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1 INTRODUCTION

This manual describes the installation and operation of the P-K Duration II™ Semi-instantaneous indirect domestic hot water system. It is important to note that the P-K Duration II is designed to operate in conjunction with a complete hydronic system and does require an external source of hot boiler water. The available boiler water temperature will have a profound impact on the performance and capacity of the P-K Duration II, and it must always exceed the desired domestic hot water supply temperature.

If you have any questions on the information contained within, or do not fully and completely understand the content, please contact Harsco Industrial, Patterson-Kelley Technical Service at 570.476.7261 or toll free at 877.728.5351.

The P-K Duration II system is only a part of a complete water heating system. This add-on package may be fully operational and yet because of poor circulation, control, or other operating characteristics not deliver hot water to the desired location. Additional equipment such as pumps, flow switches, balancing valves, and check valves may be required for satisfactory operation of any system. Harsco Industrial, Patterson-Kelley cannot be responsible for the design or operation of such systems and a qualified engineer or contractor must be consulted.

2 SAFETY

WARNING

It is **essential** to read, understand, and follow the recommendations of this manual before installing, operating, or servicing this equipment. Failure to do so could result in serious injury, death, and/or property damage.

CAUTION

Installation and service must be performed by a qualified and knowledgeable installer or service agency.

2.1 GENERAL

The P-K Duration II instantaneous indirect domestic hot water system **must** be:

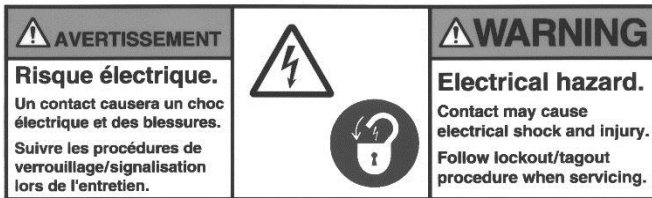
Installed, operated, and serviced in accordance with instructions contained in this manual and other supplemental manuals.

Installed by qualified personnel in accordance with designs prepared by qualified facility engineers including: structural, mechanical, electrical, and other applicable disciplines.

Operated and serviced in accordance with a comprehensive safety program determined and established **by the customer**. Do not attempt to operate or service until such a program has been established.

Operated and serviced by experienced, qualified, and properly trained personnel in accordance with all applicable codes, laws, and regulations.

2.2 TRAINING



Proper training is the best protection against accidents. Factory training sessions are available to qualified individuals who are sponsored by the local Harsco Industrial, Patterson-Kelley representative. Operating and service personnel must be thoroughly familiar with the basic construction of the P-K Duration II system, the

location and operation of the controls, adjustment of their various mechanisms, and all applicable safety precautions. If any of the provisions of this manual are not fully and completely understood, contact Harsco Industrial, Patterson-Kelley Technical Service at 570.476.7261 or toll free at 877.728.5351.

2.3 SAFETY FEATURES

It is the responsibility of the customer to maintain the safety features, such as but not limited to: guards, safety labels, safety controls, interlocks, lockout devices and pressure relief valves.

2.4 SAFETY LABELS

The following words are used in this manual to de-note the degree of seriousness of the individual hazards.



indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury. This signal word is to be limited to the most extreme situations.



indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.



indicates a potentially hazardous situation which, if not avoided, **may** result in minor or moderate injury. It may also be used to alert against unsafe practices.

NOTICE! - NOTICE is the preferred signal word to address practices not related to personal injury. The safety alert symbol is not used with this signal word.

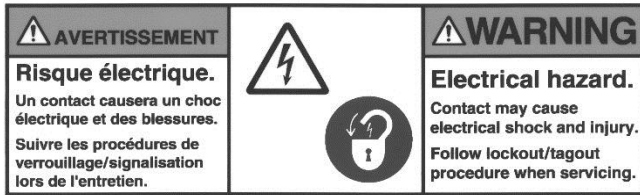
2.5 SAFETY PRECAUTIONS

Provide a suitable location for the P-K Duration II system, away from normal personnel traffic, with adequate working space, adequate clearances, proper ventilation and lighting, with a structure sufficiently strong and rigid to support the weight of the P-K Duration II system, all piping, and accessories.



Proper lockout/tagout procedures must be employed whenever this unit is serviced.

2.5.1 Electrical Hazards



- Shock hazard! Properly lockout/tag out the electrical service and all other energy sources before working on or near the P-K Duration II.
- Shock hazard! Do not spray water directly on this system or on any electrical components.
- Electrical hazard! Do not alter wiring connections.

2.5.2 Burn, Fire, and Explosion Hazards



- Burn hazard! Possible hot surfaces. Pipes and internal components could be hot. Do not touch piping or internal components during operation or immediately after shutdown of the appliance.



- Burn hazard! Hot fluids. Use caution when servicing or draining the P-K Duration II system.

- Isolation valves are provided on all inlets and outlets for your convenience. Close the applicable isolation valves and allow the P-K Duration II to cool down to ambient temperature before servicing.

DANGER

The P-K Duration II is a dynamic system that is designed to heat domestic hot water to a wide range of temperatures. The P-K Duration II system is capable of heating water to scalding temperatures. Refer to your local codes for guidelines on compliance for domestic hot water systems. A thermostatic mixing valve or other device may be required to prevent scalding.

2.5.3 Crush Hazards



- Lifting hazards! Use properly rated lifting equipment to lift and position the P-K Duration II system. The load is unbalanced. Test balance before lifting 3 ft. above the floor. Do not allow personnel beneath the lifted load. Refer to approximate weights in the table.

Model	Weight in Pounds
D2DW-30S Simplex	950 lbs.
D2DW-30D Duplex	1590 lbs.
D2DW-80S Simplex	1005 lbs.
D2DW-80D Duplex	1700 lbs.

2.5.4 Chemical Hazards



- Chemical hazards from cleaning products. Use caution when cleaning the system. The use of professional assistance is recommended. Use safe procedures for the disposal of all cleaning solutions.

2.5.5 Pressure Hazards



- Pressure hazard! Hot fluids. Isolation valves are provided on all inlets and outlets for your convenience. Make sure all isolation valves are closed before servicing.
- Pressure hazard! Hot fluids. Annually test safety relief valve for proper operation. Do not operate with faulty relief valve(s).

2.5.6 Slip, Fall Hazards



- Tripping hazard! Do not install piping on floor surfaces. Maintain clear path around the P-K Duration II™ system.
- Slip and fall hazard! Use drip pan to catch water while draining. Maintain dry floor surfaces.
- Fall hazard! Do not stand on the P-K Duration II™ system.

3 INSTALLATION

WARNING

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

3.1 RECEIVING AND STORAGE

3.1.1 Initial Inspection

Upon receiving the P-K Duration II system, inspect it for signs of shipping damage. Since some damage may be hidden, unpack the product, open the front, and side doors to inspect. Verify that the total number of pieces shown on the packing slip agrees with those actually received.

NOTICE! Note any damage, suspected potential damage, or shortage of materials on the freight bill and immediately notify the carrier. File all claims for shortage or damage with the carrier. Claims for hidden damages must be filed with your carrier within 7 days.

3.1.2 Storage Prior to Installation

If the P-K Duration II system is not installed immediately, it must be stored in a location adequately protected from the weather, preferably indoors. If this is not possible, then it should remain in the shipping container and be covered by a tarpaulin or other waterproof covering.

NOTICE! Controls and other equipment that are damaged or fail due to weather exposure are not covered by warranty.

3.2 COMPLIANCE WITH CODES

The brazed plate heat exchanger is constructed and stamped in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 for 219 psig maximum operating pressure. However, certain components in the domestic piping have a maximum pressure rating of 150 psig. Therefore, the domestic side pressure must never exceed 150 psig.

The pressure-only relief valve in the domestic piping is constructed and stamped in accordance with ASME Boiler and Pressure Vessel Code, Section VIII with a standard 150 psig set pressure.

