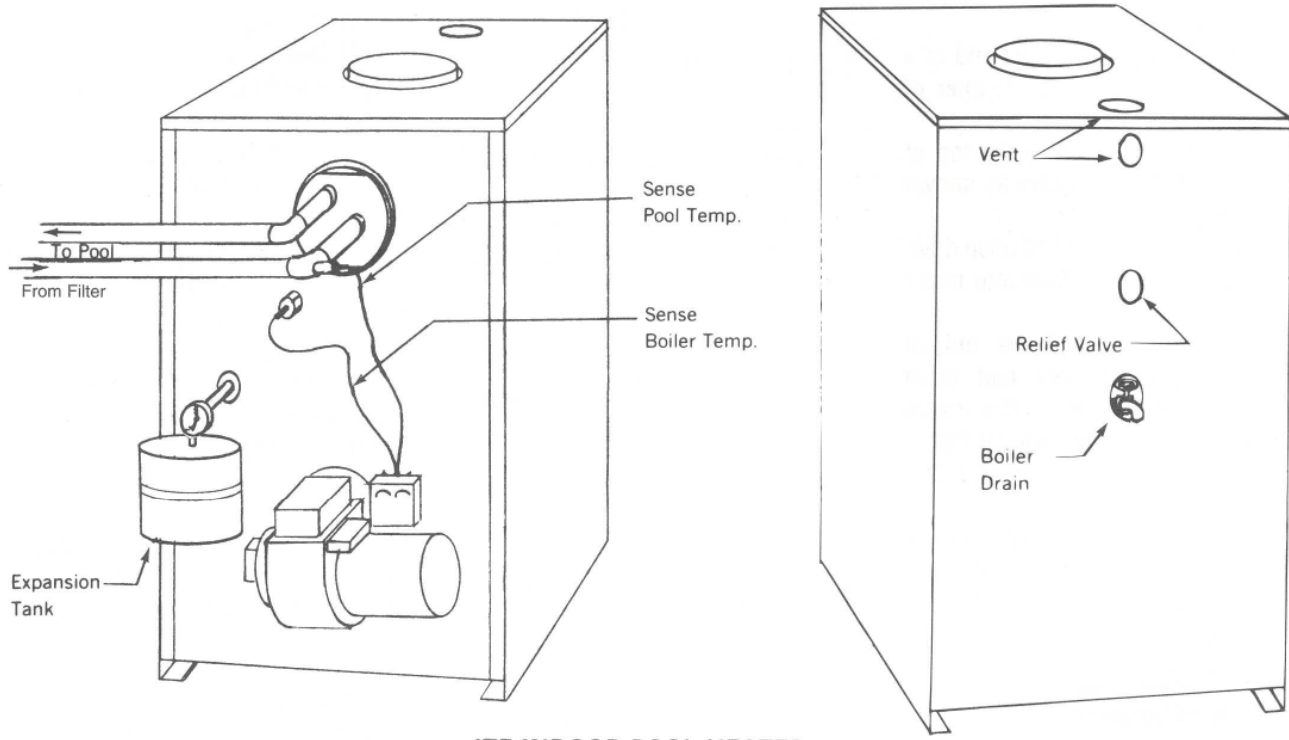
Reduce the air supply by closing the air band to allow just sufficient air for clean combustion. This is accomplished by loosening the lock screws on the air shutter and closing the air shutter until a TRACE of smoke is recorded. Take a CO<sup>2</sup> sample, which should be approximately 12%. Open the air shutter and lower CO<sup>2</sup> reading approximately by 1-1/2 to 2% from the above reading. A "0" smoke reading should result with a CO<sup>2</sup> reading of approximately 10%.

