

SUPPLEMENTAL INSTALLATION AND OPERATION MANUAL

Professional Indirect
Pool Heater Powered
by



THIS MANUAL CAN BE VIEWED ELECTRONICALLY
USING YOUR SMART DEVICE. SEE PAGE 30 FOR QR
CODE.

Models 1005A, 1505A, 2005A

Use this document in conjunction with XTherm Installation and Operation Manual, Part Number 241513

▲ WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, exposure to hazardous materials* or loss of life. Review the information in this manual carefully. *This unit contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans.

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 a safe place for future reference.



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P/N 241735 Rev. 4

Revision 4 reflects the following changes:

Added Item "31-M - Sealant Tape (gray) Specify Length (Not Shown)" to IPL; Added QR Code section.

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1. WARNINGS

Pay Attention to These Terms

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

▲ DANGER: Make sure the gas on which the heater will operate is the same type as that specified on the heater rating plate.

▲ WARNING: Should overheating occur or the gas supply valve fail to shut, do not turn off or disconnect the electrical supply to the heater. Instead, shutoff the gas supply at a location external to the heater.

▲ WARNING: Do not use this heater if any part has been under water. Immediately call a qualified service technician to inspect the heater and to replace any part of the control system and any gas control which has been under water.

▲ WARNING: To minimize the possibility of improper operation, serious personal injury, fire, or damage to the heater:

- Always keep the area around the heater free of combustible materials, gasoline, and other flammable liquids and vapors.
- Heater should never be covered or have any blockage to the flow of fresh air to the heater.

▲ WARNING: Risk of electrical shock. More than one disconnect switch may be required to de-energize the equipment before servicing.

▲ WARNING: Both natural gas and propane have an odorant added to aid in detecting a gas leak. Some people may not physically be able to smell or recognize this odorant. If you are unsure or unfamiliar with the smell of natural gas or propane, ask your local gas supplier. Other conditions, such as “odorant fade,” which causes the odorant to diminish in intensity, can also hide, camouflage, or otherwise make detecting a gas leak by smell more difficult.

▲ WARNING: UL-recognized fuel gas detectors are recommended in all enclosed propane and natural gas applications wherein there is a potential for an explosive mixture of fuel gas to accumulate and their installation should be in accordance with the detector manufacturer’s recommendations and/or local laws, rules, regulations, or customs.

▲ CAUTION: If this heater is to be installed in a negative- or positive-pressure equipment room, there are special installation requirements. Consult factory for details.

▲ CAUTION: If this heater is to be installed above radiation level, it must be provided with a low water cut-off device at the time of heater installation.

WATER CHEMISTRY

▲ CAUTION: Corrosive water voids all warranties.

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

Water Chemistry	Cupronickel	Titanium
Water Temperature	68-104°F (20-40°C)	68-104°F (20-40°C)
pH	7.6-7.8	7.6-7.8
Total Alkalinity (ppm)	80-120	80-120
Calcium Hardness (ppm)	200-400	200-400
Salt (ppm)	4500 Maximum	6000 Maximum
Free Chlorine (ppm)*	2-3	2-3
Total Dissolved Solids (ppm)	3000 Maximum**	10000 Maximum

Table A. Pool and Spa Water Chemistry

*Free Chlorine **MUST NOT EXCEED 5 ppm!**

**In saltwater chlorinated pools, the total TDS can be as high as 6000 ppm.

- Occasional chemical shock dosing of the pool or spa water should not damage the indirect heat exchanger providing the water is balanced. However, it is highly recommended that the pool heater is isolated via shutoff valves before any aggressive chemical treatment.
- Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water. Unless controlled, they can lead to an excessive chlorine level which can damage the indirect heat exchanger.
- Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your water.

2. PRODUCT OVERVIEW

Raypak Professional Indirect Pool Heaters are factory-assembled and plumbed on a prefabricated skid using our ultra-high-efficiency XTherm boiler driving a highly-efficient shell-and-tube indirect heat exchanger(s).

The indirect heat exchanger keeps the XTherm boiler safe from corrosive pool water (low pH or high chlorine levels) by separating the boiler water from the pool water. The standard configuration utilizes a highly corrosion-resistant Cupronickel indirect heat exchanger, with an option to upgrade to Titanium for the ultimate in corrosion resistance.

The system arrives completely assembled; just connect, fill, and flip the switch! No onsite soldering or assembly needed. Easy to install and commission, the system comes standard with:

- 7" touchscreen display
- Raypak's VERSA IC® control system, full diagnostics, history, and Modbus RTU BMS port
- PVC vent connections - economical to vent
- Full electronic load tracking with 7:1 turndown

3. WATER CHEMISTRY

Refer to the Water Chemistry **Table A** on page 5 of this manual.

Pool/Spa Water Chemistry

CAUTION: Corrosive water can cause unwarrantable damage to the indirect heat exchanger.

NOTE: Chemical imbalance can cause severe damage to your indirect heat exchanger and associated equipment.

Chemical imbalance can cause severe damage to the indirect heat exchanger and associated equipment. Maintain the water chemistry according to the **Table A** on page 5. Indirect heat exchanger damage resulting from chemical imbalance is not covered by the warranty.

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

Occasional chemical shock dosing of the pool or spa should not damage the indirect heat exchanger providing the water is balanced. Automatic chemical dosing devices and salt chlorinators are usually more efficient in heated water. If not controlled, they can lead to high chemical levels which can damage your indirect heat exchanger.

Further advice should be obtained from your pool or spa builder, accredited pool shop, or chemical supplier for the correct levels for your pool water.

Automatic Chlorinators and Chemical Feeders

All chemicals must be introduced downstream of the indirect heat exchanger and completely diluted into the water before being circulated through the indirect heat exchanger.

Chlorinators must feed downstream of the indirect heat exchanger and have an anti-siphoning device or check valve to prevent chemical back-up into the indirect heat exchanger when the pool filtration pump is shutoff.

CAUTION: High chemical concentrations from feeders that are out of adjustment will cause rapid corrosion of the indirect heat exchanger. Such damage is not covered under the warranty.

CAUTION: Failure of a indirect heat exchanger due to lime scale build-up on the heating surface, low pH, or other chemical imbalance is not covered under the warranty.

4. SHIPPED LOOSE COMPONENTS

These items are shipped inside a box in the crating with the Professional Indirect Pool Heater:

1. Vent Termination Cap Vertical/Horizontal
2. Flue Exhaust Termination Adapter for PVC Venting
3. Air Intake Collar
4. Air Intake Cover Panel
5. Indirect Plumbing Assy CPVC (2005A only)
6. Gasket ANSI Flange 4" (2005A only)
7. Vent Group PVC
8. Clamp, Vent Support
9. PVC Coupling 3/4" FNPT

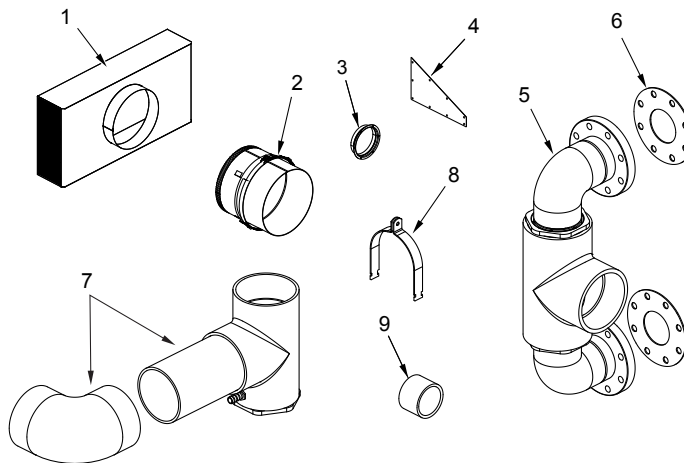


Figure 1. Shipped Loose Components

5. COMPONENT LOCATIONS

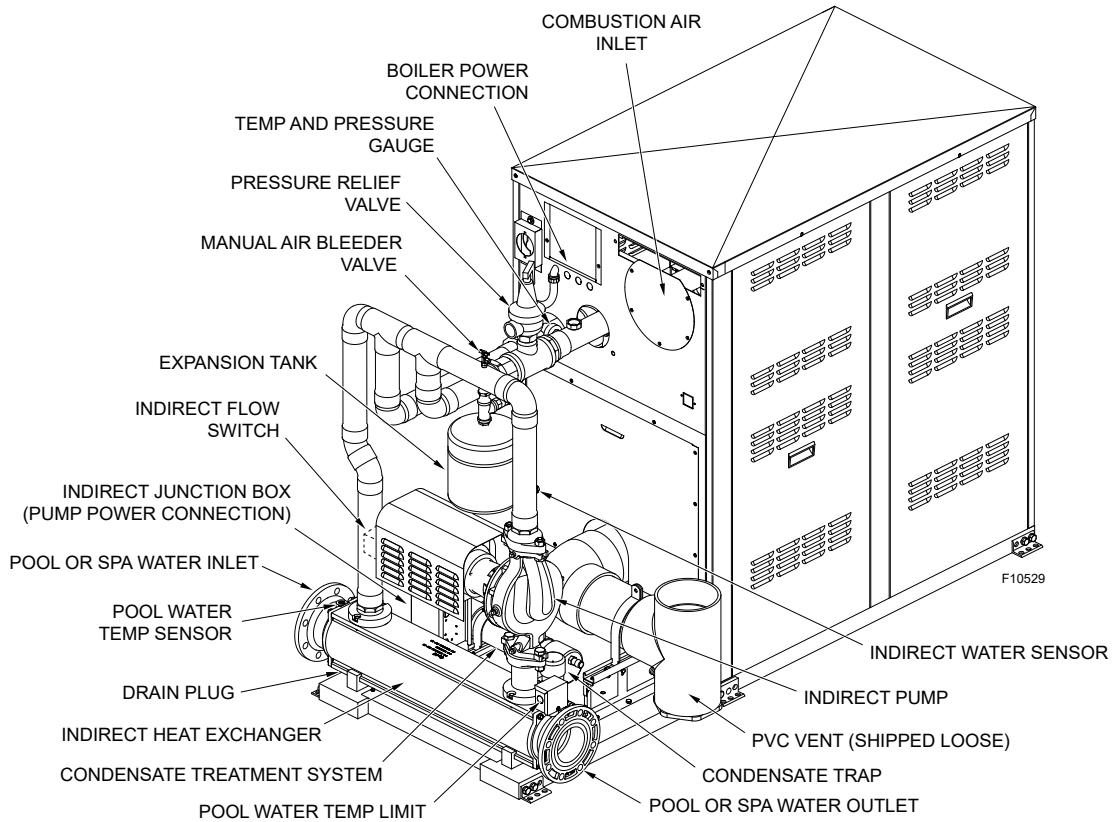


Figure 2. Component Locations for Models 1005A and 1505A

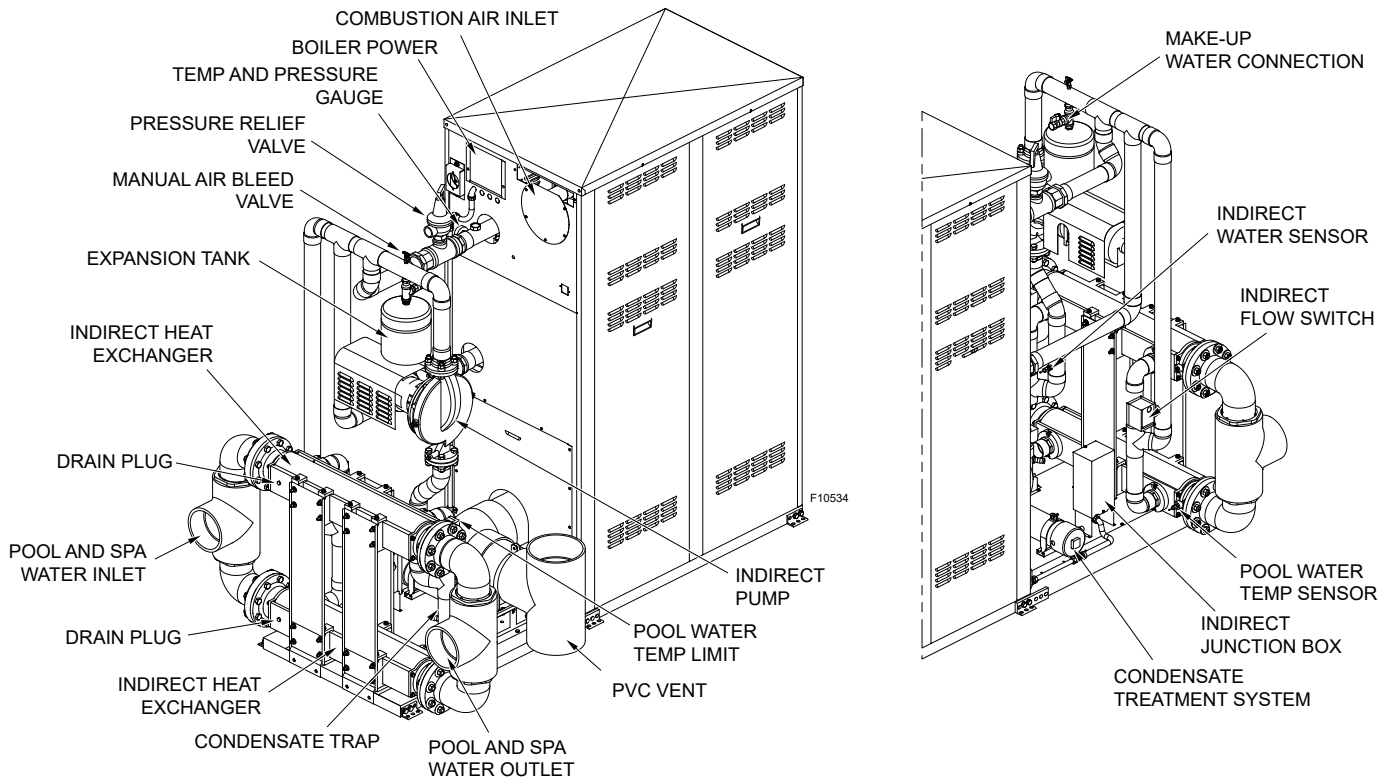


Figure 3. Component Locations for Model 2005A

6. INSTALLATION INSTRUCTIONS

To achieve the optimum operating efficiency, keep the pool water flow of each appliance \pm 5 gallons per minute (18 liters per minute) of the recommended pool water flow as stated in **Table B**.

