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MODEL:

SERIAL#:

HVR 120-700kW Hydronic Boiler Models



Instructions Manual

TABLE OF CONTENTS

Limited Warranty Information.....	4
Important Safety Information.....	5
Installation.....	7
Location.....	7
Installation.....	7
Heating Loop Piping.....	8
Safety Relief Valve.....	8
Electrical.....	8
Operation.....	9
Boiler Startup.....	9
Boiler Operation.....	10
Operation of the Safety Limit Controls.....	10
Boiler Maintenance.....	11
Element Inspection, Replacement, and Element Cleaning.....	11
Tightening the Electrical Terminal Connections.....	11
Testing the Safety Relief Valve.....	11
Testing the Safety Relief Valve.....	11
Testing the Low Water Cut-Off Device.....	12
Troubleshooting.....	13
Parts Lists.....	13

HVR120 - HVR700 HOT WATER BOILERS



Features

- Maximum design 160psi, 250°F
- Maximum operating 135psi, 235°F
- All boilers are manufactured in accordance with the requirements of the A.S.M.E. Boiler and Pressure Vessel Code and A.S.M.E. CSD-1. Each boiler bears the National Board Stamp "H".
- Shell fiberglass insulation thickness minimum 2" (Average thickness min. 3").
- Power range 120kW - 700kW with up to 12 heating stages, depending on model.
- Heating stages controlled by Schneider Electric PID controls.
- One sensor operation - sensor A controls boiler temperature
- Two sensor operation with outdoor reset - sensor A in boiler, sensor B outdoors
- Temperature set point, max heating power limiting, boiler on/off, time scheduling. Max four (4) programmable events per day.
- Space saving vertical design; Move the boiler through standard 32in doors with pallet jack

Standard Equipment of Each Boiler Includes:

- A.S.M.E. pressure relief valve
- One (1) primary high temperature cutoff control with automatic reset and one (1) secondary high temperature cutoff control with manual reset
- One (1) low water cutoff control with manual reset
- PID-step controller with number of heating stages depending on the boiler heating power
- Digital readout of boiler operating parameters
- Magnetic contactors
- Internal branch circuit fusing with high interrupting capacity
- Main supply power distribution block
- Indicator lights for POWER, HEATING, and ALARMS
- Pressure and temperature gauges
- BACnet™ MS/TP and IP and Modbus® Communication Interface with Building Automation System (BAS) provided as standard equipment

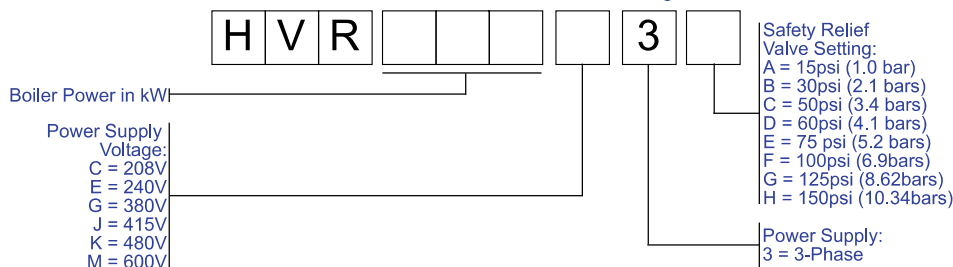
Applications

- Space Heating
- Water Source Heat Pumps
- Bio-Diesel Reactors
- Tank Heating
- Swimming Pools
- De-Icing

The new HVR - electric hot water boiler series is designed to meet the demands of modern heating equipment, providing as standard equipment multiple communication protocols for communication with the building automation system (BAS), heating power limiting to manage the electrical demand of the facility, a step controller with advanced features to modulate up to 12 boiler heating stages, up to 100kA short circuit current rating of the panel and much more.

Each boiler can be optionally equipped with a solid state SCR controlled modulation heating stage to provide smooth heating power control between individual on/off heating stages and reduction of wear on the contactor used in the on/off switched heating stages. Further all boiler models can be equipped with a high precision power/energy transducer which allows the logging of energy consumed by the boiler and monitoring the power of all voltages and currents in the three-phase power supply. The power/energy transducer also communicates with the step controller, which allows the monitoring of all heating stages for proper function. All boiler models can also be equipped with unfused molded case switches, which allows a simpler and more compact installation in confined places. A complete list of optional equipment is shown on the "Optional Equipment & Accessories", page 7.

Model Number Key



Example: HVR700K3B = HVR-Series hot water boiler, 700kW heating power, power supply 480V, 3ph, safety valve set to 30psi

* Each boiler model requires two (2) power supplies: Heating power and control voltage. Nominal control voltage is 120V AC. Boiler models rated for 380V and 415V are equipped with control voltage transformers that require 220/240V applied to their primary side in order to provide the 120V AC control voltage to the boiler. As an option, all boiler models can be equipped with control voltage transformers so that only the heating power supply needs to be connected to the boiler.

Please note that all information provided within this brochure is approximate and subject to change without notice. Please contact Reimers Electra Steam, Inc. with any questions regarding the specifications or dimensions detailed within this document.

LIMITED WARRANTY - HOT WATER BOILERS

Reimers Electra Steam, Inc. warrants the following products of its own manufacture against defects in materials and workmanship under normal use and service. This warranty is in lieu and excludes all other expressed or implied warranties or merchantability of fitness for any particular use. No person is authorized to extend the terms of this warranty or assume any other liability except by written statement signed by an officer of Reimers Electra Steam, Inc. Clear Brook, Virginia 22624.

WARRANTY PERIOD

The pressure vessel and electrical & mechanical components are warranted for one year from date of shipment from Reimers Electra Steam, Inc. in Clear Brook, VA 22624.

LIMITATIONS

Products must be installed, used and maintained in accordance with our instructions, including reasonable & necessary maintenance by the user. Users are responsible for the suitability of the products to their application. There is no warranty for damage resulting from improper installation, abuse, power failure, fire, flood, lightening, improper water, misuse, improper specification, misapplication or other operating conditions beyond our control or parts that are normally expendable in usual course of operation.

Claims against carriers for damage in transit must be filed by the buyer. Reimers liability, if any, will not exceed the price of Reimers products claimed to be defective.

Components manufactured by any supplier other than Reimers shall bear only that warranty made by the manufacturer of that product and service for that warranty shall be the responsibility of that manufacturer and not Reimers.

REMEDY

Claims under this Limited Warranty must be made by obtaining a Return Authorization Number from our office (PHONE: 540-662-3811, FAX: 540-665-8101) & returning the defective part, freight prepaid to: Reimers Electra Steam, Inc., 4407 Martinsburg Pike, Clear Brook, Virginia 22624

Defective items will be repaired or replaced as necessary within a reasonable time without charge, other than incidental charges such as freight prepayment. Such repair or replacement within a reasonable time is the exclusive remedy available from Reimers Electra Steam, Inc., under this Limited Warranty.

CONSEQUENTIAL DAMAGES

Reimers Electra Steam, Inc., is not liable for labor costs incurred in the removal, re-installation, or unauthorized repair of product, or for damages of any type whatsoever, including incidental and/or consequential damages.

THIS WARRANTY SUPERSEDES ALL PREVIOUS WARRANTIES



**Read this manual before installing and using this product.
Failure to do so can result in serious injury or death.**

You have just purchased a quality steam boiler designed to the ASME Boiler Code and registered with the National Board of Boiler Inspectors. Treat this industrial equipment with care and respect. It is safe when installed, maintained, and used properly. Read the instruction carefully and contact the factory if you have any questions.



WARNING Read this manual before installing and using this product.
Failure to do so can result in serious injury or death.

Your boiler should be marked with a complete set of WARNING/CAUTION labels shown below. If one of these labels is missing, please contact our factory immediately.

US and All Other Non-Francophone Countries

Located on electrical enclosure door

Canada and All Other Francophone Countries

⚠️ WARNING		⚠️ ADVERTENCIA	
	Risk of electric shock. This boiler is connected to more than one branch circuits. Disconnect all power and control circuits before servicing.		Riesgo the electrochoque. Esta caldera está conectada a mas de un circuito de alimentación. Desconecte los todos circuitos antes de realizar el mantenimiento.
	Read and understand the operator's manual before using this boiler.		Lea y comprenda el manual de instrucciones antes de utilizar esta

⚠️ WARNING		⚠️ AVERTISSEMENT	
	Risk of electric shock. This boiler is connected to more than one branch circuits. Disconnect all power and control circuits before servicing.		Risque de choc électrique. Cette chaudière est reliée à plusieurs circuits d'alimentation. Débrancher tous les circuits d'alimentation avant l'entretien.
	Read and understand the operator's manual before using this boiler.		Lire et comprendre les instructions avant d'utiliser cette chaudière.

