



User's Information Manual



CHALLENGER SOLO

CC50s, CC85s, CC105s, CC125s, CC125Hs, CC150s



WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury, or death.

WARNING

To maintain the safety & longevity of your appliance, read and follow the maintenance schedule information throughout this manual.

FOR YOUR SAFETY

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **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.

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Section I: Product & Safety Information

1.1 Definitions

The following terms are used throughout this manual to bring attention to the presence of potential hazards or important information concerning the product.

DANGER

Indicates the presence of a hazardous situation which, if ignored, will result in substantial property damage, serious injury, or death.

WARNING

Indicates a potentially hazardous situation which, if ignored, can result in substantial property damage, serious injury, or death.

CAUTION

Indicates a potentially hazardous situation which, if ignored, can result in minor property damage or injury.

NOTICE

Indicates special instructions on installation, operation, or maintenance, which are important to equipment but not related to personal injury hazards.

BEST PRACTICE

Indicates recommendations made by ACV-Triangle Tube for the installers which will help to ensure optimum operation and longevity of the equipment.

1.2 Safety Information

DANGER

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

WARNING

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.

1.3 Homeowners

WARNING

The CHALLENGER installation manual is for use only by a qualified heating installer/service technician. Refer to this User's Information Manual for your reference. Failure to comply can result in substantial property damage, serious injury or death.

NOTICE

Please reference the appliance model number and the serial number from the rating label, on the right panel, when inquiring about service or troubleshooting.

NOTICE

ACV-Triangle Tube reserves the right to modify the technical specifications and components of its products without prior notice.

 **WARNING**

A byproduct of any gas fired appliance (stove, fireplace, clothes dryer, water heater, furnace, boiler, etc.) is carbon monoxide. In the absence of any state or local codes requiring the installation of carbon monoxide detector and alarms, ACV-Triangle Tube recommends the following:

- Installation of a carbon monoxide detector and alarm that is wired on same electrical circuit as the boiler.
- Installation of a carbon monoxide detector and alarm on each level of the building where there are bedrooms and in the living area outside the bedrooms.
- Installation of a carbon monoxide detector and alarm in the room that houses the appliance.
- Installation of a carbon monoxide detector and alarm with battery back up.
- Installation of a carbon monoxide detector and alarm that complies with NFPA 720.

 **WARNING**

ACV-Triangle Tube accepts no liability for any damage, injury, or loss of life resulting from incorrect installation, alteration of any factory supplied parts, or the use of parts or fittings not specified by ACV-Triangle Tube. If there is a conflict or doubt about the proper installation of the appliance or any factory supplied replacement parts, please contact the ACV-Triangle Tube Technical Support Department.

1.4 Warranty

NOTICE

Warranty Registration Card must be filled out by the customer and mailed within thirty (30) days of installation in order to gain warranty coverage.



Failure to adhere to the guidelines on this page can result in substantial property damage, serious injury or death

1.5 Service and Maintenance

- To avoid electric shock, disconnect electrical supply before performing service or maintenance.
- Allow the appliance to cool down prior to servicing to avoid severe burns
- The CHALLENGER must be maintained as outlined in this manual and have at least annual service performed by a qualified service technician to ensure appliance/system reliability.

1.6 CHALLENGER Operation

1. Do not block flow of combustion air to the CHALLENGER. If the combustion air blockage is easily accessible and removable, then remove it. If blockage is not obvious and cannot be removed, have the appliance and system checked by a qualified service technician.
2. Do not allow contaminated air to enter the appliance's combustion air inlet. See Section II for more information.
3. The CHALLENGER is equipped with a low water cut off device. The CH (central heating) system piping must be filled and pressurized to 12 psig [0.8 bar] prior to startup. The appliance will shut down if the pressure falls below 7 psig [0.5 bar].
4. Should overheating occur or the gas supply fails to shut off, DO NOT turn OFF or disconnect the electrical supply to the pump. Instead, shut off the gas supply at a location external to the appliance.
5. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.

1.7 Appliance & System Water

- Have the appliance and system water chemistry checked at least annually by a qualified service technician.
- Do not use petroleum-based cleaning or sealing compounds in the appliance or system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.
- Do not use any product not specifically designed for hydronic heating systems. Serious damage to the appliance, piping system, heating system, personnel, and/or property may occur.
- Continual fresh makeup water will reduce the life of the CHALLENGER. Addition of oxygen can cause internal corrosion in the system components. All leaks in the piping system must be repaired at once to prevent makeup water.
- Do not add cold water to a hot appliance. Thermal shock can cause premature failure to the appliance heat exchanger.

2. Combustion Air - Prevention of Contamination

Section II: Combustion Air - Prevention of Contamination

2.1 Combustion Air Contamination



If the CHALLENGER combustion air inlet is located in any area likely to cause or contain contamination, or if products which could contaminate the air cannot be removed, the combustion air must be repiped and terminated to another location. Contaminated combustion air will damage the appliance and the burner system and can result in substantial property damage, serious injury, or death.



Do not operate a CHALLENGER if the combustion air inlet is located near a laundry room or pool facility. These areas will always contain hazardous contaminants.

Pool, laundry, common household, and hobby products often contain fluorine or chlorine compounds. When these chemicals pass through the burner and vent system, they can form strong acids. These acids can create corrosion of the heat exchanger, burner components, and vent system, causing serious damage and presenting a possible threat of flue gas spillage or water leakage into the surrounding area.

Please read the information listed below. If contaminating chemicals are located near the area of the combustion air inlet, the installer should pipe the combustion air inlet to an area free of these chemicals per the CHALLENGER installation manual.

2.1.1 Potential Contaminating Products

- Spray cans containing chloro/fluorocarbons
- Permanent Wave Solutions
- Chlorinated wax
- Chlorine - based swimming pool chemicals / cleaners
- Calcium Chloride used for thawing ice
- Sodium Chloride used for water softening
- Refrigerant leaks
- Paint or varnish removers
- Hydrochloric acid / muriatic acid
- Cements and glues
- Antistatic fabric softeners used in clothes dryers
- Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms
- Adhesives used to fasten building products and other similar products

2.1.2 Areas Likely to Contain these Products

- Dry cleaning / laundry areas and establishments
- Beauty salons
- Metal fabrication shops
- Swimming pools and health spas
- Refrigeration repair shops
- Photo processing plants
- Auto body shops
- Plastic manufacturing plants
- Furniture refinishing areas and establishments
- New building construction
- Remodeling areas
- Garages with workshops

Section III: Maintenance Schedule

3.1 Service Technician

At least on an annual basis the following maintenance should be performed by a qualified service technician.

3.1.1 General

1. Attend to any reported problems.
2. Inspect the interior of the appliance jacket area; clean and vacuum if necessary.
3. Clean the condensate drain assembly and fill with fresh water.
4. Check for leaks: water, gas, flue and condensate.
5. Verify flue vent piping and air inlet piping are in good condition, sealed tight and properly supported.
6. Check appliance water pressure, piping and expansion tank.
7. Check control settings.
8. Check ignition electrode (sand off any white oxide; clean and reposition).
9. Check ignition wiring and ground wiring.
10. Check all control wiring and connections.
11. Check burner flame pattern (stable and uniform).

3.1.2 Poor Combustion or Performance Reported

1. Clean heat exchanger and flue ways.
2. Remove burner assembly and clean burner head using compressed air only.

Once the maintenance items are completed, review the service with the owner.

3.2 Owner Maintenance

3.2.1 Periodic

1. Check the area around the appliance.
2. Check and remove any blockage from the combustion air inlet and ventilation openings.
3. Check the temperature and pressure gauge.

3.2.2 Monthly

1. Check vent piping.
2. Check combustion air inlet piping.
3. Check the pressure relief valve.
4. Check the condensate drain assembly.
5. Check automatic air vents (if used)

3.2.3 Every 6 Months

1. Check appliance piping and gas supply piping for corrosion or potential signs of leakage.
2. Operate the pressure relief valve.