CAUTION: Excessive temperature differential across the indirect heat exchanger may result in short-cycling of the boiler and possible lockout on the Pool Water Temp. Limit.

Low flow through the indirect heat exchanger will result in higher temperatures supplied to the pool.

Model	Recommended Pool Water Flow GPM (lpm)	Maximum Pool Water Flow GPM (lpm)	Pipe Connection Size
1005A	240 (908)	400 (1514)	4"
1505A	360 (1363)	600 (2271)	6"
2005A	480 (1817)	800 (3028)	6"

Table B. Recommended Pool Water Flow and Pipe Connection Size

Water Piping

Pool/Spa connections to the indirect heat exchanger are SCH 80 CPVC glue fittings. The connections from the field loop to the indirect heat exchanger may be done in CPVC or PVC pipe as follow:

- Pool water is designed to flow from right to left standing in front of the boiler.
- A factory-installed pool water temperature sensor is on the inlet side of the indirect heat exchanger, and a factory-installed fixed pool water temperature limit is on the outlet side of the indirect heat exchanger.
- The supply and return water piping to the indirect heat exchanger shall be no smaller than 4" for Model 1005A, or 6" for Models 1505A and 2005A.

Gas Piping

See the XTherm manual (241513) for gas piping information.

Throttling Valve

A ΔT of 8°F – 10°F (4°C – 5°C) across the indirect heat exchanger is recommended. Throttling valves are used to set the flow through the indirect heat exchanger. (Standard butterfly valves are acceptable.) See **Figure 4** and **Figure 5**.

System Piping

NOTE: System piping provided by others.

Single Unit and Multiple Unit Installation

Total system flow must be greater than the recommended water flow to the indirect heat exchanger.

Example	Case 1 (1005A) GPM (lpm)	Case 2 (1505A) GPM (lpm)	Case 3 (2005A) GPM (lpm)
(a) Total Sys Flow	300 (1136)	500 (1893)	600 (2271)
(b) Heater Flow	240 (908)	360 (1363)	480 (1817)
(c) Bypass Flow	60 (227)	140 (530)	120 (454)

Table C. Recommended Pool Water Flow Examples

7. CONDENSATE TREATMENT

The condensate must be drained properly to protect the appliance and drainage system. The condensate from the boiler condensate drain is acidic. Its pH is typically between 3.2 and 4.5.

The factory-installed Condensate Treatment Kit is connected to the condensate drain of the boiler and vent tee and contains treatment media to raise the pH level of the condensate.

The pH of the effluent entering a sanitary drain must be 5.0 or higher.

CAUTION: In general, the condensate piping from the appliance must have a downward slope of 1/4" per horizontal foot. Condensate drain traps must be primed with water to prevent gas flue leaks. Treatment kits should be checked at least once per year. To ensure the pH of the effluent is 5.0 or higher, the media should be replenished as necessary. When replacing the media, they should be no smaller than 3/4" to avoid blockage in the condensate piping.

WARNING: Do not install the heater outdoors if freezing conditions are typical. The condensate will freeze and back up the flue system.

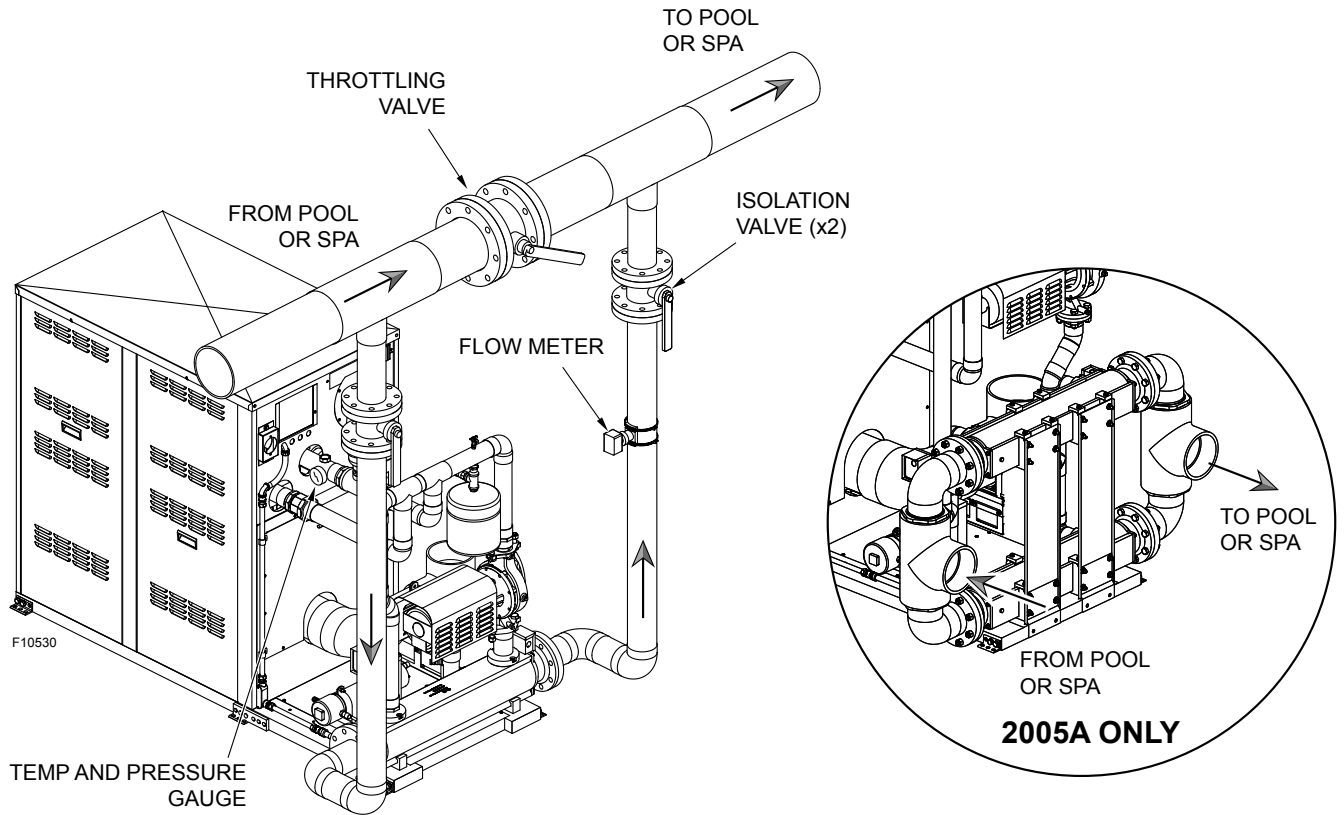


Figure 4. Indirect Pool Heater Single-Unit Plumbing Schematic

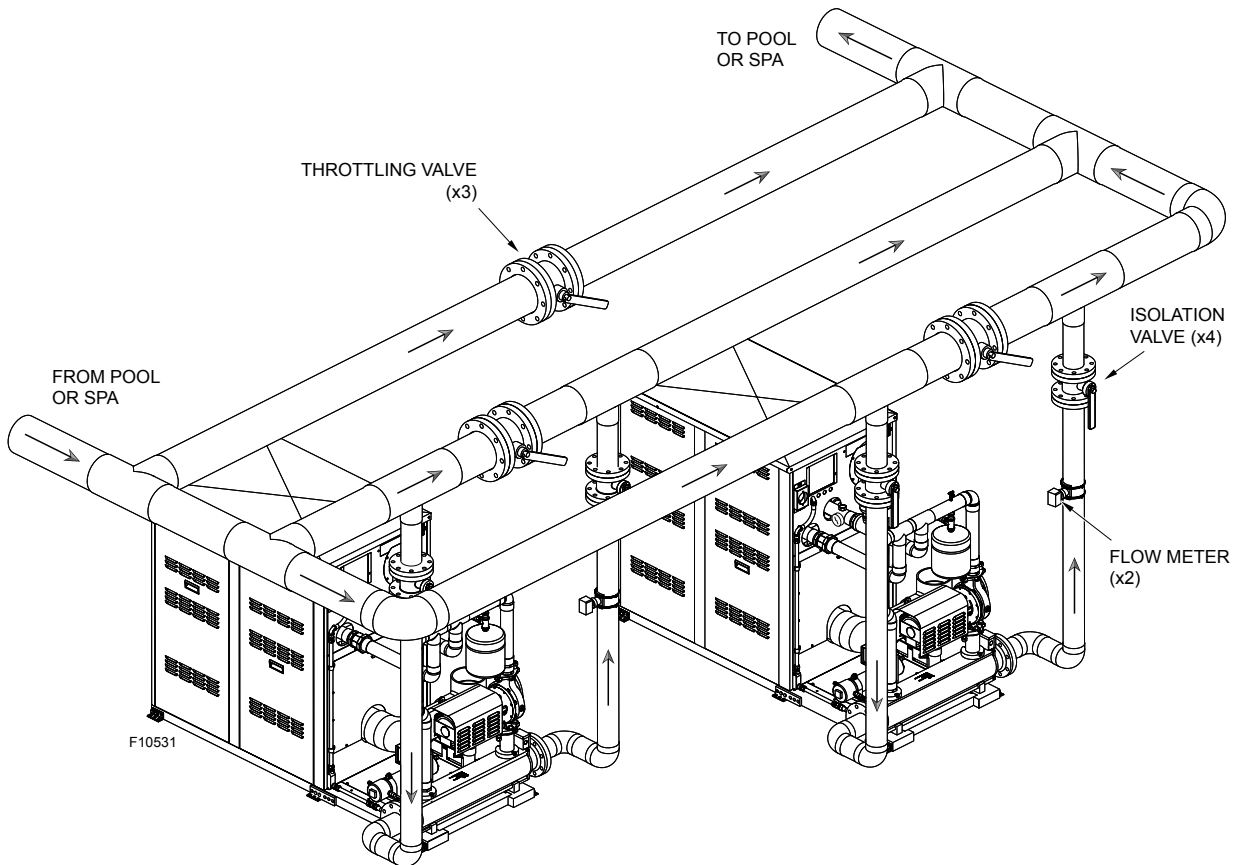


Figure 5. Indirect Pool Heater Multiple-Unit Plumbing Schematic

8. VENTING

CAUTION: Proper installation of flue venting is critical for the safe and efficient operation of the heater.

NOTE: Raypak strongly recommends installing the vent system before water piping. This will ensure that the venting system and associated components will fit into the allotted space for proper operation.

For vent termination, see the XTherm manual (241513) for detailed information.

Indoor Installation

CAUTION: Combustion air must not be contaminated by corrosive chemical fumes which can damage the heater and void the warranty.

For indoor installation, see the XTherm manual (241513) for detailed information.

Standard Venting Installation

The unit as shipped is configured to have the vent system routed to the left of the skid as viewed from the front door of the boiler cabinet. This is accomplished using the supplied PVC venting components included with the system. These are to be oriented as shown in **Figure 6**.

1. First prepare the PVC flue outlet pipe at the rear of the boiler and PVC elbow provided using an appropriate PVC primer.
2. Using an appropriate PVC glue, assemble the elbow to the PVC flue outlet pipe. The flue outlet pipe can be rotated by loosening the clamp on the flue outlet adapter inside the rear of the boiler cabinet for alignment purposes.
3. Prepare the provided PVC flue tee assembly and elbow from the previous step using an appropriate PVC primer.
4. Using an appropriate PVC glue, assemble the supplied PVC flue tee assembly to the PVC elbow attached to the PVC flue outlet of the boiler and orient as shown in **Figure 6**.

NOTE: The PVC flue pipe must rest on the flue support brackets provided and mounted on the skid system to allow for proper drainage of the condensate. Failure to provide proper drainage can cause a non-warrantable failure of the flue system.

5. Attach the hose from condensate trap to the barb fitting on the vent tee with hose clamp.
6. With the PVC flue tee and associated components installed per **Figure 6**, you are now ready to complete the PVC vent system installation by connecting your field-supplied PVC pipe to the point of termination.

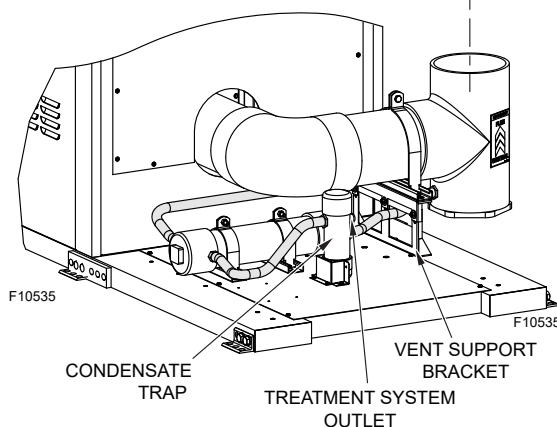
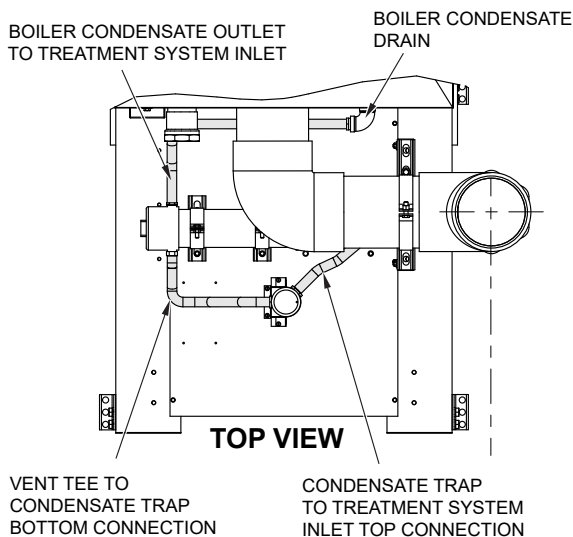


Figure 6. Standard Venting Direction

Optional Venting Installation

7. Identify three rubber hoses from the Standard Venting Direction. See **Figure 7**.
 - a. XTherm condensate outlet to the condensate treatment system.
 - b. Condensate trap tee connection to the condensate treatment system inlet, top connection.
 - c. Vent tee to condensate trap, bottom connection.
8. Detach all three hoses. Loosen the clamps around the condensate treatment system, then remove the treatment system.
9. Remove the vent support bracket and the treatment system base mounting bracket and relocate as shown in **Figure 6** and **Figure 7**.
10. Install the treatment system in opposite direction as shown in **Figure 7**.
11. Remove the 3/4" elbow from the boiler condensate drain connection and attach the straight coupling with the barb fitting from the 3/4" elbow.

