For Polypropylene Venting

For Conventional Venting

Ascent™ Combi and Ascent™ Plus Combi Boilers

National Board Listed

Model EK1T & EK1T+ Oil and B100 Addition

OWNER AND INSTALLATION MANUAL

Manufactured By:

Energy Kinetics, Inc.
51 Molasses Hill Road
Lebanon, NJ 08833
(908) 735-2066
www.energykinetics.com

LISTED
MH28303
UL 726;
Low-Press Boiler

H
ASME certified by EKI. Certificate plate is under the jacket on the steel vessel.

INSTALLER: HANG THIS INSTRUCTION MANUAL AND ACCESSORY INSTRUCTIONS VISIBLY NEXT TO THE BOILER USING THE SUPPLIED POUCH.

HOMEOWNER/USER: READ AND SAVE THIS INSTRUCTION MANUAL AND ACCESSORY INSTRUCTIONS FOR FUTURE REFERENCE.

PLEASE READ THIS FIRST

Special Attention Flags

Please pay particular attention to the following flags when you see them throughout this manual.

DANGER: Notifies you of hazards that **WILL** cause severe personal injury, death or substantial property damage.

WARNING: Notifies you of hazards that **CAN** cause severe personal injury, death or substantial property damage.

CAUTION: Notifies you of hazards that **WILL or CAN** cause minor personal injury or property damage.

NOTICE: Notifies you of special instructions on installation, operation, or maintenance that are important, but not normally related to injury or property damage hazards.

Best Practice: Suggestions of best practices developed over many years of experience by professionals.

WARNING: Installation and service must be performed by a qualified installer, service agency or the oil supplier. Retain this manual for use by your qualified service technician only. Should you observe unusual or abnormal operation of the burner or boiler, contact your qualified service technician immediately. Do not attempt to service or repair this product yourself.

WARNING: If the information in this manual is not followed exactly, a fire or explosion may result, causing property damage, personal injury or loss of life.

WARNING: Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other oil appliance.
Provide unobstructed combustion air openings sized and located per boiler manual and applicable codes.

WARNING: Have the burner/boiler started up and serviced at least once annually by a qualified service technician. Professional care is necessary to properly service your equipment and verify it is operating reliably. Failure to properly maintain the equipment could result in severe personal injury, death or substantial property damage.

WARNING: You must keep the area around the burner/boiler free from the following. Failure to comply could result in severe personal injury, death or substantial property damage due to potential fire, explosion or equipment damage from corrosive flue products.

- Do not store or use gasoline or other flammable vapors or liquids near or in the same room as the burner.
- Do not use or store laundry products, paint, varnish, thinner or other such chemicals near or in the same room as the burner/boiler. These chemicals cause creation of acids in the burner, heat exchanger and vent system that can cause severe damage.
- Do not store combustible materials near or in the same room as the boiler or any other combustion appliance.

CAUTION: DO NOT TAMPER WITH THE UNIT OR CONTROLS – CALL YOUR SERVICE PERSONNEL.

WARNING: Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury (exposure to hazardous materials) or loss of life. Refer to the user's information manual provided with this boiler. Installation and service must be performed by a qualified installer, service agency or the oil supplier (who must read and follow the supplied instructions before installing, servicing, or removing this boiler. This boiler contains materials that have been identified as carcinogenic, or possibly carcinogenic, to humans).

Homeowner/User: General care and maintenance of your boiler:

☐ Please read through the information provided for you in this manual. Ask your qualified service technician to explain normal operation of your equipment.

☐ Daily inspect the space around the burner/boiler to verify the area is clean and free of the materials listed above.

☐ Monthly watch the operation of your burner/boiler through an operating cycle to verify normal operation. If you notice unusual conditions or equipment behavior, contact your qualified service technician. Follow the instructions on the next page to shut down the burner/boiler while waiting for the technician.

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HOMEOWNER/USER NOTE:

EMERGENCY SHUT DOWN INSTRUCTIONS:

Turn power off to boiler by switching the “Oil Burner Emergency Switch” (typically located at the top of basement stairway or at boiler room entrance) to the OFF position. Shut off oil supply valve.

NOTICE

Do not use this boiler 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 which has been under water and replace any other parts that may pose a safety risk.

IN CASE OF NO HEAT

In case of no heat coming from the boiler, perform the following actions or call a qualified service agency for help.

- Look at the LCD display on the burner control. If the screen shows “LOCKOUT”, then press and hold in the reset button for one second. The burner will then try to relight. If the burner relights successfully, then no further action is needed.
- **If the burner goes into lock out again, contact a qualified service agency for help.**

ANNUAL MAINTENANCE

The Ascent Combi boiler requires an annual tune-up by a qualified service agency to maintain top efficiency and peak performance and to verify proper performance of all safety devices.

PERIODIC MAINTENANCE

The Ascent Combi boiler requires minimal attention from the user.

- Daily inspect the space around the burner/boiler to verify the area is clean and free of any flammable or combustible materials.

- Once a month it is recommended that the owner/user inspect the boiler and to watch the operation of the boiler. The owner/user should:

- Inspect flue connections.
  - Look for evidence of deterioration from corrosion or other sources. Watch the flue pipes during a startup of the boiler and look and smell for evidence of escaping flue products.
  - For a chimney installation, particularly examine the joint between the boiler outlet and the flue pipe. Also examine the joint between the flue pipe and the base of the chimney.
- Inspect for evidence of water, such as leakage from the safety pressure relief valve.
- Watch the Ascent Hydrostat control during one heating cycle of the boiler.
- Verify the pressure gauge on the boiler is reading between 5 psi and 30 psi.
- Verify the temperature gauge on the boiler reads no more than 220F at the end of a heating call.

If any of the above items seem unusual or out of the ordinary, then immediately call your qualified service agency.

RECORD OF INSTALLATION

INSTALLER NAME: _____

INSTALLER ADDRESS: _____

INSTALLER CITY, STATE: _____

DATE INSTALLED: _____

NOTES: _____

_____

SCOPE

This manual covers the Energy Kinetics Ascent Combi Boiler. The boiler is designed and equipped and has been tested to generate hot water in a low pressure closed loop system. The boiler is a major component of a closed loop system that can be used as a heat source for hydronic, radiant, domestic hot water, spa, and/or pool heating systems. Call Energy Kinetics to obtain piping and wiring instructions for applications, such as hydronic heating, radiant heating, domestic hot water, swimming pool heating, multiple boilers, primary/secondary injection loops, etc. The installer of the system is responsible for the final design of the system and for adding the balance of the needed parts to complete the system.

COMMONWEALTH OF MASSACHUSETTS
When the boiler is installed within the Commonwealth of Massachusetts:

- **This product must be installed by a licensed plumber**
- **If antifreeze is used, a reduced pressure backflow preventer device shall be used.**

INSTALLER NOTE:

ALL INSTALLATIONS MUST BE MADE IN ACCORDANCE WITH ALL NATIONAL, STATE AND LOCAL, PLUMBING, HEATING AND ELECTRICAL CODES THAT MAY DIFFER FROM THIS MANUAL AND IN ACCORDANCE WITH THE FOLLOWING CODES, AS APPLICABLE:

N.F.P.A. No. 70: National Electrical Code A.N.S.I. / N.F.P.A. No. 211: Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances
A.N.S.I. / N.F.P.A. No. 31: Installation of Oil Burning Equipment

If this oil fired boiler is converted to gas fired by field mounting a listed gas conversion burner, then install in accordance with A.N.S.I. Z223.1/N.F.P.A. No. 54: National Fuel Gas Code

These codes are available from:
National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101.

A hot water boiler installed above radiation level or as required by the Authority having jurisdiction, must be provided with a low water cutoff device.

A boiler should be installed in such a manner that, if the pressure vessel or any connection thereto should leak, the resulting flow of water will not cause damage to the area in which it is installed.

A hot water storage tank should be installed in such a manner that, if the storage tank or any connection thereto should leak, the resulting flow of water will not cause damage to the area in which it is installed.

A boiler's pressure relief valve, hot water storage tank T&P relief valve, backflow preventer, and all other devices must be piped to the nearest drain to avoid damage in the event the valve is actuated.

Make sure relief discharge pipes from all reliefs are properly placed to safely contain discharge. Make sure relief discharge pipes, such as from a boiler or a hot water storage tank, will safely contain hot water and/or boiling water. Make sure relief discharge pipes, such as from a boiler or a radiant heating system, will safely contain water treated with boiler chemicals and/or antifreeze. Reliefs include the boiler pressure relief valve, the back flow preventer discharge port, and the domestic hot water tank temperature and pressure relief valve. Any other reliefs, such as from radiant heating systems, must also follow these guidelines.

ASCENT COMBI and ASCENT PLUS COMBI BOILER

IMPORTANT MESSAGE TO HOMEOWNER/USER: *These instructions should be carefully read and kept for future reference to gain the best performance from your Ascent Combi boiler.*

CONGRATULATIONS ON YOUR PURCHASE OF THE ASCENT BOILER with its highly efficient low mass hydronic heat exchanger, the Energy Converter. It is the product of years of engineering and advanced design, which brings together in a single system all elements needed to provide efficient home heat and hot water. This operation and maintenance information has been prepared so that you may better understand and use your **Energy Kinetics Ascent Boiler and Heating System**.

PRINCIPLE OF OPERATION

The Ascent Combi Boiler comprises a heat source, the energy converter, circulating water, and an on demand domestic hot water plate heat exchanger. The **Ascent Plus Combi Boiler** additionally includes an expanded heat transfer surface and extended flue pass with a power venter that uses dilution air to allow advanced polypropylene venting.

The Boiler maintains a minimum temperature (in stock configuration, see “advanced settings”) until a heating zone or zone controller (supplied by Energy Kinetics or sourced locally) signals a call for heat, or the domestic water flow switch signals hot water flow in excess of about ½ GPM. The Ascent Hydrostat control receives the call for heat or hot water and turns on the heat and/or hot water/bypass circulators, and turns on the burner if the boiler is not hot enough to satisfy the demand.

The Ascent Energy Converter is the product of advanced thermal engineering. It is designed with two separate passageways, nearly 8 feet long, coiled around each other. Water travels along one passageway from your home toward the center of the unit and heated gases travel from the unit center toward the vent. This is a “forced circulation counter-flow” design and it provides very efficient transfer of heat from the burning fuel to the circulating water. The superior insulation of the boiler minimizes heat losses to the surroundings, resulting in directing heat to your home in an efficient and quiet manner.

Ascent Combi and Ascent Plus Combi have high annual efficiency because they are very well insulated low mass designs with a moderate amount of water so excess heat is not wasted as is commonly found in cast iron and steel boilers. They are also designed to produce domestic hot water at much lower temperatures than those required in tankless coil boilers, allowing significantly lower idle temperatures and lower heat loss in standby mode.

Your Ascent boiler begins to supply heat and hot water almost instantly. This rapid response means that your rooms can be heated quickly to temperature. The Ascent Combi can heat water with up to 175,000 BTU/hr (140,000 BTU/hr for the Ascent Plus Combi) input, enough for two simultaneous showers in a typical house with standard flow fixtures. With the factory installed backflush and cleaning ports, the boiler and plate heat exchanger may be easily serviced to keep peak hot water production for the life of the system.

A modern retention head oil burner fires into the center of the Ascent boiler where a high temperature, stainless steel alloy combustion chamber provides ideal conditions for “near perfect” and efficient combustion.

The Ascent Boiler is designed with a hinged front cover that allows full access to the inside of the boiler for inspection and cleaning. All access for pressure vessel service is from the front, so the Combi Boiler can be placed near a wall or into a closet.

RECEIVING and UNPACKING

TIP: Inspect shipment upon receipt for external damage. Walk around the freight and identify and address any unusual signs of handling with the shipper before signing for the delivery. This is a fast and easy way to resolve all transportation damage claims.

When unpacking and uncrating, inspect each item for internal damage. Any damage found should immediately be reported to the freight carrier before installation. The receiver is responsible for following the claims procedure of the freight carrier. The freight carrier is responsible for taking prompt action on all claims. Replacements for parts damaged in shipment are available upon receipt of a signed copy of a claim report *(concealed damage claims should be filed immediately against the freight carrier by the consignee).*

After unpacking, check each item against the packing list. Inspect it thoroughly for loose parts, instruction sheets and packing lists. Immediately report any missing items. It is wise to complete the installation before discarding packing material. Store all parts where they will not be damaged or lost prior to installation.

Attention Receiver!

All cartons and skids must be inspected at time of delivery.

Never sign for a delivery without first inspecting your freight.

1) Note any carton damage on the delivery receipt; if obvious damage to the contents is visual at time of delivery you have the right to refuse the shipment.
2) If you're not sure how to proceed call Energy Kinetics at 1-800-735-2066 for assistance before the driver leaves.
3) Neither Energy Kinetics nor the trucking company is responsible for damage found after delivery or after freight is moved to the job site.

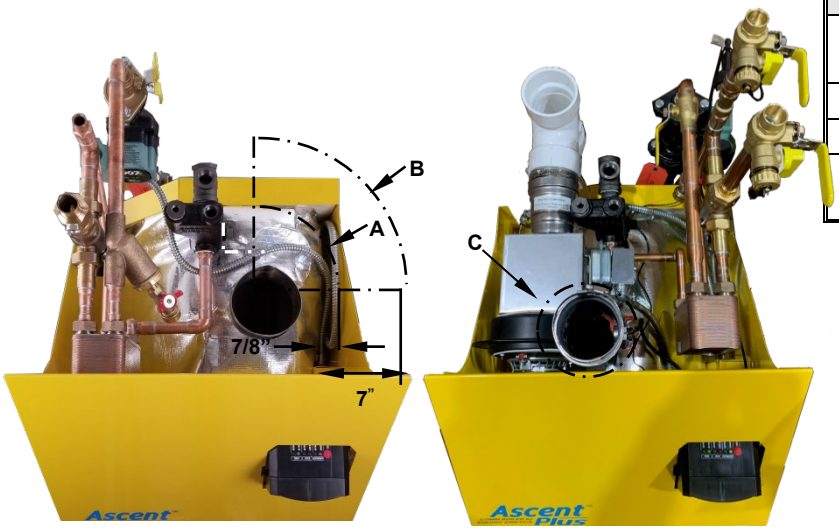
LOCATION and CLEARANCE

DANGER: Provide clearance to combustible surfaces in accordance with all local and national codes. Follow National Fire Protection Association Bulletin NFPA Installation of Oil Burning Equipment and all applicable codes.

Installation Clearances from Boiler Surfaces, Inches	Clearance to Combustibles	RECOMMENDED Clearance for Service
Front of boiler (not including burner)*	10"	20"
Left side of boiler body	0	5"
Right side of boiler body	0	12"
Back of boiler body	4"	4"
Top of boiler body	10"	16"
Bottom of boiler legs to floor	0	0
Ascent Combi L-Vent: from flue pipe "**A**"	3"	3"
Ascent Combi Standard Flue: from flue pipe "**B**"	9"	9"
Ascent Plus Combi Polypropylene "**C**"	0"	0"

* Minimum recommended clearance to allow door to fully open.

Figure 1A, Top View of Boiler
Flue Connection Clearance to Combustibles



Ascent Combi

Ascent Plus Combi
(Shown with optional Clean-In-Place valves)

	Ascent Combi	Ascent Plus Combi
Weight (with stand/piping)	375 lbs	415 lbs
Water Content	3 gallons	3 gallons
Air Inlet Pipe Size	2" PVC	3" PVC
Boiler Flue Outlet	5" Flue Pipe	3" Polypropylene

Place the unit as near to the chimney or vent as possible *allowing clearance for front cleaning and service as shown in Figure 1B*. Installing the boiler with the burner parallel to a wall is sometimes advisable to allow access to front and rear components in spaces with limited depth.

Installations should utilize the Energy Kinetics boiler stand or a suitable solid, stable, level, and smooth foundation for the boiler. If not using an Energy Kinetics supplied stand, provide a solid, level, and smooth foundation with clearance for door opening and service. Place the unit as near to the chimney or vent as possible *allowing clearance for front cleaning and service as shown in Figure 1A and 1B*. Installing the boiler with the burner parallel to a wall is sometimes advisable to allow access to front and rear components in spaces with limited depth.

NOTICE: The Ascent Combi is manufactured with the BACK of the boiler *higher* than the front to assist in air removal. A spirit level placed front to back on the lower side of the base near the floor will read level. The stand design compensates and properly pitches the boiler ¼ to ½ a bubble off level, with the back of the boiler higher. Adjust the levelling feet or by shimming the base at the floor as necessary.

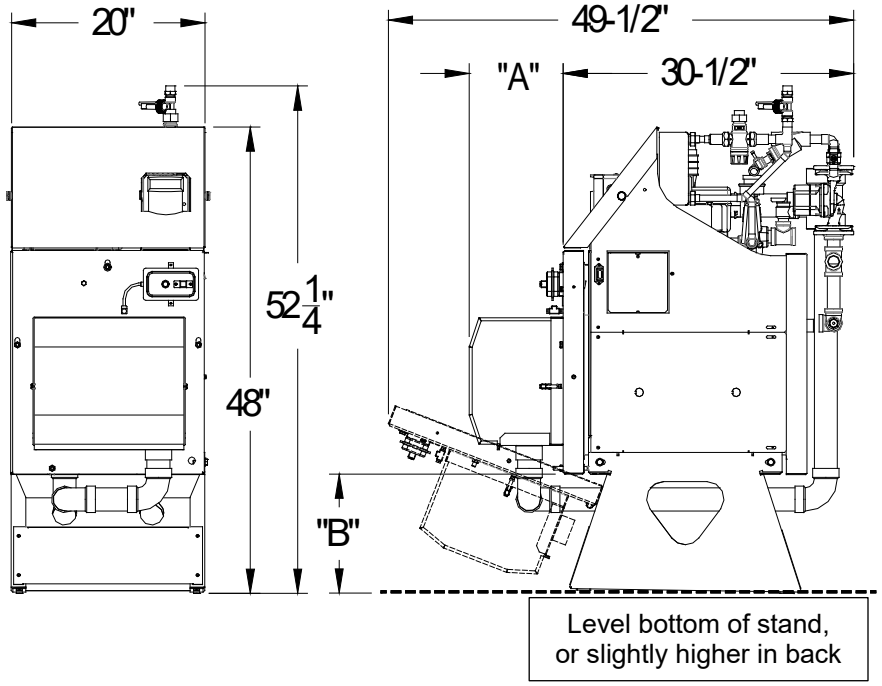


Figure 1B - Boiler Clearance for Cleaning and Service

Burner	Dim "A"		Open Door Leg Bottom to Floor Clearance "B" (minimum)
	W/O Silent Burner Cover	With Silent Burner Cover	
Carlin EZ-1	9"	9-1/2"	12"

COMBUSTION AIR

The Ascent Combi Boiler must be installed in an area where adequate fresh air is available to support combustion. An optional sealed air box (Silent Burner Cover, included in the Combi Plus model) allows combustion air to be piped from outside the building. Piping of outside air directly to the boiler is highly recommended because it completely isolates the boiler from the home environment, it greatly reduces operating noise from the boiler, and it can lower idle loss in some cases.

