

Sellers[®] Quick Heat

INSTALLATION & OPERATING INSTRUCTIONS

The innovative *Sellers[®]* Quick Heats are durable, reliable, proven.

- Compact size, <4ft²
- Auto Safety Solenoid Valve
- 10 Year Heat Exchanger Warranty



Note: Place a copy of these instructions adjacent to the boiler/heater; notify the owner to keep for future reference.

If Shipping Damage is noted, receiver must make damage claim to recover damage.

WARNING: If these instructions are not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

FOR YOUR SAFETY: Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliance. To do so may result in an explosion or fire.

Installation must be performed by a Qualified Installer and the startup must be performed by a qualified Service Technician

Sellers[®]
MANUFACTURING CO.

18 West Walnut St. Danville, Kentucky 40422
Visit Us on The Web: www.sellersmfg.com
For Customer Service: info@sellersmfg.com or call 859-236-3181

Industrial boiler equipment design and manufacturing excellence for over 80 years.
Proudly made in Danville, Kentucky, USA.

SAFETY

Safety messages and instructions located in this manual and on the heater/boiler provide warnings to you and others of potential hazards. Before installing, operating or servicing this heater/boiler, it is important to read and understand these safety instructions and messages.



DANGER indicates the presence of immediate hazards which, if not avoided, could result in severe personal injury, death, or substantial property damage.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in severe personal injury, death or substantial property damage.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Qualified Installer: Must have the ability of a licensed tradesman in the fields of gas supply, plumbing and venting, including a thorough understanding of the National Fuel Gas Code as it relates to gas fired water heaters and boilers. The installer must thoroughly review and understand this manual.

Service Technician: An individual trained and experienced in boiler startup and trained in Sellers boiler startups. Individual must also have training and experience in the controls used, steam and feedwater systems and related utilities



Ensure proper grounding of all electrical components to avoid electrical shock.



Surface may be hot due to radiation from steam inside.

Sellers Quick Heat Pre-Start Check List & Start-Up Data Report

S.O. Number: _____ Model Number: _____
Job Name: _____ Location: _____
Purchaser: _____ Representative: _____

Pre-Start Check List

Service room around water heater: _____ Steam supply connection: _____
Housekeeping pad or piers: _____ Steam supply trap: _____
Tube bundle pull clearance: _____ Condensate return connection: _____
Hot water connection (dielectric): _____ Electrical connection: _____
Hot water connection (dielectric): _____ Wiring alterations?: _____
Bottom drain connection (dielectric): _____ Supply voltage: _____
Expansion tank connection (dielectric): _____ Control circuit voltage: _____
High temperature relief piping: _____ Blower rotation correct: _____
Safety relief valve piping: _____ Water heater flushed: _____

Start-Up Data

Air Supply Pressure: _____ Outlet Water Temperature: _____
Inlet Water pressure: _____ Circulation Pump Amps: _____
Inlet Water Temperature: _____

Control Check

	<u>Set Point</u>	<u>Check</u>
Air Filter Regulator:	_____	_____
Accritem Controller:	_____	_____
High Limit Controller:	_____	_____

Performed By: _____
Company: _____

Date: _____
Phone Number: _____

Notes:

MUSE BE RETURNED TO INFO@SELLERSMFG.COM FOR WARRANTY VALIDATION

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1. Installation

1.1. General Information

The Quick Heat model number gives information that may be useful.

Example: QHV 25 B3-140

QH - Quick Heat

V - Vertical

25 - Steam

B - Exchanger Diameter

3 - Exchanger Length (FT.)

140 - Operating

Temperature

Exchanger Diameter

A - 6"

B - 8"

C - 10"

D - 12"

1.2. Receiving the Equipment

As soon as the equipment arrives on the truck, be sure to inspect it thoroughly. If there is any damage or missing parts, have the truck driver note on the Bill of Lading the fact that the damage occurred or that parts are missing. A claim should be filed with the truck line to cover any discrepancies. **DO THIS IMMEDIATELY.**

As soon as the equipment is unloaded, move it to a safe place. It should not be left to the ravages of the weather and to the dangers of pilferage.



If the unit cannot be installed when received, it should be stored in a dry, clean place out of the weather.

1.3. Locate the Unit in the Desired Position

Locate the heater to comply with building codes and insurance regulations. Provide at least 24 inches clearance all around the unit. For horizontal units, allow room for removal of the heat exchanger tube bundle.

Be sure to provide room to clean strainers to service the pump and to provide access to valves and controls. Horizontal units are shipped with four support legs not installed. Once the unit is located in the desired position, insert the four legs and anchor securely to the floor.

For horizontal steam units, make sure the heat exchanger is level on the steam units so that condensate will not collect in that portion of the heater opposite of the trap or orifice union. Place a level on the exposed cylindrical shell of the heat exchanger to ensure that it is level. Making the legs level may not necessarily

make the exchanger level.

1.4. Making Plumbing Connections

Make inlet and outlet service water connections. Do not install a check valve in the cold water inlet. Many plumbing codes prohibit the installation of such a check valve. If local codes require a check valve, drill a ¼ inch hole in the flapper of the valve to prevent leakage through the relief valve.