3.3 SETUP

3.3.1 Foundation and Placement

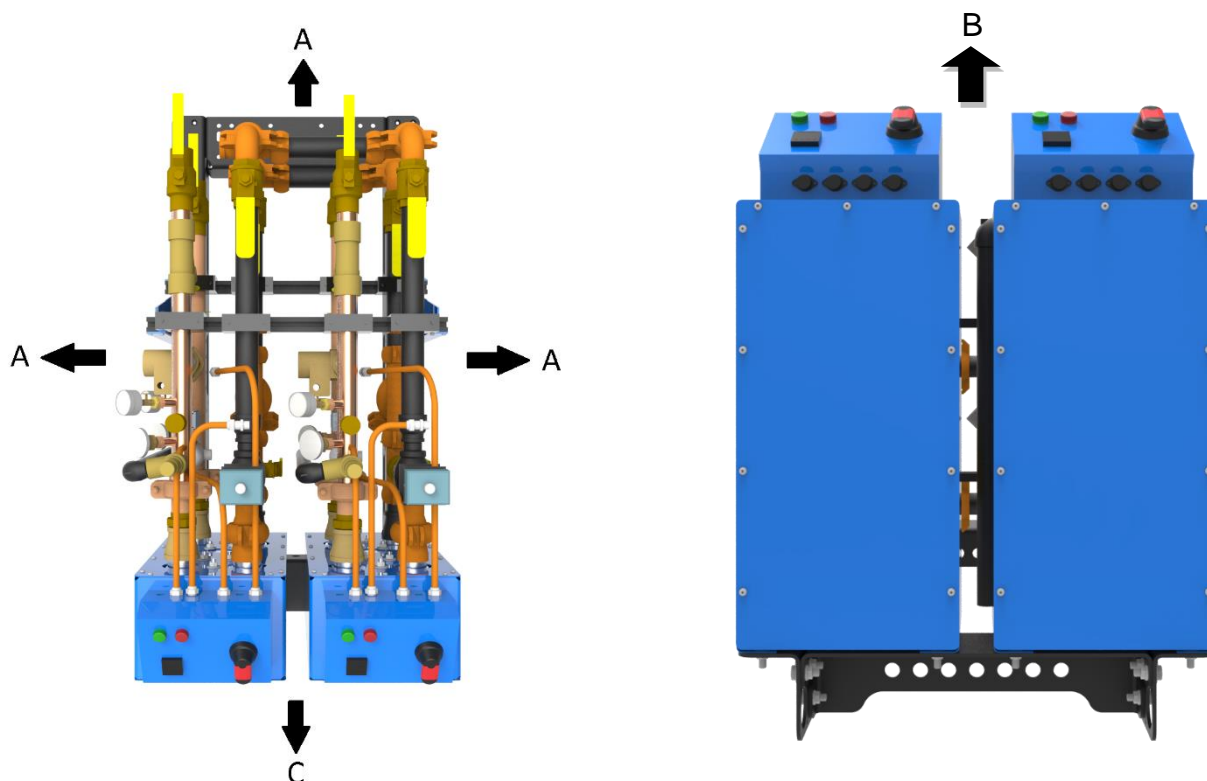
Provide a firm, level foundation, preferably of concrete. The P-K Duration II system must be level to function properly. Consult with a certified Professional Engineer regarding any seismic anchoring requirements.

3.3.2 Clearances

Since the P-K Duration II instantaneous indirect domestic hot water system is designed to operate in potentially remote mechanical rooms, it requires sufficient clearance for service and operation.

Clearance Dimensions	
A	24"
B	18"
C	36"

3.3.2.1 Clearance Figure

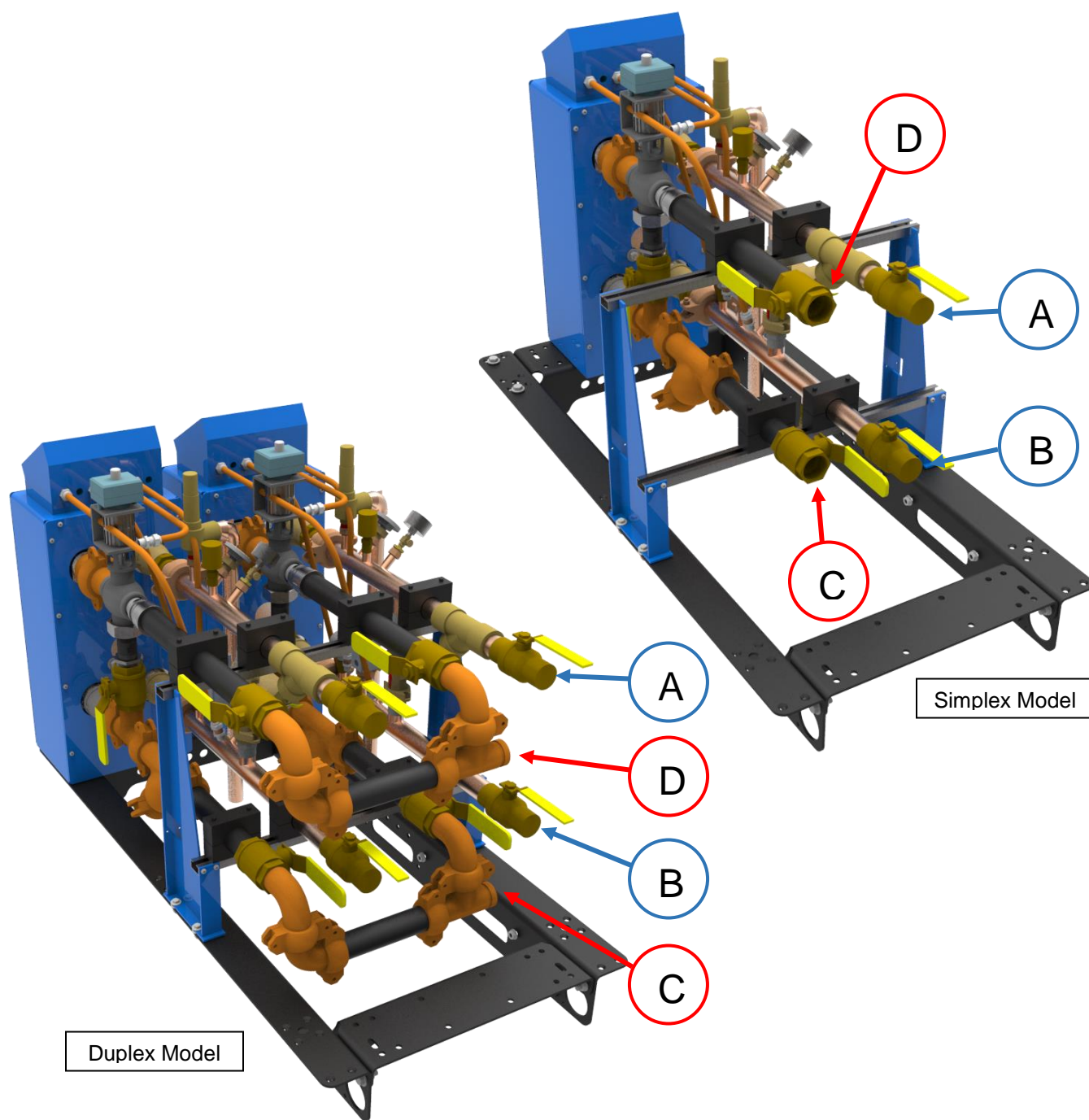


3.4 MECHANICAL CONNECTIONS

The P-K Duration II system is designed to provide substantial domestic hot water capacity in a 32" wide x 64" long footprint and requires four (4) piping connections to operate as seen below:

- | | |
|-------------------------------------|--|
| A. DHW Supply (2" Sweat Ball Valve) | C. Boiler Water Inlet (2" NPT Ball Valve/Grooved) |
| B. DHW Return (2" Sweat Ball Valve) | D. Boiler Water Outlet (2" NPT Ball Valve/Grooved) |

