

# INSTALLATION AND OPERATION MANUAL

# Raypak Indirect Pool Heaters

**RP-995 and B Ti-180 through  
B Ti-500**



**WARNING:** If these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

**FOR YOUR SAFETY:** Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance. To do so may result in an explosion or fire.

**WHAT TO DO IF YOU SMELL GAS:**

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

This manual should be maintained in legible condition and kept adjacent to the heater or in another safe place for future reference.

**Rev. 06 reflects the following:** Remove all references to Model and Part Numbers: RP-045 (013476), RP075 (013477), RP-125 (013476), RP-185 (013479), RP-245 (013480), RP-305 (013481) & RP-495 (013482).

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# 1. WARNINGS

## Pay Attention to These Terms

<b>▲ DANGER</b>	Indicates the presence of immediate hazards which will cause severe personal injury, death or substantial property damage if ignored.
<b>▲ WARNING</b>	Indicates the presence of hazards or unsafe practices which could cause severe personal injury, death or substantial property damage if ignored.
<b>▲ CAUTION</b>	Indicates the presence of hazards or unsafe practices which could cause minor personal injury or product or property damage if ignored.
<b>CAUTION</b>	<b>CAUTION</b> used without the warning alert symbol indicates a potentially hazardous condition which could cause minor personal injury or product or property damage if ignored.
<b>NOTE</b>	Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

**NOTE:** The instructions in this manual are for the use of qualified individuals specially trained and experienced in the installation and maintenance of this type of equipment and related system components. Installation and service personnel are required by some states to be licensed. Persons not qualified shall not attempt to install, service, or maintain this equipment.

**NOTE:** Minimum 18 AWG, 105°C, stranded wire must be used for all low voltage (less than 30 volts) external connections to the unit. Solid conductors should not be used because they can cause excessive tension on contact points. Install conduit as appropriate. All high voltage wires must be the same size (105°C, stranded wire) as the ones on the unit or larger.

### CAUTION

Elevated water temperature can be hazardous. The U.S. Consumer Product Safety Commission has these guidelines:

1. Spa water temperatures should never exceed 104°F (40°C). A temperature of 100°F (38°C) is considered safe for a healthy adult. Special caution is suggested for young children.
2. Drinking of alcoholic beverages before or during spa or hot tub use can cause drowsiness which could lead to unconsciousness and subsequently result in drowning.
3. Pregnant Women Beware! Soaking in water over 102°F (39°C) can cause fetal damage during the first three months of pregnancy resulting in the birth of a brain-damaged or deformed child. Pregnant women should stick to the 100°F (38°C) maximum rule.

4. Before entering the spa or hot tub, users should check the water temperature with an accurate thermometer; spa or hot tub thermostats may err in regulating water temperatures by as much as 4°F (2.2°C).
5. Persons with a medical history of heart disease, circulatory problems, diabetes, or blood pressure problems should seek a physician's advice before using pools or hot tubs.
6. Persons taking medications which induce drowsiness, such as tranquilizers, antihistamines, or anticoagulants, should not use spas or hot tubs.

**CAUTION:** Operating control and high limit are NOT part of the Indirect Pool Heater. These items must be supplied separately.

## 2. WATER CHEMISTRY

**(Corrosive water causes damage that will not be covered under warranty.)**

For your health and the protection of your pool equipment, it is essential that your water be chemically balanced. The following levels must be used as a guide for balanced water.

Recommended Level(s)		Fiberglass Pools	Fiberglass Spas	Other Pool & Spa Types
Water Temp. °F (°C)		68 to 88 (20-31)	89 to 104 (32-40)	68 to 104 (20-40)
pH		7.3 to 7.4	7.3 to 7.4	7.6 to 7.8
Total Alkalinity (PPM)		120 to 150	120 to 150	80 to 120
Calcium Hardness (PPM)		200 to 300	150 to 200	200 to 400
Salt (PPM)	RP 316L SS	<b>1000 MAXIMUM</b>	<b>1000 MAXIMUM</b>	<b>1000 MAXIMUM</b>
	Titanium	<b>6000 MAXIMUM**</b>	<b>6000 MAXIMUM**</b>	<b>6000 MAXIMUM**</b>
Free Chlorine (PPM)*		2 to 3	2 to 3	2 to 3
Total Dissolved Solids (PPM)	RP 316L SS	<b>1000 MAXIMUM</b>	<b>1000 MAXIMUM</b>	<b>1000 MAXIMUM</b>
	Titanium	<b>3000 MAXIMUM</b>	<b>3000 MAXIMUM</b>	<b>3000 MAXIMUM</b>
Metals (PPM)		0	0	0

