



Accel CS™

Gas Fired Hot Water Boiler

EK1C, EK2C, EK3C



INSTALLATION & SERVICE MANUAL

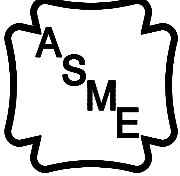
Manufactured By:
Energy Kinetics, Inc.
 51 Molasses Hill Road
 Lebanon, NJ 08833
 (908) 735-2066
www.energykinetics.com

GAS-FIRED

LISTED
 MH27877
 ANSI Z21.13b-2012
 Low-Press Boiler
 2MF1


 This product meets the
 Energy Star® guidelines
 for efficiency.


 National Board
 Listed


H
 ASME certified by EKI.
 Certificate plate is on the
 front center of the vessel.

INSTALLER: PLEASE HANG THIS INSTRUCTION MANUAL AND ACCESSORY INSTRUCTIONS VISIBLY NEXT TO THE BOILER USING THE SUPPLIED POUCH.
CONSUMER: PLEASE RETAIN 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:** Notifies you of recommendations made by Energy Kinetics for the installers, which will help ensure optimum operation and longevity of the equipment.

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 gas appliance.
Provide unobstructed combustion air openings sized and located per boiler manual and applicable codes.

WHAT TO DO IF YOU SMELL GAS

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

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

- 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 burner/boiler.
- 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.

General care and maintenance

- 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.
- Periodically 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.

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 gas 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).

FOR YOUR SAFETY READ BEFORE OPERATING


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

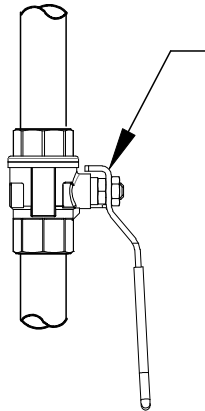
- A. This burner does not have a pilot. It is equipped with an ignition device which automatically lights the burner. **DO NOT** try to light the burner by hand.
- B. BEFORE OPERATING, smell all around the boiler area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
 - Do not touch any electric switch; do not use any phone in your building
 - Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to turn the gas "shutoff" valve. Never use tools. If the handle will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
 - D. Do not use this 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 and any gas control, which has been under water.


OPERATING INSTRUCTIONS

1. Read the safety information above.
2. Set the thermostat(s) and aquastat(s) to their lowest setting.
3. Turn the service switch located on the front panel "OFF".
4. This burner is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Turn the external **manual gas valve** handle clockwise  to the "CLOSED" position (valve handle will be perpendicular to gas piping).



External manual gas shutoff valve, supplied by installer.

A typical ball valve is shown, some models do not have a handle, your installation may vary.

6. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, **STOP!** Follow the safety information above. If you don't smell gas, go to the next step.
7. Turn **manual gas valve** handle counterclockwise  to the "OPEN" position (valve handle will be parallel to gas piping).
8. Set thermostat(s) and aquastat(s) to desired setting.
9. Turn on all electric power to the burner and boiler.
10. If the burner/boiler will not operate, follow the instructions "TO TURN OFF GAS TO THE BURNER" below and call your service technician or gas supplier.

TO TURN OFF GAS TO THE BURNER


1. Set thermostat(s) to their lowest setting.
2. Turn the service switch on the Accel CS front panel "OFF".
3. Turn the external **manual gas valve** handle clockwise  to the "CLOSED" position.

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RECORD OF INSTALLATION

INSTALLER NAME: _____

INSTALLER ADDRESS: _____

INSTALLER CITY, STATE: _____

DATE INSTALLED: _____

NOTES: _____

SCOPE

This manual covers the Energy Kinetics Accel CS 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, 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

Canadian Electrical Code, Part I

A.N.S.I. / N.F.P.A. No. 211: Chimneys, Fireplaces, Vents and Solid Fuel Burning Appliances

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 backflow 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.

Accel CS BOILER

IMPORTANT MESSAGE TO HOMEOWNER: These instructions should be carefully read and kept for future reference to gain the best performance from your Accel CS boiler.

CONGRATULATIONS ON YOUR PURCHASE OF THE Accel CS BOILER with its highly efficient condensing low mass hydronic heat exchanger, modulating burner and state of the art zone and domestic hot water control. 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. This operation and maintenance information has been prepared so that you may better understand and use your Energy Kinetics Accel CS boiler and Heating System.

The Accel CS Boiler basically consists of a heat source (gas burner with control), an energy converter, piping, sheet metal chassis and outer covers. For a typical residence, the installation may include a circulating water pump and up to five zones controlled by the electronic Condensing Heat and Hot Water Hybrid Energy Recovery Control (Condensing Energy Manager). For a typical multi-boiler light commercial situation, the installation may include a multi-boiler control along with the appropriate primary/secondary piping. To support both types of installations, Energy Kinetics provides suggested piping and wiring schematic drawings, which will be provided upon request. For any questions about installations not already explained within this manual, consult Energy Kinetics Tech Support at 800-323-2066.

Accel CS BOILER - PRINCIPLE of OPERATION

The Boiler remains cold until a thermostat calls for heat. The Condensing Energy Manager receives the call for heat and opens the respective heat or hot water zone and turns on the main circulator and burner. When the thermostats are satisfied, the Condensing Energy Manager turns off the burner and enters the energy recovery stage. The circulator and zone (zone valve or zone circulator) stay energized to deliver the heat remaining in the boiler to your home.

When energy recovery is complete and the Boiler has cooled off, the Condensing Energy Manager turns off the system and waits for another thermostat (or tank thermostat) to call for heat. The Accel CS runs the burner only when you need heat and delivers that heat only where you need heat.

The Accel CS Energy Converter is the product of advanced thermal engineering. It is designed with thirty seven fire tubes, optimized to produce the maximum condensation with water side baffles to direct hydronic water flow and improve heat transfer. This is a "forced circulation counter-flow" design that 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.

The Accel CS has an extremely high annual efficiency (over 99% of steady state) because it runs only when your home needs heat. Energy recovery is completed at the end of each heat call, virtually eliminating off cycle losses.

Your Accel CS holds a small volume of water and it begins to supply heat very quickly. Maximizing condensing operation by operating with lower boiler temperatures during warmer outdoor weather can cause longer and slower responses to thermostat calls. The innovative SmartBoost™ function accelerates the response to recovery from thermostat night setbacks for enhanced comfort and savings. Depending on the model, the Accel CS can heat water with input rates of up to 399,000 BTU's per hour.

The Accel CS boiler is designed with a removable burner flange and condensate collector that allows access to the inside of the boiler for inspection and cleaning. All access for service is from the front, top, and bottom and the Accel CS boiler may be floor mounted on a stand, or may be optionally mounted on a wall.

CONDENSING ENERGY MANAGER - PRINCIPLE of OPERATION

The left side of the Condensing Energy Manager is the input side, which provides 24-volt power supply and connections for thermostats. The right side is the output side, which powers the zone valves or zone circulators and signals the burner and main circulator control.

Lights on the Condensing Energy Manager indicate what is calling for heat on the left side and the right side lights indicate active zone(s), burner operation and Smart Pump and/or Injection zone operation. These function lights are an aid in servicing. The following is a typical cycle.

1. **SYSTEM WAITING FOR A CALL:** There is not an active thermostat call, and the boiler is off and remains cold, waiting until a call for heat. The blue power light on the Condensing Energy Manager is glowing.
2. **CALL FOR HEAT:** A room thermostat call starts the cycle. The thermostat light on the left side will turn on for that zone.
3. **HEAT:** Output lights for the zone output and heat demand turn on, the main circulator starts, the zone opens and the burner begins its firing cycle with pre-purge followed by ignition. The boiler water circulates through the boiler and the active zone, heating up the water and the connected radiation. The controls include the option for outdoor reset and will set the boiler supply temperature as needed based on the outdoor temperature and the outdoor reset settings.
4. **HOT WATER CALL:** A hot water call is similar to a heat call, except hot water is most effectively and efficiently produced and delivered when the boiler supply temperature is between 165°F and 180°F. For this reason, upon a call for domestic hot water, the supply set point temperature of the Accel CS boiler is increased to 182°F. The boiler will heat up the boiler side of the plate heat exchanger. Once the boiler supply temperature has reached 140°F, the domestic hot water circulator is turned on. With domestic water pumping through the domestic side of the plate heat exchanger and boiler water pumping through the boiler side of the plate heat exchanger, the water in the storage tank will be heated quickly and efficiently. The temperature of the domestic water coming out of the plate heat exchanger is determined by the flow rate of the domestic water. Partially close the ball valve below the smart pump to reduce the flow and increase the temperature, or partially open the ball valve below the smart pump to increase the flow and decrease the temperature. The plate heat exchanger is so effective at heat transfer that this operating temperature still allows a high level of condensation of the flue gas for peak efficiency. Note that this is much more effective than a tank with an internal coil during heating and in the Energy Recovery Cycle. The burner runs as long as there is a thermostat calling and as long as heat is being delivered to the zone. Hot water priority is always active during a hot water call, so the heating zone outputs will be turned off for the duration of the hot water call or up to 25 minutes, whichever comes first.
5. **THERMOSTAT SATISFIED:** The thermostat light on the left side will go out. The burner will then turn off.
6. **ENERGY RECOVERY:** The circulator and zone valve remain energized. The circulating water will remove the energy from the boiler, sending the heat to the last zone that called. The energy recovery stage continues until the boiler temperature has dropped sufficiently or until maximum timing has been reached. The boiler is now sitting cold, waiting for the next call for heat. Maximum timing for heat recovery stage is twenty minutes for space heating zones and is five minutes for the hot water zone. Zone four has the option to shorten maximum heat recovery timing to five minutes.

RECEIVING and UNPACKING

Inspect shipment upon receipt for external damage. Further inspect any items that appear damaged by opening shipping packaging before signing for the freight. Refuse any individual shipping cartons or packages that are damaged or appear to be damaged. Contact Energy Kinetics and freight carrier.

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 during installation. Any claims for damage or shortage in shipment must be filed immediately against the transportation company by the consignee.

CLEARANCE to COMBUSTIBLES and SERVICE

Due to the low stack temperature of the condensing boiler, the Accel CS boiler may be installed with zero clearance to combustibles. Specifically, with zero clearance to top, bottom, left, right, front and back.

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

NOTICE: Do not install on carpeting. Place the unit as near to the vent as possible allowing clearance for cleaning and service. If not using an Energy Kinetics supplied stand or wall mounting brackets, provide a solid, level, smooth foundation with clearance for opening covers for service and enough space under the unit for the condensate trap.

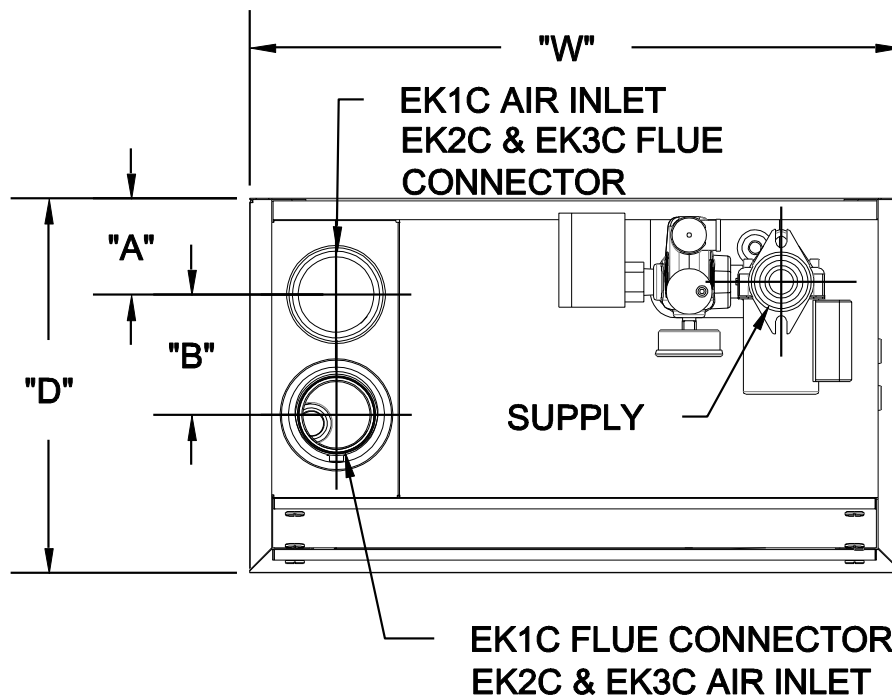
NOTICE: When determining boiler location, consider hydronic piping, venting, air intake and wiring.

Installation Clearances from Boiler Surfaces, Inches	Clearance to Combustibles	Clearance for Service
Front of boiler	0 inches	20 inches
Left side of boiler body	0 inches	0 inches
Right side of boiler body	0 inches	0 inches
Back of boiler body	0 inches	1 inch
Top of boiler body	0 inches	20 inches
Bottom of boiler chassis to floor (Without boiler base)	0 inches	12 inches*
Stainless Steel Vent Pipe (Z-Flex Z-Vent III)	Refer to Manufacturer Specs.	Refer to Manufacturer Specs.
Polypropylene (Centrotherm & DuraVent)	Refer to Manufacturer Specs.	Refer to Manufacturer Specs.
PVC and CPVC Vent Pipe	Not Recommended	Not Recommended

*Minimum recommended clearance to allow a condensate trap/neutralizer/pump.

Boiler Weight, Water Content, and Connection Sizes							
Model	Weight, dry	Weight, filled with water and w/stand	Water Content, Gallons	Supply and Return Pipe Size	Air Inlet Size	Boiler Flue Outlet Size	Gas Inlet Pipe Size
EK1C	197 lbs.	267 lbs.	5	1" NPT	3"	3"	3/4" NPT
EK2C	275 lbs.	377 lbs.	6-1/2	1-1/4" NPT	4"	4"	3/4" NPT
EK3C	360 lbs.	512 lbs.	12	1-1/2" NPT	4"	4"	1" NPT

Figure 1A - Boiler Dimensions - Top View



DIMENSIONS								
Model	"H"	"HT"	"HB"	"W"	"D"	"D2"	"A"	"B"
EK1C	40-5/8"	4-5/8"	12"	25-7/8"	15"	10"	3-7/8"	4-13/16"
EK2C	45-3/8"	6-1/2"	12"	28-1/8"	18-1/2"	10"	5-1/8"	6-1/2"
EK3C	47-1/4"	5-1/2"	12"	32"	22-3/8"	10"	4-5/8"	10"

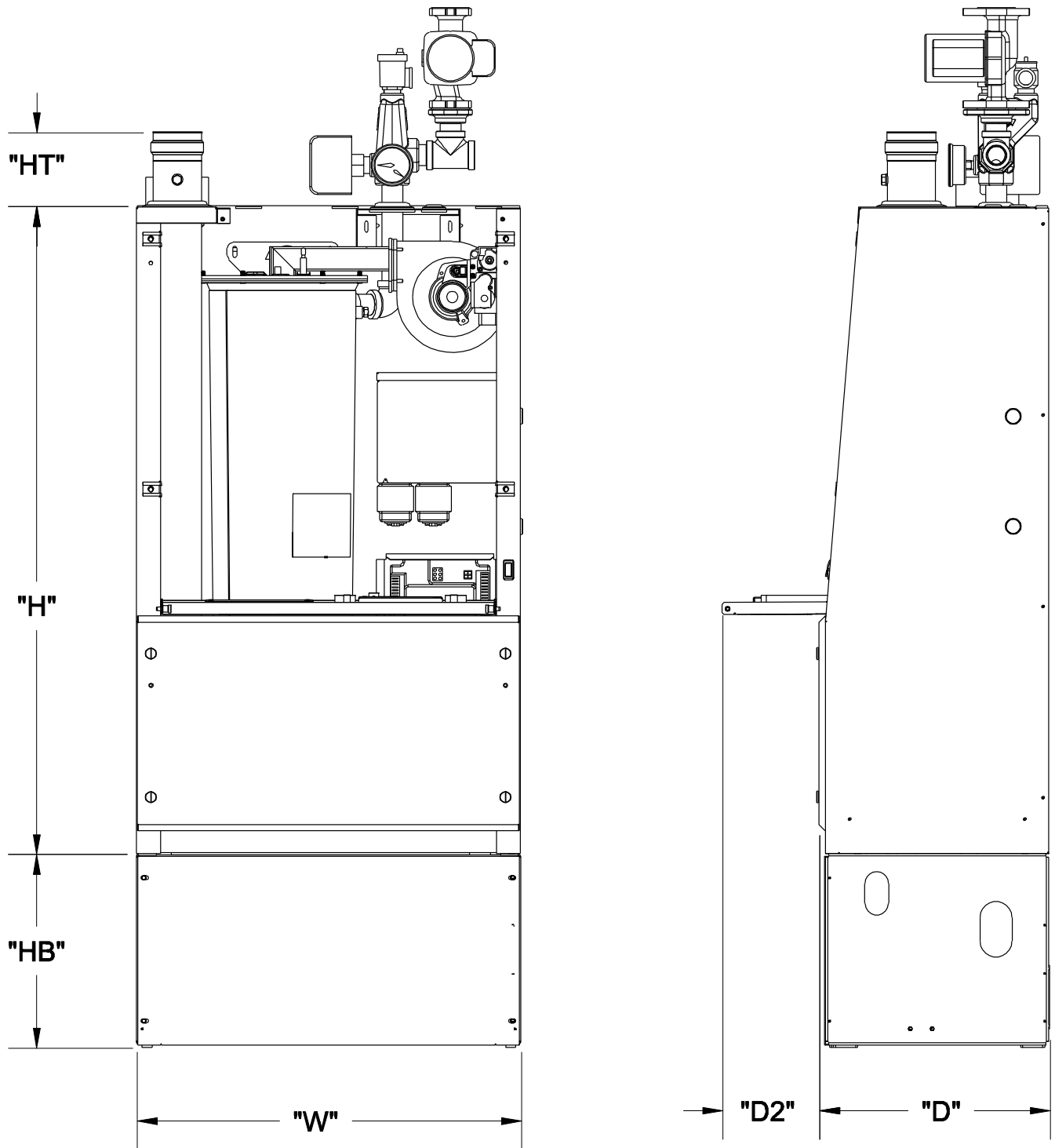


Figure 1B - Boiler Dimensions - Front and Side Views

Model	Firing Rate Range	Max In (BTUs)	Min In (BTUs)	Max Out (BTUs)	Min Out (BTUs)
EK1C	Standard	120,000	24,000	114,000	22,800
	“Smart” Rate	90,000	18,000	85,500	17,100
EK2C	Standard	200,000	40,000	190,000	38,000
	“Smart” Rate	150,000	30,000	142,500	28,500
EK3C	Standard	399,000	79,800	379,050	75,810
	“Smart” Rate	300,000	60,000	285,000	57,000

VENTING and COMBUSTION AIR

Overview

The Accel CS boiler is a direct vented condensing boiler. Venting of the flue gases requires approved vent piping listed herein. Fresh air for combustion must be supplied to the boiler from outdoors using approved intake piping listed below. The boiler cabinet doors must be in place and tightened during normal operation. When venting through the side of a building, fresh air intake and flue gas venting must enter and exit on the same side of the building. When venting through a chimney (where the chimney is used as a chase for a liner rated for positive pressure condensing operation), fresh air can be piped alongside the liner inside the chimney chase or fresh air can also be taken from outdoors on any side of the building.

The Accel CS boiler can be vented using the Energy Kinetics stainless steel sidewall vent system using Z-Vent III stainless steel piping for the vent connections. The Energy Kinetics stainless steel sidewall vent system has been used for many years to vent the System 2000 family of boilers and has a proven track record of operation.

The Accel CS boiler can also be vented using approved polypropylene venting systems such as manufactured by Centrotherm and by DuraVent. The Accel CS boiler may not be vented using PVC, CPVC, or ABS piping.

NOTICE: Pipe the combustion Air Inlet directly to the outdoors, even if venting vertically through a liner inside a chimney chase to avoid any of the contaminations often found in indoor air and to improve overall efficiency of operation. Piping combustion air from outside will also stabilize the flame (particularly during light offs), make the unit more resistant to the effects of negative indoor pressures, and will provide a significant reduction in combustion noise.

The installation of the flue vent and combustion air piping must comply with local codes and requirements and with the National Fuel Gas Code NFPA 54, ANSI Z223.1 for installations in the USA or with CSA B149.1 or B149.2 for installations in Canada.

NOTICE: The Accel CS boiler requires a special venting system designed for pressurized venting rated ANSI Z21.13 Category 4. As such, the flue gas will condense in the flue and provision must be made to accommodate this.

DANGER: All flue piping must be tightly sealed as per the pipe manufacturer’s recommendation to insure against leakage of noxious fumes, deadly carbon monoxide and/or condensate water.

WARNING: Sidewall venting (direct vent) requires outside air to be piped directly to the boiler.

WARNING: No solid fuel appliance or fireplace should be installed in a flue common with this heating appliance.

WARNING: You may use any of the vent and air piping options covered in this manual. Do not use any other method or material when installing this appliance.

WARNING: Do not insulate the plastic flue pipes as excessive sagging of the plastic sections could result.

REMOVAL from COMMON VENT SYSTEM

DANGER: When any existing appliance, such as a boiler, is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it. Testing of the remaining venting system must be performed according to the following procedure.

At the time of removal of the existing appliance, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors and windows, and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage after five minutes of main burner operation. Use a draft gauge or pressure gauge to verify that the vent pipe at the breach of the appliance is under draft (negative pressure) relative to the room.
6. Repeat steps 4 and 5 for each appliance connected to the common venting system, one appliance at a time.
7. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.
8. Any improper operation of the common venting system should be corrected so the installation conforms to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CGA B149 Installation Codes. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CAN/CGA B149, Installation Codes.

LENGTH of RUN, INTAKE and VENT

Model	Inlet & Outlet Pipe Size	Maximum Length*
EK1C	2"	50 Feet
	3"	100 Feet
EK2C	3"	50 Feet
	4"	100 Feet
EK3C	3"	50 Feet
	4"	100 Feet

*Air Inlet and Vent Pipe:

Subtract 5 feet from the maximum length for each elbow added. A total equivalent length of 50 feet is allowed. For example, if (5) ninety degree elbows are used, subtract 5 x 5 ft. = 25 feet from the maximum of 50 equivalent feet, for a maximum of 50 ft. – 25 ft. =25 feet of straight pipe allowed.

Fan Speed Set Guide:

Use the following chart to select the optimal fan speed range based on your venting parameters.

Vent Size	LPG	Standard RPMs		Alternate RPMs		Natural Gas	Standard RPMs		Alternate RPMs	
		Low	High	Low	High		Low	High	Low	High
2" Venting	EK1C	Low	High	Low	High	EK1C	Low	High	Low	High
	15'	1400	6000	1200	4600	15'	1500	6200	1300	4800
	25'	1500	6200	1200	4800	25'	1600	6400	1300	5000
	50'	1600	6500	1200	5000	50'	1600	6700	1300	5200
3" Venting	EK1C	Low	High	Low	High	EK1C	Low	High	Low	High
	15'	1300	5900	1200	5600	15'	1300	6200	1200	5900
	25'	1300	6000	1200	5700	25'	1300	6200	1200	5900
	50'	1400	6100	1300	5800	50'	1300	6300	1300	6000
	75'	1400	6100	1300	5900	75'	1400	6400	1300	6100
	100'	1500	6200	1400	6000	100'	1400	6400	1300	6100
	EK2C	Low	High	Low	High	EK2C	Low	High	Low	High
	15'	1200	5100	1000	4100	15'	1300	5600	1100	4300
	25'	1200	5300	1000	4200	25'	1300	5700	1100	4400
	50'	1300	5500	1100	4300	50'	1300	5800	1100	4500
	75'	1400	5700	1100	4400	75'	1400	5900	1200	4600
	100'	1400	5800	1100	4500	100'	1400	6000	1200	4700
	EK3C	Low	High	Low	High	EK3C	Low	High	Low	High
	15'	1500	6400	1000	4800	15'	1500	6800	1200	5200
25'	1500	6500	1100	5100	25'	1500	7100	1200	5400	
50'	1600	6600	1100	5200	50'	1600	7200	1300	5600	
4" Venting	EK3C	Low	High	Low	High	EK3C	Low	High	Low	High
	15'	1400	5900	1000	4500	15'	1500	6400	1200	4800
	25'	1400	6000	1100	4600	25'	1500	6600	1200	5000
	50'	1400	6000	1100	4600	50'	1500	6600	1200	5200
	75'	1400	6100	1200	4700	75'	1500	6700	1200	5400
100'	1400	6200	1200	4800	100'	1500	6900	1200	5600	

Vent Pipe Joint Connections

- WARNING:** Joint connections not meeting full insertion can leak, causing severe personal injury, death or substantial property damage.
- DANGER:** Fasteners (screws, rivets, etc.) must not penetrate the components of the vent system either when joining pipes and fittings or using support straps. Drilling holes in the components is not permitted. Exception: For exterior components only, one stainless steel screw per joint may be used to fix direction of vent.
- CAUTION:** Damaged gaskets can cause leakage of dangerous levels of carbon monoxide or property damage due to condensate leaks.

Each female end of each component uses a gasket installed by the vent manufacturer. Check each component to ensure the gasket is present and not damaged from shipping.

Stainless Steel: Pipe insertion at joint must be at least 1.75" minimum
Gear clamps must be tightened to a minimum of 40 in/lbs. with a maximum of 50 in/lbs.

WARNING: Over tightening the gear clamp can cause the seal to fail. DO NOT use power tools when tightening gear clamps.

Polypropylene: Locking rings must be used at each interior connection to meet the requirements of ULC-S636 & UL-1738.

SIDEWALL VENT LIMITATIONS

The Accel CS boiler and the vent system must be carefully installed, adjusted and maintained. It should be annually checked and adjusted if necessary.

The conventional chimney can absorb, unseen, the many things that can go wrong with a combustion system such as poor ignition, improper air adjustment, accumulation of pet hair or lint on the inlet shutter, component malfunctions, improper setup or installation, etc.

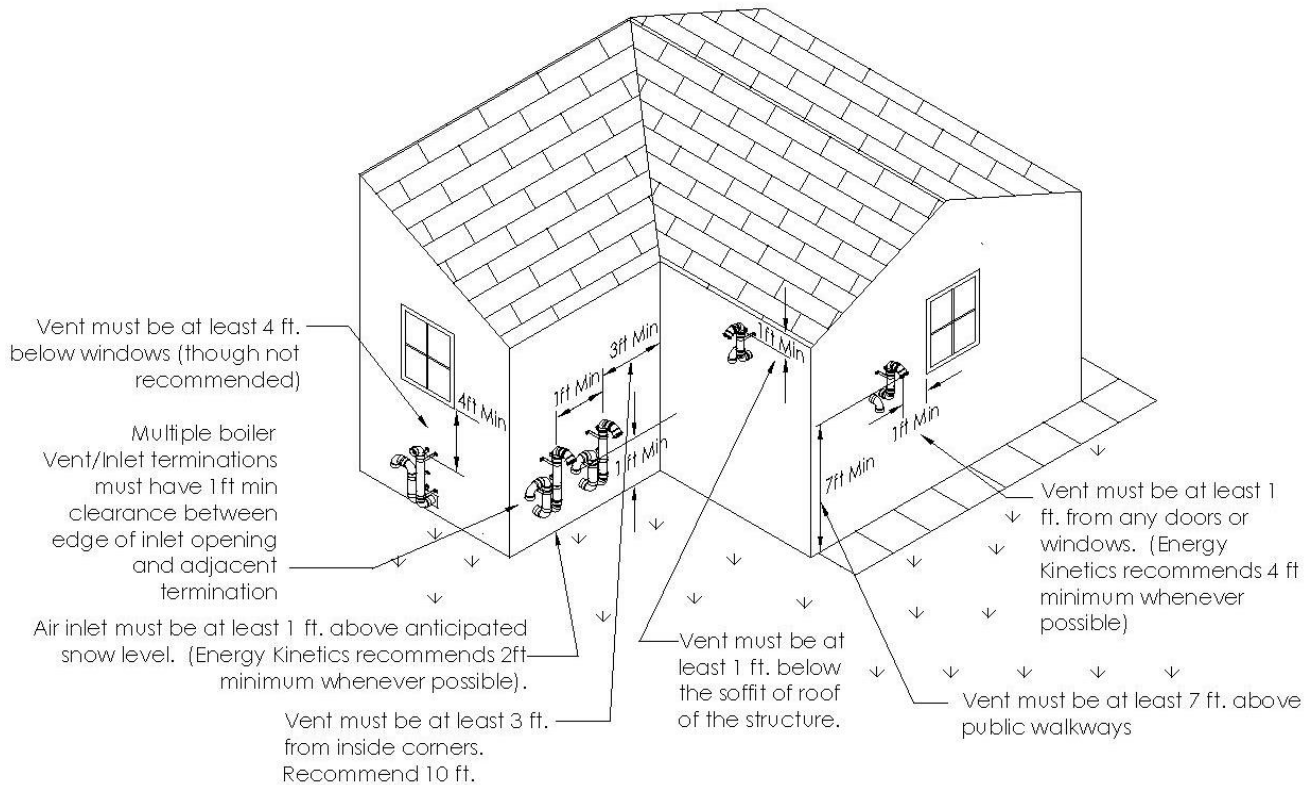
With sidewall venting, the effect of these conditions can result in an exhaust that may contain odors or incompletely burned fuel. These flue products, while still effectively discharged outside the home, may cause discoloration to siding or areas immediately surrounding the vent. The flue by-products may be corrosive and can cause damage to nearby objects such as condensers, playground equipment, landscaping, shrubs, etc. The exhaust may emit odors similar to a poorly tuned car exhaust. This would normally not be apparent when discharged from a chimney well above the roofline.