3.4.1 Connection Figure

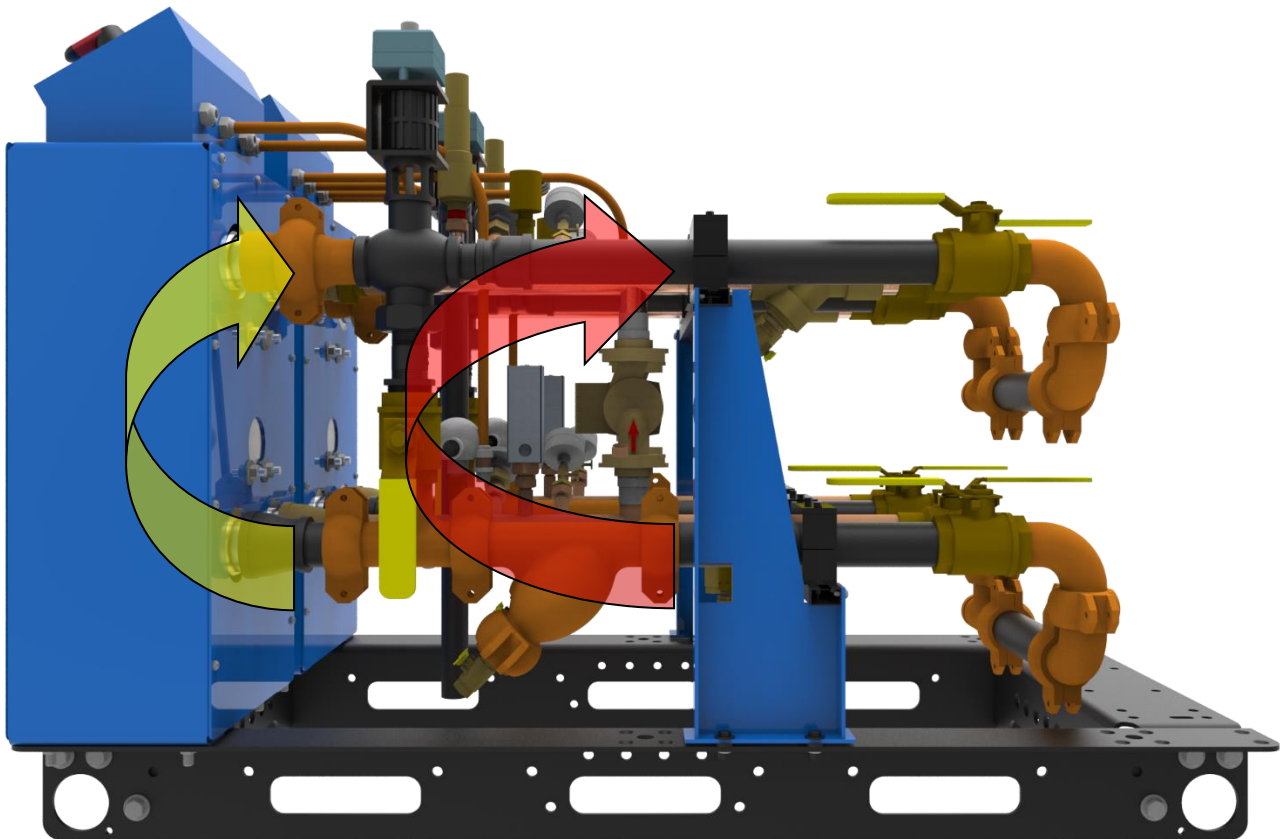


3.4.2 Boiler Piping (Simplified)

The energy source for the P-K Duration II system is hot boiler water from the hydronic system and is regulated by an electronic control valve. By default, this control valve is setup to operate as a 3-way valve since this is the recommended and preferred operating method. By closing the isolation valve below the control valve, it is also possible to operate this as a 2-way valve.

Assuming the Duration II system will be operated with 3-way control valve functionality, when the domestic hot water supply temperature is satisfied, the control valve bypasses all hot boiler water away from the brazed plate heat exchanger as shown below with the curved red arrow (middle):

3.4.2.1 Boiler Piping Figure



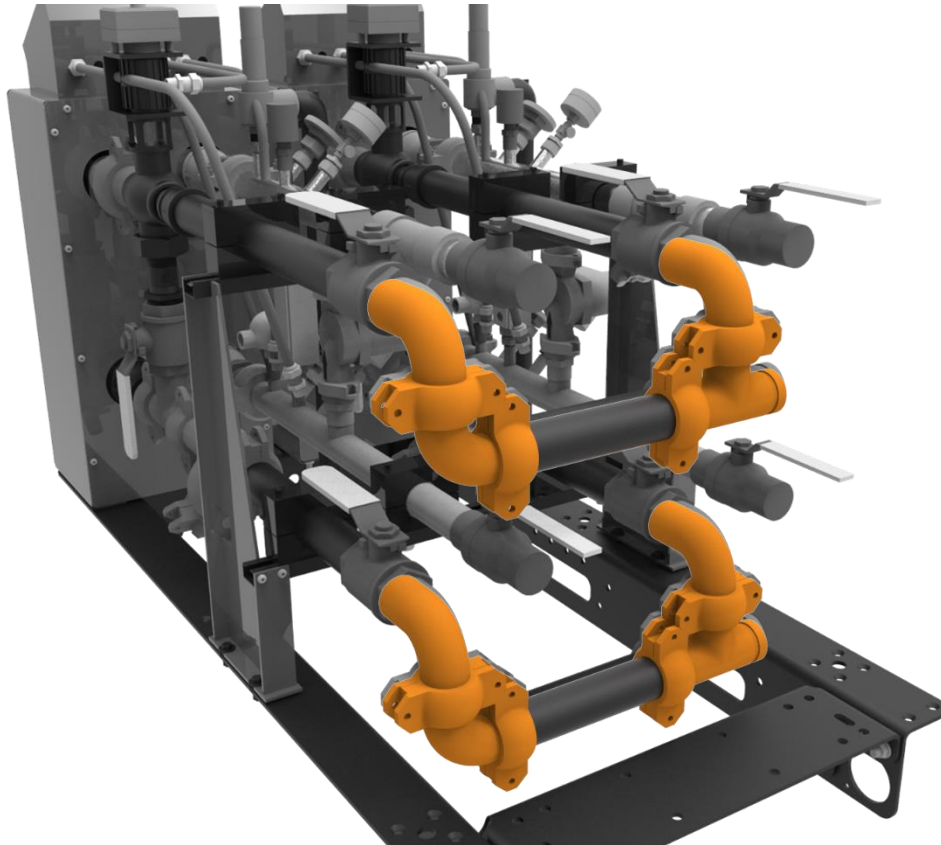
As the domestic hot water supply temperature drops below the desired setpoint, the control valve actuates allowing the flow of hot boiler water into the brazed plate heat exchanger as shown above with the curved yellow arrow (Left). As the DHW supply temperature drops below setpoint, the control valve allows more boiler water to enter the heat exchanger.

During this process, heat is transferred from the boiler water to the colder domestic water, reducing the outgoing boiler water temperature. As the DHW supply temperature approaches setpoint, the 3-way control valve will restrict the flow through the heat exchanger and will bypass more boiler water. The boiler water flows through a grooved wye strainer. This helps protect the brazed plate heat exchanger from foreign debris which will reduce its efficiency. The strainer is recommended to be cleaned every 6 months.

3.4.3 Boiler Water Manifold Piping (Duplex Only)

The Duration II Duplex unit is equipped with a Boiler Water Manifold to allow for easy installation. Below is an image which shows the manifold. The Boiler water is piped to each heat exchanger from one connection point, limiting the requirement for multiple connections, provided the same boiler water is required to feed both heat exchangers. In a situation where the boiler water is coming in from the left side, removing the grooved tee fitting and rotating the manifold is easily complete.