Follow the maintenance procedures given throughout this manual. Failure to perform the service and maintenance or follow the directions in this manual can result in damage to the CHALLENGER or system components which can result in substantial property damage, serious injury or death.

Section IV: Maintenance Procedures



WARNING

The CHALLENGER must be inspected and serviced annually, preferably at the start of the heating season, by a qualified service technician. In addition, the maintenance and care of the appliance as outlined in Section III and further explained in Section IV must be performed to assure maximum efficiency and reliability of the appliance. Failure to service and maintain the CHALLENGER and the system components could result in equipment failure which can cause substantial property damage, serious injury or death.

NOTICE

The following information provides detailed instructions for completing the maintenance items outlined in the maintenance schedule in Section III. In addition to this maintenance, the CHALLENGER should be serviced at the beginning of the heating season by a qualified service technician.

4.1 Periodic Maintenance

4.1.1 Check the Surrounding Area



WARNING

To prevent potential of substantial property damage, personal injury or death, eliminate all the materials listed in Section II from the area surrounding the appliance and from the vicinity of the combustion air inlet. If contaminants are found:

- **Remove products immediately from the area. If they have been there for an extended period of time, call a qualified service technician to inspect the appliance for possible damage from acid corrosion.**
- **If products cannot be removed, immediately call a qualified service technician to re-pipe the combustion air inlet piping and locate the combustion air intake away from the contaminated areas.**

1. Combustible/flammable materials - Do not store combustible materials, gasoline or other flammable vapors or liquids near the appliance. Remove immediately if found
2. Air contaminants - Products containing chlorine or fluorine, if allowed to contaminate the combustion air, will cause acidic condensate within the appliance. This will cause significant damage to the appliance. Read the list of potential materials listed in Section II of this manual. If any of these products are in the room from which the appliance takes its combustion air, they must be removed immediately or the combustion air intake must be relocated to another area.

4.1.2 Check Combustion Air Inlets

1. Verify that ventilation air openings to the mechanical room are open and unobstructed.
2. Verify that the appliance's vent termination and combustion air intake are clean and free of obstructions. Remove any debris on the air intake or flue exhaust openings. If removing the debris does not allow the appliance to operate correctly, contact your qualified service technician to inspect the appliance and the vent/combustion air system

4.1.3 Check Temperature Display and Pressure Gauge

1. Ensure the pressure reading on the pressure gauge does not exceed 25 psig [1.7 bar]. Higher pressure readings may indicate a problem with the expansion tank.
2. Ensure the temperature on the display does not exceed 194°F [90°C]. Higher temperature readings may indicate a problem with the operating thermostat controls.
3. Contact a qualified service technician if problem persists.

4.2 Monthly Maintenance

4.2.1 Check Vent Piping

1. Visually inspect the entire length of flue gas vent piping including all joints and appliance adapter for any signs of blockage, leakage or deterioration of gaskets or piping. Notify a qualified service technician immediately if problems are found.



WARNING

Failure to inspect the venting system as noted and have it repaired by a qualified service technician can result in vent system failure, causing serious injury or death.

4.2.2 Check Combustion Air Inlet Piping

1. Visually inspect the combustion air inlet piping for any signs of blockage. Inspect the entire length of the combustion air inlet piping is intact and all joints are properly sealed.
2. Notify a qualified service technician if any problems are found.

4.2.3 Check Pressure Relief Valve

1. Visually inspect the primary pressure relief valve and the relief discharge pipe for signs of weeping or leakage.
2. If pressure relief valve opens weeps, the expansion tank may not be operating properly. Immediately contact a qualified service technician to inspect the unit and system.

4.2.4 Check Condensate Drain Trap Assembly

1. Ensure condensate drain trap assembly is firmly secured to the bottom of the heat exchanger/unit as shown in Fig. 1 on page 7.



WARNING

Do not operate the CHALLENGER without condensate drain trap assembly firmly installed on unit and filled with water. If the trap is not installed and full of water, flue gases can be emitted into the area and can cause serious injury or death.

- While the appliance is operating, check the discharge end of the condensate drain tubing. Ensure no flue gas is leaking from the condensate drain tubing by holding your fingers near the opening.
- If you notice flue gas leaking from the opening, this indicates a dry condensate drain trap assembly. Fill the condensate trap assembly. Contact a qualified service technician to inspect the appliance and condensate line and refill the condensate trap if problem persists regularly.
- Ensure the condensate drain line is not blocked by pouring water through the condensate drain assembly. The water should flow out of the end of the drain line. If water does not appear at the end of the drain line, contact a qualified service technician to inspect and clean the condensate line.
- To fill the condensate drain assembly, if necessary, slowly pour water into the top of the trap assembly until water appears at the end of the drain line. Stop filling.

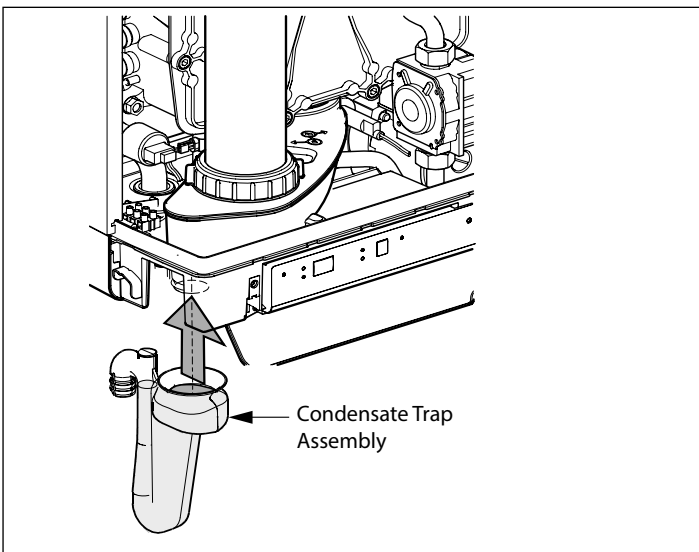


Fig. 1: Condensate Drain Trap Installation

4.2.5 Check Manual Air Vents

- Open manual air vent on top of unit. Once air has stopped escaping, close the manual air vent.

4.3 6 - Month Maintenance

4.3.1 Check Water and Gas Piping

- Remove the appliance front jacket panel and perform a gas leak inspection per steps 1 through 6 of the Operating Instructions in Section V. If gas odor or leak is detected, immediately shut down the appliance following procedures in Section V. Call a qualified service technician.
- Visually inspect for leaks around the internal appliance water connections and around the heat exchanger. Visually inspect the external system piping, circulators and system components and fittings. Immediately call a qualified service technician to repair any leaks.



WARNING

Have leaks fixed at once by a qualified service technician. Failure to comply can result in substantial property damage, serious injury or death.

4.3.2 Operate Pressure Relief Valve

- Before proceeding, verify that the relief valve outlet has been piped to a safe place of discharge, avoiding any possibility of scalding from hot water.



WARNING

To avoid water damage or scalding due to valve operation, a discharge line must be connected to the relief valve outlet and directed to a safe place of disposal. This discharge line must be installed by a qualified service technician or heating/plumbing installer in accordance with the CHALLENGER Installation Manual. The discharge line must be terminated so as to eliminate the possibility of severe burns or property damage should the valve discharge.

- Read the temperature and pressure gauge to ensure the system is pressurized. Lift the relief valve top lever slightly, allowing water to relieve through the valve and discharge piping.
- If water freely, release the lever and allow the valve to seat. Watch the end of the relief valve discharge pipe to ensure that the valve does not weep after the line has had time to drain. If the valve weeps, lift the lever again to attempt to clean the valve seat. If the valve does not properly seat and continues to weep afterwards, contact a qualified service technician to inspect the valve and system.
- If the water does not flow from the valve when you lift the lever completely, the valve or discharge line may be blocked. Immediately shut the appliance down per the instructions in Section V. Call a qualified service technician to inspect the valve and system.

5. Operating Instructions

Section V: Operating Instructions

FOR YOUR SAFETY READ BEFORE LIGHTING





WARNING


If you do not follow these instructions exactly, a fire or explosion may result causing substantial property damage, personal injury or loss of life.