Unions and isolation valves should be installed in the code and hot water service piping close to the unit. This will allow for easy removal of the water distribution chamber to inspect the heat exchanger when necessary.

The relief valve should be piped to the sewer. Be sure the piping is not obstructed in any way or the pipe size reduced from the outlet size of the relief valve. Valves must not be installed in this line.

The outlet end of the drain line pipe should not be threaded. If the outlets of two relief valves are connected, the cross-sectional area of the connection should not be less than the total area of the outlet of the valves.

Install the house recirculated hot water connection line into the cold-water supply line upstream of the unit. Pumps and isolating valves and a check valve should be included in this line. The pump should be installed with an On-Off switch and allowed to run continuously.

After all water lines are connected, fill the heater with water. Check for and correct all leaks.

1.5. Make System Pipe Connections

Connect main steam line to inlet steam strainer on the unit. This line should provide a dry, saturated steam to the steam flow control valve at the steam pressure shown on the name plate. The steam lines can be sized with the information provided in this manual. A union should be installed before screwed steam valves. A steam line isolation valve should be installed upstream of the steam valves, strainer and union to allow maintenance on the steam valve. The “y” on the strainer should be piped to a drain through a globe valve to allow condensate blow off on start up.

Condensate Lines – Provide full sized condensate lines to a condensate return system located below the heat exchanger level.

Insulate all steam and condensate lines.



If desired, the trap condensate outlet pipe may be piped back up within two inches of the bottom of the heat exchanger outlet connections and then run to the return system from there. The trap does not have to be raised. If it is desired to raise the condensate about the exchanger outlet, a special trap or return system must be used. Consult the factory for more information.

1.6. Provide Air Supply

If a pneumatically operated valve has been furnished on the unit, instrument air is required. Provide an instrument source of air and an air pressure regulator. The air inlet pressure should be at least 25 psi and not over 60 psi. The air should be filtered, de-oiled and de-watered. Regulated outlet air pressure to the temperature controller should be 20 to 25 psig.

1.7. Make Electrical Connections to the Unit

Provide 115 Volts, Single Phase, 60 Hertz power to the circulating pump motor. (If special motor power characteristics were ordered, the motor will be so marked to indicate the power supply required.) An on-off switch should be located near the unit. The circulation pumps have built in thermal overload protection. Wiring should be a minimum of 14 gauge to 1 HP at 120 Volts. Use 12 gauge to 1-1/2 HP at 120 Volts. Wire should be provided with a continuous ground bond. Connections to the electric motor should be through a flexible lead not over 18 inches long. The power supply should come through a suitably fused switch. Be sure all wiring complies with local and national electrical codes.

1.8. Check Installation

1. Be sure steam supply pressure does not exceed tank design pressure (normally 150 psi) or the steam pressure rating shown on the name plate.
2. Be sure a pressure relief valve is installed and properly piped to a drain.
3. Be sure the building water recirculation line is properly connected to the code water supply line and not to the drain line at the bottom of the unit. This house recirculation line is intended only to recirculate hot water to the fixtures in the building. It has nothing to do with the circulation pump installed on the unit.
4. Be sure proper air supply is piped to an air filter regulator, then to the pneumatic temperature controller on the unit. (This is not required for self-operated valves.)
5. Check to be sure that isolating valves are located around all pumps, that there are stop valves to isolate the mains steam line and there are gate or ball valves in all water connections to the unit. Gate valves should be used when there is no pressure drop across the valve as it is operated, such as the isolating valves around a circulating pump. Globe or ball valves should be used if there is a pressure drop across the valve. Globe valves are preferred for steam stop valves.
6. Be sure a shutoff valve and union are in the steam or boiler water supply line.
7. Be sure all pipes are properly supported. Do not depend on heater for support.
8. Be sure steam heat exchangers are level.

2. Start-Up

2.1. General

The operator should be familiar with the location and purpose of all controls on this unit for operation. A representative of the owner or operator of the equipment should be present to receive instructions in care of the unit at the time of startup. Notify necessary utility companies of scheduled startup.

1. Hard water in excess of 13 grains should be softened to approximately two to five grains. Very hard water

will foul the heating surface quickly and reduce heat transfer. The use of hard water will increase the need for required maintenance.