3.4.3.1 Boiler Water Manifold Piping Figure



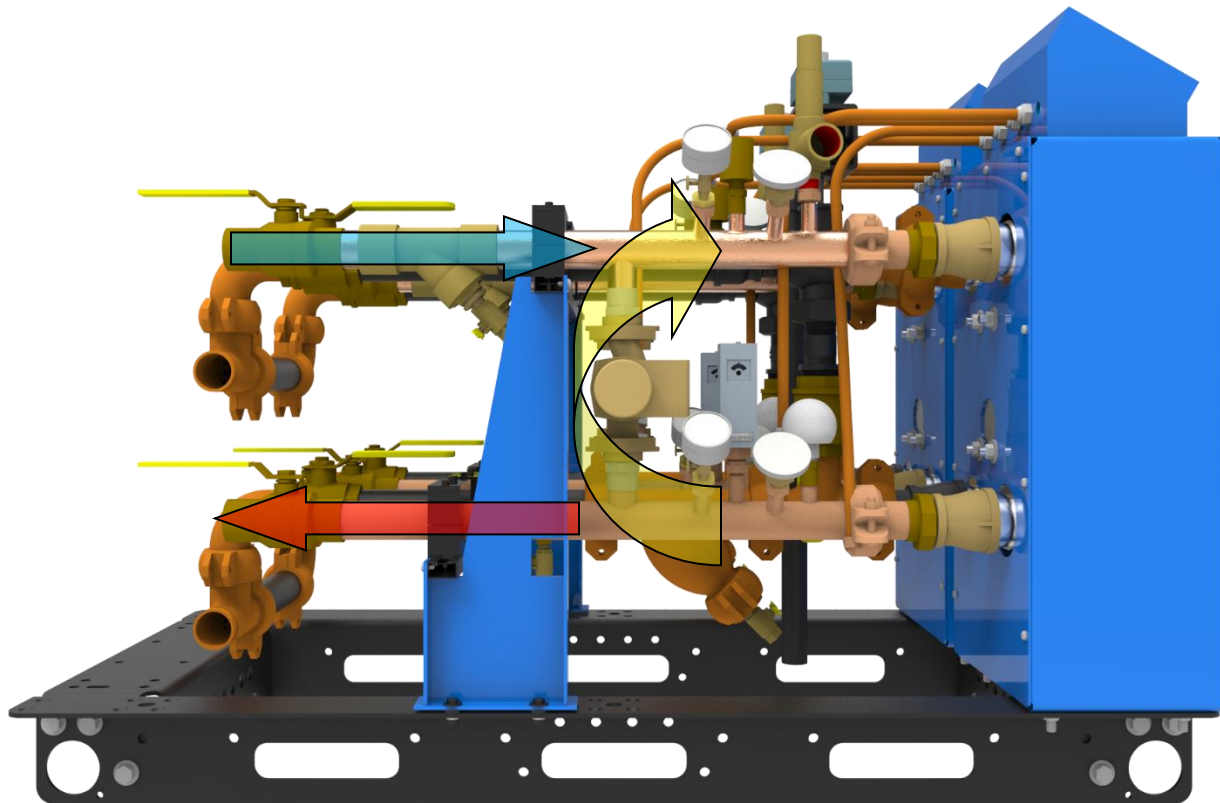
3.4.4 Domestic Water Piping (Simplified)

The P-K Duration II system features constant recirculation on the domestic hot water piping. This circulation pump offers 3-speed operation that can be selected by the operator. Constant circulation on the domestic hot water side offers several advantages:

- “Primes” the DHW loop ensuring the discharge water is at the correct temperature.
- Maintains accurate temperature readings by maintaining flow across the temp gauges and RTD.
- Minimizes heat exchanger scale formation by maintaining velocity across the plates.
- Inhibits bacterial growth by preventing stagnant water conditions.

As domestic hot water is consumed throughout the building, hot water will exit the Duration II in the lower copper piping (red arrow) and fresh makeup water will enter in the upper copper piping (blue arrow). The recirculation pump circulates water through the heat exchanger to reduce the amount of hot spots that may form on the heat exchanger, and keep the velocity to prevent scale build it. The recirculation path is indicated by the yellow arrow (Middle).

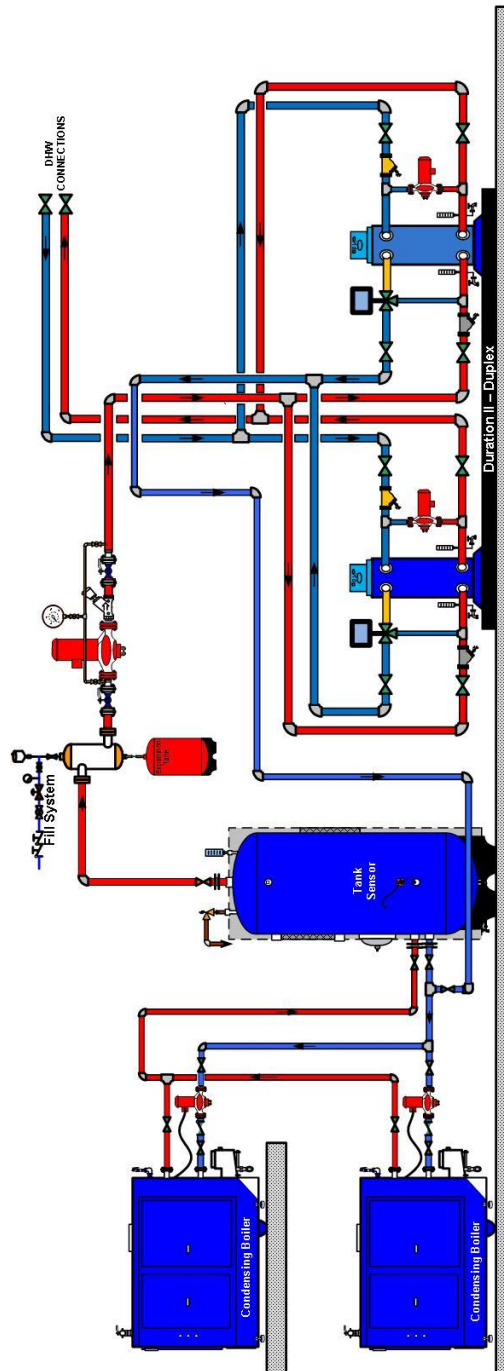
3.4.4.1 Domestic Water Piping Figure



3.4.5 Example Domestic Hot Water Installation

It is important to note that the P-K Duration II indirect domestic water heating system does not require a domestic water storage tank, if hot water is constantly available for the 3-way valve. If using in conjunction with a boiler, the initial call for heat takes time until the boiler operates at maximum power. If the unit is used in this manner, the storage tank needs to be sized appropriately for the application.

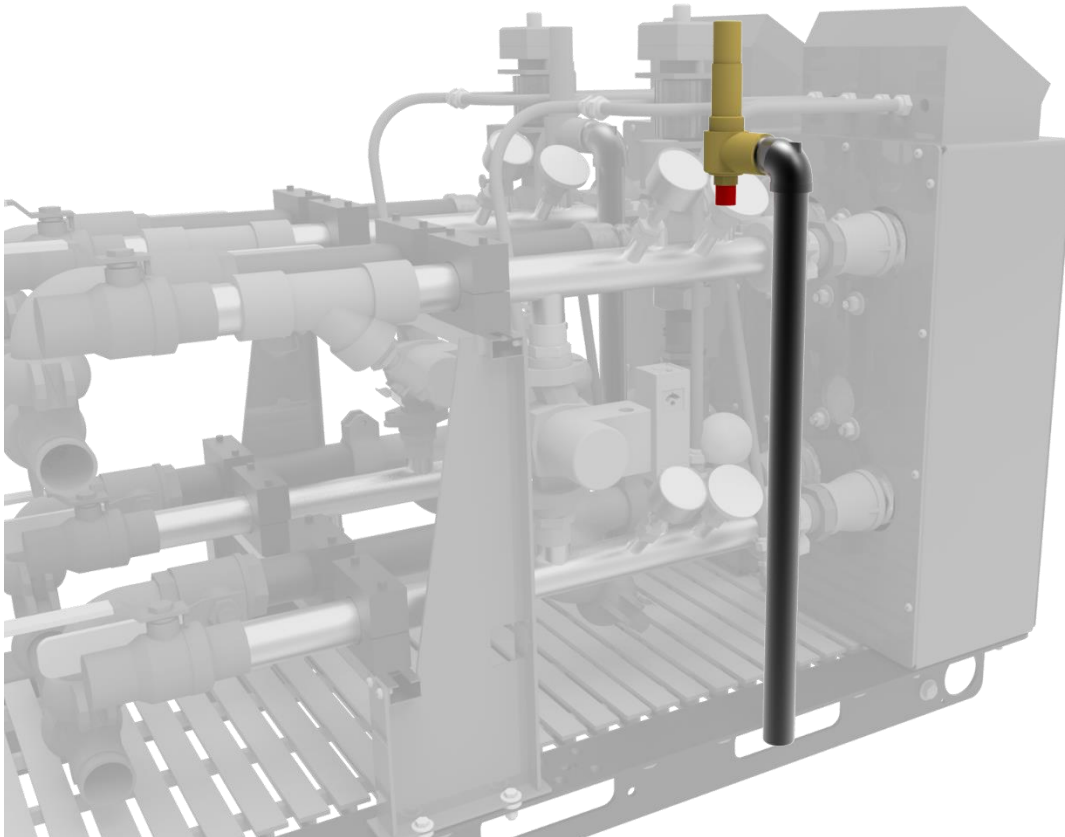
3.4.5.1 Example Piping Diagram



3.4.6 Relief Valve Discharge Piping

The Pressure Only relief valve discharge pipe is routed towards the floor. Refer to your local code enforcement to ensure compliance with relief valve discharge piping. **DO NOT** connect any valves in the relief valve discharge piping.