No one can guarantee that at all times the exhaust will be without a trace of odor or corrosive by-products for all the reasons described above which may be beyond the control of the homeowner, manufacturer, installer or service company. Periodic cleaning of the area around the vent may be required if the appearance is objectionable in the view of the homeowner. This cannot be the responsibility of the manufacturer, installer or service company.

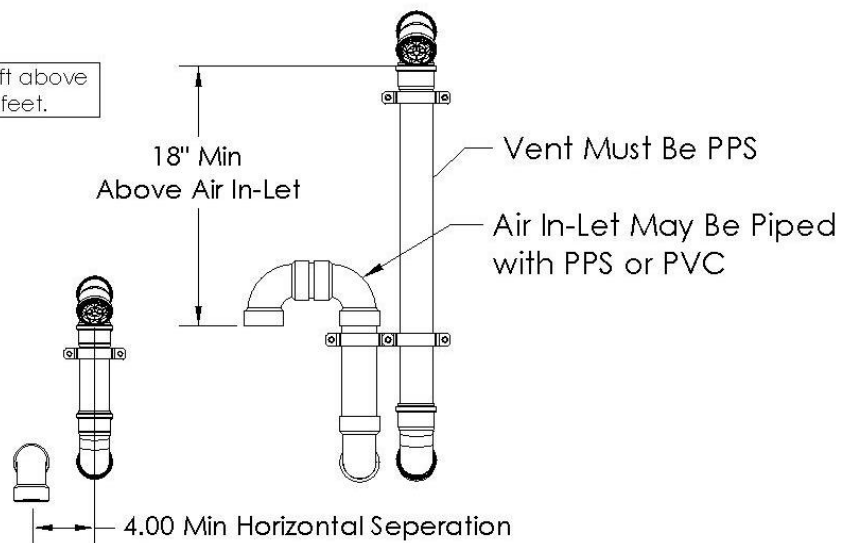
VENT OUTLET LOCATION

The hood or exhaust pipe should be located so that proper clearances are maintained, according to local code. Per the National Fuel Gas Code NFPA 54 ANSI Z223.1, the flue gas outlet termination of a direct vent application with an input over 50,000 Btu/hr. shall be located at least 1 ft. from any door, window, or air inlet to the structure.

TWO PIPE SIDEWALL VENT/INLET TERMINATION LOCATION REQUIREMENTS



Vent termination must be at least 3ft above any forced air intakes within 10 feet.



Note that the Accel CS boiler meets the definition of a direct vent appliance as used in NFPA 31 & NFPA 54. Regardless of input, the flue gas outlet terminal and air intake shall be located at least 1 ft. above grade or at least 1 ft. above expected snow level, whichever is higher. Although not required, Energy Kinetics recommends at least 2 ft. above grade whenever possible. Both the vent hood and air intake must be at least 5 ft. from any supply tank vents.

The vent terminal shall not be installed closer than 3 ft. from an inside corner of an L-shaped structure and must be at least 1 ft. from the soffit of the roof of the structure.

VENTING MATERIALS and OPTIONS

The Accel CS boiler can generate exiting flue gas temperatures between room temperature and 230°F, depending on the modulated firing rate and the boiler water temperature. The Accel CS boiler can be safely vented using a variety of venting materials. Approved materials include stainless steel, such as 316, 316L, 316Ti or AL 29-4C. Plastic venting products made from polypropylene are approved. Plastic venting products made from other plastics, such as PVC, CPVC, or ABS are not approved. Any of the plastic pipe materials may be safely used for air intake piping, but not for venting.

The venting materials for the Accel CS boiler may be obtained from Energy Kinetics, from Z-Flex, from Centrotherm or from DuraVent. The Z-Flex, Centrotherm and DuraVent products may also be obtained from any stocking distributor that carries these products.

Where to obtain venting materials				
Manufacturer	Material	Product	Telephone	Web Address
Energy Kinetics	Stainless steel	Energy Kinetics EK1 or EK2 sidewall vent kit	800-323-2066	www.EnergyKinetics.com
Z-Flex	Stainless steel	Z-Vent III, 2", 3" or 4"	800-654-5600	www.novaflex.com
Centrotherm	Polypropylene	Innoflue, 2", 3" or 4"	877-434-3432	www.centrotherm.us.com
DuraVent	Polypropylene	PolyPro, 2", 3", or 4"	800-835-4429	www.duravent.com

Venting material must be listed by a nationally recognized testing agency.				
Manufacturer	Material	Agency	Minimum Thickness	
Energy Kinetics	Stainless steel	UL	0.020"	
Z-Flex	Stainless steel	UL	0.020"	
Centrotherm	Polypropylene	ETL	0.020"	
DuraVent	Polypropylene	ETL	0.020"	

Approved Vent and Air Inlet Pipe Material		
Item	Material	Standards
Appliance Adapter ¹	Stainless Steel (AL29-4C)	UL-1738
	Polypropylene	UL-1738 ULC-S636
Vent Pipe & Fittings ¹	Stainless Steel (AL29-4C)	UL-1738
	Polypropylene (PPs)	UL-1738 ULC-S636
Air Inlet Pipe & Fittings	PVC Schedule 40 ²	ANSI/ASTM D1785
	Polypropylene (PPs)	UL-1738 ULC-S636
	CPVC Schedule 40 ²	ASTM F441
	ABS Schedule 40 ²	ASTM F628
Notes:		
1. Only Stainless Steel and Polypropylene material permitted for Venting		
2. Use of PVC, CPVC, or ABS is only allowed for Air Inlet piping		

The Accel CS boiler may be vented using several different options, materials, and methods.

- 1) Energy Kinetics EK1 or EK2 sidewall vent kit using 3" Z-Vent III piping.
- 2) Sidewall venting using Polypropylene in 2", 3" or 4" diameters.
 - a) Two pipe with low profile termination (2" & 3" only).
 - b) Two pipe with snorkel termination.
 - c) Concentric through the wall (2/4", 3/5" or 4/6").
- 3) Vertically with Polypropylene in 2", 3" or 4" diameters.
 - a) Using a chimney as a chase.

WARNING: Sidewall vent systems must have outside air connected to the boiler and both intake and vent hood must be located on the same side of the structure. Vertically vented systems should have outside air connected to the boiler.

The Accel CS boilers have a flue collar made of Z-Vent III AL29-4C stainless steel - 3" on the EK1C / 4" on the EK2C & EK3C. If the boiler is vented using Z-Vent III stainless steel vent materials, then the venting may be directly connected to the flue outlet. If the boiler is vented using either of the two polypropylene materials, then a stainless steel to polypropylene appliance adapter is required. The fresh air inlet polypropylene pipe size at the boiler is 2" and 3" on the EK1C / 3" and 4" on the EK2C & EK3C. PVC pipe may be used for air inlet only. When using PVC for air intake, it may be necessary to adapt from PVC to polypropylene using the appropriately sized PVC to polypropylene adapter.

Item	Description	Energy Kinetics stocks and sells Centrotherm PPs Vent Items		DuraVent Part No.
		Energy Kinetics Part No.	Centrotherm Part No.	
1	3" Appliance adapter, stainless to PPs	10-1000	ISSA0303	N/A
1	3" Appliance adapter, stainless to PPs	10-0194	N/A	N/A
2	2" Intake adapter, PVC to PPs	10-1023	ISAGL0202	2PPS-AD
3	3" Intake adapter, PVC to PPs	10-1013	ISAGL0303	3PPS-AD
4	4" Intake adapter, PVC to PPs	10-1024	ISAGL0404	4PPS-AD
5	5" Intake adapter, PVC to PPs	10-1025	ISAGL0505	5PPS-AD

There are several parts that are used for all arrangements such as the locking rings needed for each joint, elbows, straight runs of pipe, etc. These common parts are listed here and will not be listed on any of the following arrangements.

Typical venting parts. Order additional venting parts as needed for the job.

Item	Description	Energy Kinetics stocks and sells Centrotherm PPs Vent Items		DuraVent Part No.
		Energy Kinetics Part No.	Centrotherm Part No.	
4	2" Locking ring, typical	10-1017	IANS02	2PPS-LB
5	2" Wall mount brackets	10-1020	IASC02	2PPS-WSM
6	2" Bird screen	10-1022	IASPP02	2PPS-BG
7	2" PPs elbow, 45°	10-1021	ISELL0245	2PPS-E45
8	2" PPs elbow, 87/90°, long radius, black	10-1016-B	ISELL0287UV	2PPS-E90B
9	2" PPs elbow, 87/90°, long, gray	10-1016	ISELL0287	2PPS-E90
10	2" PPs pipe, 2 ft long, black	10-1015-24B	ISVL022UV	N/A
11	2" PPs pipe, 3 ft long, black	N/A	N/A	2PPS-36B
12	2" PPs pipe, 3 ft long, gray	10-1015-36	ISVL023	2PPS-36
13	2" Low profile wall mount termination	10-1029	ISLPT0202	N/A
14	3" Locking ring, typical	10-1010	IANS03	3PPS-LB
15	3" Wall mount brackets	10-1009	IASC03	3PPS-WSM
16	3" Bird screen	10-1007	IASPP03	3PPS-BG
17	3" PPs elbow, 45°, black	10-1006	ISELL0345UV	3PPS-E45B
17	3" PPs elbow, 45°, gray	10-1001	ISELL0345	3PPS-E45
18	3" PPs elbow, 87/90°, long radius, black	10-1008	ISELL0387UV	3PPS-E90B
19	3" PPs elbow, 87/90°, long, gray	10-1003	ISELL0387	3PPS-E90
20	3" PPs pipe, 2 ft long, black	10-1004	ISVL032UV	N/A
21	3" PPs pipe, 3 ft long, black	N/A	N/A	3PPS-36B
22	3" PPs pipe, 3 ft long, gray	10-1002-36	ISVL033	3PPS-36
23	3" to 2" PPs Reducer	10-1019	ISR0302	3PPS-R2
24	3" Low Profile Wall Mount Termination	10-1012	ISLPT0303	3PPS-HTP
25	3" Side Wall Vent Termination, EK Style Nozzle		ISEK03	N/A
26	3" ICTC adapter for Centrotherm	N/A	ICTC335	N/A
27	3"/5" Elbow, 45°	N/A	ICEL3545	N/A
28	3"/5" Elbow, 87°	N/A	ICEL3587	N/A
29	3"/5" Concentric pipe, 1 ft long	N/A	ICVLAL351	N/A
30	3"/5" Concentric pipe, 2 ft long	N/A	ICVLAL352	N/A
31	3"/5" Concentric pipe, 3 ft long	N/A	ICVLAL353	N/A
32	3"/5" Concentric wall termination, 5" OD	N/A	ICWT352	3PPS-HK
33	Joint lube, Centrocerin for Centrotherm	10-1011	IACE50	N/A
34	2" Wall plate, round rubber, black	10-1032	IAWP02B	N/A
	2" Wall plate, square metal, black	N/A	N/A	2PPS-WPB
35	3" Wall plate, round rubber, black	10-1008	IAWP03B	N/A
	3" Wall plate, square metal, black	N/A	N/A	3PPS-WPB
36	2" Horizontal Drain Tee	10-1026	ISHDT02	
37	3" Horizontal Drain Tee	10-1027	ISHDT03	
38	3" Test Port	10-1028	ISTP03	3PPS-TP
39	2" X 35 ft Flex Vent Length	10-1030	IFCK0235	3PPS-FLEX35
40	2" Coupler, Solid wall to Flex	10-1033	IFS02	2PPS-FAM

50	2" X 35 ft Flex Chimney Kit	10-1030	IFCK0235	N/A
51	3" X 35 ft Flex Chimney Kit	10-1014	IFCK0335	N/A
52	4" X 35 ft Flex Chimney Kit	10-1048	IFCK0435	N/A
53	4" Locking ring, typical	10-1041	IANS04	
54	4" Wall mount brackets	10-1045	IASC04	
55	4" Bird screen	10-1044	IASSS04	
56	4" PPs elbow, 45°, black	10-1042	ISEL0445UV	
57	4" PPs elbow, 45°, grey	10-1043	ISEL445	
58	4" PPs elbow, 87/90°, long radius, black	10-1049	ISEL0487UV	
59	4" PPs elbow, 87/90°, long, grey	10-1039	ISEL0487	
60	4" PPs pipe, 2 ft long, black	10-1040	ISVL042UV	
61	4" PPs pipe, 3 ft long, gray	10-1038	ISVL043	

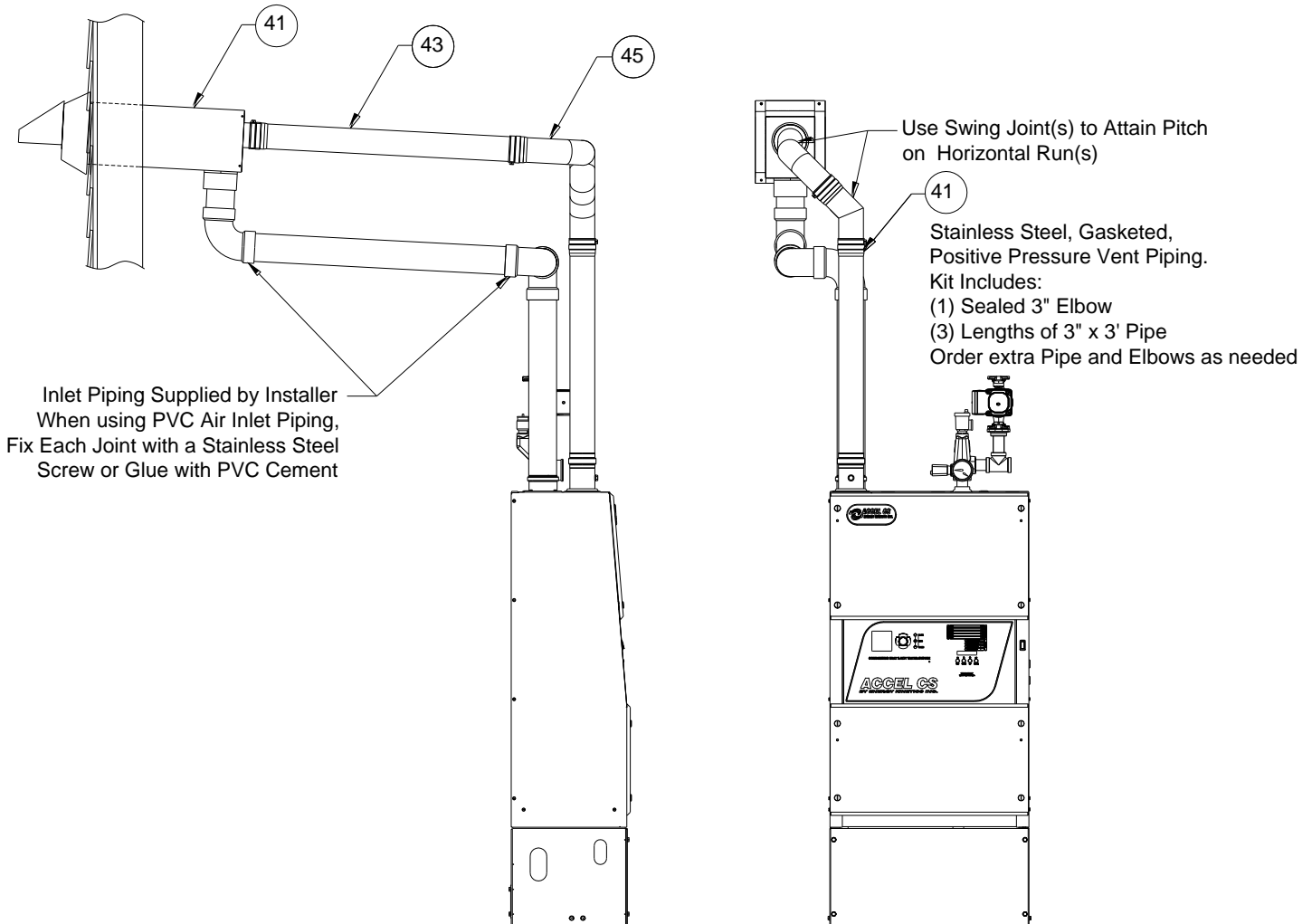
VENTING WITH ENERGY KINETICS SIDEWALL VENT KIT

3" Stainless Steel Vent Kit and Optional Parts

Item	Description	Energy Kinetics Part No.
41	Combo Vent Hood (Includes: hood, trim ring, silicone sealant, mtg hardware, elbow & shield)	10-0332-1*
42	Non-Combo Hood (Includes: hood, trim ring, silicone sealant, mtg hardware, elbow & shield)	10-0333-1**
43	Extra Pipe 3ft Length	10-0191-P33
44	Extra Pipe 1ft Length	10-0191-P31
45	Extra 90 degree Elbow	10-0191-E390

*Kit includes: Sidewall Vent Hood, (1) 90 deg. Elbow & Shield, (1) Trim Plate, (4) SS Mounting Screws & Inserts, (1) Tube Silicone Sealant.

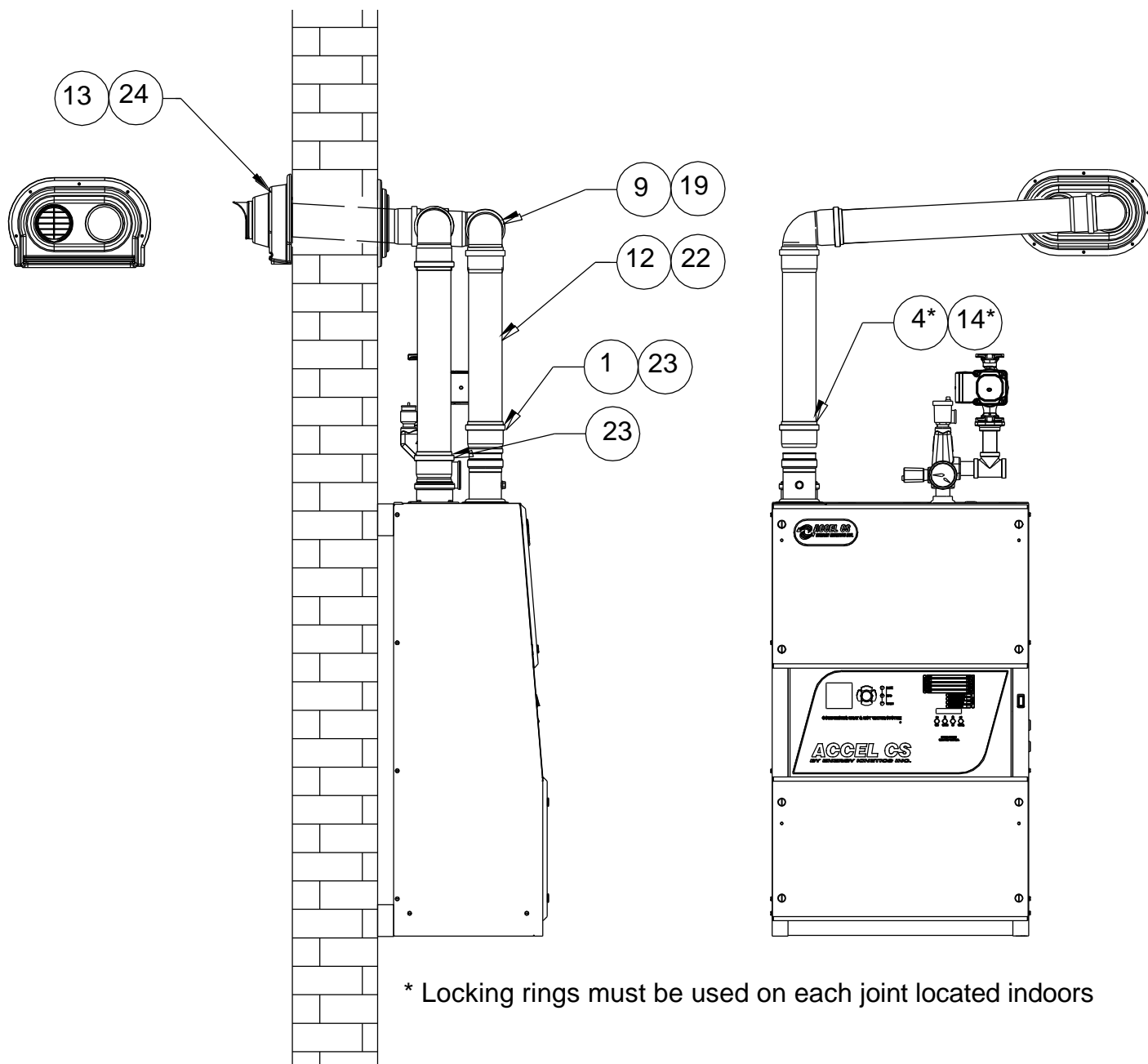
**Replaces Combination Vent Hood with Non-Combo, Vent Only Hood



SIDEWALL VENTING WITH POLYPROPYLENE – Low Profile
2" or 3" Low Profile Wall Mount Termination.

Part No:	Description:
10-0584	Low Profile Vent Kit 2in PPs
10-0585	Low Profile Vent Kit 3in PPs

Low Profile Parallel Wall Termination incorporates air intake and exhaust into a single aesthetically pleasing termination. Part is paintable to match exterior of structure. Interior wall plate and bird screen included. Exterior exhaust can be extended or re-directed with PPS-UV black elbows or vent lengths. External joints may be fastened with stainless steel screws. Vent lengths and elbows sold separately.



* Locking rings must be used on each joint located indoors

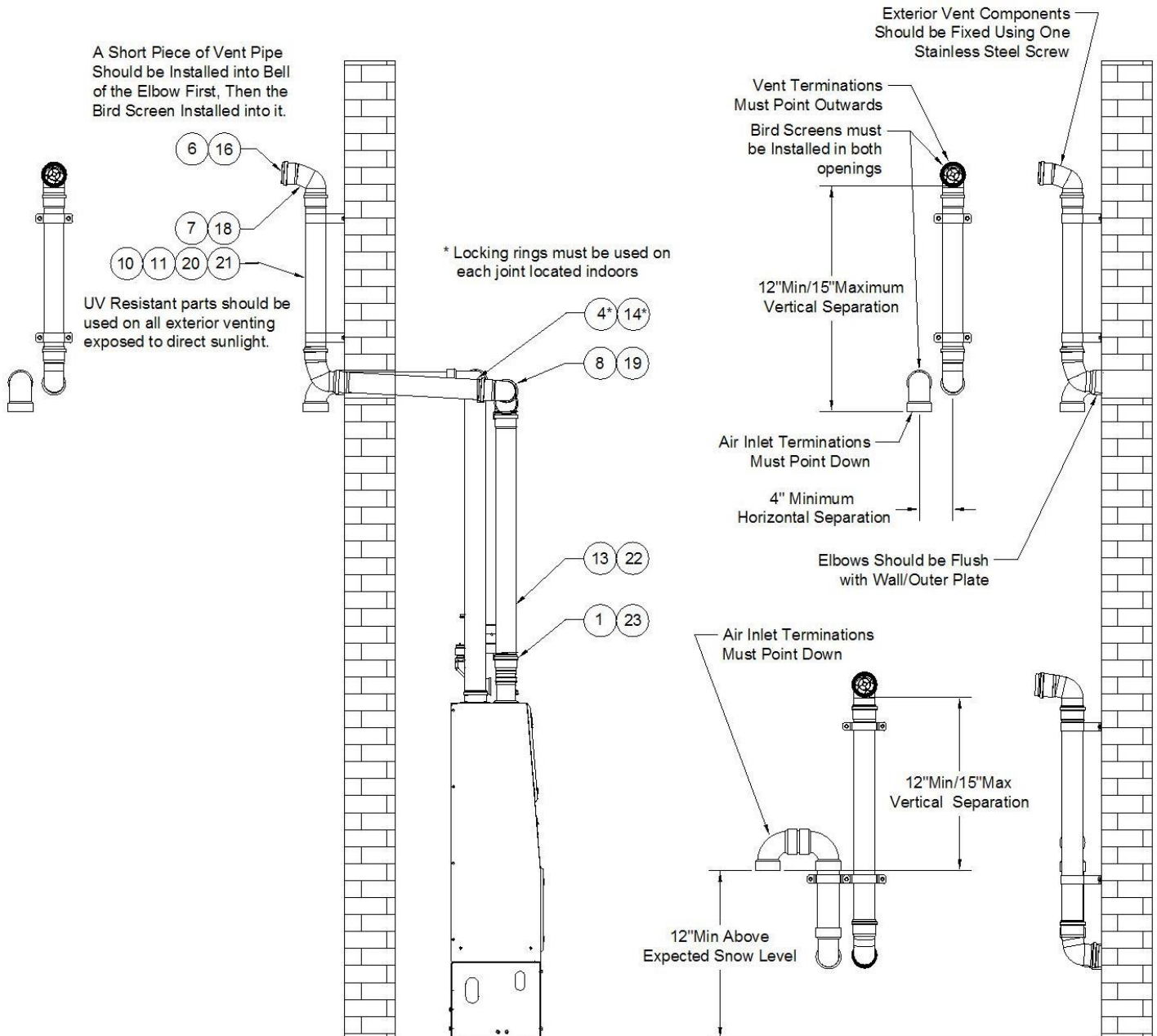
SIDEWALL VENTING WITH POLYPROPYLENE – Snorkel style
2” or 3” non-concentric sidewall vent termination, snorkel style.

Part No:	Description:
10-0581	Sidewall Vent Kit 2in PPs
10-0580	Sidewall Vent Kit 3in PPs
10-0587	Sidewall Vent Kit 4in PPs

VENTING GUIDELINES WHEN USING TWO PIPES (SNORKEL STYLE)

1. Vertical Separation: The exhaust vent must be above the air inlet between 12” and 15”. The air inlet must be a minimum of 12” (24” preferred) above maximum anticipated snow level.
2. Horizontal Separation: The horizontal distance between the air inlet and the exhaust vent must be a minimum of 4” center to center.
3. The outdoor portion of a snorkel style vent should be limited to 4 feet between elbows. Longer runs may require insulation and/or a chimney chase to prevent condensation and freezing in the vent; the chase must provide access for vent pipe inspection

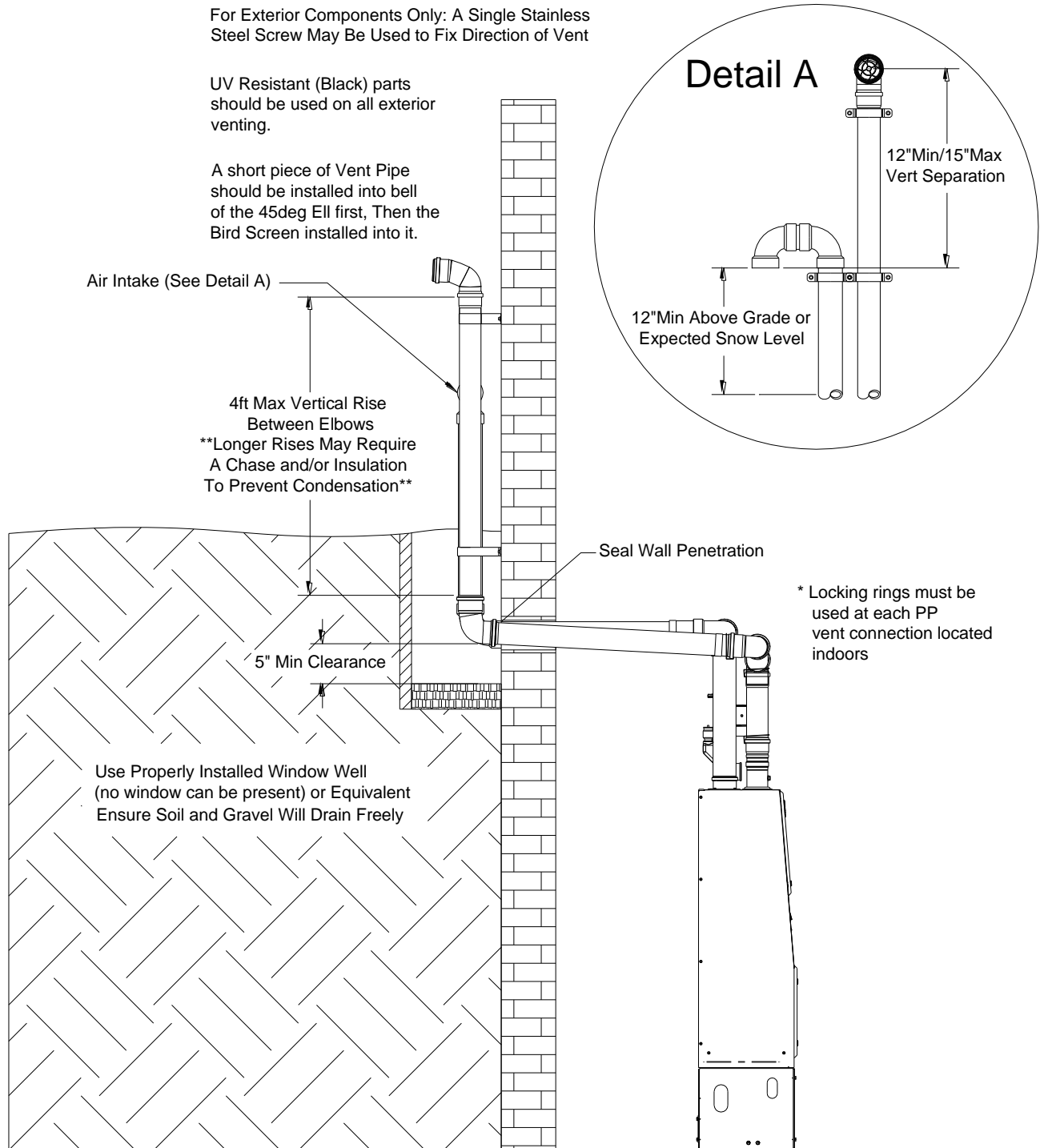
- 2” Non-concentric sidewall vent termination kit, snorkel style**
- 3” Non-concentric sidewall vent termination kit, snorkel style**
- 4” Non-concentric sidewall vent termination kit, snorkel style**



BELOW GRADE SIDEWALL VENTING WITH POLYPROPYLENE – Snorkel style
2" or 3" non-concentric sidewall vent termination, snorkel style.