12. Loosen retaining screws and rotate condensate trap about 180 degrees using top connection as guide.
13. Cut hoses to fit and install as shown. Make sure hoses do not kink.
14. Install vent elbow and the vent tee as shown in **Figure 7**.

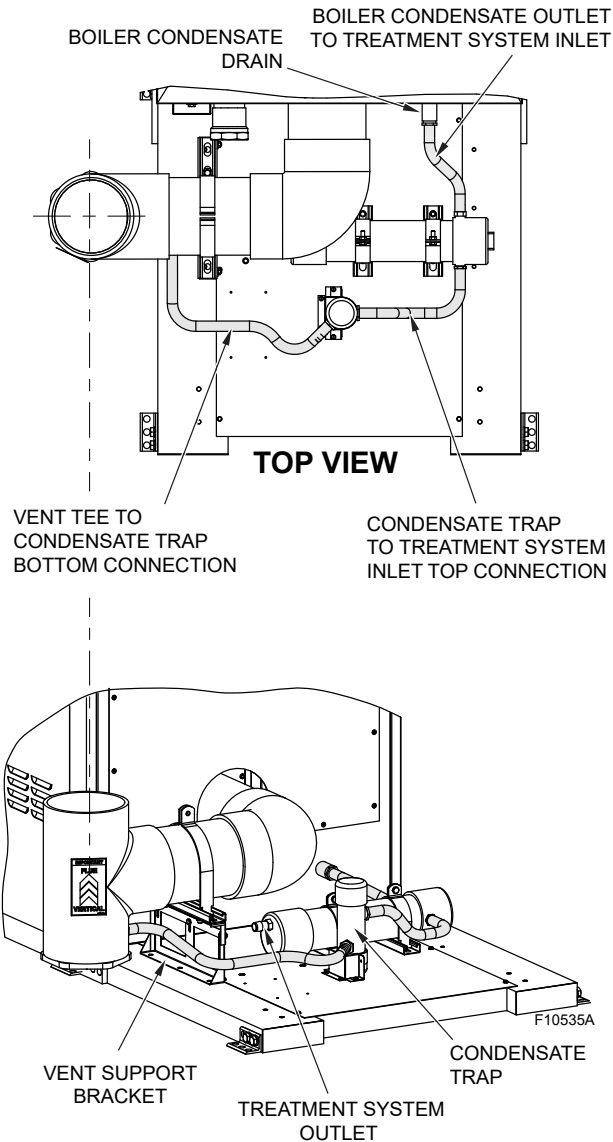


Figure 7. Optional Venting Direction

Outdoor Installation

XTherm heaters are certified for outdoor operation in non-freezing conditions only. Freezing conditions may cause condensate to freeze in the condensate drain line and trap, causing the unit to shut down due to a blocked condensate drain. Additionally, components of the condensate management system may be damaged by the ice formation. Units installed for seasonal use in climates with off-season freezing must be winterized to avoid freeze damage to the heater.

Outdoor models must be vented with listed vent material per the following instructions and installed with the optional factory-supplied outdoor vent kit (sales option D-11). A special vent cap is provided in accordance with CSA requirements. It must be installed directly on the vent pipe as illustrated in **Figure 9**.

Care must be taken when locating the heater outdoors, because the flue gases discharged from the vent cap can condense as they leave the cap. Improper location can result in damage to adjacent structures or building finish. For maximum efficiency and safety, the following precautions must be observed:

15. Outdoor models must be installed outdoors and must use the outdoor vent cap available from the manufacturer.
16. Periodically check the venting system. The heater's venting areas must never be obstructed in any way and minimum clearances must be observed to prevent restriction of combustion and ventilation air. Keep area clear and free of combustibles and flammable materials.
17. Do not locate adjacent to any window, door, walkway, or gravity air intake. The vent must be located a minimum of 4' (1.2 m) horizontally from such areas.
18. Install above grade level and above normal snow levels.
19. Vent terminal must be at least 3' (1 m) above any forced air inlet located within 10' (3 m).
20. Adjacent brick or masonry surfaces must be protected with a rust-resistant sheet-metal plate.

NOTE: The vent cap must be furnished by the heater manufacturer in accordance with its listing.

NOTE: Condensate can freeze on the vent cap. Frozen condensate on the vent cap can result in a blocked flue condition and non-warrantable failure. Condensate is acidic and highly corrosive. Condensate must not be allowed to freeze. Take appropriate measures.

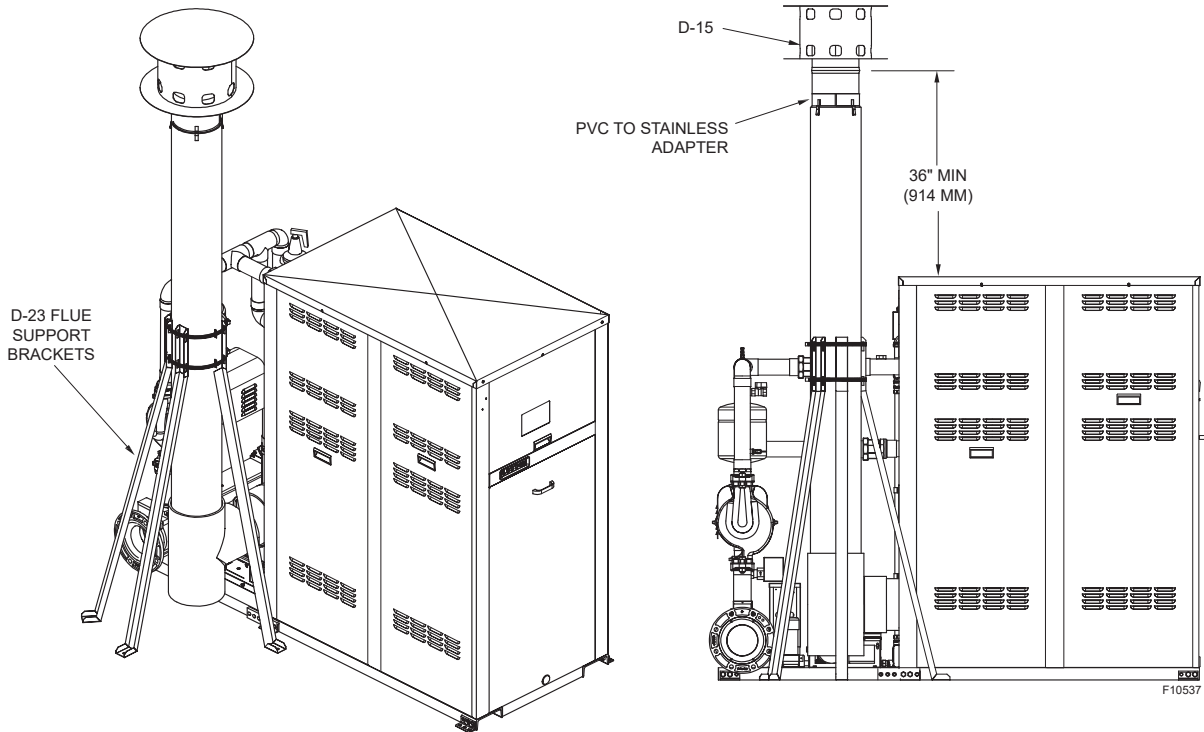


Figure 9. Outdoor Installation

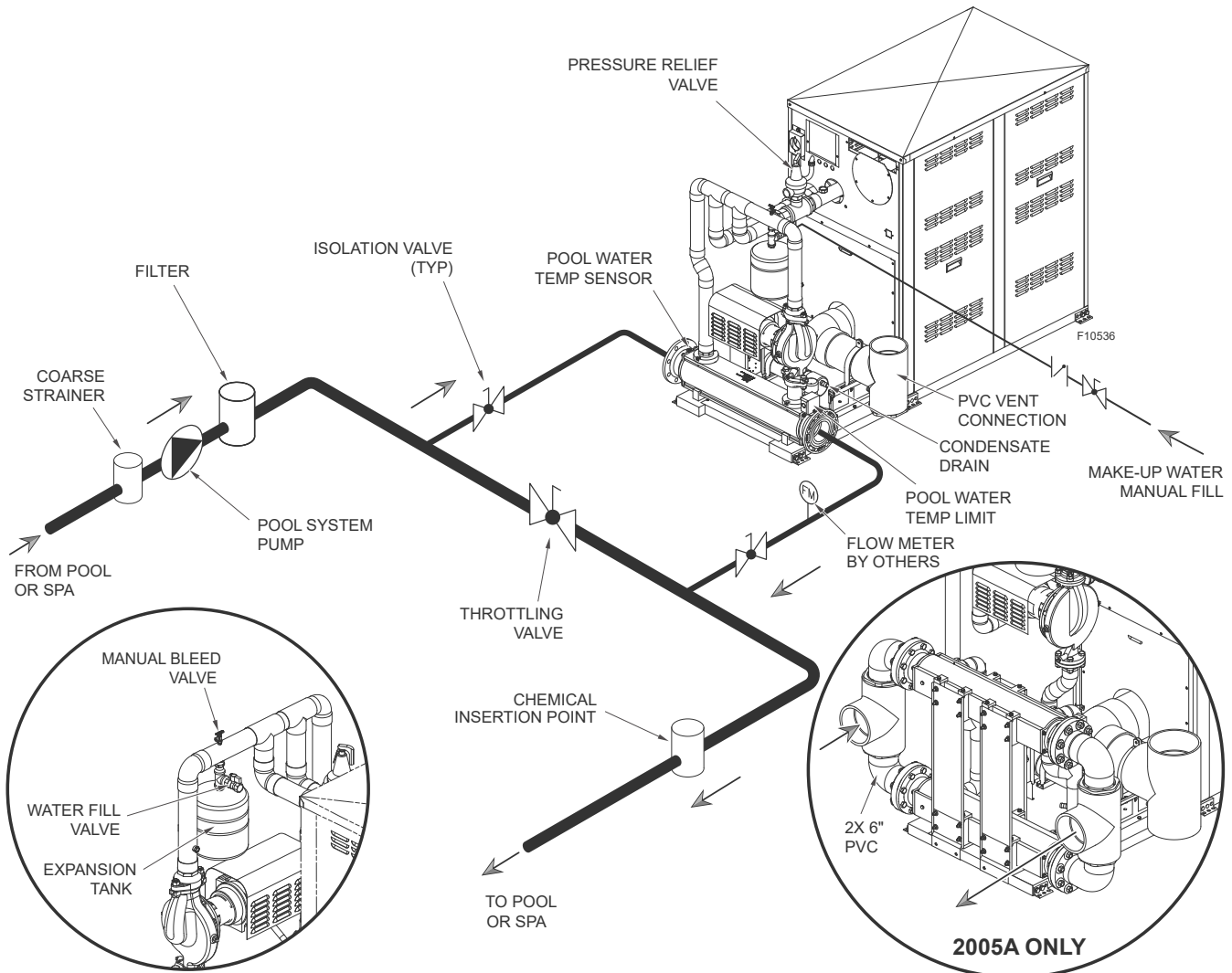


Figure 8. Recommended Plumbing Setup

9. FILLING THE SYSTEM/AIR REMOVAL

The boiler is to be filled with clean and cool water by connecting to the 3/4" make-up water valve adjacent to the expansion tank.

Connect the water line/hose to the fill valve, open the valve, and fill the boiler loop to an operating pressure of 15 psi. See the temp and pressure gauge on the boiler piping as shown in **Figure 4**.

Bleed the air out through manual bleed valve on the boiler to indirect manifold above the expansion tank. It may take several minutes for all the air to be evacuated from the boiler and indirect piping. See **Figure 2** and **Figure 3**.

Close the fill valve and make sure there is no leakage in the system. The expansion tank is set at 20 psi.

Fill pressure of less than 10 psi will not close the water pressure safety switch, which will prevent the system from operating.

NOTE: Unit is equipped with a water pressure safety switch designed to disable the boiler and provide an alarm output in the event of an indirect heat exchanger failure.

Winterizing Your Unit

Units installed outdoors in freezing climate areas should be shut down for the winter. To shut down the heater, turn off the manual main gas valve and main gas shut-off. Close isolation valves. Drain the XTherm boiler using the hose bibs located on the bottom of both internal heat exchangers. Disconnect the condensate hose from the boiler and drain the condensate trap and Condensate Treatment Kit. Drain the indirect heat exchanger(s) by removing the drain plug(s) at the bottom of the aluminum housing.

NOTE: There are 3 separate drains on the XTherm that must ALL be drained to protect the boiler heat exchangers. These are accessible by removing the lower front door from the heater for the 2 primary drains and the right-rear panel for the condensing heat exchanger drain. Drain any piping of all water that may experience below-freezing temperatures. Refer to the XTherm manual (241513).