Located on end caps of cylindrical boiler pressure vessel jacket

⚠️ WARNING		⚠️ ADVERTENCIA	
	Risk of electric shock. Disconnect all branch circuits before removing this cover.		Riesgo de electrochoque. Desconecte los todos circuitos antes de remover esta cubierta.

⚠️ WARNING		⚠️ AVERTISSEMENT	
	Risk of electric shock. Disconnect all branch circuits before removing this cover.		Risque de choc électrique. Débrancher tous les circuits avant de retirer le couvert.

Located on end caps of cylindrical boiler pressure vessel jacket

⚠️ CAUTION		⚠️ ATENCIÓN	
	All exposed pipes and valves may be hot. Do not touch.		Las tuberías y valvulas expuestas pueden estar calientes. No toque.

⚠️ CAUTION		⚠️ PRUDENCE	
	All exposed pipes and valves may be hot. Do not touch.		Tous les tuyaux et valves exposées peuvent être chauds Ne pas toucher

This manual contains safety messages. Each of the safety messages are preceded by one of the following signal word panels:



DANGER Safety messages preceded by this label contain information, that if not followed will result in death or serious injury.



WARNING Safety messages preceded by this label contain information, that if not followed could result in death or serious injury.



CAUTION Safety messages preceded by this label contain information, that if not followed could result in minor or moderate injury.



NOTICE Messages preceded by this label contain important information, but are not hazard-related.

Ensure that this manual is available to the boiler operator at any time.

Read carefully all safety labels attached to the boiler. If any safety label was damaged during shipment, contact the factory immediately:

Ph. 540-662-3811; e-mail: sales@reimersinc.com

Important Safety Information



1. BLOWDOWN VALVE: This valve is utilized to blow impurities from the boiler chamber. When opened, a large volume of hot water and steam is discharged. Ensure that this valve is properly piped for such discharge. State and local codes must be met as applicable.

2. ELECTRICAL: All field wiring to the boiler must be in accordance with the National Electric Code and any local codes that may apply. Wiring must be made by a competent certified electrician. Use copper wire only. Ensure that all electrical components are in a dry location, free from any possibility of water soaking. Electric foot switches when supplied must not be placed on a wet floor. They must be placed on dry surface, not subject to steam or water.

3. GAUGE GLASS: The gauge glass protector guards must be on at all times. When replacing the glass, be sure that the unit is not under pressure and is cool to touch. The gauge glass should be replaced once per year. If cracks or wear is evident, replace the gauge glass immediately.

4. MODIFICATION/MISUSE: This boiler has been designed and constructed in accordance with the ASME Boiler and Pressure Vessel Code. Any modification or misuse can result in a dangerous situation. Reimers Electra Steam, Inc. is not liable for any product that has been modified or improperly used.

5. PRESSURE GAUGE: The pressure gauge indicates the internal pressure of the boiler. It can fail. Periodically have your boiler inspector compare the gauge with a known gauge utilizing the test valve arrangement provided

6. REGISTRATION: Most states and cities require boiler registration and inspection. Check with your government authorities.

7. INSTALLATION AND REPAIR:

Installation and repair work of this unit must be performed only by experienced personnel. Before commencing a repair, ensure that the boiler is cold, not pressurized and electrically disconnected. All standard electrical and steam safety precautions must be taken during testing.

8. SAFETY VALVE: The safety valve is designed to discharge hot steam when the set pressure is exceeded. Ensure that the discharge port is pointing toward the back of the unit away from the operator or any aisles. Test the safety valve periodically to ensure that it is operating properly. Test carefully at full pressure by lifting lever using pliers and let it "slapping" shut. Steam discharge can scald. Ensure no one is exposed.

9. STEAM INSTALLATION: Steam piping must be of black pipe, not galvanized. Work must be done by an experienced steam fitter. All state and local codes must be met as applicable.

10. WATER: Ensure that all electrical components are in a dry location, free from any possibility of water soaking. Electric foot switches when supplied must not be placed on a wet floor. They must be placed on dry surface not subject to steam or water.

1. Installation

REIMERS ELECTRA STEAM, INC. boilers are heated by one or more immersion type heating elements. Automatic controls are provided to maintain pre-set operating pressure and proper water supply. Safety features include automatic low water cutoff, automatic temperature control, and safety valve. Each boiler is manufactured in accordance with the ASME Power Boiler Code Standards and is individually inspected and stamped by an authorized National Board Insurance Inspector. All boilers are registered with the National Board of Boiler and Pressure Vessel Inspectors. When boiler is received, make sure it has not been damaged in shipment.

NOTE:

ASME DATA PLATE IS LOCATED ON END OF PRESSURE VESSEL BEHIND LABEL STAMPED WITH NATIONAL BOARD NUMBER OF UNIT.

When boiler is received, make sure it has not been damaged in shipment.

1.1 Location

Place the boiler in a level position, close to the equipment which it is to supply. This will insure minimum heat losses and allow more economical piping arrangements. All steam lines should be insulated. Review the overall dimensions of your boiler model on page 6 to select proper boiler location.

Regardless of the NFPA-70 working space requirements shown below, provide a minimum of 3ft clearance on both sides of the boiler for element servicing, 3ft of clearance to the front of the boiler and 1.5ft to the rear of the boiler.

Nominal Voltage To Ground (Volts)	Minimum Clear Distance		
	Condition 1	Condition 2	Condition 3
0 – 150	3ft (914mm)	3ft (914mm)	3ft (914mm)
151 – 600	3ft (914mm)	3.5ft (1.07m)	4ft (1.22m)

a.) Working space:

Electric boiler spacing is dictated by NFPA-70, Table 110.26 as follows:

Note: Where the conditions are as follows:

Condition 1 - Exposed live parts on one side of the working space and no live or grounded parts on the other side of the working space, or exposed live parts on both sides of the working space that are effectively guarded by insulating materials.

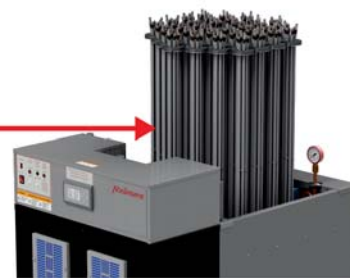
Condition 2 - Exposed live parts on one side of the working space and grounded parts on the other side of the working space. Concrete, brick, or tile walls shall be considered as grounded.

Condition 3 - Exposed live parts on both sides of the working space.

(a) Dead-Front Assemblies. Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on non-electrical parts on the back of enclosed equipment, a minimum horizontal working space of 762 mm (30 in.) shall be provided.

b.) Regardless of the above working space required by the National Electrical Code, the following clearance above the boiler must be provided for heating element servicing:

HVR120-HLR700 39in (991mm) above boiler



c.) Alcove or closet installation per UL834: Proper location of this boiler model with regard to combustible and noncombustible surfaces and materials is coded on the boiler name plate. The following decoding sketch and description is provided for the user information:

Model HVR120 - HVR 700	Dimension in (cm)						
	A	B	D	EL	ER	F	G
	3 (7.62)	3 (7.62)	3 (7.62)	3 (7.62)	3 (7.62)	C	-

Description of dimensions and symbols

A - Clearance above top of boiler

B - Clearance from front of boiler

Prefix C to numeral indicates suitability for closet or alcove installation

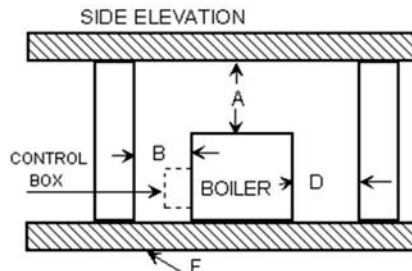
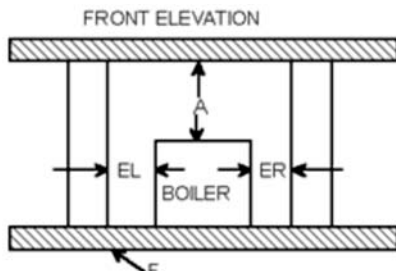
Prefix A indicates suitability for alcove but not for closet installation

D - Clearance from back of boiler

EL - Clearance from left side of boiler

ER - Clearance from right side of boiler

F - Indicates type of flooring: "NC" for noncombustible floor / "C" for combustible floor. Numeral indicates minimum clearance below suspended units to combustible floor



1.2 Heating Loop Piping

Piping: This hot water boiler is intended to be used in a closed pressure system with a circulating hot water pump. The boiler safety relief valve can have settings from 30 up to 150psig. The expansion tank must be sized to meet the ASME standards for the overall water capacity of your heating system. The circulating system should also include an air trap and bleed, as well as automatic water fill. The water inlet and outlet are located on top of the boiler as shown in FIGURE 1.