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. DO NOT try to light the burner by hand.
- B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- 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.
- C. Use only your hand to turn the external manual gas valve. Never use tools. If the valve will not turn by hand, do not try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

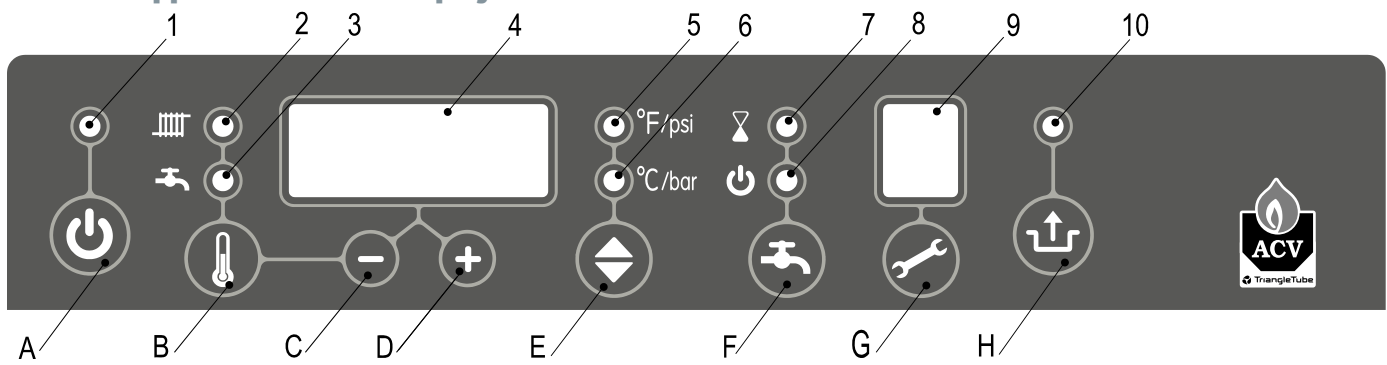
OPERATING INSTRUCTIONS

1. STOP! Read the safety information above. This appliance is equipped with an ignition device which automatically lights the burner. DO NOT try to light the burner by hand.
2. Set room thermostat(s) to lowest setting. Turn the external manual gas valve handle clockwise  "CLOSE" (valve handle shall be perpendicular to gas piping).
3. Turn "OFF" all electrical power to the appliance.
4. Remove the front jacket panel on the appliance.
5. Turn the external manual gas valve handle counter clockwise  to "OPEN" gas supply (valve handle shall be parallel to gas piping).
6. Wait five (5) minutes to clear out any gas. If you then smell gas in the jacket enclosure or around the appliance, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
7. Turn "ON" all electric power to the appliance. Push ON/OFF button on the CHALLENGER control panel display until LED above button is lit.
8. Set room thermostat(s) to desired setting(s).
9. The CHALLENGER control panel display will show a sequence of numbers (1,2,3,4) as the right digit. Sequence digit 3 or 4 indicates the appliance is firing. A blank display means there is no call for heat (all external thermostats are satisfied).
10. If the appliance will not operate with a call for heat and the system piping is not hot, follow the instructions "To Turn Off Gas to Appliance", below and call your service technician or gas supplier.
11. Replace the front jacket panel. Make sure the panel is seated firmly in place and all mounting screws are tightened.

TO TURN OFF GAS TO APPLIANCE

1. Set the room thermostat to lowest setting.
2. Turn "OFF" all electrical power to the appliance if service is to be performed.
3. Turn the external manual gas valve handle clockwise  to "CLOSE" (valve handle shall be perpendicular to gas piping).

Section VI: Appliance Control Display



Indicators

1. On/Off (Lit when on)
2. CH operation or setting maximum CH temperature
3. DHW operation with optional Triangle Tube SMART/COMFORT I.F.W.H.
4. Main display with temperature or water pressure or fault code
5. Temperature °F & pressure psi
6. Temperature °C & pressure bar
7. Not applicable
8. Not applicable
9. Operating display
10. Flashes to indicate fault

Buttons

- A. On/Off
- B. Parameter
- C. Decrease
- D. Increase
- E. U.S. customary or metric units
- F. Not applicable
- G. Service
- H. Reset/store

6.1

Appliance ON/OFF

1. Turn appliance ON/OFF using the ① ON/OFF button.
2. When appliance is ON, the green LED above the ① ON/OFF button will be lit. The main display will show the water pressure followed by "P" when there is no heat demand.
3. When the appliance is OFF, the green LED above the ① ON/OFF button will not be lit. The main display will show "OFF" and the

operating display will show — .





6.2 Units

Press Up/Down arrow button to change the displayed units from U.S. Customary (°F & psi) to metric (°C & bar). The °F/psi LED will be lit for U.S. Customary units or °C/bar LED will be lit for metric units.

NOTICE





Units cannot be changed if the main display or operating display is flashing.

6. Appliance Control Display

 Main Display		 Operating Display	Description	Adjustments
LED (Flashing)	Factory Settings	Parameters (Flashing)		
	186°F [86°C]		CH Maximum Boiler Temperature	Adjustment range 86°F to 194°F [30°C to 90°C]
	140°F [60°C]		Not applicable	Adjustment range 104°F to 149°F [40°C to 65°C]
	0	1	Installation type	0=Combi (Heat and DHW) 1=Heating + SMART/COMFORT I.F.W.H. ② 2=DHW only 3=Heating only
	0	2	CH pump continuous	0=Intermittent, pump on during heat and post purge 1=Pump continuously, active except during DHW call or if outside temperature is above parameter 7 with the outdoor sensor installed - Warm Weather Shut Down.
	86°F [30°C]	5	CH Minimum Boiler Temperature	Adjustment range 60°F to 140°F [16°C to 60°C]
	0°F [-18°C]	6	CH Reset Curve Coldest Day	Adjustment range -22°F to 50°F [-30°C to 10°C]
	64 °F [18°C]	7	CH Reset Curve Warmest Day	Adjustment range 60°F to 78°F [16°C to 26°C]
	1	8	CH post pump	Adjustment range 0 to 15 minutes
	1	9	DHW post pump ③	Adjustment range 0 to 15 minutes
	0	o	Not applicable	Adjustment range 0 to 15 minutes
	0	P	CH Anti cycle time ①	Minimum off time during CH operation Adjustable from 0 to 15 minutes
	0	P.	DHW Flow Device Selection	0 for all Solo Boilers


- ① The CH anti cycle time starts when the burner shuts down during a CH call due to boiler water reaching the boiler set point temperature plus a 6°F [3°C] differential. The CH circulator will continue to operate while the burner is blocked.
- ② For installations with an optional ACV- Triangle Tube SMART/COMFORT Indirect Fired Water Heater (I.F.W.H.) piped off the CHALLENGER, similar to Figures 7 and 8 on page 14, parameter 1 should be set to 1. The I.F.W.H. aquastat should be wired to CHALLENGER's X4-5 and X4-6 terminals, see Figure 12, page 19. The I.F.W.H. circulator should be wired using the CHALLENGER's 120 V terminals 4 (line), 5 (neutral) and 6 (ground). During a DHW call for heat on terminals X4-5 and X4-6, only the DHW circulator will operate and the boiler's target supply water temperature will change to 186°F [86°C].
- ③ The DHW post pump function only applies when parameter 1 is set to 1 Heating & SMART/COMFORT I.F.W.H. and only occurs if no CH call for heat is present.

6.3 Setting the Appliance Parameters






1. Press the “” button at the display panel for approximately 2 to 3 seconds until main display begins to flash.
2. Press the “” button repeatedly to scroll through the list of parameters. The operating display will show the parameter number and the main display will show the parameter setting.
3. To modify a parameter, press the “+” or “-” buttons.
4. Press the “” button to advance to the next parameter to be changed.
5. After all parameters have been changed, press the reset 

button to close the parameter menu and store the changes. The main display will go blank and a P will be displayed in the operating display to indicate the parameter changes have been stored.