Boiler with outside air piping: Combustion air must be supplied for the Ascent Plus Combi for sidewall vent installations, although it is optional for the Ascent Combi. In modern houses with tight construction, the connection of the Silent Burner Cover to an outside air source to provide combustion air is highly recommended on the Ascent Combi. It is required on the Ascent Plus Combi for sidewall vent installations. The outside air source should be located high enough above grade to be at least 12" above expected snow accumulation.

WARNING: Combustion air must be supplied for the Ascent Plus Combi for sidewall vent installations, although it is optional for the Ascent Combi. It may be supplied with up to 50 feet in equivalent length through polypropylene or PVC pipe. For the EK1T Ascent Combi use 2" pipe, and for the EK1T+ Ascent Plus Combi use 3" pipe. Each 90 degree elbow is the equivalent of 5 feet of straight pipe. For example, if three 90 degree elbows are used, then the length of pipe run may be up to 35 feet. For longer runs up to 65 equivalent feet increase pipe size by 1"(to 3" for the Ascent Combi and to 4" for the Ascent Plus Combi). A Tek-screwed or un-cemented joint allows the air inlet pipe to be disconnected so the swing down door may open.

WARNING: Modern buildings of tight construction, as well as the operation of attic and exhaust fans, kitchen ventilation systems, clothes dryers or fireplaces may create conditions of unsatisfactory combustion or venting. Provisions must be made to use *combustion air that communicates with a well-ventilated attic or with the outdoors* (such as using a louver or grate). The opening should have a free area of not less than one (1) square inch per 4,000 BTU per hour of the total input rating.

Boiler without outside air piping:

WARNING: The confined space shall be provided with two permanent openings, one near the top of the enclosure and one near the bottom. Each opening shall have a free area of not less than one square inch per 1,000 BTU per hour of the total input rating of all appliances in the enclosure, freely communicating with interior areas *having adequate infiltration from the outside.*

CONVENTIONAL CHIMNEY VENTING – ASCENT COMBI ONLY

DANGER: Improper chimney installation or operation may cause flue gas leakage and/or carbon monoxide leakage, which may lead to severe injury or death.

When connecting an Energy Kinetics Ascent Combi boiler to an existing chimney, be sure to follow all applicable local, state, and national codes that may differ from this manual, and in accordance with the following codes, as applicable:

NFPA No. 31: Installation of Oil Burning Equipment

NFPA No. 211: Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances

If this oil fired boiler is converted to gas fired by field mounting a listed gas conversion burner, then install in accordance with ANSI Z223.1/NFPA No. 54: National Fuel Gas Code

In retrofit installations, have chimney thoroughly cleaned. Carefully inspect chimney, base of chimney, and liner prior to installation of the Ascent Combi Boiler.

WARNING: Masonry chimneys must have a tile or metal liner. The liner must:

1) Extend above the masonry.
2) Have an insulating air gap, isolating the liner from the chimney, allowing for rapid heat-up and draft establishment.
3) Be sealed at each joint to prevent air infiltration and damage from condensation.

NOTICE: Inspect Chimney and Chimney base after initial three months of heating season.

The installation of a chimney cap is recommended. The base of the chimney must always have a drop leg below the flue connector to allow scale and condensation to accumulate without blocking the flue pipe. Do not block the flue opening by inserting the flue connecter too deeply into the chimney.

Best Practice: If drop leg is in excess of 12 inches deep, backfill with loose gravel or sand to obtain a maximum of 12-inch depth. Use of fiberglass insulation to backfill the drop leg is also a practical method. All cleanout doors should be closed, and if practical also sealed with silicone, to prevent cold air entry into chimney. Cleanout doors that are sealed with silicone can still be opened every tune up to inspect and clean the drop leg, and then resealed with silicone for another year. Pay particular attention to cleanout doors that are located out of doors.

CAUTION: If liner is not sound or if existing tile liner fails to contain intermittent condensation, or if excessive debris is found at the base of the chimney, then it is recommended to install a properly sized metal liner approved for use with oil heat appliances.

The metal liner diameter and length should be as recommended by the metal liner manufacturer. Corrugated metal liners should be at least 5”diameter for EK1T Ascent Combi (a 6” diameter chimney liner may be required at 1.25 GPH firing rate). Energy Kinetics has 5” flexible metal chimney connectors available to be used between the boiler flue collar and the chimney. Call Energy Kinetics for details on metal liners.

Chimney connectors should be positioned to create the shortest possible run of flue pipe to the chimney. If a 6” diameter chimney liner is used, it is recommended that the chimney connector be 6” diameter too by using a short piece of 5” to 6” adapter in the flue outlet. The overall horizontal length of flue piping should not exceed 15 feet. Long runs or low firing rates may require insulated flue pipe such as L-Vent or All-Fuels to keep the temperature at base of chimney adequate for draft and to prevent corrosion of piping and connectors.

Because the Ascent Combi boiler uses a power burner, the flue pipe may experience some positive pressure on start up. Energy Kinetics recommends that all pipe joints be sealed with high temperature silicone sealant to ensure passage of all combustion products to the chimney.

Normally, pitch horizontal flue pipe up toward chimney approximately ¼” per foot. For existing installations, it is permissible for the flue connection of the boiler to be higher than the chimney thimble, provided adequate draft is established.

If a minimum of -0.02” w.c. draft at the breech is not present after sufficient burner run time to heat up the chimney, there is a problem that will need to be corrected. Call Energy Kinetics for help resolving draft problems. Under normal

circumstances, there is NO need for a DRAFT REGULATOR and one should not be installed. Call Energy Kinetics with questions about flue pipe sizing.

WARNING: No solid fuel appliance or fireplace should be installed in a flue common with this heating appliance. The flue gas exit of the venting system must be at least three (3) feet above the point at which it passes through the roof and at least two (2) feet higher than any portion of a building within 10 feet horizontally of its location.

L-VENT CHIMNEY – ASCENT COMBI ONLY

Ascent Combi Boilers typically have flue gas temperatures between 350F and 550F during normal operation. Due to the low flue gas temperatures, L-Vent chimney pipe is suitable for use with Ascent Combi Boilers. L-Vent chimney pipe may allow smaller chase dimensions than other chimney pipe materials and should be considered for new installations with Ascent Combi Boilers.

1. L-Vent must be U.L. Listed to U.L. 641.
2. L-Vent to be installed in accordance with the vent manufacturer's instructions.
3. Ascent Combi and L-Vent must be installed in strict compliance with all State and Local Codes and with the regulations of the authorities having jurisdiction, which may differ from and which take precedence over these instructions or the vent manufacturer's instructions.

POLYPROPYLENE VENTING – ASCENT PLUS COMBI ONLY

See supplemental "Smart Vent" installation manual for Ascent Plus Combi Only.
The Ascent Plus Combi ships with an integrated dilution-air power venter which results in positive pressure, near-condensing flue gas. It must only be vented with class IV venting products as outlined in the supplemental manual and *must not be vented with L-Vent or any conventional chimney products*. A total equivalent length of 50 feet of 3" polypropylene is allowed. Subtract 5 feet from the maximum length for each elbow added. Snorkel assemblies must be included in the total allowance for venting and intake lengths and elbows allowance calculation. Intake PVC, CPVC, or ABS components must be securely fastened together with cement (or a minimum of one screw per connection joint).

WARNING: Ensure that all gear clamps on the Dilution Air adapter are tightened. After installation, pull upwards on the vent to confirm a good mechanical connection. Failure to properly tighten all gear clamps can result in a failure of the venting system.

WARNING: Sidewall venting and combustion air piping from outside the building is required. The Energy Kinetics Smart Vent kit contains specific instructions for installation that must be followed. For length of run for intake air and for the vent connection, refer to the Smart Vent with Dilution Air installation manual. Combustion air may be supplied through PVC pipe. An unglued or Tek-screw joint allows the door to swing down when the air inlet pipe is disconnected. For polypropylene chimney vented systems, combustion air piping from outside the building is required.

FUEL SYSTEMS

NOTICE: Inspect and if needed, replace oil lines according to local codes. Oil lines must be absolutely airtight. Use only flared joints on all copper tubing and use thread sealant suitable for oil on all iron pipe threaded joints. Do not use Teflon tape on fuel system joints. Check all joints and connections for leaks after installation. A high quality 10-micron fuel filter should be installed in the fuel line. When changing the fuel filter, be sure to *lubricate cartridge gasket with motor oil*, not heating oil. Fuel filter must be compatible with blends of equal or greater biodiesel content than the fuel in use.

It is recommended that Ascent Combi and Ascent Plus Combi systems be equipped with a (optional) fuel filter and a (optional) flexible fuel line. Call Energy Kinetics to obtain optional Smart filter and optional UL Listed flexible fuel line. The flexible fuel line allows the door to open without disconnecting the fuel supply. The flexible line connects the fuel pump to the Smart Filter. The fuel filter can be mounted on either side of the unit. Flexible fuel line must be compatible with blends of equal or greater biodiesel content than the fuel in use. A fusible link shutoff valve should be installed at the inlet of the fuel filter or as required by the authority having jurisdiction. If the oil supply is higher than the burner creating a higher than 3 psi inlet pressure to the filter, then an anti-siphon valve (OSV) should be installed.

All piping systems should conform with pump manufacturer's specifications that are attached to each new pump. The boiler is capable of burning No. 1 or No. 2 heating oil, or biodiesel blends up to B100 (100%) when equipped with a listed burner rated for blends of equal or greater biodiesel content than the fuel in use. The burner will not operate unless an adequate supply of fuel in a liquid state is supplied from the tank through the burner nozzle.

When servicing or installing equipment in homes using biodiesel or Bioheat® fuel, technicians must select components and accessories specifically rated for biodiesel blends at or above the blend being delivered - or as required by state or local regulations.

CAUTION: DO NOT USE GASOLINE, CRANKCASE DRAININGS, OR ANY OIL CONTAINING GASOLINE.

NOTICE: Order an additional flexible fuel line for two-pipe systems. A two-stage pump is required if lift from oil tank exceeds approximately eight (8) feet. Follow instructions provided by pump manufacturer on single and two pipe connections for bypass plug usage and other specific installation requirements.

CAUTION: ALWAYS KEEP THE OIL SUPPLY VALVE SHUT OFF IF THE BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.

OIL BURNER SETTINGS

EK1T Ascent Combi Boilers are shipped from the factory preset for 0.85 GPH firing rate. The Ascent Combi Boiler can be fired over a range of firing rates to suit the needs of the application. The following table lists approximate settings for oil burners based on testing performed at Energy Kinetics.

CAUTION: Final settings for each burner and firing rate for a particular installation **must** be determined by using combustion test equipment and following the instructions given under "Start Up Procedure".

CAUTION: Because the energy converter removes heat from the combustion flue gas so efficiently, low firing rates may not provide high enough flue gas temperature for proper draft in a chimney. The Columns labeled 'Chimney' and 'Sidewall' show the suitability of the firing rate for a particular combination.

Input GPH	Ascent	Ascent Plus	Chimney	Sidewall Vent			Burner: Carlin EZ-1			
					Nozzle Delavan	Pump Pressure	Head Setting**	Air Shutter	Air Band Ascent	Air Band*** Ascent Plus
0.68	Y	Y	N	Y	0.60 60°A	130 psi	0.50	EZ-1	0.65/40%	40%
0.74	Y	Y	Y	Y	0.65 60°A	130 psi	0.60/0.65	EZ-1	0.70/45%	45%
0.85	Y	Y	Y	Y	0.75 60°A	130 psi	0.75	EZ-1	0.80/50%	50%
1.00*	Y	Y	Y	Y	0.85 60°A	135 psi	0.85/1.00	EZ-1	0.90/60%	55%
(1.25)	Y	N	Y	N	1.00 60°B	155 psi	0.85/1.00	EZ-1	1.25/70%	N/A

*Factory Setting for Ascent Combi and Ascent Plus Combi

( ) 1.25 GPH firing rate is ONLY for the conventionally chimney vented Ascent Combi, a 6" chimney liner is recommended. The Ascent Plus Combi has a maximum firing rate of 1.00 GPH.

** Head Setting on Carlin EZ-1 set by using supplied Head Bars

***Actual air band setting is typically more closed than yellow label GPH INPUT and firing rate indicates due to fan assist on Ascent Plus.

OIL BURNER MOUNTING

Ascent Combi and Ascent Plus Combi Boilers are shipped from the factory with the oil burner pre-mounted. The burner flanges are designed to insert the burner head 2-3/8" into the boiler. Energy Kinetics installs a ceramic sleeve, (the amulet), to protect the burner head from the heat of combustion, and then seals the air tube flange joint with a high-grade retort cement. **NOTICE:** Oil burners for field installation or for field replacement should be installed according to burner manufacturer instructions, according to installation instructions below, and with consultation with Energy Kinetics for any special considerations or adjustments.

Follow these instructions for field installation of Energy Kinetics supplied burners. Start by checking nozzle and electrode position per manufacturer's specifications prior to assembly to unit. Test fit the amulet by inserting the amulet into the boiler opening. If the amulet doesn't easily slide into the boiler, then gently sand the outside diameter of the amulet until it will fit into the boiler opening. Test fit the amulet onto the burner head. If the amulet is a tight fit on the burner head, then slightly moisten inside the amulet with water.

Place a 3/8" bead of retort cement onto the burner head at the flange to air tube joint, and slide the (moistened) amulet over the burner head and against the flange. Ensure proper seating of the amulet by pressing the amulet onto the burner with a flat object. Leave the excess retort cement at the amulet to flange joint and the cement will provide an airtight seal of the air tube flange to the boiler face.

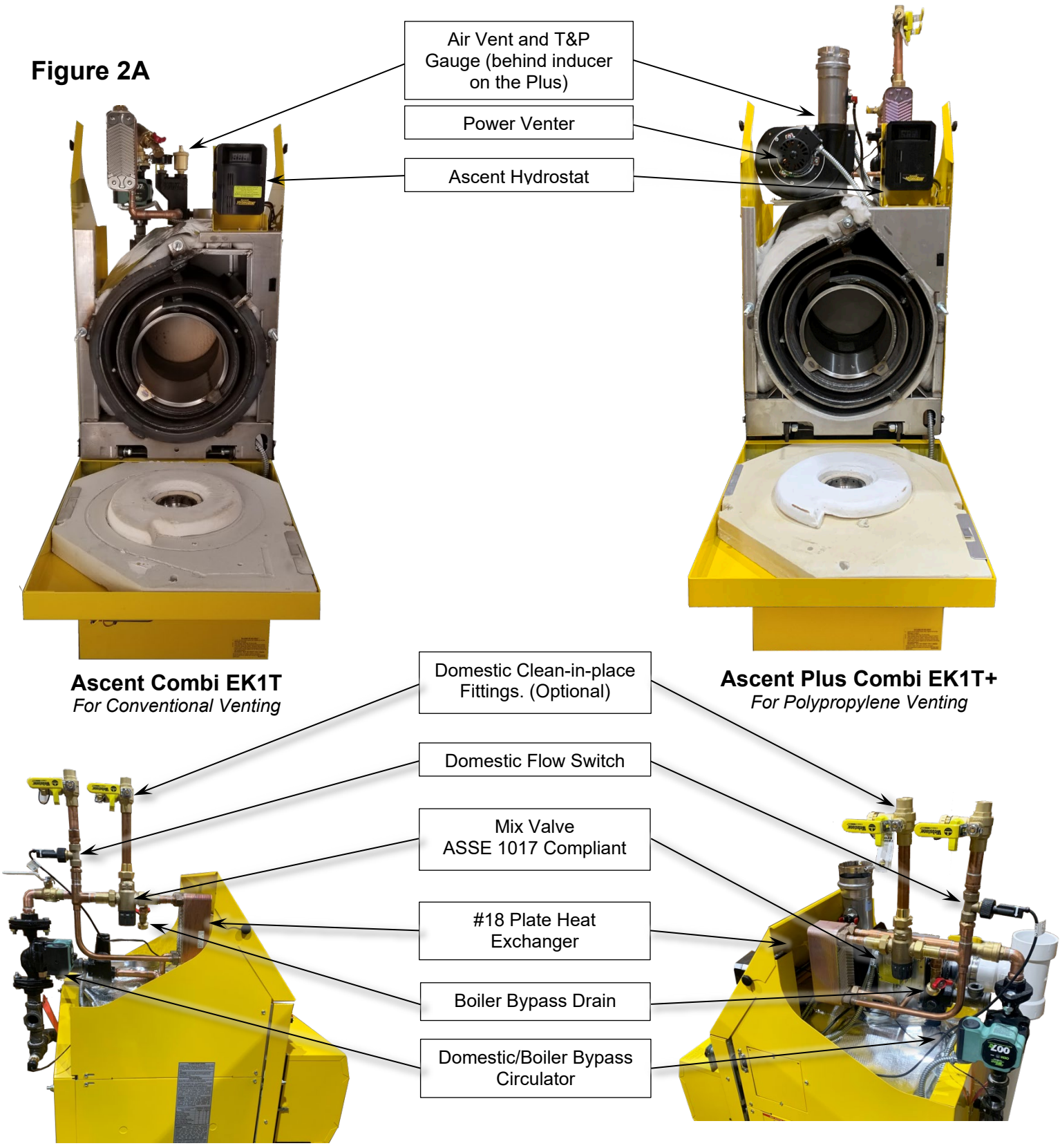
The amulet has an inside edge that will cover the edge of the burner head. The air slots in the retention head must not be blocked or obstructed by the amulet. If needed, trim a 45-degree chamfer on the inside of the amulet using a sharp utility knife and maintain a 1/8" clearance to retention head air slots.