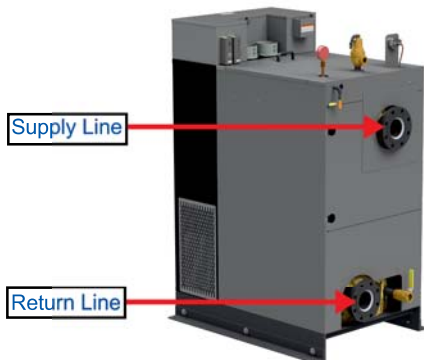
Recommended heating loop piping size, depending on the boiler heating power:

HVR120 – 180: 2.5" NPS

HVR200 – 420: 3" NPS

HVR440 – 700: 4" NPS

FIGURE 1



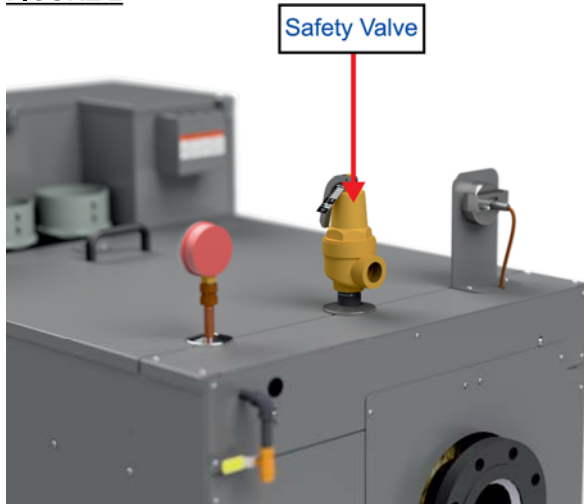
Refer to the Dimensional Drawings in this manual for location of Supply- and Return-Nozzle, drain valve, etc.

In order to ensure long term trouble-free boiler operation, we recommend that the water used as boiler feed water to be tested for hardness. If the water in your area is harder than 1grain (17mg/L), use a water softener. The main cause for premature heating element failure in electric steam boilers is water hardness. If severe corrosion during inspection of the pressure vessel as indicated in chapter 3.4 of this manual becomes evident, additional tests of your boiler feed water must be performed. A water analysis should be performed by a qualified and recognized water treatment company located in your area.

1.3 Safety Relief Valve

The safety valve is designed to discharge hot water when the set pressure is exceeded. Ensure that the discharge port is pointing toward the back of the unit away from the operator and any aisles. If it is required that discharge piping be installed from the safety valve, the pipe should not be smaller than the valve outlet and should be rigidly supported so as not to place weight on the valve itself. Important: No valve in this line!

FIGURE 2



1.4 Electrical

1.4.1 Power Supply Field Connections

Install a fused disconnect switch near the boiler. It should be fused as marked on the boiler name plate.

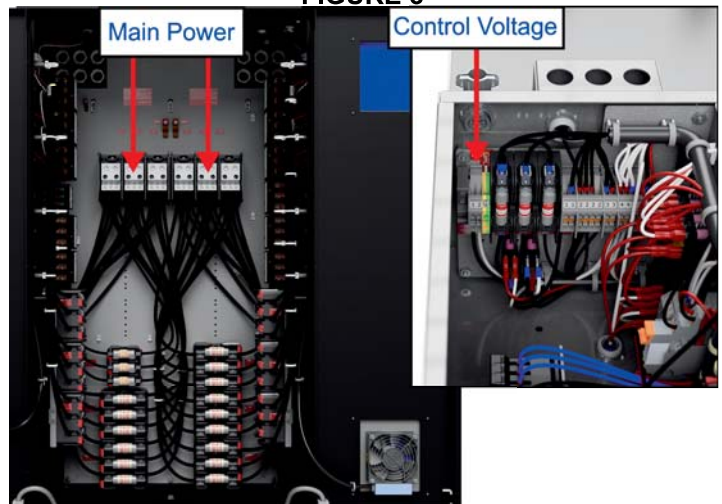
As an option, all boiler models can also be ordered with build-in molded case switches.

Connect the main power supply to the field terminals in the main electrical enclosure (FIGURE 2) and if the boiler is not equipped with an optional control voltage transformer, connect the control voltage to the field terminals in the boiler control module (FIGURE 3). A copy of the wiring diagram is located in the control panel. Important: Electrical connections to the boiler control panel (FIG. 2 and FIG. 3) should be made by a qualified Electrician. All wiring must comply with local electrical codes. All boiler models that are equipped with a transformer option (OPT1010 or OPT1011) do not require a separate external control voltage power supply.

The field terminals of the power supply conductors are marked with size and temperature rating on labels, located close to the field terminals.

NOTE: Most boiler models can be ordered in either one (1) or two (2) main power supply configurations. Please refer to the HVR120 – 700 Brochure for specific information related to power supply options.

FIGURE 3

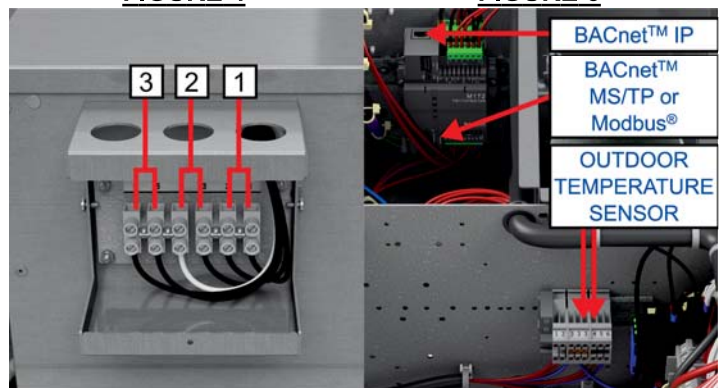


1.4.2 Other Field Connections

Optional equipment, external temperature sensors and communication cables can be connected to the boiler controller module as shown in FIGURES 4 and FIGURE 5 below.

FIGURE 4

FIGURE 5



- 1 Dry contact of external thermostat or control device, when closed enables the boiler to heat.
- 2 Dry relay contact from the boiler controller module for controlling external motor starter of circulator pump.
- 3 Dry contact of flow switch, installed in the heating loop piping.

2. Operation

2.1 Boiler Startup

a. With all power disconnected, check the control panel for loose wires caused by vibration in shipping. Review installation instructions to be sure boiler is properly wired and installed.

b. Be sure that the boiler drain valve is closed

c. Fill the system with water

d. Ensure that the selector switch is in OFF-position

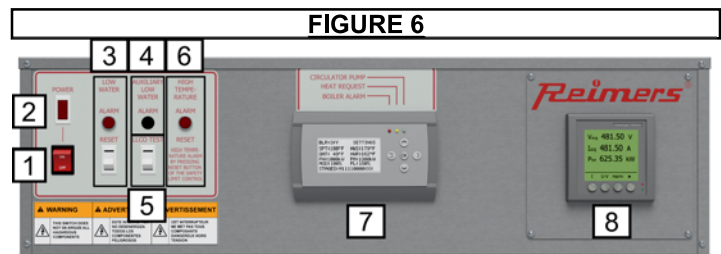
e. Turn on the control voltage power supply

f. Turn the three phase power supply ON

g. Flip the red POWER switch to the ON-position

h. Get familiarized with the boiler controller features and sequence of events:

- 1 - **POWER SWITCH:** As long as the switch is in the OFF-position, all control circuits are de-energized and the boiler can not be accessed remotely by the BAS. As soon as the switch is thrown to the ON-position, the boiler control circuits can be energized from the boiler controller user interface or remotely from the BAS.
- 2 - **CONTROL VOLTAGE INDICATOR LIGHT:** As soon as and as long as the boiler control circuits are energized through the boiler controller or remotely from the BAS, the POWER - indicator light is lit.
- 3 - **LOW WATER CUT-OFF DEVICE:** This device is installed in all boilers and provides low water cut-off function with lockout and manual reset after detection of a boiler low water condition. If the optional Auxiliary Low Water Cut-Off device is installed (see Item 4 below) this device acts as the secondary low water cut-off. As soon as a low water condition is detected, the ALARM indicator light turns on. After the cause of the low water condition is identified and normal water level restored,



- the alarm can be reset by pressing the RESET switch to resume normal boiler operation.
- 4 - **AUXILIARY LOW WATER CUT-OFF:** When the auxiliary low water cut-off device is installed, it acts as the primary low water cut-off and it resets automatically as soon as the water level in the boiler is restored to normal level after a low water condition.
 - 5 - **LLCO TEST:** The proper function of the secondary low water cut-off electronic controller (see Item 3 above) can be tested by pressing this switch for more than 3 seconds. After 3 seconds, the ALARM light should turn on and all heater circuits should de-energize.
 - 6 - The high temperature alarm can be reset with the button installed in the high limit control, located at the rear of the controller enclosure.
 - 7 - **BOILER CONTROLLER USER INTERFACE:** Change settings and monitor the temperature control-, power monitor-, power limiting-, modulating stage- and step controller features on the controller user interface.
 - 8 - **POWER TRANSDUCER:** Monitor and record total Amp-draw, 3-phase voltages, total heating power and energy of the heater circuits. The accurate measured parameters are sent to the BAS through the boiler controller. The measurements of the power transducer can also be used as an option to detect faults in heater branch circuits.