**\*Free Chlorine MUST NOT EXCEED 5 PPM!**

**\*\* Titanium is immune to saline and seawater.**

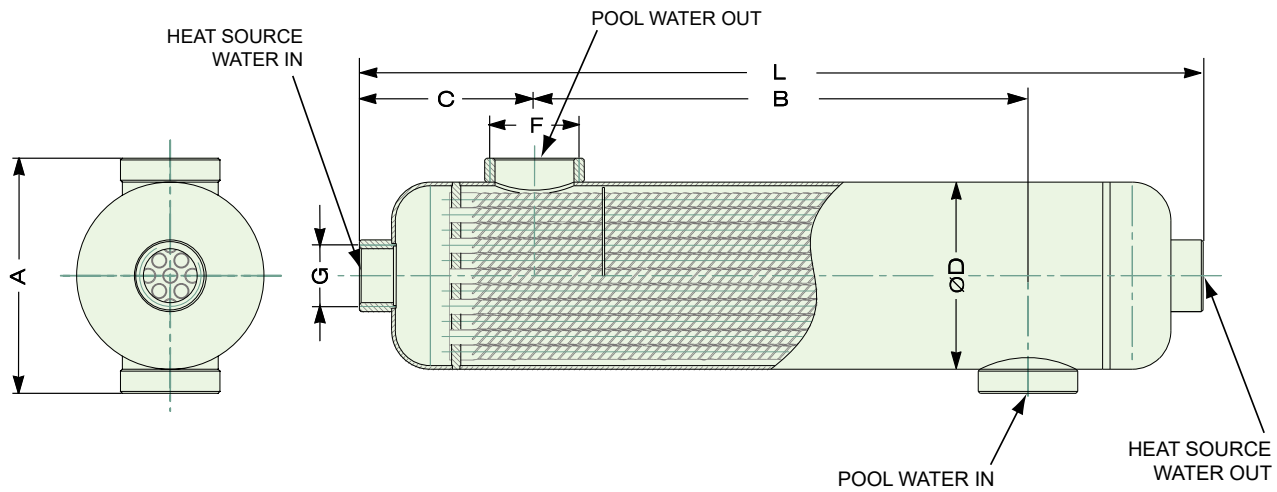
- Occasional chemical shock dosing of the pool or spa water should not damage the heater providing the water is balanced.
- Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water. Unless controlled, they can lead to excessive chlorine levels, which can damage your heater.
- Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your water.

Part Number		Model Number	Nominal Capacity* BTU/hr (Kwh)	Dimensions Inches (mm)							
SS316L	Ti**			A	B	C	Pool Conn. NPT F	Boiler Conn. NPT G	Length L	Diameter ØD	Heat Transfer Area ft <sup>2</sup> (m <sup>2</sup> )
013483		RP-995	995,000 (291,606)	6-9/16 (167)	26-5/8 (676)	4-5/16 (110)	2 (51)	2 (51)	35-3/16 (894)	5-1/2 (132)	21.5 (2)
	018306	Ti-180	185,000 (54,218)	5-5/8 (143)	7-11/16 (195)	4-1/4 (107)	1-1/2 (38)	1-1/4 (31)	16-1/8 (409)	4-1/16 (103)	4.70 (0)
	018307	Ti-305	305,000 (89,387)	5-5/8 (143)	17-1/2 (444)	4-1/4 (107)	1-1/2 (38)	1-1/4 (31)	25-15/16 (635)	4-1/16 (103)	9.00 (1)
	018308	Ti-495	495,000 (145,070)	5-5/8 (143)	35-5/16 (889)	4-1/4 (107)	1-1/2 (38)	1-1/4 (31)	43-3/4 (1092)	4-1/16 (103)	16.80 (2)

\* Nominal values are based on 140°F (60°C) temperature differential between incoming heating and heated water.