Once the amulet has been seated and trimmed, then install the burner into the boiler by carefully inserting the air tube with amulet into the boiler opening while aligning the burner flange holes with the boiler studs. Install flat washers and nuts onto the boiler studs and tighten all nuts evenly.

GENERAL ASSEMBLY

Assembly of various packaged units is illustrated in figure 2A and 2B as well as throughout this manual. The use of non-Energy Kinetics supplied pump, controls and accessories should follow good practices. The diagrams and locations presented in the manual are recommended.

Figure 2A



BOILER FEED and EXPANSION TANK LOCATION

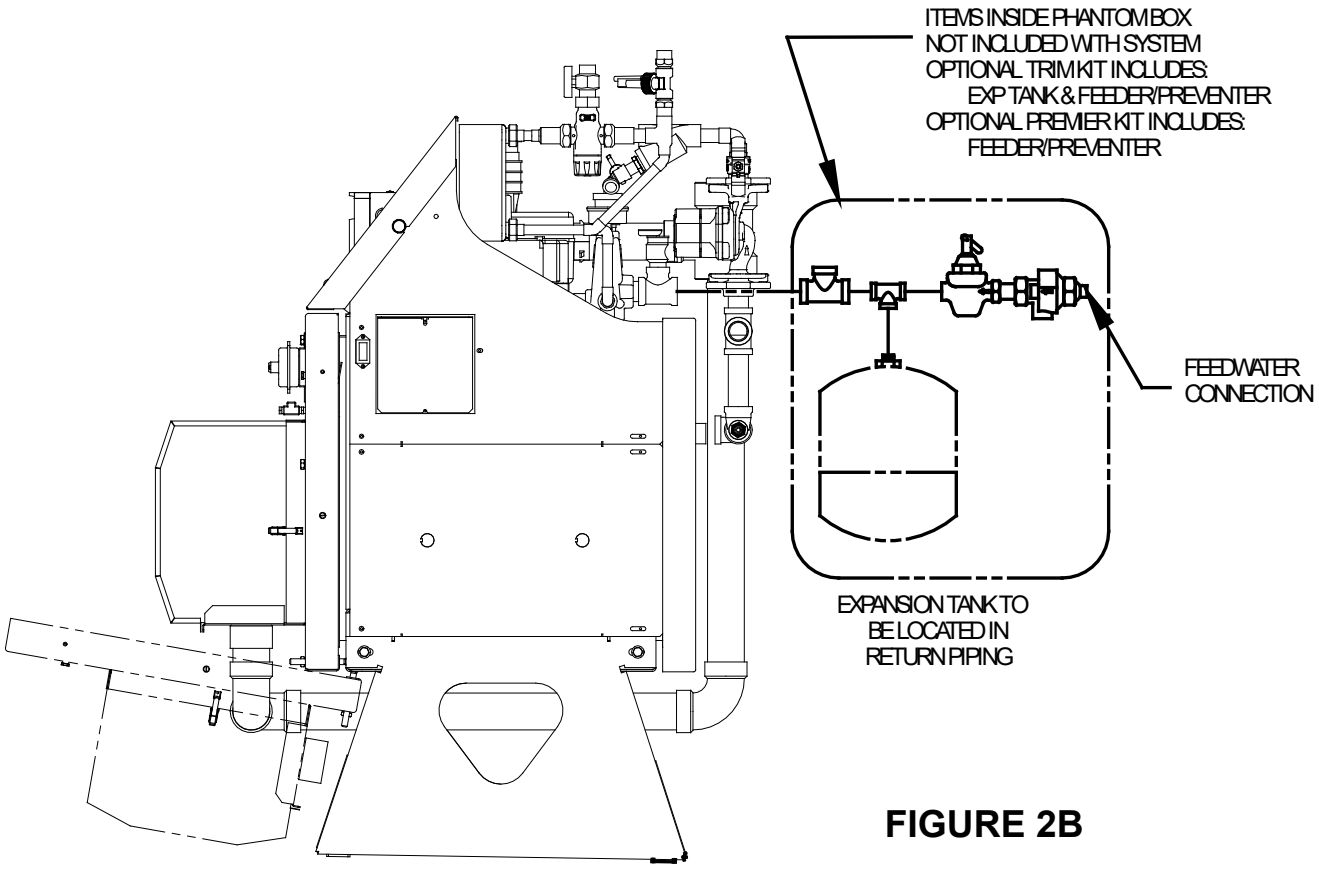


FIGURE 2B

PIPING

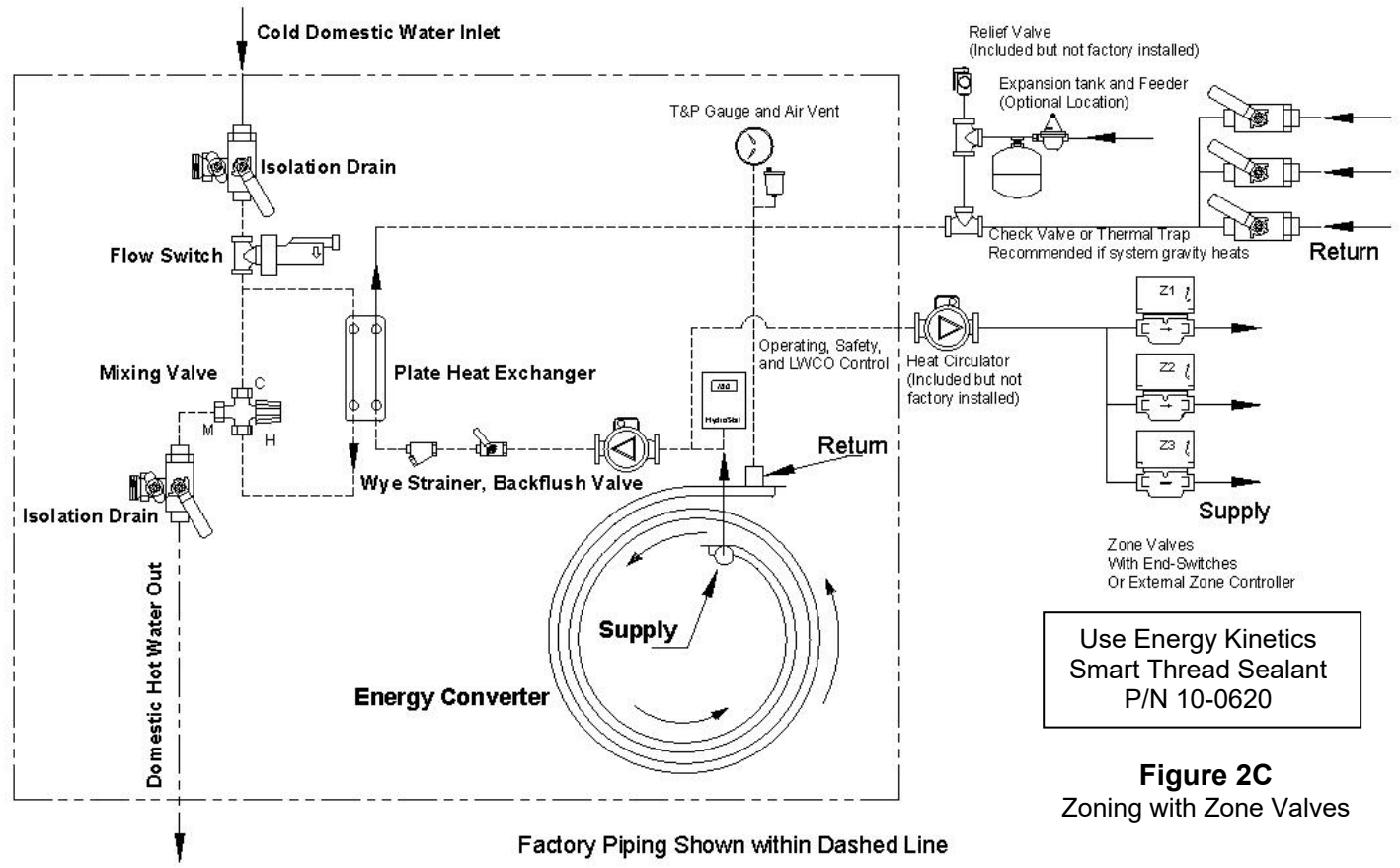
All piping and accessory connections should follow good practice using approved joint sealants.

Figure 2C indicates a typical flow schematic for boiler water feeding multiple zones. Each system will vary according to job location.

Supply and return connections are 1”NPT on the EK1T Ascent Combi and EK1T+ Ascent Plus Combi.

Call Energy Kinetics to obtain piping and wiring instructions for alternate applications, such as hydronic heating, radiant heating, domestic hot water, swimming pool heating, multiple boilers, injection loops, etc.
Figures 2C and 2D indicate general system piping arrangement and options. Piping of individual systems may vary from figures.

Some site specific heating zone piping configurations may allow heat migration, in which case a flow check(s) may be installed to prevent the gravity flow of heat.



Use Energy Kinetics
Smart Thread Sealant
P/N 10-0620

Figure 2C
Zoning with Zone Valves

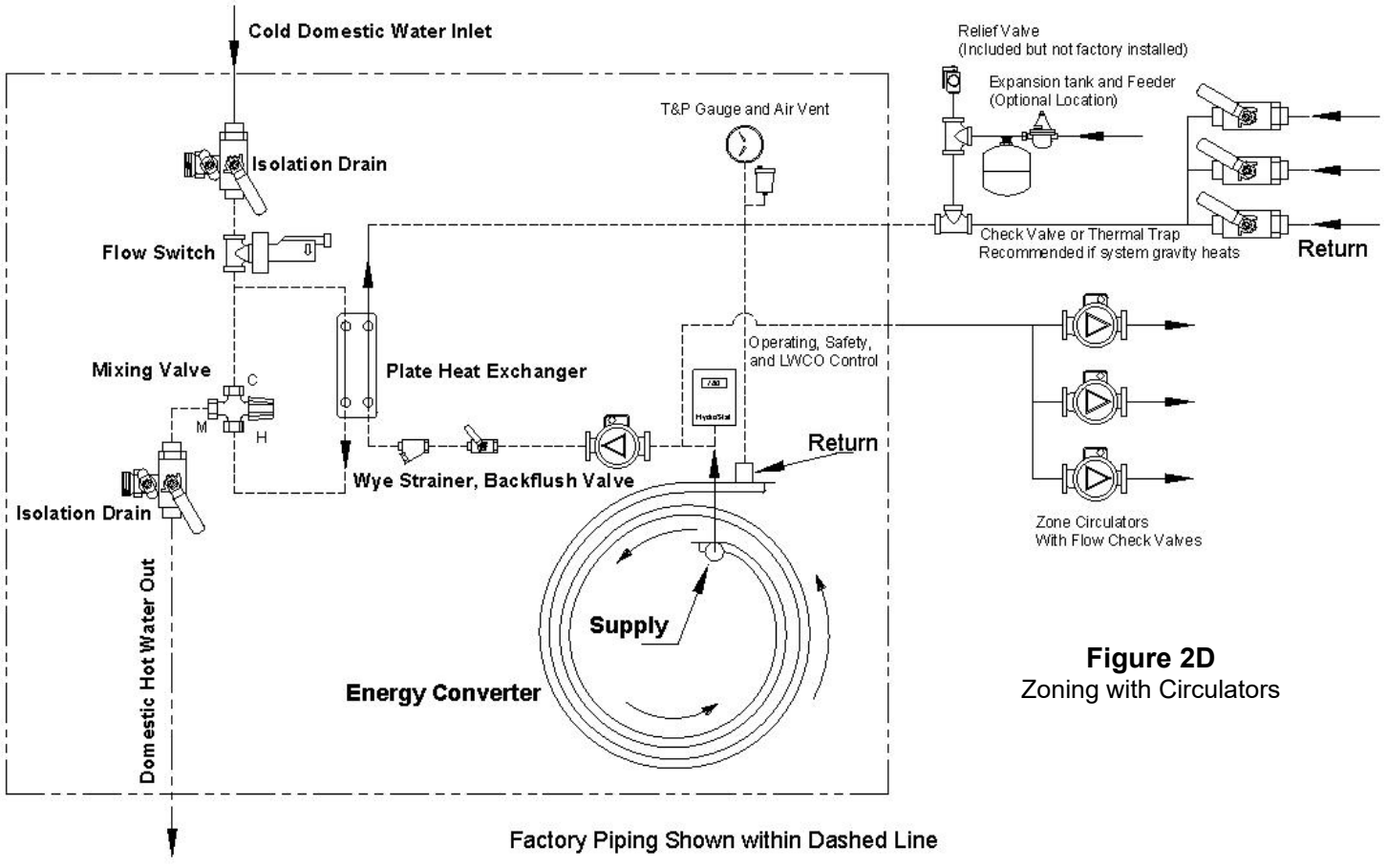
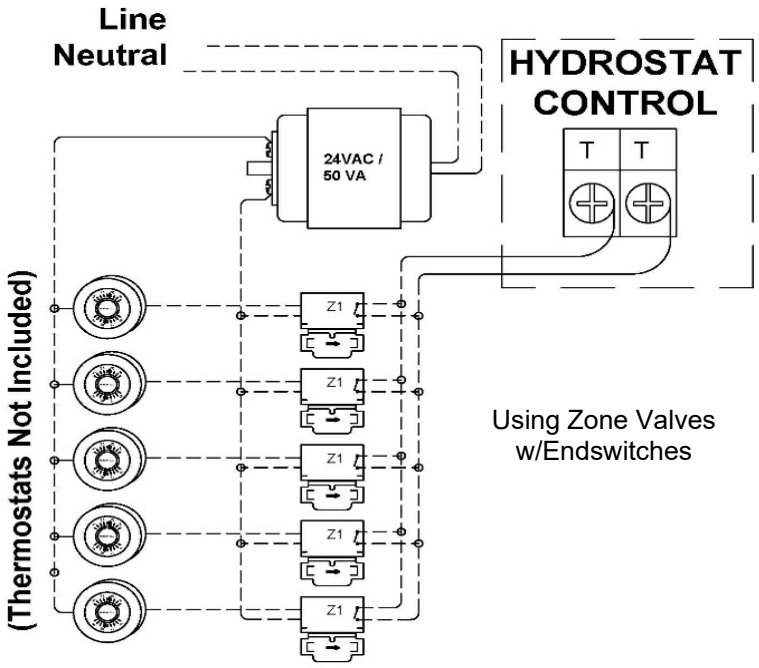


Figure 2D
Zoning with Circulators

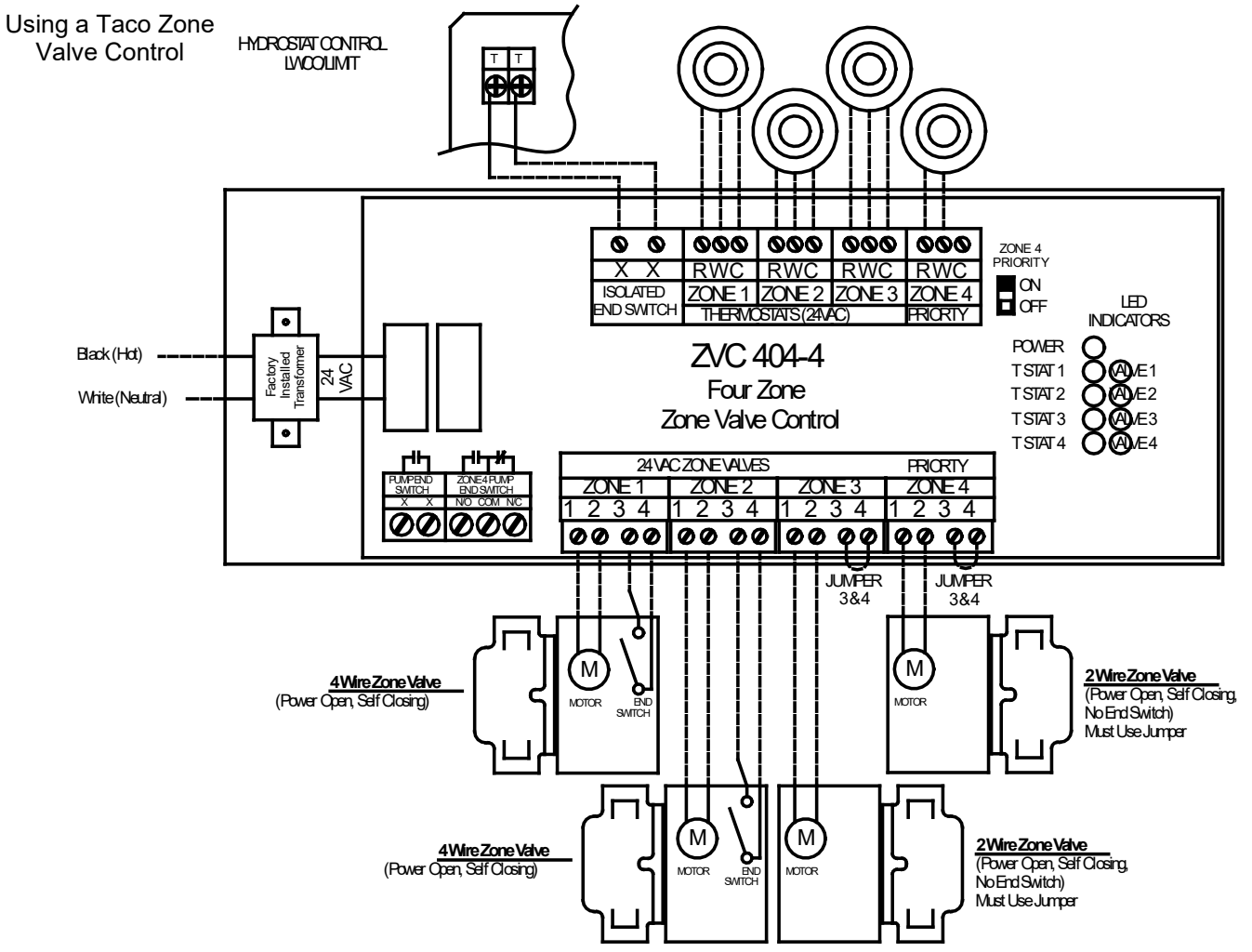
ZONE CONTROL

ZONE CONTROL BY VALVE: Heating zones controlled by zone valves will require a separate power supply for the valve(s) with end switch(s) to complete the call for heat to the Ascent Hydrostat control. A multi zone valve panel (EK P/N: 10-1216, ZVC404 or equivalent) may also be used; follow the instruction manual found with the control. The control will need an end switch to connect to TT on the Ascent Hydrostat control to complete the call for heat.