VENTING GUIDELINES WHEN USING TWO PIPES (SNORKEL STYLE)

1. Use a properly installed window well (no window present) or equivalently constructed well with adequate drainage
2. Wall penetration must be at least 5" above the bottom of the window well.
3. Vertical rise must be limited to 4 feet maximum between elbows (see figure below); longer runs may require a chimney chase and/or insulation on the vent to prevent condensation and freezing.
4. Vertical Separation: The exhaust vent must be above the air inlet between 12" and 15".
5. Horizontal Separation: The horizontal distance between the air inlet and the exhaust vent must be a minimum of 4" center to center.



VENTING VERTICALLY WITH POLYPROPYLENE

Part No:	Description:
10-0582	Chimney Vent Kit 2in PPs
10-0583	Chimney Vent Kit 3in PPs
10-0586	Chimney Vent Kit 4in PPs

The Accel CS boiler may be installed with polypropylene vent materials vertically through the roof of a building.

Combustion air may be piped alongside the vertical vent using a dedicated polypropylene liner or PVC pipe. Combustion air may also be taken directly from the outdoors via a dedicated sidewall termination.

Chimney Liner

A masonry chimney will not stand up to the corrosive nature of the flue gas from a condensing boiler. The chimney therefore must have a liner installed that complies with UL 1738. An existing chimney may be used as a chase for an approved liner.

Any chimney liner must be made from AL29-4C stainless steel alloy or an approved polypropylene product that is designed for positive pressure venting. The chimney liner length must be added to the rest of the flue piping to determine the allowable maximum length.

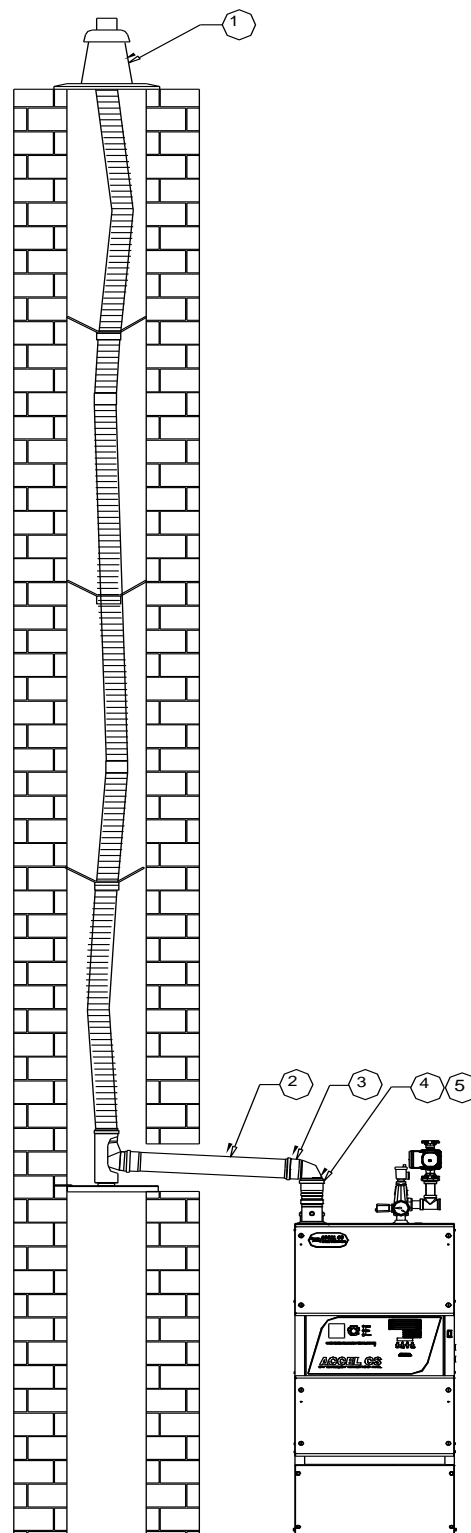
Optional Venting parts, order as needed for the job.

Description	Centrotherm Part No.	DuraVent Part No.
2" Chimney Liner Kit, with 35 ft of flex	IFCK0235	N/A
3" Chimney Liner Kit, with 35 ft of flex	IFCK0335	N/A
3" Chimney Liner Kit, with 35 ft of flex	IFCK0435	N/A
2" Chimney Liner Kit, order flex separately	N/A	2PPS-FKL
3" Chimney Liner Kit, order flex separately	N/A	3PPS-FKL
4" Chimney Liner Kit, order flex separately	N/A </td <td>4PPS-FKL</td>	4PPS-FKL
2" Flex lining, 35 feet	IFVL02035	2PPS-FLEX35
3" Flex lining, 35 feet	IFVL03035	3PPS-FLEX35
4" Flex lining, 35 feet	IFVL04035	4PPS-FLEX35

Notes:

For Centrotherm: Includes all components necessary to line a chimney from chimney termination to base support. Rigid vent lengths, elbows and adapters required to connect chimney kit base support to appliance are sold separately. Kit includes 35 feet of flex.

For DuraVent: Use for a vertical flex lining system. Includes black UV resistant chimney cap, rigid flue vent, flex support bracket, 4 spacers in 3" kits, male and female flex adapters with gaskets, extended support elbow, wall plate and Appliance adapter. Flex sold separately.

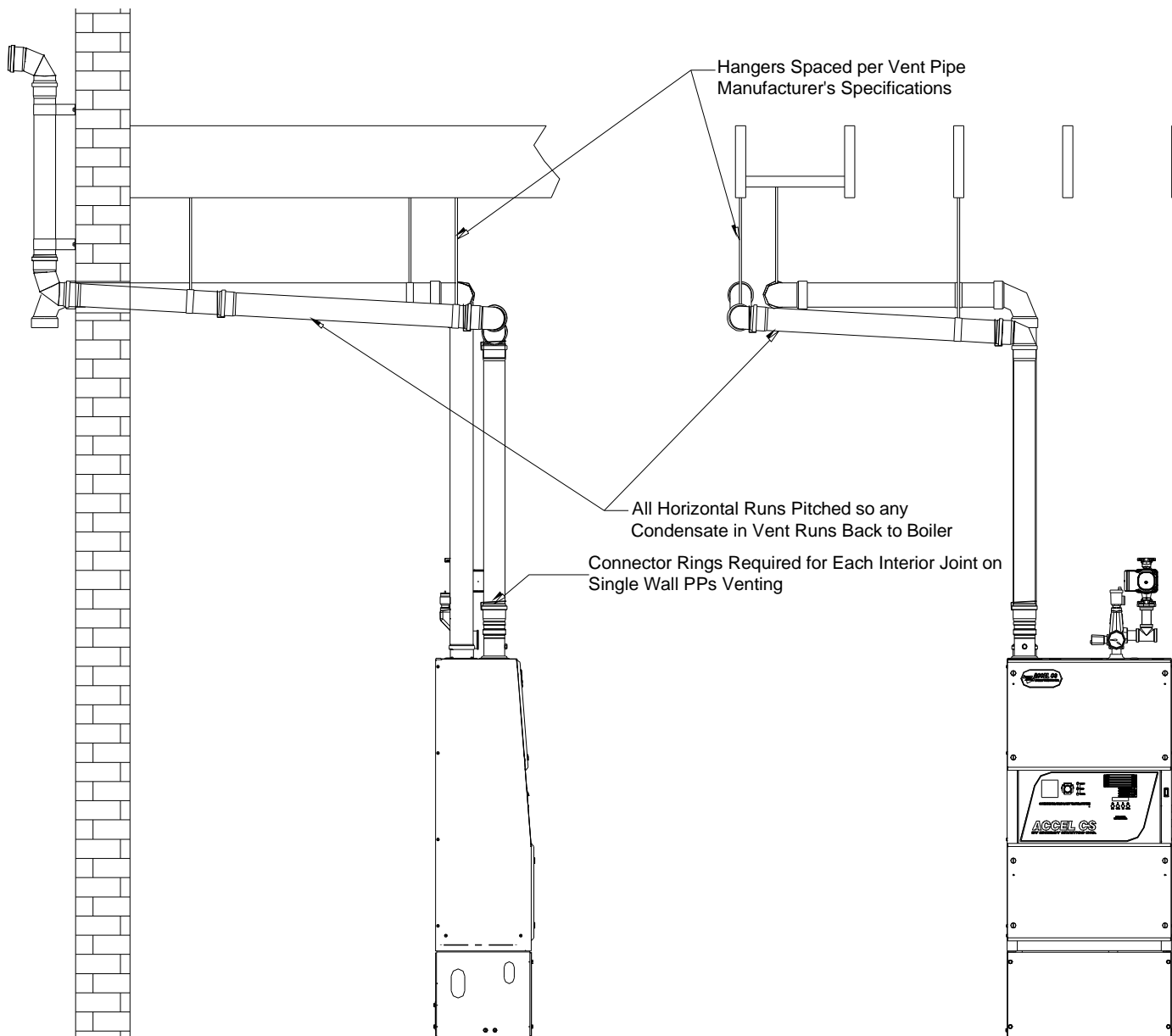


HANGING OF VENT PIPING

Vent Piping Slope

Stainless Steel: The vent pipe manufacturer states the flue piping must slope 1/4" minimum per foot of run so that the condensed water will flow back into the boiler and go through the neutralizer before being discharged.

Polypropylene: The vent pipe manufacturer states the flue piping must slope 1/4" minimum per foot of run so that the condensed water will flow back into the boiler and go through the neutralizer before being discharged.



Vent Pipe Support

Space supports per the vent pipe manufacturer's specifications for both vertical and horizontal runs. Install one support near to the boiler and use additional supports at direction changes such as tees and elbows as required.

COMBUSTION AIR

The Accel CS is provided with a sealed outer jacket that when piped to the air outside the building provides a clean fresh air supply for combustion. Piping of outside air directly to the boiler isolates the boiler from the home environment and any of the contaminants often found in indoor air. The Accel CS comes from the factory with a 2" and 3" PPs (for EK1C, 3" and 4" PPs for EK2C/3C) adapter installed at the top of the boiler directly behind (for EK1C, "in front of" for EK2C/3C) the stainless steel vent connector. The outside air source must be located high enough above grade to be at least 12" (24" preferred) above expected snow accumulation. The use of PVC pipe is suitable for piping the air intake only. See venting drawings for recommended placement locations of the combustion air pipe termination on the sidewall. Additionally, you may run corrugated polypropylene pipe in the chimney flue if space allows.

CONDENSATE DRAIN TRAP

1. Locate condensate trap kit.
2. Refer to photo for assembly of trap.
3. Push drain tube up into trap body (the drain hose should slide up over the o-ring and seat against the trap body).

NOTICE: Use of 3/4" PVC, CPVC, EPDM or polypropylene pipe or flex hose is acceptable for trap drain use. When using pipe, make sure pipe I.D. and O.D. are well de-burred to allow mating with trap body.

4. Make sure the trap ball is located inside the trap body.
5. With trap retaining nut loose, slide the trap body onto the boiler condensate outlet. Firmly hand tighten the nut.

WARNING: The condensate trap ball **MUST** be in place in the condensate trap assembly to prevent possible flue gas leakage through the condensate drain system. Do not install condensate trap if ball is missing, replace the entire assembly.

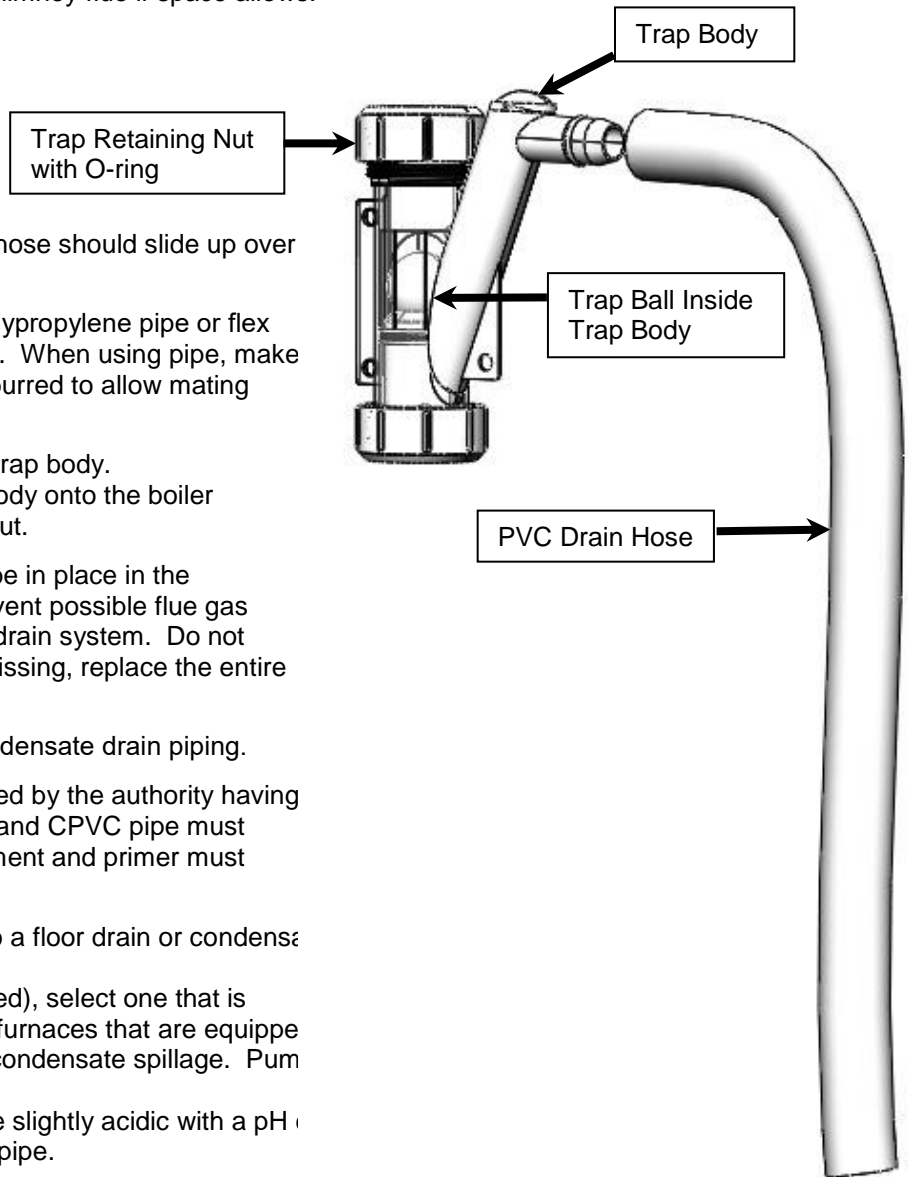
NOTICE: 13/16" I.D. hose may be used for condensate drain piping.

NOTICE: Only use drain line materials approved by the authority having jurisdiction. In absence of such authority, PVC and CPVC pipe must comply with ASTM D1785, F441 or D2665. Cement and primer must comply with ASTM D2564 or F493.

6. Continue the pipe from the drain assembly to a floor drain or condensate pump.
7. When selecting a condensate pump (if needed), select one that is approved for use with condensing boilers or furnaces that are equipped with an overflow switch to prevent damage from condensate spillage. Pump should have a minimum capacity of 3 GPH.
8. Condensate from the Accel CS boiler will be slightly acidic with a pH required by local code or draining into metal pipe.

NOTICE: Condensate pumps (if equipped) with integrated high water cutoff switches (HWC) should be wired into the junction box in place of the jumper as noted in drawing SYS-08-300. This will cause a lockout if the condensate reservoir reaches the cutoff level indicating a pump failure.

CAUTION: The condensate drain line must remain unobstructed and allow free flow of the condensate. The condensate must not be subjected to conditions where freezing could occur and obstruct flow. Flow obstruction can result in leakage causing possible water damage to the boiler and surrounding area.



GAS PIPING

The boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the gas supply piping system at test pressures in excess of 1/2 psi (3.5 kPa, 14 in wc).

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas piping system at test pressures equal to or less than 1/2 psi (3.5 kPa, 14 in wc).

A manual shutoff valve and a sediment trap must be provided in the gas piping upstream of the electric gas valve at the boiler.

The boiler and its gas connection must be tested for gas leakage before placing the boiler in operation. Close the manual shutoff valve during any pressure test with less than 14" w.c. Disconnect the Accel CS boiler and its gas valve from the supply piping during any pressure test greater than 14" w.c. Purge all air from the gas supply piping.

Gas piping must be properly sized in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or according to state and local codes as applicable. Gas piping must be sized to provide the maximum firing rate gas flow for all appliances in the building. For natural gas installations, be sure to verify that the gas meter is properly sized for all appliances. Do not use any service 90° elbows. Use only full port shutoff valves. When in doubt, oversize the piping. Support the gas piping using hangers. Do not use the unit or its components to support the piping.

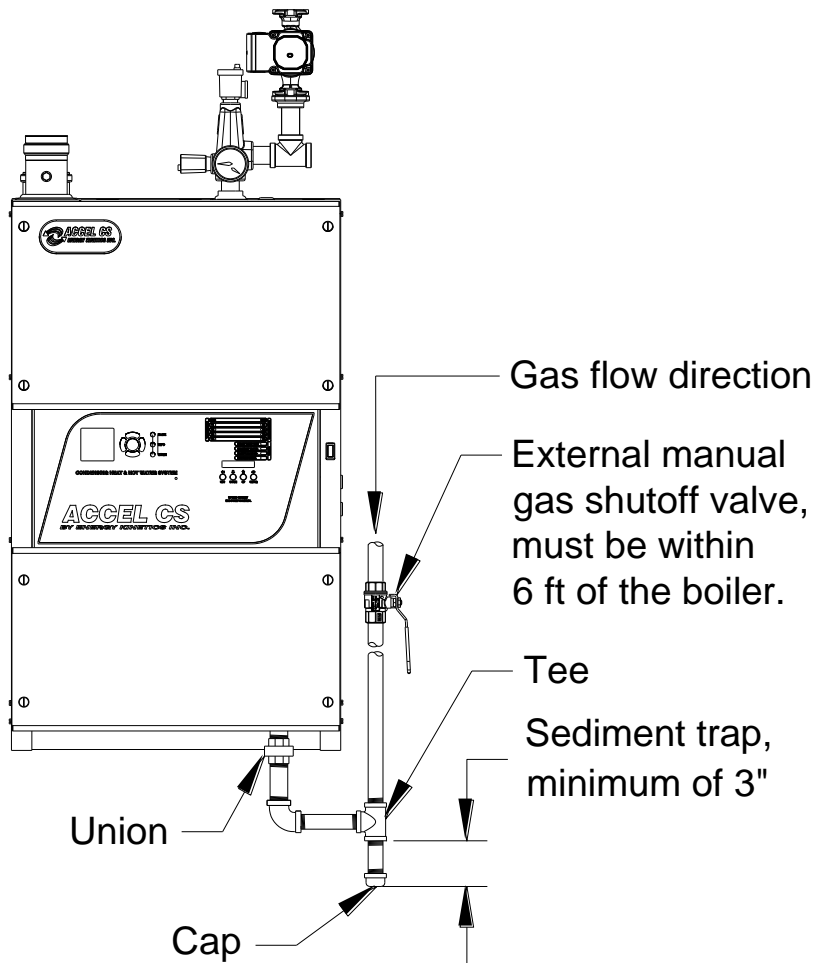
Only use pipe dope compatible with natural gas or LPG. Apply pipe dope sparingly only to the male threads of pipe joints so gas flow is not blocked by pipe dope.

Gas piping should be run beside, behind, or beneath the boiler. Do not run gas piping in front of the boiler and do not block the front covers from being opened.

WARNING: Do not check for gas leaks with an open flame. Use a gas detection device or bubble test. Failure to check for leaks can cause severe personal injury, death or substantial property damage.

WARNING: Failure to apply pipe dope as described can result in severe personal injury, death or substantial property damage.

WARNING: Use a two-wrench method of tightening gas piping near the unit and its gas piping connection. Use one wrench to prevent the boiler gas line connection from turning and the second to tighten the adjoining piping connection. Failure to support the boiler gas piping could damage gas line components and/or the boiler.



GAS PIPE SIZING

Size the gas piping from meter outlet to boiler in accordance with the below table.

Use total output of all connected appliances. Divide total input in BTU/hour by 1000 to obtain the approximate number of cubic feet per hour of natural gas.

Pipe lengths given in table are equivalent length of straight pipe. Convert pipe fittings to equivalent lengths using data from the below table.

For additional gas pipe sizing information, refer to ANSI Z223.1 (or B149.1 or B149.2 for Canadian installations).

The following tables provide suggested sizing for Schedule 40, Black Iron Pipe. Be sure to add the appropriate equivalent length for every fitting and elbow used. For other types of pipe or tubing, consult NFPA 54 or the manufacturer of the pipe or tubing or your gas supplier for pipe sizing information.

BEST PRACTICE: When selecting gas pipe size for a LPG installation, plan ahead and size the piping as if for a natural gas installation. If in the future the boiler is ever converted from LPG to natural gas, then the gas piping will already be properly sized.

For LPG, drawing up to 150,000 Btu/Hr (60 Cubic Feet per Hour).

For Natural Gas, drawing up to 150,000 Btu/Hr (140 Cubic Feet per Hour).

Natural Gas		LPG	
Iron Pipe Size, Inches	Maximum Equivalent Length, Feet	Iron Pipe Size, Inches	Maximum Equivalent Length, Feet
		1/2	20
3/4	30	3/4	90
1	100	1	200
1-1/4	200	1-1/4	200

For LPG, drawing up to 250,000 Btu/Hr (100 Cubic Feet per Hour).

For Natural Gas, drawing up to 250,000 Btu/Hr (250 Cubic Feet per Hour).

Natural Gas		LPG	
Iron Pipe Size, Inches	Maximum Equivalent Length, Feet	Iron Pipe Size, Inches	Maximum Equivalent Length, Feet
3/4	10	3/4	20
1	40	1	90
1-1/4	150	1-1/4	200

For LPG, drawing up to 399,000 Btu/Hr (156 Cubic Feet per Hour).

For Natural Gas, drawing up to 399,000 Btu/Hr (399 Cubic Feet per Hour).

Natural Gas		LPG	
Iron Pipe Size, Inches	Maximum Equivalent Length, Feet	Iron Pipe Size, Inches	Maximum Equivalent Length, Feet
		1	50
1-1/4	100	1-1/4	200

Iron Pipe Size, Inches	Equivalent Length, Feet		
	90° Elbow	Tee	
		Short Radius	Line Flow
1/2	3.6	1.7	4.2
3/4	4.4	2.4	5.3
1	5.2	3.2	6.6
1-1/4	6.6	4.6	8.7

GAS SUPPLY PRESSURE

Pressure required at gas valve inlet pressure port:

Natural Gas:

- **Minimum operating inlet gas pressure** **3.5" w.c.**
- **Maximum operating inlet gas pressure** **10.5" w.c.**

LPG:

- **Minimum operating inlet gas pressure** **8.0" w.c.**
- **Maximum operating inlet gas pressure** **13.0" w.c.**

Verify that with gas flowing during boiler start-up, while boiler is at high fire, and with all other gas appliances within the building operating, that the inlet gas pressure exceeds the minimum of 3.5" w.c. gas pressure for natural gas or 8.0" w.c. gas pressure for LPG.

Verify that with no gas flow with the boiler turned off and with all other gas appliances within the building turned off, that the inlet gas pressure does not exceed the maximum of 10.5" w.c. gas pressure for natural gas or 13.0" w.c. gas pressure for LPG.

Install 100% lockup gas pressure regulator in the gas supply line if the inlet pressure can exceed the maximum gas pressure at any time. Adjust the lockup regulator for 10.5" w.c. maximum pressure for natural gas and 13.0" w.c. maximum pressure for LPG.

WARNING: The supply gas pipe line should never be smaller than the connection pipe on the appliance although it can be larger. The gas valve must be disconnected at the flexible pipe flare fitting and plugged at the outgoing side of the flex pipe when checking for leaks in the gas supply piping at pressures exceeding ½ PSI (14" w.c.). Recheck for leaks at the flare connection with the required gas pressure (use gas or air) any time the union connection is opened for any reason.

WARNING: DO NOT adjust or attempt to measure gas outlet pressure. The gas valve is pre-set for the correct outlet pressure suitable for both LPG and natural gas and requires no field adjustment. Attempts to adjust or measure the gas outlet pressure may result in damage to the valve which can potentially cause severe personal injury, death or substantial property damage.

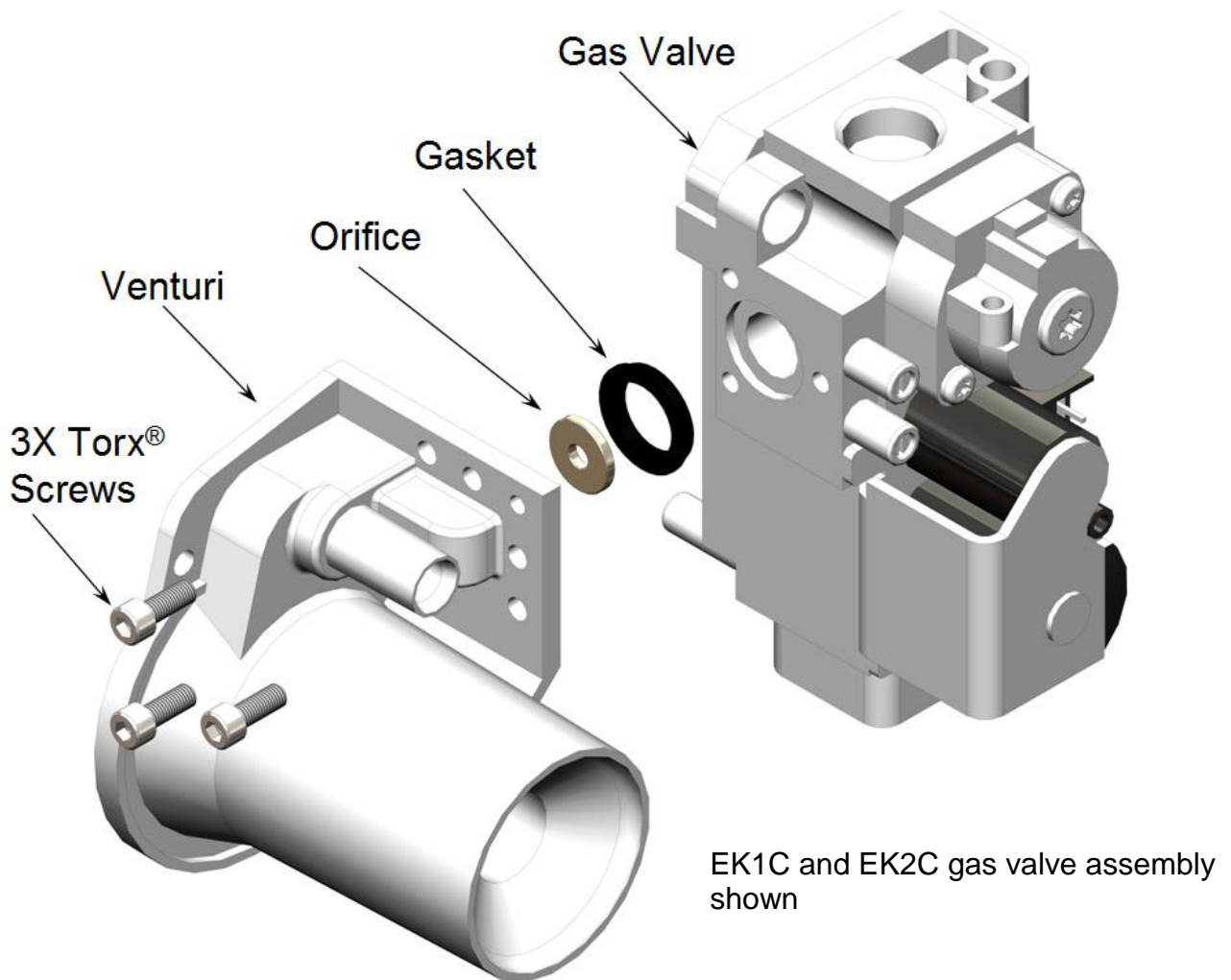
WARNING: Ensure the unit is set to fire with correct fuel gas before start up. Check the factory rating label for type of fuel. Check the gas valve for a LPG conversion label. If there is any conflict or doubt as to the burner set up, remove the gas valve and verify that the LPG orifice is installed or not. Failure to ensure proper burner set up could result in severe personal injury, death, or substantial property damage.