The Controller User Interface displays all relevant operating parameters in one single home screen. The controller's features are set and configured in a separate SETTING menu. All boiler functions can be controlled and monitored either from this user interface or remotely from the BAS.

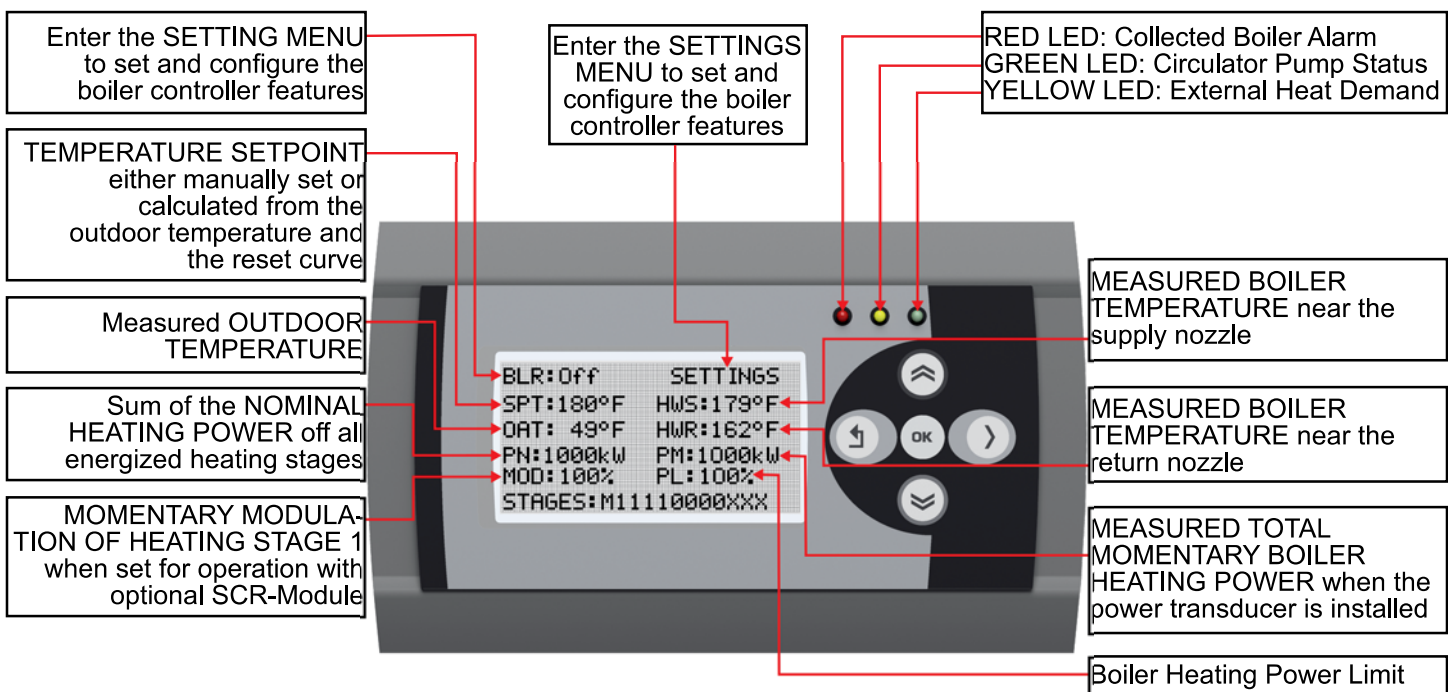


FIGURE 7

1. **Boiler Temperature Control:** As long as the outdoor reset feature is disabled, the temperature setpoint (SPT) displayed in the homescreen is a fixed value that can be set between 35°F - 240°F. The temperature control feature calculates the momentary required heating power in a PID-loop, using the readings from a PT1000 type temperature sensor installed near the supply nozzle and the setpoint (SPT). The PID - loop allows the setting of a proportional-(throttling range), integral - and derivative component. The required momentary heating load gets then distributed to a number of to be energized heating stages, depending on the number of enabled stages. As soon as the outdoor reset feature is enabled, the displayed setpoint (SPT) is the value calculated from the measured outdoor temperature (OAT) and the reset curve points. The measured temperature near the return nozzle (HWR) is for monitoring purposes only. It does not influence the temperature control feature.

2. **Heating Power Measurement Control and Monitoring:** As soon as the optional power transducer is installed, the Amp - draw of the heater circuits, the three phase supply voltages and total heating power can be measured. The momentary measured heating power (PM) is displayed in the homescreen. The step controller feature (see next item) allows the assignment of the nominal heating power to each individual stage. The sum of the heating powers of all momentary energized heating stages (PN) is also displayed in the homescreen. During normal boiler operation with the optional power transducer installed, the controller compares in regular time intervals the actual measured total momentary heating power (PM) to the expected momentary nominal heating power (PN). As soon as a power difference (PN-PM) becomes greater than a programmed parameter in the step controller SETTING menu, the controller will indicate an alarm with the RED-LED and the PM-value in the display flashing, indicating that an open circuit was detected in one of the heater branch circuits. With the optional unfused molded case switches installed, equipped with optional shunt trip units, the controller can disconnect the boiler heater power supplies by tripping the molded case switches in case that a power difference (PM-PN) becomes greater than a programmed parameter. This can occur when a contactor in the heater branch circuits remains with closed welded contacts. The boiler heating power can be limited to a percentage of its total installed heating power by setting the (PL) - value in the controller user interface SETTING - menu or remotely over the BAS. This feature helps the managing of the electrical demand of the facility in which the boiler is installed.

3. **Step Controller with Advanced Features:** The step controller can be set to operate with a maximum of twelve (12) heating stages. Heating stage 1 can be set in the SETTINGS-menu to either ON/OFF- or modulating-operation. Each heater stage can be individually enabled or disabled. When disabled, the respective heater stage is displayed in the user interface home screen with an "X". During normal boiler operating, the enabled heater stages 2 - 12 indicate either "0" when the stage is de-energized or "1" when energized. When heater stage 1 is enabled and set to ON/OFF-operation, it behaves identically to stages 2 - 12. When set to modulating, heater stage 1 displays an "M" and the momentary modulating value is displayed with the (MOD) - value. In order to operate the boiler with heater stage 1 in modulating mode, the optional SCR-module(s) must be installed.

4. **Scheduling Options:** When the boiler controller is not connected to a BAS, it still can perform automatic tasks using the SCHEDULING feature in the SETTING - menu. The following tasks can be scheduled: BOILER ON/OFF (BLR: On or Off), BOILER SETPOINT (SPT - value) and

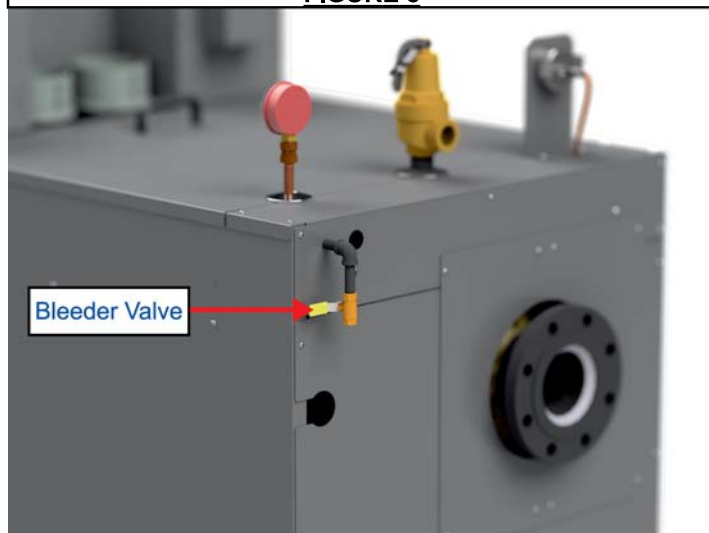
POWER LIMITING (PL - value).