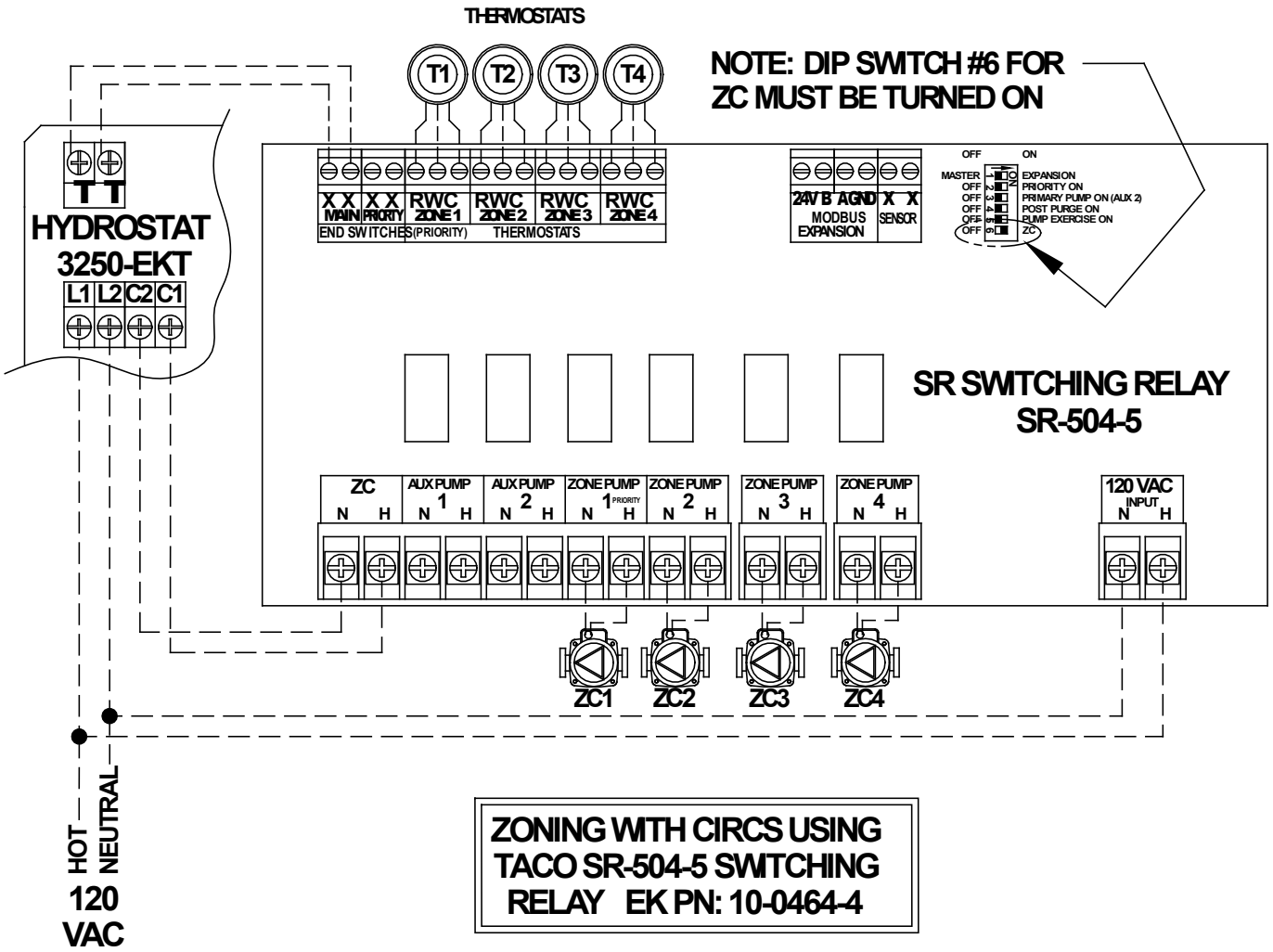


Using Zone Valves
w/Endswitches

Using a Taco Zone
Valve Control



ZONE CONTROL BY CIRCULATOR: Zone control by circulators requires a circulator relay with end switch (EK P/N: 10-0464-4, SR504 or equivalent) or individual relays (EK P/N: 10-0464, SR501 or equivalent) for each zone. The boiler bypass circulator is still used in this case. **NOTICE:** An additional tee must be installed into the supply for each additional circulator. The tee is the supply connection for any zone circulators with the returns for these zones connected to the boiler return. See "Zoning with Circulators" diagram found in this manual.



ZONE PURGING: Valves to isolate and purge individual zones should be installed according to good piping practices.

EXPANSION TANK SIZING: The type and size of expansion tank depends on the total system water volume. The EK1T Ascent Combi and the EK1T+ Ascent Plus Combi contain 3 gallons of water. **NOTICE:** Sizing must consider **cold start** and **hot operation** due to system concepts of cold start and rapid heat up. Note: Optional trim package, EK P/N:10-1702 includes a #30 Amtrol expansion tank.

BOILER BYPASS CIRCULATOR

NOTICE: Systems are piped at the factory with the plate heat exchanger mounting installed with a Boiler bypass circulator. This zone must have all valves open for the boiler to operate properly.

The boiler bypass circulator is required for proper operation in both the space heating and domestic hot water production cycles. In a space heating cycle, the bypass circulator provides integrated condensing protection. In a domestic hot water production cycle, the bypass circulator provides forced circulation to the plate heat exchanger to allow rapid and efficient heat transfer to the domestic water. **NOTICE:** Heat Only systems come from the factory with "bypass" piping installed in place of the plate heat exchanger to provide the required flow through the bypass circuit.

FILLING WITH WATER, VENTING, and PURGING

When piping is completed and all accessories are installed on the Converter, the system should be filled with water. The Converter purges itself of air when properly installed. Purge all zones and heating circulators. **NOTICE: CALEFFI AIR VENT CAP CORRECT POSITION IS CLOSED; REMOVE CAP FOR PURGING AND REINSTALL IN THE FULLY CLOSED POSITION WHEN PUT INTO SERVICE (other air vent caps must be in the OPEN position when put into service).** Each zone should be purged until a steady stream of water without air passes out of the purge hose. Vent all radiation.

NOTICE: DO NOT START BURNER UNTIL CONVERTER AND SYSTEM ARE FULL OF WATER. Fill to normal cold system pressure, 10 to 12 psi on pressure gauge. Before placing system in operation, carefully check for leaks throughout system. Tighten pipe joints, circulator flanges; check gaskets, etc., as needed.

BOILER WATER TREATMENT

Addition of boiler water treatment is recommended to reduce lime and mineral buildup inside the boiler. Energy Kinetics recommends addition of one quart of 8-Way Boiler Treatment per 30 gallons system water. 8-Way Boiler Treatment is recommended to treat water up to medium hardness. 8-Way Boiler Treatment contains pH buffering agents that are color activated. Treated water will appear blue-purple with the color fading as the buffering/neutralizing capabilities of the treatment are depleted. Adding additional 8-Way Boiler Treatment as required as part of scheduled maintenance will ensure the boiler and heating system is continually protected from scale and corrosion. Call Energy Kinetics for more details about boiler water treatment and about hard water conditions.

ANTI-FREEZE

Only non-toxic antifreeze (such as Propylene Glycol) should be used if adding anti-freeze to a system that produces domestic hot water. Hard water should not be used in combination with generic antifreeze. Energy Kinetics supplies a quality inhibited Propylene Glycol anti-freeze with orange dye and an antifoam agent. 8-Way Boiler Treatment can be added to Energy Kinetics anti-freeze and is recommended in areas of medium water hardness. **NOTICE: Thoroughly clean system prior to adding antifreeze.** TSP (Tri-Sodium Phosphate) is recommended for removing flux and other oil based compounds (where allowed by local regulations). Once system has been cleaned and flushed, then add antifreeze to obtain approximately a 30% by volume mixture of antifreeze in water. Call Energy Kinetics for assistance in calculating how much anti-freeze to add to system.

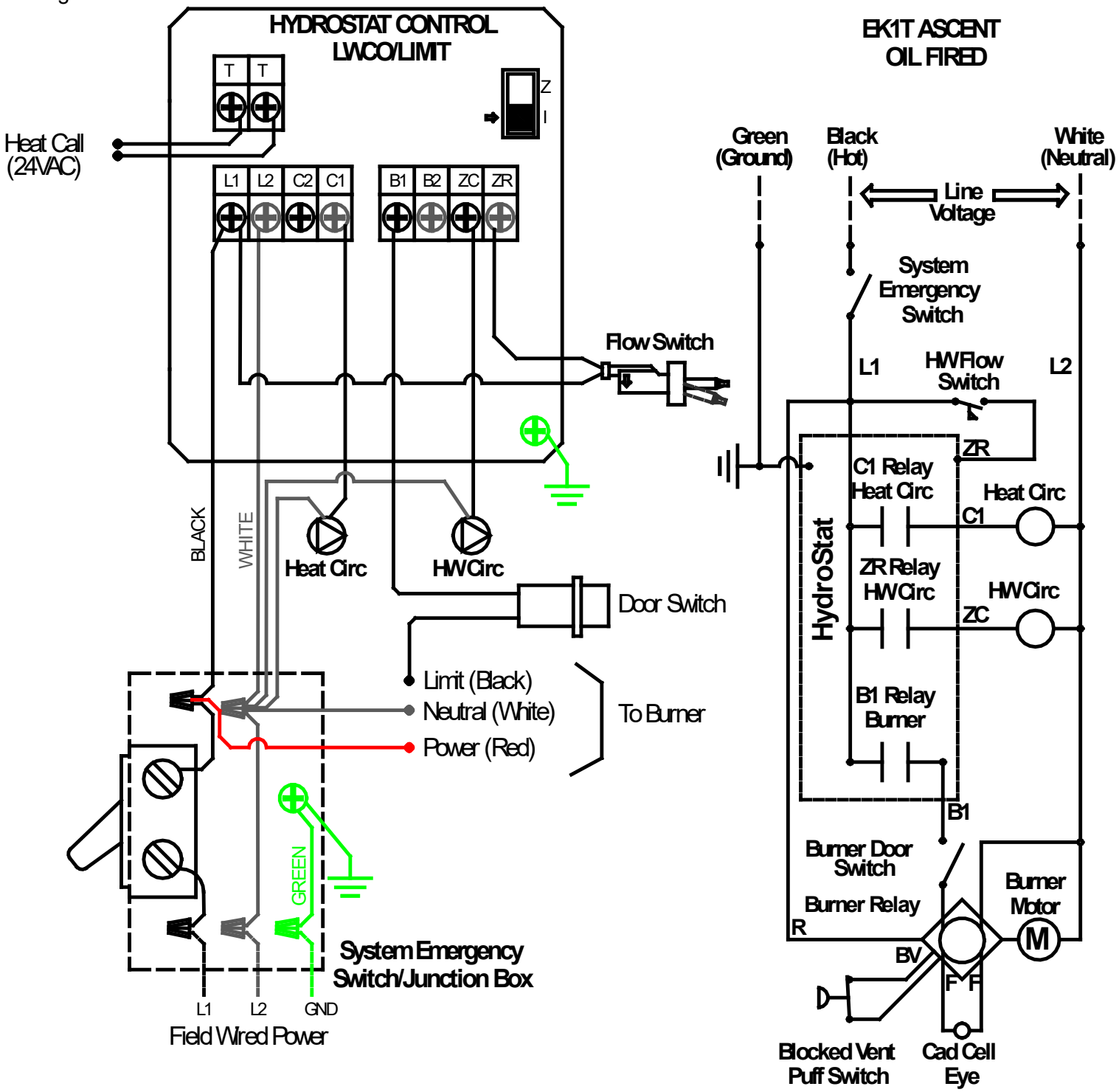
WINTERIZING

NOTICE: If the Ascent Combi and Ascent Plus Combi Boilers may be exposed to freezing temperatures, such as a vacation home shut down for the winter, then anti-freeze should be added. When a home is winterized by draining all domestic water piping, then the Ascent Combi and Ascent Plus Combi Boilers must be protected. It is not recommended to drain the boiler, because introducing air into the boiler can cause rusting inside the boiler shell and also because the Energy Converter has a spiral water passage that cannot be completely drained of water. When draining the domestic water piping system, be sure to drain the domestic side of the plate heat exchanger. If the hydronic system will not be drained, then add enough anti-freeze to protect the entire hydronic system including the boiler, piping, radiation, circulators, etc. If the hydronic system will be drained, then add shut off valves to isolate the boiler and add anti-freeze to the boiler only, as follows. Drain water from the boiler and then add anti-freeze to the boiler. Refill boiler with water and run boiler circulator through the bypass to distribute antifreeze within boiler. Propylene Glycol in water will provide the following freeze protection: 30% down to +8F, 40% to -8F, 50% to -27F. Energy Kinetics recommends using 30% anti-freeze to obtain the best boiler performance. Use over 30% anti-freeze only if lower temperature freeze protection is mandatory.

Caution: Always keep the fuel supply valve shutoff if the burner is shut down for an extended period of time.

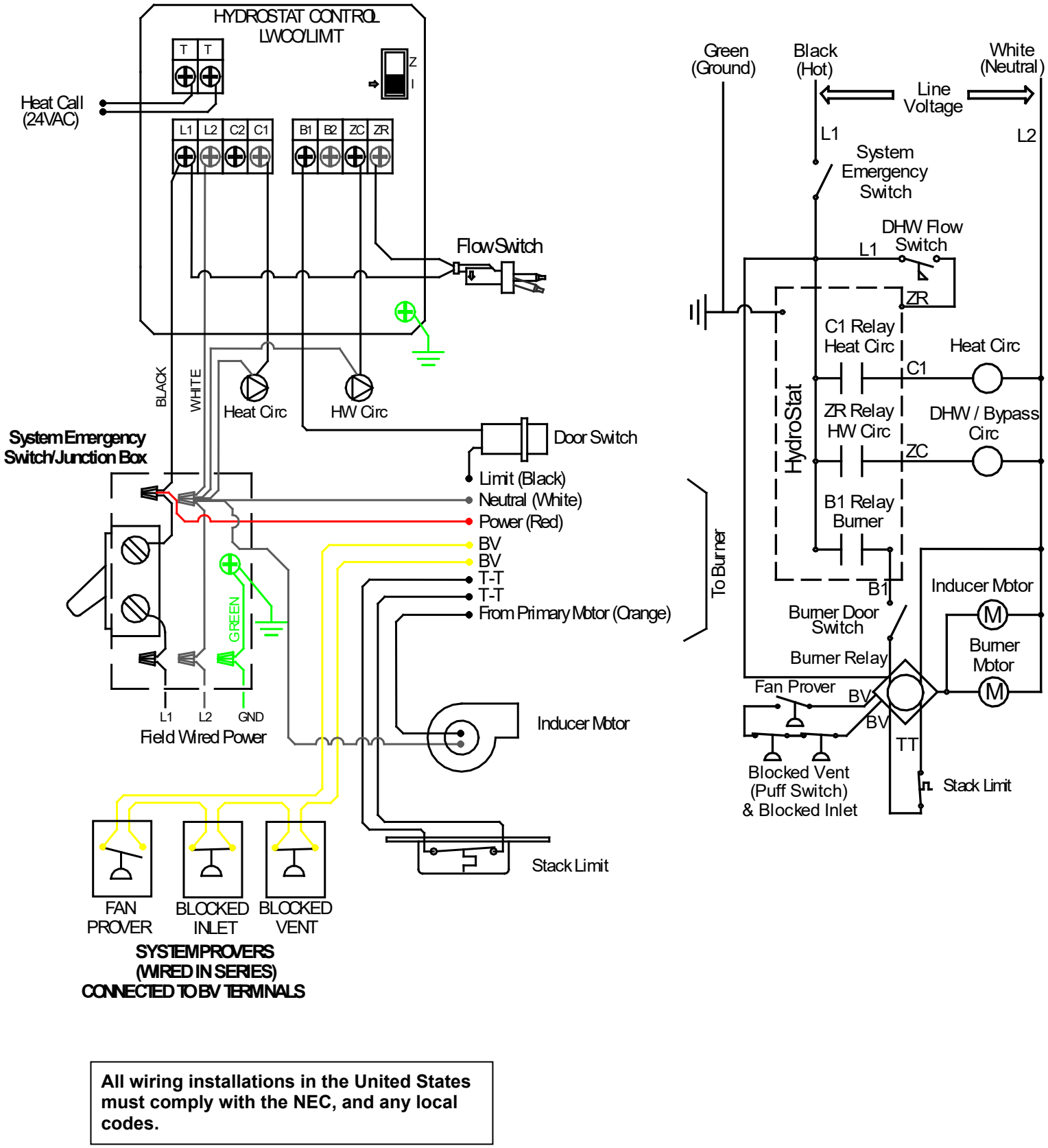
LINE VOLTAGE WIRING DIAGRAMS

Figure 3A - Ascent Combi



All wiring installations in the United States must comply with the NEC, and any local codes.

Figure 3B - Ascent Plus Combi



All wiring installations in the United States must comply with the NEC, and any local codes.

WIRING and CONTROLS

The Ascent Combi Heating System is furnished with controls and basic accessories as illustrated and described in this manual. Control, burner and accessory instruction sheets and system wiring diagrams should be attached to this manual for future reference.