10. ELECTRICAL POWER CONNECTION

⚠ WARNING: Electrical power connection must be performed by qualified licensed electrician(s) for the voltage being applied.

XTherm Boiler Connection

For XTherm boiler connections, please refer to the XTherm manual (241513) for location data for proper connection.

Indirect Pump Connection

The indirect heat exchanger has a dedicated, factory-mounted pump that requires a dedicated power circuit per the ampacity and breaker **Table D**.

Model	Amp Draw** (120V)			
	Boiler †	Minimum Breaker Rating	Pump †	Minimum Breaker Rating
1005A	12**	20	10	15
1505A	12**	20	14	20
2005A	18**	25	17	25

† Separate power connections are factory-supplied and separate supply breakers must be field-supplied.

** Current draw is for boiler only (Supply breaker must have delayed trip).

Breakers must be motor-rated.

Table D. Electrical Power and Breakers

Power is to be brought into the indirect J-box using the upper most electrical knockout via properly-rated conduit and connected directly to the indirect pump contact or opposite the factory pump wiring as shown in **Figure 10**. Use caution when connecting solid-core conductors as this can put strain onto the contactor connections and may damage the contactor.

The indirect pump is shipped factory-wired and configured for 115V/1PH power but can be field-configured for 230V/1PH if so desired. Follow the instructions on the pump motor cover to convert the motor from 115V/1PH to 230V/1PH before turning power on to the unit to prevent possible damage.

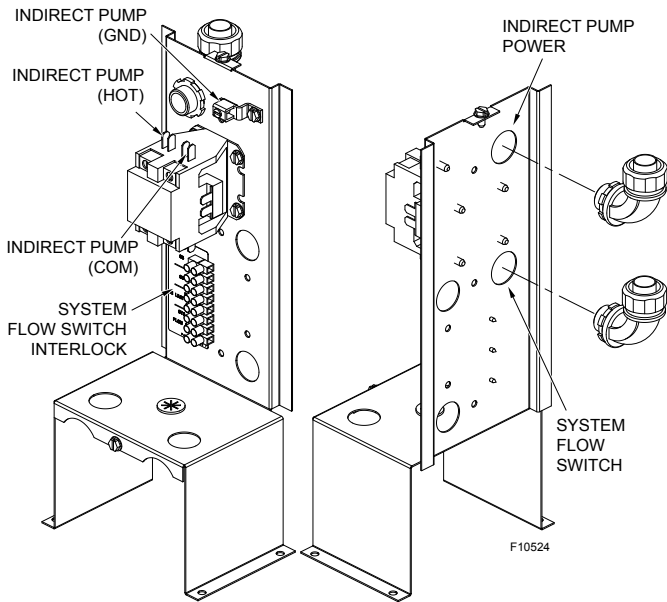


Figure 10. Inside Junction Box

Low Voltage

System Interlock (Indirect DHW Override)

Contact closure is required between terminals 10 and 12 on the field-wiring terminal block to enable the system to run. See **Figure 12**.

This contact **MUST BE** interlocked with the filtration pump or a fault may occur.

External Interlock

To be used in conjunction with an optional system fault switch or extractor fan, combustion air lubber, etc.

Use stranded conductor copper wire. Contact closure is required between terminals 17 and 18 on the field-wiring terminal block. Remove factory jumper when connecting field-installed devices such as a system flow switch, or a damper proving switch. See **Figure 12**.

Fan Damper (Optional)

Used to enable fan or motorized damper. Connection is pilot-duty, dry contact.

Alarm (Optional)

Connection is pilot-duty, dry contact and is closed to indicate an alarm connection exist.

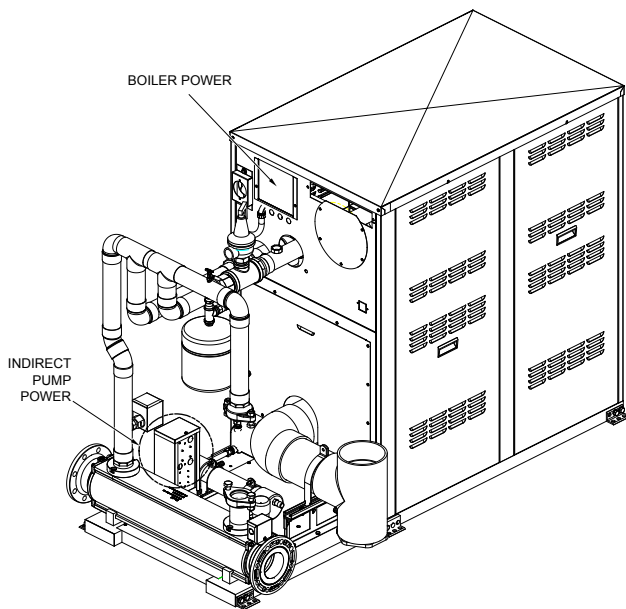


Figure 11. Indirect Pump Power

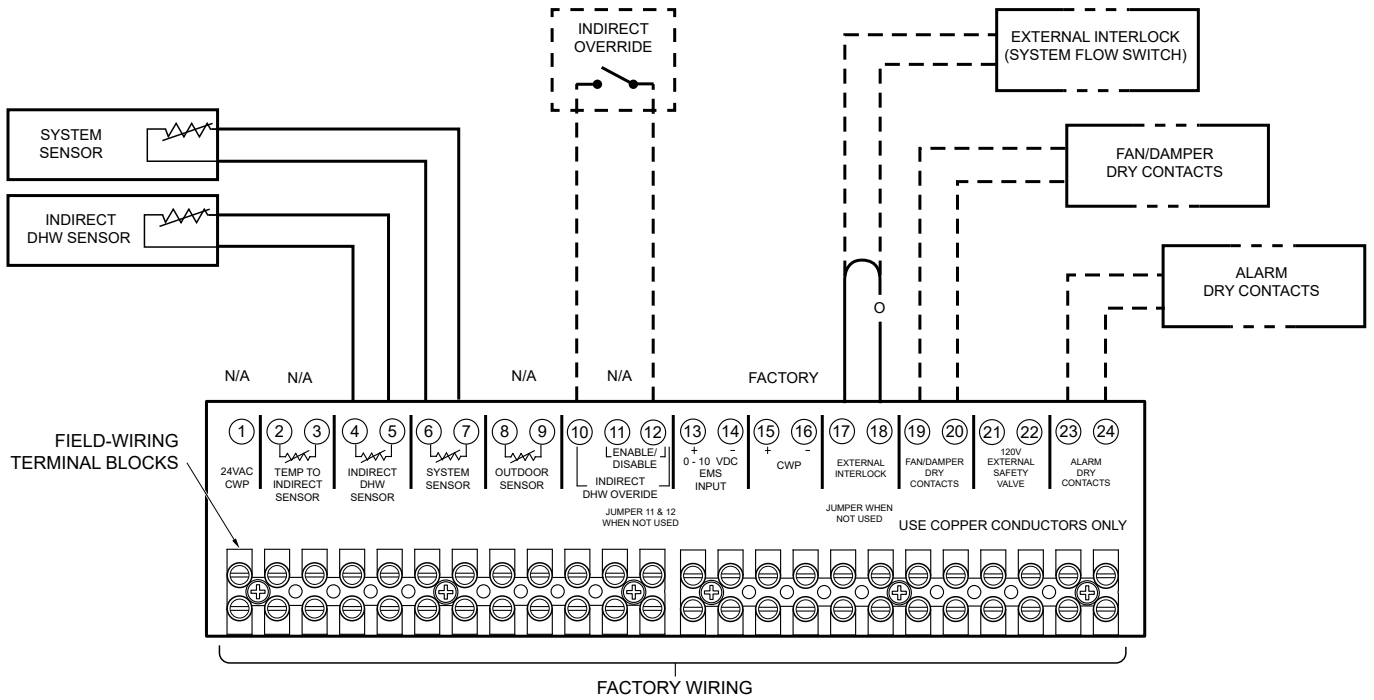


Figure 12. Low-Voltage Terminal Block

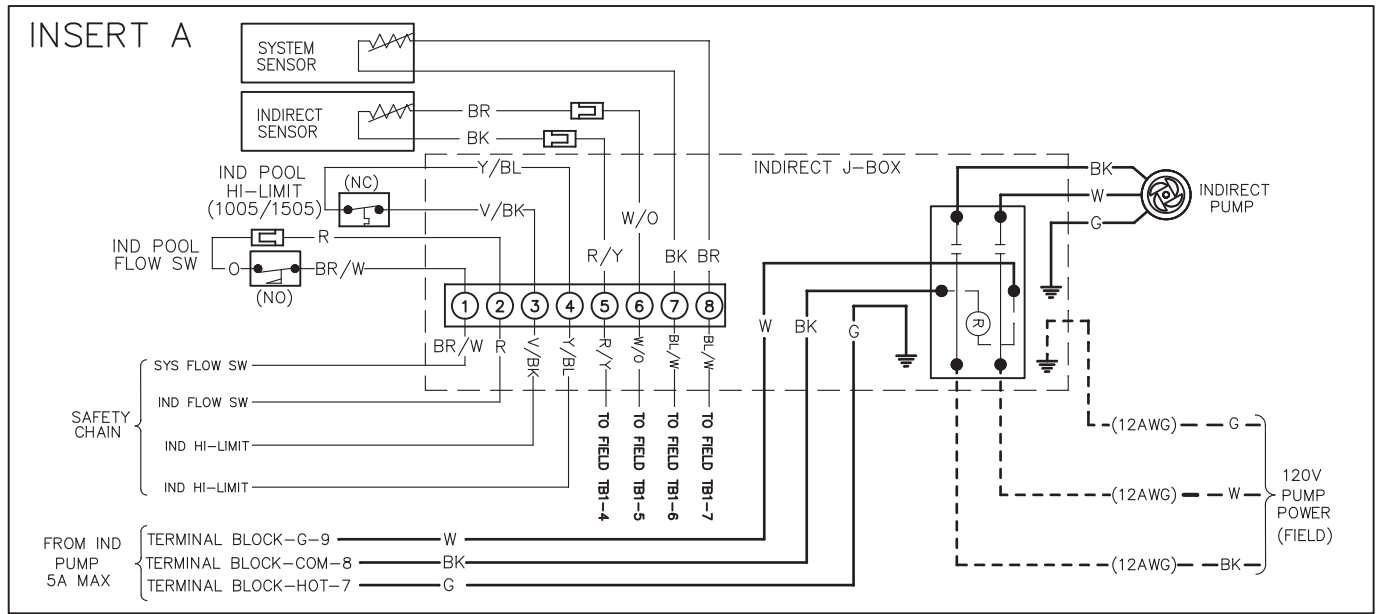


Figure 13. Indirect Pool Heater Wiring Diagram

11. INITIAL START-UP SEQUENCE

Do the initial start-up sequence, as follows:

1. Verify pool filtration system is operational and flow through the indirect heat exchanger has been established.
2. Turn power on to the boiler pump.
3. Verify gas supply is ON to the unit. Refer to the XTherm manual (241513) for gas supply data.

NOTE: Confirm that the DIP Switch #7 on the VERSA control board is in the ON position for proper operation.

4. Turn on boiler power at the front panel rocker switch. Allow controls to load. This may take several minutes on initial setup.

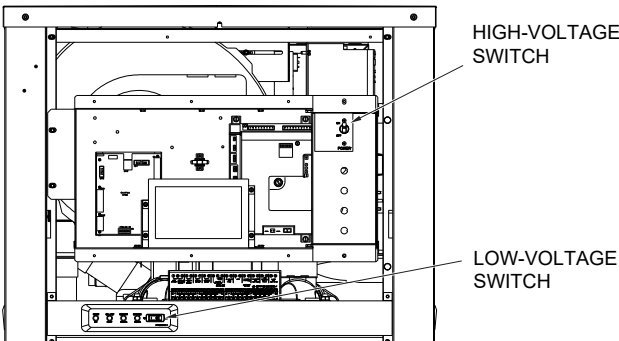


Figure 15. Front Panel Voltage Switches

5. Once you reach the default screen you can set up the desired Pool Setpoint and Differential.

NOTE: In the event of a water pressure fault, confirm that boiler water loop pressure exceeds 10 PSI. Water pressure of less than 10 PSI will prevent the system from operating.

Adjust the Pool Indirect Setpoint

Adjust the XTherm Pool Indirect Setpoint, as follows:

6. Press the MENU button to open the menu options. See Figure 16.
7. Select the ADJUST menu.
8. Press the POOL SETTINGS button.



Figure 16. Menu Screen

Once in the POOL SETTINGS screen set the Pool Setpoint, as follows:

9. Use the UP and DOWN arrows to adjust the Pool Setpoint. See Figure 17.
10. After setting the desired Pool Setpoint, press the SET button to apply the changes
11. The confirmation bar will turn green showing that the value entered has been applied.
12. Once the Pool Setpoint values are applied to the system, the confirmation bar will turn green.

NOTE: The minimum setpoint temperature is 50°F (10°C) and the maximum is 104°F (40°C).

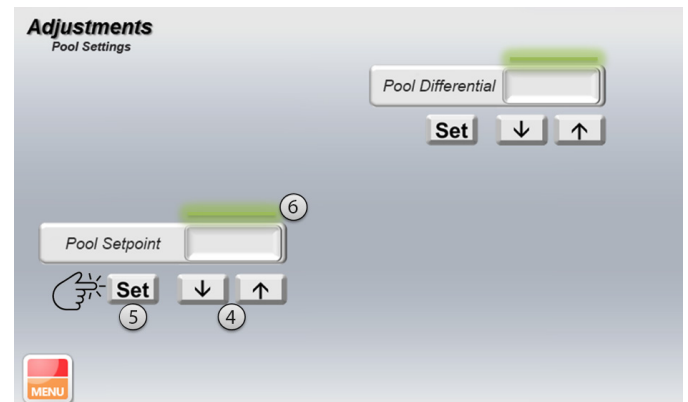


Figure 17. Pool Setpoint Adjustment

Pool Differential is subtractive to the setpoint. For example, in the case of a Pool Setpoint of 80°F (27°C) with a 2°F (1°C) differential, the control will energize the heater when the pool temperature drops to 78°F (26°C) and then will shut the heater off at 80°F (27°C). The Pool Differential defaults to 2°F (1°C) with a range of 2°F (1°C) to 5°F (3°C).