2. Lubricate the Flow Control Valve.
3. Lubricate the steam or boiler water flow control valve when required on Powers Regulator Company valves. The Valve stem must be lubricated by unscrewing the valve packing nut, screwing it back finger tight and then back off one turn. Turn the lubricator screw until the grease packing nut cannot be moved with the fingers. The lubricator is furnished on water system and on steam system under 50 psi.
4. Fill Unit
Open cold-water supply valve. Fill unit. Bleed air out of unit through relief valve. Be sure cold-water supply pressure does not exceed 75 percent of unit design pressure or valve pressure setting. If it does, the valve may not shut or leak in operation.
5. Fill System
Open hot water supply valve to allow water into system.
6. Start Pump
Start heat exchanger circulating pump by turning the On-Off switch to "ON" position. **(Do not operate pump without water in it.)**
7. Open Steam or Boiler Water Valve
Valve should be opened slowly to allow exchanger to come up to temperature slowly. Steam valves should be left wide open to protect the seat.
8. Calibrate the Pneumatic Temperature Control
See the enclosed technical data sheet for specific detail on controller operation. Instructions on calibrating the controller to operating temperature is also included. Unit should be under full load when making adjustments. Make sure the sensitivity adjustment (located on the bottom of the temperature controller) is not closed. For air operation, the screw should be opened approximately 1/8 of a turn from the closed position. Failure to correctly set the sensitivity adjustment will result in erratic temperature control.
9. Steam or Boiler Water Flow Control Valve
 - 9.1. Power Model 593-XXX pneumatic operated valves require calibration of the Accritem. See Accritem instruction at rear of this manual. Valves may also require pre-tensioning adjustment to assure proper operation and leakage control. Although the valve is pre-adjusted by Sellers, a change in steam pressure may require a readjustment to prevent leakage. See the Power instructions for more details.
 - 9.2. Power Model II self-operated valves require a temperature setting adjustment. See valve instructions at rear of this manual.
 - 9.3. Spence E valve requirement. Complete dismantling at regular intervals for inspection and repair is not recommended. Under normal conditions, if kept relatively free of dirt, a regulator will function year after year with a minimum of maintenance attention. These service points are suggested:
 - 9.3.1. After the first few days and thereafter twice a year, inspect for dirt collected at:
 - 9.3.1.1. Bleed point Orifice – screwed into downstream side of main valve.
 - 9.3.1.2. Restriction Orifice – screwed into underside of main valve types E and E2. Type E2 main valve has an open elbow with orifice.

- 9.3.1.3. Inlet Screen in Pilot - remove square bottom cap to drop out for cleaning.
- 9.4. After the first few days of operation and thereafter twice a year, inspect all flanges and screwed joints for leakage. Tighten all bolts. Never allow a leak to persist.
- 9.5. Self-operating valves require special care. They will fail open if the capillary tube is broken. Do not under any circumstances loosen bolts on temperature diaphragm chamber or attempt to dismantle the thermostat element. The system is filled with volatile fluid which, if lost will render the pilot inoperative. A damaged element, however can easily be changed in the field by following the directions.



All of the above adjustments should be rechecked after the heater is up to temperature.

10. Adjust the Flow Sensor

A small pipe or tube connects outlet of the circulating pump with the shroud around the temperature sensing bulb. This line directs a small amount of water from the cold-water inlet forward to flow over the temperature sensing bulb. This assists in providing the close temperature control for which your unit is noted. Properly adjusted, it will also smooth out the demand load on your boiler. A small needle valve is included in the line.

To properly adjust the temperature, the unit must be under full load demand. Start with the needle valve wide open. This provides maximum sensitivity to incoming cold water and the quickest response to it. Wide open, it may also overload the boiler for short periods of the high capacity of the heat exchanger. Overloading of the boiler will cause its steam pressure to drop and may cause it to prime or pump out water. If any of these happen, turn the handle of the needle valve one to two turns closed (clockwise). Continue this adjustment until the load on the boiler evens out. Basically, in the closed position, the temperature sensing bulb senses the warmest water at the discharge of the unit. This increases the reaction time of the flow control valve possibly resulting in uneven temperature control. With the needle valve in full open position, cold water entering the unit is quickly sensed and the flow control valve operates immediately. The needle valve adjustment balances the load demand to the required heat input.

3. Start-Up

3.1. General

1. **Is the correct steam pressure available?** If the supply steam pressure is in excess of the design pressure stamped on the name plate, the Quick Heat steam valve may leak. If a Powers steam valve was provided and if you question the steam pressure available, consult the table below for the maximum valve shutoff capability. The model number of the steam valve provided can be found on the packing list. The letters in the table below, represent the valve seat type and make up part of the valve model number. If the steam pressure needs to be checked, be sure the on-off switch is in off position and the shut-off valve in the steam line is closed. A temporary pressure gauge can be installed in the steam line downstream of the shut-off valve, or in the blowdown connection of the strainer.
2. **If a pneumatic steam valve and temperature controller is provided, check the air pressure available.** The POWERS Accritem temperature controller requires a twenty PSI supply clean, dry

instrument air for proper operation. An air filter regulator should be installed to ensure the proper air pressure is delivered to the temperature controller. Fifteen PSI supply air pressure is the absolute minimum – twenty-five PSI is the maximum supply air pressure for proper operation. The maximum air consumption of the Powers (Accritem) pneumatic temperature controller is 800 scim or .46 scfm.