DANGER: All wiring for installations in the United States must comply with the NEC, and any local codes.

ELECTRICAL CONNECTION - LINE VOLTAGE

POWER SUPPLY: 120 VOLT 60 HZ, 7.5 Amperes

The Ascent Combi requires 120 VAC. The supply voltage must be within 108 VAC min / 132 VAC max for reliable operation of the boiler and the Ascent Hydrostat. An easy way to check the supply voltage is to test L1 and L2 on the Ascent Hydrostat control.

DANGER: Make All Connections with *Power Off* at Main Circuit Box

Figure 3A: Connect power from a separate 15 AMP fused circuit. Install 3rd wire grounding for proper bond between all electrical accessories. The system switch is included so power can be shut off at the unit for servicing.

Pigtails are provided for the line voltage power connection. Connect black pigtail to hot, white pigtail to neutral, and the green pigtail to ground.

LOW VOLTAGE WIRING

WARNING: Make All Connections with Power Off at Main Circuit Box

A typical low voltage wiring diagram for the Energy Kinetics Ascent Combi and Ascent Plus Combi is shown in the "Zone Control" section of this manual. Thermostats must be located on inside walls away from cold drafts, windows or heat from fireplaces, appliances or sunlight. Set thermostat heat anticipators to hydronic or 0.4 amps (or "gas" if gas/electric option). Call Energy Kinetics to request alternate low voltage wiring diagrams to handle special situations such as air handler wiring, heat pump wiring, Wi-Fi and power stealing thermostats, or isolation relays for thermostats.

ASCENT HYDROSTAT CONTROL

The Ascent Hydrostat control is the operating and limit control for the Burner, Bypass Circulator, and Heating Circulator. The high and low limit is field adjustable to meet the needs of the installation; see recommended settings below. The control has an Automatic reset High Limit (AHL) and a Manual reset High Limit (MHL) the AHL is field adjustable the MHL is factory set at 250°F and requires a manual reset of the control. The control has circulator relay terminal designations C1 and C2 (internally connected to Neutal) to operate the Heating circulator when a switch closure is made at the TT terminals. The boiler must be at or above the condensation protection temperature (145°F) of the control in order for the heat circulator to operate. The Burner will fire when the TT switch closure is made up to the AHL setting and will continue until the call for heat is satisfied. The Ascent Hydrostat control ZR connection is used to register the input from a hot water flow switch. The ZC terminal supplies power to the integrated bypass/hot water circulator. The bypass circulator has a 5 minute overrun to allow hot water production at low flow rates.

HYDROSTAT CONTROL SETTINGS

Ascent Hydrostat Control	
Hydrostat 3250-EKT	**Normal Setting**
Auto Reset High/Operating Limit (AHL)	190º F* (up to 220º F Maximum) 10º Differential* (20º, 30º optional)
Low Limit (LL)	170º F with 25º F Differential*
Manual Reset High Limit (MHL)	Manual Reset: 250º F*
Auto Reset Low Water Cut-off	N/A
Economy Setting	OFF

*** Factory Setting.**

Do not set Low Limit (LL) below 170°F for heat and hot water applications.

See Ascent Hydrostat for further information.

ADVANCED SETTINGS

To improve efficiency, the EK1T Ascent Combi and the EK1T+ Ascent Plus Combi boilers have been equipped with advanced features designed to reduce idle loss (the energy required to keep the boiler in standby mode). See next section for instructions on how to set the desired Option Mode.

Option 1 (OP1) – Maintain Temperature – Good Efficiency, Best Hot Water Convenience
Option 2 (OP2) – Cold-start On Demand Hot Water – Best Efficiency, Good Hot Water Convenience
Option 3 (OP3) – Advanced Learning – Better Efficiency, Better Hot Water Convenience
Option 4 (OP4) – Advanced Learning – Better Efficiency, Better Hot Water Convenience - For inconsistent schedules

Option 1 (OP1): The EK1T Ascent Combi and EK1T+ Ascent Plus Combi ship in the least efficient domestic hot water mode, Option 1, or OP1. In this mode, the boiler will create an implied hot water load to maintain a minimum temperature (factory set to 145°F with a LL setting of 170º F) to ensure hot water can be instantly produced at all times. This is similar the way traditional tankless coil boilers operate although they typically maintain significantly higher temperatures than are required by the Ascent boilers. Even in this setting, significant savings over traditional tankless coil boilers will be realized. If hot water is not employed, OP2 must be selected.

Option 2 (OP2): This mode is much more efficient and the boiler operates as a cold start system for heat and hot water. The boiler will not maintain temperature (although it may be hot for a large portion of the heating season) and may not always be able to instantly produce hot water. A hot water draw of at least 30 seconds will enable the boiler to fire. The boiler will take roughly 2-3 minutes to reach full operating temperature, during which the boiler will send out progressively warmer pulses of water as part of its preheat and condensation protection operation. To speed preheating and reduce water use, the boiler can be activated instantly with a “double pump”: Turn the hot water on and off twice in quick succession at any fixture in the house. The boiler will recognize this as a requirement to preheat and quickly get ready to make hot water. With a “double pump,” the hot water fixture can be left off and the boiler will preheat. The Ascent boilers are well insulated and will remain hot for over 2 hours after preheating, so after activated, the water will be ready for an extended period of time.

Option 3 (OP3): This option is a compromise between maximum efficiency and hot water convenience. In this mode, the boiler will learn your hot water schedule over the course of two weeks. The boiler will create an implied hot water load to automatically preheat anytime your usage pattern indicates a hot water draw may be imminent. This mode will use more fuel than OP2, however it will provide significant savings over OP1 as long as your schedule is reasonably consistent. If the boiler does not correctly anticipate your schedule, the same draw patterns as OP2 will activate the boiler (30 second draw or cycling the hot water faucet twice in succession).

Option 4 (OP4): This option is a compromise between maximum efficiency and hot water convenience. Like Option 3, in this mode, the boiler will learn your hot water schedule over the course of two weeks in particular by identifying periods with no hot water demand like night time hours. The boiler will create an implied hot water load to automatically preheat anytime your usage pattern indicates a hot water draw may be imminent based on any usage in the past two weeks. This mode will use more fuel than OP2 and OP3, however it will provide savings over OP1 and is ideal if your schedule is less consistent. If the boiler does not correctly anticipate your schedule, the same draw patterns as OP2 will activate the boiler (30 second draw or cycling a hot water faucet twice in succession).

These hot water modes create an implied load for hot water to ensure hot water is ready based on the selected comfort level and/or historical hot water use patterns. The low mass design will only allow the burner fire when the Hydrostat has determined that the inferred heat load cannot be met by the residual heat of the water in the system. The boiler will not fire the burner without an implied hot water load, and in OP2, the burner will only fire with an active heat or hot water demand.

NOTE: The Ascent Hydrostat does not have ‘persistent memory’ meaning that cycling the power will erase usage memory. The Ascent Hydrostat will begin relearning usage patterns once power is restored.

SELECTING ADVANCED SETTINGS

The advanced settings can be activated using the red “Test/Reset” button on the Ascent Hydrostat control. Pressing the button will cycle through system parameters and eventually the advance settings options, displayed as options 1, 2, 3, or 4 (‘OP1’, ‘OP2’, ‘OP3’, and ‘OP4’). Pressing and holding the red button will cause the display to flash so the Option Mode may be selected. Once the control is flashing, press the red button to cycle through OP1, OP2, OP3, and OP4 until you reach the desired setting. Releasing the button for 2 seconds will select the last option displayed. The control will then return to the main temperature display.

EMERGENCY WIRING

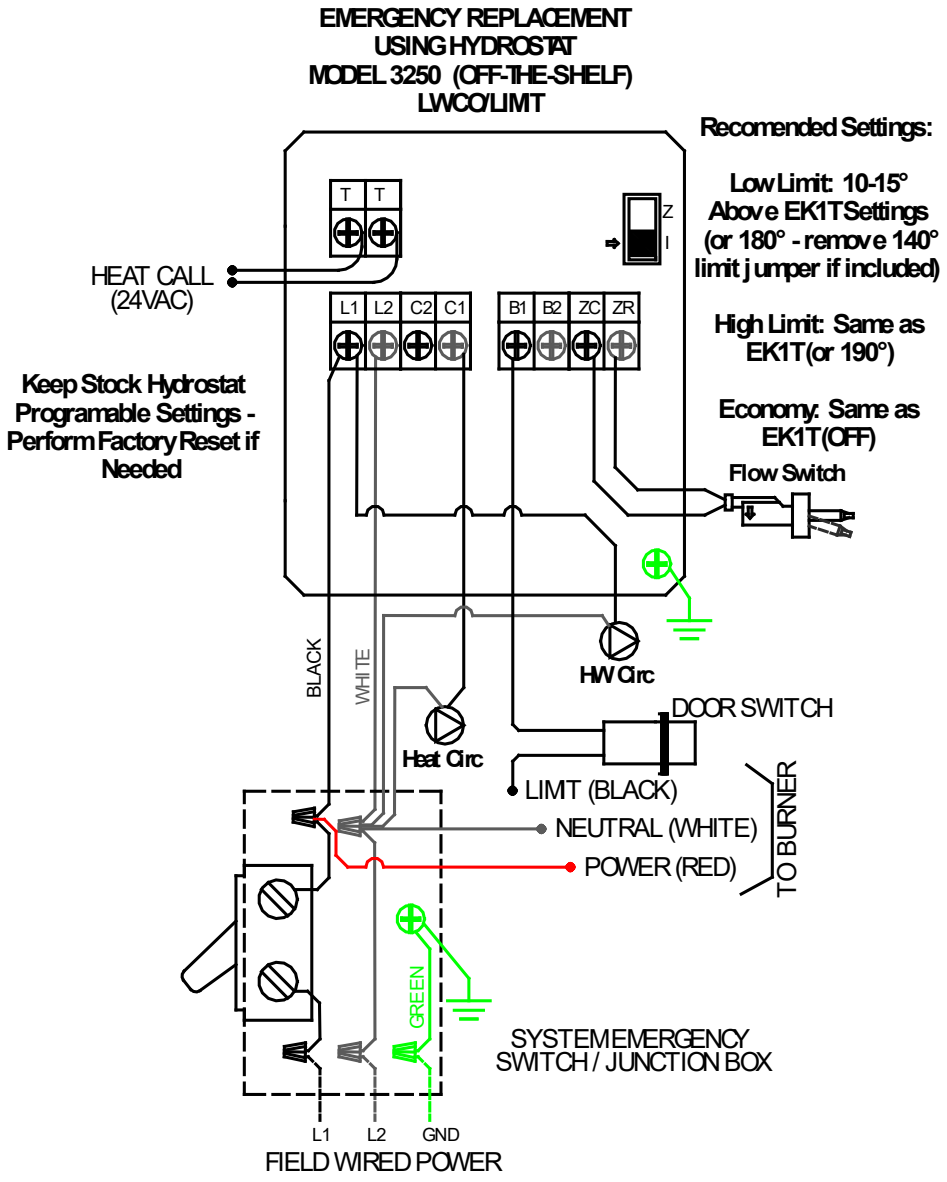
The Ascent Hydrostat 3250-EKT limit control provided with the Ascent boilers provides advanced features not found in the industry standard (and readily available) Hydrolevel Hydrostat 3250. If replacement of the limit control is required, an off-the-shelf Hydrostat 3250 can be fitted as a temporary replacement to provide heat, hot water, and limit control (safety and operating). Some advanced features are not available on the standard Hydrostat control, so the unit should be replaced with a unit from Energy Kinetics in a timely manner to ensure optimal efficiency and full boiler functionality.

To temporarily install an off-the-shelf Hydrostat 3250 on the EK1T or EK1T+, follow the standard wiring diagram with the following exceptions:

1. Reinstall the flow switch to ZC and ZR (factory installed to L1and ZR)
2. Reinstall the HW Circulator to L1 and L2 (factory installed to L2 and ZC)
3. Increase the Low Limit settings to 10-15°F higher than needed on the factory installed control (set to 180° if the setting on the original unit is unknown). There may be a jumper (located in the top-right of the Hydrostat control PCB) that limits the low limit to 140° max. Remove this jumper to set the proper limit setting.

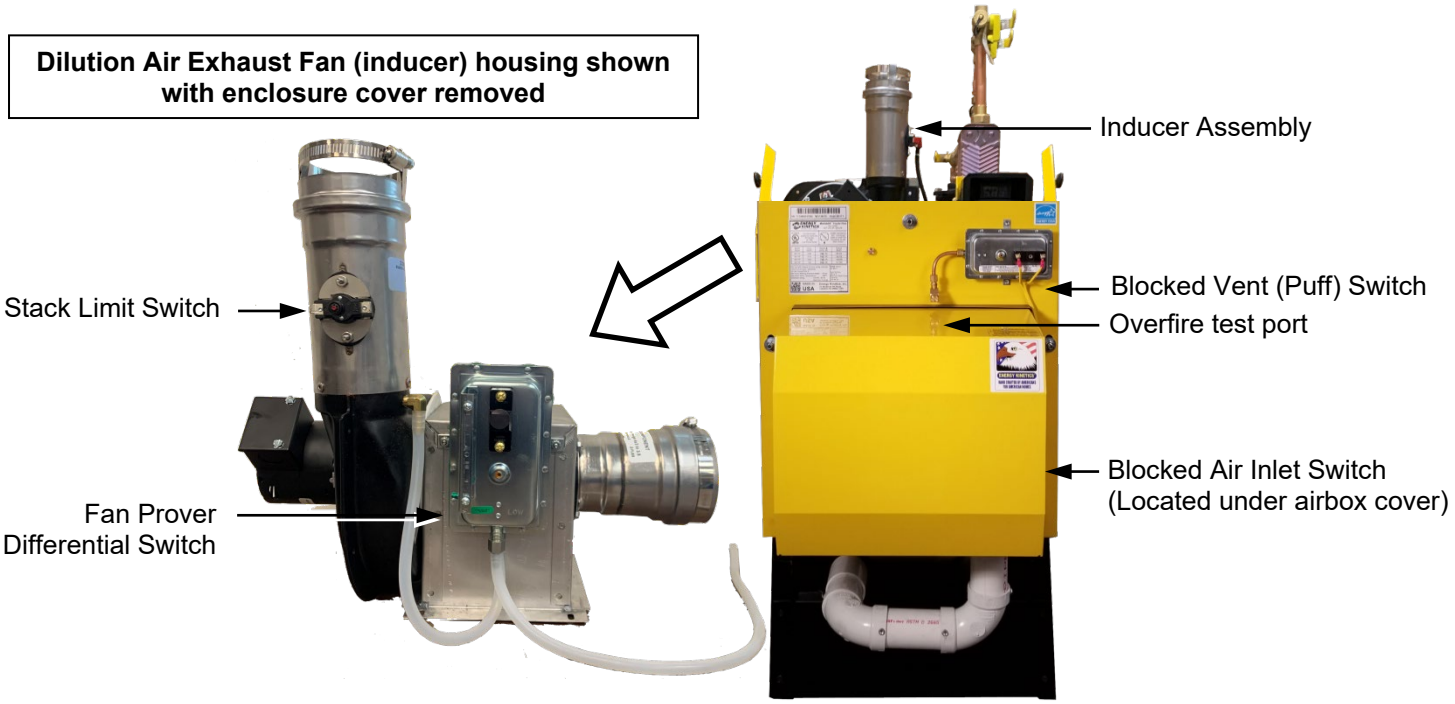
When replacing the temporary Universal Hydrostat with the Energy Kinetics Ascent Hydrostat, follow the wiring instructions found in the Line Voltage Wiring Diagram section of this manual.

OFF-THE-SHELF HYDROSTAT CONTROL
LWCO/LIMIT EMERGENCY REPLACEMENT



TROUBLESHOOTING THE SAFETY SWITCHES

Dilution Air Exhaust Fan (inducer) housing shown with enclosure cover removed



DESCRIPTION: The Ascent Plus and Resolute RT with the dilution air venting systems have three separate pressure switches to ensure safe operation of the boilers air inlet and venting systems. These three switches are wired in series and connected to the BV (blocked vent) terminals on the burner's primary control. Note: There is also a stack limit switch, but it is wired in series with TT to the burner.

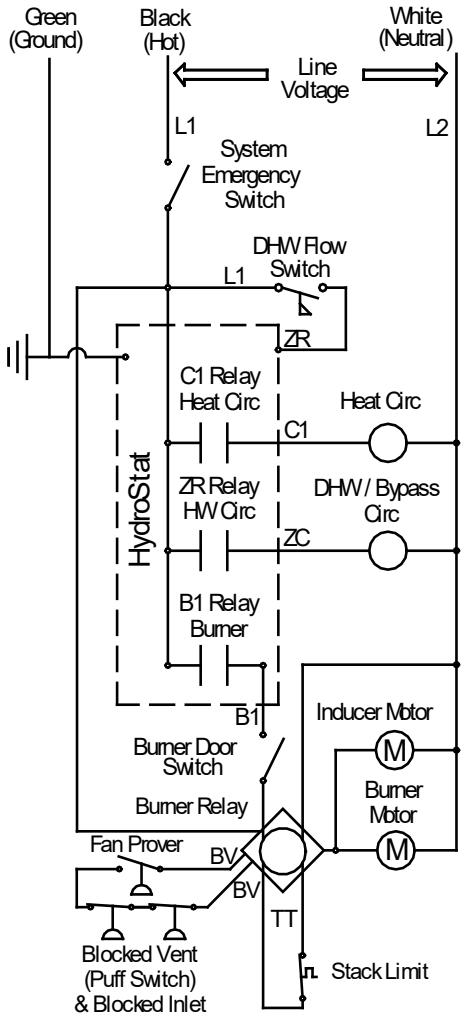
"BV" Blocked Vent Error Displayed: If the Blocked Vent error is displayed on the burner primary control, either the Blocked Vent (Puff) switch or the Blocked Inlet Air switch has opened or the Dilution Air Exhaust Fan Prover did not close. If this happens during start-up, the burner will continue to run for 30 seconds before locking out. If the BV terminals open after the flame has proven, the burner will recycle and eventually lockout.