\*\* Titanium - widely used in industrial salt water environments. Due to its unsurpassed corrosion resistance, this unique super alloy option is a 'true' salt water product, now available from Raypak for the most demanding of applications, from high chlorination to high salt content.

**Table A. Specifications**



**Figure 1. Dimensions**

	Pressure		Temperature °F (°C)
	SS316L*	B Ti Titanium	
<b> Tubeside</b>	190 PSI	150 PSI	406 (208)
<b> Shellside</b>	190 PSI	150 PSI	406 (208)

\*Designed and fabricated to the ASME B31.3 Process Piping Code.

**Table B. Design Ratings**

Model		Boiler Flow		Boiler Head Loss		Pool Flow		Pool Head Loss		Heating Surface
SS316L	Titanium	GPM (L/min)		Feet (m)		GPM (L/min)		Feet (m)		Ft <sup>2</sup> (m <sup>2</sup> )
		Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
	<b>Ti-180</b>	20 (76)	30 (114)	1.0 (0.3)	2.0 (0.6)	20 (76)	50 (190)	1.5 (0.5)	9.5 (2.9)	4.7 (0.43)
	<b>Ti-300</b>	20 (76)	35 (133)	1.5 (0.5)	4.0 (1.2)	30 (114)	60 (227)	1.5 (0.5)	6.0 (1.8)	9.0 (0.83)
	<b>Ti-500</b>	25 (95)	35 (133)	3.5 (1.1)	6.5 (2)	40 (152)	80 (303)	3.0 (0.9)	12 (3.7)	16.8 (1.56)
<b>RP-995</b>		50 (190)	100 (379)	4.0 (1.2)	13 (4)	70 (265)	120 (455)	5.5 (1.7)	15 (4.6)	23.7 (2)

**Table C. Flow & Pressure Drop**

### 3. INSTALLATION GUIDELINES

#### Plumbing

Connections to the Indirect Pool Heater must be made with materials that have similar galvanic properties to the passivated 316 stainless steel or Titanium of the heat exchanger. Connections to the heat source plumbing should be made with 300-series stainless steel nipples. Dielectric unions are recommended if dissimilar plumbing is used. Connections to the pool system should be made with CPVC or PVC adapters or 300-series stainless steel nipples. Dielectric unions are recommended if dissimilar plumbing is used.

The connection diagram, Figure 2, is shown for reference only. The system must be designed and installed by a qualified installer and all local, state, provincial and national codes, laws, regulations and ordinances must be followed.

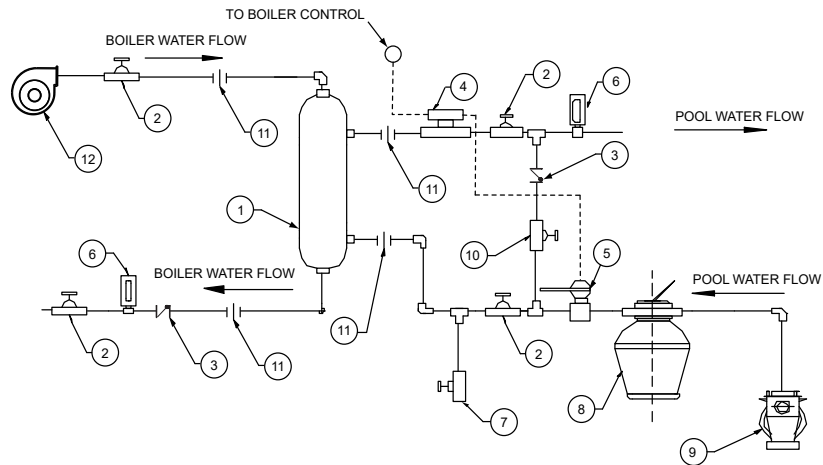
#### Flow

For optimal heat transfer, use counter-flow; the supply water from the heat source should flow in the opposite direction of the return water from the pool/spa, as shown in Figure 2. Systems must be designed to provide flow rates within the range provided in Table 3. Do not exceed the published maximum flow rates. On the heating side, desired flow rates can be accomplished with pump sizing and/or the use of balancing valves. On the pool-side, the flow may be variable either due to variable-speed pumps or changes in the pressure drop through the filtration system. These variances can be accommodated by installing a 2 lb. spring-loaded check valve in the bypass line along with a manual valve (see Figure 2 for details).