2.2 Boiler Operation

To operate the boiler from the User Interface, or from remote (turn the boiler ON/OFF, change operating parameters, program scheduled boiler actions, enable/disable functional features, please refer to the separate HVR-Controller Programming Instruction Manual, attached to the documentation of each boiler.

As soon as the boiler control circuits are energized, and the POWER indicator light (Item 2, FIGURE 6) is lit, check whether any low water alarm indicator light on the boiler controller front panel is lit. If yes, then open slowly the air bleeder valve (FIGURE 8) and let the air escape from the top of the pressure vessel until water begins exiting the bleeder valve.

FIGURE 8



Close the bleeder valve and press the low water alarm RESET switch if the ALARM light of the secondary low water cut-off device (Item 3, FIG. 6) is lit. If the low water alarm light doesn't turn off after pressing its corresponding reset switch, follow the instructions in the Trouble Shooting- and Low Water Cut-Off Testing Procedure in the Maintenance sections of this manual.

As soon as the front panel of the boiler controller doesn't indicate any alarms and the dry contact of an external thermostat or control device, connected as shown in FIGURE 4 is closed, the boiler energizes heating stages as long as the boiler temperature is lower than the boiler setpoint (SPT).

Observe the boiler temperature (HWS) rising while the boiler heats. If the boiler temperature (HWS) is higher than the boiler temperature setpoint (SPT) after all heating stages are turned OFF, then the throttling range must be increased. If the boiler temperature in the pressure vessels swings too high over the programmed set point, the high temperature safety limit control(s) may trip.

2.3 Operation of the Safety Limit Controls

2.3.1 Low Water Cut-Off Function

The low water cutoff function of the boiler controller de-energizes the heating elements when the water level in the boiler pressure vessel falls below the minimum acceptable operating level. The controller senses the water level in the boiler pressure vessel through a conductivity type probe. When the tip of the probe is in contact with water in the boiler pressure vessel, the boiler operates normally. When the water level in the boiler falls below the tip of the probe the controller senses that water level is low. The control will not de-energize the heating elements when the probe loses

contact with the boiler water for short periods of time. However, when the probe loses contact with the probe for a set time, the controller deenergizes the heating elements and turns on the low water boiler alarm light. Boiler operation can only be resumed after restoring normal water level in the boiler and pressing the low water reset switch. After pressing the low water reset switch the low water alarm light turns off, the lockout is reset and the heating elements are energized.

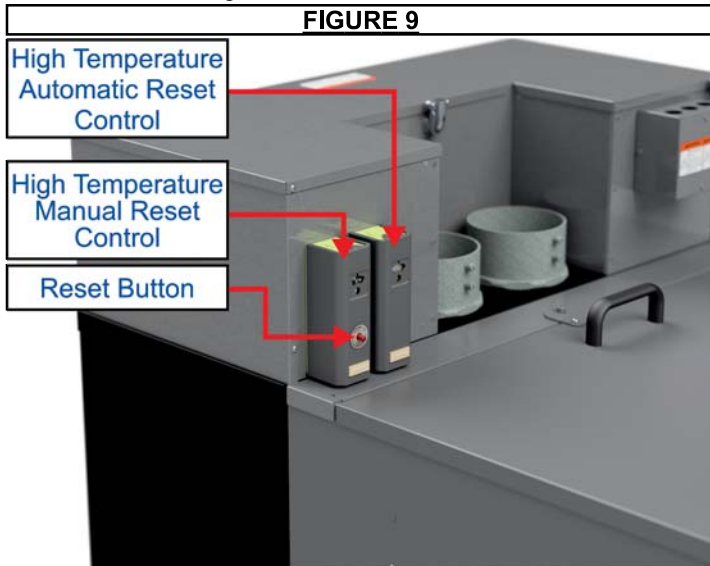


FIGURE 9

2.3.2 High Temperature Cutoff Function

As soon as the water temperature in the boiler reaches the high limit setting, the heaters and the HEATING - light will turn off. This may occur when the system is brought up from cold to fully heated condition. In this case, increase the throttling range as described above. However, if the high limit control actuates repeatedly it would indicate that the water temperature setting is too close to the hi limit setting. Check these settings and increase the difference between them. Each boiler is equipped with two high limit temperature safety limit controls: One automatic reset control, set to a lower cutoff temperature and manual reset temperature high limit control one manual reset control, set to a higher cutoff temperature. If the automatic reset control trips, the HEATING light on the front panel of the boiler controller turns off and all heating stages turn OFF immediately.

3. Boiler Maintenance

WARNING Do not add any chemicals to the boiler feed water unless specifically recommended by a qualified and recognized water treatment company.

3.1 Re-Tightening the Electrical Terminal Connections inside the Electrical Enclosure and Pressure Vessel Jacket

Frequency: During boiler installation, 90days after boiler installation and then annual.

Re-tighten the terminals of the contactors, fuse blocks and heating element terminals inside the electrical enclosure and pressure vessel jacket, following the maximum torque values listed below:

Component	Maximum Torque
50A-Contactor	25 in*lb
75A-Contactor	45 in*lb
93A-Contactor	
Fuse Block	45 in*lb
Copper Lugs to Element Terminals	12 in*lb

3.2 Testing the High Temperature Cut-Off Devices

Frequency: Once every six months

For this test, the boiler temperature should be near the boiler temperature setpoint and at least one heating stage energized.

3.2.1 Testing the Automatic Reset Temperature High Limit Safety Control

- Read the current boiler operating temperature set-point
- Read and memorize the current setting of the automatic reset temperature high limit safety control
- Turn the dial of the temperature control towards the boiler temperature set-point until all energized heating stages turn off together.
- Turn the dial of the temperature control to its initial position. The heating stages should energize staged in accordance with the programmed ON-delay time in the Honeywell step controller

3.2.2 Testing the Manual Reset Temperature High Limit Safety Control

Read the current boiler temperature boiler operating temperature set-point

- Read and memorize the current setting of the manual reset temperature high limit safety control
- Turn the dial of the temperature control towards the boiler temperature set-point until all energized heating stages turn off together. The HIGH TEMPERATURE alarm indicator light in the boiler controller panel should be ON.
- Turn the dial of the temperature control to its initial position. Press the red RESET button. The heating stages should energize staged in accordance with the programmed ON-delay time in the Honeywell step controller

3.3 Testing the Safety Relief Valve

CAUTION Before testing, make certain that the discharge pipe is properly connected to the valve outlet and arranged to contain and safely dispose of boiler discharge.

Frequency: Under normal operating conditions test valve every two (2) months. Under severe service conditions or if corrosion and/or deposits are noticed within the valve body, testing must be performed more often. A test must also be performed at the end of any non-service period.

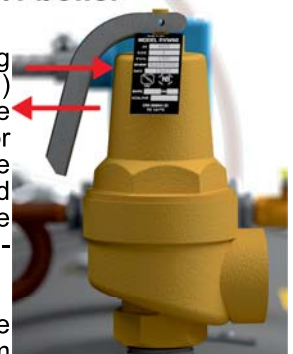


FIGURE 10

Test the safety relief valve (preferably near its maximum pressure setting by holding the test lever fully open for at least 5 seconds to flush the valve seat free of sediment and debris. Then release and permit the valve to snap shut.

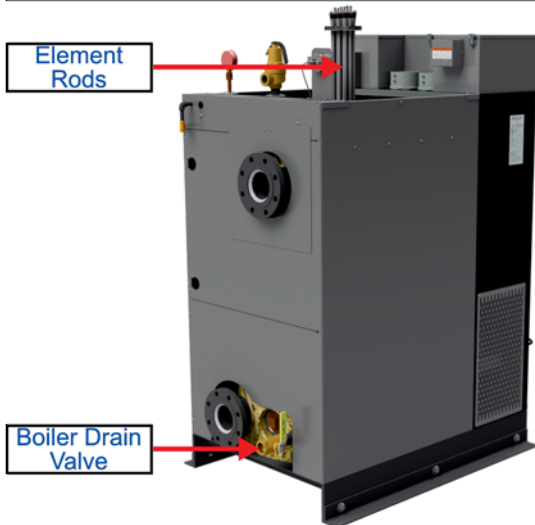
3.4 Element Inspection, Replacement, and Element Cleaning

WARNING Maintenance work must be performed by experienced personnel only. Ensure boiler is cold and drained and has no pressure or electricity.