(e) Stack Temperature: (ITF only)

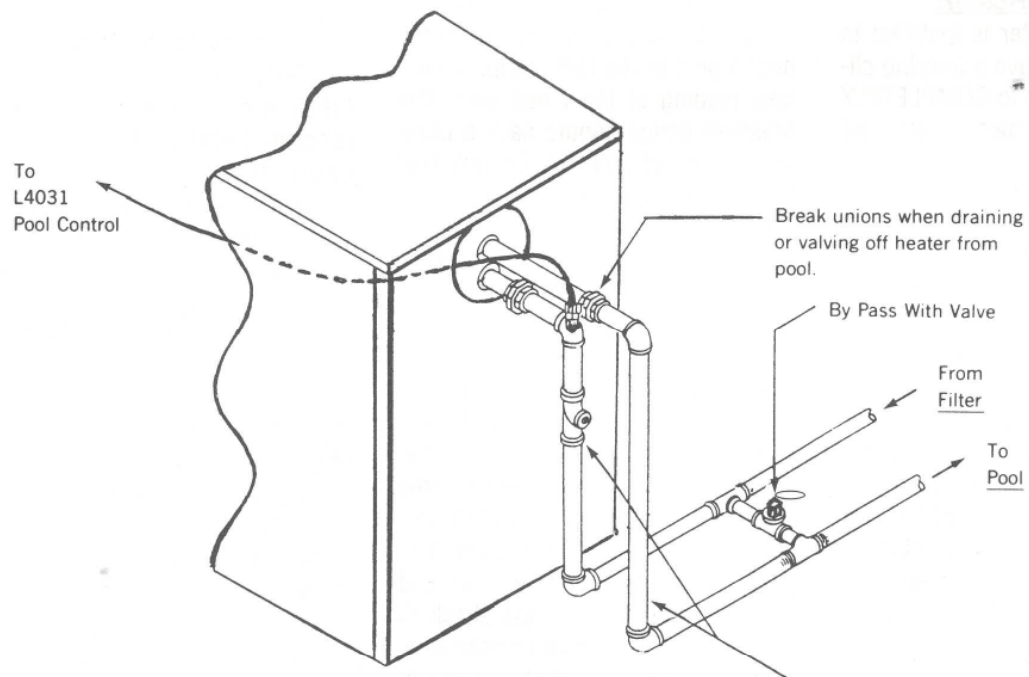
Check to see that the stack temperature is approximately 500° above the ambient temperature.

(f) Turn LIMIT CONTROL to the lowest setting; burner should shut down. Turn back to the desired setting, (normally 180°) burner should operate.

(g) Turn POOL TEMPERATURE CONTROL down to lowest setting;