3. **A pressure relief valve sized for the full system capacity and set above the steam delivery pressure should be installed to further protect the system.** If a pressure reducing station fails or the boiler operation pressure is accidentally increased, unit operation problems may result. If a POWERS steam valve is provided, consult the maximum shut-off rating of the valve type and size provided (see chart on page one) before selecting the relief valve set pressure. The system relief valve set pressure should be selected at a pressure above the delivery steam Pressure and below the steam valve maximum shut-off rating.
4. **Notice how the condensate line is piped from the steam trap provided on the water heater.** The condensate line should run along the floor, returning the condensate by gravity to a feed system located below the trap outlet. Improper condensate line sizing can contribute to operation problems. If you experience operation problems, check to see if the condensate has a long distance to travel to get to the return system. Note the line size and question if it is correctly sized.
5. **Is the condensate being lifted instead of being returned below the unit by gravity?** Lifting the condensate is not recommended and will violate the factory warranty. If lifting the condensate is unavoidable, under certain conditions, a moderate four to five lift may be possible. A check valve must be installed on the trap outlet at the lowest point. Steam pressure must be present in water heater in order to lift condensate. The QUICK HEAT water heater is provided with a “modulating” steam valve designed to replace heat as it is lost while under load. If on load exist, no steam pressure is available at the trap inlet. If the lift is greater than the steam pressure required to handle a partial load, required operation temperature may be difficult to obtain. Knocking sounds may also be present. This sound is known as condensate steam hammer. This is a result of the condensate accumulating in the shell of the units and coming in contact with steam. If not corrected, this condition could destroy the tube bundle.
6. **Is the supply steam wet?** Wet Steam will contribute to the hammer problem and damage the seat of the steam valve. To make sure dry steam is available to the unit, install an auxiliary steam trap in front of the steam valve.
7. **Is water being circulated through the unit from the system?** If so, pipe this line into the cold-water inlet connection on the water heater. A tee will have to be installed in the cold-water inlet piping. A check valve will be required in the house circulation line.

3.2. Pneumatic Controls

1. Turn the temperature setting on the Accritem (pneumatic temperature control) to the lowest setting of 50 deg. F. On the bottom of this control you will find a screw adjustment. This is referred to as the “sensitivity adjustment”. Begin by closing this adjustment clockwise and open one-eighth turn counter clockwise.
2. Fill the unit with water by holding the relief valve seat open (horizontal unit only), or by opening a hot water tap near the heater.
3. Bleed the condensate that has collected in steam line ahead of the control valve. We recommend a ball

or globe valve be installed in the strainer to make this possible.

4. Confirm that the control panel is powered with 120V-60Hz-1P electric power and the pump runs when the on-off switch is turned on. Do not pump unless the unit is filled with water.
5. It is best to start up under a load without opening the valves to the system, particularly if the unit is being used for domestic hot water. However, this is not always possible. On horizontal units, the seat of the relief valve can be held partially open while the temperature is adjusted. When starting a vertical model, sinks or showers may have to be open in order to provide a load.
6. Completely open the needle valve on the anticipator line.
7. When adjusting the temperature, keep in mind the Accritem has not been calibrated so you cannot go by the dial setting. It will be necessary to use the temperature dial adjustment as well as the sensitivity adjustment to set the unit to the desired operating temperature. As the sensitivity adjustment screw is "opened up", or turned counter clockwise, the controls become more sensitive. Air pressure is bypassed through the control directly to the steam valve actuator. The steam valve may tend to "hunt", or open and close continuously. Opening the sensitivity adjustment can improve this situation. The temperature should then be checked with no demand. If the temperature rises above the desired set point, the sensitivity will need to be decreased slightly. (See troubleshooting pneumatic controls).
8. Increase the temperature very slowly to allow the unit to heat up gradually.
9. After adjusting the temperature, change the flow through a range within the water heaters designed capacity. Re-adjust the temperature if necessary.
10. Manually lower the high limit setting to confirm if the safety solenoid valve closes, shutting off the air supply to the steam valve. The high temperature light should come on.
11. The high limit control should be set at approximately twenty degrees above the operation temperature.
12. Close the needle valve on the anticipator line about half way.
13. Loosen the set screw on the temperature knob on the Accritem. Set the knob in accordance with the thermometer reading and tighten the set screw.

3.3. Self-Operated Controls

If a SPENCE self-operated steam valve is provided, refer to the SPENCE operating and maintenance instructions (S.I.O.O 18A) in the owner's manual and adjust the valve as follows:

1. Remove all compression from the pressure limit spring by turning the delivery pressure adjustment screw counter clockwise.
2. Turn the temperature adjustment hand wheel clockwise, completely compressing the temperature adjustment spring.
3. Bleed the condensate that has collected in the steam line ahead of the control valve. We recommend a ball or globe valve be installed in the strainer to make this possible.

4. Confirm that the control panel is powered with 120V-60H-1P electric power and the pump runs when the on-off switch is turned on. Do not pump unless the unit is filled with water.
5. It is best to start up under a load without opening the valves to the system, particularly if the unit is being used for domestic hot water. However, this is not always possible. On horizontal units, the seat of the relief valve can be held partially open while the temperature is adjusted. When starting a vertical model, sinks or showers may have to be open in order to provide a load.
6. If the valve adjustment must be made at partial load, the temperature may sag under heavier loads. Should this happen, the temperature can be offset by increasing the pressure adjustment setting.
7. Completely open the needled valve on the anticipator line.
8. Put the on-off switch in the "on" position. This will energize the circulating pump and open the safety solenoid, allowing the steam valve to operate.
9. Slowly turn the steam valve pressure adjustment clockwise. Continue to increase the temperature until it is approximately five degrees above set point. Turn the temperature adjusting hand wheel on the pilot counter clockwise until the desired operating temperature is obtained.
10. Close the needle valve in the anticipator line about halfway.