WARNING: New iron piping has been known to absorb gas odorant in some cases. Do not assume that just because you can't smell the gas odorant, that combustible gas is not present. Use gas detection equipment to test for presence of combustible gas.

LPG ORIFICE

WARNING: Orifice must be installed to operate the boiler on LPG. Verify LPG orifice is installed before operating boiler on LPG. Failure to comply could result in personal injury, death or substantial property damage.

NOTICE: LPG orifice must be Energy Kinetics part number: EK1C: 10-1614
 EK2C: 10-1614-2
 EK3C: 10-1612-3



CONVERTING FROM ONE GAS TO ANOTHER

WARNING

The conversion kit shall be installed by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, an explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency is responsible for the proper installation of this kit. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the kit.

The Accel CS boiler's gas burner is factory set for using either natural gas or LPG. A conversion kit with detailed instructions can be purchased from Energy Kinetics if necessary to convert from one gas to another. The kit includes the orifice required to convert from natural gas to LPG, plus the proper labels and tags to show that the gas valve has been converted from natural gas to LPG or to show that the gas valve has been converted from LPG to natural gas.

DANGER: Double check that the gas you are using matches the gas listed on the tags on the gas valve and boiler.

Refer to the detailed gas valve adjustment procedure given under the section 'Gas Valve Setup Procedure', shown deeper in this manual.

The burner is set at the factory for an oxygen (O₂) flue gas reading of 4.0% to 5.0%, with a target of 4.5% O₂. If upon initial startup a reading is taken that is outside of this range, and cannot be adjusted to within this range, then replace the valve.

After converting from one gas to another, a combustion test using a combustion analyzer must be performed. If the O₂ flue gas reading is within the range of 4.0% to 5.0%, the gas mixture can be adjusted to reach the target of 4.5% O₂ by turning the throttle valve screw. Carbon monoxide (CO) must be below 400 ppm air free.

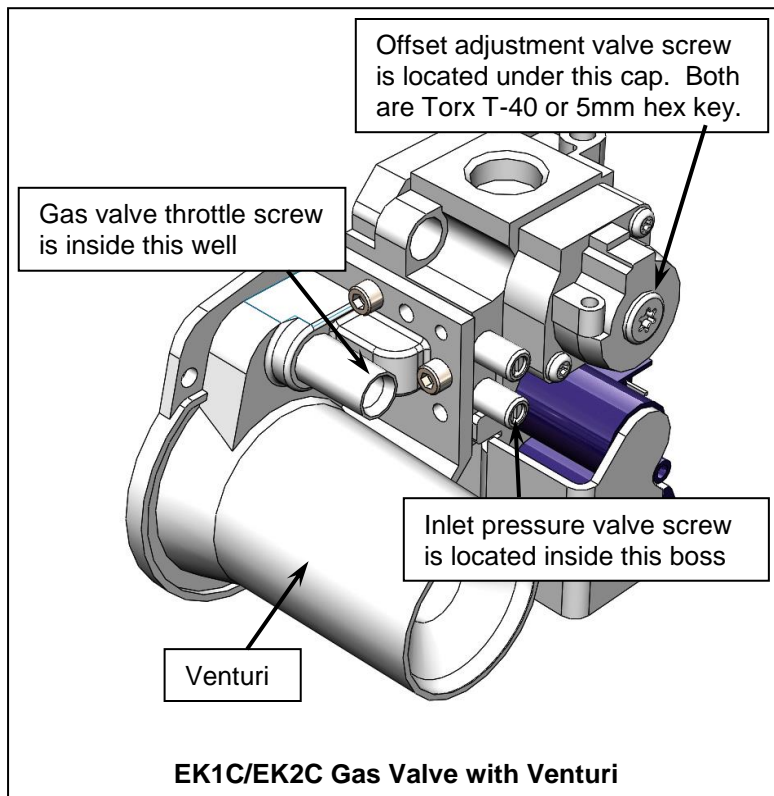
GAS VALVE DESCRIPTION

Accel CS boilers are shipped from the factory preset for their maximum firing rate. The boiler will modulate its firing rate from low to high firing rate as needed to maintain the supply temperature setting during a heat call.

The Honeywell gas valve allows for a preset ratio of air/fuel gas (premix) throughout the range of input air pressure supplied by the speed (RPM) modulated system fan. It can utilize either of two gas types, i.e. natural gas and LPG. However, it must be set properly for use of either of these two specific gas types. Check the tag on the valve to see which type it is set for before connecting up to a gas source.

The valves first have an electric on/off direct operator for opening the safety valve (class B according to EN161) and a second electric on/off servo operator (class B or C according to EN161).

The pressure regulator is in accordance with class B requirements of EN88.



GENERAL ASSEMBLY

Assembly of various packaged units is illustrated throughout this manual. The use of non-Energy Kinetics supplied pumps, controls and accessories should follow good practices. The diagrams and locations presented in this manual are recommended.

WARNING: Boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during appliance installation, operation, and service (circulator, control, etc., replacement).

BOILER MOUNTING

The Accel CS boiler can be mounted either free standing on a base or EK1C's may be mounted on a wall (wall mounting for EK2C and EK3C is not recommended). Mounting the boiler on a base and standing the boiler near a wall will make for a clean looking installation, because wiring and piping running behind the boiler will be hidden from view.

BOILER MOUNTING ON BOILER BASE

The boiler ships from the factory mounted to the stand. Bolts go up through the holes in the base and are threaded into the weld-nuts in the bottom of the boiler.

BEST PRACTICE: Use the cardboard from the shipping container to protect the enclosure and the floor from scratches while handling the boiler.

WARNING: The boiler is heavy and it is recommended that two or more people carry or lift the boiler. It is recommended that leather gloves are worn while handling the boiler to prevent the possibility of cuts from the edges of the sheet metal chassis.

The boiler should only be lifted from the bottom and back of the enclosure. Front covers may be left on. Do not try to lift by the piping or any other system components.

If for some reason the mounting base needs to be replaced, with help from a second person, lay the boiler down on back of the unit. Using hardware provided, thread a bolt with a flat washer through one of the four mounting holes in the top of the base and thread it into the corresponding threaded hole in the bottom of the chassis. Install all four by hand, and then tighten with wrench. With help from a second person, stand the boiler with base attached up and move into place for installation.

WALL MOUNTING THE EK1C BOILER

Wall mounting requirements

The wall must be plumb and capable of carrying the weight of the boiler, water, and any piping components attached, plus a reasonable safety margin.

A water filled Accel CS EK1C boiler weighs over 250 pounds, an EK2C weighs over 375 pounds, and an EK3C weighs well over 500 pounds. Add the weight of any additional components, such as piping, zone circulators, etc. Failure to comply could result in severe personal injury, death, or substantial property damage.

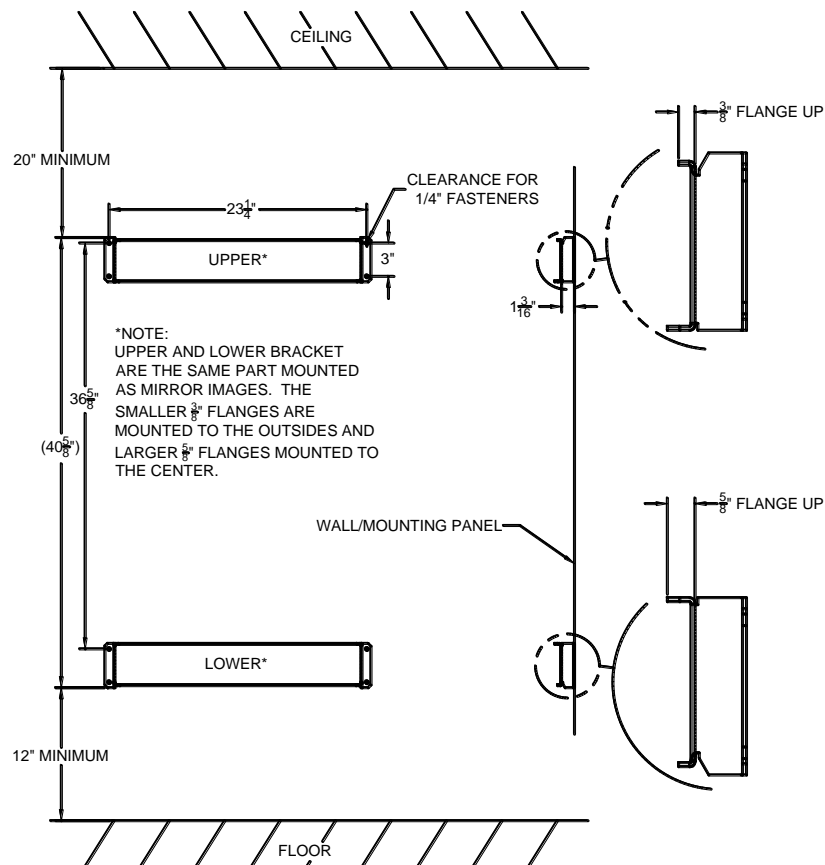
WARNING: Do not attempt to attach the wall mounting brackets using any means other than direct attachment to wall studs or equivalent structure if studs are not available.

WARNING: Verify that the studs and structure are suitable for carrying this wall mounted load.

There are four holes in the bracket, two on each side. The mounting holes are designed for $\frac{1}{4}$ " diameter fasteners. Attach the top mounting bracket so the smaller flange is on top, using four fasteners as it carries the weight of the boiler. Attach the bottom bracket so the larger flange is on top and may be installed using two fasteners, one per side as it only spaces the boiler out from the wall/mounting panel.

The flange at the top, rear panel of the boiler must be hooked into the two notches with the taper lead in.

The two brackets must be installed level and vertically in line with each other per the dimensions given.



The lower bracket should be mounted at least 12” from the bottom of the bracket to the surface below it. This provides clearance for the gas piping, condensate trap, neutralizer and condensate pump.

The top of the top mounting bracket must be located a minimum of 20” from the ceiling to allow clearance for service and cleaning of the pressure vessel.

Lift and place boiler on wall mounting brackets

WARNING: The boiler is heavy and requires two people to lift and place on bracket. It is recommended that leather gloves are worn while lifting into place to prevent the possibility of cuts from the edges of the sheet metal chassis.

The boiler should only be lifted from the bottom and back of the enclosure. Front covers may be left on. Do not try to lift by the piping or any other system components.

With help from a second person, lift the boiler up and hook the rear top edge of the boiler into the notches on the top wall mounting bracket. If required, slide the boiler left or right to center it over the mounting brackets.

HYDRONIC PIPING

NOTICE: To avoid conflicts with the opening of the system, piping should be behind, beside, beneath, and/or above the boiler. With the upper and lower front covers removed, the center panel swings down for internal access. The burner also needs clearance when top cover is removed. Do not locate any piping in front of the boiler or over top of the pressure vessel until clearance from the center panel and turbulator removal is verified. This also applies to the gas line piping.

All piping and accessory connections should follow good practice using approved joint sealants. The following pages include several general system piping arrangements and options. Piping of individual systems will vary from the suggested arrangements at the discretion of the installer.

Supply and return connections on Accel CS boiler models are:

Accel CS Model	Supply & Return NPT
EK1C	1”
EK2C	1-1/4”
EK3C	1-1/2”

Call Energy Kinetics to obtain piping and wiring instructions for alternate applications, such as radiant heating, domestic hot water, swimming pool heating, multiple boilers, injection loops, etc.

Use Energy Kinetics Smart Thread Sealant P/N 10-0620, or equal.

ZONE CONTROL

ZONE CONTROL BY ZONE VALVE: The Accel CS boiler is designed to provide multi-zone control of the heating system. Energy Kinetics recommends and offers two wire and four wire, full port, 24-volt zone valves for control of each heating zone. Refer to Zone Piping diagrams in the Drawings section of the manual.

ZONE CONTROL BY ZONE CIRCULATOR: Zone control by circulators requires a flow valve, circulator and 24-volt relay (fan type such as RIB relay or Energy Kinetics relay box kit) for each zone. The main circulator and domestic heat exchanger are still used in these cases. Refer to Zone Piping diagrams in the Drawings section of the manual.

NOTICE: An additional tee(s) must be installed into the supply on the inlet side of the main circulator. This tee is the supply for circulators with returns for these zones into normal return location.

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 and temperature.

NOTICE: Sizing of the boiler expansion tank must follow expansion tank manufacturer’s guidelines.

NOTICE: Always use an isolating heat exchanger to heat a pool, spa or domestic water.

DOMESTIC HOT WATER

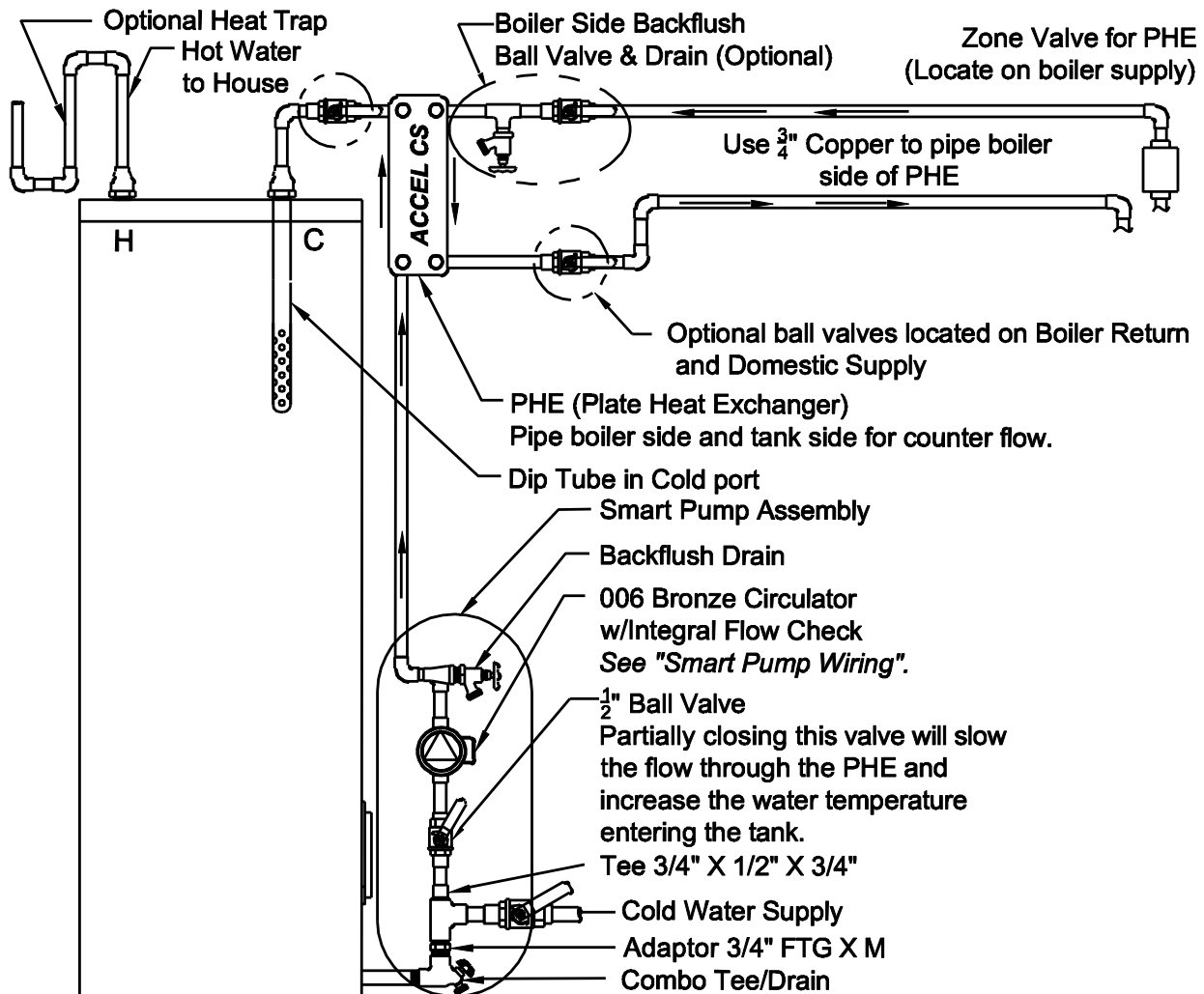
The Accel CS boiler uses a Plate Heat Exchanger (PHE) to make domestic hot water that is stored in an insulated tank. The PHE separates the boiler water from the domestic water. The boiler circulator pumps hot boiler water through the boiler side of the PHE, while the domestic circulator (the Smart Pump) circulates cold domestic water from the tank through the domestic side of the PHE.

The Smart Pump is a low head, low flow circulator that circulates cold water from the bottom of the storage tank, through the PHE where it is heated and then pumped back into the top of the tank through a special Dip Tube. When domestic hot water flows from the tank and out to the house, the water does not flow through the PHE circuit unless the Smart Pump is operating.

The plate exchanger is made of 316 stainless steel formed into corrugated plates and sealed by brazing. The ports are arranged so that hot boiler water and cold domestic water flow through alternating channels. The exchanger is piped so the boiler water flow and domestic water flow are in opposite directions. This is known as counter flow operation. The plate exchanger can be back flushed in place which effectively cleans sediment from the plate passages. The brazed plate exchanger can be easily removed and replaced or deep cleaned of scale by flushing with acid or other chemical cleaning.

Principle of Operation

The boiler will remain cold in standby until there is a call for domestic hot water from the storage tank thermostat. The *HOT WATER* input light on the Condensing Energy Manager will turn on telling the Condensing Energy Manager there is a call for domestic hot water. The Condensing Energy Manager will open the hot water zone valve and two seconds later, send a heat demand signal to the Sola boiler control. The boiler circulator will begin circulating boiler water through the Plate Heat Exchanger. The Sola boiler control will also change the boiler supply temperature setpoint from the heating setpoint to the domestic hot water setpoint. The Sola boiler control will fire the burner and the boiler outlet will start to rise.



Domestic Hot Water Zone Piping Schematic

Once the boiler supply temperature has reached 140°F, the Condensing Energy Manager will turn on the SP (Smart Pump) output light and will send a command to the Sola to turn on the Smart Pump relay output. The Smart Pump will then start to circulate the cold domestic water from the bottom of the storage tank, through the plate heat exchanger which will heat up the domestic water. The heated domestic water then enters the storage tank through the dip tube which will help stratify the storage tank. The burner will continue to fire, heating the flow of domestic water into the storage tank, until the storage tank thermostat is satisfied.

The flow rate of the domestic water through the plate heat exchanger determines the temperature of the domestic water going into the top of the tank. While running a constant flow from a hot water tap of about 2 gpm, let the boiler stabilize, and then adjust the ball valve just below the smart pump until the domestic water temperature coming out of the plate heat exchanger is about 140°F. Higher flow rates will lower the water temperature, and lower flow rates will increase the water temperature.

Once the storage tank thermostat is satisfied, the Condensing Energy Manager turns off the heat demand to the Sola boiler control which will turn off the burner. The Condensing Energy Manager will keep the hot water zone valve, the boiler pump and the Smart Pump all running until the boiler supply temperature has cooled off to near room temperature or until five minutes have elapsed. The key to recovering the energy in the boiler is the stratification of the water in the storage tank. The cold water in the bottom of the tank will remove the heat from the boiler and put the heat into the storage tank where the heat will be useful. Once the boiler has cooled off, the Condensing Energy Manager will turn everything off, will restore the boiler supply setpoint to the heating setpoint and wait for another call for hot water.

Domestic Hot Water Production Rate at 140°F (50°F Source)			
	EK1C with 40 Gallon Buffer Tank	EK2C with 40 Gallon Buffer Tank	EK3C with 80 Gallon Buffer Tank
First Hour Draw	190 gallons per hour	290 gallons per hour	580 gallons per hour
Continuous Draw	150 gallons per hour	250 gallons per hour	500 gallons per hour

Domestic Hot Water Piping

The plate heat exchanger and the Smart Pump will be piped as a zone off the boiler header as shown in the diagram “Domestic Hot Water Zone Piping Schematic” on the previous page. The plate heat exchanger and the Smart Pump should be mounted at the storage tank. The boiler side piping should be ¾” copper and the boiler pump will easily drive the flow out to the heat exchanger.

FILLING WITH WATER, VENTING and PURGING

Check Boiler System Water Chemistry

Water pH level should be no lower than 7.0. Check pH using litmus paper or have it chemically tested by a water treatment company. If pH does not meet this requirement, contact a local water treatment company and correct this issue before filling system.

Water hardness should be less than 20 grains. If the local water hardness is 20 grains or higher, consult a local water treatment company for help reducing the water hardness. Chloride concentration must be less than 200ppm. Chlorinated fresh water is normally safe to use as the chlorine levels for drinking water are usually less than 5ppm.

NOTICE: AIR VENT CAP MUST REMAIN CLOSED ON CALEFFI AIR VENTS. ALL OTHER BRANDS OF AIR VENT MUST HAVE A CAP OPENED, with the vent cap removed and kept in a safe location.

Note that existing piping and radiation systems may contain significant levels of contaminants such as minerals, deposits, sludge, dirt or other debris. Existing contaminants may adversely affect system operation and reliability, and may cause damage to the Accel CS boiler, piping or any hydronic components. Tri-Sodium Phosphate (TSP) is recommended for removing flux and other oil based compounds. Once the existing system has been cleaned and flushed, proceed with filling the system with water.

When piping is completed, all accessories installed and the boiler, piping and attached radiation have been flushed of all sediment, the system should be purged of all air.

For zoned systems, each zone should be isolated and purged separately until a steady stream of clean water without air passes out of purge hose. Vent all radiation.

NOTICE: DO NOT START BURNER UNTIL BOILER AND SYSTEM ARE FULL OF WATER.

Fill to a normal cold system pressure, typically 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.

WARNING: Failure to repair all system leaks will cause make-up water to be added to the system continuously. This will reduce the life of the boiler as a result of mineral buildup in the heat exchanger thereby reducing heat transfer and overheating the heat exchanger. Furthermore, if the make-up water contains a significant amount of dissolved oxygen, it may promote oxygen corrosion of iron containing hydronic components. Scale buildup or corrosion of the pressure vessel is not a manufacturing defect, and is not covered under the warranty.

BOILER WATER TREATMENT

Addition of boiler water treatment is recommended to reduce scale 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 for all installations and will help dissolve scale buildup due to hardness in the boiler water. Call Energy Kinetics for more details about boiler water treatment and about hard water conditions.

Thoroughly cleaning and flushing the boiler and piping after installation is highly recommended.

WINTERIZING

ANTIFREEZE

Only antifreeze rated as non-toxic (such as propylene glycol) should be used if adding antifreeze. 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 antifreeze and is recommended in areas of hard water.

NOTICE: Thoroughly clean system prior to adding antifreeze.

Tri-Sodium Phosphate (TSP) is recommended for removing flux and other oil based compounds. Once system has been cleaned and flushed, 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.

NOTICE: If the Accel CS boiler may be exposed to freezing temperatures, such as a vacation home shut down for the winter, then anti-freeze should be added to the boiler water.

NOTICE: If the Accel CS boiler may be exposed to freezing temperatures, such as a vacation home shut down for the winter, then the condensate collection system, including the condensate trap, condensate neutralizer, condensate pump, and all condensate piping should be either filled with antifreeze or removed and drained. The condensate collection system must be reassembled prior to placing the boiler back into service.

When a home is winterized by draining all domestic water piping, then the boiler must be protected. 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. Propylene Glycol in water will provide the following freeze protection: 30% down to +8° F, 40% to -8° F, 50% to -27° F. 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.

WIRING AND CONTROLS

The Accel CS boiler is furnished with controls and basic accessories as illustrated and described in this manual.

DANGER: All wiring installations in the United States must comply with the NEC, and any local codes. All wiring installations in Canada must be in accordance with the Canadian Electric Code, Part I.

LINE VOLTAGE – ELECTRICAL CONNECTIONS

The Accel CS boiler operates on 120 VAC, 60 Hz power. The boiler is rated to operate with supply voltages anywhere between 102 VAC minimum and 132 VAC maximum.

Boiler power rating: 120 VOLT 60 HZ, less than 12 Amperes.

Branch circuit overcurrent device rating: 120 VOLT 60 HZ, 15 Amperes.

Central heating equipment such as the Accel CS boiler must be connected to an individual branch circuit. The individual branch circuit for the Accel CS boiler must be a dedicated 15 AMP fused circuit. The branch circuit overcurrent device is also the main power disconnect for the Accel CS boiler. Turn off the branch circuit at the main service entrance panel before making connections to the Accel CS boiler. The branch circuit wiring must be properly sized for the branch circuit rating.

DANGER: Make All Connections with Power Disconnect Turned Off at Main Service Entrance Panel.

If required by local codes or the authority having jurisdiction, install a system disconnect switch (in some parts of the country, this is known as 'the red emergency switch') that will disconnect the power to the Accel CS boiler.

Pigtails inside the Accel CS cabinet are provided for the line voltage power connection. Refer to the wiring diagrams shown later in this manual for location. Connect black pigtail to hot, white pigtail to neutral and the green pigtail to ground. The boiler must be electrically bonded to ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA 70 and/or the Canadian Electrical Code Part I, CSA C22.1, Electrical Code.

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

SURGE SUPPRESSION

The Printed Circuit Terminal Board in the Accel CS boiler is equipped with built-in surge suppression.

HYDRONIC CIRCULATORS

The Accel CS boiler is designed to work with up to three hydronic circulators. The Sola boiler control includes three relays that will control hydronic and domestic water circulators. Hydronic circulators must be listed (such as the UL listing code REUZ) by a nationally recognized testing laboratory and when controlled directly by the Sola boiler control, the circulators must be rated at 2.2 amps or less. Hydronic circulators rated at more than 2.2 amps require additional power control relays (not included) where the additional power control relay coils will be controlled by the Sola boiler control relays. In other words, when running a very large circulator, you must add an appropriately rated circulator relay that controls a separate source of 120VAC to power the large circulator. The circulator relay coil will be wired to be pulled in by the Sola boiler control relay. Call Energy Kinetics and request wiring instructions for this unusual situation.

LOW VOLTAGE WIRING

The low voltage controls on the Accel CS boiler operate on 24 VAC, 60 Hz power. Low voltage must be supplied by two individual, Class 2, 50 VA transformers. The Sola boiler control requires one 50 VA transformer and the Condensing Energy Manager requires another separate 50 VA transformer. These transformers must remain isolated from each other.

WARNING: **Make All Connections with Power Disconnect Turned Off at Main Service Entrance Panel.**

A typical low voltage wiring diagram for the Condensing Energy Manager is shown in the *Drawings-Wiring* section. Thermostats should be located on inside walls away from cold drafts, windows, heat from fireplaces, appliances or sunlight. Set thermostat heat anticipators to 0.1 amps or for *Hydronic* system to operate properly. Set heat anticipator to greater than 0.1 amps if a longer cycle is desired.

Call Energy Kinetics to request alternate low voltage wiring diagrams to handle special situations such as heat pump wiring, isolation relays for thermostats, and isolation relays for heat motor zone valves or circulators, etc. The Condensing Energy Manager is designed to be compatible with power stealing thermostats.

The Condensing Energy Manager is designed to operate up to five zones. A typical installation will have one hot water zone and up to four heating zones. Use Energy Kinetics supplied full port zone valves with two wire connections or other full port two wire zone valves. Use full port, four wire zone valves with end switches for air handler zones, and wire the end switches to turn on the air handler fan motor.

INSTALLATIONS WITH MORE THAN FIVE ZONES

When the total number of zones exceeds five, an Accel CS boiler with a 15 zone condensing manager is available.

For existing jobs where an Accel CS boiler with a 5 zone condensing manager is already installed, an Energy Kinetics ERC (Energy Recovery Control) should be added. How to pipe and wire the ERC is shown in the drawing section of the manual, refer to drawings SYS-05-304 or SYS-05-305.