NOTICE

If the  reset button is not pressed within 30 seconds, the parameter menu is automatically closed and the changes are stored.



If the  ON/OFF button is pressed prior to the  reset button, the parameter menu is closed and the changes are NOT stored.

Main Display		Operating Display		Description	Adjustments
LED (Flashing)	Factory Settings	Parameters (Flashing)			
	186°F [86°C]			CH Maximum Boiler Temperature	Adjustment range 86°F to 194°F [30°C to 90°C]
	140°F [60°C]			Not applicable	Adjustment range 104°F to 149°F [40°C to 65°C]
	0	1		Installation type	0=Combi (Heat and DHW) 1=Heating + SMART/COMFORT I.F.W.H.  2=DHW only 3=Heating only
	0	2		CH pump continuous	0=Intermittent, pump on during heat and post purge 1=Pump continuously, active except during DHW call or if outside temperature is above parameter 7 with the outdoor sensor installed - Warm Weather Shut Down.
	86°F [30°C]	5		CH Minimum Boiler Temperature	Adjustment range 60°F to 140°F [16°C to 60°C]
	0°F [-18°C]	6		CH Reset Curve Coldest Day	Adjustment range -22°F to 50°F [-30°C to 10°C]
	64 °F [18°C]	7		CH Reset Curve Warmest Day	Adjustment range 60°F to 78°F [16°C to 26°C]
	1	8		CH post pump	Adjustment range 0 to 15 minutes
	1	9		DHW post pump 	Adjustment range 0 to 15 minutes
	0	o		Not applicable	Adjustment range 0 to 15 minutes
	0	P		CH Anti cycle time 	Minimum off time during CH operation Adjustable from 0 to 15 minutes
	0	P.		DHW Flow Device Selection	0 for all Solo Boilers

- ① The CH anti cycle time starts when the burner shuts down during a CH call due to boiler water reaching the boiler set point temperature plus a 6°F [3°C] differential. The CH circulator will continue to operate while the burner is blocked.
- ② For installations with an optional ACV- Triangle Tube SMART/COMFORT Indirect Fired Water Heater (I.F.W.H.) piped off the CHALLENGER, similar to Figures 7 and 8 on page 14, parameter 1 should be set to 1. The I.F.W.H. aquastat should be wired to CHALLENGER’s X4-5 and X4-6 terminals, see Figure 12, page 19. The I.F.W.H. circulator should be wired using the CHALLENGER’s 120 V terminals 4 (line), 5 (neutral) and 6 (ground). During a DHW call for heat on terminals X4-5 and X4-6, only the DHW circulator will operate and the boiler’s target supply water temperature will change to 186°F [86°C].
- ③ The DHW post pump function only applies when parameter 1 is set to 1 Heating & SMART/COMFORT I.F.W.H. and only occurs if no CH call for heat is present.

6. Appliance Control Display

6.4 Error Mode

If a boiler fault occurs, the CHALLENGER enters a hard lockout condition which requires a manual reset by pressing the reset  button. A hard lock is indicated by a flashing [E] on the operating display as well as a flashing LED above the reset  button. The error code is shown on the main display. The error must be corrected before the control will reset.

 **CAUTION**

The appliance freeze protection feature is disabled during a Hard Lockout, however the CH circulator will operate.



 **CAUTION**

During a hard lockout or low water condition the appliance will not re-start without service. If the heating system is left unattended in cold weather appropriate safeguards or alarms should be installed to prevent property damage.

Table 1: 12 kOhm NTC Sensor Resistance



Temperature (°F)	Temperature (°C)	NTC (kOhm)
-22	-30	171.70
-4	-20	98.82
14	-10	58.82
32	0	36.10
50	10	22.79
68	20	14.77
78	25	12.00
86	30	9.81
104	40	6.65
122	50	4.61
140	60	3.25
158	70	2.34
176	80	1.71
194	90	1.27
212	100	0.95

6.5 Error Codes

Red LED above  button will flash. Correct condition first, then press  button.

6.6 Warning Codes

In situations where the boiler takes a preventative action without going into a hard lockout, a warning code flashes in the main display. The warning code will alternate with the normally displayed value. The cause of the warning code should be investigated and corrected immediately to return the boiler to full functionality.

 Main Display	 Operating Display (Flashing)	Error Description	Possible Solution
10, 11, 12, 13, 14	E	CH supply sensor fault	<ul style="list-style-type: none"> • Check wiring for break • Check for proper flow direction • Replace supply sensor • E10 Open sensor • E 11 Shorted sensor • E12 Decreased too quickly • E13 Increased too quickly • E14 Stuck
20, 21, 22, 23, 24	E	CH return sensor fault	<ul style="list-style-type: none"> • Check wiring for break • Check for proper flow direction • Replace return sensor • E 20 Open sensor • E 21 Shorted sensor • E22 Decreased too quickly • E23 Increased too quickly • E24 Stuck
0	E	Sensor fault after self check	<ul style="list-style-type: none"> • Replace supply and/or return sensors
1, 28	E	Temperature too high	<ul style="list-style-type: none"> • Air in system • Pump not running • Insufficient water flow, shut off valves closed, pump setting too low • Flow switch sticking or miss-installed • Check for wiring error
2	E	Supply sensor and return sensor swapped	<ul style="list-style-type: none"> • Check for proper flow direction • Replace supply and/or return sensors
4	E	No flame signal	<ul style="list-style-type: none"> • Manual gas shut off valve closed • Remove air from gas pipe • Gas supply pressure too low • Gas valve or ignition unit not powered • Incorrect ignition gap • Check adjustment of gas valve
5	E	Poor flame signal	<ul style="list-style-type: none"> • Condensate drain blocked • Check adjustment of gas valve
6	E	Flame detection fault	<ul style="list-style-type: none"> • Replace ignition cable • Replace ignition unit at gas valve • Replace boiler controller
8	E	Incorrect fan speed	<ul style="list-style-type: none"> • Fan rubbing on cabinet • Wiring between fan and cabinet • Check wiring for poor contact • Replace fan
29,30	E	Gas valve relay fault	<ul style="list-style-type: none"> • Replace boiler controller
18, 19	E	Flue sensor fault	<ul style="list-style-type: none"> • E18 Open sensor • E19 Shorted sensor • Check/Replace flue sensor
7,16, 17	E	DHW sensor fault	<ul style="list-style-type: none"> • E16 Shorted sensor • E17 Open sensor • Check/replace DHW sensor • E7 Excessive temperature • Check gas orifice • Check combustion settings
50F		Improper power frequency	<ul style="list-style-type: none"> • Verify ground • Frequency should be between 45 and 65 Hz
E101		Flue gas temperature approaching limit	<ul style="list-style-type: none"> • Supply water temperature too high • Check positioning of flue gas sensor • Ambient temperature too high • Check heat exchanger for debris • Replace flue gas temperature sensor
E105		Outdoor Sensor Short	<ul style="list-style-type: none"> • Check wiring • Replace outdoor sensor

7. Replacement Parts

Section VII: Replacement Parts



Replacement parts must be purchased through a local ACV - Triangle Tube distributor. When ordering parts, please provide the model number and description and/or part number of the replacement part. Use only genuine ACV - Triangle Tube replacement parts to ensure warranty coverage and to avoid damage to appliance and improper operation of appliance. Contact ACV - Triangle Tube at 856-228-8881 or www.triangletube.com for a list of distributors nearest you.