3.4. Electric Siemens PID and SK Controls

How to calibrate the steam valve:

Step 1

Power up unit make sure the steam is isolated from the unit to start.

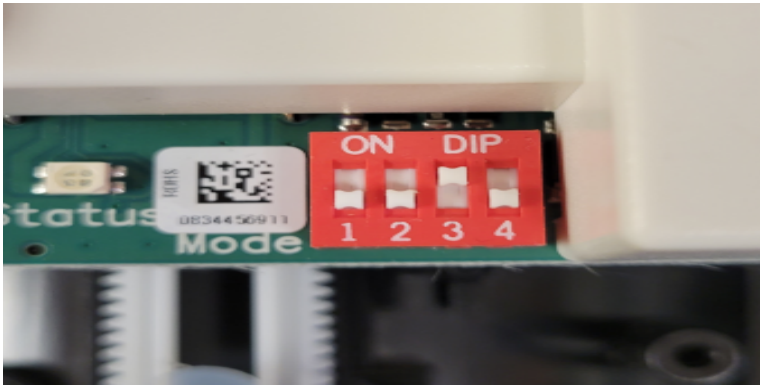
Step 2

Take the cover of the SK Steam valve actuator off.



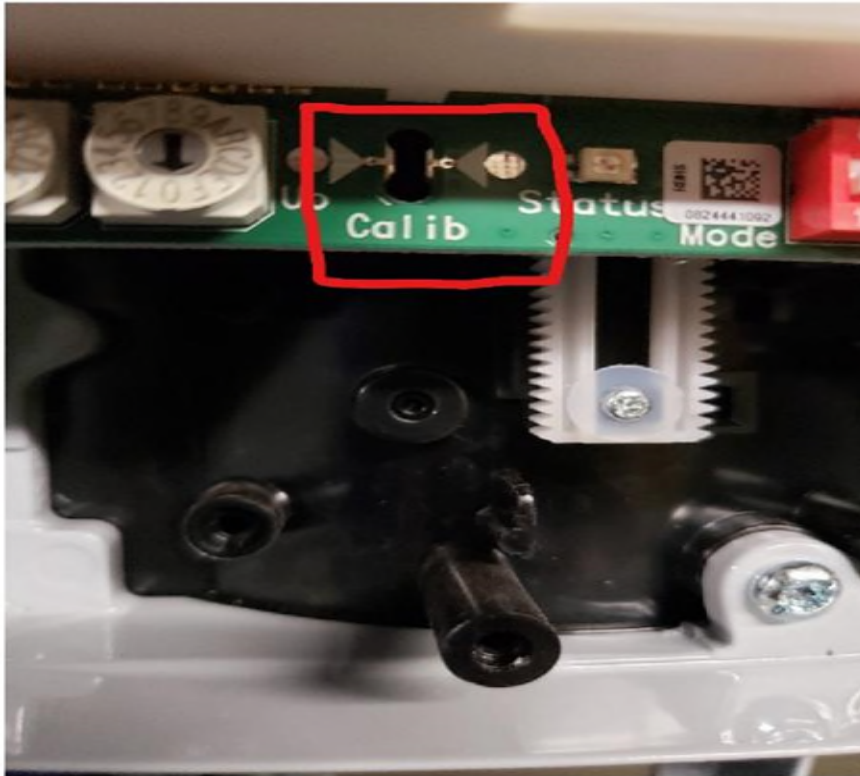
Step 3

Verify jumpers' correct position 1, 2, and 4 are down and 3 is up.



Step 4

Use a precision screwdriver and insert it in calibration space till green light starts to flash.



Step 5

The steam valve should stroke completely open and then close. The green light will stop flashing then. You can replace the cover on the actuator and screw it back down.

Step 6

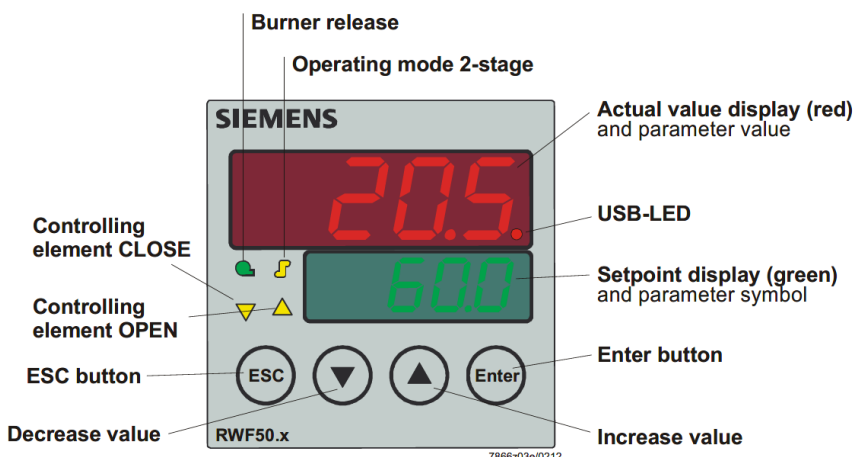
You can now introduce steam to the unit.