The Blocked Vent (Puff) Switch is located near top of the front cover and is connected to the "Overfire" test port on the boiler. On the Ascent, it is located to the left of center and on the Ascent Plus it is located to the right of center. It has a set of Normally Closed (NC) contacts and the switch is set to open or "break" if the vent becomes restricted, blocked, or the inducer fails any of which will cause the draft Overfire to reach a positive +0.10"wc or greater.

The Blocked Inlet Air Switch located under the burner airbox cover on the upper left side of the burner. This switch has two ports on it, one has an extension tube that goes down and sticks out through the grommet in the bottom of the airbox frame and references the boiler room, the other port references the pressure inside the airbox (the airbox cover must be in place). This switch has a set of Normally Closed (NC) contacts and will open or "break" if the inlet air piping becomes blocked and causes the air pressure inside of the airbox to negative -1.00"wc or greater.

The Dilution Air Exhaust Fan (Inducer) Prover Differential Switch is located on the right side of the inducer mounting box. This switch has a set of Normally Open (NO) contacts that will close when the inducer is running properly. This is a two port switch with one referencing the vent outlet and the other referencing the inlet air.

EK1T ASCENT PLUS
OIL FIRED



Burner won't run, No Call (TT) to the Burner Primary: The Stack Limit is a normally closed, manual reset switch located in the stainless steel, polypropylene vent adaptor located on the outlet of the inducer. If the stack temp has hit the limit, this switch will open, interrupting the call to the burner primary. When the primary has a call for heat, it is indicated by a "TT" lit up on its LCD display. Reset the stack limit switch by pressing the reset button on it to restore a call for heat.

TESTING: If the burner is locking out due to the BV (blocked vent) error, check each of the following.

The Blocked Vent (Puff) Switch, after running the burner for 15 minutes continuously remove the brass plug in the brass tee at the Overfire test port, and using a piece of ¼" dia. metal tubing on the end of the hose on your draft gauge/manometer, stick it in the test port and take a reading. Draft overfire should be negative -0.10" wc or greater. Remember, this switch opens under positive pressure around +0.10" wc so you have a pretty big window. If your overfire draft measures any less than -0.10", check the front and rear cover bolts for tightness, if the cover bolts are all tight, pull the inducer motor wheel assembly from the inducer housing and clean the fins of the fan wheel removing any soot accumulation. If the edges of the fins appear rough or worn thin, it is suggested that the inducer or at least the motor/fan wheel assembly be replaced.

The Blocked Inlet Air Switch, while the burner is running (airbox cover must be in place), stick the ¼" dia. tube on the end of those hose on your draft gauge/manometer into the airbox assembly from the outside going up through one of the grommets located in the bottom of the air frame under the burner (the air frame is the black "L" shaped bracket mounted on the front cover that the airbox cover mounts to). The combustion air intake must not be greater than negative -0.90"wc of vacuum (-0.50"wc to -0.85"wc is typical). If the intake draft is more negative than -0.90"wc, check for signs of a blockage in the intake piping and ensure that the intake length is shorter than 50 feet total equivalent length (remember each elbow counts as 5' equivalent length).

The **Dilution Air Exhaust Fan (Inducer) Prover Differential Switch** is a 0.55"wc switch, normal operation is 0.90"wc to 1.20"wc, less than 0.65"wc indicates a possible issue. Normal pressures are greater than 0.80"wc with 0.95"wc to 1.10"wc being common. If a differential monometer is not available, each leg can be measured independently and the can be calculated. *Example: Exhaust pressure = +0.60"wc, Intake pressure = -0.35"wc, subtracting Intake from Exhaust pressure means the Differential pressure equals 0.95"wc.* If the switch contacts are not pulling in or opening while the burner is running, verify inducer, fan wheel and tightness of cover bolts. If everything looks good, a restrictor may need to be added in either the vent or inlet piping.

By process of elimination, the switch which is causing the "BV" Blocked Vent error may be quickly determined. Removing the airbox cover from the burner will disable the blocked inlet air switch. Temporarily run the burner with the cover removed. If the Blocked Vent error returns, verify overfire draft. If overfire draft is within spec, replace the switch. If the Blocked Vent error does not return, replace the airbox cover over the burner and take a draft reading inside the airbox while the burner is running. Do this by putting a metal sample tube on the end of your manometer hose and stick the end of the sample tube into the airbox through one of the grommets in the bottom of the airbox frame under the burner. The combustion air intake must not be more negative than -0.90"wc of vacuum (-0.50"wc to -0.85"wc is typical). If the intake draft is more negative than -0.90"wc, check for signs of a blockage in the intake and ensure that the intake length is shorter than 50 feet total equivalent length (with each elbow counting as 5' equivalent length).

<u>NOTE:</u> The Dilution Air Exhaust Fan (Inducer) Prover Switch may not prove if the vent piping is short with only one or two elbows and short straight vent lengths. Verify the factory provided vent has been installed exiting the first elbow after the inducer.
Refer to Smart Vent for Resolute-RT and Ascent Plus manual for more information.

HOT WATER DIAGNOSTICS

First, test hot water at a simple fixture like a sink instead of a shower. Most hot water issues are corrected by the following:

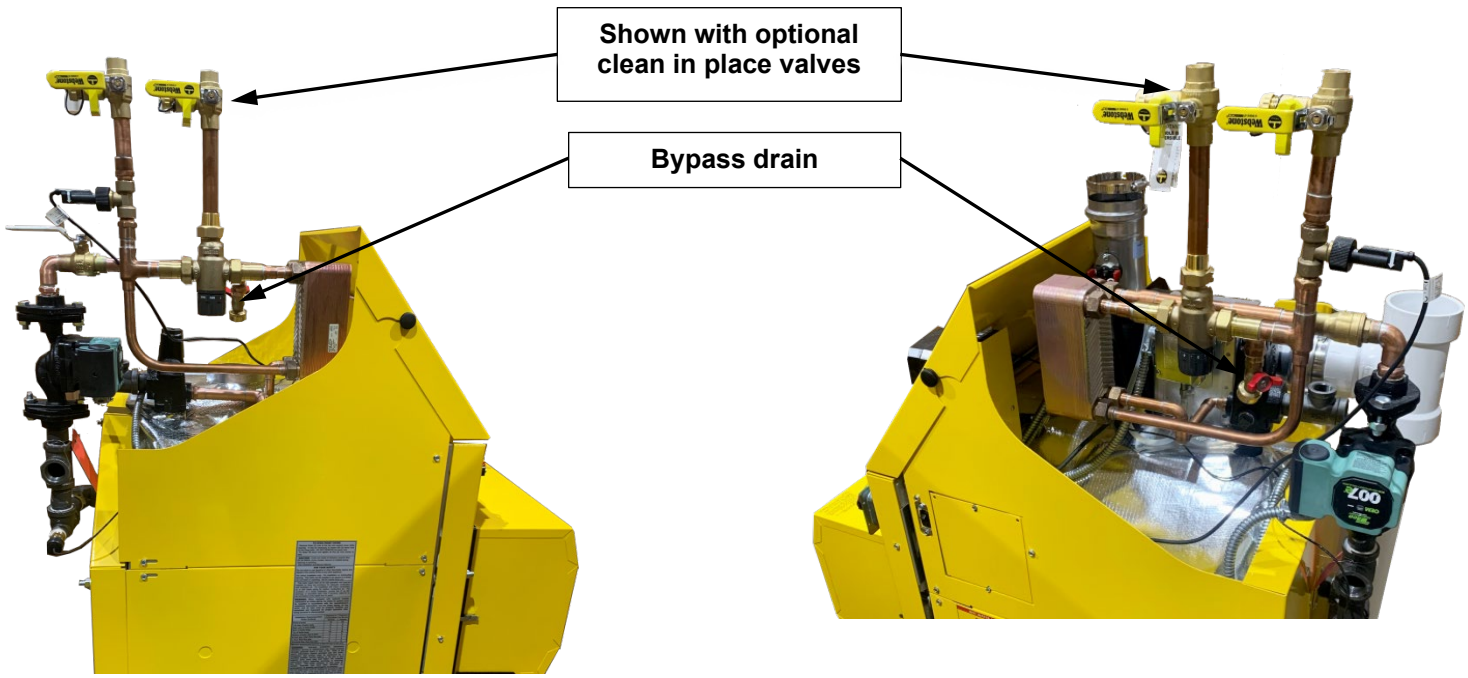
1) Properly setting the mixing valve (usually between 4 and 5 ½ which is 120°F to 125°F maximum). Setting higher temperatures may cause fluctuations.
2) Making sure the boiler low limit temperatures is set to 170°F and not lower.
3) Making sure the burner primary control has a 3 second pre-purge.
4) Fluctuating domestic mixed temperatures may be caused by debris obstructed check valves or the shuttle on the mixing valve (see page 2). Continuously move the set point up and down through the full range when cleaning or flushing.
5) "Bucket test" the hot water flow to make sure it does not exceed the boiler capacity.
6) Make sure the heating circulator has a functioning check valve. This issue may only show up during the heating season.

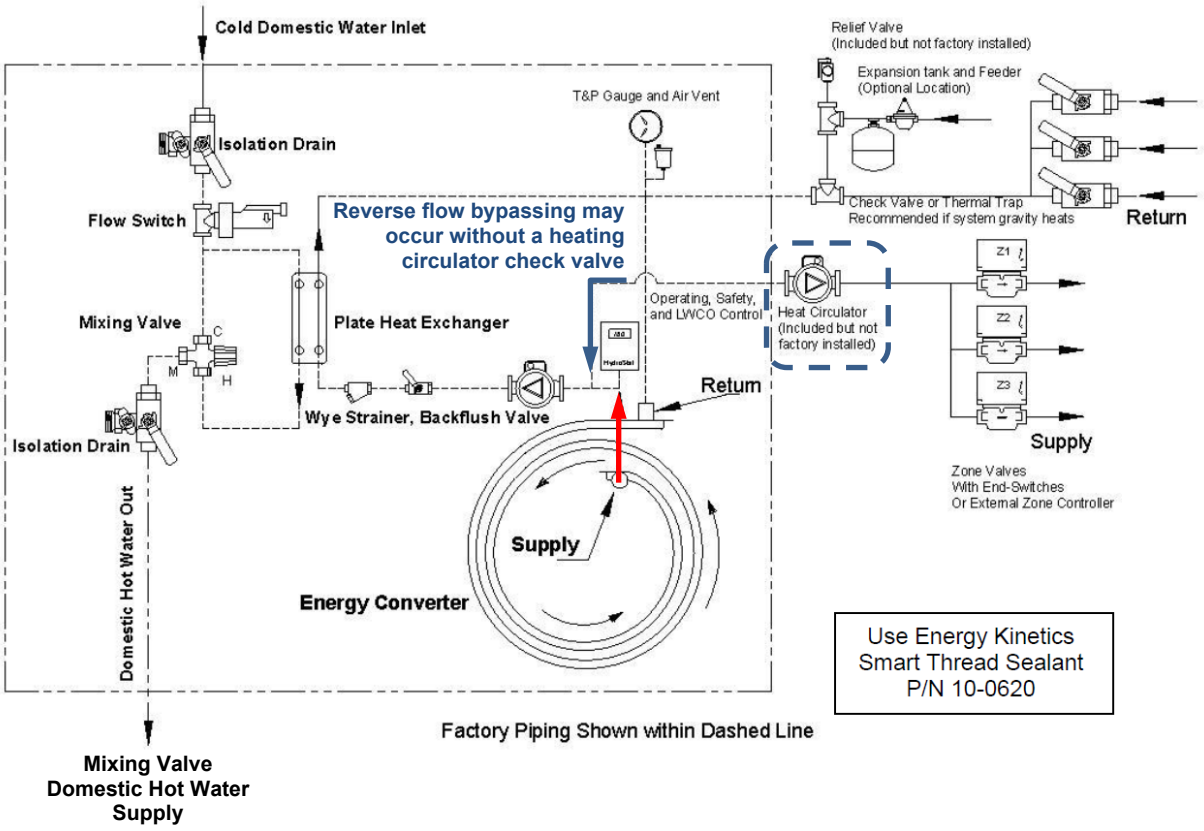
If these do not correct the hot water condition, check to see if the domestic supply temperature is adequate out of the mixing valve at the boiler. If this is consistent and hot enough and the fixtures are not, the problem is with the domestic hot water fixtures or hot water distribution system. Investigate any newly installed fixtures, washing machine connections, etc. for bypassing and proper operation.

Advanced Diagnostics

Check boiler supply temperature at hydrostat. If always greater than 140°F, then the boiler is doing its job and you can look at the domestic water system or potential issues with heating zones.

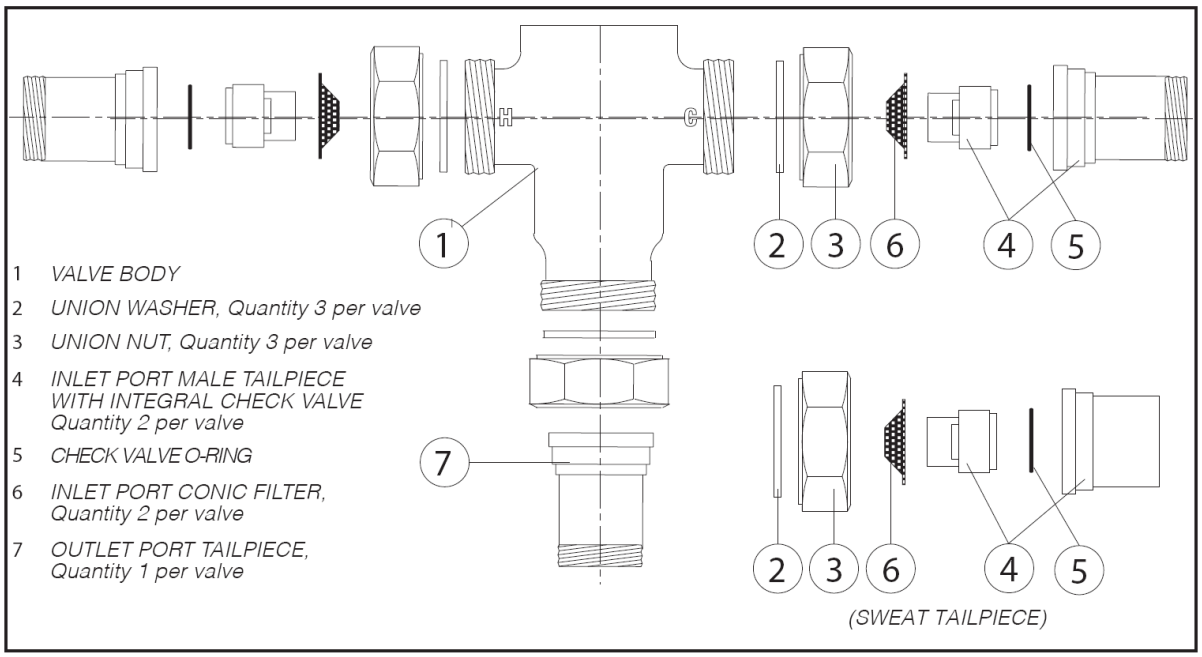
- A short cycling boiler with long off cycles may indicate a blocked heat exchanger. Cold returns on the hydronic side indicate a blocked hydronic side; check and clean the Y-strainer. High return temperatures on the hydronic side indicate a blocked domestic hot water side; clean the heat exchanger and check and clean the mixing valve and mixing valve check valves.
- Check for missing or non-functioning heating circulator check valve(s). This is best performed with cold heating system piping.
    1) Heat the boiler up to limit temperature, and then remove all heat and hot water calls and close all heating zone ball valves. The circulator will continue to run for 5 minutes.
    2) Wait about 2 minutes for the temperature to stabilize on the Hydrostat.
    3) Monitor the temperature at the Y-strainer with a temperature probe.
    4) Manually open all the zone valves and heating zone ball valves. The temperature should remain stable. If the temperature drops noticeably, the check valve is missing. For zone circulators, identify the missing check valve by testing one zone at a time.





Obstructed check valves will cause poor mixing valve temperature performance. Removal and cleaning of the integral check valve (item 4) and the valve body shuttle may be required. We recommend having a spare valve on hand as check valves may be damaged if removed. Replace all damaged or inoperable components. Cleaning information from Caleffi may be found here:
https://www.caleffi.com/usa/en-us/blog/how-do-i-clean-thermostatic-mixing-valve
https://youtu.be/ppN9M8eqwSA?t=3064

Anti-scald shower and fixture valves respond instantly to water temperature changes. This means that if the boiler mixing valve is not performing as designed due to debris or other reasons, rapid changes in flow may occur from the fixture anti-scald valve response, causing even greater hot water temperature fluctuations. Testing at a sink without an anti-scald valve can help identify this condition.



PREPARE FOR START UP

DANGER: **MAKE CERTAIN THE FOLLOWING REQUIREMENTS HAVE BEEN SATISFIED BEFORE START UP:**

1. The boiler and piping are completely filled with water and purged of air.
2. Re-check wiring to ensure that it is correct and in accordance with appropriate wiring diagrams and codes.
3. Verify that the correct nozzle is installed properly.
4. Verify electrode settings.
5. Verify the burner settings for air band position and head position *(See "Oil Burner Settings" Table)*.
6. Oil supply is connected to burner. Oil supply lines and shut-off valves are open.
7. **CAUTION:** DO NOT USE GASOLINE, CRANKCASE DRAININGS, OR ANY OIL CONTAINING GASOLINE.
8. Fuel pump and fuel lines are purged.
9. Verify operating oil pressure at gauge port.
10. Flue pipe properly connected from unit to chimney. All joints are secured and sealed.
11. Combustion air supply is available and sufficient. (*See "Combustion Air")*
12. Loosen the 1/8" NPT hex plug near the breach for draft and stack temperature readings. Loosen the 1/8" NPT hex plug in front jacket (above the burner) for over fire CO_2 sampling.
13. Mixing valve set to the proper temperature setting.
14. **CAUTION:** All covers, enclosures, and guards must be maintained in place at all times, except during maintenance and servicing.
15. **CAUTION:** Do not start burner unless the front door is closed and the nuts have been properly tightened. DO NOT overtighten.