7.1 Internal Components

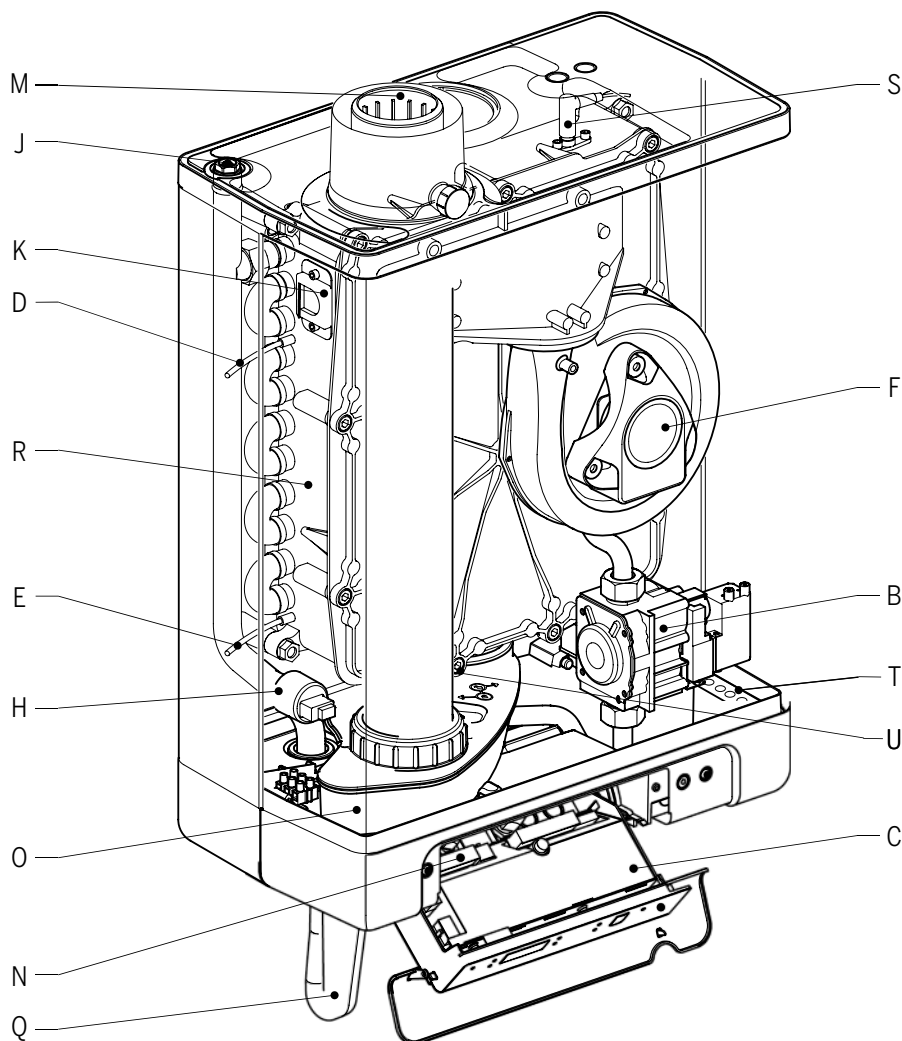


Fig. 2: CHALLENGER Internal Components

- | | | |
|----------------------------|--|-----------------------------------|
| B. Gas Valve | J. Pressure Relief & Air Vent Connection | Q. Condensate Drain Trap Assembly |
| C. Control/Display | K. Sight Glass | R. Heat Exchanger |
| D. CH Supply Sensor | M. Vent/Air Adapter (80/125 Concentric
Option shown - 3" Standard, not shown) | S. Igniter |
| E. CH Return Sensor | T. Line Voltage Terminal Strip | |
| F. Blower | N. Low Voltage/Terminal Strip (X4) | U. Flue Sensor |
| H. LWCO/CH Pressure Sensor | O. Condensate Pan | |

7.2 Front Door

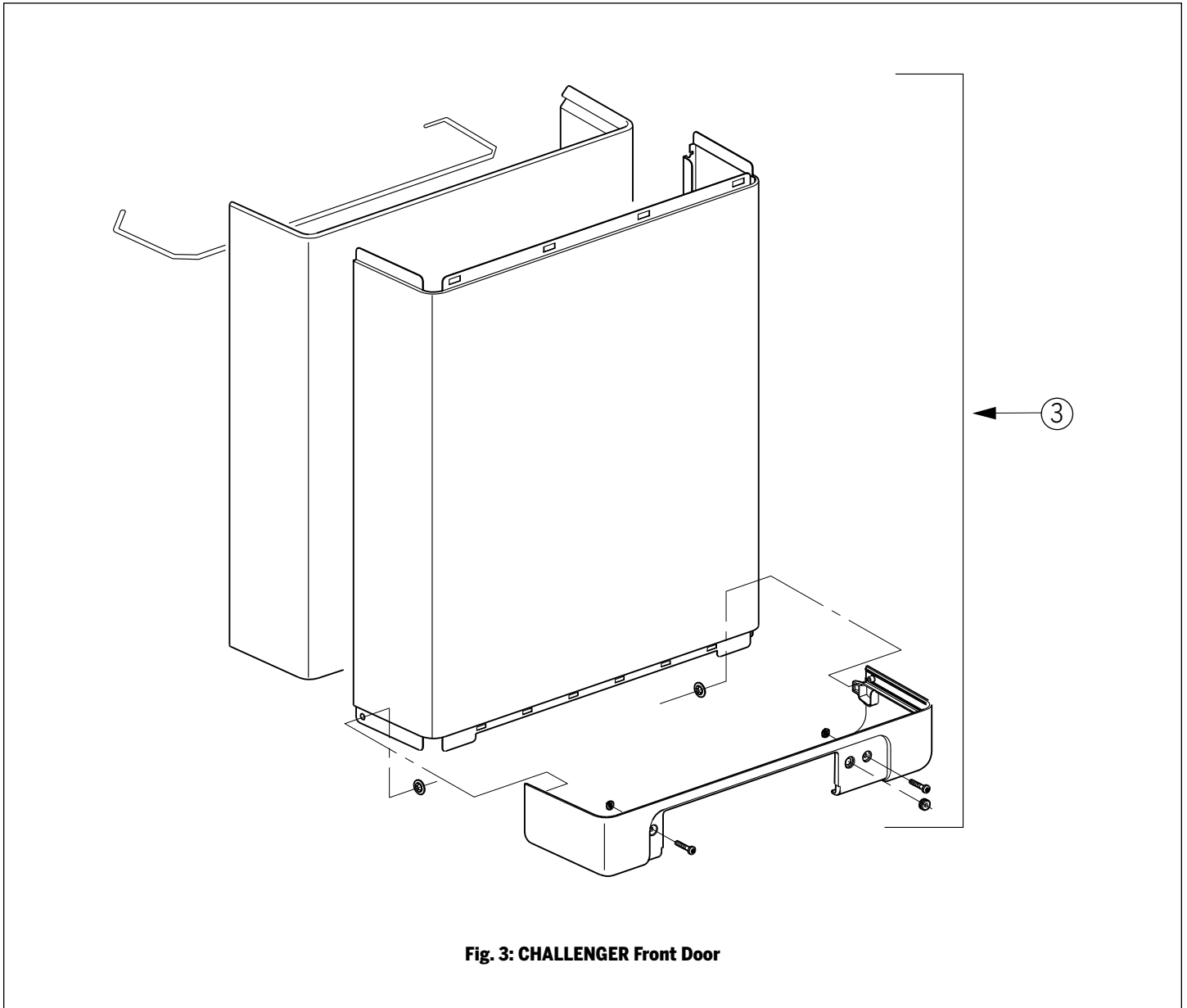
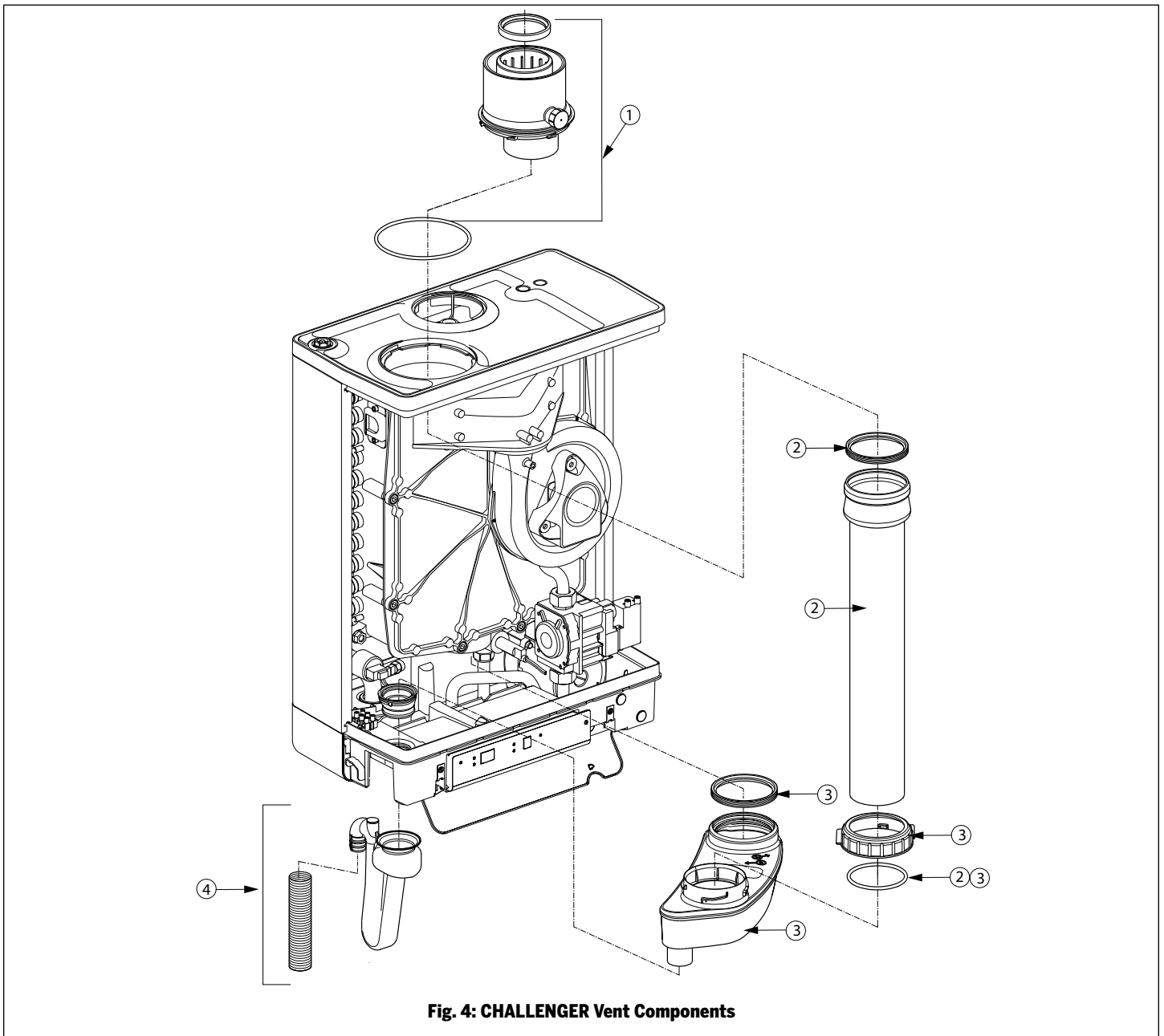