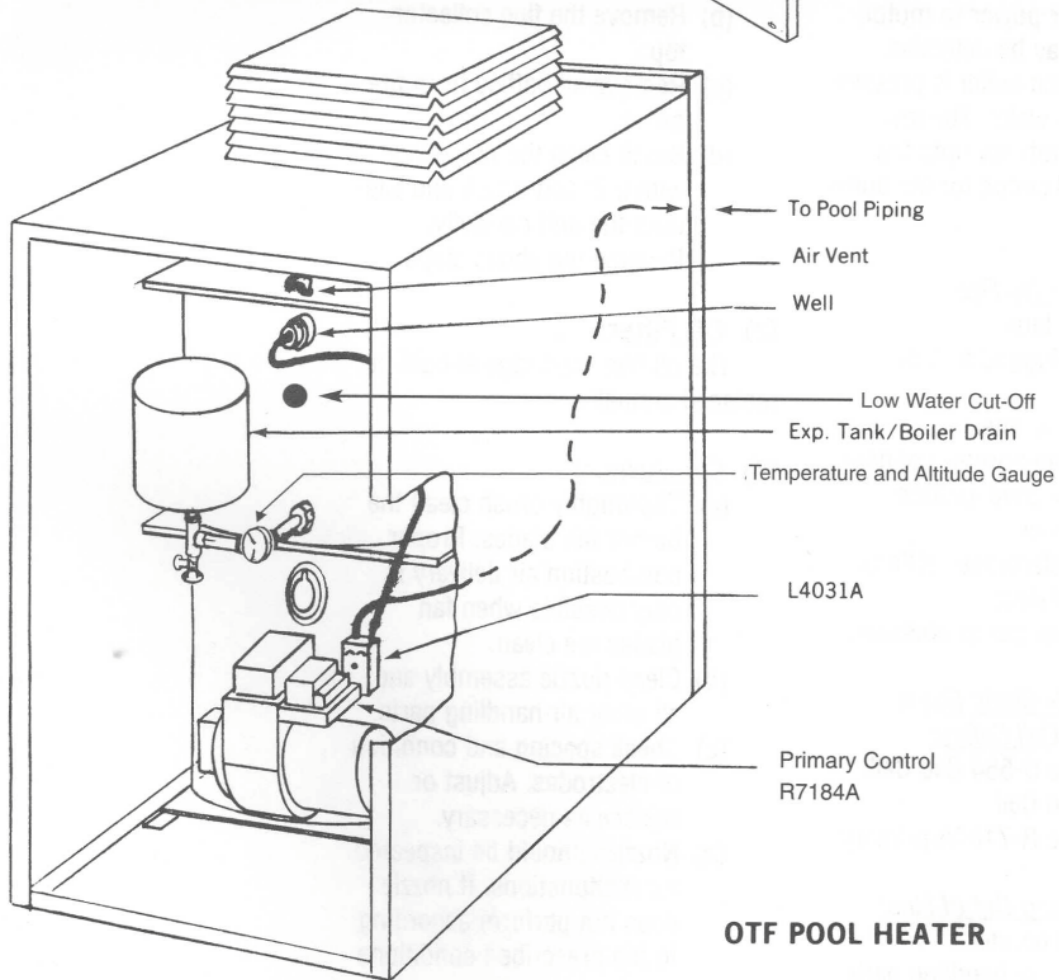
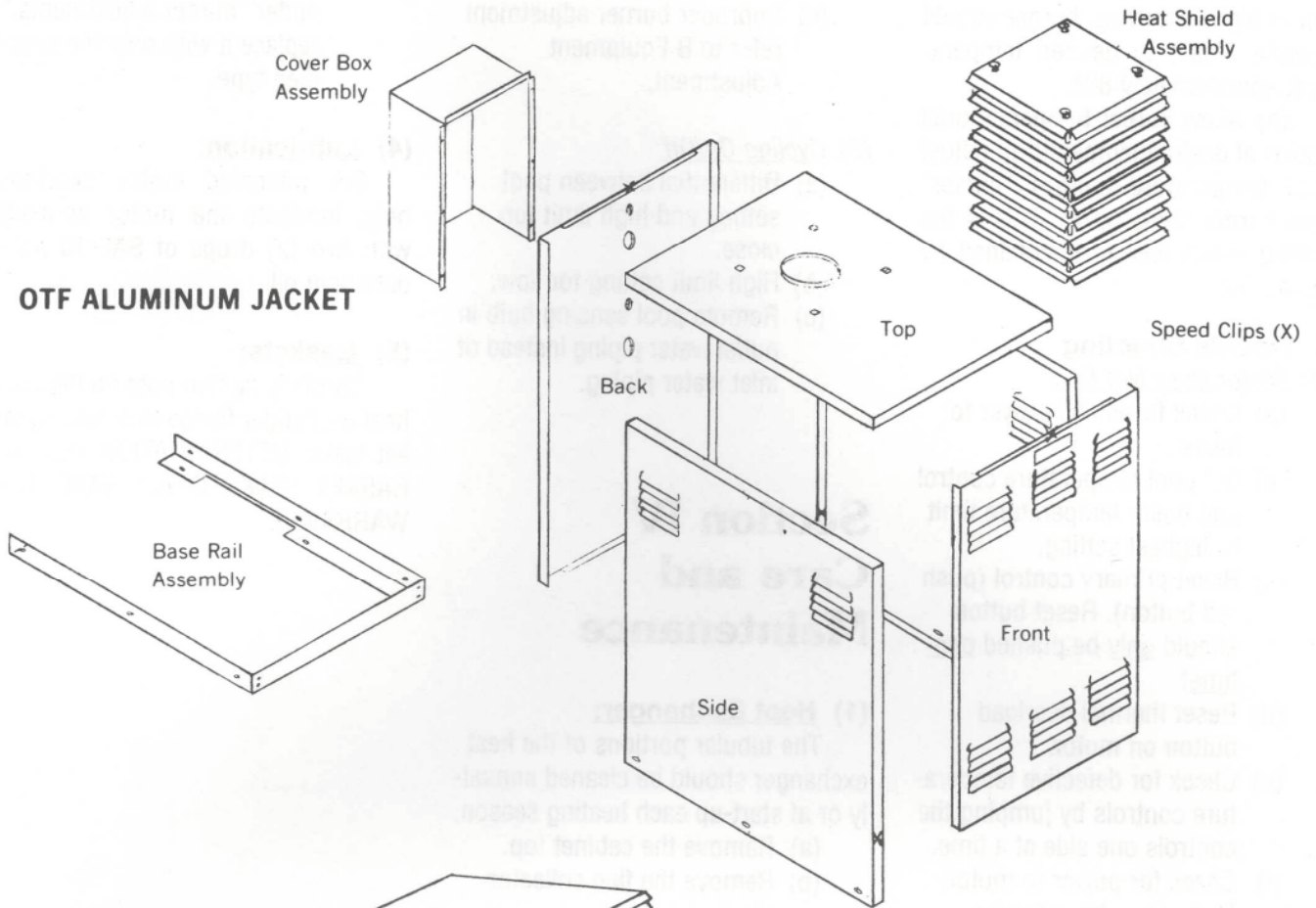