DISPLAY CONDENSING ENERGY MANAGER OPERATION

Energy recovery is based on time or temperature:

The Display Condensing Energy Manager will end energy recovery by stopping thermal purge to the last zone that called when the boiler has cooled off sufficiently. The Condensing Manager also tracks the thermal purge time and will end thermal purge after a maximum time limit. The DHW zone is limited to a maximum of five minutes, unless set as a heating zone[†]. The heating zones can be set to either twenty minutes or five minutes[†].

Auto Express or Custom Settings

Select your boiler supply temperature settings using either Auto Express or Custom[†]. Auto Express will set the boiler outdoor reset supply temperatures automatically to either a low range or a high range[†]. Auto Express will set the boiler supply temperature to a fixed setting every time there is a domestic hot water thermostat call. Custom settings give the installer full control over the selection of the outdoor reset settings and of the boiler supply temperature setting used during domestic hot water heating. The installer enters the maximum boiler supply setting and the minimum boiler supply setting for the desired outdoor reset temperatures through the Sola display.

Note: setting of the maximum and minimum boiler supply temperatures can be done only when a domestic hot water call is not present.

SmartBoost™ Operation

Outdoor temperature reset alone is inadequate to adapt to the comfort needs of typical homes. Operating a boiler based on a single reset curve with multiple zones generally leads to higher boiler temperatures and lower efficiency. When the curve is properly set to maintain temperature, it is inadequate for recovering from night setback thermostats, leading to poor response and inadequate space heating. Running at lower temperatures, however, can improve condensation rates, nominally increasing operating efficiency.

Energy Kinetics' unique solution to deliver higher efficiency and faster response for home comfort is SmartBoost™. The Condensing Manager operates the boiler with supply temperature at the reset curve temperature for up to 25 or 45 minutes[†] and then increases the operating temperature temporarily to recover from night setback or to satisfy individual zones requiring higher temperatures. Each zone's operating time is tracked individually, and once the zone is satisfied, the boiler will slowly adjust the temperature back to the reset curve setpoint for that specific zone. If there is another call from

the boosted zone in a short period of time, it will return to a boosted temperature without waiting for the boost delay time to elapse.

Specifically, upon a thermostat call, SmartBoost™ waits for the boost delay time (either 25 or 45 minutes) before raising the heating zone supply temperature set point by 5°F every five minutes until either of the following is reached: 200°F, or the calculated design day set point plus 30°F, whichever is lower. Also, when the return water temperature is greater than 130°F, the boiler will no longer condense, and the supply temperature set point is immediately raised by about 15°F. The higher supply temperature will help satisfy the thermostat sooner, which will shut off the burner sooner. The combined boost from time and return temperature is never more than 200°F or the design day set point plus 30°F, whichever is lower.

Boiler Supply Temperature Setting During Domestic Hot Water Call

When the DHW zone is active (THW/ZHW terminals), the boiler supply temperature is controlled to the *DHW Setpoint* as shown on the Sola Display. The *DHW Setpoint* will not change due to outdoor reset function and so does not change when the outdoor temperature changes. DHW temperatures are normally set to approximately 140 degrees F (a copper pipe with 140 degree water can be grasped in your hand for only 2-3 seconds). If the DHW temperature is too low (120-130 degrees), or too high, the boiler supply temperature for DHW calls can be adjusted. Start with an adjustment of 5-10 degrees on the boiler side if the DWH temperature needs adjustment. The *DHW Setpoint* can be changed from the factory default of 182°F by using the Sola display. Press the *info* button and select *Quick Start*, then select *DHW Setpoint*.

Note: The boiler supply temperature setting during a DHW zone call is not affected by Auto Express/Custom Settings.

Domestic Hot Water Smart Pump Operation

When using an Energy Kinetics DHW storage tank and plate heat exchanger, operation of the DHW Smart Pump relay output is controlled by the Condensing Manager. Upon a thermostat call from the storage tank, the Manager will turn on the zone valve output and after 2 seconds will send a heat demand to the Sola. Once the boiler supply temperature has reached 140°F, the Smart Pump relay and indicator LED are turned on by the Condensing Manager. If at any time the boiler supply temperature drops below 140°F, the Manager will turn off the Smart Pump relay, allowing the boiler to reheat. When using an indirect style DHW tank by others or using the DHW zone as a space heating zone, disable the Smart Pump relay and indicator LED by setting DHW as a heating zone[†].

Domestic Hot Water Priority

The Domestic Hot Water zone has priority over the heating zones. Upon a thermostat call from the DHW storage tank, the Condensing Manager will turn off any active heat zones. Once the DHW thermostat is satisfied, then the Manager will turn on all heat zones that have active thermostat calls. DHW Priority is limited to 25 minutes by default, but can be extended to 45 minutes of priority operation[†]. Setting the DHW Zone as a heating zone disabled HW priority.

Normal Heat Zones or Primary/Secondary Heat Zones

Heating zones will operate as normal direct supply/return heating zone(s) when not set for Primary/Secondary[†]. The following will occur upon a thermostat call to input terminal T1: the Zone 1 output will turn on which will begin opening the heating zone valve. Two seconds later, the Condensing Manager will apply a heat demand to the Sola which will start the boiler circulator. When zone(s) are set as secondary zone(s) fed from a primary/secondary injection loop, the following will occur upon a thermostat call to input terminal T1: the Zone 1 output will turn on which will begin opening the heating zone valve. Then the Condensing Manager Injection Zone output will turn on which will begin opening the injection zone valve. Two seconds later, the Condensing Manager will apply a heat demand to the Sola which will start the boiler circulator and the primary loop circulator. During a Domestic Hot Water thermostat call, DHW Priority will turn off the injection zone valve only, and will continue to run the primary loop circulator and any active heating zone valves.

Main Boiler Circulator Two Second ON Delay:

Upon a thermostat call, the Condensing Manager will immediately turn on the corresponding zone output and the zone valve will begin to open. Two seconds later, the Condensing Manager will turn on the B1-B2 output which will send a demand for heat to the Sola control. The Sola control will start the burner and turn on the main boiler circulator relay. The two second delay will give the zone valve time to open slightly before the main boiler circulator is turned on.

Thermostat Short Cycle Protection:

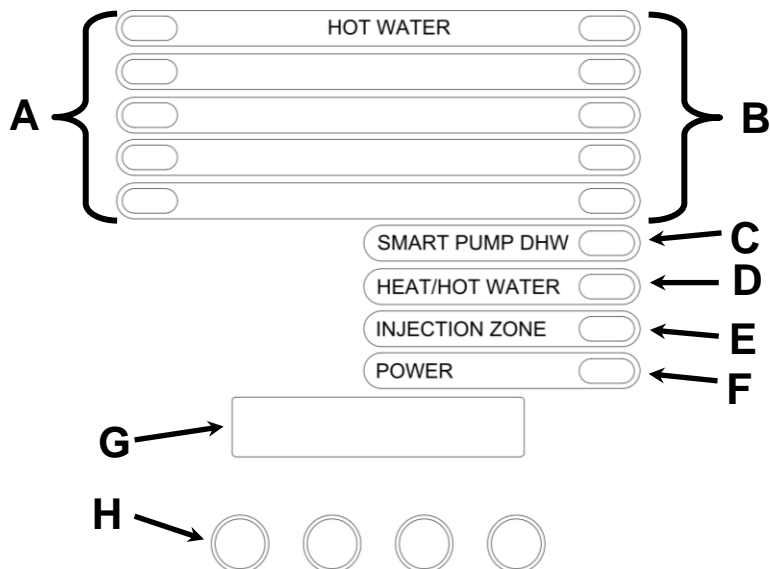
There is a thermostat short cycle delay of 25 seconds for domestic hot water and heat zones. If any thermostat calls very frequently, such as once every second or two, then a short cycle delay timer will start. During the delay time, the Condensing Manager will ignore the call from the thermostat which will prevent short cycling the burner. If while performing troubleshooting you don't want to wait for the demand to start again, clear the short cycle delay by cycling the power to the Condensing Manager.

Output Protection

The 24 VAC zone outputs of the Condensing Manager are protected from damage by shorted wiring, zone valve motors, relay coils or jumpers. The outputs are designed to electronically clamp down and limit potentially damaging excessive current flow. To clear the clamp down, turn off power to the Manager for a few seconds and then turn the power back on.

[†] Manager settings are modified through the Options Setup menu of the Energy Manager Display.

CONDENSING ENERGY MANAGER INTERFACE



WARNING: Do Not Jump or apply voltage to terminals!

NOTE: The Condensing Energy Manager cannot lockout the Sola boiler control or the burner.

Manager power on Self-Test (POST):

To confirm operation of the Condensing Manager lights and outputs, turn boiler power off briefly and right back on. On startup, all outputs and temperature lights will turn on for a brief moment. Thermostat input lights will only light with an active thermostat call. The three circulator relay outputs on the Sola control will also turn on for a few seconds to verify operation of the relays.

A) Thermostat Lights:

When any thermostat light is on, it indicates that a thermostat is calling for heat. If all lights are OFF, the burner will not run because there is no call for heat. SET THERMOSTAT HEAT ANTICIPATORS FOR 0.1 AMPS. Set heat anticipator to greater than 0.1 amps if a longer cycle is desired.

B) Heating or Zone Lights:

When any zone lights are on, it indicates 24-volt power from terminals 24VAC to Z_x (Z_{HW} , Z_1 , Z_2 , Z_3, \dots, Z_n). This provides power to 24-volt zone valves or zone circulator relays. NEVER JUMPER THIS CONNECTION! When any of the zone output lights are turned on, the Condensing Manager will tell the Sola to turn on the boiler pump relay output. The zone outputs and the boiler circulator output will be active during energy recovery.

C) Smart Pump Light On:

This light indicates that the Condensing Manager has told the Sola to turn on the domestic hot water Smart Pump.

D) Heat/Hot Water Demand Light On:

When any thermostat call is active, the Condensing Manager turns on the Heat/Hot Water light and closes the dry contact relay between B_1 and B_2 . This dry contact is wired to the heat demand input on the Sola control. When the last thermostat call ends, the Condensing Manager turns off the burner light and opens the B_1 - B_2 relay. After a thermostat call ends, the Condensing Manager will ignore subsequent thermostat calls from that thermostat for 25 seconds to prevent short-cycling the burner. To skip the short cycle delay and to turn on the Heat/Hot Water light right away, make sure a thermostat call is active and turn OFF the boiler power switch for a few seconds and then turn the boiler power switch back on.

E) Injection Zone and Loop Circulator Light:

When lit, this light indicates 24 volts between the terminals 24VAC and IZ. This provides power to a 24-volt injection zone valve if the system is so equipped. When this light is on, the Condensing Manager will tell the Sola to turn on the Loop Circulator relay output. Refer to the *Display Condensing Energy Manager Option Menu Descriptions* page for more information on how to use this feature.

F) Power Indicator Light On:

This light indicates that the Condensing Manager is powered.

G) LCD Display:

The Condensing Manager is equipped with a 16x2 LCD display that provides operational and diagnostic information, as well as menu-screens to view and customize option settings. The main screen normally displays the current operational mode, the boiler supply temperature, and the boiler return temperature. To wake the LCD display, press any of the menu navigation buttons below the display.

Note: The Sola display will show the boiler supply and return temperatures, the outdoor temperature and the stack temperature

H) Menu Navigation Buttons:

The four push-buttons below the display are used to navigate the menu-screens, as well as to set up the option settings. Pressing any of the buttons while the display is asleep will wake the display. The display has guided prompts to assist in navigating the screens and setting the options. For a detailed description of the available options, refer to the *Display Condensing Energy Manager Option Menu Descriptions* page.

DISPLAY CONDENSING ENERGY MANAGER OPTION MENU DESCRIPTIONS

Custom ODR - Default setting is **OFF**

This option allows the user to turn the Custom Outdoor Reset (ODR) function **ON** or **OFF**. While **ON**, the system will use the user-entered min/max boiler supply settings for the desired outdoor reset temperature. These custom settings are entered using the Sola Display.

Auto Express - Default setting is **160°F/120°F**

If the **Custom ODR** setting is turned **OFF**, this option allows the user to set the boiler outdoor reset supply temperature to either **160°F/120°F** or **180°F/140°F**. **Auto Express** will set the boiler supply temperature to a fixed setting every time there is a domestic hot water call.

See DISPLAY CONDENSING ENERGY MANAGER OPERATION section for more information.

SmartBoost™ - Default setting is **ON**

This option allows the user to turn the SmartBoost function **ON** or **OFF**. While **ON**, if a zone has been calling for heat for 25 minutes (optionally 45 minutes), then SmartBoost kicks in to help satisfy that zone sooner by boosting the maximum return temperature by 5° every 5 minutes until either of the following is reached: 200°F, or the calculated design day set point plus 30°F, whichever is lower. The boosted zone will stay at the boosted setting for up to 25 minutes after the call is satisfied.

See DISPLAY CONDENSING ENERGY MANAGER OPERATION section for more information.

SmartBoost™ Delay - Default setting is **25 Minutes**

This option allows the user to choose either a **25 minute** or **45 minute** delay before SmartBoost raises the maximum return temperature. This option only impacts boiler operation if SmartBoost is **ON**.

HW Zone - Default setting is **Hot Water**

This option will allow the hot water zone to be turned into a heating zone. While this option is set to **Heating**, the “Hot Water Zone” will act as a heating zone with 20 minutes of thermal purge. This change will allow the hot water zone to become a fifth heating zone, for those cases where domestic hot water isn’t required.

HW Priority - Default setting is **25 Minutes**

This option allows the user to choose either **25 minutes** or **45 minutes** of Hot Water Priority. The Hot Water Zone will have priority over heating calls for the amount of time selected. During this period, the system will ignore calls from the Heating zones. After the selected amount of time, or when the hot water call is satisfied, the system will resume providing heat to the rest of the zones.

MultiPurge™ - Default setting is **OFF**

This option allows the user to turn the Multipurge function **ON** or **OFF**. While **ON**, any zones finishing in the prior 20 minute period will purge with the last zone satisfied. Setting the Purge Time for a given zone to 5 minutes prevents that zone from multi-purging.

Zone Purge Times - Default setting for each zone is **20 Minutes**

This option allows the user to choose either a **20 minute** or **5 minute** purge time for heating zones. After all zone calls have been satisfied, there may still be heat remaining in the boiler. Instead of wasting that remaining heat, the Energy Manager will keep the last calling zone (or zones, if Multipurge is **ON**) open to allow the heat to be purged out of the boiler and into the system. The user is able to choose to let the boiler purge for either 5 minutes or 20 minutes before closing the zone. Any zone set to 5 minutes will also have Multipurge disabled for that zone. Regardless of the selected option, the Energy Manager will always end purging and close the zone when the return temperature has dropped sufficiently.

Secondary Zones - Default setting for each zone is **OFF**

This option allows for primary/secondary operation. If any secondary zone is enabled, the IZ output on the Manager will control the injection zone (IZ) and the Loop Circ. Relay on the Sola will control the zone circulator (ZC). Any zone that gets a call while set as a secondary zone will also activate the IZ and ZC, when needed.

If the hot water zone is set as a heating zone, the HWZ will also be displayed under the Secondary Zones options.

HYDRONIC CONTROL/LIMIT SETTINGS

Configuration	Control	Model No.	Normal Setting
Accel CS boiler	Auto Reset High Limit Thermostat	Built into the Sola control	210° F
	Manual Reset High Limit <i>(If Equipped)</i>	Honeywell L4006E	210° F
	Auto Reset Stack Limit	Built into the Sola control	230° F
Domestic Hot Water Storage Tank	Tank Thermostat <i>(On Tank)</i>	Energy Kinetics PN: 10-0414	'Hot', pointer points to 6 pm. <i>(To suit individual installation)</i>

AUTO RESET HIGH LIMIT

The Sola is a 24VAC boiler operating control and will modulate the burner fan speed down in 20% increments if the boiler stack temperature exceeds 220°F and will turn off the burner if the stack temperature exceeds 230°F. The Sola will turn off the burner altogether if the boiler supply temperature exceeds the 210°F high limit setting. The high limit setting is pre-programmed at the factory and cannot be changed in the field.

Burner Lockout

The Sola boiler control will detect loss of flame and will attempt to restart the burner. The Sola will attempt to restart the burner up to five times. If the flame cannot be established after the fifth restart, the boiler control will go into safety delay hold for 60 minutes. The display will note "Hold 110 Ignition failure occurred" and the burner state will be "Standby Delay." After 60 minutes, the hold will clear and the burner will attempt to light again. This replaces the "Lockout 109" from previous versions.

The boiler control may be reset from safety lockout by pushing the reset button on the boiler control or by using the display.

If normal operation cannot be established after ONE reset, then do not make further attempts to put the boiler back into operation.

The boiler control tries to light the burner six times and then locks out. Pressing reset ONCE allows the boiler control to attempt to light the burner six more times. If the burner hasn't lit after twelve attempts, don't continue pressing the reset button. Instead, call for professional help from a qualified service agency.

SOLA USER INTERFACE

The Sola hydronic boiler control system provides flame supervision, hot surface ignition, circulator relays and burner fan control for basic boiler operations. It also provides boiler status and error reporting through the display shown below. All efficiency operations and heat demand functions are communicated directly to the Sola hydronic boiler control by the Condensing Energy Manager. The Condensing Energy Manager may be bypassed for temporary operation using only the Sola control to provide limited heat and hot water functions. If the black Sola boiler control fails, there is no emergency heat option. You must obtain a replacement Sola control configured for operating the Accel CS boiler to restore operation.

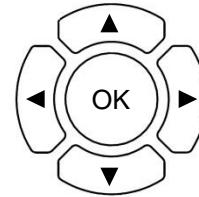
Setting Minimum and Maximum Outdoor Temperatures

To program minimum and maximum outdoor temperatures:

PRESS: **INFO**

This will bring up the **Quick Start** screen.

System setpoint	160°F
Operating temp	158°F
Outlet temp	158°F
Inlet temp	138°F
Outdoor temp	15°F
Boiler name	Accel CS
State	Preignition Time
Demand	CH
Access status	User
No lockout/hold/alert	

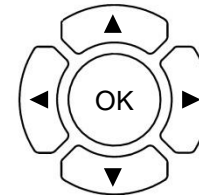


- BACK
- INFO
- HOME

PRESS: **OK**

This will bring up the **Quick Start** setpoint menu.

Quick Start	
Quick Start	Login
Test	Advanced Setup
Diagnostics	Display Setup



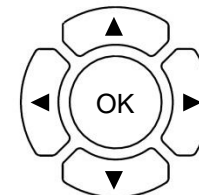
- BACK
- INFO
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PRESS: (down arrow) until **Max outdoor temp** is highlighted.

PRESS: **OK**

PRESS: (up arrow) / (down arrow) to add one or to subtract one from the setting. When finished changing to your new setting, press **OK** to accept the new setting.

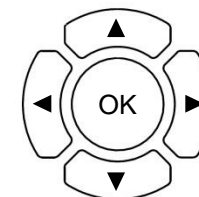
Quick Start	
CH setpoint	138°F
DHW setpoint	180°F
Outdoor reset	Enable
Low water temp	118°F
Max outdoor temp	68°F
Min outdoor temp	10°F



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- INFO
- HOME

Repeat to change the minimum outdoor temp, highlight **Min outdoor temp**, press **OK**, adjust the temperature to the desired setting, and press **OK** to accept the new setting.

Quick Start	
CH setpoint	138°F
DHW setpoint	180°F
Outdoor reset	Enable
Low water temp	118°F
Max outdoor temp	68°F
Min outdoor temp	10°F



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NOTE: DO NOT enable warm weather shutdown on a boiler that provides domestic hot water. Enabling warm weather shutdown will disable domestic hot water production during warm weather.

Customized Hydronic System Temperatures

NOTE: Customized settings will only store and function if the Condensing Energy Manager is powered up and Custom ODR setting is enabled.

To program maximum boiler water supply temperature:

PRESS: **INFO**

This will bring up the **Quick Start** screen.

PRESS: **OK**

This will bring up the **Quick Start** setpoint menu

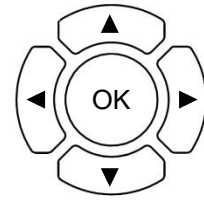
Press (up arrow) / (down arrow) to highlight **CH setpoint**, which is the maximum boiler supply temperature setpoint.

PRESS: **OK**

PRESS: (up arrow) / (down arrow) to add one or to subtract one from the setting. When finished changing to your new setting, press **OK** to accept the new setting.

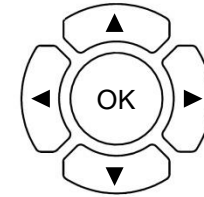
Repeat to set the minimum boiler water temperature. Highlight **Low water temp**, press **OK**, adjust the temperature to the desired setting and press **OK** to accept the change.

System setpoint	160°F
Operating temp	158°F
Outlet temp	158°F
Inlet temp	138°F
Outdoor temp	15°F
Boiler name	Accel CS
State	Preignition Time
Demand	CH
Access status	User
No lockout/hold/alert	



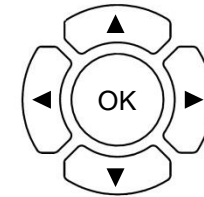
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Quick Start	
Quick Start	Login
Test	Advanced Setup
Diagnostics	Display Setup



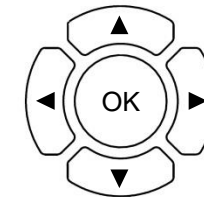
- BACK
- INFO
- HOME

Quick Start	
CH setpoint	138°F
DHW setpoint	180°F
Outdoor reset	Enable
Low water temp	118°F
Max outdoor temp	68°F
Min outdoor temp	10°F



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Quick Start	
CH setpoint	138°F
DHW setpoint	180°F
Outdoor reset	Enable
Low water temp	118°F
Max outdoor temp	68°F
Min outdoor temp	10°F



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Outdoor Temperature Sensor Selection

The Sola boiler control must have an outdoor temperature sensor connected in order for the outdoor temperature reset feature to work. The Accel CS boiler comes standard with a wired outdoor temperature sensor and is configured at the factory to work with the wired outdoor temperature sensor.

If outdoor temperature reset is not required, then the wired outdoor sensor does not need to be connected and the Sola boiler control should be instructed using the display to not expect the outdoor sensor.

If the optional wireless outdoor temperature sensor is being used, then the Sola boiler control should be instructed using the display to read the outdoor temperature from the wireless outdoor sensor.

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 pressurized to between 12 and 20 psi.
2. Re-check all wiring to ensure that it is correct and in accordance with appropriate wiring diagrams and codes.
3. Verify that the intended fuel gas matches the labeling on the boiler.
4. Gas supply is connected to burner. Gas supply lines and shut-off valves are open.
5. All gas lines, including factory connections, are leak-checked and purged.
6. Inspect the condensate trap, verify ball is in place and drain tube connected.
7. Venting system properly installed. All joints are secured and sealed.
8. Combustion air supply is available and sufficient.

WARNING: Double check the supply gas pressure at the valve.

The gas control valve is provided with a pressure tap/nipple of 9 mm OD (for 5/16" ID hose) at the inlet and outlet side. Refer to the photo in the **GAS VALVE DESCRIPTION** section for the location of the pressure tap. To check the inlet gas pressure, first close the manual gas service valve. Next turn the valve screw inside the inlet tap/nipple a half turn counterclockwise to open it and slip the tubing for your gauge over tap/nipple. After attaching the gauge, open the gas service valve and take your reading. Refer to the **Gas Supply Pressure** section for allowable readings.

If the inlet gas pressure passes this test, the unit is ready for further testing or use. Make sure that the screw inside the gas valve tap/nipple is re-tightened after removing the gauge tubing. If the gas pressure is outside of the required range, contact the gas utility or gas supplier to correct this problem before proceeding with run testing or use of the boiler.

START UP PROCEDURE

Turn the boiler power switch on. All the Condensing Energy Manager output lights should come on briefly. The burner relay should close briefly. The blue power light will remain on.

1. Adjust a thermostat to call for heat. A Tx LED and the corresponding Zx LED will light on the Condensing Energy Manager and the Heat/Hot Water LED will light at the same time. If not, check the thermostat wiring to the Condensing Energy Manager.
2. The fan will come on shortly to purge the boiler of any unburned gas mixture.
3. Check for burner ignition. If gas piping is not well purged, then several tries at light off may be required to clear air from gas piping.
4. If the burner doesn't light, the Sola control will try 6 more times and then the control will go into 60 minute ignition delay and the display will read "Hold 110 Ignition failure occurred".
5. After burner light off, water temperature and flue gas temperature will start to rise. A slight odor is common on initial light off as combustion chamber and converter surfaces warm for the first time.
6. Watch the pressure and temperature gauge as the burner starts. The pressure on the gauge should remain constant and between the minimum and maximum required pressure (12 and 20 psi) during this time. The temperature should start to rise.
7. **NOTICE:** Perform carbon monoxide test two minutes after light off; increase time to 30 minutes on new installations to allow the refractory to burn-in. If the carbon monoxide exceeds 400 ppm *air-free* after two minutes of operation, shut off boiler immediately and repeat "Prepare for Start Up" checklist. (See "*Air-free method of measuring CO*")
8. Allow system to run about 15 minutes before testing and recording burner operation. (See "*Gas Burner Operation*")
9. **DANGER:** Verify flame failure lockout of burner control.
 - ✓ Turn on any thermostat and the burner should fire and start heating the boiler.
 - ✓ With the burner running, turn off the service gas valve to the burner.
 - ✓ The burner should shut off within a few seconds after the gas valve is closed.
 - ✓ An alert/hold message will appear on the display, and the control will try relighting the burner.
 - ✓ After six more tries the display will show a hold code of 110 (failed ignition).
 - ✓ If hold does not occur, replace the burner control.

10. **DANGER:** Verify proper operation of high temperature limit safety.
 - ✓ Verify boiler is full of water and has at least 12 psi of pressure in boiler.
 - ✓ Turn on any thermostat and the burner should fire and start heating the boiler.
 - ✓ Locate and turn off valve(s) to stop water from flowing through the boiler. For example, if there is a single valve on the return piping that will stop all flow, turn off that valve.
 - ✓ The boiler supply temperature will start to quickly rise and the boiler return temperature should not change much.
 - ✓ Within a few minutes, the boiler supply will reach 210°F, and the high limit safety should shut off the burner.
 - ✓ After finishing the test, be sure to open all valves to restore full water flow through the boiler.
9. **DANGER:** Verify proper operation of boiler pressure relief valve.
 - ✓ Refer to valve manufacturer's instructions on pressure relief valve.
 - ✓ Make sure to add makeup water after test.
 - ✓ Pressure gauge should read at least 12 psi, verify that the boiler air vents are open and operational, and that the boiler is full of water before resuming boiler operation.
10. **NOTICE:** Check that each thermostat operates the proper zone output.
11. **Caution:** Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

THE AIR-FREE METHOD OF MEASURING CO

Air-free measurement of CO takes account of the amount of excess air by incorporating an adjustment to the as-measured ppm value, thus simulating air-free (oxygen-free) conditions in the combustion gases. To do this, a reading of oxygen (O₂) or carbon dioxide (CO₂) percentage is taken from the combustion gases along with the as-measured CO reading. This can be done with a meter having the capability of measuring CO and O₂ or CO₂ percentage, or it can be done with two different meters, one measuring CO ppm and one measuring O₂ or CO₂ percentage.

If air-free CO is determined with a single meter, an integral electronic chip calculates the air-free level from as-measured CO ppm and O₂ percentage. If two meters are used, the equations below can be used to determine the air-free level of CO in a combustion gas sample.

For natural gas or LPG, using as-measured CO ppm and O₂ percentage:

$CO_{AFppm} = \left[\frac{20.9}{20.9 - O_2} \right] \times CO_{ppm}$ <p>For LPG, using measured CO ppm and CO₂ percentage:</p> $CO_{AFppm} = \left[\frac{14}{CO_2} \right] \times CO_{ppm}$ <p>For natural gas, using measured CO ppm and CO₂ percentage:</p> $CO_{AFppm} = \left[\frac{12.2}{CO_2} \right] \times CO_{ppm}$	<p><u>Where:</u></p> <p>CO_{AFppm} = Carbon monoxide, air-free ppm</p> <p>CO_{ppm} = As-measured combustion gas carbon monoxide ppm</p> <p>O₂ = Percentage of oxygen in combustion gas, as a percentage</p> <p>CO₂ = Percentage of carbon dioxide in combustion gas, as a percentage</p>
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Notes:

1. CO₂/O₂ must be checked with all covers in place.
2. Flue gas readings should be taken through 1/4" test port in SS flue pipe just above the boiler jacket. Sample tube should extend at least two (2) inches into flue pipe and be tilted downwards to properly sample flue gas.