Fig. 3: CHALLENGER Front Door

Item	Part Number CC50s & CC85s	Part Number CC105s	Part Number CC125Hs	Part Number CC125s & CC150s	Description
1		CCRKIT04			Wall Bracket Assembly (Not Shown)
2		CCRKIT05			Pipe Connectors & Brackets Assembly (Not Shown)
2A		CCFTG01			Connector Pipe CH (Not Shown) - 1/Kit
3	CCRKIT06	CCRKIT07	CCRKIT08		Front Door Assembly

7. Replacement Parts

7.3 Vent Components



Item	Part Number CC50s & CC85s	Part Number CC105s	Part Number CC125s	Part Number CC125Hs	Part Number CC150s	Description
1	CCRKIT09					80/125 Concentric Vent/Air Adapter Assembly (Optional - Shown)
	CCRKIT35					3" Vent/Air Adapter Assembly (Standard - Not shown)
2	CCRKIT10	CCRKIT11	CCRKIT12			Vent Assembly
3	CCRKIT13					Condensate Collector Assembly
4	CCRKIT14			CCRKIT14A		Condensate Trap Assembly
5	CCRKIT41					Condensate Collector/Trap Gasket
6	CCRKIT36					Flue Sensor

7.4 Heat Exchanger Components

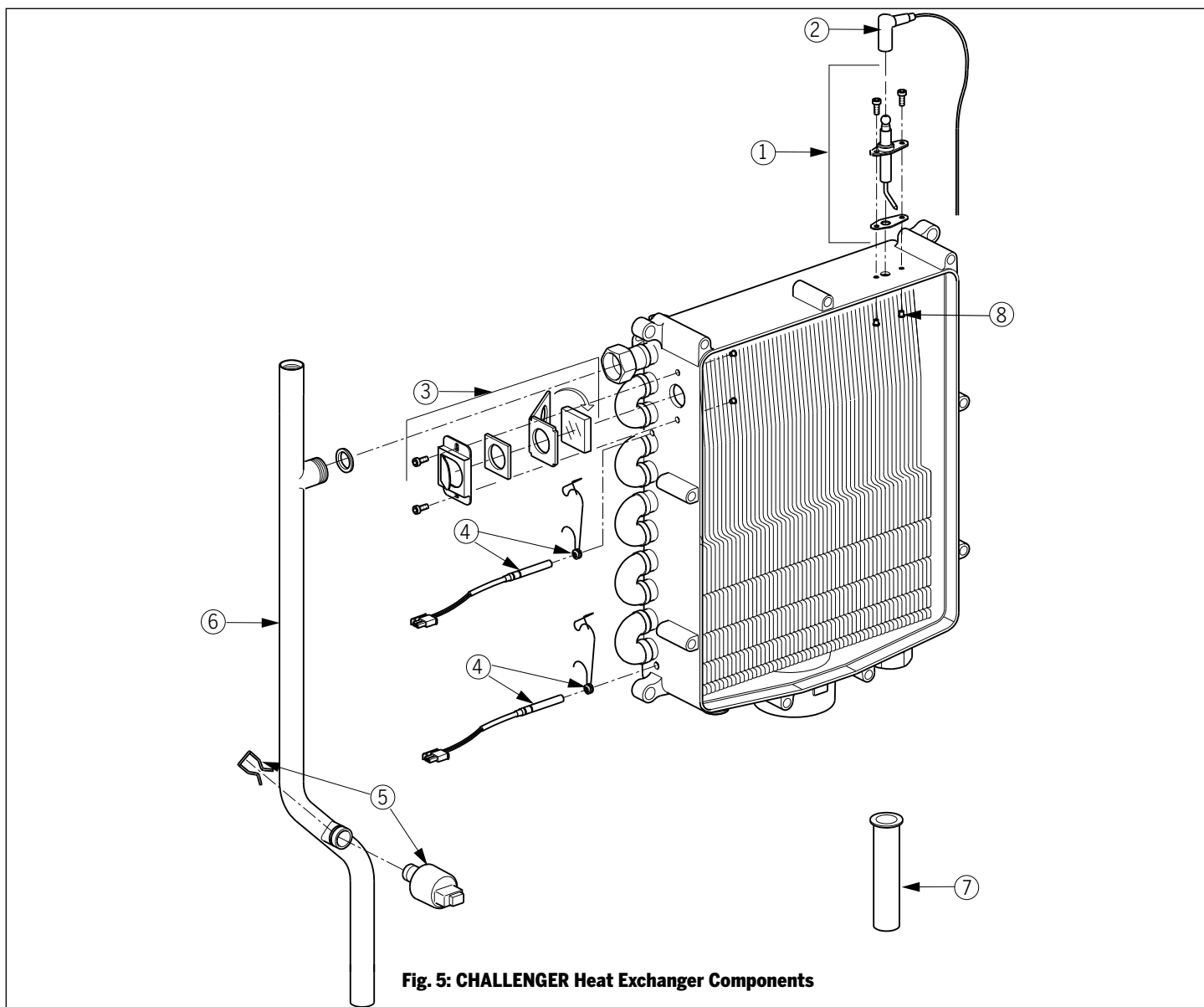


Fig. 5: CHALLENGER Heat Exchanger Components

Item	Part Number CC50s & CC85s	Part Number CC105s	Part Number CC125Hs	Part Number CC125s & CC150s	Description
1			CCRKIT15		Igniter Assembly
2			CCCLB01		Ignition Cable
3			CCRKIT16		Sight Glass Assembly
4			CCRKIT17		CH Sensor Assembly - 1/Kit
5			CCRKIT19		LWCO / CH Pressure Sensor Assembly
6	CCRKIT20	CCRKIT21		CCRKIT22	CH Supply Pipe Assembly
7			CCRKIT23		CH Return Pipe Assembly
8			CCRKIT40		Igniter Bushings - 2/Kit
9			CCRKIT42		LWCO Wiring Harness (Not Shown)