- Close the supply- and return-stop/isolation valves installed nearest to the boiler
- Turn off and lock out all boiler power supplies
- Ensure that the boiler drain valve (FIGURE 11) is piped to a safe point of discharge
- Open the boiler drain valve carefully and drain the pressure vessel. As soon as there is no pressure present in the vessel, open the bleeder valve (FIGURE 8) slightly to break the vacuum.

- Remove the top cover of the pressure vessel jacket to access the heating elements.
- Label the wires that are connected to the heating element(s) to be inspected and disconnect them from the element terminals.

FIGURE 11



- slightly to break the vacuum.
- Flip the red POWER switch to the ON-position.
- Observe the low water alarm light in the boiler controller front panel. If it turns on, the low water cutoff device works properly.
- Close the Drain Valve and open the supply- and return-stop/isolation valves installed nearest to the boiler.
- Follow the instructions in chapter 2.2 to resume boiler operation.

- Remove the six (6) nuts from each heating element flange and pull the elements slowly out of the pressure vessel.
- Inspect and if necessary remove with a stiff wire brush rust, calcium or other deposits from the element rods.
- Insert a flash light through one heating element opening and inspect through the second opening the inner walls of the pressure vessel. It is normal that the inner walls of the vessel be covered by a layer of red, brown or black layer of rust. However, rough pressure vessel surface and layers of rust peeling off the surface are an indication for severe corrosion. In such case, contact a water treatment company.
- Install the heating elements back into the boiler pressure vessel, following the above procedure in reverse order.
- After installing the top cover of the pressure vessel jacket, turn on all power supplies of the boiler.
- Flip the red POWER switch on the controller front panel to the ON-position, close the Boiler Drain Valve, open the supply- and return-stop/isolation valves and follow the instructions in chapter 2.2 to resume boiler operation.

3.5 Testing the Low Water Cut-Off Device

3.5.1 Testing the Electronic Low Water Cut-Off Device Only Frequency: Any time.

- Press and hold the LLCO TEST switch on the boiler controller front panel (Item 5, FIGURE 6)
- After 3 seconds, the low water ALARM light of the secondary low water cut-off device (Item 3, FIGURE 6) should turn on and all heater stages should de-energize.
- Press the low water RESET switch to de-activate the low water alarm.

3.5.2 Testing the Entire Low Water Cut-Off System (Electronic Low water Cut-Off Device + Low Water probe) Frequency: 90 days after installation, then once every year

- Flip the red POWER switch on the boiler controller panel to the OFF-position.
- Close the supply- and return-stop/isolation valves installed nearest to the boiler
- Turn off and lock out all boiler power supplies.
- Ensure that the boiler Boiler Drain Valve (FIGURE 11) is piped to a safe point of discharge.
- Open the boiler drain valve carefully and begin draining the pressure vessel. As soon as there is no pressure present in the vessel, open the bleeder valve (FIGURE 8)

4. Troubleshooting

⚠ WARNING Ensure that the boiler is cold and has no pressure. Electrical trouble shooting must be performed by a qualified electrician.

Boiler Status	Quick Fix
Control voltage to boiler turned on, POWER switch on boiler controller (5) turned ON, but no lights on the front panel of the boiler controller ON:	<ul style="list-style-type: none"> - Check circuit breaker or fuse of the wall outlet where the boiler control voltage circuit is hooked up to. If the circuit breaker is tripped or the fuse blown, check whether other appliances are plugged into outlets that are fed by the same circuit breaker/fuse. If that is the case, then plug those other appliances into outlets that are protected by other circuit breakers or fuses.
"Low Water" alarm light on boiler controller panel (5) ON:	<ul style="list-style-type: none"> - Press the "Low Water" reset button. If the "LOW WATER" alarm light remains on, check the water supply of the system. - Check whether the heating loop is filled with regular tap water and not with purified water (de-ionized, distilled, etc)
"HIGH TEMPERATURE" alarm light on boiler controller panel (5) ON:	<ul style="list-style-type: none"> - Press the "High TEMPERATURE" reset switch - If the temperature gauge indicates water temperature above the preset value, reduce water temperature setting and press the "HIGH TEMPERATURE" reset switch again.

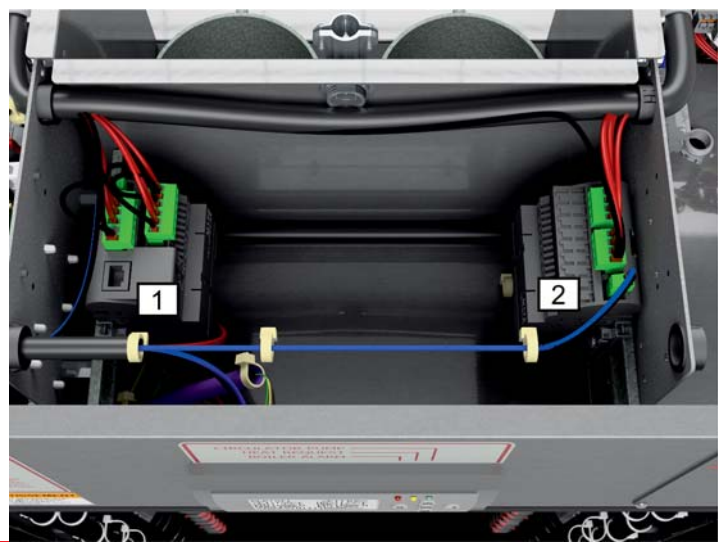
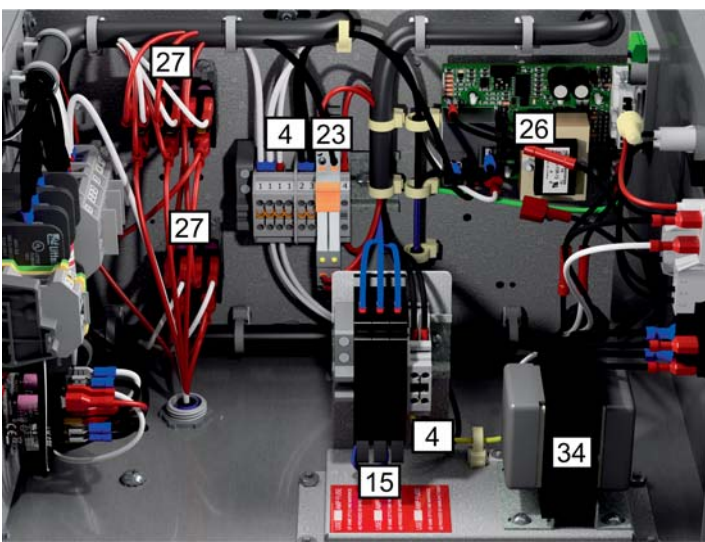
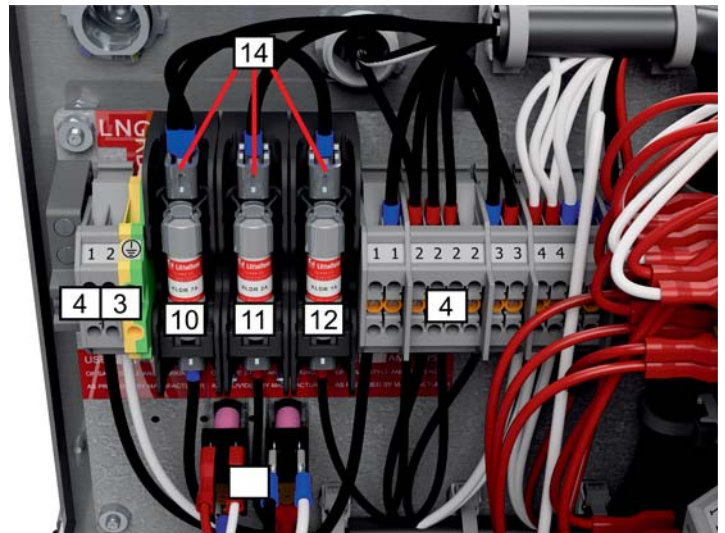
If trouble shooting did not resolve problem, please contact our service technicians at:

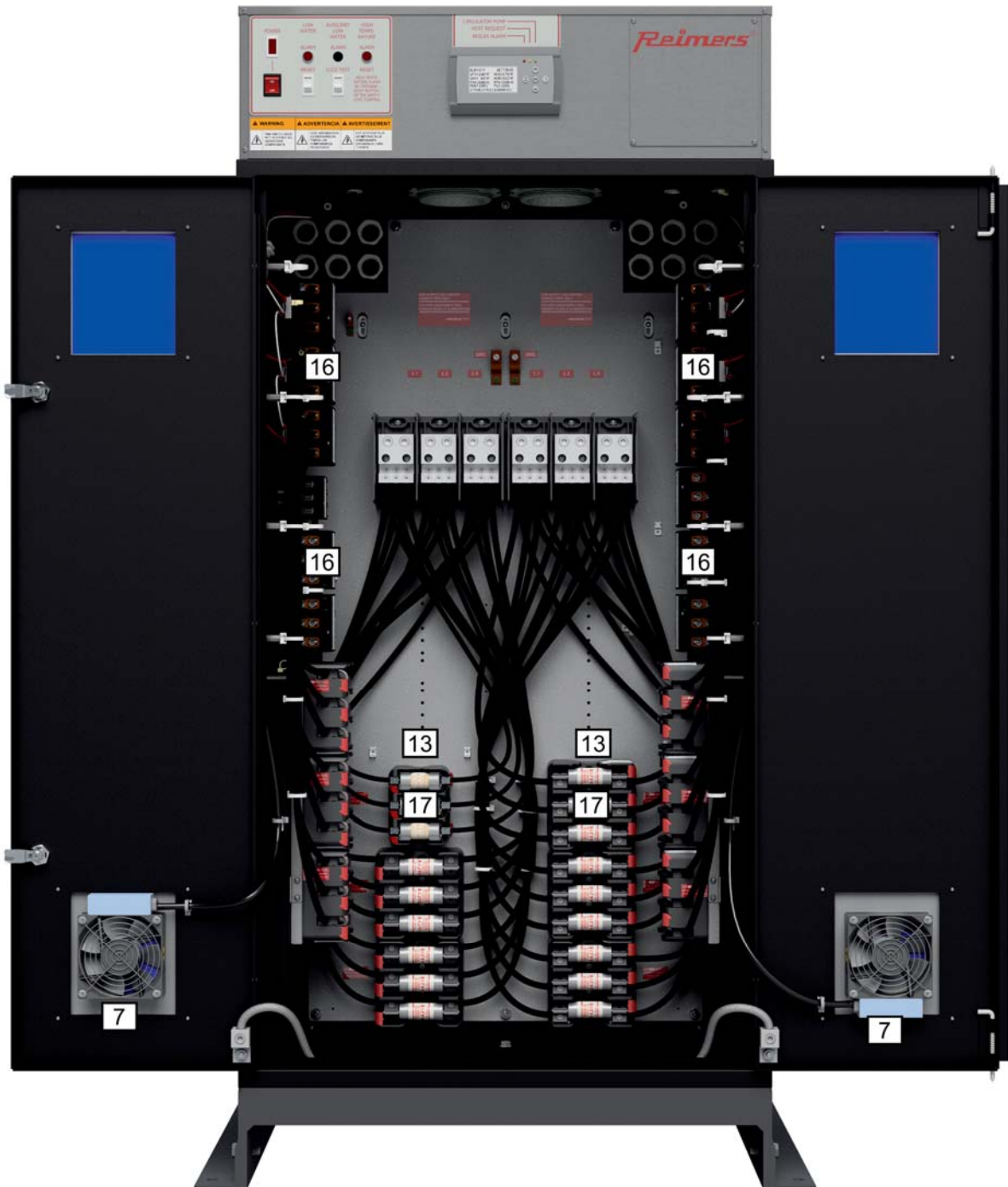
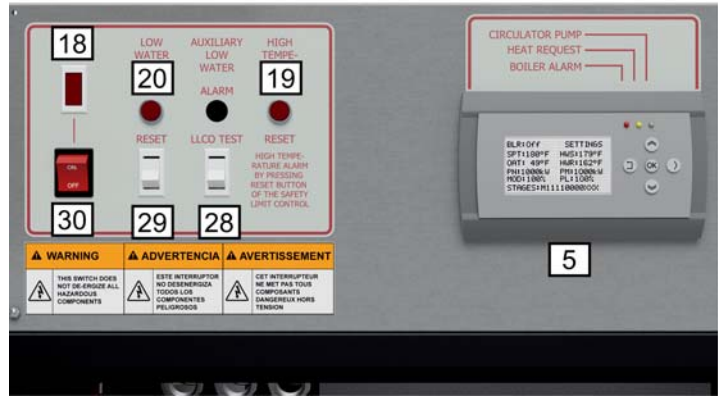
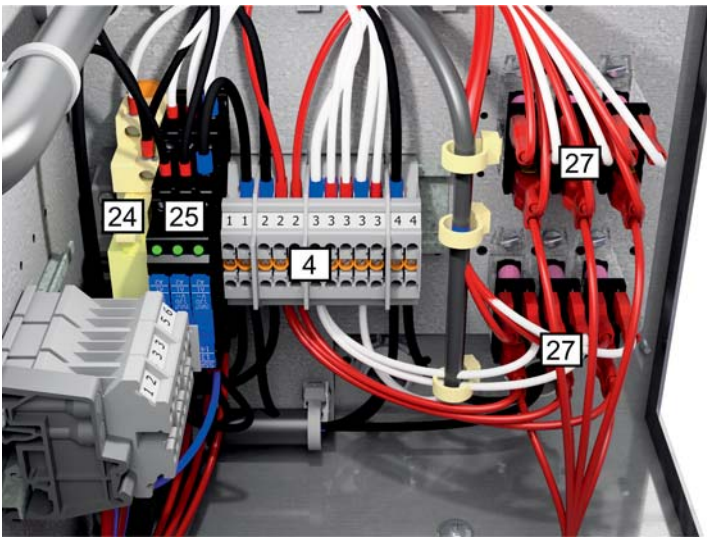
Phone: 540-662-3811

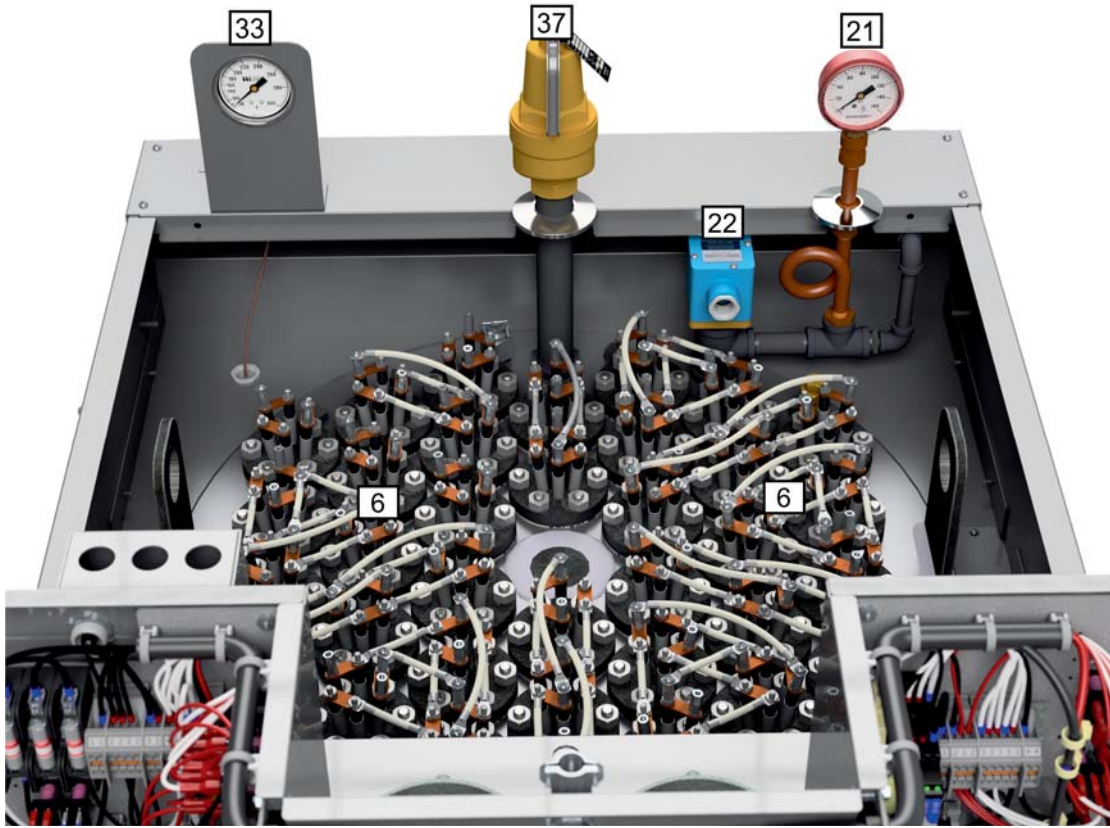
Email: techsupport@reimersinc.com

5. Parts list for HLR 210-510

⚠ WARNING Use Reimers replacement parts. All components are designed and approved to be used in this Underwriters Laboratories listed and ASME National Board Stamped boiler. Failure to do so may cause serious injury or death.