AFTER 15 MINUTES RUNNING, CHECK AND RECORD:

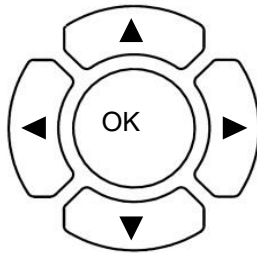
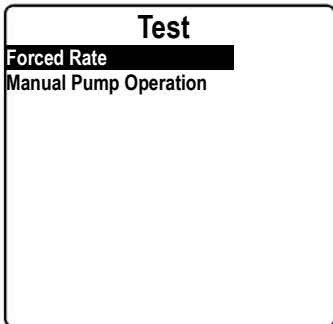
3. CO₂/Carbon Dioxide Normal Installation Conditions*
 - LPG..... 11.1% Max., 10.4% min., 10.7% Target
 - Natural Gas..... 9.5% Max., 8.9% min., 9.2% Target
4. O₂/Oxygen Normal Installation Conditions
 - LPG..... 5.0% Max., 4.0% min., 4.5% Target
 - Natural Gas..... 5.0% Max., 4.0% min., 4.5% Target
5. CO/Carbon Monoxide..... Must be less than 400 ppm air-free
6. Stack Temperature 230°F Max (depends on return temp)

*Burner operating range is up to 13% CO₂ with propane depending on model and firing rate range. Running with low levels of excess air may reduce burner head long term durability without noticeable benefits in annual efficiency.

GAS VALVE SETUP PROCEDURE

- Verify gas supply pressure to the appliance with a manometer connected to the inlet pressure port.
Natural Gas: 3.5" – 10.5"w.c.
LPG: 8" – 13"w.c.
- Using combustion test equipment, insert the probe into the exhaust gas outlet (flue port).
- Start appliance by turning on a hot water tap, which will start the boiler for hot water production. We need a large load on the boiler in order to run at full firing rate. To prevent the burner from modulating down use the domestic hot water demand or a large volume central heat zone. Refer to the table below for the proper modulation maximum and minimum fan speeds.

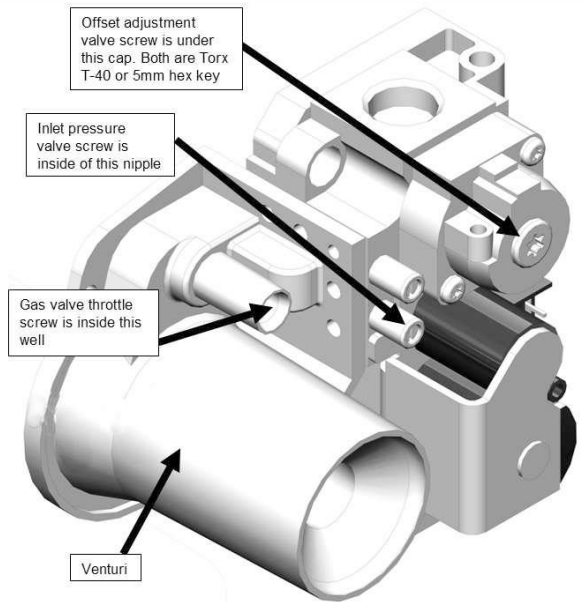
Method 1



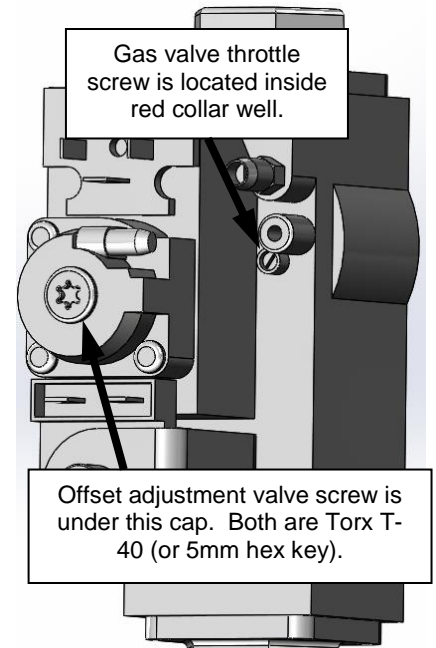
- BACK
- INFO
- HOME

If the **INFO > Test** screen displays two options as shown above, use the following setup procedure:

1. Perform carbon monoxide test two minutes after light off. If the carbon monoxide exceeds 400 ppm air-free after two minutes of operation, shut off boiler immediately and repeat "Prepare for Start Up" checklist.
2. Set appliance 'max modulation rate' to *maximum* desired fan speed: **INFO > Advanced Setup > Modulation Config**. Use left and right arrows only. To delete prior setting, arrow to DEL and press OK until cleared, then use arrows to enter the max fan speed. See *Fan Speed chart in section Length of Run, Intake and Vent for fan speed ranges*. *Selecting fan speeds outside the recommended ranges may cause a lockout*.
3. Check that O₂ reading is 4.5% and adjust throttle screw if necessary. Turn throttle screw clockwise to increase O₂ and counterclockwise to decrease O₂ for EK1Cs and EK2Cs. For EK3Cs, the throttle valve can be turned continuously (4 full turns of the throttle adjustment screw will leave the throttle back at the starting point)--turn in one direction and note if the O₂ increased or decreased, and proceed using that as a reference to adjust the screw in the proper direction to set the O₂ reading to 4.5%.
4. Keep appliance running until stabilized, about 15 to 20 minutes, make adjustment when necessary.
5. Set appliance max modulation rate to *minimum* desired fan speed: **INFO > Advanced Setup > Modulation Config**. Use left and right arrows only. To delete prior setting, arrow to DEL and press OK until cleared, then use arrows to enter min fan speed. See *Fan Speed chart in section Length of Run, Intake and Vent for fan speed ranges*. *Selecting fan speeds outside the recommended ranges may cause a lockout*.
6. Remove cap screw with a Torx T-40 screw driver or 5 mm hex key to expose offset adjustment screw.
7. Check that offset O₂ reading is 4.5% and adjust if necessary- clockwise to lower O₂ (raise CO₂, or make mixture richer) and counterclockwise to raise O₂ (lower CO₂, or make mixture leaner).
8. Reset appliance fan speed to max fan speed (see Item 2 above). Verify speed is at max fan speed.



EK1C & EK2C Gas Valve

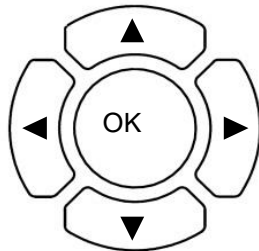
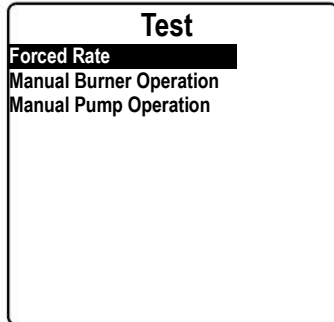


EK3C Gas Valve

9. Repeat steps 2 through 8, inclusive, when adjustment of offset valve was necessary, resetting 'max modulation rate' to max fan speed.
10. After adjustments are made, stop appliance, disconnect pressure gauge and combustion analyzer. Make sure to tighten inlet pressure tap, offset cap screw and combustion test port.
11. The target O2 reading is 4.5%. The valve used in the EK1C and EK2C boilers is capable of holding 4.5% O2 plus or minus 0.2% O2. Maximum allowable deviation for all sizes is plus or minus 0.5% O2, or from 4.0% O2 to 5.0% O2

Method 2:

If the **INFO > Test** screen displays three options as shown, the following setup procedure may be used:



- BACK
- INFO
- HOME

1. Perform carbon monoxide test two minutes after light off. If the carbon monoxide exceeds 400 ppm air-free after two minutes of operation, shut off boiler immediately and repeat "Prepare for Start Up" checklist.
2. Set appliance minimum and maximum 'modulation rate' to min and max desired fan speed, respectively: **INFO > Advanced Setup > Modulation Config**. Use left and right arrows only. To delete prior setting, arrow to DEL and press OK until cleared, then use arrows to enter the min/max fan speed. *See Fan Speed chart in section Length of Run, Intake and Vent for fan speed ranges. Selecting fan speeds outside the recommended ranges may cause a lockout.*
3. Navigate to test mode menu: **INFO > Test > Forced Rate**. Select "Set Low Fire" and press the OK button, wait (2) seconds to be sure "Manual firing rate" displays the desired fan speed. Repeat with "Set High Fire". Select "Start Test".
4. Check that O2 reading is 4.5% and adjust throttle screw if necessary. Turn throttle screw clockwise to increase O2 and counterclockwise to decrease O2 for EK1Cs and EK2Cs. For EK3Cs, the throttle valve can be turned continuously (4 full turns of the throttle adjustment screw will leave the throttle back at the starting point)--turn in one direction and note if the O2 increased or decreased, and proceed using that as a reference to adjust the screw in the proper direction to set the O2 reading to 4.5%. *If additional time is needed, the test may be restarted by selecting "Stop Test" and pressing the OK button, and then immediately pressing the OK button again. The test can also be restarted after the 5 minute time limit has expired by selecting "Start Test" and pressing the OK button.*
5. Keep appliance running until stabilized, about 15 to 20 minutes, make adjustment when necessary.
6. Set appliance to minimum fire by selecting "Set Low Rate".
7. Remove cap screw with a Torx T-40 screw driver or 5 mm hex key to expose offset adjustment screw.
8. Check that offset O2 reading is 4.5% and adjust if necessary- clockwise to lower O2 (raise CO2, or make mixture richer) and counterclockwise to raise O2 (lower CO2, or make mixture leaner).
9. Reset appliance max fan speed to max RPM (see Item 2 above). Verify speed is at max fan speed.
10. Repeat steps 2 through 8 inclusive when adjustment of offset pressure was necessary, resetting maximum fire to max RPM. The test mode will run for 5 minutes before reverting to auto modulation.
11. After adjustments are made, stop appliance, disconnect pressure gauge and combustion analyzer. Make sure to tighten inlet pressure tap, offset cap screw and combustion test port.
12. The target O2 reading is 4.5%. The valve used in the EK1C and EK2C boilers is capable of holding 4.5% O2 plus or minus 0.2% O2. Maximum allowable deviation for all sizes is plus or minus 0.5% O2, or from 4.0% O2 to 5.0% O2

What if the fire goes out when you adjust the fan speed to minimum?

When this happens, it means the valve is far enough out of offset adjustment that at low fan speeds the flame signal drops below minimum. Example: Upon a hot water call, the burner lights at the light off speed of 3600 rpm, and then the burner ramps up to maximum fan speed. Measure the oxygen level and adjust the gas valve main throttle screw as needed. Next change the fan speed to minimum, and as the fan speed ramps down, the flame signal drops below minimum due to a large change in the oxygen level, and the burner shuts off. In order to keep the burner running long enough to adjust the offset, set the minimum fan speed to 2500 rpm and the flame should stay lit long enough for you to adjust the valve offset to a reasonable setting. Then lower the minimum fan speed in steps such as 2000 rpm or 1200 rpm, and again adjust the gas valve offset as needed.

Final checkout of the installation

After any adjustment, set appliance in operation. Observe several complete cycles to ensure that all burner components function correctly.

TROUBLESHOOTING WITH THE ENERGY MANAGER

✓ **Does the Sola Control need to be reset?**

YES: Troubleshoot as standard burner lockout.

NO: **Did homeowner reset control?**

YES: Troubleshoot as standard burner lockout.

NO: Reset Manager. Run through standard heat cycle.

✓ **Does boiler supply and return heat up properly?**

NO: Check boiler circulator. Possible closed or blocked zone.

YES: Intermittent problem. Check low voltage 24vac wiring for tightness from Manager to the Sola control.

ACCEL CS OPERATION WITHOUT AN OPERATIONAL CONDENSING ENERGY MANAGER

Background: The Condensing Energy Manager communicates with the Honeywell Sola boiler control to operate circulators and to operate a heat demand. Domestic hot water (DHW) is operated with a central heat (CH) demand to the Sola, and priority is set at the manager. The Sola has separate CH demand and DHW demand connections (even though the Manager does not use the Sola DHW connection). Note: The Accel CS Condensing Energy Manager method of communication with the Sola is different enough that inserting a System 2000 service board will not allow proper function. Here's how to provide temporary or emergency heat and hot water without a Condensing Energy Manager and with an operational Sola boiler control:

For temporary heat: Turn the Accel CS power off and disconnect both right and left quick connects from the Manager. Choose a master thermostat to control the heat in the home. Temporarily wire this thermostat to the Sola heat demand input by connecting the two thermostat wires to the B1 and B2 terminals on the right hand quick connect. Manually open all zone valves for zones requiring heat. Leave the quick connectors disconnected until a new Manager is available and you are ready to restore the wiring. Double check all wiring connections and turn the Accel CS power on. The Accel CS will only run when there is an active heat call from this master thermostat.

For temporary domestic hot water: Turn the Accel CS power off and disconnect both right and left quick connects from the Manager. Connect the tank thermostat wires (THW, A1) directly to the Sola DHW demand terminals as follows: Remove connector J9 from the Sola and wire the tank thermostat wires to Pin 1 and Pin 2 on J9 – see diagram SYS-08-301. Replace connector J9. The Sola DHW demand connection is programmed for a 4 minute boiler preheat delay before making domestic hot water by turning on the smart pump relay. To make domestic hot water, turn off the master heating thermostat that was connected for temporary heat, close all heating zone valves (so the house is not simultaneously heated), and manually open the domestic hot water zone valve. Turn the Accel CS power on and wait until the domestic hot water tank is heated and the tank thermostat is satisfied. Turn the Accel CS power off, disconnect the domestic hot water thermostat at the tank or at terminal J9, and close the domestic hot water zone valve. Turn the Accel CS power on and restore temporary heat by first opening the heating zone valves and then turning the master thermostat up to the desired temperature. *Note: If the heating zones are not manually closed, domestic hot water temperature quality may still be adequate, depending on radiation temperature.*

DIAGNOSTICS USING THE ACCEL CS DISPLAY

System setpoint	160°F
Operating temp	158°F
Outlet temp	158°F
Inlet temp	138°F
Outdoor temp	13°F
Boiler name	Accel CS
State	Preignition Time
Demand	CH
Access status	User
No lockout/hold/alert	

The **Home** screen shows the current state of the boiler control. At any time, you can press the **Home** button and the display will return to the **Home** screen. The first five rows show the current temperatures of the system. The next four rows in smaller font show the boiler name, the state of the control, the demand, and the access status.

Pay particular attention to the state and the demand rows. The state of the control will tell you what the control is doing at any time, such as pre-purge, ignition, running, or post purge. The demand row shows 'CH' whenever there is a call for heat or hot water to the Sola control. The demand row will show 'Standby' when the boiler is idle, and will show 'Lead Lag slave' when the boiler is cooling off due to energy recovery.

The bottom row will show codes with an English explanation for lockouts, holds, and/or alerts. A lockout will require manual reset of the control, while holds and alerts will automatically reset when the condition is cleared.

Press the right arrow to move to the Analog sensor screen.

Outlet temp	138°F
Inlet temp	115°F
Delta T	23°F
DHW temp	OPEN
Stack temp	117°F
Outdoor temp	36°F
Fan Speed	LOW
Flame Signal	8.21µA
4-20mA input	OPEN
System sensor	Outlet

Analog Sensor Screen

- Do they all make sense?
- **OPEN** indicates that the sensor is not connected
- Minimum flame signal is 1 uA
- Review sensor temperature readings

Press the right arrow again to move to the Digital input/output screen

Boiler pump (A)	Off
DHW pump (B)	Off
System pump (C)	Off
Blower/HIS	Off
External Ignition	Off
Pilot valve	Off
Main valve	Off
Alarm	Off
Interlock (ILK)	On
Pre-ignit Interlock (PII)	Off
Load Control Input (LCI)	On
STAT (Demand)	On
Time of Day	Off
Safety relay	Off

Digital IO screen

- Review digital inputs and outputs
- **Boiler pump (A)**, the main boiler circulator
- **DHW pump (B)**, the bronze Smart Pump
- **System pump (C)**, the primary loop circulator
- **Interlock (ILK)** is the Low Water Cut Off input

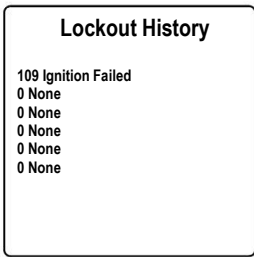
Diagnostics	
Quick Start	Login
Test	Advanced Setup
Diagnostics	Display Setup

Press the **Info** button to transition to the Information Screen. Using the arrow/cursor buttons, navigate to the **Diagnostics** icon and push the **OK** button.

Diagnostics	
Analog Sensors	
Digital IO	
History	

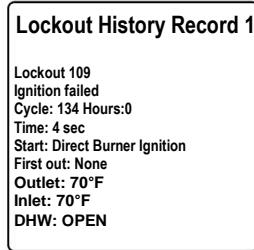
Using the arrow/cursor buttons - navigate to...

- **History** icon and press **OK** button to view the **Alert** or **Lockout History**.



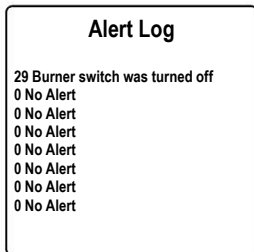
Lockout History

- Records last 15 Lockouts
- Using the arrow/cursor buttons – navigate to the Lockout record of choice and push the **OK** button to view Lockout details stored at the time the Lockout occurred.
- Lockout history is stored in non-volatile memory. History will be retained even when the power is off.



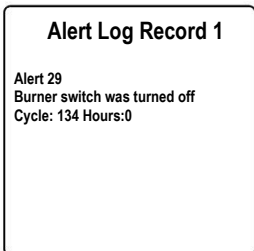
Lockout History Record

- Display detailed information for each Lockout.
- Pressing **Back** or **OK** buttons transitions back to the **Lockout History** screen.



Alert History

- Records the last 15 Alert messages.
- Using the arrow/cursor buttons – navigate to the Alert record of choice and push the **OK** button to view Alert details stored at the time the Alert occurred.
- Alert



Alert History Record

- Display detailed information for each Alert.
- Pressing **Back** or **OK** buttons transitions back to the **Alert History** screen.

LOCKOUTS, HOLDS, AND ALERTS

The Honeywell Sola boiler control has a display designed to inform the user about lockout, hold, and alert conditions. Each condition has a code that is displayed along with an English sentence that briefly describes what the code means.

Lockouts: It is very important to note that lockouts must be manually reset and will usually require service attention. The history of lockout events is stored in non-volatile memory, which means that up to fifteen lockout events can be stored and displayed, even if the power to the boiler control is turned off and back on.

Holds and Alerts: On the other hand, holds and alerts are meant to be informative about the state of the boiler and will automatically reset themselves once the hold or alert condition has cleared. It is very important to note that holds and alerts in general are not error conditions and rarely would require any type of service attention. Since holds and alerts are not safety related conditions, the history of the last fifteen holds and alerts is stored in volatile memory, which means that the hold and alert memory will be lost if the power to the boiler control is turned off and back on.

Best Practice: Be sure to write down, or take a picture of, the history screen showing the holds and alerts before turning off the power to the boiler.

FAQ: “I’m getting a code that isn’t listed in this manual. What should I do?” There are several hundred different lockout, hold, and alert codes programmed into the Sola boiler control. If a code comes up that isn’t listed and discussed in this manual, it will be a rare event, so be sure to write down or take a picture of the code. Next, read carefully what the brief description says, and interpret what it says almost literally. If the description doesn’t make sense or if there are any concerns about the circumstances, then call Tech Support and email us the picture. We will help make sense of what is going on and whether it’s a situation that requires service attention.

Message on the Display	State of the control	Details
<p>Hold 110 <i>Ignition failed</i></p> <p>Legacy Units: <i>Lockout 109</i> <i>Ignition failed</i></p> <p>Press OK to clear lockout</p>	<p>Hold – 60 minutes</p> <p>Legacy Units: Lockout</p>	<p>After a total of seven unsuccessful attempts to light, the Sola control will go into 60 minute Hold (or Lockout on legacy units). Anything that prevents a flame signal from being received can cause an ignition failure.</p> <p>Check:</p> <ul style="list-style-type: none"> • The gas is turned on • Flame signal exceeds 1uA after four seconds of flame – Remove and clean flame rod if flame signal is low on lightoff (<1.5uA) • Gas pressure at valve inlet is within spec • Hot surface igniter glows before gas valve opens • Gas valve opens • Flame rod is connected, not open and not shorted
<p>Hold 62 <i>Fan speed not proved</i></p>	<p>Prepurge Drive to Purge Rate</p>	<p>When the combustion blower speed does not reach the targeted fan speed within a short time, the control will go to a hold state.</p> <p>Check:</p> <ul style="list-style-type: none"> • Is the fan running at all? <ul style="list-style-type: none"> ○ If not running, check for 120VAC at the fan connector • Is the fan running at top speed? <ul style="list-style-type: none"> ○ If running at top speed, check the speed command and tach feedback wires and connector.
<p>Hold 63 <i>LCI OFF</i></p>	<p>Standby</p>	<p>Condensate pump high water switch contacts (if connected) are open before startup or open mid-cycle resulting in immediate burner shutdown. High water condition will prevent burner from starting. If already running, this will shut off the burner. The Sola control will automatically reset and restart when condensate pump water level drops to normal.</p>
<p>Hold 67 <i>ILK OFF</i></p>	<p>Standby</p>	<p>Low Water Cut Off (LWCO) contacts are open before startup or open mid-cycle resulting in immediate burner shutdown. Low water condition will prevent burner from starting. If already running, this will shut off the burner. The Sola Control will automatically reset and restart when water level is restored.</p>
<p>Hold 79 <i>Outlet high limit</i></p>	<p>Standby</p>	<p>The boiler supply (outlet) temperature has exceeded the high limit temperature setting of 210°F. The control will turn off the burner and will keep the burner off until the supply temperature drops back down.</p> <p>Check:</p> <ul style="list-style-type: none"> • Is the burner cycling on/off frequently on high limit? <ul style="list-style-type: none"> ○ Is the supply temperature setting set at 210°F? If so, turn down the supply temperature setting to no more than 205°F. • If this is a no-heat call, the boiler is going off on high limit and the boiler return water temperature is cold, then there may be a circulation problem. Manually open all zone valves as a test of the boiler circulation. <ul style="list-style-type: none"> ○ If high limit standby happens with all zones, the boiler circulator may not be functioning. ○ If high limit standby happens with only one zone, the zone valve or zone circulator may not be functioning. • Gravity flow with a failed circulator through open zone valves will provide some heat to the zones, but will have a very high temperature drop across the zones. • See <i>Hold 92</i> outlet sensor fault for sensor concerns
<p>Hold 82 <i>Stack Limit</i></p>	<p>Standby</p>	<p>The stack (flue gas) temperature has exceeded the high limit temperature setting. The Sola control will turn off the burner and will keep the burner off until the stack temperature drops back down.</p> <p>Check:</p> <ul style="list-style-type: none"> • Are all of the turbulators installed in the pressure vessel? • The stack limit setting may be field adjusted between 150°F and 230°F. Has

		the stack limit been turned down? Note that using PVC to vent the Accel CS is not approved, even when the stack limit setting has been lowered to 150°F.
Hold 92 <i>Outlet sensor fault</i>	Standby	The supply (outlet) sensor is the high temperature limit safety. If the sensor wiring is broken, the supply (outlet) temperature reading on the display will read <i>OPEN</i> , the control will go into a hold condition and will shut off the burner until the sensor or wiring is repaired.
Hold 95 <i>Stack sensor fault</i>	Standby	The stack sensor is used as a stack high limit safety. If the sensor wiring is broken, the stack temperature reading on the display will read <i>OPEN</i> , the control will go into a hold condition and will shut off the burner until the sensor or wiring is repaired.
918 F Outlet or 918°F Stack	Standby	Whenever the display shows 918°F for the outlet or stack temperature, it will also show <i>Hold 92</i> or <i>Hold 95</i> . The control knows that a sensor is connected, but there is something wrong with the sensor. For example, if a single thermistor and a jumper are connected to a dual thermistor input, the control will display 918°F and will go into the Hold condition until the situation is corrected. To correct the 918°F error, replace the sensor with the appropriate dual thermistor sensor.
NOISY	Standby	The temperature sensors for the supply, return, stack, and outdoors are continually monitored by the Sola. If there is something wrong with a sensor, the display will post a message, such as <i>Noisy</i> , <i>Open</i> or <i>Short</i> . Almost always, any kind of message about a sensor means the sensor should be replaced as soon as possible. Any message about the supply sensor requires immediate replacement.
Alert 248	No effect	If the Sola boiler control is configured for a wired outdoor temperature sensor, but no sensor is connected, then the display will show <i>Alert 248</i> . The boiler control will run fine without an outdoor temperature sensor. To eliminate this unimportant alert, change the Sola boiler control configuration to not expect an outdoor temperature sensor, and then the alert will no longer be displayed.

DISPLAY CONDENSING MANAGER ERROR CODES

A flashing backlight on the LCD screen indicates an error has been detected. Pressing any button will disable the flashing and turn on the backlight.

E085 A message reading “E085” on the Manager display indicates that the Manager can’t communicate with the Sola. The Manager won’t be able to read the supply and return temperatures from the Sola and the Manager won’t be able to send circulator control commands to the Sola. The Sola will still respond to a heat demand from the Manager when the B1-B2 dry contact relay in the Manager closes by turning on the boiler circulator and firing the burner. Zone valves will be opened by the Manager zone outputs and heating operation will continue. The Sola will not turn on the bronze Smart Pump for domestic hot water production unless the tank thermostat is rewired as explained in a previous section, *ACCEL CS OPERATION WITHOUT AN OPERATIONAL CONDENSING ENERGY MANAGER*.

The flashing light won’t have an effect on burner operation. However, some functions are disabled.

- No DHW, unless tank thermostat rewired to Sola DHW demand input.
- Smart Pump disabled.
- Manager post purge energy recovery disabled.
- Loop circulator disabled.

Restored connection allows normal Manager operation without power reset.

Possible causes include:

- Broken or loose wire. The wires attached to the Manager terminals labeled A and B, must be connected to the Sola terminals labeled A and B with a sub-label of MB2.
- The Sola may not be running, check for an illuminated power light on the Sola control.

E130 A message reading “E130” on the Manager display indicates an excessive temperature condition. Zones could not extract heat from boiler. Check zone valves, heat exchanger and boiler circulation. High limit aquastat may not be functioning.

PUMP EXERCISE

The Sola boiler control includes a pump exercise function. The Sola comes set for a fourteen day pump exercise interval and a one minute pump exercise time duration. The Sola keeps track of the last time each pump has been running. After any of the pumps has been off for fourteen days, the Sola will turn on that pump for one minute. The pump exercise interval and the time duration can be altered using the Sola Display. Go into ‘Advanced Setup’, ‘System Config’, ‘Pump Config’ and then select and change ‘Pump exercise interval’ and ‘Pump exercise time’. Setting the interval to zero days, or setting the time to zero minutes, will disable the pump exercise feature.

FROST PROTECTION

The Sola boiler control includes a frost protection function. If the boiler supply (outlet) temperature drops below 40°F, then the burner will fire at minimum rate. If the boiler supply temperature then goes above 50°F, the burner will turn off. The Sola will not turn on the boiler pump and will not open any zone valves. To protect your entire system from freezing, add antifreeze as described under 'Winterizing'. Frost protection can be enabled or disabled by going to 'Advance Setup', 'Frost Protection Config', then select 'CH Frost Protection' and select enable or disable.

TEMPERATURE SENSORS

The Sola control uses thermistors to measure temperatures. The Sola will measure and display:

- boiler supply temperature (Outlet temp)
- boiler return temperature (Inlet temp)
- flue gas temperature (Stack temp)
- outdoor temperature (Outdoor temp)

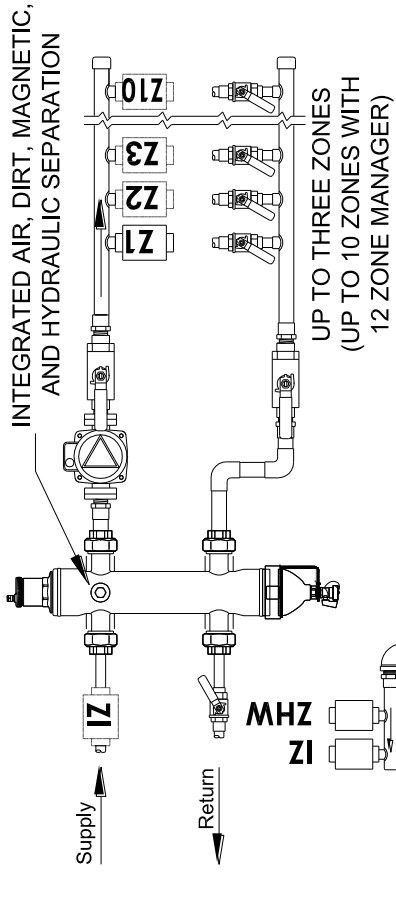
The user interface display uses the words shown above in parenthesis as the label for each of the four temperatures. Common industry terms are used throughout this manual, such as boiler supply temperature, and the user interface display uses its own set of terms. As you read the manual, please keep in mind either type of term may be used.

The thermistors are 10K thermistors, where the sensor will measure 10,000 ohms when the sensor is at 77 degrees Fahrenheit. The following tables show the resistance in ohms of the sensors at various temperatures. If any sensor is more than 20 degrees F off, it should be replaced.