7. Replacement Parts

7.5 Blower & Gas Valve Components

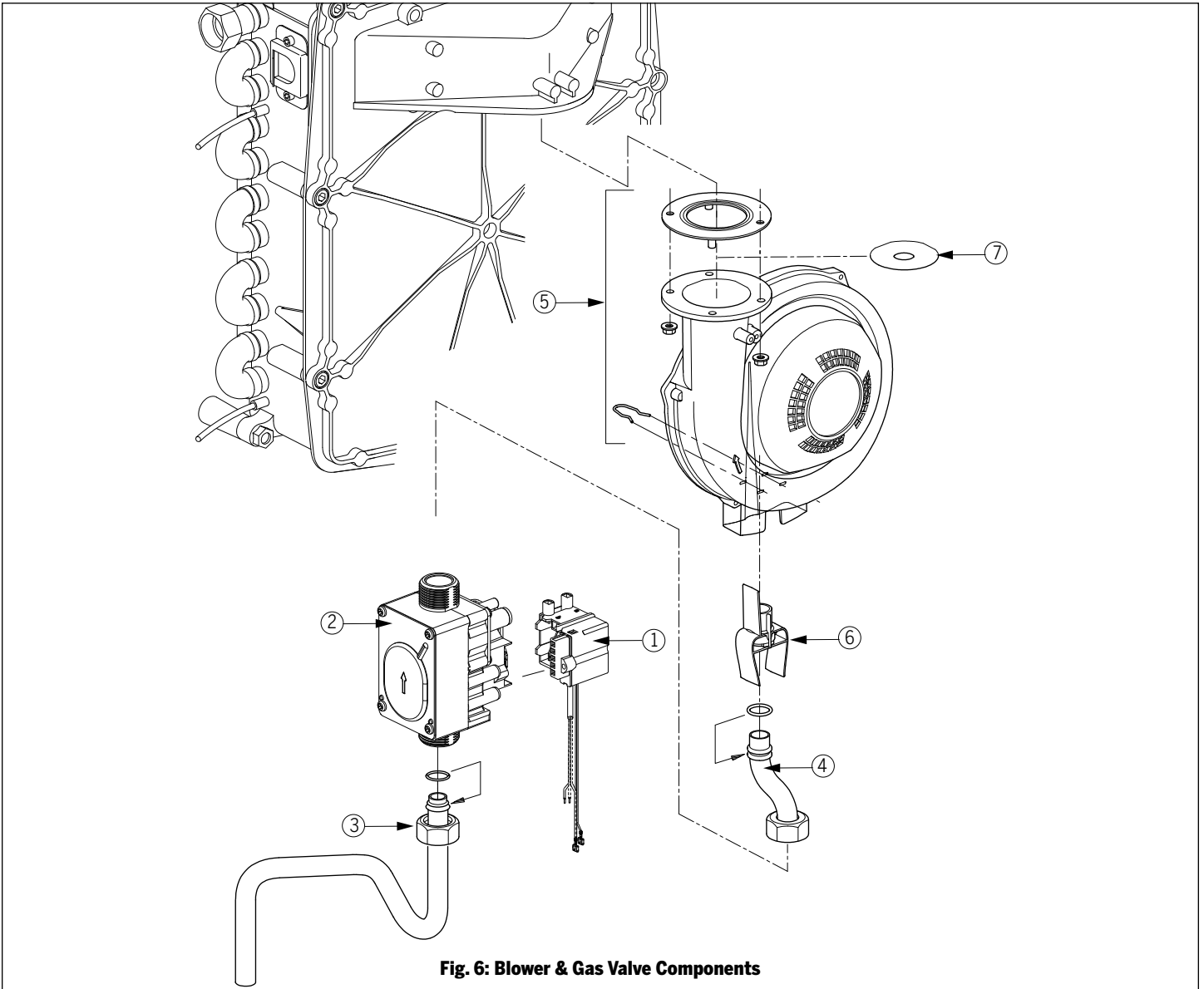


Fig. 6: Blower & Gas Valve Components

Item	Part Number CC50s	Part Number CC85s	Part Number CC105s	Part Number CC125Hs	Part Number CC125s & CC150s	Description
1			CCRKIT59			Ignition Transformer Assembly
2			CCRKIT60			Gas Valve Assembly
3	CCRKIT30			CCRKIT31		Lower Gas Pipe Assembly
4		CCRKIT61		CCRKIT62		Upper Gas Pipe Assembly
5			CCRKIT32			Blower Assembly
6	CCRKIT52			N/A		Venturi 541
	N/A		CCRKIT45		N/A	Venturi 406
		N/A		CCRKIT63	N/A	Venturi 471
			N/A		CCRKIT46	Venturi 362
7	N/A	CCRKIT 47		N/A		Blower Outlet Orifice 1" (25 mm)
		N/A	CCRKIT48		N/A	Blower Outlet Orifice 1-7/16" (37 mm)
N/A = Not Applicable						