NOTE: When ordering parts, please give boiler Model and Serial Number and detail shipping instructions.

ITEM NO.	PART NO.	DESCRIPTION	BOILER MODEL
1	05944	BACNET CONTROLLER 1-6 STEPS	ALL MODELS
2	05946	BACNET EXPANSION MODULE 7-12 STEPS	NOTE 2
3	05219	DIN RAIL GROUND TERMINAL BLOCK	ALL MODELS
4	05214	DIN RAIL TERMINAL BLOCK GRAY	ALL MODELS
5	05945	DISPLAY UNIT FOR SCHNEIDER CONTROLS	ALL MODELS
6		ELEMENT 10KW 208V	NOTE 1
		ELEMENT 10KW 240V	NOTE 1
		ELEMENT 10KW 380V	NOTE 1
		ELEMENT 10KW 415V	NOTE 1
		ELEMENT 10KW 480V	NOTE 1
		ELEMENT 10KW 600V	NOTE 1
		ELEMENT 15KW 208V	NOTE 1
		ELEMENT 15KW 240V	NOTE 1
		ELEMENT 15KW 380V	NOTE 1
		ELEMENT 15KW 415V	NOTE 1
		ELEMENT 15KW 480V	NOTE 1
		ELEMENT 15KW 600V	NOTE 1
	05994	ELEMENT 20KW 208V	NOTE 1
	05995	ELEMENT 20KW 240V	NOTE 1
	05996	ELEMENT 20KW 380V	NOTE 1
		ELEMENT 20KW 415V	NOTE 1
	05997	ELEMENT 20KW 480V	NOTE 1
	05998	ELEMENT 20KW 600V	NOTE 1
		ELEMENT 22.5KW 208V	NOTE 1
		ELEMENT 22.5KW 240V	NOTE 1
		ELEMENT 22.5KW 380V	NOTE 1
		ELEMENT 22.5KW 415V	NOTE 1
		ELEMENT 22.5KW 480V	NOTE 1
		ELEMENT 25KW 415V	NOTE 1
		ELEMENT 25KW 480V	NOTE 1
		ELEMENT 25KW 600V	NOTE 1
	05992	ELEMENT FLANGE GASKET	ALL MODELS
	05245	ELEMENT NUT	ALL MODELS
	06018	ELEMENT STUD	ALL MODELS
7	05038	FILTER FAN KIT	ALL MODELS
8		FUSE 250V 200mA GLASS 218 SERIES	ALL MODELS
9	05920	FUSE 250V 2A GLASS 218 SERIES	ALL MODELS
10	04974	FUSE 600V 1A CLASS CC TRANSFORMER TIME DELAY UL/CSA	ALL MODELS
11	05107	FUSE 600V 2A CLASS CC TRANSFORMER TIME DELAY UL/CSA	ALL MODELS
12	05376	FUSE 600V 7A CLASS CC TRANSFORMER TIME DELAY UL/CSA	ALL MODELS
13	03770	FUSE BLOCK 600V 100A 3P CLASS J UL/CSA	NOTE 2
	04648	FUSE BLOCK 600V 60A 3P CLASS J UL/CSA	NOTE 2
14	05122	FUSE BLOCK CC FUSES	ALL MODELS
15	05919	FUSE HOLDER 250V 218 SERIES DIN-RAIL UL/CSA	ALL MODELS
16	02530	HEATING ELEMENT CONTACTOR 50A 120V 3PH	NOTE 2
	02539	HEATING ELEMENT CONTACTOR 75A 120V 3PH	NOTE 2
	02597	HEATING ELEMENT CONTACTOR 93A 120V 3PH	NOTE 2
17	05776	HEATING ELEMENT FUSE 600V 20A CLASS J UL/CSA	NOTE 2
	05781	HEATING ELEMENT FUSE 600V 25A CLASS J UL/CSA	NOTE 2
	03775	HEATING ELEMENT FUSE 600V 30A CLASS J UL/CSA	NOTE 2
	05713	HEATING ELEMENT FUSE 600V 35A CLASS J UL/CSA	NOTE 2
		HEATING ELEMENT FUSE 600V 45A CLASS J UL/CSA	NOTE 2
	03350	HEATING ELEMENT FUSE 600V 50A CLASS J UL/CSA	NOTE 2
		HEATING ELEMENT FUSE 600V 55A CLASS J UL/CSA	NOTE 2
	03352	HEATING ELEMENT FUSE 600V 60A CLASS J UL/CSA	NOTE 2
	05165	HEATING ELEMENT FUSE 600V 70A CLASS J UL/CSA	NOTE 2
		HEATING ELEMENT FUSE 600V 75A CLASS J UL/CSA	NOTE 2
	03349	HEATING ELEMENT FUSE 600V 80A CLASS J UL/CSA	NOTE 2
	05962	HEATING ELEMENT FUSE 600V 90A CLASS J UL/CSA	NOTE 2
18	04215	LIGHT 125V RED NEON WHITE SQUARE FRAME SNAP-IN	ALL MODELS
19	04395	LIGHT 2V RED LED STAINLESS STEEL CIRCULAR FRAME PANEL MOUNT	ALL MODELS

NOTE: When ordering parts, please give boiler Model and Serial Number and detail shipping instructions.

20	20720	LIGHT ALARM SUBASSEMBLY	ALL MODELS
21	02328	PRESSURE GAUGE 0-100#	NOTE 2
	02329	PRESSURE GAUGE 0-160#	NOTE 2
	02451	PRESSURE GAUGE 0-30#	NOTE 2
	02048	PRESSURE GAUGE 0-300#	NOTE 2
22	02635	PROBE HOUSING	ALL MODELS
23	05967	RELAY DIN RAIL 24VDC 6A SPST-NO UL/CSA	ALL MODELS
24	05212	RELAY DIN RAIL SOCKET 250V 10A 5 PIN SPDT UL/CSA	ALL MODELS
25	05671	RELAY DIN RAIL SOLID STATE 120V 3.5A SPST-NO UL/CSA	ALL MODELS
26	04316-R	RELAY SOLID STATE 120V 30A PROGRAMMED	ALL MODELS
27	04603	RELAY SPDT 120V 10A PANEL MOUNT UL/CSA	ALL MODELS
28		SWITCH LLCO TEST	ALL MODELS
29	20592	SWITCH RESET & WIRE TO RELAY J	ALL MODELS
30	05969	SWITCH ROCKER 20A 125V ON/OFF	ALL MODELS
31	02378	TEMPERATURE CONTROL AUTO RECYCLE 100 – 240°F	ALL MODELS
32	02599	TEMPERATURE CONTROL W/MANUAL RESET	ALL MODELS
33	02567	TEMPERATURE GAUGE	ALL MODELS
34	02376	TRANSFORMER 45VA 120V/24V UL/CSA	ALL MODELS
35	03201	VALVE BALL .25" MINI	ALL MODELS
36	03209	VALVE BALL 1.25"	ALL MODELS
37	02657	VALVE SAFETY 0.75", 100psi HOT WATER	NOTE 2
	02384	VALVE SAFETY 0.75", 30psi HOT WATER	NOTE 2
	05255	VALVE SAFETY 0.75", 50psi HOT WATER	NOTE 2
	02706	VALVE SAFETY 0.75", 60psi HOT WATER	NOTE 2
	02641	VALVE SAFETY 0.75", 75psi HOT WATER	NOTE 2
	02707	VALVE SAFETY 1.0", 100psi HOT WATER	NOTE 2
	04957	VALVE SAFETY 1.0", 125psi HOT WATER	NOTE 2
	03358	VALVE SAFETY 1.0", 150psi HOT WATER	NOTE 2
	03358	VALVE SAFETY 1.0", 150psi HOT WATER	NOTE 2
	02574	VALVE SAFETY 1.0", 30psi HOT WATER	NOTE 2
	05195	VALVE SAFETY 1.0", 50psi HOT WATER	NOTE 2
	02560	VALVE SAFETY 1.0", 60psi HOT WATER	NOTE 2
	05203	VALVE SAFETY 1.0", 75psi HOT WATER	NOTE 2
	05943	VALVE SAFETY 1.0", 80psi HOT WATER	NOTE 2
	05405	VALVE SAFETY 1.25", 100psi HOT WATER	NOTE 2
	05148	VALVE SAFETY 1.25", 15psi HOT WATER	NOTE 2