**ITF INDOOR POOL HEATER**



**OTF POOL HEATER SUGGESTED PIPING**

**NOTE**  
 If plastic pipe is used - provide heat trap by extending metal piping to floor line before conn. to plastic and install positive check valve as shown.



burner should shut down. Turn control to highest setting; burner should operate. Reset to desired temperature, approximately 80°.

(h) Allow burner to operate until pool is at desired temperature. Adjust pool temperature control "cooler" until burner shuts down. This is the setting that will be maintained by the heater.

### **C Trouble Shooting**

#### **(1) Motor Does Not Run:**

- (a) Check fuses and power to heater.
- (b) Set pool temperature control and boiler temperature limit to highest setting.
- (c) Reset primary control (push red button). Reset button should only be pushed one time!
- (d) Reset thermal overload button on motor.
- (e) Check for defective temperature controls by jumping the controls one side at a time.
- (f) Check for power to motor. Motor may be defective.
- (g) Ensure that boiler is pressurized with water. The low water cutoff disrupts the electrical circuit for the burner.

#### **(2) Motor Runs - No Fire:**

- (a) No oil in tank.
- (b) Bad or plugged burner nozzle.
- (c) Blocked oil line.
- (d) Loose transformer connections/defective ignition transformer.
- (e) Inspect electrode settings and insulators.
- (f) Check fuel pump pressure.

#### **(3) Burner Fired--Shuts Down**

##### On Cad Cell Safety:

- (a) Defective C-554 Cad Cell.
- (b) Dirty Cad Cell.
- (c) Defective R-7184A primary control.

#### **(4) Smoke Coming Out of Flue:**

- (a) Clogged nozzle.

- (b) Dirty fan/air handling parts.
- (c) Improper burner adjustment refer to B Equipment Adjustment.

#### **(5) Cycling On/Off:**

- (a) Differential between pool setting and high limit too close.
- (b) High limit setting too low.
- (c) Remote pool sensing bulb in outlet water piping instead of inlet water piping.

to the prescribed conditions under "burner adjustments," replace it with only the specified type.

#### **(4) Lubrication:**

For unsealed motor bearings only, lubricate the motor annually with two (2) drops of SAE-10 nondetergent oil.

#### **(5) Gaskets:**

Carefully tighten nuts on the pool heat exchanger flange to prevent gasket leaks. DETERIORATION DUE TO GASKET LEAKS SHALL VOID THE WARRANTY.

## **Section IV Care and Maintenance**

### **(1) Heat Exchanger:**

The tubular portions of the heat exchanger should be cleaned annually or at start-up each heating season.

- (a) Remove the cabinet top.
- (b) Remove the flue collector top.
- (c) Remove all baffles from fire tubes.
- (d) Brush clean the flue ways with a 2" soft brush and vacuum the unit carefully. Reverse the above steps.

### **(2) Oil Filter:**

The oil filter cartridge should be replaced annually.