Thermistor Resistance in Ohms at Various Temperatures in Fahrenheit.										
	0	1	2	3	4	5	6	7	8	9
40	26109	25400	24712	24045	23399	22771	22163	21573	21000	20445
60	15314	14925	14548	14180	13823	13477	13140	12812	12494	12185
70	11884	11592	11308	11032	10763	10502	10248	10000	9760	9526
80	9299	9078	8862	8653	8449	8250	8057	7869	7685	7507
100	5827	5697	5570	5446	5326	5208	5094	4982	4873	4767
120	3758	3679	3602	3527	3453	3382	3312	3244	3177	3112
140	2488	2439	2391	2344	2298	2253	2209	2166	2124	2083
160	1688	1656	1625	1595	1566	1537	1509	1481	1454	1427
180	1170	1150	1129	1110	1090	1071	1053	1035	1017	999
200	828	814	801	788	775	762	749	737	725	713

Thermistor Resistance in Ohms at Various Temperatures in Celsius.										
	0	1	2	3	4	5	6	7	8	9
0	32648	31026	29495	28049	26682	25389	24166	23010	21915	20879
10	19898	18968	18088	17253	16461	15710	14998	14322	13680	13071
20	12492	11942	11419	10922	10450	10000	9572	9165	8778	8409
30	8057	7722	7403	7099	6808	6532	6268	6016	5775	5546
40	5327	5117	4917	4726	4543	4368	4201	4042	3889	3742
50	3602	3468	3340	3217	3099	2986	2878	2774	2675	2579
60	2488	2400	2316	2235	2157	2083	2011	1942	1876	1813
70	1752	1693	1637	1582	1530	1480	1432	1385	1340	1297
80	1256	1216	1177	1140	1105	1070	1037	1005	974	944
90	916	888	861	835	810	786	763	741	719	698

ZONING W/ZONE VALVES OFF HYDRAULIC/AIR/DIRT SEPARATOR

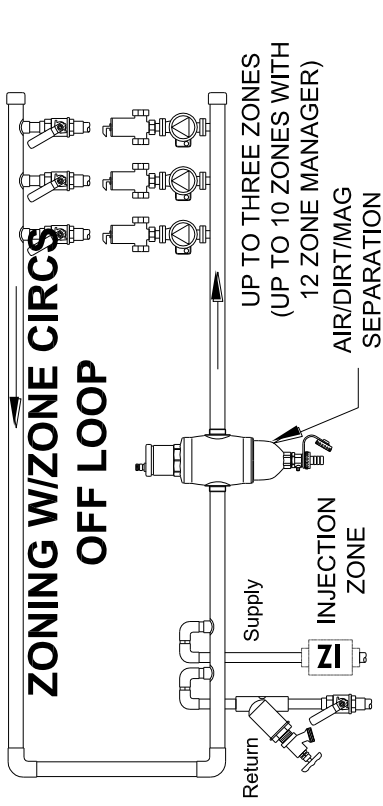


HYDRAULIC SEPARATOR CONVERSION KIT
 EK1C: 10-0544-1
 EK2C: 10-0544-2

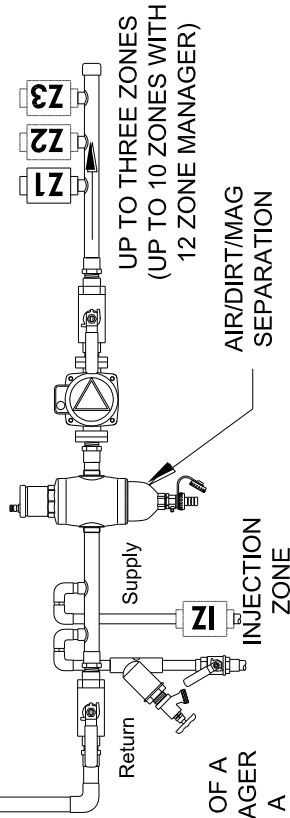
NOTES:

1. UP TO THREE ZONES MAY BE PIPED OFF OF A LOOP WITH A 5 ZONE CONDENSING MANAGER (PRIMARY/SECONDARY); 10 ZONES WITH A 12 ZONE MANAGER.
2. THE ZONES ON THE LOOP ARE WIRED AS THE FIRST THREE ZONES.
3. OPTION SWITCHES 1, 2 & 3 MUST BE SET TO THE "ON" POSITION SO THAT DURING A THERMOSTAT CALL FOR HEAT, THE ZONE VALVE/CIRCULATOR FOR THE CALLING ZONE WILL OPEN/START, THE INJECTION ZONE VALVE WILL OPEN AND BOTH THE SYSTEM AND LOOP CIRCULATORS WILL START.
4. AIR AND DIRT SEPARATION ON PRIMARY LOOP IS HIGHLY RECOMMENDED
5. IF USING ZONE CIRCS, A ZONE RELAY KIT LIKE ENERGY KINETICS P/N: 10-0412R-5 MUST BE USED.

ZONING W/ZONE CIRCS OFF LOOP



ZONING W/ZONE VALVES OFF LOOP



HIGH MASS / LOW MASS CONVERSION KIT

EK1C: 10-0545-1
 EK2C: 10-0545-2
 SHOWN WITH OPTIONAL STRAINER KIT 10-0546
 SHOWN WITH OPTIONAL AIR/DIRT/MAG SEPARATOR
 1" NPT: 10-0692
 1-1/4" SWEAT: 10-0693
 * ALL HIGH MASS/LOW MASS KITS ARE 1-1/4"
 * SOME MODIFICATIONS TO HIGH MASS/LOW MASS KITS ARE REQUIRED FOR SHOWN AIR/DIRT/MAG SEPARATOR LOCATION

This drawing provided for reference only, design subject to change. Review application to determine suitability and compliance with code requirements.



Molasses Hill Road
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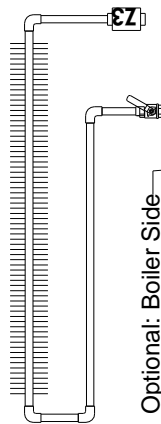
EK1C PIPING EXAMPLES

Primary/Secondary Piping

DRAWN BY: JS	REV: 4	DATE: 08/21/12	DWG. NO.
CAD FILENAME: sys-05-301-rev04.dwg			SYS-05-301

**EXAMPLE OF A COMBINATION OF ZONE TYPES
SOME PIPED DIRECTLY FROM THE BOILER AND SOME PIPED TO AN INJECTION LOOP
ALL 5 ZONES PLUS THE INJECTION ZONE CONTROLLED BY AND UTILIZING ENERGY RECOVERY BY THE
CONDENSING ENERGY MANAGER**

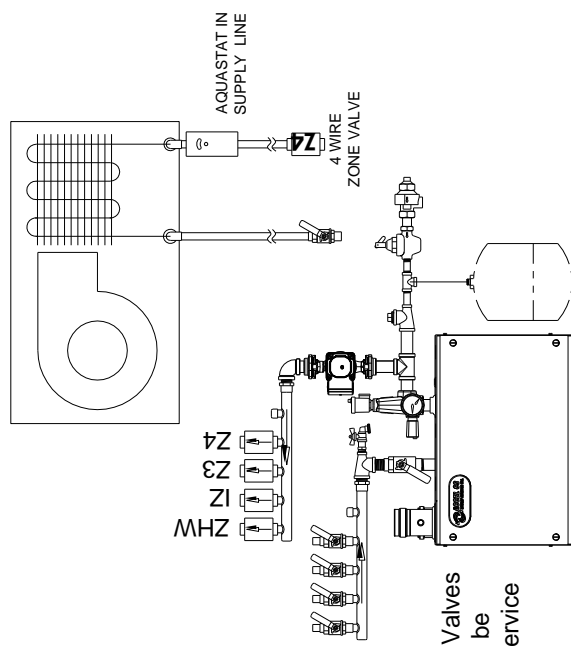
FIN TUBE BASEBOARD



Optional: Boiler Side Back Flush for PHE

Hot Water Supply

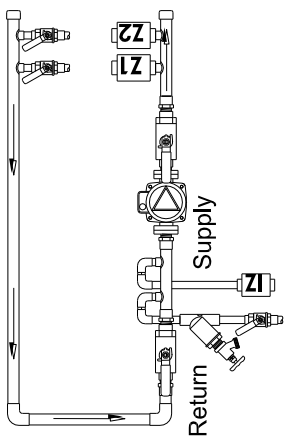
AIR HANDLER WITH HYDRO-AIR



AQUASTAT IN SUPPLY LINE

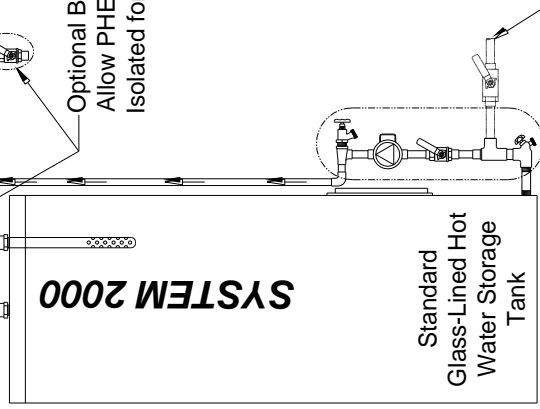
4 WIRE ZONE VALVE

ZONING WITH ZONE VALVES OFF LOOP (PRIMARY/SECONDARY) LOOP (PRIMARY/SECONDARY)



Return Supply

Optional Ball Valves Allow PHE to be Isolated for Service



Standard Glass-Lined Hot Water Storage Tank

Cold Water Supply

DOMESTIC HOT WATER

- NOTES:**
1. TWO HEAT ZONES (Z1 & Z2) PIPED OFF A LOOP (PRIMARY/SECONDARY).
 2. TWO HEAT ZONES AND A THIRD DOMESTIC HOT WATER (DHW) PIPED DIRECTLY OFF THE BOILER
 3. THE ZONES ON THE LOOP ARE WIRED AS THE FIRST TWO ZONES.
 4. OPTION SWITCHES 1 & 2 MUST BE SET TO THE "ON" POSITION SO THAT DURING A THERMOSTAT CALL FOR HEAT, THE ZONE VALVE FOR THE CALLING ZONE WILL OPEN, THE INJECTION ZONE VALVE WILL OPEN AND BOTH THE SYSTEM AND LOOP CIRCULATORS WILL START.

This drawing provided for reference only, design subject to change. Review application to determine suitability and compliance with code requirements.

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EK1C PIPING EXAMPLES
Combination of Zones

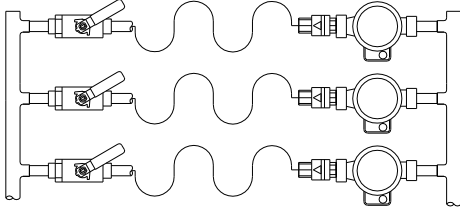
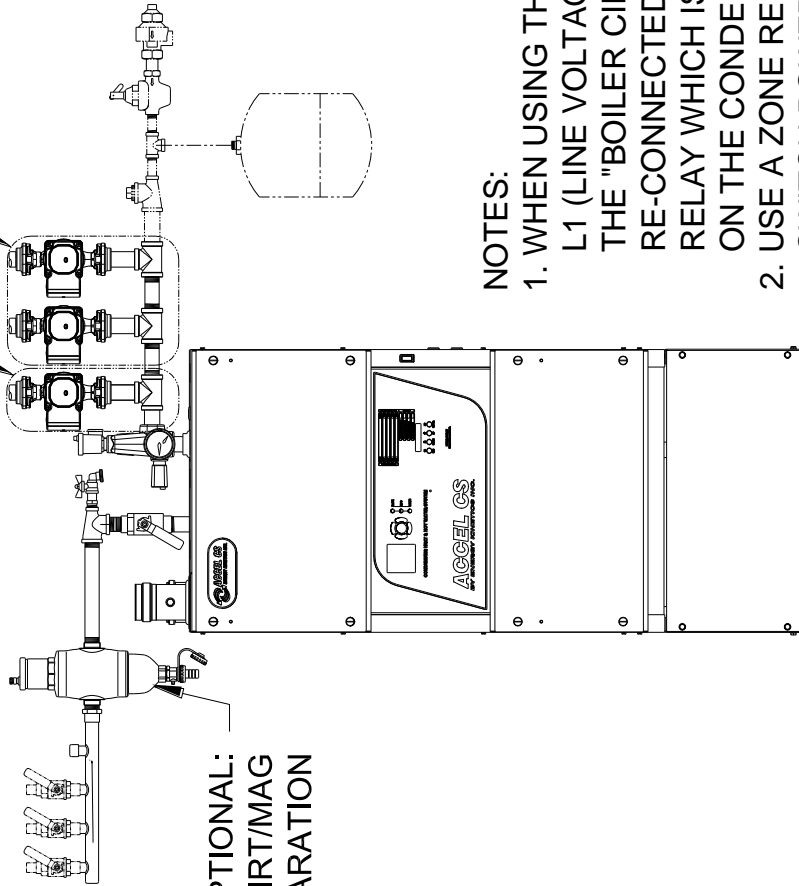
DRAWN BY: JS	REV: 03	DATE: 08/21/12	DWG. NO.
CAD FILENAME: sys-05-302-rev03.dwg			SYS-05-302

EXAMPLE OF ZONING WITH ZONE CIRCULATORS PIPED DIRECT TO THE BOILER

SYSTEM CIRC SUPPLIED WITH BOILER BECOMES FIRST ZONE CIRC

ADDITIONAL ZONE CIRC'S FIELD PIPED IN PARALLEL WITH SYSTEM CIRC

OPTIONAL: AIR/DIRT/MAG SEPARATION



TYPICAL EXAMPLE OF RADIANT ZONES

NOTES:

1. WHEN USING THE SYSTEM CIRCULATOR AS A ZONE CIRCULATOR, L1 (LINE VOLTAGE) TO THE CIRC MUST BE DISCONNECTED FROM THE "BOILER CIRC" TERMINAL IN THE JUNCTION BOX AND RE-CONNECTED TO LINE VOLTAGE SWITCHED ON THROUGH A 24V RELAY WHICH IS ENERGIZED BY THE APPROPRIATE ZONE OUTPUT ON THE CONDENSING ENERGY MANAGER.
2. USE A ZONE RELAY KIT LIKE ENERGY KINETICS P/N: 10-0412R-5 TO SWITCH POWER TO THE ZONE CIRCULATORS.

This drawing provided for reference only, design subject to change. Review application to determine suitability and compliance with code requirements.



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EK1C PIPING EXAMPLES

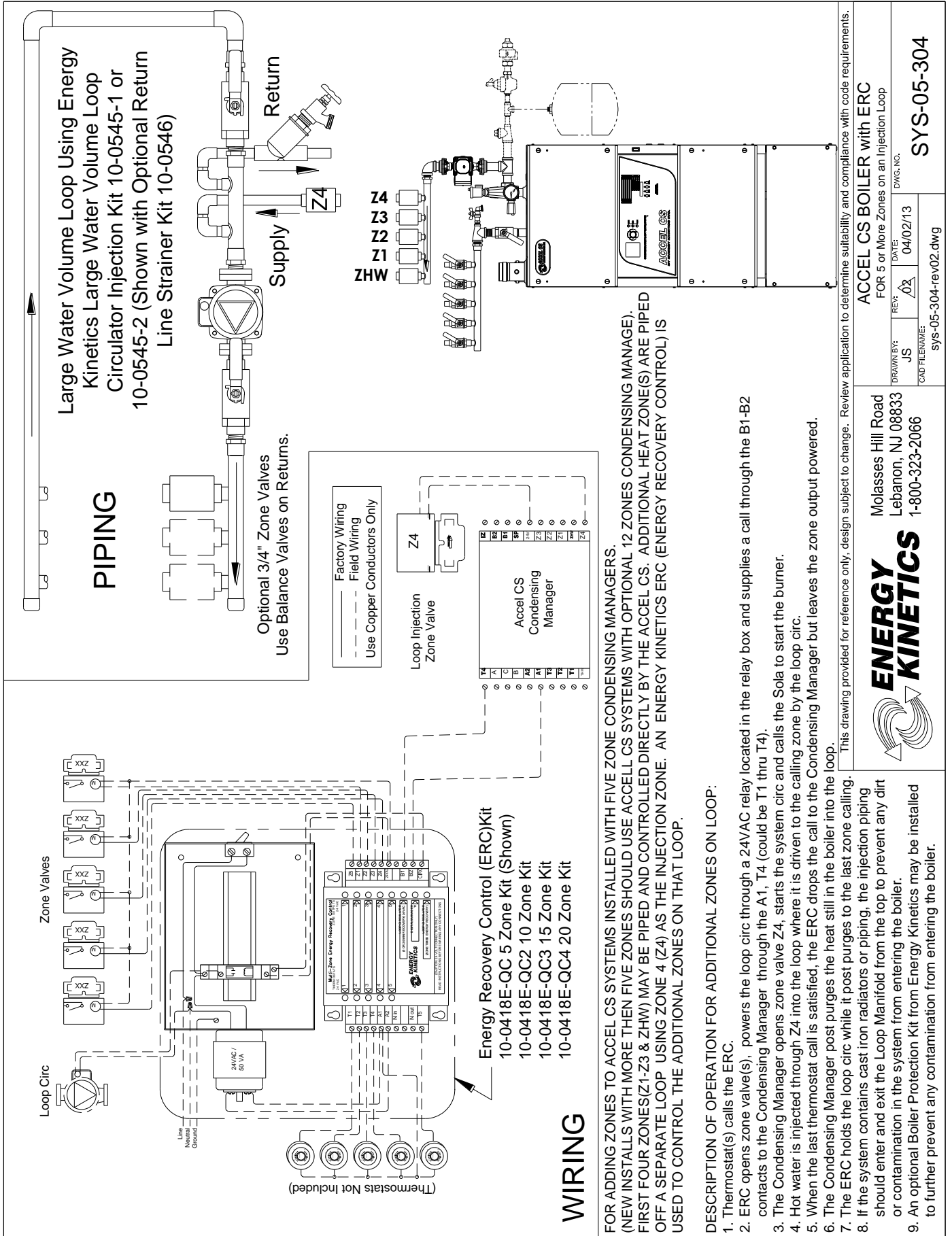
Zoning with Circulators

DRAWN BY:	REV:	DATE:
JS	03	08/21/12
CAD FILE NAME:		
SYS-05-303-rev003.dwg		

DWG. NO.

SYS-05-303

DRAWINGS - PIPING

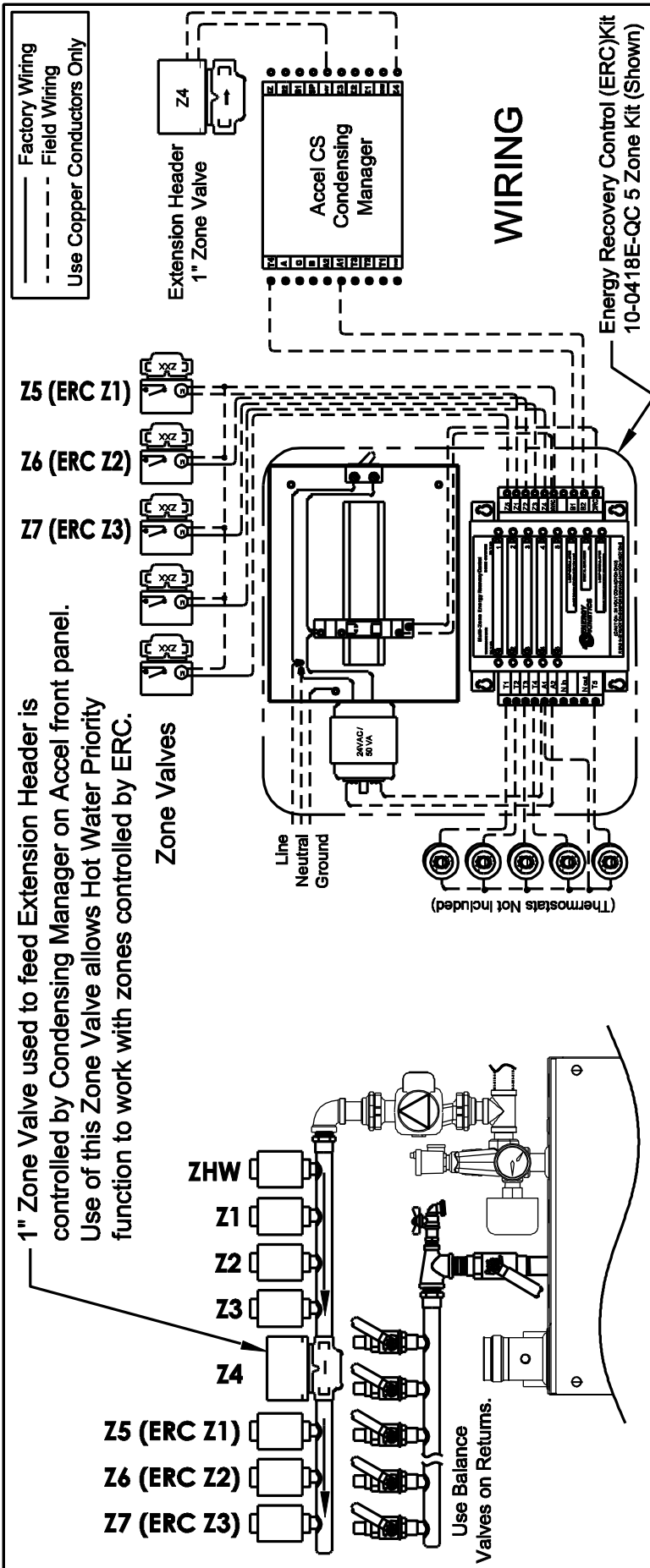


ACCEL CS BOILER with ERC FOR 5 or More Zones on an Injection Loop	
DRAWN BY: JS	DATE: 04/02/13
REV: 02	DWG. NO. SYS-05-304
CAD FILENAME: sys-05-304-rev02.dwg	

ENERGY KINETICS

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DRAWINGS - PIPING



FOR ADDING ADDITIONAL ZONES TO AN ACCEL CS INSTALLED WITH A FIVE ZONE CONDENSING MANAGER.

THE FIRST FOUR ZONES (Z1-Z3 & ZHW) MAY BE PIPED AND CONTROLLED DIRECTLY BY THE ACCEL CS. ADDITIONAL HEAT ZONE(S) ARE PIPED OFF A SECOND "EXTENSION" HEADER FED BY A 1" ZONE VALVE USING ZONE 4 (Z4) TO FEED THE EXTENSION HEADER. AN ENERGY KINETICS ERC (ENERGY RECOVERY CONTROL) IS USED TO CONTROL THE ADDITIONAL ZONES ON THAT LOOP.

NOTE: FOR NEW INSTALLATIONS REQUIRING MORE THEN FIVE ZONES, AN ACCEL CS WITH OPTIONAL 12 ZONE CONDENSING MANAGER SHOULD BE USED.

DESCRIPTION OF OPERATION FOR ADDITIONAL ZONES ON EXTENSION HEADER:

1. Thermosta(s) calls the ERC.
2. ERC opens zone valve(s) and supplies a call through the B1-B2 contacts to the Condensing Manager through the A1, T4 (could be T1 thru T4) terminals.
3. The Condensing Manager opens zone valve Z4, starts the system circ and calls the Sola to start the burner.
4. Hot water is fed through Z4 into the extension header with the zone valve(s) for the calling zone(s).
5. When the last thermostat call is satisfied, the ERC drops the call to the Condensing Manager but leaves the zone output powered.
6. The Condensing Manager post purges the heat still in the boiler out to the last zone calling on the extension header.

TIP:

If only one or two additional zones are needed, look into combining any smaller zones or combining zones that share open floor space before adding an ERC to the system.

This drawing provided for reference only, design subject to change. Review application to determine suitability and compliance with code requirements.

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ACCEL BOILER with ERC
FOR 5 AND MORE HEAT ZONES

DWG. NO.

SYS-05-305

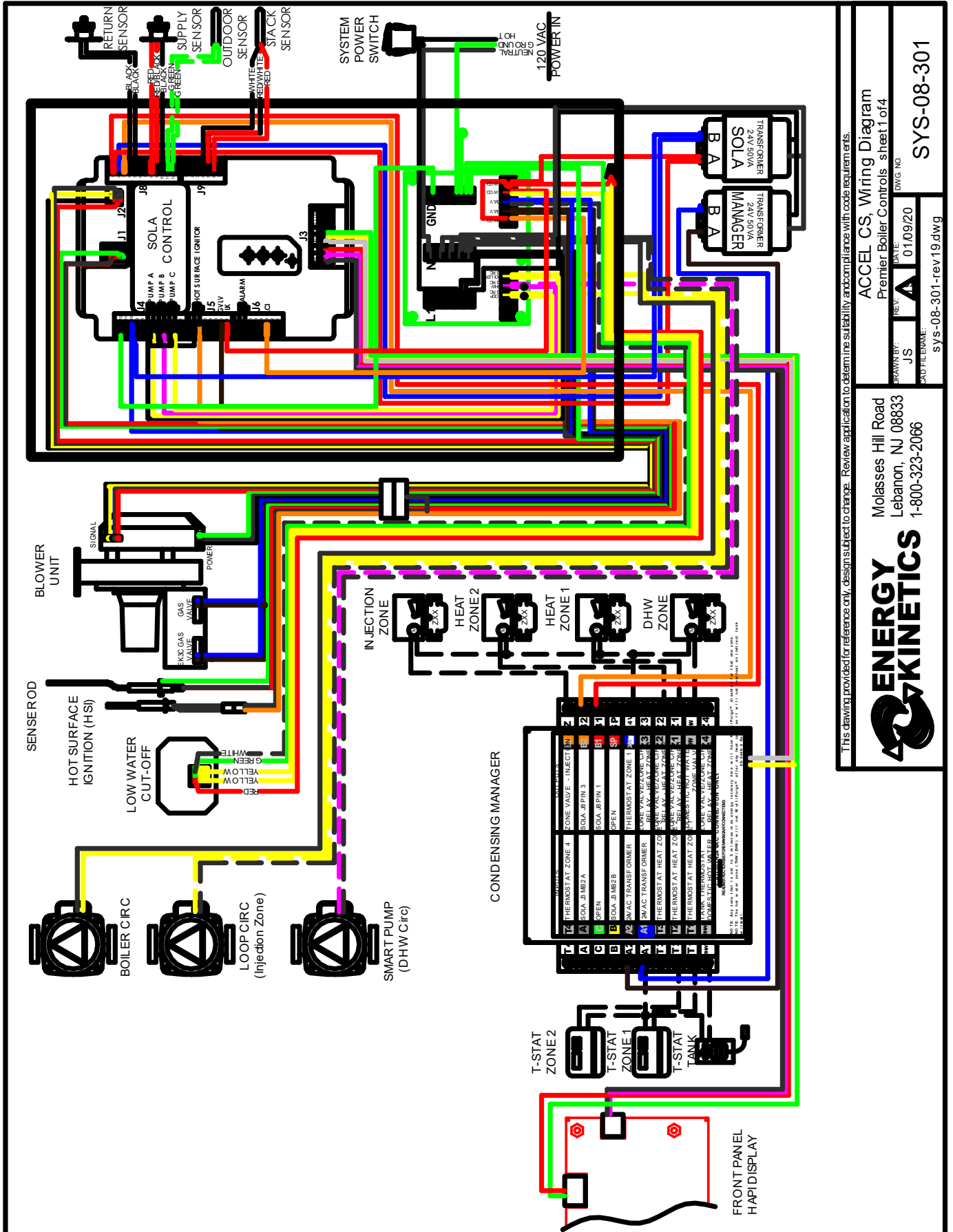
REV: JS

DATE: 11/25/13

CAD FILENAME: sys-05-305-rev01.dwg

DRAWINGS - WIRING

All wiring installations in: The United States must comply with the NEC, and any local codes.
Canada must be in accordance with the Canadian Electric Code, Part I.



This drawing provided for reference only, design subject to change. Review application to determine suitability and compliance with code requirements.