7.6 Burner Components

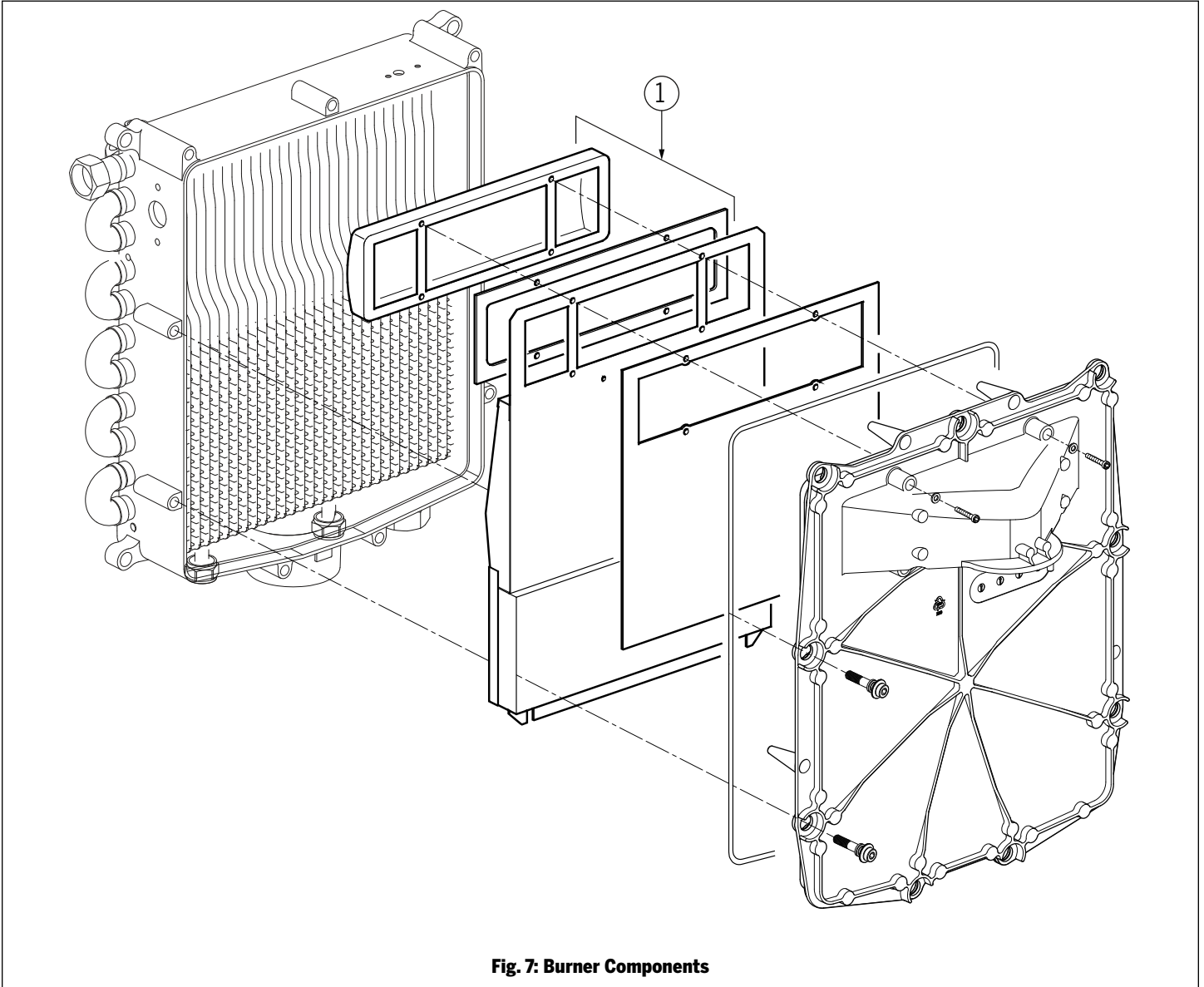


Fig. 7: Burner Components

Item	Part Number CC50s & CC85s	Part Number CC105s	Part Number CC125Hs	Part Number CC125s & CC150s	Description
1	CCRKIT33				Burner Assembly

7. Replacement Parts

7.7 Control Components

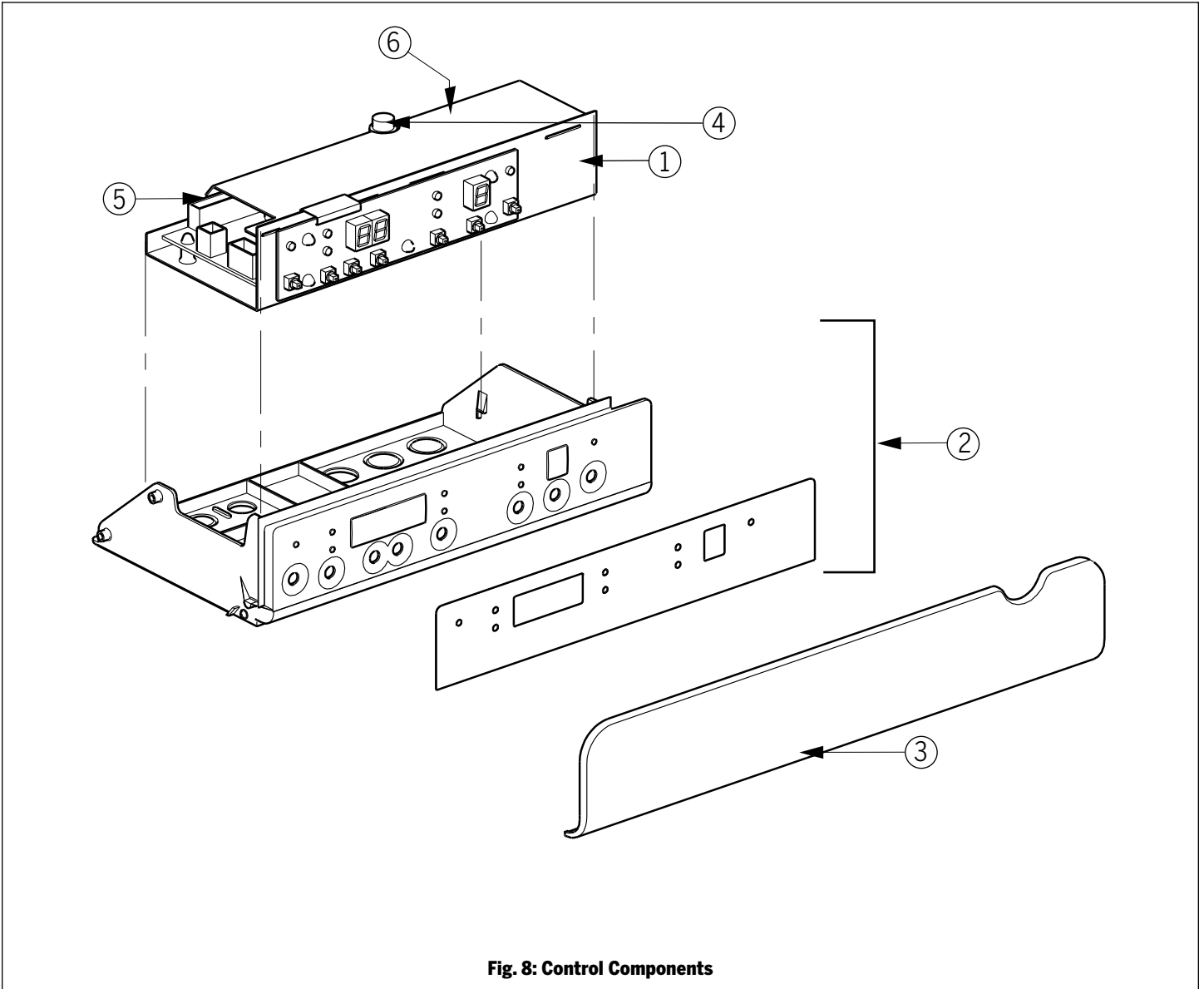


Fig. 8: Control Components

Item	Part Number CC50s	Part Number CC85s, CC105s, & CC125s	Part Number CC125Hs	Part Number CC150s	Description
1	CCRKIT52	CCRKIT53	CCRKIT54	CCRKIT55	Control/Display
2		CCCS01			Plastic Control Housing
3		CCRKIT34			Flip Panel
4		CCFUSE01			Fuse - 1/Kit
5		CCRKIT43			Connector - X4, 24V, 9 Pin (Not Shown)
6		CCRKIT44			Connector - X2, 120V, 8 Pin (Not Shown)

Section VIII: Notes

Additional Quality Water Heating Equipment Available From



Maxi-Flo Pool and Spa Heat Exchangers



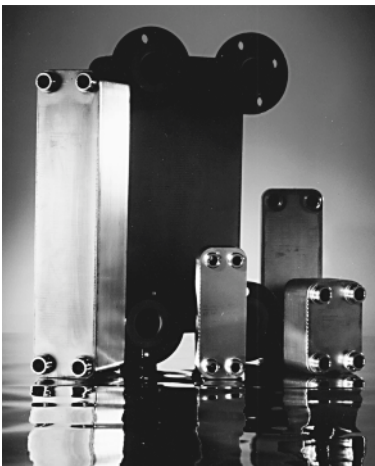
- Constructed of high quality corrosion resistant stainless steel (AISI 316) or titanium
- Specially designed built-in flow restrictor to assure maximum heat exchange
- Compact and light weight
- Available in 8 sizes that can accommodate any size pool or spa

SMART/COMFORT Indirect Fired Water Heaters



- Exclusive Tank-in-Tank design
- Stainless steel construction
- Self cleaning/Self descaling heat exchanger
- SMART available in 7 sizes; COMFORT available in 2 sizes
- SMART: Limited LIFETIME residential warranty / Limited 6 year commercial warranty
- COMFORT: Limited 10 year warranty

TTP Brazed Plate Heat Exchangers



- For domestic water, snow melting, radiant floor, and more
- Plates made of stainless steel, with 99.9% copper brazing ensuring a high resistance to corrosion.
- Self Cleaning / Self Descaling
- Computerized sizing available from ACV - Triangle Tube
- Available in capacities from 25,000 BTUH to 5,000,000 BTUH



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