You need to set the Honeywell Aquastat to what temp you want the unit to drain so that unit discharge temp doesn't scald

How to tune the PID for the unit

Step 1

Using the up and down arrows set the desired temperature then press the Enter button.



Step 2

Start Self-setting function.

Start

* Press  +  for 5 seconds

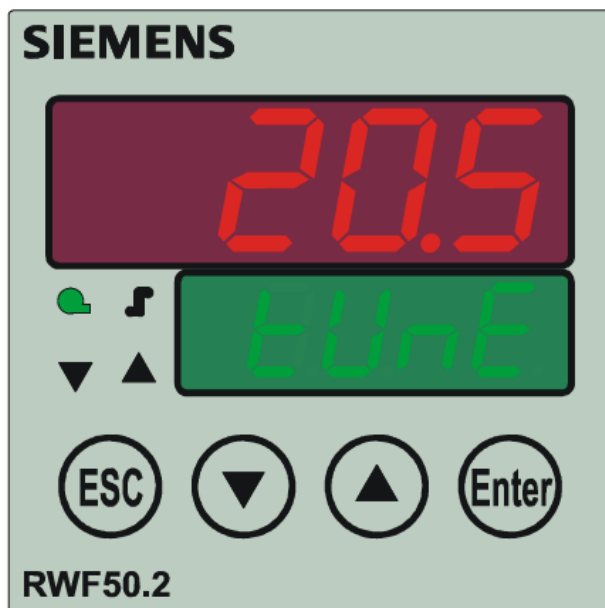
To cancel the Self-setting function.

Cancel

* Cancel with  + 

Step 3

Once the Self-setting function has started the display will change tUnE as seen below.



Step 4

Once the tUnE stops flashing, the Self-setting function has ended, and the parameters calculated by the controller are automatically adopted.

4. Maintenance

4.1. Copper U Tube Heat Exchangers

1. At regular intervals, observe interior and exterior condition of all tubes and keep them clean. Neglect in keeping all tube clean may result in complete stoppage of the flow through some tubes with consequent overheating of these tubes as compared to surrounding tubes resulting in leaking tube joints.
2. Do not attempt to clean tubes by flowing steam through individual tubes.
3. Do not open heads until all pressure is off equipment and the unit drained.
4. Do not handle tube bundles with hooks or other tools which might damage tubes. Bundles should be moved about on cradles or skids or nylon slings.
5. Exchangers subject to fouling should be cleaned periodically. A marked increase in pressure drop and or reduction in performance usually indicates cleaning is necessary. Since the difficulty of cleaning increases rapidly as the scale thickens or deposit increases, the intervals between cleaning should not be too great. There are specific compounds on the market for this purpose. These cleaning compounds are made by most major manufactures of water treatment chemicals such as Dearborn, Calgon, Perolin, Mogul, Oakite, Wyandotte and many others. Many other good companies make good cleaning compounds. All are available either directly from the company or through plumbing supply houses.
6. When removing tube bundles from exchangers for inspection or cleaning, care should be exercised that they are not damaged by improper handling. Tube bundles are often of great weight, yet the tubes are small and of relatively thin material.
7. In cleaning a tube bundle, tubes should not be hammered on with any metallic tool. In case it is necessary to use scrapers, care should be exercised that the scraper is not sharp enough to cut the metal of the tubes.
8. Vertical Quick-Heat Heat Exchanger Removal
9. The Vertical Quick Heat is designed so the heat exchanger can be removed simply from the shell after the shell is laid down sideways. Have replacement gaskets, bar clamp and wrenches available. Use the following procedure:
 - 9.1. Disconnect the steam line at the steam valve flange or union.
 - 9.2. Disconnect the trap and pressure gauge connection to the shell.
 - 9.3. Remove the jacket and insulation from the flange.
 - 9.4. Scribe a vertical mark across the two flanges and the tube sheet to aid in reinstalling the assembly with the proper orientation.
 - 9.5. Remove the flange bolts.
 - 9.6. Tilt the heat exchanger a few degrees to the side to break the gasket loose.
 - 9.7. Install a bar clamp to hold the heat exchanger in the shell. A bar clamp is easily made from a heavy strip of flat metal inserted between the heat exchanger and the mixer. Apply clamps to the flange on each side to hold the exchanger in place as it is tilted to the side. (Special screw clamps are available from the Sellers Engineering Company's Parts Department to accomplish the same purpose.)
 - 9.8. After the heat exchanger is secured in the shell, the shell can be tilted to the side and laid on flat surface. Be careful in tilting the assembly as some units are heavy with many copper tubes.
 - 9.9. After the unit is laid on horizontally, the heat exchanger can be slid out. The exchangers should only be handled with wide slings or support boards on the baffles to avoid damage.
 - 9.10. Reverse the above procedure to reassemble the unit. To aid assembly, the new gasket should be coated with pipe dope to hold them in place and properly located on the flange of the mixing chamber. The bar clamp should also be used to hold the heat exchanger and the shell together. Be sure to properly line up the mixer dividers, the gaskets, and the heat exchangers, so proper flow is maintained. The orientation marks made in Step 4 will help prevent an error here.
 - 9.11. After completing the reassembly, apply water, air, electricity and steam in that order then check for leaks. Leaks should be fixed promptly.