SETUP COMPLETE!

12. BOILER START-UP

For boiler start-up, see the XTherm manual (241513) for detailed information.

13. SEQUENCE OF OPERATION

1. Upon initial application of 24VAC power, the PIM resets with all outputs in the "OFF" state.
2. The PIM and VERSA IC® perform a processor and memory self-test to ensure proper operation.
3. The PIM confirms the presence of a valid ID card which matches the configuration stored in memory at the factory. If a valid ID card is NOT present, the PIM generates a diagnostic fault and will shut down waiting for this fault to be addressed.
4. The PIM reads the DIP switch settings and configures itself for the desired operation. PIM DIP 3 must be ON, which indicates primary/secondary and uses a boiler pump.
5. The VERSA board reads the DIP switch settings and configures itself for the desired operation. VERSA board DIP 3 must be ON to allow Cold Water Protection operation, VERSA board DIP 7 must be ON indicating the presence of the external indirect heat exchanger.
6. The PIM scans the FTbus communications for the VERSA IC® and if found, system operation is controlled by the VERSA IC® Control.
7. Non-volatile memory is checked for any active lockout conditions. If any exist, they must be addressed before the PIM will allow a new trial for ignition to start.
8. The PIM continually monitors the flame status to ensure that no flame is present during standby. If an erroneous flame is detected, the PIM generates a False Flame error fault.
9. A call-for-heat is initiated by a heat demand (contact closure) on field-wiring terminals 10 and 12, assuming that the VERSA IC® sees the indirect pool water temperature sensor temperature is below Pool Setpoint.
10. The PIM initiates a trial-for-ignition counter to the programmed number of trials for ignition (1 or multiple) and proceeds to Pump Purge mode.
11. The VERSA IC® will turn on the boiler pump, system pump, and Indirect pump as necessary to address the call-for-heat. The boiler will proceed through its pre-purge period before the control will move into a Trial for Ignition (TFI).
12. The VERSA board and PIM check the safety circuit and will stop from going into a trial for ignition if any of the safety devices is in an error/fault condition.
13. The blower is energized and set to pre-purge speed.
14. Once the blower speed is acknowledged as operating at the pre-purge speed by the tachometer output, the blower proceeds to pre-purge for the specified duration.
15. The voltage level of the 24VAC supply input is confirmed to be above 18VAC – if not, a Low Voltage fault will be recorded and the heater will go into a soft-lockout condition until the voltage rises above 18VAC consistently.
16. If all checks have passed, the system proceeds to ignition. Safeties include water pressure safety switch, condensate switch, low water cut-off, temperature high limit switches for both the indirect and the boiler, indirect flow switch, boiler flow switch, and the optional system flow switch.
17. The PIM re-initializes the ignition counter to the configured number of trials (typically 1 or 3).
18. The Hi Limit sensor is confirmed to read below the boiler Hi Limit Setpoint.
19. The blower light-off RPM speed is verified.
20. The gas valve relay contacts are verified open – if closed, a fault code will be issued and the boiler will post-purge and go into a hard lockout condition.
21. The XTherm is equipped with a Hot Surface Igniter (HSI):
 - a. The control turns on the HSI and the HSI proving current is verified to be above the configured value.
 - b. The configured heat-up delay takes place to allow the HSI element to reach ignition temperature.
 - c. The gas valve output is energized for the trial for-ignition time to light the burner.
 - d. The HSI is de-energized during the last second of the trial-for-ignition period to sense for the burner flame.
 - e. The flame sense is checked for successful lighting of the burner. If a valid flame is detected, the main gas valve, operating pumps and blower relay remain energized and the PIM proceeds to the Heating mode.
22. If flame is not detected during the trial-for-ignition period, the gas valve output is disabled immediately and the blower goes to a post-purge.
23. On single trial-for-ignition models, the PIM enters ignition lockout and the LED on the PIM indicates the fault code for ignition lockout. The VERSA IC® display will also state Ignition Lockout.
24. On multi-trial-for-ignition models, the control goes through an inter-purge delay before additional ignition attempts are started. If no flame is detected after the final trial-for-ignition, the PIM enters ignition lockout and the LED on the PIM indicates the fault code for ignition lockout. The VERSA IC® display will also state Ignition Lockout.

25. Once flame has been proven and rectified, the unit will release to full modulation.
26. The unit will modulate to achieve indirect Pool Setpoint, and maintain water inlet temperature with the built in twin injector pumps.

Indirect Heat Exchanger Maintenance

The indirect heat exchanger must be regularly inspected and cleaned as needed. A fouled heat exchanger can have a major impact on system efficiency. Problems typically occur due to scale buildup and particulate deposits due to low flow. This can result in loss of unit performance due to heat transfer problems and tube failure.

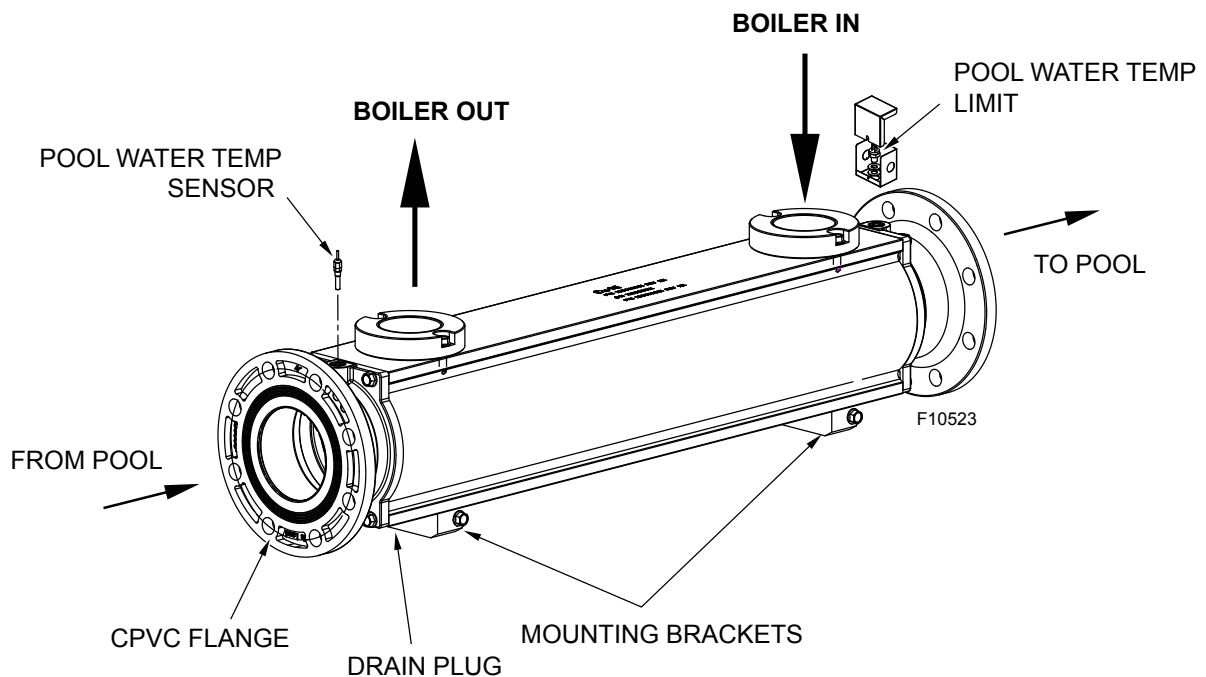
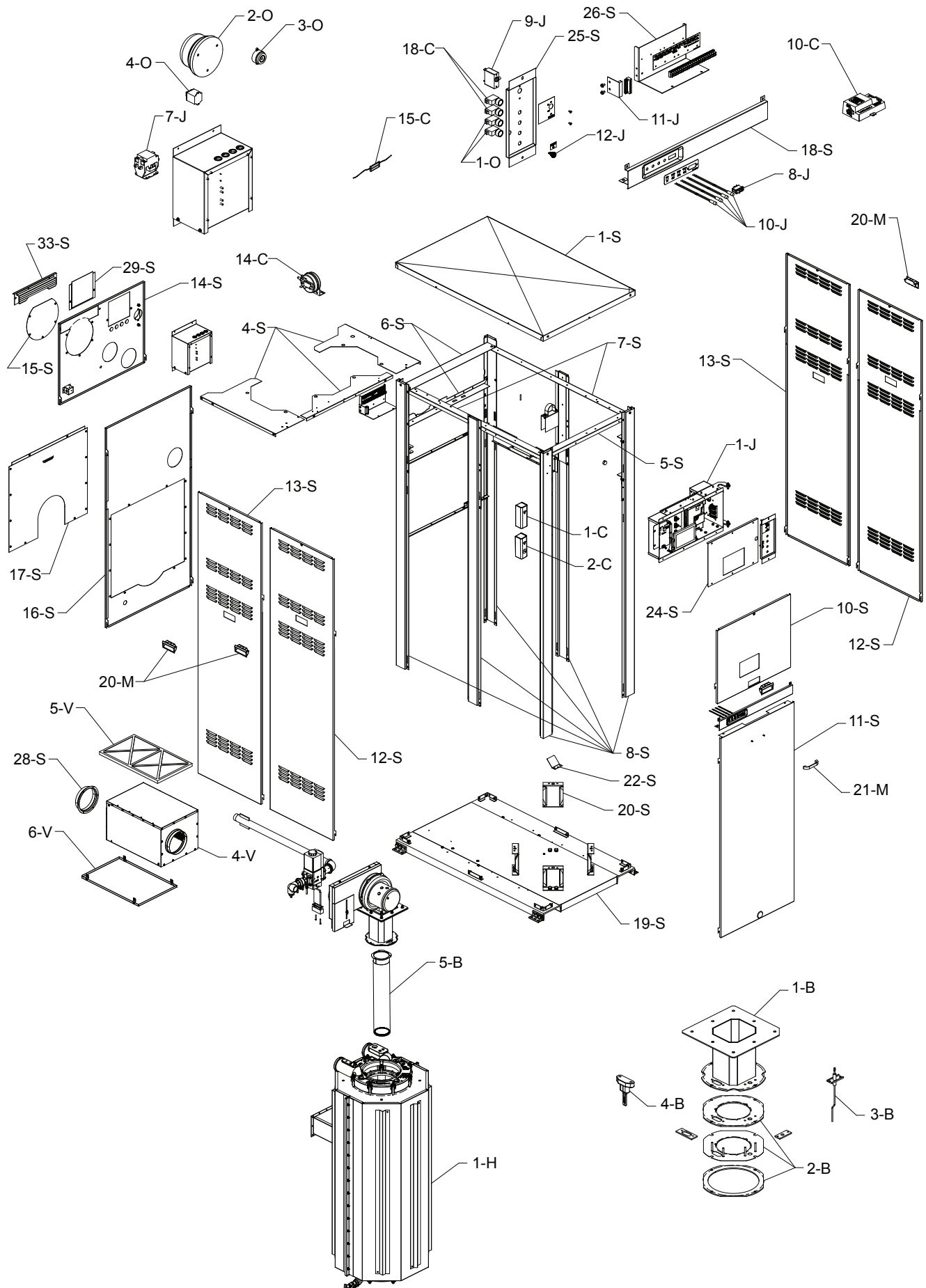
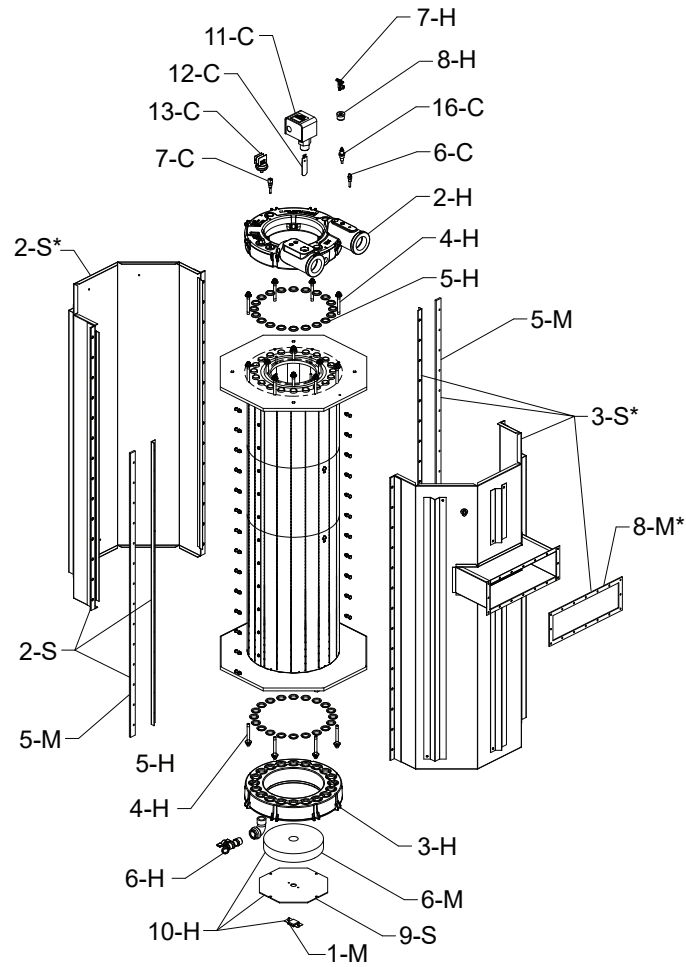