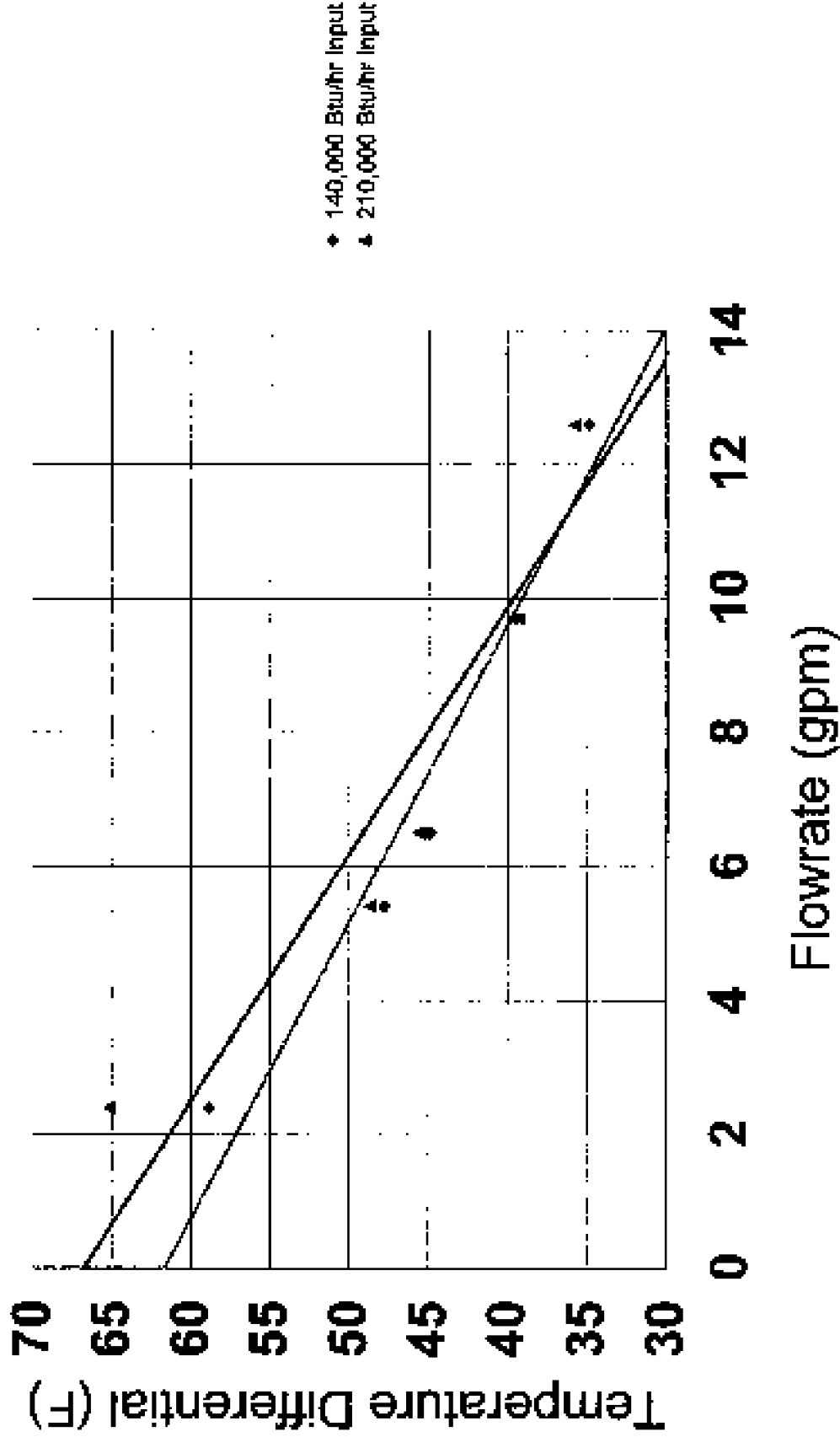
### **(3) Oil Burner:**

- (a) Thoroughly brush clean the burner fan blades. Proper combustion air delivery is only possible when fan blades are clean.
- (b) Clean nozzle assembly and all other air handling parts.
- (c) Check spacing and condition of electrodes. Adjust or replace as necessary.
- (d) Nozzles should be inspected for malfunctions. If nozzle does not perform according