START UP PROCEDURE

1. Turn on system switch. The Ascent Hydrostat control should call for heat if in factory on demand hot water mode; if not, adjust Ascent Hydrostat operating mode or start a hot water draw or call for heat. The burner and plate heat exchanger bypass circulator should come on at the same time. If not, check primary control and reset it if necessary.
2. Check for burner light off. On an oil supply system with one pipe, it will be necessary to bleed air from fuel pump. On a two-pipe system, several starts may be required to clear air from fuel pump, or bleed air from pump.
3. On light off, water temperature and stack temperature will start to rise. A slight odor is common on initial light off as refractory and converter surfaces warm for the first time.
4. **NOTICE:** Perform smoke test immediately after light off. Smoke test should show yellow after initial one minute of operation due to the refractory insulating boards heating up. If the smoke test shows dark grey or black after one minute of operation, shut off boiler immediately and repeat "Prepare for Start Up" checklist.
5. As the Ascent Combi exceeds 145°F supply temperature with hot water flowing fully from a domestic faucet (2 ½ GPM to 4 GPM depending on firing rate), adjust mixing valve so water temperature going to fixtures is at the desired temperature (120-125°F).
6. Allow system to run about 15 minutes before testing and recording burner operation. (*See "Oil Burner Operation")*
7. **CAUTION:** Do not attempt to start the burner when excess oil has accumulated, when the unit is full of vapor, or when the combustion chamber is very hot.
8. **CAUTION:** NEVER BURN GARBAGE OR PAPER IN THE UNIT, AND NEVER LEAVE COMBUSTIBLE MATERIAL AROUND IT.

BOILER OPERATION AND SAFETY CHECKS

Check for proper boiler operation and proper safety operation. Correct any deficiency.

1. ***DANGER:*** Verify proper operation of high limit aquastat.
   a. Remove all heat and hot water calls so there is no heating load on the system.
   b. Turn System switch off, then jumper T-T on the Ascent Hydrostat control to simulate a thermostat call.
   c. Restore power. The burner should start shortly.
   d. At approximately 180º F, the Ascent Hydrostat control should shut off burner (for factory set HL setting of 180°).
   e. Turn off power and disconnect the T-T jumper.
2. ***DANGER:*** Verify proper operation of the Low Water Cut-Off.
   Press and hold the Test/Reset button for 5 seconds (30 seconds for manual reset LWCO). The display will read LCO. The red Low Water light should illuminate and the LWC circuit will de-energize.
2. ***DANGER:*** Verify proper operation of boiler pressure relief valve by following instructions on pressure relief valve, which calls for a 'try lever test'. Make sure discharge pipe is properly placed to safely contain discharge and open relief valve using the try lever.
3. **NOTICE:** Check that each thermostat operates proper zone.
4. Test water temperature at all fixtures in the system and set the mixing valve temperature to the lowest satisfactory temperature for the user.

OIL BURNER OPERATION

NOTICE: For reliable operation, set Air-Fuel mixture conservatively based on installation conditions. CO_2/O_2 and draft readings should be taken through the over fire test port in front jacket opening at right of burner (see FIG. 6). A 1/4" O.D. sample tube must extend at least eight (8) inches into front cover to obtain accurate readings. Smoke test and stack temperature should be taken at flue outlet. A test port in the flue box is provided to measure draft loss and smoke.

NOTICE: For accurate efficiency calculations, measure flue gas temperature in flue box sample port.

Installation Conditions	CO_2 Setting	O_2 Setting
Target for Normal Conditions*	**11.5% to 12%**	**3.8% to 5.5%**

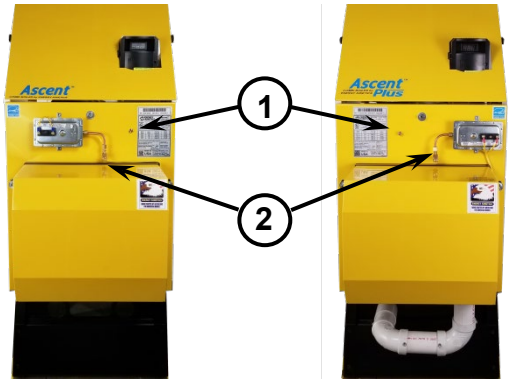
*Burner operating range is up to 13% CO2 with no or a minimal smoke trace. Burner should be adjusted for clean and safe combustion operation. Site specific conditions may require lower CO_2 setting, with 11% minimum overall. For biofuels blends of B40 (40% blend) through B100 (100% blend) an 11 ½% minimum CO_2 and a burner primary control post purge of 15 seconds is recommended for the best operation. Running with very low levels of excess air may reduce burner head long term durability without noticeable benefits in annual efficiency.

Note 1: For combinations of above, use lowest CO_2 level or highest O_2 level.
Note 2: All combustion testing must be performed with **Silent Burner Cover in place**.

AFTER 15 MINUTES RUNNING, CHECK AND RECORD:

1. DRAFT at Overfire test port — Ascent Combi……..... -0.02”minimum (slightly negative)
   Ascent Combi Plus -0.05” to -0.25” wc
2. CO_2/O_2 …… See table above
3. STACK TEMPERATURE (CONVENTIONAL VENTING ASCENT COMBI)…… 350° to 550° F at breech
   (ASCENT PLUS COMBI with DILUTION AIR)…….. 150° to 300° F at breech
4. SMOKE TEST ……..…..Verify 0 smoke at flue box

ANNUAL TUNE UP & INSPECTION



Step 1 Initial Test (Draft Check & CO_2)

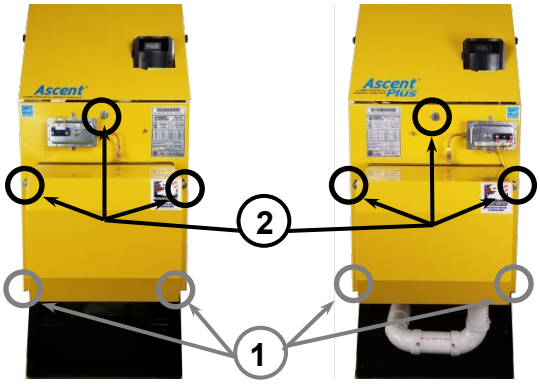
If there is an optional Silent Burner Cover, make sure it is in place before testing.

1. Remove the 1/8" brass plug from the flue box plug (1) in the top right corner of the front cover. Check draft at the flue box (1) using a 12" long piece of ¼" O.D. steel or copper tubing inserted approximately 8" into the boiler. Connect this tube to your test probe using a piece of hose.

   This must be negative for proper operation.

2. Check CO_2 through the "over fire" test port (2). Insert the 12" long steel or copper tube approximately 8" in through the test port.

   Recommended settings at the test port:
   Oil-fired: 11.5% to 12% CO_2 with zero smoke

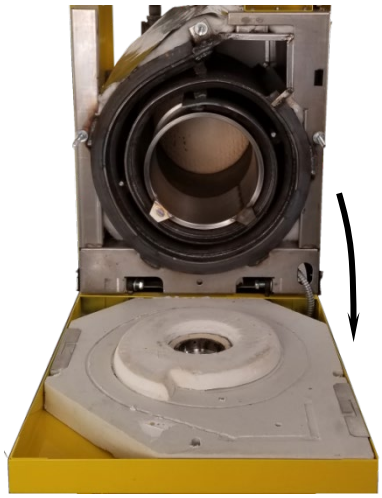


Step 2 Open Front Cover

1. Loosen, but **DO NOT REMOVE** (2) lower nylock nuts on hinge bolts below burner.
2. Remove (3) upper nuts and support cover while opening.
3. Inspect burner head/end cone condition.

Step 3 Inspect Flue Passage and Vent System

If passage is clean, no scale, then close cover and tighten all hardware evenly.
Clean ONLY if dirty.
Check vent system joints for proper connections, including condensate drain (if equipped).

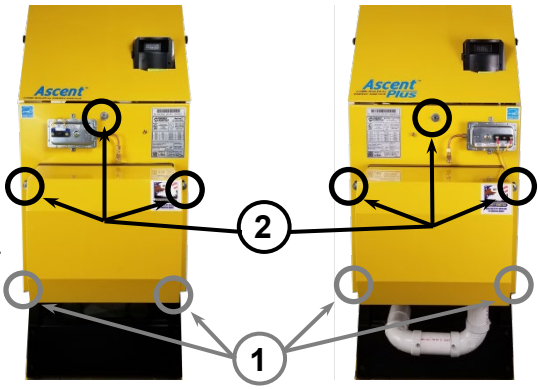


Step 4 Clean Boiler

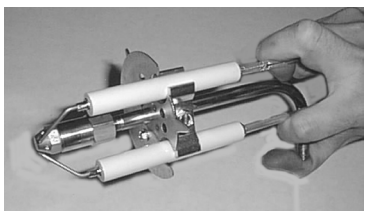
Remove stainless steel alloy combustion chamber using caution, it may be hot. Brush and vacuum the heat exchange surface if needed.

Step 5 Close Front Cover

1. Clean insulation off stud threads, and then install (3) upper nuts and washers.
2. Tighten nuts (5) uniformly
   - DO NOT overtighten.
3. Check and tighten (5) rear cover nuts.
4. Check Flue Pipe.
5. Check chimney base and clean if necessary.



Step 6 Remove Drawer Assembly



1. Check Electrode Setting.
2. Check Porcelain Condition.
3. Check Nozzle for coking/heat.
4. Replace nozzle if necessary. *See installation manual for nozzle selection.*

Step 7 Check Burner

1. Check end cone through air tube opening with drawer assembly removed.
2. Check Fan/Air Inlet for dirt or lint.
3. Install drawer assembly and check ignitor.
4. Check Filter condition. Replace annually and if vacuum exceeds 7" for single pipe systems.
5. Check flexible oil line for leaks or corrosion. Gently bend hose along its length to check for hardening. Replace immediately if any of these conditions are present.

Note: All burners require "Amulet" retention head protector.

Step 8 Zone controls

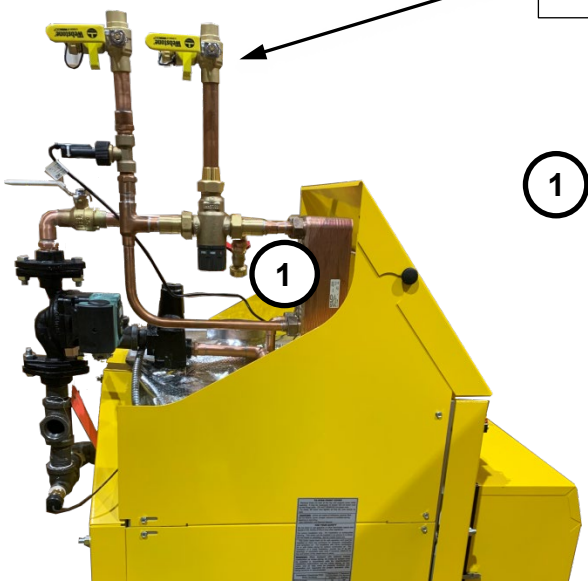
Open/Close zone valves or operate zone circulators several times to see that they move freely.

Step 9 Plate Heat Exchanger Maintenance

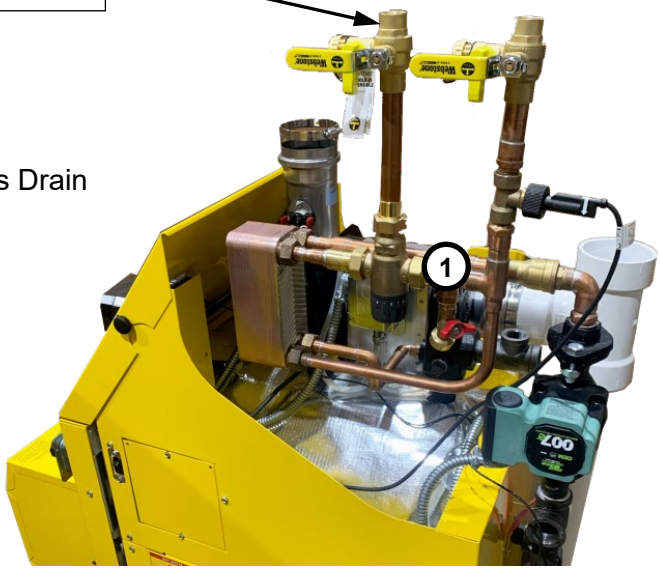
1. Close the isolating ball valve located on the bypass circ flange, connect a drain hose to the hydronic bypass y-strainer, open flush valve, and flush into a bucket to remove debris. Close flush valve, remove drain hose, open isolating ball valve on bypass circ flange, and confirm boiler pressure is adequate, adding makeup water if necessary.
2. Open a fixture and wait until hot water is continuously flowing. Turn the mixing valve up and down in temperature to ensure that it moves freely. Set the mixing valve temperature feeding the domestic hot water fixtures to the desired temperature of approximately 120°F using mixing valve.

Note: If the domestic water supply is "hard" with high mineral or lime content, clean and flush when necessary. Symptoms include poor hot water quality or low domestic hot water flow. See Hot Water Maintenance for mineral cleaning and flushing instructions. Consider installing Scale Stopper (EK P/N: 10-0650) or water softener in hard water conditions so recurring plate heat exchanger cleaning will no longer be necessary in most circumstances.

Shown with optional clean in place valves

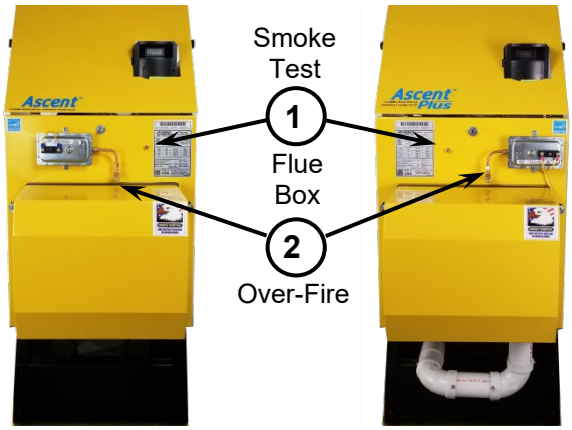


1 Boiler Bypass Drain



Step 10 Start Burner & Check Safety Functions

Check & Record:



1. Draft must be negative at flue box port (1).

Ascent Combi Chimney: Draft at the overfire test port should be slightly negative
(at least -.02"w.c.).
Ascent Plus Combi: Draft at the overfire test port should be negative (typically between -0.05" to -0.25" w.c.).

Check CO_2 at "over fire" test port (2) per oil burner operation section.
11.5 to 12% CO_2 with zero smoke

2. Smoke Test: Must be zero smoke (Port 1). A trace is not acceptable.

3. Stack Temp:
- a. Ascent Combi - 350º-550º F measured at stack or flue box port
- b. Ascent Plus Combi - 150°-300°F measured at the flue box port

4. Test Ascent Hydrostat Safety High Limit operation:

- a. Remove all heat and hot water calls so there is no heating load on the system. Disable all zone controls and DHW flow switch.
- b. Turn System switch off, then jumper T-T on the Ascent Hydrostat control to simulate a thermostat call.
- c. Restore power. The burner should start shortly.
- d. At approximately 180º F, the Ascent Hydrostat control should shut off burner.
- e. Turn off power and disconnect the T-T jumper. Reconnect zone controls and DHW flow switch.

5. Test Low Water Cut-Off: Press and hold the Test/Reset button for 5 seconds (30 seconds for manual reset). The display will read LCO. The red Low Water light should illuminate and the burner circuit (B1 and B2) should de-energize.

6. Check safety lockout: Shut off fuel supply and operate burner to verify safety lockout.

For Ascent Plus Combi ONLY

13. Check operation of blocked air intake detection switch, as follows:

A. Block the air inlet piping to the burner, upstream of the dilution branch

B. Start the burner. The blocked intake switch will open, interrupting the cad cell circuit. Safety lockout should occur after the primary control recycles operation.

C. Unblock the air inlet piping and verify that the burner operates normally.

14. Check proper operation of the blocked air intake detection switch:

A. Block air inlet to burner

B Attempt to start the burner. Safety lockout should occur in approximately 1 minute.

C. Unblock air inlet to burner.

HOT WATER MAINTANENCE

Domestic hot water is produced through a brazed plate heat exchanger (BPHE) which is factory installed on the EK1T and EK1T+ on the top of the boiler. In areas with hard water (typical in wells and city water derived from aquifers), lime scale can build up on the internal surfaces of the plate heat exchanger and decrease performance and efficiency. The EK1T and EK1T+ are shipped with a pair of integrated shutoff/drain valves to allow full isolation of the hot water components of the boiler. Additionally, the drain valves allow clean-in-place (CIP) maintenance. CIP allows all portions of the domestic hot water equipment to be cleaned with a descaling agent without removing any components from the boiler.

Energy Kinetics recommends using a citric acid descaler such as Hercules HAYMAKER™ for the following reasons:

1. Chemical compatibility with all components and gaskets.
2. NSF 60 rated for potable water.
3. Citric Acid is non-corrosive and biodegradable and is septic and sewer safe. Follow manufacturer instructions for proper neutralization (if applicable) and disposal.