3.4.6.1 Relief Valve Discharge Pipe



3.4.7 Flushing the Domestic Water

Flush the domestic water periodically by using the drain valve located on the DHW supply line (Bottom). At the same time, the strainer should be checked and cleaned properly.

NOTICE! Under no circumstances should petroleum based cleaning or sealing compounds be used in the boiler system.

Before the initial fill, ensure that any and all sediment or particulates have been removed from the domestic water. Ensure that the outlet isolation valve on the P-K Duration II system is closed. Use the drain valve on the domestic water outlet line to purge sediment and particulates.

3.4.8 Filling the DHW System

Before filling the system, ensure all the mechanical connections are complete.

- **STEP 1** – Connect a hose to the drain valve on the domestic water outlet line.
- **STEP 2** – If applicable, close the manual isolation valves in the domestic piping between the domestic water storage tank and the P-K Duration II system.
- **STEP 3** – Open drain valve on domestic piping.
- **STEP 4** – Slowly open the domestic water inlet ball valve to start the flow of water.
- **STEP 5** – Close the drain valve on the domestic piping once a steady flow of water occurs.
- **STEP 6** – Open the cap on the automatic air vent in the domestic water inlet piping.
- **STEP 7** – Open the manual isolation valves on the outlet of the domestic piping.
- **STEP 8** – Check for any leaks in all piping connections, especially at the Victaulic couplings. Tighten or reseal the connections if necessary.

3.4.9 Filling the Boiler System

Before filling the system, ensure all the mechanical connections are complete.

- **STEP 1** – Connect a hose to the drain valve on the boiler water strainer valve.
- **STEP 2** – Open drain valve on domestic piping.
- **STEP 3** – Slowly open the boiler water outlet ball valve to start the flow of water.
- **STEP 4** – Close the drain valve on the boiler water strainer once a steady flow of water occurs.
- **STEP 5** – Open the manual isolation valves on the inlet of the boiler piping.
- **STEP 6** – Check for any leaks in all piping connections, especially at the Victaulic couplings. Tighten or reseal the connections if necessary.

3.5 ELECTRICAL CONNECTIONS

Only after all the mechanical connections have been completed and verified should any electrical connection be made. Please refer to [Section 6.2](#) for a wiring diagram of the P-K Duration II system.

NOTICE! A dedicated earth ground (green wire) is required. Do not ground through the conduit.

The P-K Duration II system requires 120 volt, single phase, 60 hertz electrical service (15 amps). Size the supply circuit accordingly.

NOTICE! Be sure to properly lockout/tagout the Duration II for any electrical work that needs to be made.

3.5.1 Incoming Power Line

The control panel is located and accessed on the front of the P-K Duration II system. The 120 volt, single phase, 60 hertz, 15 amps electrical service should be routed to this panel. Knockouts are located in the rear of the panel.

3.5.2 High Voltage



WARNING

The P-K Duration II has inputs for line voltage (120VAC) connections.

- **120 VAC Supply:** Connect the incoming power supply directly to the disconnect switch.

3.5.3 Low Voltage

- **Communication Connection:** The controller is capable of MODBUS Communication. A Protocol Convertor is available to convert from MODBUS to BACNet or LONWORKS.
 - Connect BMS system to LOVE controller on terminals 9 (Data -) and 10 (Data +).
 - For connecting the Protocol Convertor to the system, please refer to the ProtoNode Startup Guide.

3.6 PRE-START CHECK LIST

Before attempting to start the P-K Duration II system, ensure the following items have been completed.

1. Inspect the P-K Duration II system for leaks in either the boiler side or domestic side piping. Correct any and all leaks promptly. If leaks occur at grooved fittings, refer to manufacturer's instructions for more information.
2. Inspect the relief valve discharge piping and ensure this is routed to a nearby floor drain.
3. Ensure there is sufficient clearance around the unit, especially the front for access to control panel.

3.7 SAFETY CHECKS

The following checks of safety systems must be made before putting the P-K Duration II™ system boiler into normal operation.

WARNING

Never attempt to operate a P-K Duration II system that has failed to pass all the safety checks described below.

WARNING

After checking controls by manual adjustment, make sure they are always reset to their proper settings.

3.7.1 Test of Circulation Pumps

Once power has been turned on to the Duration II, ensure the domestic water pump is pumping water in the correct direction (up).

3.7.2 Test of High Temperature Limit Aquastat

When the Duration II is powered on, adjust the dial on the high temperature limit aquastat to the lowest possible setting. Allow the Duration II to increase the domestic water temperature. Once the domestic water temperature exceeds this value, the high temperature limit aquastat should open and trigger the safety circuit. When this happens, the control valve is immediately disabled will close completely, and the circulating pumps will continue to run during this time in order to dissipate the heat.

If this does not work, check the wiring on the high temperature limit aquastat and ensure there is no jumper or other wiring attached to the Duration II safety circuit. If necessary, replace the high temperature limit aquastat.

4 OPERATION


4.1 LOVE CONTROLLER

CAUTION



Read instructions and understand operation before operating or making adjustments to the digital temperature controller.

A digital temperature controller (right) positions the valve in response to outlet water temperature. A 4-20 milliamp signal drives the valve actuator. The controller uses a type J thermocouple to sense the outlet domestic water temperature.

The default screen is shown. PV - the top number (red) - is the temperature of the water in the P-K COMPACT® water heater and SV - the lower number (green) - is the setpoint.

The index button  changes the parameters displayed on the screen. The PV line lists the parameter name and the SV line lists the parameter value.

Press the enter button  to store any value after it is changed.

The up  and down  buttons are used to change the values of the parameters.



4.1.1 Controller Operation

To change the setpoint, press the up or down buttons to change SV to the desired value. Once the desired value is displayed, press the enter button to store the value.

The temperature control starts in the operation mode. The following table lists the operating parameters, their factory default settings, and a description of the parameters function. Parameters are accessed by repeatedly pressing the index key until the desired parameter is displayed.

Operational Mode		
Parameter	Default Value	Description of Parameter Function
Home Screen = Setpoint	120°F	Setpoint temperature of outlet water
r-S	RUN	Run – Stop output control. Must be in run for control to operate
SP	0	Sets the number of digits to the right of the decimal point
AL1H	20	Alarm 1 High Set Point, Alarms at setpoint + AL1H value
LoC	Off	Set front panel security, Off = no security, On = settings are locked
OUt1	###	Output value of controller, 0 – 100%

4.2 SETUP OF THE ELECTRIC VALVE

The valve should open when the hot water demand increases and close when the hot water demand decreases.

⚠ WARNING

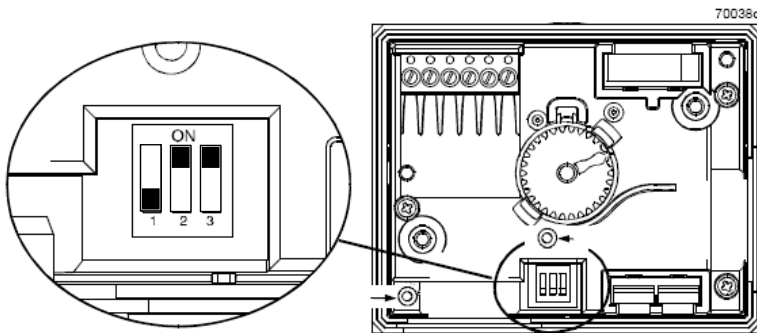
If power is removed, the valve should fail in the closed position. This must be verified prior to putting the unit in service.