On 995 models the 2 lb. check valve does not provide enough resistance to direct adequate flow through the heat exchanger, and must be augmented by using the manual valve to throttle flow to provide approximately 6 to 15 ft. of head across the 995 exchanger.

## Sample Installation Diagram

1. Indirect Pool Heater
2. Gate valve
3. Check valve
4. Flow switch
5. Thermostat or Aquastat
6. Thermometer
7. Drain valve
8. Filter
9. Pool/Spa Pump
10. Bypass valve
11. Union
12. Boiler Pump



**NOTE:**

- Damage to the Indirect Pool Heater due to improper water chemistry is not covered under the warranty
- Chlorine feeder must be installed after (downstream of) the Indirect Pool Heater and be installed with an anti-siphoning valve to prevent pool chemicals from backing up into the Indirect Pool Heater.
- This is only a conceptual drawing. A qualified installer must determine whether this system setup will work in each application. Installer must also ensure compliance with code requirements.

**Figure 2. Connection Diagram**

### Controls

The Indirect Pool Heater must be installed with temperature and flow controls to protect the heat exchanger and control water temperature supplied to the pool or spa. The return from the pool/spa must be controlled at the inlet to the Indirect Pool Heater by a thermostat set to the desired temperature for the pool/spa, with the maximum recommended operating temperature of 104°F (40°C). A second temperature control must be installed in the outlet piping of the Indirect Pool Heater to limit pool/spa supply temperatures to 140°F (60°C) maximum. In addition to the temperature controls, a flow switch should be installed in the pool/spa supply line to prove adequate flow through the heat exchanger. All three of these controls must be satisfied to provide a call for heat to the heat source.

### Chemical feeders or salt water generators

The pool chemical feeder or salt water generator (with Titanium exchangers only) must be installed after (downstream of) the Indirect Pool Heater and be installed with an anti-siphoning valve to prevent chemicals from backing up into the Indirect Pool Heater. During periods of high or fluctuating chemical levels, the Indirect Pool Heater must be isolated from the system by closing the isolation valves, protecting the unit from chemical damage.

**CAUTION:** Operating control, high limit and flow switch are NOT part of the Indirect Pool Heater. These items must be supplied separately.

**LIMITED WARRANTY  
RAYPAK INDIRECT POOL HEATERS  
Models: RP-995,  
B Ti-180, B Ti-300, B Ti-500**

**SCOPE OF WARRANTY**

Raypak, Inc. (Raypak) warrants to the original owner that the above model HEATER, when installed in the contiguous 48 states with a pool or spa by a properly licensed installer will be free from defects in materials and workmanship under normal use and service for the Applicable Warranty Period. In accordance with the terms of this Limited Warranty, Raypak will, at its option, repair or furnish a replacement for any defective part of the HEATER if it fails in normal use and service during the Applicable Warranty Period. The repair or replacement will be warranted for only the unexpired portion of the original Applicable Warranty Period.

**EFFECTIVE DATE**

The Effective Date of this Limited Warranty is the date of original installation if properly documented; if you are not able to provide documentary proof of the date of original installation, the Effective Date will be the date of manufacture plus 30 days.

**APPLICABLE WARRANTY PERIOD**

If the HEATER is installed with a pool or spa, the Applicable Warranty Period is one (1) year from the Effective Date, parts and labor, for the HEATER and component parts.

**LABOR AND SHIPPING COSTS**

This Limited Warranty covers the normal cost of Raypak authorized labor repairs or replacements covered by this Limited Warranty which are performed by a Raypak designated service provider during the Applicable Warranty Period. Do not attempt to repair or replace any in-warranty product or component part(s) without prior authorization from Raypak. This Limited Warranty does not cover any travel time or other labor costs. This Limited Warranty does not cover any shipping costs to and from Raypak's designated service provider or to and from the installation site. All of the foregoing costs and expenses are your responsibility.