Figure 18. Indirect Heat Exchanger

14. ILLUSTRATED PARTS LIST

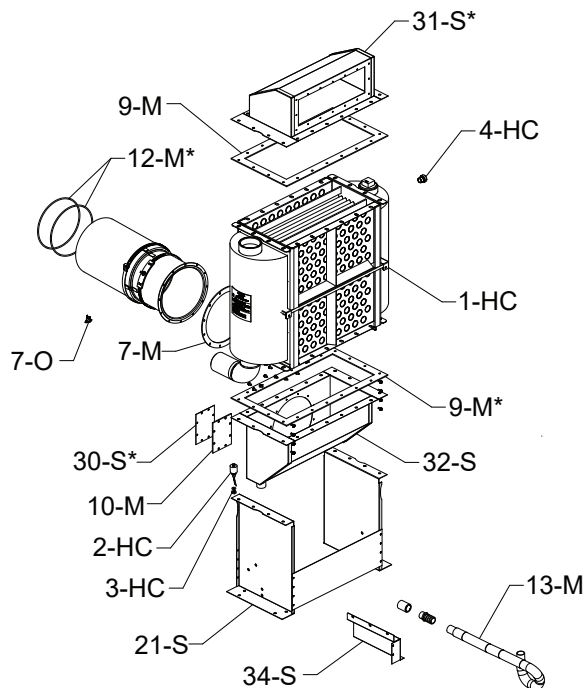


HEAT EXCHANGER DETAIL

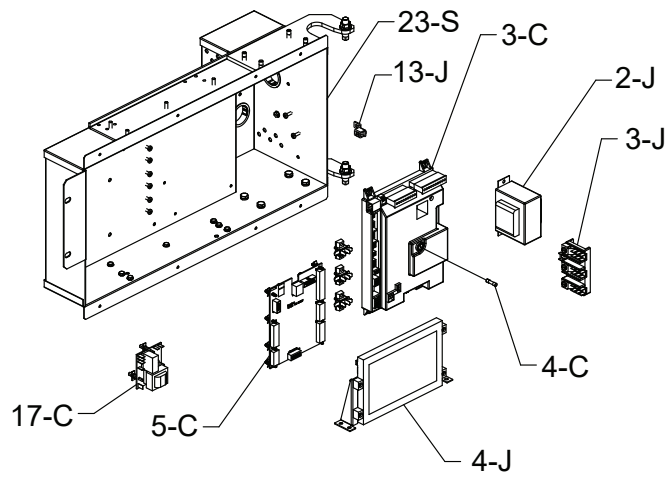


* SURFACES REQUIRE HIGH-TEMPERATURE RTV SEALANT (ITEM 4-M).
FOLLOW MANUFACTURER'S INSTRUCTIONS.