During initial startup, check the DIP switches to verify correct positioning. The DIP switches are found in the valve actuator. The following pictures illustrate the correct positioning for the various valve actuators.

NOTICE! - For water to water applications or when valve is oversized, equal percentage valves are the preferred type.

4.2.1 Siemens Valve Actuators MXG and MXF:

All of the Siemens valves have a manual override control knob on the top of the valve actuator. The knob must be set to “Auto” for the valve to function. The style actuators used is the MXG. The MXG actuator is shown below.



DIP switches are labeled 1 2 3 and ON is labeled.

Switch	Function	OFF	ON	Factory Setting
1	Valve Response Type	Linear	Equal Percent	ON
2	Control Signal Range	0-10 VDC	2-10 VDC or 4-20 mA	ON
3	Input Selector	0/2-10 VDC	4-20 mA	ON

5 MAINTENANCE

5.1 MAINTENANCE AND INSPECTION SCHEDULE

WARNING

Proper lockout/ tag out procedure must be employed when servicing this unit.

CAUTION

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

WARNING

Determine the cause of any lockout or errors before resetting the boiler. If able to determine cause of lockout, then appropriate corrective action should be taken. If unable to determine cause of the problem, call a qualified service technician.

WARNING

Verify proper operation after operation servicing.

5.1.1 Daily

- Observe operating temperature and general conditions.
- Listen to the performance of the P-K Duration II system.
 - If you hear a “sloshing” noise that means air is present in the system. Ensure the vent cap on the automatic air vent are open.
 - If the pumps are making noise, ensure they are not deadheaded or cavitating. Refer to [Section 5.2](#) for troubleshooting information.

5.1.2 Weekly

- Check for leaks in the boiler piping and the domestic piping. Correct immediately if discovered.

5.1.3 Monthly

- Check all relief valves by slightly opening the stem. Once you see a small amount of water exit the discharge, close the relief valve’s stem. Once the stem is closed, ensure there is no additional water that exits the relief valve.
- Verify the domestic temperature sensor reading is accurate on the Temperature Controller.
- Ensure the high temperature limit aquastat is functioning properly.

5.1.4 Annually

- The brazed plate heat exchanger can scale up with calcium and other minerals present in the domestic water. This will inhibit heat transfer and it may be necessary to clean or replace the brazed plate heat exchanger.
- Remove and inspect the circulating pumps for signs of deterioration. Repair or replace if needed.
- Clean and inspect the P-K Duration II™ system for any signs of cracks, leaks, or loose connections. Repair or replace if needed.

5.2 TROUBLESHOOTING

5.2.1 Circulation Pump Deadhead

Deadheading occurs when the circulation pump is unable to deliver any flow. Ensure that any isolation valves installed in the system are OPEN.

5.2.2 Circulation Pump Cavitation

Cavitation occurs when the water pressure at the suction side of the pump is below the pump's required suction head pressure. Ensure that any isolation valves on the suction side of both circulation pumps are OPEN. Also, ensure that there is a sufficient static fill pressure of the system.

5.2.3 Poor Heat Transfer

Poor heat transfer can be caused by insufficient flow, insufficient boiler water temperature, or scaling of the heat exchanger.

- Ensure that the boiler side has sufficient flow, as well as the domestic side, and that all circulation pumps are moving water at the desired rate. (Boiler pump supplied by others)
- Next, increase the boiler supply temperature in small increments to ensure there is sufficient temperature to produce the desired domestic water temperature. If these two steps are unable to restore heat transfer, it may be necessary to clean or replace the brazed plate heat exchanger.

5.2.4 Erratic temperature control

- Check for proper operation of the temperature control.
- Check for proper rotation of integral circulation pump.
- Check for flow of circulator pump. (Be sure water is flowing through the recirculation pipe)
- Check valves in pipe line must be operational.
- Check for proper boiler water flow.

5.2.5 Domestic water temperature is too high or too low.

- Check the setting of the temperature control.
- Check temperature sensing element for malfunction.
- Check for proper boiler water temperature and flow rate.
- Check to be sure heater design rating is not being exceeded.

5.3 HEAT EXCHANGER CLEANING

AIC brazed plate heat exchangers operate with high turbulence flow, even at low flow rates. This high turbulence keeps small particles in suspension minimizing fouling and scaling. However, in some applications the fouling tendency can be very high, e.g. when using extremely hard water at high temperatures. In such cases it is always possible to clean the exchanger by circulating a cleaning liquid. Use a tank with weak acid, 5% phosphoric acid or, if the exchanger is frequently cleaned, 5% oxalic acid. Pump the cleaning liquid through the exchanger. For optimum cleaning, the cleaning solution flow rate should be 1.5 times the normal flow rate, preferably in a back-flush mode. After use, do not forget to rinse the heat exchanger carefully with clean water. A solution of 1-2% sodium hydroxide (NaOH) or sodium bicarbonate (NaHCO₃) before the last rinse ensures that all acid is neutralized. Clean at regular intervals.

6 PARTS/TECHNICAL SUPPORT

Spare parts and replacement parts can be ordered from Harsco Industrial, Patterson-Kelley by calling toll free (877) 728-5351. The fax number is (570) 476-7247. Refer to the parts list shown on the assembly drawing provided in this manual. Technical information is also available at the above number and at the Harsco Industrial, Patterson-Kelley website www.harscopk.com.

6.1 RECOMMENDED SPARE PARTS

- Circulator Pump: bearing and seal assembly.
- Dial Thermometers
- Temperature sensor – RTD
- Temperature Controller
- Relief Valve
- Thermostat for over-temperature control

WARNING

Use of Non-Factory Authorized replacement parts are not recommended for this equipment. All control components are engineered for safety and are designed to work in unison with each of the other components. Use of non-factory authorized replacement parts jeopardizes the functionality of the safety features as well as the performance of the appliance.

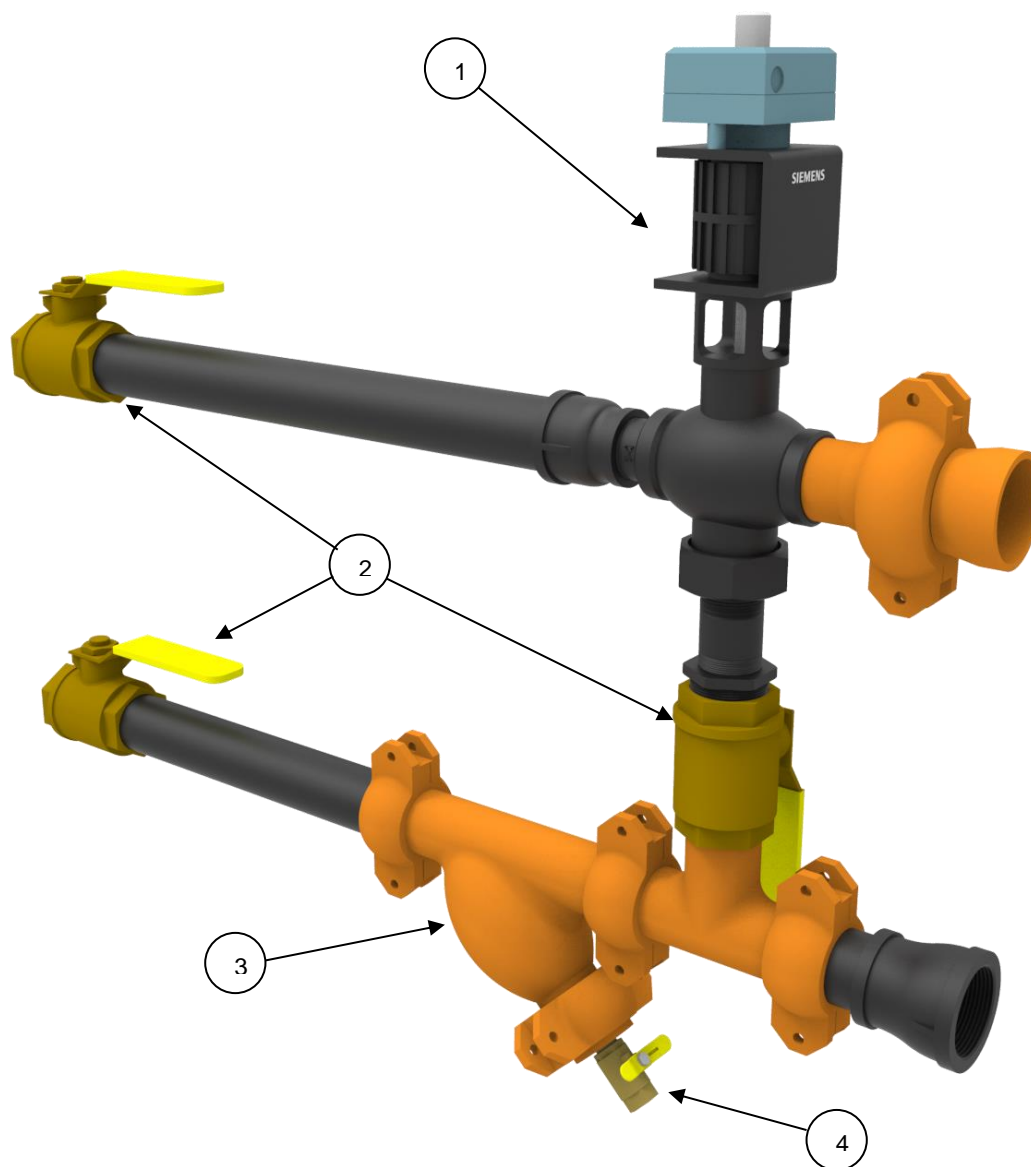
When ordering replacement parts please have the **model number** of your product.
Typical schematic drawings are shown on the following pages.