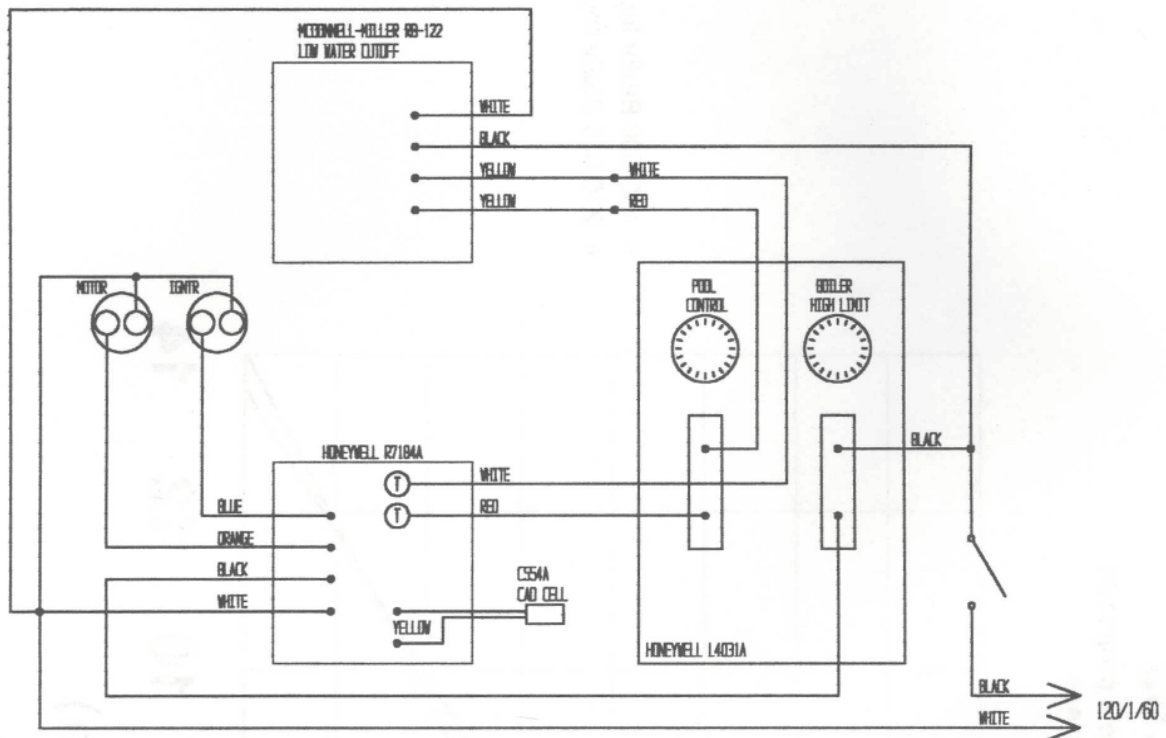
# SC-150 Pool Coil

Tested according to Hydronics Institute's proposed standard for indirect water heaters.