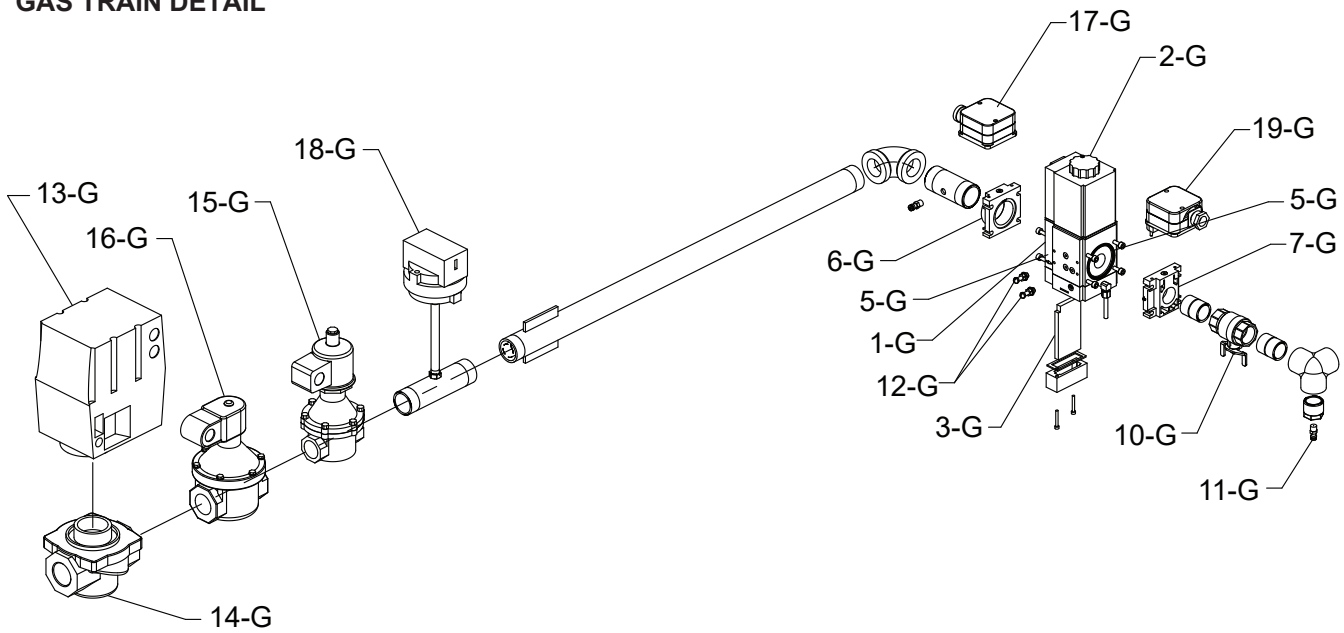
SECONDARY HEAT EXCHANGER DETAIL



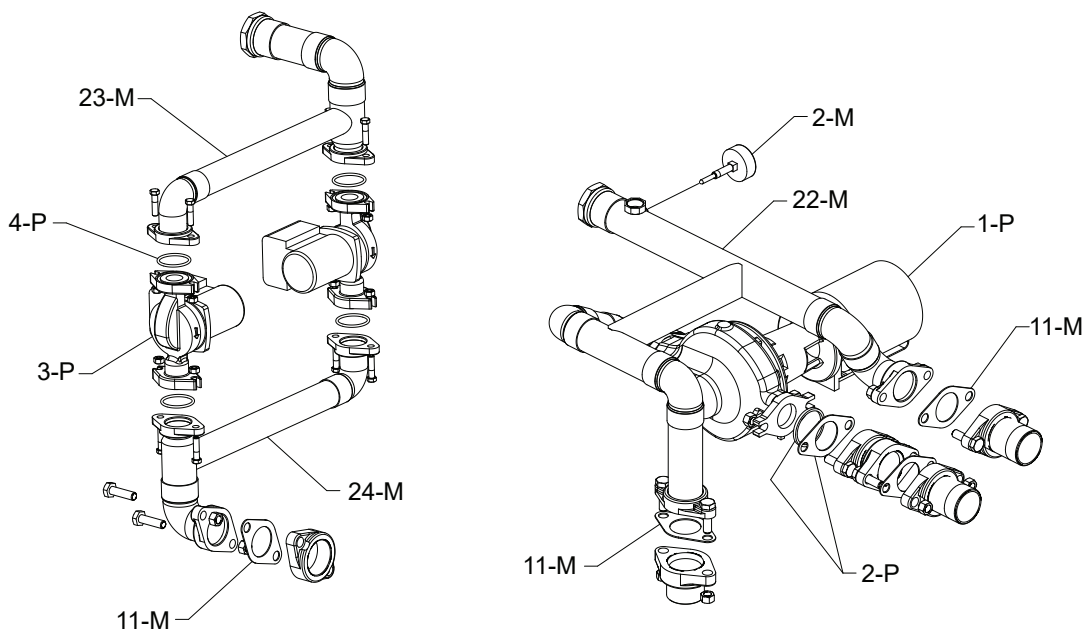
J-BOX DETAIL



GAS TRAIN DETAIL

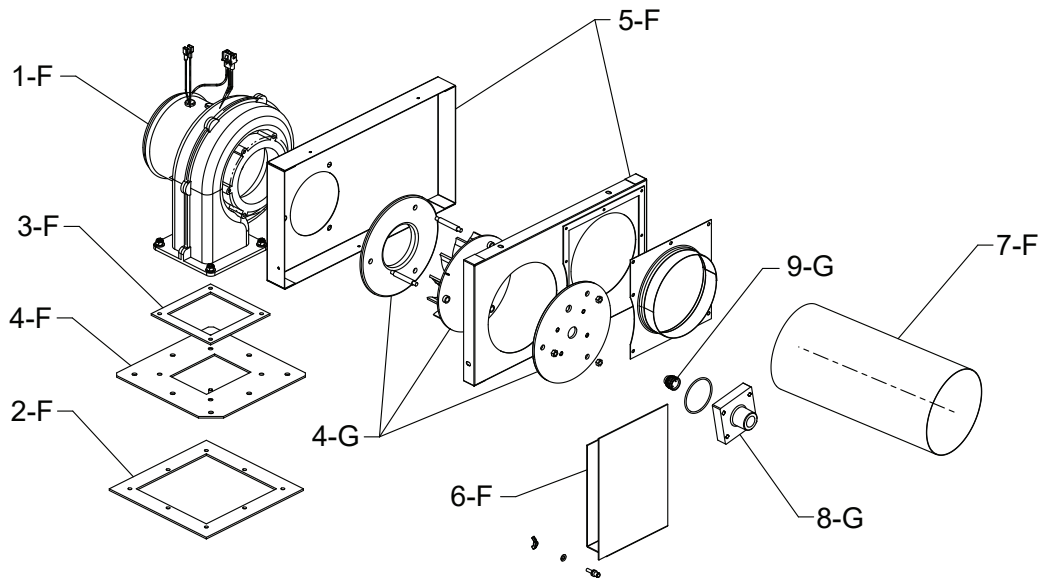


BYPASS DETAIL



BLOWER DETAIL

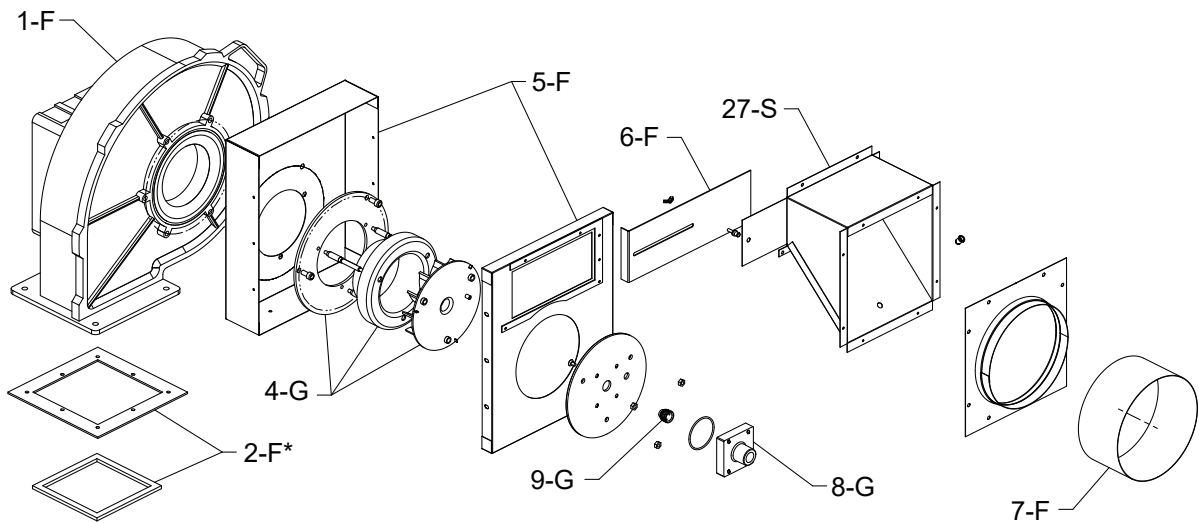
MODELS 1005A and 1505A



MODELS 1005A/1505A

BLOWER DETAIL

MODEL 2005A

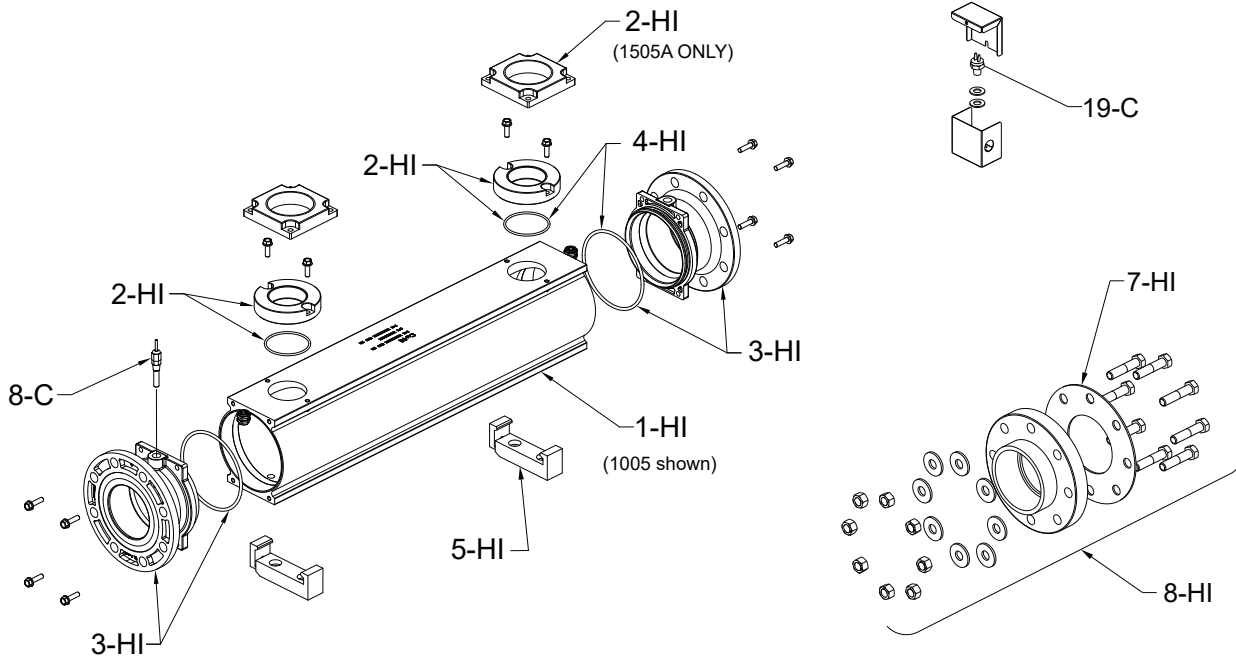


MODEL 2005A ONLY

*** SURFACES REQUIRE HIGH-TEMPERATURE RTV SEALANT (ITEM 4-M). FOLLOW MANUFACTURER'S INSTRUCTIONS.**

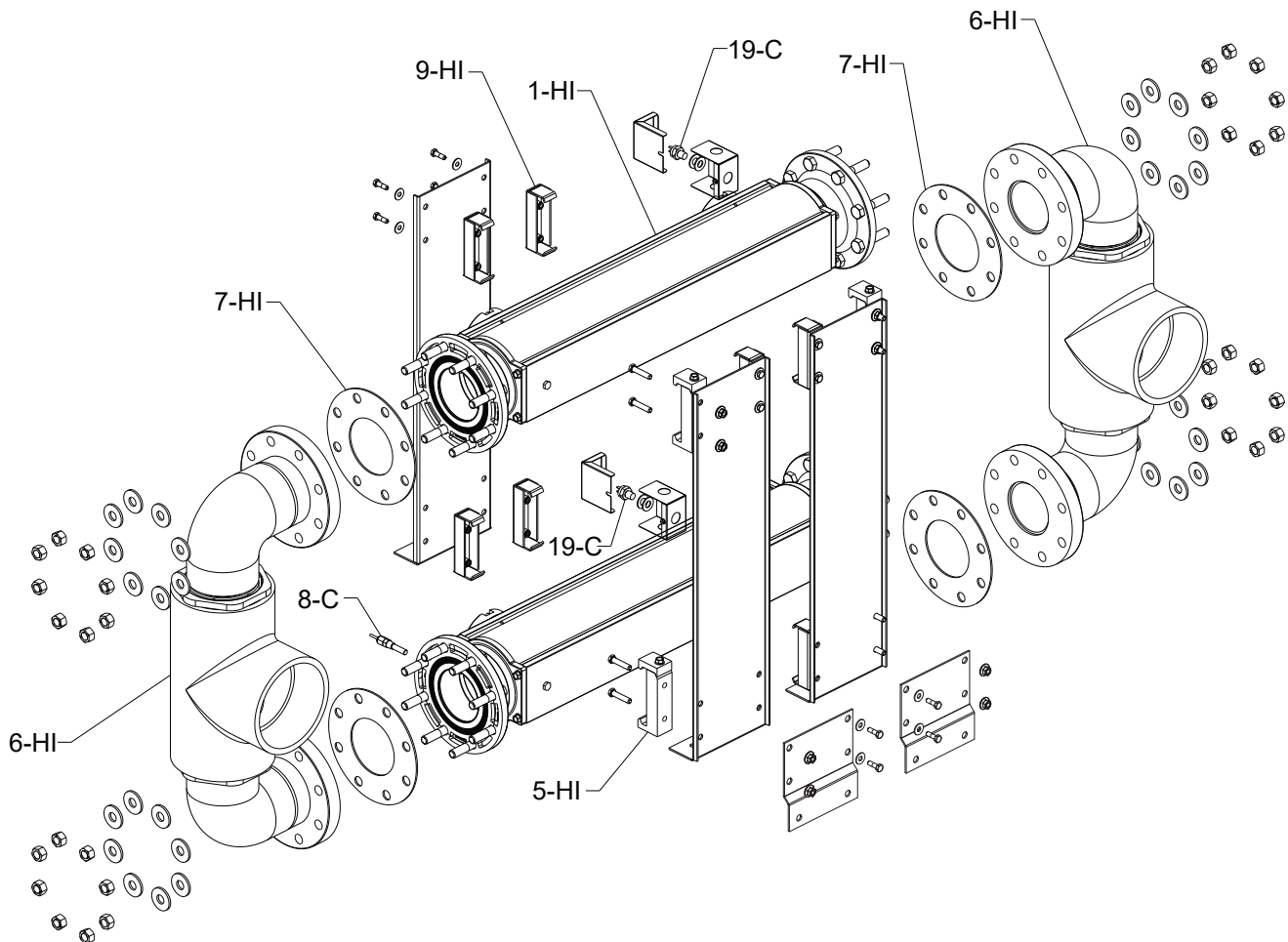
INDIRECT POOL HEAT EXCHANGER DETAIL

MODELS 1005A and 1505A

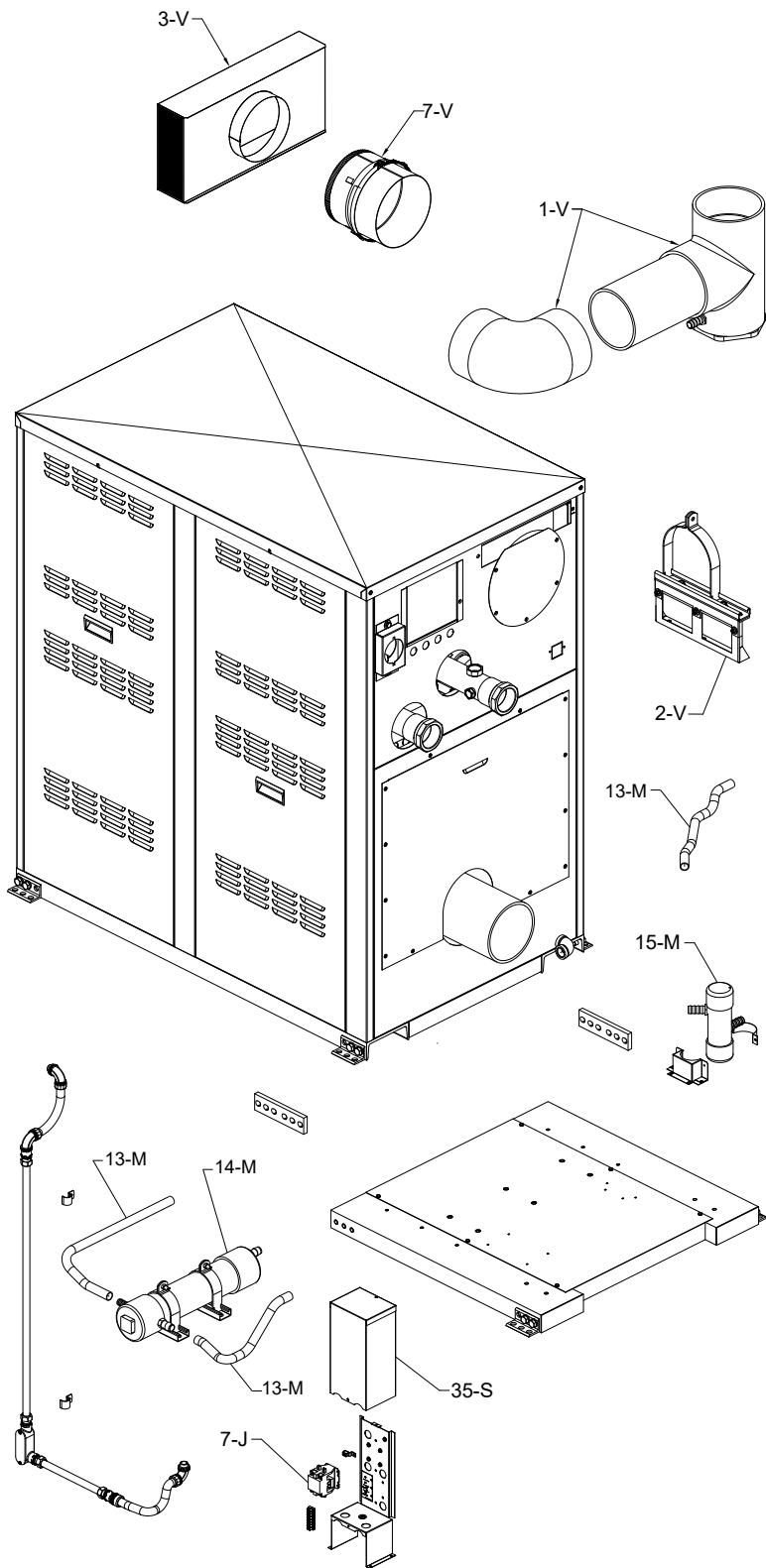


INDIRECT POOL HEAT EXCHANGER DETAIL

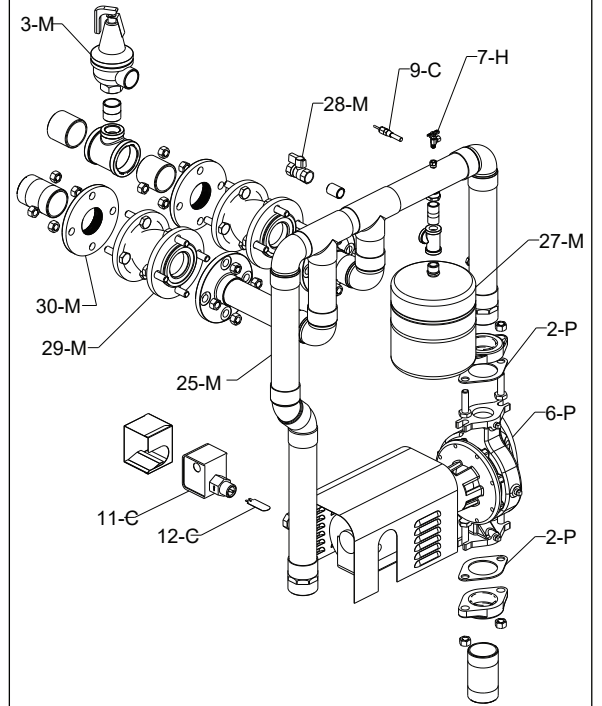
MODEL 2005A



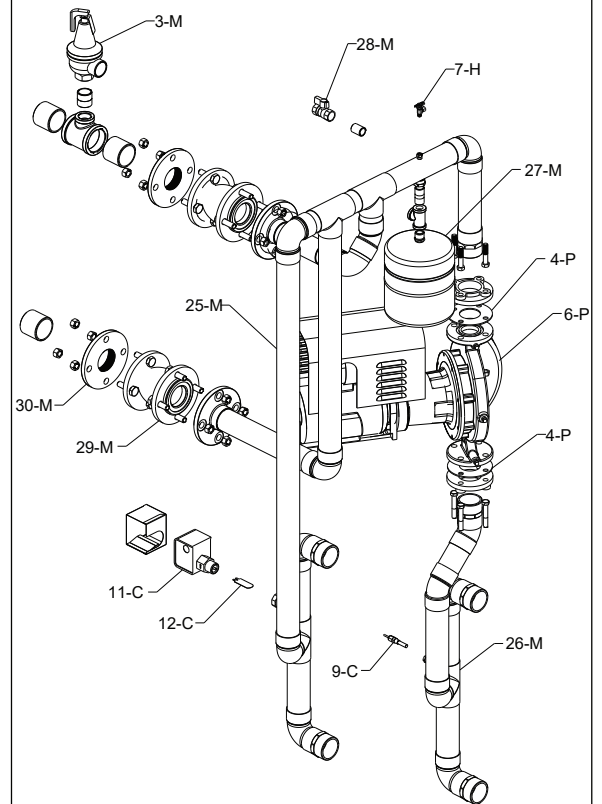
SECONDARY SKID DETAIL



BYPASS PLUMBING DETAIL MODELS 1005A and 1505A



BYPASS PLUMBING DETAIL MODEL 2005A



CALL OUT	DESCRIPTION	1005A	1505A	2005A
B	BURNER ASSEMBLY			
1-B	Adapter Assembly	011749F	011749F	011750F
2-B	Adapter Gaskets and Heat Shield	011751F	011751F	011751F
3-B	Flame Sensor Probe	011752F	011752F	011752F
4-B	Igniter	007400F	007400F	007400F
5-B	Burner	011754F	011755F	011756F
C	CONTROLS			
1-C	Auto Reset Adjustable High Limit 240°F Max	011860F	011860F	011860F
2-C	Manual Reset Adjustable High Limit 200°F	008081F	008081F	008081F
3-C	PIM (Platform Ignition Module) Multi Try	014324F	014324F	014324F
	PIM (Platform Ignition Module) Single Try CSD-1	014325F	014325F	014325F
4-C	Fuse 5 Amp (Fast Acting)	013971F	013971F	013971F
5-C	PC Board Versa IC	013935F	013935F	013935F
6-C	Inlet Sensor (2 Wire)	013175F	013175F	013175F
7-C	Outlet/Limit Sensor (4 Wire)	013932F	013932F	013932F
8-C	Indirect System Water Sensor 10K	016936F	016936F	016936F
9-C	Indirect System Water Sensor 10K	016936F	016936F	016936F
10-C	Gateway BACnet Interface Module B-85	016617F	016617F	016617F
	Gateway LonWorks Interface Module B-86	016618F	016618F	016618F
11-C	Flow Switch	007142F	007142F	007142F
12-C	Flow Switch Paddle (Taco)	010026F	010026F	010026F
13-C	Water Pressure Switch	016932F	016932F	016932F
14-C	Vent Pressure Switch	011760F	011760F	011760F
15-C	Fuse 5 Amp (Pump) (Slow Blow)	013972F	013972F	013972F
16-C	Remote Sensor (LWCO)	007228F	007228F	007228F
17-C	Control PC Board (LWCO)	007157F	007157F	007157F
18-C	Test / Reset Switch (LWCO)	005641F	005641F	005641F
19-C	Temperature Limit 140°F Auto	016971F	016971F	016971F
J	CONTROL BOX			
1-J	Control Box Complete	N/A	N/A	N/A
2-J	Transformer 120/24 100 VA	007494F	007494F	007494F
3-J	Terminal Block w/Ground Lug	008523F	008523F	008523F
4-J	Touchscreen Display	018438F	018438F	018438F
5-J	SD Card Programmed (Not Shown)	015877F	015877F	015877F
6-J	Lithium Battery 3V (Not Shown)	015888F	015888F	015888F
7-J	Pump Contactor 120 VAC (Wiring Box)	007906F	007906F	007906F
8-J	Rocker Switch	009493F	009493F	009493F
9-J	On / Off Shut Down Switch 30 Amp	007380F	007380F	007380F
10-J	Indicator Lamp LED	011848F	011848F	011848F
11-J	PC Board Adapter Status Lights Wiring	014712F	014712F	014712F
12-J	Reset Switch for Touchscreen	015879F	015879F	015879F
13-J	Ground Lug	007155F	007155F	007155F
F	FAN			
1-F	Blower Combustion Air	014556F	014556F	011765F
2-F	Adapter Gasket	011885F	011885F	011885F
3-F	Adapter Gasket	011886F	011886F	N/A
4-F	Adapter Plate	011887F	011887F	N/A
5-F	Plenum Assembly	011863F	011863F	011864F
6-F	Air Shutter	011875F	011875F	011876F
7-F	Hose Duct 6"	007420F	007420F	N/A
	Hose Duct 8"	N/A	N/A	012680F