9.12.Recheck all safeties to be sure they work.

5. Trouble Shooting

5.1. General

If the steam pressure is greater than expected, this can create problems. The outlet temperature will be difficult to control. Special attention should be given to the type of steam valve that was provided with the unit. The POWERS steam valves have shutoff limitations. (Consult chart on page one). The steam trap model and size is selected based on the expected steam pressure available. The trap can be damaged, or will not work, if exposed to excessive steam pressure. A pressure reducing valve may need to be installed to lower the steam pressure to the proper design pressure.

If the steam valve remains open but the temperature is not satisfied, check the design capacity of the water heater. The design capacity is shown on the name plate. It should be rated in GPH (gallons per hour). If this number is divided by sixty the resulting number will be in GPM (gallons per minute). Excessive water flow probably exists if the hot and cold piping running to and from the unit are larger than hot and cold connections supplied on the water heater. The recovery rate of the unit is based on the temperature range specified in the model number. If the water heater is being operated at a temperature higher than expected, the rated capacity may not be attainable. If the steam pressure is far less than expected, the temperature may be affected. Also check to see if the steam strainer is clogged.

If the stem valve swings from closed to wide open, resulting in a major temperature fluctuation, check to see if the unit is being operated at a temperature greater than the design operating point. Make sure the circulation pump is operating. If a pneumatic steam valve was provided, check the delivery air pressure. It should always be twenty-five psi. Also check the sensitivity adjustment setting.

If the temperature increases under no load, there may be dirt in the valve seat allowing steam to pass through. The unit could be full of condensate as a result of improper steam pressure, improper condensate line sizing, or condensate lifting. Also see troubleshooting (pneumatic and self-operated controls).

If you suspect the tube bundle may be leaking, this condition can be checked without draining the unit. Turn the unit off and close the main valve in the steam line. While maintaining city water pressure on the unit, disconnect the steam trap line at the water heater. If water continually leaks from this opening, a tube may be ruptured.

If you experience a loss of recovery capacity over a period of time, the tube bundle may need cleaning. Scale accumulation will reduce the ability to transfer heat to the water. The tube bundle can be cleaned with Dow Chemical Versene 100 or a similar solution.

5.2. Pneumatic Controls

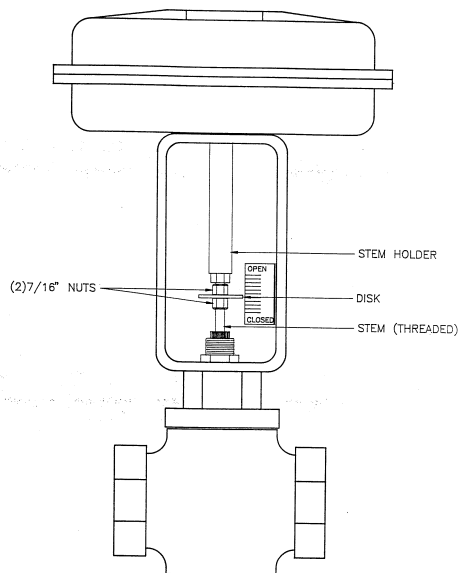
If the desired operating temperature is difficult to obtain, check the air pressure/volume available. Even though the supply air pressure gauge may read 20 psi, there may not be enough volume of air available to hold the steam valve open. The steam valve is reverse acting or “normally closed”. This means if the air pressure is lost, the valve will close. If there is not enough supply air pressure to overcome the valve spring, the air will build up against the back pressure provided by the steam valve. The air pressure may build up enough to open the valve but not enough to keep it open. First, scribe a mark on the base of the Accritem marking the current location of the sensitivity position. Make sure the sensitivity adjustment is not completely closed. If it is not closed, quickly open the sensitivity adjustment approximately one turn. If you notice the supply air pressure decrease, more air must be made available to the temperature control.

If the temperature increases under no load with a POWER steam valve, the sensitivity adjustment on the temperature control may be open too much. If the delivery air pressure gauge (gauge on left side of the Accritem control) reads greater than 4 to 5 psi, with no load on the unit, turn the sensitivity adjustment clockwise until the delivery air pressure is within this pressure range. MAKE SURE THE STEAM VALVE IS NOT PASSING STEAM WHEN CLOSED. Check to see if the available steam pressure has increased. If a POWERS steam valve was furnished, special attention should be given to the shutoff limitation of the steam valve.

The POWERS steam valves are shipped from the factory and tested for maximum shutoff. However, if the valve begins to open with an air signal less than 6 to 7 psi, the valve may need adjustment.