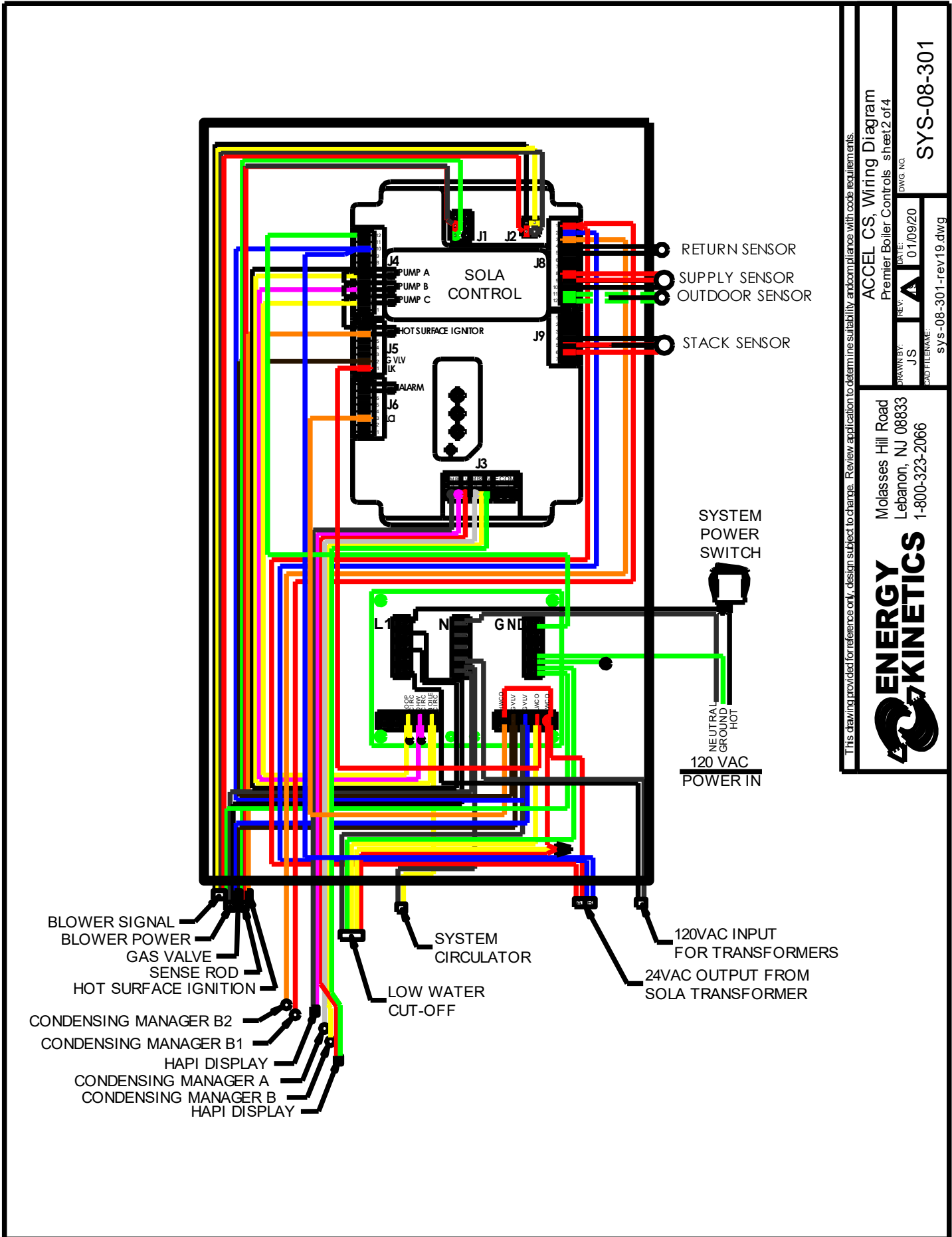
Molasses Hill Road
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ACCEL CS Wiring Diagram
 Premier Boiler Controls sheet 1 of 4

DRAWN BY: JS
 DATE: 01/09/20
 DWG NO: SYS-08-301

REV: 1
 DATE: 01/09/20
 FILE NAME: sys-08-301-rev19.dwg

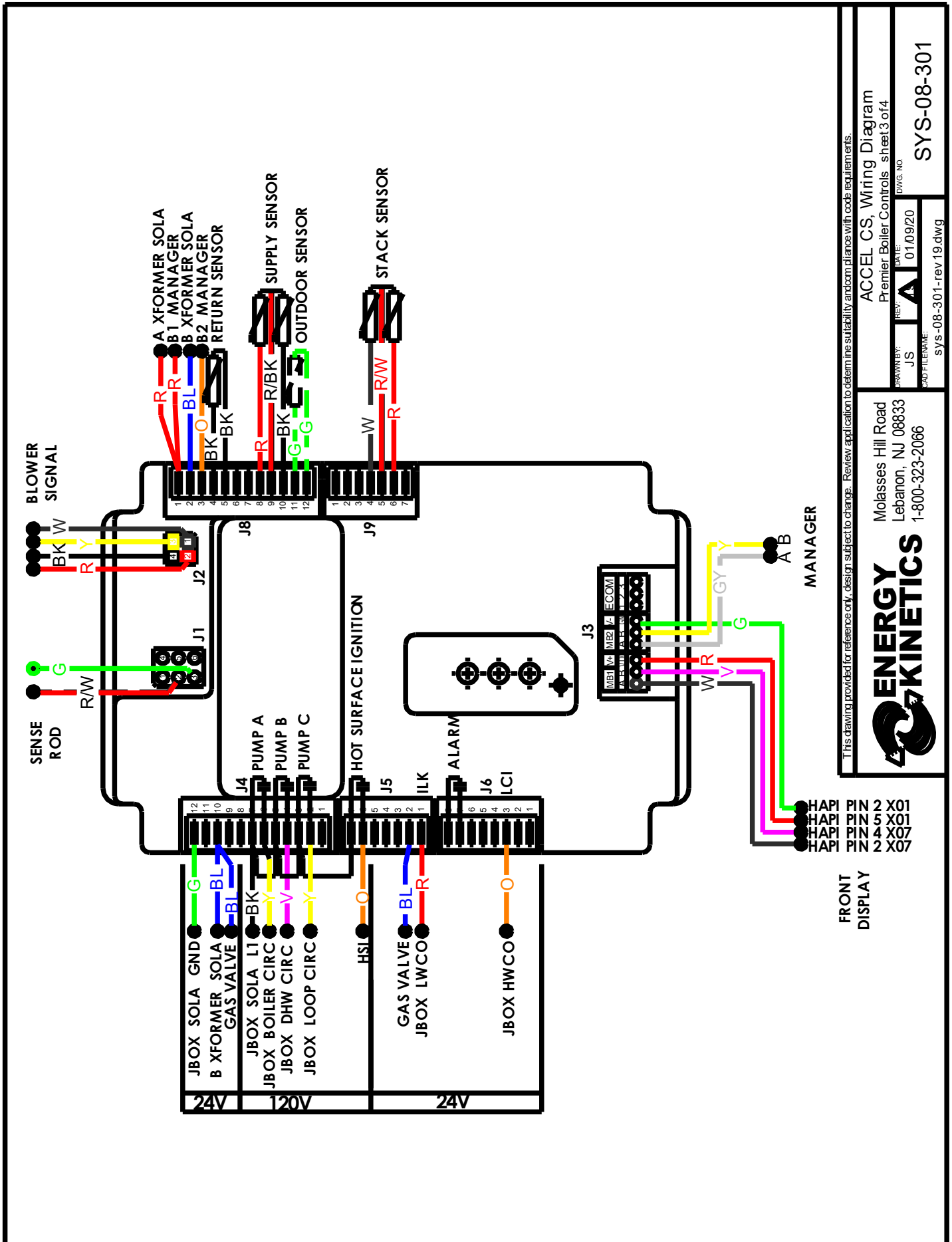
DRAWINGS – WIRING



This drawing provided for reference only, design subject to change. Review application to determine suitability and compliance with code requirements.

ENERGY KINETICS Molasses Hill Road Lebanon, NJ 08833 1-800-323-2066		ACCEL CS Wiring Diagram Premier Boiler Controls sheet 2 of 4 DWG. NO.
DRAWN BY: JS	DATE: 01/09/20	SYS-08-301
CAD FILENAME: sys-08-301-rev19.dwg		

DRAWINGS – WIRING



FRONT
DISPLAY

HAPI PIN 2 X01
HAPI PIN 5 X01
HAPI PIN 4 X07
HAPI PIN 2 X07



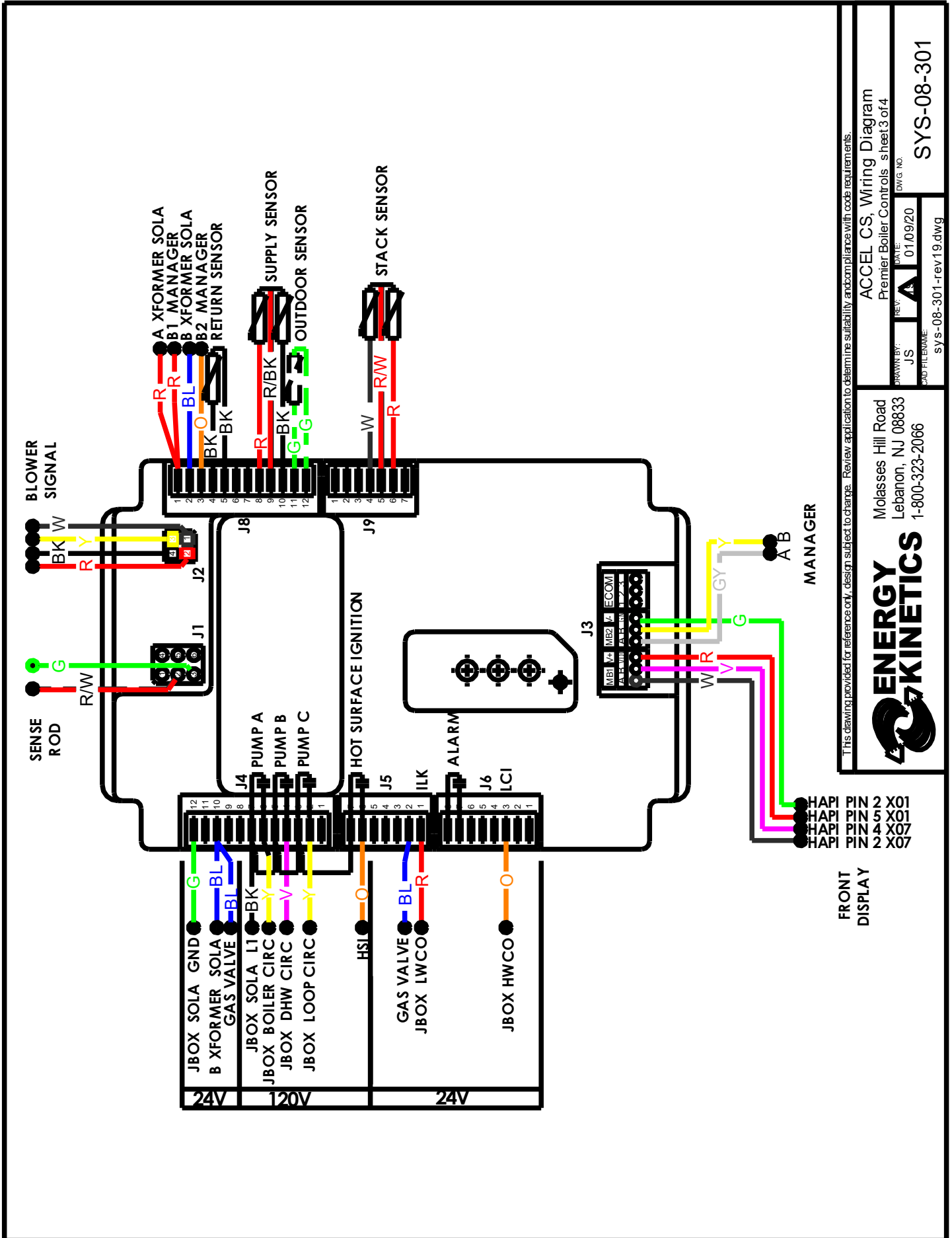
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ACCEL CS, Wiring Diagram
Premier Boiler Controls - sheet 3 of 4

DRAWN BY: JS
REV: 1
DATE: 01/09/20
DWG. NO: SYS-08-301-19.dwg

REV: 1
DATE: 01/09/20
DWG. NO: SYS-08-301-19.dwg

DRAWINGS – WIRING



ENERGY KINETICS
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ACCEL CS, Wiring Diagram
 Premier Boiler Controls - sheet 3 of 4
 DATE: 01/09/20
 REV: JS
 DWG NO. SYS-08-301
 FILE NAME: SYS-08-301-rev19.dwg

ANNUAL TUNE UP & INSPECTION

DANGER: The boiler and burner may be hot. Allow boiler enough time to cool down so that the burner can be handled safely before proceeding.

Materials required:

- New Scotch Brite pad,
- A Citrus type cleaner in a spray bottle,
- Water in a squirt bottle,
- (2) 1-1/8" wrenches or (2) large adjustable wrenches or 14" pipe wrenches,
- medium Phillips screwdriver,
- large stubby flat blade screwdriver or a quarter dollar,
- medium flat blade screwdriver,
- soft cleaning brush,
- combustion analyzer

DANGER: Before starting, make sure gas and electric are turned off external to boiler.

BURNER HEAD REMOVAL

1. Remove the four ½ turn screws holding the upper front boiler jacket access panel and set the panel aside.
2. Remove the two screws holding the jacket top cover on, pick up, and slide forward on the panel to remove it. Set it aside.
3. Remove the electrical wire quick connect on the top of the flame rod.
4. Remove the two screws holding the flame rod and pull the flame rod out of the burner flange. Be especially careful not to destroy the high temperature flame rod gasket.
5. Thoroughly clean the flame rod with scotch brite or any such cleaning pad.
6. Reinsert the flame rod and tighten the two screws.
7. Using two wrenches disconnect the flexible gas line below the service valve at the flare fitting.
8. Disconnect the two electrical wiring connectors at the fan housing. The connector holding clips are on the sides of the three pin connector and on the back of the four pin connector. They are both press to release type.
9. Disconnect the electrical wiring connector connecting the wires to the top of the burner.
10. Remove the six nuts holding the burner flange to the top of the heat exchanger.
11. Lift the burner and flange straight up about 2 inches and rotate the fan toward you. Tilt the fan down while picking up on the burner. Lift it high enough to remove it from the boiler.
12. Place the burner on a flat surface with the nozzle pointing upward. Be especially careful not to damage the igniter.

Clean Turbulators

13. Pull each turbulator up about 3-4 inches; turn them back and forth to loosen any accumulated debris.
14. If it looks like the boiler needs to be flushed, remove the condensate trap and place a bucket or tray below the condensate outlet and spray the furnace area with a citric acid based cleaner and scrub with a soft brush. Then rinse thoroughly with clean water and push back down into the tube.
15. If the condensate trap was removed, then reinstall the trap.
16. When using the citrus cleaner, wear eye protection and rubber gloves. Use of cleaners containing chlorine, sodium or other acids will void the warranty.
17. Clean burner sight glass and double check insulation around igniter.

Reinstall Burner

18. Reverse these instructions to reinstall the burner.

Check Wiring

19. Using a thin blade screwdriver verify all the screws attaching the electrical wiring to the connectors on the burner control, to the Condensing Manager, and inside the electrical junction box are all tight.

Check Condensate Parts

20. Remove and clean the condensate trap. Verify that the sealing ball is present inside of the trap.
21. Check the condensate neutralizer for adequate amount of neutralizing chips, replace as needed.
22. Check gasket between condensate collector and boiler vessel for proper seal. Tighten bolts or replace gasket as needed.

Start and Check Operation

23. Start up boiler and perform a combustion analysis. (See Start Up Procedure)

Confirm Low Water Cut Off Functionality

24. Every year: Press "TEST" button on LWCO while burner is firing- "LOW WATER" LED will turn on, confirm the burner shuts down.
25. Every 5 years: Remove LWCO and clean sensing probe- reinstall LWCO and confirm burner lights.

TOP INSULATION REPLACEMENT

The insulation board in the top of the combustion chamber is of high quality material and will normally not need to be replaced. A replacement board, if required, is available from Energy Kinetics.

DANGER: Before starting make sure gas and electric are turned off external to boiler.

WARNING: Fibrous insulation materials such as Ceramic fiber or fiberglass may contain carcinogenic particles (cristobalite) after exposure to heat. Airborne particles from fiberglass or ceramic fiber components have been listed as having potential health effects. Take the following precautions when removing, replacing and handling these items.

Precautionary procedures:

Avoid breathing dust and avoid contact with skin or eyes. Wear long-sleeved, loose-fitting clothing, gloves and eye protection. Use a properly fitted NIOSH certified respirator for dusty activities and where exposure levels are unknown.

Use hand tools whenever possible if cutting or trimming is required. Power tools generate significantly more airborne dust.

Use a vacuum with HEPA-filters for cleanup. If a HEPA-filter vacuum is not feasible, lightly spray fiber materials and work area with a water mist before sweeping or bagging of debris.

Wash exposed skin with soap and water after handling.

Do not use compressed air to clean work clothes or work area.

Wash work clothes separately from other clothing. Rinse washer thoroughly afterwards.

Avoid smoking, eating or drinking while dust is present in the work area.

To install the replacement:

1. Remove the burner by following the 'Burner Head Removal' instructions.
2. The insulation board will come along with the top cover, burner nozzle, and blower.
3. Remove any cement that may be applied between the base of the burner nozzle and the insulation board by prying out pieces with a thin flat blade screwdriver.
4. Cover the burner nozzle with something smooth, such as by wrapping the nozzle with a piece of paper, a piece of plastic wrap, a plastic bag, etc.
5. Pull off the insulation board.
6. With the burner nozzle covered with something smooth, slide the new insulation board over the burner nozzle and seat the board onto the top cover.
7. Fill in between the insulation board and the base of the burner nozzle with furnace cement or with other refractory cement such as EZ-Fill that can be obtained from Energy Kinetics.
8. Reassemble the burner head by following the 'Burner Head Removal' instructions.

COMMERCIAL INSTALLATION KIT

The Accel CS Commercial Kit (EK Part Number 10-1637) consists of a factory installed commercial version of the Sola control (CSD1 compliant). This commercial version of this control is identified by its blue color. It uses the standard *automatic-reset* LWCO to create a manual reset within the sola.

RATINGS

Boiler Model	Burner Input (MBH)		Heating Capacity (MBH)^[1]
Accel CS		AFUE	
EK1C-90	90	96.6	84
EK1C-120	120	96.4	111
EK2C-150	150	96.8	141
EK2C-200	200	96.7	185

Notes:

1. MBH refers to thousands of BTU per hour.
2. Adjusting the burner fan speed and firing rate will affect AFUE.
3. Minimum fan speed is 950 RPM. Vent and intake diameter and length must be suitable to achieve minimum firing rate or a vent restrictor may be installed.

REPLACEMENT PARTS

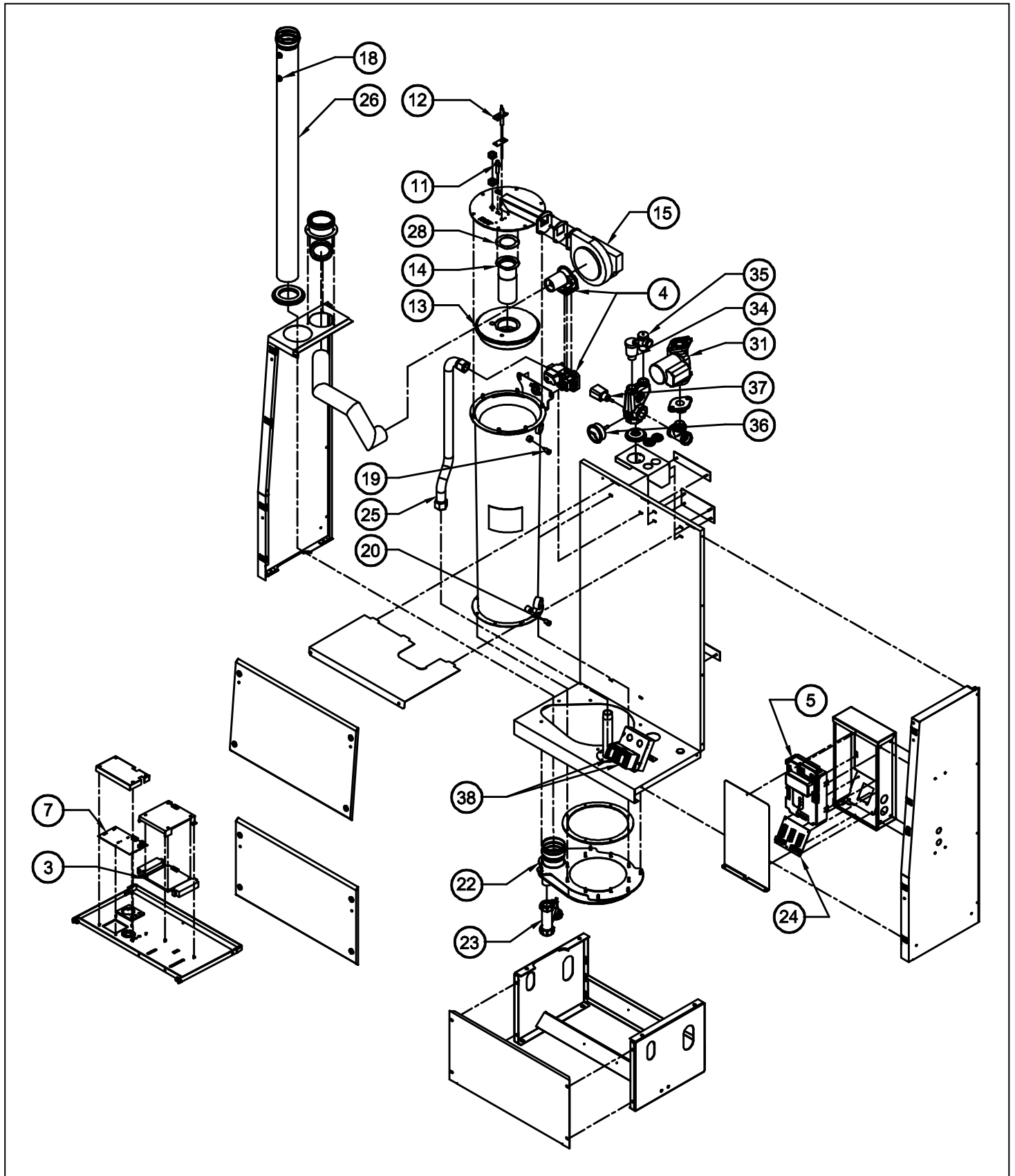
Obtain replacement parts from your local Energy Kinetics dealer.
Refer to page 70 for parts diagram.

Item	Description		Model	EK Part No.
1	PHE NO UNIONS, REPLACEMENT FOR ACCEL CS	#15	EK1C	10-0436C
		#19	EK2C & EK3C	10-0381C
2	PHE WITH UNIONS, FOR ACCEL CS	#15	EK1C	10-0436D
		#19	EK2C & EK3C	10-0381D
3	ACCEL CS 5-ZONE ENERGY MANAGER		ALL	10-1608
	ACCEL CS 12-ZONE ENERGY MANAGER		ALL	10-1609
4	ACCEL CS GAS VALVE W/VENTURI		EK1C	10-1610
			EK2C	10-1610-2
			EK3C	10-1610-3
5	ACCEL CS SOLA BOILER CONTROL		EK1C	10-1611
			EK2C	10-1611-2
			EK3C	10-1611-3
6	ACCEL CS COMERCIAL KIT		ALL	10-1637
7	ACCEL CS DISPLAY HAPI DSP49		ALL	10-1613
8	ACCEL CS ORIFICE		EK1C LPG	10-1614
			EK2C LPG	10-1614-2
			EK3C LPG	10-1614-3LPG
			EK3C NG	10-1614-3NG
9	ACCEL CS EK1C GAS CONV KIT, W/LABELS & ORIFICE		EK1C	10-1615
			EK2C	10-1615-2
			EK3C	10-1615-3
10	ACCEL CS PAIR OF WALL MOUNTING BRACKETS		EK1C	10-1616
			EK2C	10-1616-2
			EK3C	NOT AVAILABLE
11	ACCEL CS HOT SURFACE IGNITER		ALL	10-1617
12	ACCEL CS FLAME ROD		ALL	10-1618
13	ACCEL CS TOP ROUND REFRACTORY INSULATION		EK1C	10-1619
			EK2C	10-1619-2
			EK3C	10-1619-3
14	ACCEL CS BURNER NOZZLE		EK1C	10-1620
			EK2C	10-1620-2
			EK3C	10-1620-3
15	ACCEL CS FAN BLOWER		EK1C	10-1621
			EK2C	10-1621-2
			EK3C	10-1621-3
16	ACCEL CS TURBULATOR (ONE)		ALL	10-1622
17	ACCEL CS DEALER PARTS KIT,SOLA,MGR,HSI,FR,+MORE		EK1C	10-1623
			EK2C	10-1623-2
			EK3C	10-1623-3
18	ACCEL CS STACK THERMISTER SENSOR		ALL	10-1624
19	ACCEL CS SUPPLY THERMISTER SENSOR		ALL	10-1625
20	ACCEL CS RETURN THERMISTER SENSOR		ALL	10-1626
21	ACCEL CS OUTDOOR THERMISTER SENSOR		ALL	10-1627
22	ACCEL CS CONDENSATE COLLECTOR		EK1C	10-1628
			EK2C	10-1628-2
			EK3C	10-1628-3
23	ACCEL CS CONDENSATE TRAP		ALL	10-1629

Item	Description	Model	EK Part No.
24	ACCEL CS TERMINAL BOARD	ALL	10-1630
25	ACCEL CS FLEX GAS HOSE	EK1C & EK2C	10-1631
		EK3C	10-1631-3
26	ACCEL CS VENT PIPE WITH TEST PORT, STAINLESS STEEL	EK1C	10-1632
		EK2C & EK3C	10-1632-2
27	ACCEL CS GASKET SET, COMPLETE	EK1C	10-1633
		EK2C	10-1633-2
		EK3C	10-1633-3
28	ACCEL CS GASKET, BURNER NOZZLE ONLY	EK1C	10-1638
		EK2C	10-1638-2
		EK3C	10-1638-3
29	ACCEL CS DEALER PARTS, NOZZLE/INSUL REPLACE KIT	EK1C	10-1635
		EK2C	10-1635-2
		EK3C	10-1635-3
30	ACCEL CS WIRELESS OUTDOOR RESET KIT	ALL	10-1636
31	TACO PUMP IRON	007	EK1C
		VIRIDIAN VR1816F	EK1C
		0010	EK2C
		0012	EK3C
	GRUNDFOS	UPS15-58FRC	EK1C
		ALPHA FR	EK1C
		UPS26-99FC	EK2C
		UPS43-44FC	EK3C
32	TACO PUMP CARTRIDGE (C.I.)	007	EK1C
		0010	EK2C
33	CONBRACO AUTOFEED/BACKFLOW PREVENTER-COMBO UNIT	ALL	10-0518
34	FLOAT VENT, 1/2" MPT AUTO, MINICAL	ALL	10-0560
35	BOILER PRESSURE RELIEF VALVE, 30 PSI	ALL	10-0516
36	ALTIMETER GAUGE (T&P) TRIDICATOR	ALL	10-0420
37	LOW WATER CUTOFF, AUTO RESET	ALL	10-0507
38	TRANSFORMER 24VAC 50VA	ALL	10-0152
39	ACCEL CS MANUAL, INSTALLER	ALL	10-2018
40	ACCEL CS MANUAL, USER	ALL	10-2019
41	ACCEL CS BOILER WIRING DIAGRAM	ALL	10-2039

Contact Energy Kinetics at 800-323-2066 or www.energykinetics.com for help locating your nearest authorized dealer.

Boiler Parts Diagram



Commonwealth of Massachusetts

- ◆ **Approval No. C1-0713-539 (EK1C), C1-0415-454 (EK2C, EK3C)**
- ◆ **This Energy Kinetics gas fired hot water boiler has been approved by the Massachusetts Board of Plumbers and Gas Fitters.**
- ◆ **When an Energy Kinetics gas fired hot water boiler is installed in the Commonwealth of Massachusetts, the following requirements must be met.**
 - **The Commonwealth of Massachusetts requires that an Energy Kinetics gas fired boiler must be installed by a licensed Plumber or a licensed Gas Fitter.**
 - **The Commonwealth of Massachusetts requires that the licensed Plumber or a licensed Gas Fitter installing the boiler must comply with the following excerpt from “Rules and Regulations - 248 CMR”.**

5.08: Modifications to NFPA-54, Chapter 10

(2) Revise 10.8.3 by adding the following additional requirements:

(a) For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS.



LIFETIME LIMITED WARRANTY For Residential Accel CS™ 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 ACCEL CS WATER BOILERS

Energy Kinetics warrants that its residential heating boiler, the Accel CS Model EK1C and EK2C, 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 warrants that its Condensing Energy Manager is free from defects in material and workmanship for a period of five years from the date of installation. The warranty is extended to the End User for the lifetime of the unit by a manufacturer sponsored rebuild program offered at nominal cost.

2. 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.

3. If any such component is found defective, Energy Kinetics' responsibility is solely to repair or replace the defective part at it's or the original manufacturer's option.

LIMITED WARRANTY FOR THE ACCEL CS 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 seven years, Energy Kinetics will repair or replace the pressure vessel at its option. After 7 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:	1 st	8 th	9 th	10 th	11 th	12 th
	Percent of Trade list Price:					
	0%	20%	30%	40%	50%	75%
YEAR:	12 th 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 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 basic BOCA Building Code, 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.



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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.

LIFETIME WARRANTY TRANSFER

By completion of the 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.

Lifetime Warranty Transfer Agreement

((I/We), the undersigned, as the original purchaser of the Accel CS home heating system, submitted the Warranty Registration within three (3) months of installation of (my/our) Accel CS 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.

Accel CS Serial Number: _____ Date of Original Installation: _____

Name of original purchaser of Accel CS: _____ 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 Accel CS 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