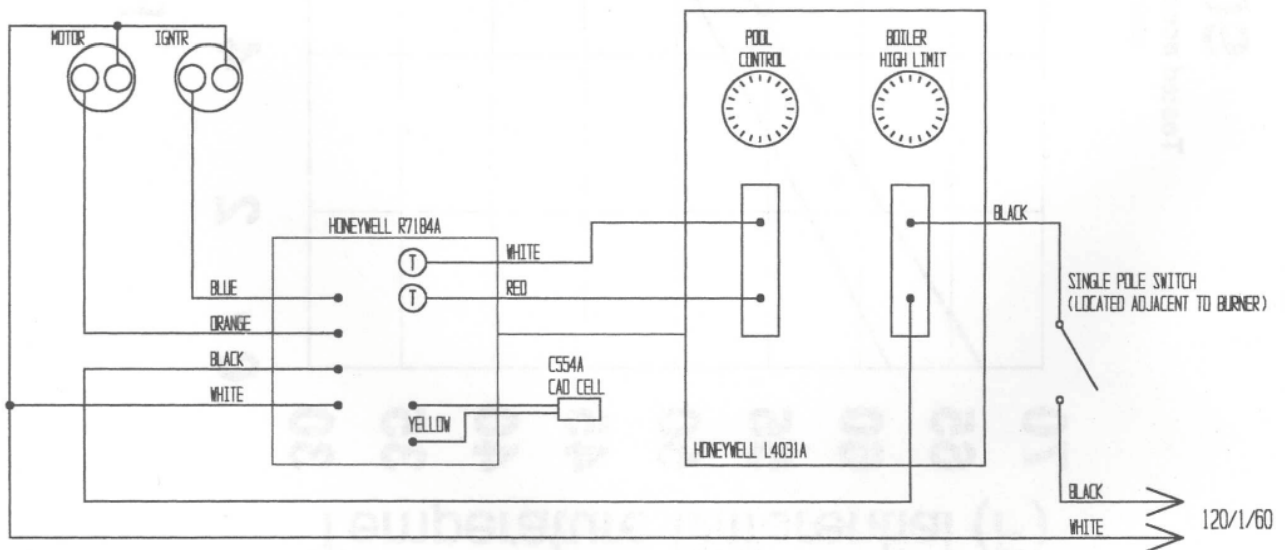


\* Note: Continued operation above 10 gpm results in premature erosion of coil

## OTF WIRING



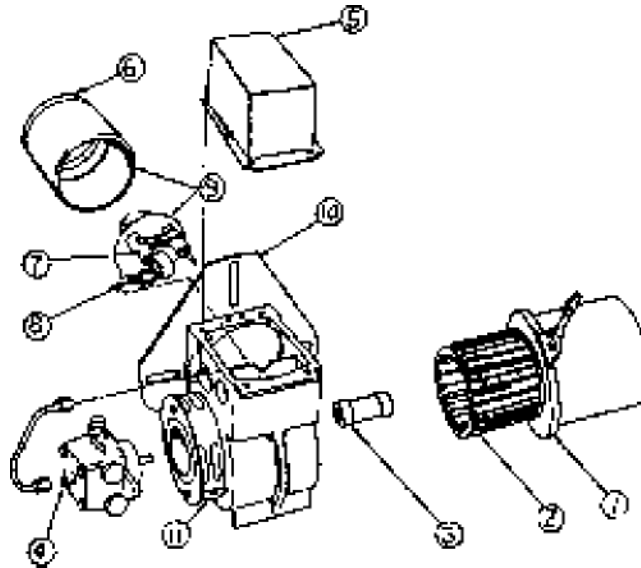
## ITF WIRING



# Parts List

## OTF/ITF 510/1600 Beckett AF Burner Parts List - #540500 (Designate heater and burner model numbers on all orders.)

Item No.	Description	Part
1	Motor 1/7 HP 3450 RPM - PSC	675141
2	Fan 4-1/2 Dia. x 3-7/16	675130
3	Flexible Coupling	675160
4	Beckett Single Stage Clean-Cut Fuel Pump	675315
5	France Electronic Igniter	675981
6	Head F-3 (510/560)	675400
6	Head F-12 (640-801)	675420
6	Head F-22 (901-1600)	675430
7	Electrode Assembly	675500
8	Gun Assembly (Nozzle Line/Electrode Assy.)	675630
9	Air Tube Combination Pkg. (510/801)	675620
9	Air Tube Combination Pkg. (901/1600)	675640
10	Burner Flange Gasket	675170
11	Blank Air Band (510/801)	675110
11	8 Hole Air Band (901/1600)	675120



Cad Cell C-554-A	553024	Nozzle 2.50 x 80° Hollow	680246
Primary Control R7184B	553010	Coil Gasket	481000
Pool Controller L4031A	552035	SC-150 Coil (510-801)	530060
Temperature and Altitude Gauge		SC-200 Coil (901-1600)	530070
1/4 - 2-1/2" Round	559560	Ceraform Sleeve	352000
Relief Valve - 3/4"	575020	#15 Expansion Tank (510 thru 801)	972000
Nozzle 1.00 x 80° Hollow	680146	#30 Expansion Tank (901 thru 1600)	972010
Nozzle 1.50 x 80° Hollow	680196	McDonnell Miller Low Water Cutoff	553101
Nozzle 2.00 x 80° Hollow	680226		