6.2 WIRING DIAGRAM



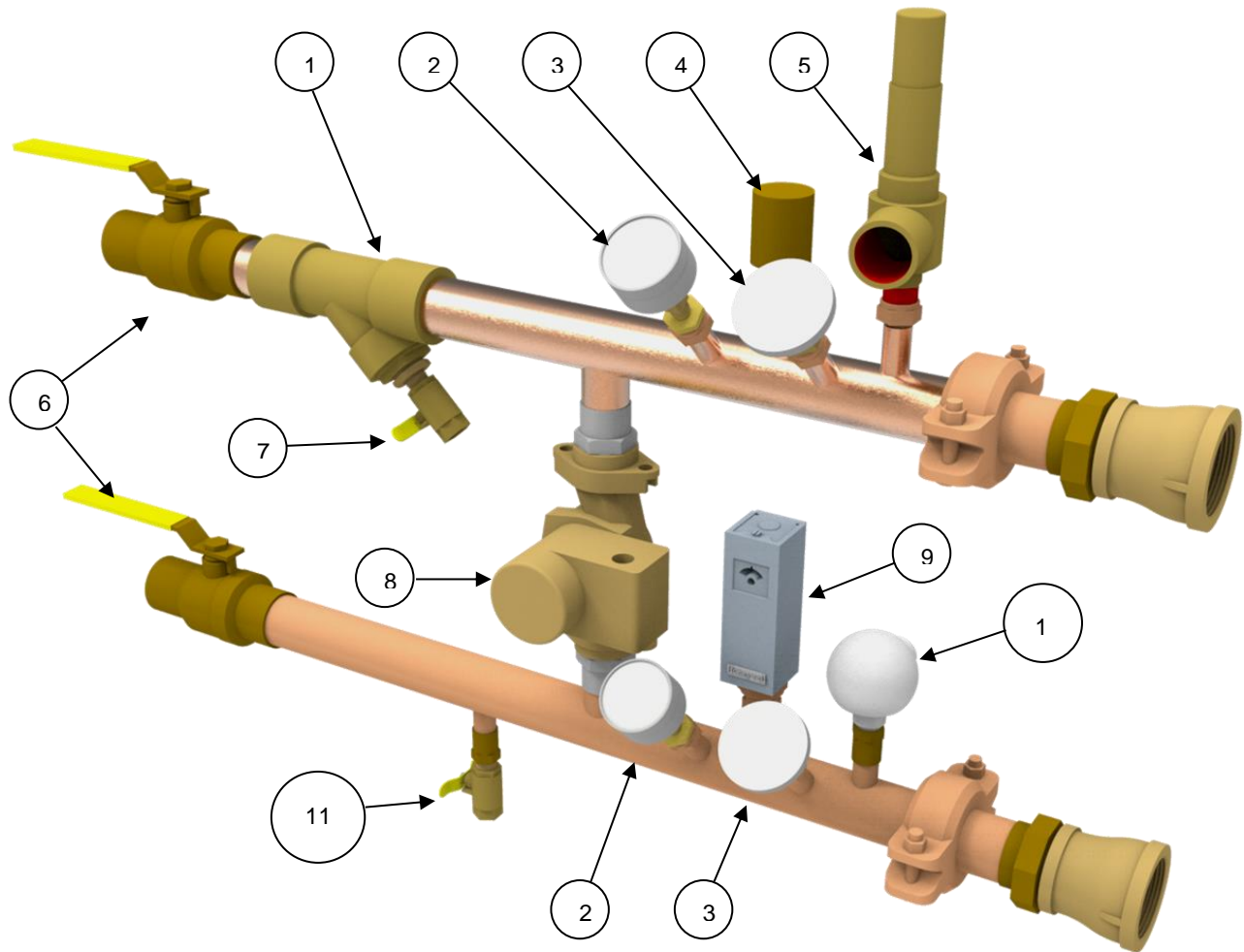
6.3 MODELS

6.3.1 Boiler Piping



Callout Tag	Part Description
1	3-way Electronic control valve
2	2" ball valve
3	wye - strainer
4	strainer blow down valve