**WARRANTY EXCLUSIONS**

This Limited Warranty does **NOT** apply;

1. if the product has been moved from its original place of installation, or if the original owner no longer owns the property where the original installation was made;
2. if the product is not properly installed with a pool or spa by a qualified licensed installer in accordance with applicable local codes and ordinances, good trade practices, and the manufacturer's installation instructions;
3. if the rating plate(s) or serial number(s) are altered or removed;
4. if the product is modified in any way, or non-factory authorized accessories or other components are used in conjunction with the product;
5. to conditions including damage, malfunctions or failures resulting from failure to properly install, operate or maintain the product in accordance with the manufacturer's instructions;
6. to conditions including damage, malfunctions or failures from abuse, act of nature, accident, fire, flood, freeze, lightning or the like;
7. to conditions including damage, malfunctions or failures resulting from or due to connected system control devices;
8. to conditions including performance problems caused by improper sizing of the heater;
9. to conditions including damage, malfunctions or failures resulting from any alteration, including the use of any attachment, including any energy saving device, not authorized by the manufacturer;

10. to conditions including damage, malfunctions or failures from misuse or neglect, including but not limited to, freeze-ups, having flow restrictions or obstructions between the heater outlet and the pool/spa, or not maintaining a proper chemical balance (PH level must be between 7.3 and 7.8 and total alkalinity between 80 and 150 PPM. Total dissolved solids (TDS) must be no greater than 1000 PPM, or 3000 PPM for CR Super Alloy models).

**HOW TO MAKE A WARRANTY CLAIM**

You should immediately notify your dealer and provide proof of purchase, model number, serial number and date of installation. Your dealer will contact the factory for instructions regarding the claim and to determine the location of the nearest authorized service center. If the dealer is not available please contact warranty service at 805-278-5300, supplying model number, serial number, date of original installation and a description of the problem. Proper authorization MUST be obtained PRIOR to any repairs for this Limited Warranty to apply. This Limited Warranty is VOID if the product is repaired or altered in any way by ANY persons or agencies other than those authorized by Raypak. Raypak reserves the right at all times to inspect, or require the return of, the defective product or component part and to verify warranty coverage at its factory.

**EXCLUSIVE WARRANTY-LIMITATION OF LIABILITY**

The Limited Warranty is the only warranty for this product and its component parts given by Raypak. No one is authorized to make any other warranties on Raypak's behalf. ANY IMPLIED WARRANTIES, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL NOT EXTEND BEYOND THE APPLICABLE WARRANTY PERIODS SPECIFIED IN THIS LIMITED WARRANTY. RAYPAK'S SOLE LIABILITY WITH RESPECT TO ANY DEFECT SHALL BE AS SET FORTH IN THIS LIMITED WARRANTY. IT IS AGREED THAT RAYPAK SHALL HAVE NO LIABILITY WHETHER UNDER THIS LIMITED WARRANTY OR IN CONTRACT, TORT OR NEGLIGENCE OR OTHERWISE FOR CLAIMS FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING NO LIABILITY FOR DAMAGE FROM WATER LEAKAGE) WHICH ARE EXPRESSLY EXCLUDED, NOTWITHSTANDING ANY FAILURE OF ESSENTIAL PURPOSE OF ANY LIMITED REMEDY. Some states do not allow limitations on how long an implied warranty lasts, or for the exclusion of incidental or consequential damages, so the above limitation or exclusion may not apply to you. THIS LIMITED WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

We suggest you immediately record the model and serial number and date of original installation and retain this Limited Warranty Certificate along with your original proof of purchase and date of installation/start-up in the event warranty service is needed.

**DO NOT RETURN THIS DOCUMENT TO RAYPAK. KEEP IT WITH YOUR POOL HEATER OR BUSINESS RECORDS.**

Name of Owner	Name of Installer
Owners Address	Installers Address
Date of Pool Heater Installation	Telephone Number of Installer
Model Number of Your Pool Heater	Serial Number of Your Pool Heater

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