# Specifications

Model - OTF - ITF	510	801	1010	1600
Gross Input	140,000	210,000	280,000	350,000
Gross Output - BTU/Hr.	109,200	163,800	218,400	273,000
Flue Pipe Dia.	6"	6"	8"	8"
Firing Rate - GPH	1.00	1.50	2.00	2.50
Width OTF-ITF	22"	22"	26-1/4"	26-1/4"
Length OTF-ITF	31"	31"	34"	34"
Height OTF-ITF	38-1/2"	38-1/2"	45"	45"

## STANDARD EQUIPMENT

OTF — Aluminum jacket with self venting / ITF - Flush Jacket with Baked Enamel Finish  
 Boiler body with combustion chamber installed, theraltimeter, completely assembled and packaged with oil burner, cadcell relay, pool & limit control, low water cutoff (OTF only), relief valve, indirect pool heating coil SC-150 (510/801) SC-200 (1010/1600) with 1-1/2" I.P.S. tappings.

## Selection of the right size OTF/ITF Heater

There are many factors related to proper sizing of Pool Heaters. We recommend you contact your installing dealer for help in determining the correct size for your particular application.

### POOL HEATER SIZING CHART - HEAT LOSS FROM POOL SURFACE - BTUs PER HOUR

Surface Area of Pool Sq. Ft.	Desired Pool Temperature (°F)			Approximate Gallons
	80°	85°	90°	
500	137,000 Btu.	155,000 Btu.	200,000 Btu.	20,000
600	166,000 Btu.	185,000 Btu.	240,000 Btu.	24,000
700	200,000 Btu.	218,000 Btu.	280,000 Btu.	28,000
800	220,000 Btu.	250,000 Btu.	320,000 Btu.	32,000
900	248,000 Btu.	280,000 Btu.	360,000 Btu.	36,000
1000	275,000 Btu.	310,000 Btu.	400,000 Btu.	40,000
1200	330,000 Btu.	370,000 Btu.	480,000 Btu.	48,000
1400	384,000 Btu.	435,000 Btu.	560,000 Btu.	56,000
1600 or Larger: Refer inquiry to Thermo-Dynamics, Schuylkill Haven, PA 17972				

- NOTES: 1. These heat losses are based on an assumed wind velocity at the water surface of 5 m.p.h. and an ambient temperature of 60°F.  
 2. Where surface area and gallons do not coincide, surface area must take precedence.

# Home Owner Information:

The Service Company:

Name

Address

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Phone No.

## **SERVICE INFORMATION:**

To avoid unnecessary expense and inconvenience your pool heater should be cleaned and serviced at least annually by a qualified service man. If difficulty occurs, the following should be observed before calling a service man:

- (a) Check to be sure there is fuel in tank.
- (b) Make sure power switch is turned on.
- (c) Check to see if the desired pool setting is greater than the temperature of the pool.

## **WARNING**

**EVEN THOUGH THE VENT CAP AREA IS APPROXIMATELY 40 INCHES ABOVE GROUND, KEEP SMALL CHILDREN AWAY FROM YOUR POOL HEATER.**

# OTF/ITF Pool Heater Beckett AF Burner

## Service Set Up Records

	Initial Set Up 1	2	3	4	
1. Date					
2. Model Number					
3. Firing Rate					
4. Pump Pressure					
5. CO <sup>2</sup>					
6. "0" Smoke					
7. Gross Stack					
8. Draft Over Fire					
9. Replaced Filter Yes/No					
10. Replaced Nozzle Yes/No					
11. Clean Pump Filter Yes/No					
12. Inspect Coil Gasket					
13. Check for Leaks @ Plugs/Fittings					
14. Brush Clean Flue Tube Passages					
15. Vacuum Chamber/Flue Tubes					
16. Clean Blower Wheel					
17. Check/Set Electrodes					

## Swimming Pool Heater Warranty (5-Year Limited)

Swimming Pool Heaters (boiler wet section) are guaranteed for 5 years against defective material and workmanship from the date of installation. The indirect heat exchanger (copper pool coil) are guaranteed for 1 year against defective material and workmanship from the date of installation. Controls and accessories made by others and attached to or furnished with the Swimming Pool Heaters are guaranteed (only) to the extent of the manufacturer's guaranteed. This warranty is separate from the Thermo-Dynamic's residential warranty.