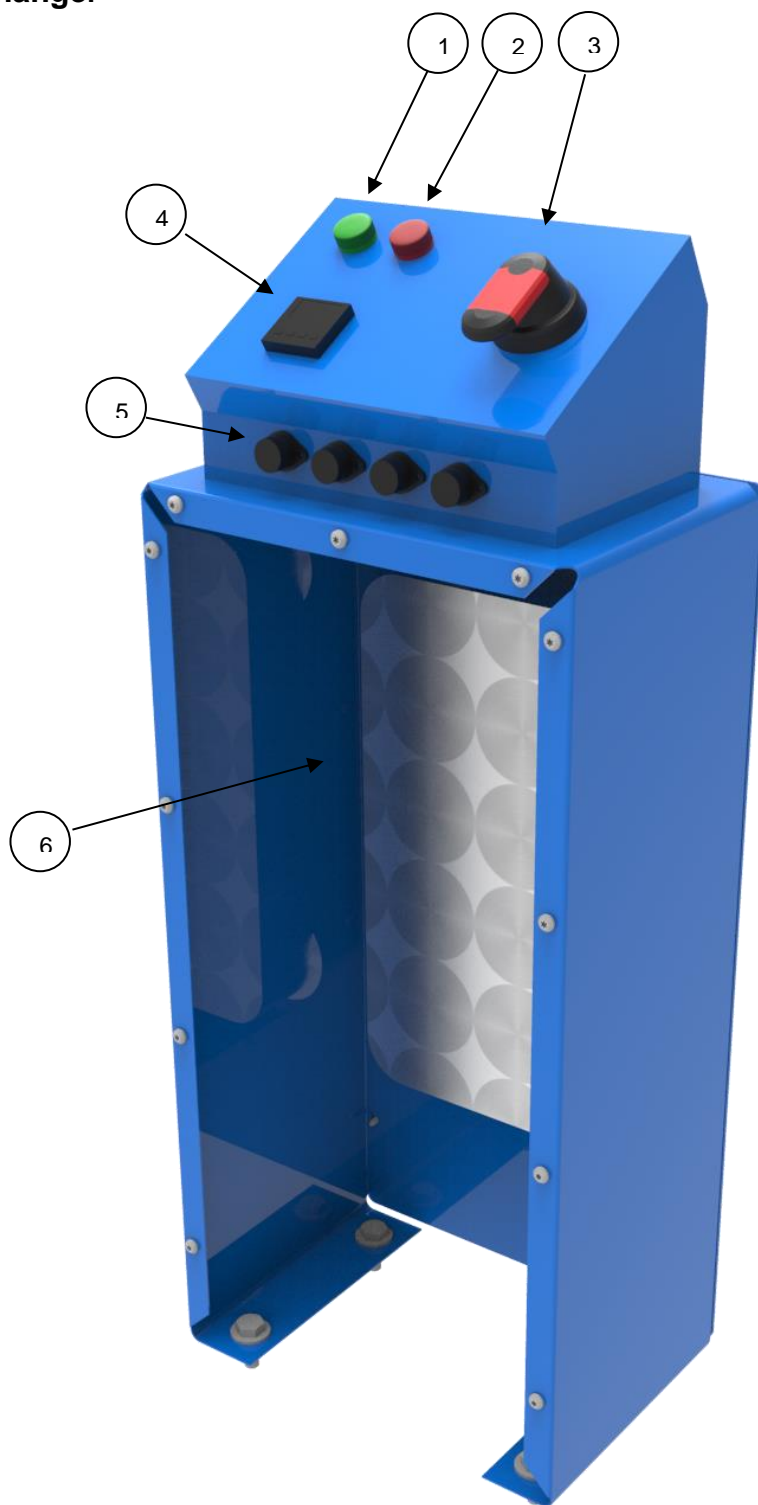
6.3.2 DHW Piping



Tag Number	Part Description
1	Wye-Strainer - 2"
2	Pressure Gauge XX-XX PSI
3	Temperature Gauge XXF – XXF
4	Automatic Air Vent
5	Section VIII Pressure Only Relief Valve
6	2" Ball Valves
7	Wye-Strainer Blow Down Valve
8	Recirculation Pump
9	Manual Reset High Limit
10	RTD – Outlet DHW Temperature Sensor
11	Drain Valve

6.3.3 Control Panel and Heat Exchanger

Tag Number	Part Description
1	power light
2	high limit light
3	disconnect switch
4	temperature controller
5	fuses
6	Heat Exchanger



7 DURATION II™ SPECIFIC LIMITED WARRANTY

Subject to the terms and conditions herein and the Terms and Conditions of Sale (as defined herein), Harsco Industrial Patterson-Kelley ("Seller") warrants to the purchaser of the product ("Buyer") that the product will be free of defects in material and workmanship, when operated in accordance with the conditions stated herein, for a period of one (1) year commencing on the date of shipment or, if a start-up report is furnished to Seller, on the start-up date shown on the report furnished to Seller (the "Warranty Period"), provided that startup is completed within six (6) months of shipment and the start-up report is furnished to Seller within thirty (30) days of startup (this "Specific Limited Warranty"). The Exclusions and limitations of liability set forth in the Terms and Conditions of Sale (as defined herein) apply to this Specific Limited Warranty. Capitalized terms used but not defined herein have the meanings ascribed to them under Seller's terms and conditions of sale, which can be found at <http://harscopk.com/warranty.php> (the "Terms and Conditions of Sale"). This Specific Limited Warranty is transferrable to the owner that utilizes the product for its intended use at the original installation site (the "Original Owner"). This Specific Limited Warranty is non-transferable to anyone who subsequently receives or purchases products from the Original Owner. If the Original Owner did not purchase the product directly from Seller, the Original Owner should contact the reseller from whom it purchased the product for a copy of the Terms and Conditions of Sale attached to the Order Acknowledgement received by the original purchaser of the product from Seller.

I. REMEDY

Seller's obligations under this Specific Limited Warranty is limited to repairing or, if in Seller's judgment it seems more appropriate, to furnishing without charge (installation not included), FCA Seller's factory (Incoterms 2010), a similar part to replace any part which after examination shall, to Seller's own satisfaction be determined to have been defective at the time it was shipped. In the event that a replacement is provided by Seller, the defective item will become the property of Seller. Transportation to Seller's facility or other designated facility for repairs of any products or party alleged defective shall, in all events, be at Buyer's sole risk and cost. This warranty applies only if the original installer and Seller (Attention: Harsco Industrial, Patterson-Kelley, 155 Burson Street, East Stroudsburg, PA 18301) receive, within the Warranty Period, an immediate written notice, providing a detailed description of all claimed defects, upon discovery of such defects together with proof of purchase (invoice or Order Acknowledgment) and a copy of the start-up report for the affected product. Seller may seek reimbursement of any costs incurred by Seller where the product is found to be in good working order, or when it has been determined that this Specific Limited Warranty does not apply as per the exclusions set forth below. The remedies available to Buyer set forth herein are exclusive remedies, and all other remedies, statutory or otherwise, including but not limited to the right of redhibition, are waived by Buyer. Buyer acknowledges that the exclusion of remedies is neither unreasonable nor unconscionable. Buyer shall indemnify and hold Seller harmless against, any claim due to any injury or death to any person or damage to any property resulting in whole or in part from any modification or alteration Buyer makes to any product sold hereunder.

II. EXCLUSIONS

To the full extent permitted by law, Seller shall have no liability for and the Warranties do not cover:

- (A) any product which has been altered or repaired by other than Seller's personnel;
- (B) deterioration or failure of any product due to
 - (i) abrasion, corrosion, erosion or fouling,
 - (ii) misuse,
 - (iii) modification not authorized by Seller in writing or
 - (iv) improper installation, lack of or improper maintenance or operation;
- (C) equipment not furnished by Seller by the owner, either mounted or unmounted, or when contracted for by a party or parties other than Seller to be installed or handled;
- (D) the suitability of any product for any particular application;
- (E) the design or operation of owner's plant or equipment or of any facility or system of which any product may be made a part;
- (F) any damage to the product due to abrasion, erosion, corrosion, deterioration, abnormal temperatures or the influence of foreign matter or energy;
- (G) the performance of any product under conditions varying materially from those under which such product is usually tested under industry standards at the time of shipment;
- (H) leakage or other malfunction caused by:
 - (i) defective installations in general and specifically, any installation which is made
 - (a) in violation of applicable state or local plumbing, housing or building codes or
 - (b) contrary to the written instructions furnished with the product,
 - (ii) adverse local conditions in general and, specifically, sediment or lime precipitation in the tubes, headers and/or shells or corrosive elements in the water, heating medium or atmosphere, or
 - (iii) misuse in general and, specifically, operation and maintenance contrary to the written instructions furnished with the unit, disconnection, alteration or addition of components or apparatus, not approved by Seller, operation with heating media, fuels or settings other than those set forth on the rating plate or accidental or exterior damage;
- (I) production of noise, odors, discoloration or rusty water;

- (J) damage to surrounding area or property caused by leakage or malfunction;
- (K) costs associated with the replacement and/or repair of the unit including: any freight, shipping or delivery charges, any removal, installation or reinstallation charges, any material and/or permits required for installation, reinstallation or repair, charges to return the boiler and/or components;
- (L) INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES, SUCH AS LOSS OF THE USE OF PRODUCTS, FACILITIES OR PRODUCTION, INCONVENIENCE, LOSS OF TIME OR LABOR EXPENSE INVOLVED IN REPAIRING OR REPLACING THE ALLEGED DEFECTIVE PRODUCT;
- (M) any claim due to any injury or death to any person or damage to any property resulting in whole or in part from any modification or alteration Buyer makes to any product sold hereunder; and
- (N) design defects where Seller has complied with Buyer's design specifications .

III. PROOF OF PURCHASE

Proof of purchase (invoice or Order Acknowledgement) and a copy of the start-up report for the affected product must be provided to Seller when requesting service under this Specific Limited Warranty.

IV. ORDER OF PRECEDENCE

The Standard Limited Warranty, which can be found at <http://harscopk.com/warranty.php> , (b) this Specific Limited Warranty, which can be found at <http://harscopk.com/warranty.php> and (c) any applicable Extended Limited Warranty exclusively govern and control Seller's and Buyer's respective rights and obligations regarding the warranty of the products. In case of any inconsistency, conflict, or ambiguity between the Standard Limited Warranty, this Specific Limited Warranty and any applicable Extended Limited Warranty (collectively, the "Warranty Documents"), the documents shall govern in the following order: (w) any applicable Extended Limited Warranty; (x) this Specific Limited Warranty; (y) the Standard Limited Warranty and (z) other provisions in the Terms and Conditions of Sale. Information identified in one Warranty Document and not identified in another shall not be considered a conflict or inconsistency. No sales representative, agent, or employee of Seller or any reseller in the chain of sale of the product is authorized to make any modification, extension, or addition to this Specific Limited Warranty, unless agreed to in writing by Seller.