The following procedure should be used to adjust the steam valve. (Consult image in this section):

- Close the manual valve in the steam line.
- Remove the air supply air line from the temperature controller.
- Remove the airline connection from the bottom of the valve actuator.
- Run airline tubing from the air filter regulator (or insert a cock so the air pressure can be manually changed) to the bottom of the valve actuator.
- Keep in mind the proper valve stroke, or stem travel, as per the chart on page eight. Place the valve at mid stroke.
- Hold the valve stem holder in place. (Do not turn stem holder at any time during this process. Doing so may damage the diaphragm).
- Two 7/16" nuts are located on the threaded valve stem – one above the disk and one below. Loosen the nut below the disk several turns then loosen the nut above the disk.
- Tighten the nut above the disk against the bottom nut. This allows you to move the valve stem when turning the disk clockwise.
- Continue to turn the disk/valve stem clockwise until the threaded valve stem drops out of the holder above.
- It may be necessary to increase the air pressure on the actuator if the stem comes in contact with the valve seat.
- Re-thread the stem back into the holder 3 to 4 turns.
- Adjust air filter regulator to decreasing air pressure or close air cock to shut steam valve.
- Open air and completely stroke the valve. If the valve stem does not complete its full travel, it will be necessary to thread the stem into the holder a couple of additional turns until the valve strokes completely.
- Loosen the 7/16" nuts and run the disk back to original position against the stem holder.



- After the adjustment is made, the valve should be stroked and stem travel checked. The chart below gives the proper stem travel (stem Movement) for each.

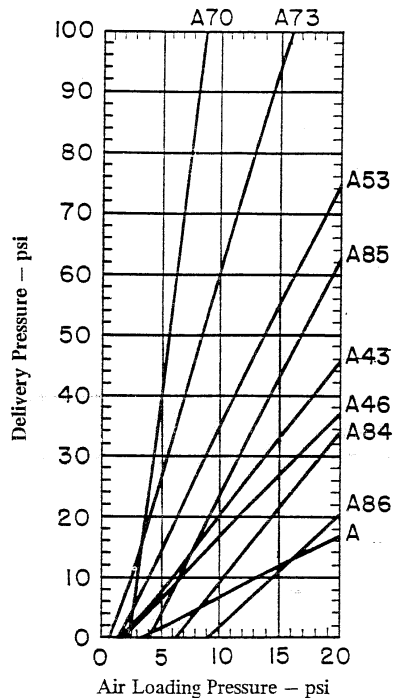
<u>SIZE</u>	<u>SD</u>	<u>CD</u>	<u>SS</u>
.75"	0.75	----	.75
1.00"	0.75	----	.75
1.25"	1.00	----	1.00
1.50"	1.00	----	1.00
2.00"	1.00	----	----
2.50"	-----	.625	----
3.00"	-----	.75	----

If the temperature increases under no load with a SPENCE steam valve, the sensitivity adjustment on the temperature control may be open too much. Consult the SPENCE Pilot Response Curve chart on Page ten. Determine which pilot model was provided with the steam valve. The model number is stamped on the plate on the base of the pilot. If the delivery air pressure gauge (on left side of Accritem control) reads a pressure greater than the point at which the pilot air loading pressure will start to open the steam valve, turn the sensitivity adjustment clockwise until the delivery air pressure is within a pressure range that will not allow the valve to pass steam when on load exists. **MAKE SURE THE STEAM VALVE IS NOT PASSING STEAM WHEN CLOSED.** Also check to see if the available steam pressure has increased.

** If a SPENCE PNEUMATIC steam valve is provided, refer to the SPENCE operating and maintenance instructions (S.I.O.I. 18C) in the owner's manual for troubleshooting tips.



STEAM PRESSURE REGULATORS



Response curves - pilots for positive pressure.

5.3. Heat Exchanger

As heating surfaces become fouled, the temperature of the water at the outlet will be reduced if the water flow exceeds the heat transfer capacity. This can be corrected by slowly closing the isolation valve on the hot water outlet of the unit. Reducing flow will raise the water temperature. This is, however, a temporary fix. When the heat exchanger becomes excessively fouled in that it will not put out enough hot water, it must be cleaned per the instruction to follow.

If steam hammering noise is noticed, check to be sure the heat exchanger is level on horizontal units. Also inspect the trap and condensate line. Condensate leaving the unit should be drained by gravity, without lifts. To a vented receiver. In order for the condensate to drain properly, the receiver should be located below the level of the condensate outlet on the water heater.

5.4. Pumps

Check periodically to see if the pump is running properly. Most pumps are self-lubricating. If lubrication fitting is on the motor, add oil or grease according to instructions.

5.5. Valve Maintenance

See instruction sheet for the particular model valve installed.

5.6. Trap

If traps leak, they prevent the system from reaching full recovery capacity and they waste steam. Leaky traps are usually caused by worn parts or a piece of dirt or scale lodge in the orifice. Traps should be cleaned and parts replaced, if necessary. Traps can be tested by measuring the upstream and downstream temperature on both side of the trap. The temperatures should be different and be about equal to the saturated steam temperatures at the line pressure on each side of the trap.

6. Appendix A

Revision Table Data

Date	Rev. #	Who	Changes Made
7/27/2018	1	DTB	Updated existing manual into word
10/17/19	4	DTB	ADDED SECTION 3.4