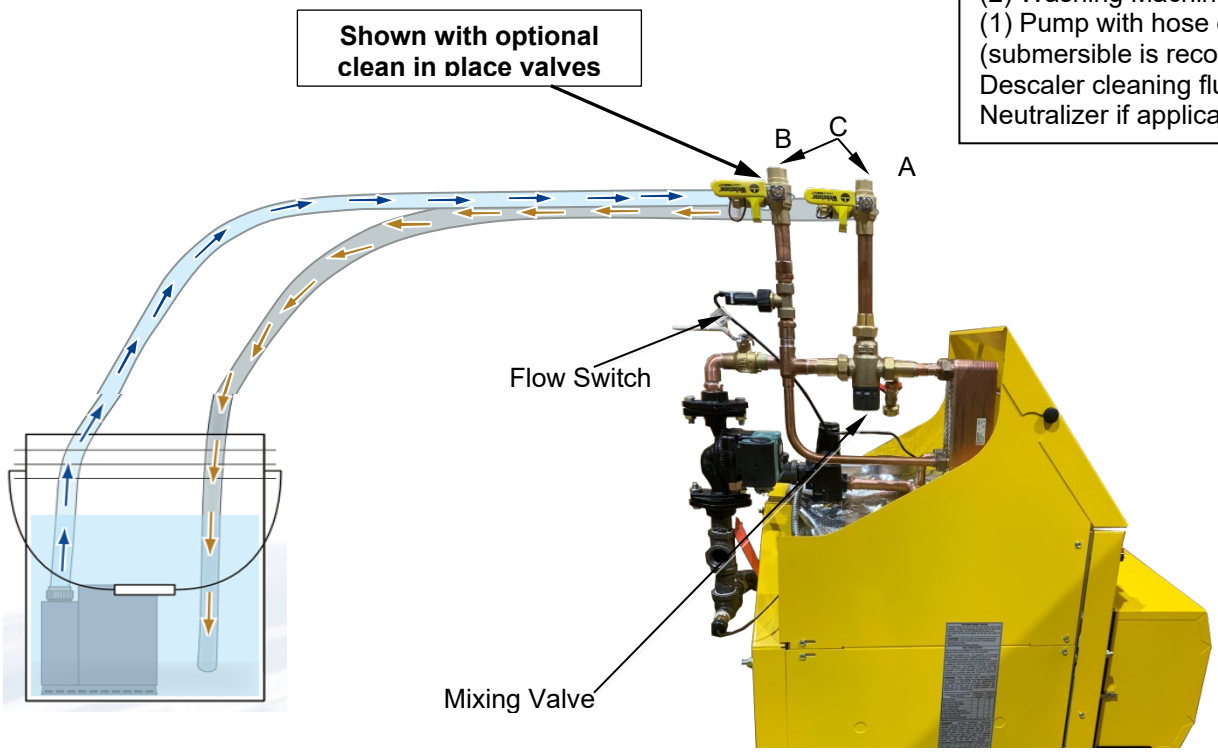
Procedure:

1. Always follow <u>all</u> safety precautions and good service practices.
2. Close factory installed hot water make-up (A) and fixture supply isolation valves (B).
3. Ensure the quarter-turn drain valves are closed and remove drain hose bib caps (C).
4. Attach cleaning hoses to the drain valves at (C) location. Attach the hose on the supply side of the EK1T's (or EK1T+'s) hot water system on hot water make-up valve (A), near the flow switch, to a submersible or pond pump.
5. Combine acid and water in ratio recommended on acid descaler bottle (1 quart of acid to 1 gallon of water is typical).

   <u>WARNING:</u> Always add acid to water, and NOT water to acid. Fill the bucket with the required amount of water, and then add the acid to the water. This minimizes the risk of splashing full strength acid.

6. Open valves (C). Power the submersible or pond pump and circulate cleaning fluid for 20-45 minutes.
7. Adjust mixing valve setting while submersible pump circulates to ensure mixing valve can fully actuate and all surfaces are cleaned.
8. Fluid will stop reacting when the system is clean, or if all of the cleaner has been consumed.
9. Dispose of cleaner per manufacturer instructions and good practices.
10. Slowly open the hot water make-up shutoff valve (A) to flush any remaining acid from the system out through fixture supply isolation drain valve (B). Flush to drain for 3-5 minutes.
11. Fully close drain valves (C). Open the hot water make-up (A) and fixture supply isolation valve (B), returning the system to service.
12. Replace the drain hose bib caps on drain valves (C).
13. Run system and set mixing valve for proper hot water supply temperature.

<u>Recommended Items:</u>
Safety glasses and gloves
(1) Bucket
(2) Washing Machine hoses
(1) Pump with hose connection (submersible is recommended)
Descaler cleaning fluid
Neutralizer if applicable



RATINGS

Boiler Model: Ascent Oil	Burner Input GPH [2]	AFUE %	Heating Capacity MBH [1]
EK1T	.85 GPH	87.0	104[3]
EK1T-140	1.00 GPH	87.0	119[4]
EK1T-175	1.25 GPH	86.2	145[5]

Boiler Model: Ascent Plus Oil	Burner Input GPH	AFUE %	Heating Capacity MBH
EK1TP	.68 GPH	91.0	86[6]
EK1TP-104	.74 GPH	90.8	93[7]
EK1TP-1119	.85 GPH	90.4	106[8]
EK1TP-140	1.0 GPH	89.9	123[8]

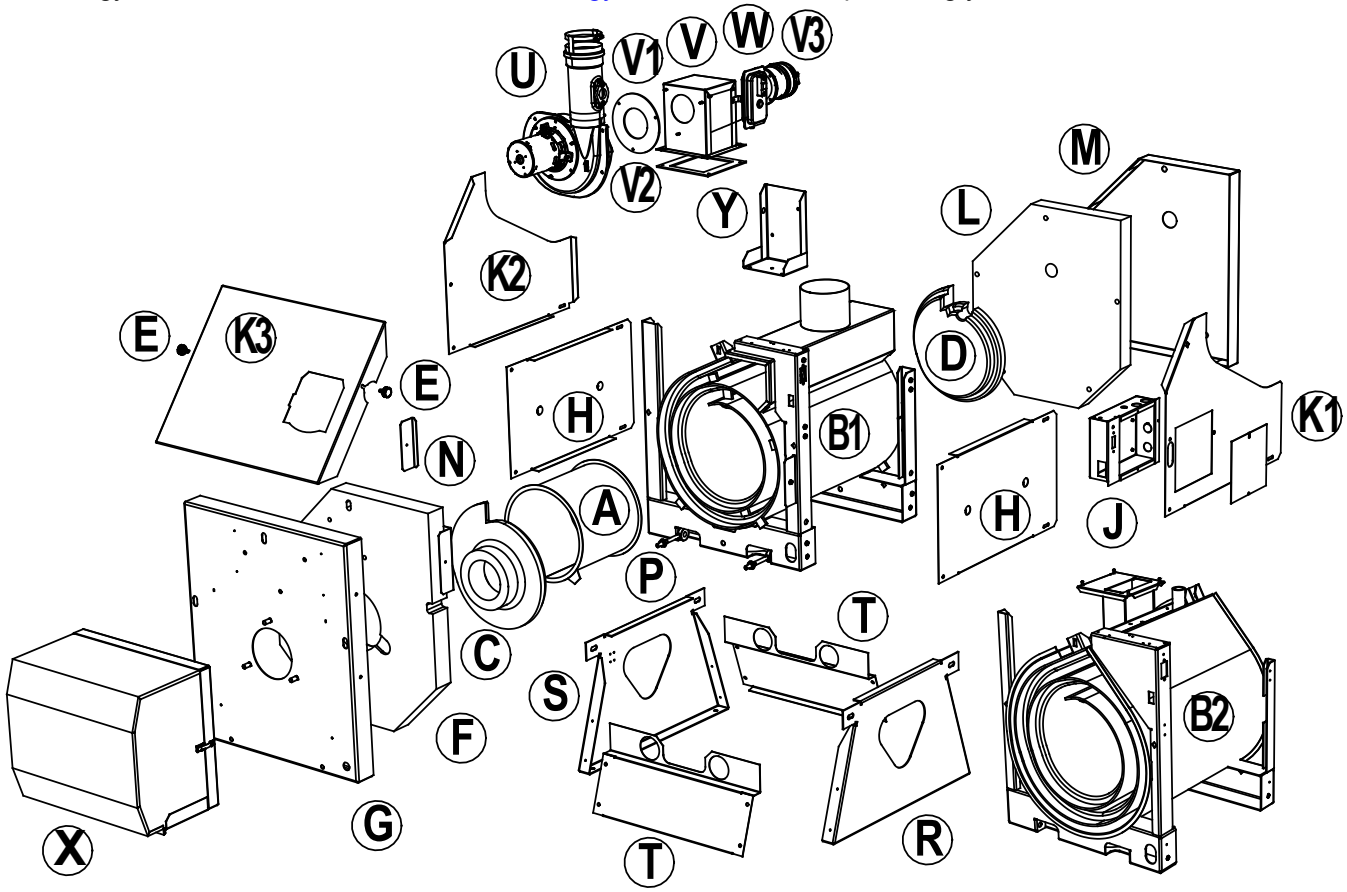
Notes:

1. MBH refers to thousands of Btu per hour.
2. Based on 138,700 Btu per gallon
3. Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 11.7% CO_2.
4. Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 10.6% CO_2.
5. Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 12.5% CO_2.
6. Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 11.9% CO2.
7. Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 12.1% CO2.
8. Based on standard test procedures prescribed by the United States Department of Energy at combustion condition of 12.2% CO2.

AFUE Test Conditions: Room Conditions: 95-99°F; Return Water Temperature 120-120.5°F; Flow adjusted to achieve 19.0-19.5° dT; Fuel Adjusted after refractory burn-off for 30 minutes

REPLACEMENT PARTS

Obtain replacement parts from your local Energy Kinetics dealer.
Contact Energy Kinetics at 908-735-2066 or www.energykinetics.com for help locating your nearest authorized dealer.



ITEM	EK1T PART NO.	DESCRIPTION	ITEM	EK1T PART NO.	DESCRIPTION
A	10-0828	Combustion Chamber (Stainless)	N	10-0833	Front Board Clip (ea)
B1	10-0825	Energy Converter (Ascent)	P	10-0726	Door Hinge Assembly (ea.)
B2	10-0825-P	Energy Converter (Ascent Plus)	R	10-0827-RL	Base Right Leg
C	10-0831	Front Liner Board	S	10-0827-LL	Base Left-Leg
D	10-0832	Rear Liner Board (PacMan)	T	10-0827-FP	Base Front/Rear Panel (ea)
F	10-0829	Front Insulation Board 2”	U	10-0330-R	EK1 Resolute Inducer
G	10-0826-F	Front Cover	V	10-0826-V	Inducer Mount
H	10-0826	Left & Right Lower Side Jacket	V1	10-0826-V1	Inducer Gasket
J	10-0826-JB	Junction Box	V2	10-0826-V2	Inducer Mount Gasket
K1	10-0826-TR	Right Side Top Jacket	V3	10-0826-V3	Inlet Air Adapter w/Gasket
K2	10-0826-TL	Left Side Top Jacket	W	10-0682	Fan Prover
K3	10 0826-TF	Front Panel Top Jacket	X	10-1700-AB	Silent Air Box Kit
L	10-0830	Rear Insulation Board 2”	Y	10-0826-HB	EK1T Hydrostat Mounting Bracket
M	10-0826-B	Rear Cover			

COMMON ITEMS AVAILABLE BUT NOT SHOWN

PART NO.	DESCRIPTION
10-0434H	Air Vent, 1/2” with ¾” bushing
10-0178	Puff Switch
10-0599	Ascent Hydrostat w/Sensor w/o Well
10-0597	Hydrostat Well, ½” NPT
10-0568F	TACO 007e ECM Circulator
10-0705	Amulet Carlin EZ1

PART NO.	DESCRIPTION
10-0465	Primary Control w/Oil Valve On-Delay
10-0420	T&P Gauge
10-0933	Cartridge for Smart Filter
10-0132	Flexible Oil Line
10-0904	Filter Bracket w/Mounting Hardware
10-0447	#18 Plate Heat Exchanger

SYSTEM 2000
ENERGY KINETICS

LIFETIME LIMITED WARRANTY
For Residential Water Boilers

By this Warranty Statement, Energy Kinetics, Inc of Clinton Township, New Jersey, issues limited warranties subject to terms, conditions, exceptions and exclusions listed below.

These Warranties are issued only to the person or entity which owns the building in which the boiler is installed at the time of original installation and only for such portion of the warranty periods as such person or entity owns such building (hereinafter, the "End User").

I. THREE YEAR –LIMITED WARRANTY FOR RESIDENTIAL WATER BOILERS

Energy Kinetics warrants that its residential heating system Ascent Combi and Ascent Plus Combi, with residential water boiler, Model EK1T or Model EK1T+, is free from defects in material and workmanship for three years from the date of installation. If any parts are found to be defective in manufacture, Energy Kinetics will repair or replace the defective parts. Exception: Honeywell Zone Valves

II. ADDITIONAL COMPONENT LIMITED WARRANTIES

1. Energy Kinetics hereby assigns to the End User limited warranties of the original manufacture of components supplied by Energy Kinetics to the extent or duration assignable.
2. If any such component is found defective, Energy Kinetics' responsibility is solely to repair or replace the defective part at its or the original manufacturer's option.

LIMITED LIFETIME WARRANTY FOR THE PRESSURE VESSEL

During the lifetime of the original owner in the original place of installation, Energy Kinetics warrants that those parts, which comprise the pressure vessel of the residential hot water boiler, remain free of defects in material or workmanship under normal usage.

In the event that such pressure vessel is found to be defective in material or workmanship during the first 10 years, Energy Kinetics will repair or replace the pressure vessel at its option. After 10 years, there will be a proportionate charge based upon the time the defective assembly was in service. The proportionate charge will be equal to the appropriate percentage of the trade list price of such pressure vessel at the time the warranty claim is made as determined in the following:

YEAR:	**1st**	**11th**	**12th**	**13th**	**14th**	**15th**	**16th**	**17th**
				Percent of Trade list Price:				
	0%	**5%**	**10%**	**15%**	**20%**	**25%**	**30%**	**35%**
YEAR:	**18th**	**19th**	**20th**	**21st**	**22nd**	**23rd**	**24th**	**25th**
				Percent of Trade list Price:				
	40%	**45%**	**50%**	**55%**	**60%**	**65%**	**70%**	**75%**

YEAR: 25TH and Above: 75% of Trade list Price

IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THE EXPRESS WARRANTY-ENERGY KINETICS EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY.

This Warranty gives you specific legal rights and you may have, also, other rights which vary from state to state.

EXCEPTIONS AND EXCLUSIONS

1. The warranty is subject to the condition that the residential boiler must have been installed and serviced in accordance with Energy Kinetics instructions, the Building Codes, local statutes and ordinances and accepted good industry practice.
2. This warranty does not cover components that are part of the heating system but which were not furnished by Energy Kinetics.
3. This warranty does not cover the workmanship of any installer of Energy Kinetics residential water boiler. In addition, it does not assume any liability of any nature for unsatisfactory performance caused by improper installation.
4. This warranty does not cover improper burner adjustments, control settings, care or maintenance.
5. This warranty does not cover any labor for removal or reinstallation of the alleged defective part, transportation to Energy Kinetics if necessary and other materials necessary to perform the exchange.
6. This warranty does not cover failure of the pressure vessel other than defects in material or workmanship and shall specifically exclude any other reason including but not limited to a) lack of water b) freezing c) excessive pressure d) floods e) fire f) acts of God g) corrosion of internal or fireside surfaces h) improper water conditioning I) improper maintenance of external fireside surfaces j) operation with defective fuels or other additives which cause improper burner operation or deposits to collect or corrosion to occur in or on the pressure vessel.

LIFETIME LIMITED WARRANTY

(Continued from Previous Page)

7. Systems installed with chimneyless, through the wall venting option may have less than complete or poor combustion which may cause sooty fumes, odors or gradual discoloration of the area near the vent (exhaust) outlet. Poor combustion is generally the result of a burner being out of adjustment for a number of reasons, including but not limited to fuel condition and combustion air supply. Energy Kinetics does not guarantee nor warranty that all times the exhaust contents will be without a trace of soot or odor for reasons described above. Periodic cleaning and repainting of the area around the vent hood may be required if the appearance is objectionable in the view of the end user. Such cleaning or repainting is not the responsibility of the service company, installer or manufacturer.

LIFETIME LIMITED WARRANTY TRANSFER

By completion of the Lifetime Limited Warranty Transfer Agreement, the original owner may transfer the warranty to a new owner by payment of a $75 registration fee.

WARRANTY SERVICE

For prompt warranty service, notify the installer who in turn will notify Energy Kinetics that the purchaser believes there is a defect in material or workmanship covered by this warranty statement.

If within 30 days of the discovery, this action does not produce a prompt response, notify Energy Kinetics, Inc. 51 Molasses Hill Road, Lebanon, NJ 08833, in writing with details to support the warranty claim.

The End User is required to make available for inspection by Energy Kinetics or its representative, the parts claimed to be defective and, if requested by Energy Kinetics, to ship said parts prepaid to Energy Kinetics at the above address for inspection or repair. In addition, the homeowner agrees to make all reasonable efforts to settle any disagreement arising in connection with this claim before resorting to legal remedies in courts. If you have any questions about the coverage of this warranty, contact Energy Kinetics at the above address.

Lifetime Limited Warranty Transfer Agreement

(I/We), the undersigned, as the original purchaser of the **Model EK1T or Model EK1T+** home heating system, submitted the *Warranty Registration* within three (3) months of installation of (my/our) **Model EK1T or Model EK1T+** to Energy Kinetics, Inc., and (I/we) hereby transfer our Lifetime Limited Warranty to the new owner(s) of the home located as noted below and understand a thirty (30) day waiting period applies. Warranty coverage begins on the date of original installation.

Model EK1T or Model EK1T+**Serial Number:**_____ **Date of Original Installation:**_____

Name of original purchaser of **Model EK1T or Model EK1T+**: _____
Print or Type full Name(s)

Located at this street address: _____

City: _____ State: _____ Zip: _____

TRANSFER TITLE of ENERGY KINETICS' WARRANTY TO: _____
Print or Type full Name(s)

New Owner(s) of the **Model EK1T or Model EK1T+** located at the address noted above. Title to be effective, _____ and continues uninterrupted coverage as is left on the original warranty.
Enter Date of Title Transfer

(Example: If the original owner has used 9 years, 3 months and 10 days of the warranty, the new homeowner warranty transfer begins at 9 years, 3 months and 11 days and continues to the end of the warranty as described on the back of this agreement or until the new homeowner sells the residence).

Enclosed is a check for $75.00 to register and maintain the warranty as described on the back of this Warranty Transfer Agreement to the new homeowner named above. Please make check payable to Energy Kinetics, Inc.

Agreed to by the Original Homeowner: _____ Accepted: _____
Original Homeowner Signature New Homeowner Signature

********** For Office Use Only **********

Energy Kinetics, Inc. Received Transfer Information: _____ $75.00 Received _____ Check No. _____
Date Received and Registered

Confirmation of Transfer mailed to New Homeowner: _____ By: _____
Date Office Personnel