CALL OUT	DESCRIPTION	1005A	1505A	2005A
G	GAS TRAIN			
1-G	Valve Gas Modulating 120V (Dungs) Natural Gas	013200F	013200F	014415F
	Valve Gas Modulating 120V (Dungs) Propane Gas	013200F	013200F	013200F
2-G	Valve Coil 120V Nat	013201F	013201F	014693F
	Valve Coil 120V Pro	013201F	013201F	013201F
3-G	Inlet Gas Filter Natural Gas	012294F	012294F	012295F
	Inlet Gas Filter Propane Gas	012294F	012294F	012294F
4-G	Intake Air Swirler	011888F	011888F	011889F
5-G	O-Rings (Includes Gas Valve and Adapter O-Rings)	012440F	012440F	012441F
6-G	Adapter Gas Valve 1" Inlet (Includes O-Rings)	011915F	011915F	011915F
	Adapter Gas Valve 1-1/4" Inlet (Includes O-Rings)	011916F	011916F	N/A
	Adapter Gas Valve 2" Inlet (Includes O-Rings)	N/A	N/A	011917F
7-G	Adapter Gas Valve Outlet w/Shutter (Includes O-Ring) Natural	013206F	013206F	014557F
	Adapter Gas Valve Outlet w/Shutter (Includes O-Ring) Propane	013206F	013206F	013206F
8-G	Adapter Swirl Plate	012298F	012298F	012298F
9-G	Nozzle Natural Gas	012304F	014467F	014467F
	Nozzle Propane Gas	012304F	012304F	012304F
10-G	Valve Gas Ball (WOG)	011769F	011769F	011769F
11-G	Bleedle Valve 1/8 MPT	007423F	007423F	007423F
12-G	Bleedle Valve G-1/8 BSP	015400F	015400F	015400F
13-G	Motorized Safety Shut Off Valve M-1 (Optional)	011908F	011908F	011908F
14-G	Gas Valve Body M1 Nat (Optional)	014015F	014015F	014558F
	Gas Valve Body M1 Pro (Optional)	014014F	014014F	014014F
15-G	Solenoid Safety Shut Off Valve M-10 Nat (Optional)	011910F	011910F	011911F
	Solenoid Safety Shut Off Valve M-10 Pro (Optional)	011909F	011909F	011909F
16-G	Vent Valve Gas M-15 Nat (Optional)	011914F	011914F	011914F
	Vent Valve Gas M-15 Pro (Optional)	011913F	011913F	011913F
17-G	Switch Low Gas Pressure	011770F	011770F	011770F
18-G	Switch Low Gas Pressure w/M-1 or M-10 (Optional)	007187F	007187F	007187F
19-G	Switch High Gas Pressure	011771F	011771F	011771F
H	HEAT EXCHANGER (Primary)			
1-H	Heat Transfer Copper Cast Iron (Includes 18-S)	014661F	014662F	014663F
2-H	Inlet/Outlet Header Cast Iron	014620F	014620F	014620F
3-H	Return Header Cast Iron	012330F	012330F	012330F
4-H	Stud Bolt	009104F	009104F	009104F
5-H	Header Gasket (20 PCS)	007343F	007343F	007343F
6-H	Drain Valve	006536F	006536F	006536F
7-H	Manual Air Vent Valve (Units Produced from July 10, 2018)	016970F	016970F	016970F
8-H	Manual Air Vent Valve Bushing (Units Produced from July 10, 2018)	016282F	016282F	016282F
9-H	Automatic Air Vent Valve (Not shown; Units Produced before July 10, 2018)	011866F	011866F	011866F
10-H	Insulation/Sight Glass & Header Cover (Repair Parts, Includes 9-S, 1-M, 6-M)	017058F	017058F	017058F
HC	HEAT EXCHANGER (Condensing)			
1-HC	Heat Exch Stainless Steel (Includes 21-S)	012586F	012587F	012588F
2-HC	Condensate Float Switch	012589F	012589F	012589F
3-HC	O-Ring Seal	012590F	012590F	012590F
4-HC	Inspection Port Plug	N/A	N/A	015118F
HI	HEAT EXCHANGER (Indirect for Pool)			
1-HI	Heat Exchanger Cupro Nickel	016972F	016974F	016972F
	Heat Exchanger Titanium	016973F	016975F	016973F
2-HI	Flange Boiler Connection (Includes O-Rings)	016976F	016978F	016976F
3-HI	Flange Pool Connection CPVC (Includes O-Rings)	016977F	016979F	016977F
4-HI	O-Rings (Includes Boiler Flange and Pool Flange O-Rings)	016980F	016981F	016980F
5-HI	Mounting Bracket	016982F	016982F	016982F
6-HI	Indirect Plumbing Assy CPVC	N/A	N/A	017016F
7-HI	Gasket ANSI Flange	016995F	017041F	016995F
8-HI	Inlet/Outlet Flange CPVC	017030F	017031F	N/A
9-HI	Mounting Bracket (Steel)	N/A	N/A	017040F

CALL OUT	DESCRIPTION	1005A	1505A	2005A
M	MISCELLANEOUS COMPONENTS			
1-M	Window Combustion Chamber	006947F	006947F	006947F
2-M	T & P Gauge 0-90 PSI	007205F	007205F	007205F
3-M	PRV 30 PSI	007748F	007748F	007748F
4-M	RTV Sealant 2.8 oz. (Not Shown)	008924F	008924F	008924F
	RTV Sealant 10 oz. (Not Shown)	005755F	005755F	005755F
5-M	Flue Collector Vertical Seal Gasket	011772F	011772F	011772F
6-M	Insulation Blanket Return Header	007241F	007241F	007241F
7-M	Flue Exhaust Adapter Gasket Round	009735F	009736F	009736F
8-M	Flue Exhaust Adapter Gasket Rectangle	012591F	012592F	012592F
9-M	Plenum Gasket Upper and Lower	012593F	012593F	012594F
10-M	Access Panel Gasket Condensing Heat Exch	012595F	012595F	012595F
11-M	Flange Gasket 2-1/2" NPT	012596F	012596F	012596F
12-M	PVC Adapter O-Rings	017019F	017013F	017013F
13-M	Condensate Hose (Internal)	012597F	012597F	012597F
	Condensate Hose (External)	017017F	017017F	017017F
14-M	Condensate Neutralizer	016933F	016937F	016937F
15-M	Condensate Trap	016931F	016931F	016931F
16-M	Touch-up Paint (Not shown)			
	Green	750125	750125	750125
	Cool Dark Gray	750256	750256	750256
17-M	Wire Harness (Boiler harnesses) (Not shown)	014922F	014922F	014922F
	Wire Harness (Indirect Pool harnesses) (Not shown)	016984F	016984F	016985F
18-M	10 Pin Ribbon cable LED Status Lights (Not shown)	014555F	014555F	014555F
19-M	Versa IC Communication Cable CAT 5 (Not shown)	015556F	015556F	015556F
20-M	Plastic Handle	012681F	012681F	012681F
21-M	Metal Handle	014650F	014650F	014650F
22-M	Bypass Plumbing Assembly Copper	015787F	015788F	015790F
23-M	Dual Injector Pump Upper Plumbing Assembly	015791F	015791F	015791F
24-M	Dual Injector Pump Lower Plumbing Assembly	015792F	015792F	015792F
25-M	Bypass Assembly Indirect (Copper)	016988F	016989F	016990F
26-M	Plumbing Assembly Indirect (Copper)	N/A	N/A	016996F
27-M	Expansion Tank	016930F	016930F	016930F
28-M	Ball Valve manual	N/A	N/A	N/A
29-M	Expansion Flange	017069F	017069F	017069F
30-M	Companion Flange 2-1/2 NPT	017070F	017070F	017070F
31-M	Sealant Tape (gray) Specify Length (Not Shown)	800351	800351	800351
O	OPTIONS			
1-O	Silencer/Reset Switch (Alarm)	005641F	005641F	005641F
2-O	Alarm Bell 4" 24V	005643F	005643F	005643F
3-O	Alarm Buzzer 24V	005640F	005640F	005640F
4-O	Relay 3PDT 24 VAC (Alarm)	014717F	014717F	014717F
5-O	System Flow Switch (Not shown)	017014F	017014F	017014F
6-O	System Flow Switch Paddle (Not shown)	017015F	017015F	017015F
7-O	PVC Vent Limit Switch Manual Reset	011868F	011868F	011868F

CALL OUT	DESCRIPTION	1005A	1505A	2005A
P	PUMPS*			
	Boiler Bypass Pump			
1-P	Bronze (H)	011845F	011845F	007351F
2-P	Pump Flange Gaskets	013423F	013423F	013423F
	Injector Pump			
3-P	Cast Iron Injector Pump	016927F	016927F	016927F
4-P	Pump Flange Gasket	008747F	008747F	008747F
5-P	Pump Cartridge (Not Shown)	951153F	951153F	951153F
	Injector Pump			
6-P	Cast Iron	011846F	007354F	007938F
S	SHEETMETAL			
1-S	Jacket Top	014664F	014664F	014664F
2-S	Flue Collector Front (No Opening) (Includes 5-M)	011789F	011791F	011793F
3-S	Flue Collector Rear (Opening) (Includes 5-M and 8-M)	012603F	012604F	012605F
4-S	Heat Transfer Supports	014665F	014665F	014665F
5-S	Upper Cabinet Support Front	014666F	014666F	014666F
6-S	Upper Cabinet Supports Rear	014703F	014703F	014703F
7-S	Upper Cabinet Supports Side	014704F	014704F	014704F
8-S	Vertical Cabinet Supports with Stiffeners	014667F	014668F	014669F
9-S	Return Header Cover	007257F	007257F	007257F
10-S	Jacket Upper Front Panel for Touchscreen	016199F	016199F	016200F
11-S	Jacket Lower Front Panel	014672F	014673F	014674F
12-S	Jacket Side/Front Panel	014705F	014706F	014707F
13-S	Jacket Side/Rear Panel	014708F	014709F	014710F
14-S	Jacket Upper Rear Panel	014675F	014676F	014677F
15-S	Access Panel Intake Air	012671F	012671F	012671F
16-S	Jacket Lower Rear Panel	012624F	012625F	012626F
17-S	Access Panel Lower Rear	012672F	012674F	012674F
18-S	Upper Front Panel w/LED Lights	014711F	014711F	014711F
19-S	Base Assembly	012627F	012627F	012627F
20-S	Leg Bracket Primary Heat Exch (4 pcs per boiler)	007306F	007306F	007306F
21-S	Leg Bracket Condensing Heat Exch (2 pcs per boiler)	012628F	012629F	012630F
22-S	Base Reflector Panel	007307F	007307F	007307F
23-S	Control Box Assy	014679F	014679F	014679F
24-S	Control Box Cover Panel for Touchscreen Display	016201F	016201F	016201F
25-S	Control Box Cover Panel with Power Switch	014616F	014616F	014616F
26-S	24V Wiring Panel	014519F	014519F	014519F
27-S	Intake Air Adapter (Plenum to Duct)	N/A	N/A	011881F
28-S	Intake Air Collar	012675F	012676F	012676F
29-S	Access Panel Wiring Box	012651F	012651F	012651F
30-S	Access Panel Condensing Heat Exch	012638F	012638F	012638F
31-S	Plenum Upper Condensing Heat Exch	012639F	012640F	012641F
32-S	Plenum Lower Condensing Heat Exch	012642F	012643F	012644F
33-S	Filter Access Cover	012683F	012683F	012683F
34-S	Condensate Hose Bracket	013422F	013422F	013422F
35-S	Cover Wire Box	016983F	016983F	016983F
V	VENTING			
1-V	Vent Group PVC	016934F	016935F	016935F
2-V	Vent Support	016986F	016987F	016987F
3-V	Vent Termination Cap Vertical/Horizontal	006644	006646	006646
4-V	Intake Air filter Box	012645F	012646F	012647F
5-V	Air Filter Media	012599F	012599F	012599F
6-V	Condensate Drip Pan	012678F	012678F	012678F
7-V	Flue Exhaust Termination Adapter for PVC Venting	013346F	013347F	013347F

* For individual pump parts see separate pump parts IPL 9300.100

15. QR CODES

View this Installation Manual and corresponding manuals on your smart device.

The QR Code will take you to the most current version of each manual.

Previous version of the manual can be found in the document library at Raypak.com.

P/N: 241735 XTHERM 1005A-2005A MODEL



NOTES