HYDROSTAT®

MODEL 3150

Combination Low Water Cut-Off & Universal Temperature Limit Control for Oil-Fired Boilers

120 VAC Operating Voltage

PATENT NOS. 7,891,572; 8,931,708

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

⚠ DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
⚠ CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Intended to bring special attention to information and practices, but not related to physical injury.

NOTICE

SERVICE TECHNICIANS Prior to installation or servicing, please read all contents of this manual to ensure proper operation and safety standards are met.

INSTALLATION INSTRUCTIONS and OPERATING MANUAL

- **Replaces Common Aquastat* Models –** Can be installed on existing immersion wells to replace both cold-start and triple-action Aquastats®. Industry standard wiring designations make change-outs quick and easy.
- **Digital Display –** Easy to read LED continually displays boiler temperature. Also displays temperature limit and differential settings during adjustment.
- **Easy to Set –** Dials for setting temperature limits and differentials eliminate complicated programming.
- **Thermal Pre-Purge Feature –** Conserves fuel and meets 2012 DOE regulations by circulating latent heat in the boiler to the heating zone before firing the burner.

*Aquastat is a registered trademark of Honeywell International, Inc.

Dual Function Design

Temperature Limit Control

Designed for cold start and tankless coil boilers.

Low Water Cut-Off

Provides protection against potentially dangerous low water conditions when installed with the Hydrolevel Electro-Well™ (see page 2 for details).

⚠ WARNING To reduce the risk of Fire, CO Poisoning, Smoke Asphyxiation and Electrical Hazard, this product, including this instruction manual, must be installed, serviced or adjusted only by a qualified service technician. Failure to comply with this and other requirements in this manual could result in severe personal injury, death or substantial property damage.
Electrical shock hazard: To prevent equipment damage, severe personal injury, or death, disconnect power supply before installing or servicing control.
Burn hazard: To prevent serious burns, boiler should be thoroughly cooled before installing or servicing the control.

⚠ CAUTION Protect the control from water exposure during and after installation. Do not install where water can flood or drip on the control or where condensation can form on the circuit board. Replace the control if the circuit board was exposed to water. If the circuit board on this unit gets wet, the control can malfunction causing the boiler to overheat, resulting in severe personal injury of death from fire or explosion.

NOTICE **Frozen pipes/water damage.** Central heating systems are prone to shut down as a result of power or fuel outages, safety related fault conditions or equipment failure. Installation of freeze protection monitoring or similar precautions are recommended for unattended dwellings in climates subject to sustained below-freezing temperatures. Failure to do so can cause frozen pipes which will result in severe property damage including burst pipes and substantial water leaks.

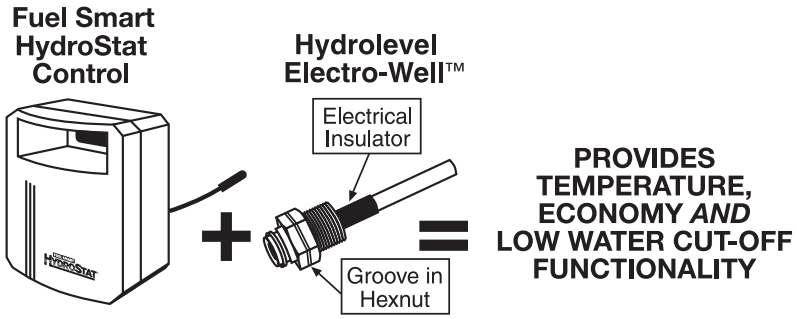
HYDROLEVEL COMPANY
126 Bailey Road, North Haven, CT 06473 • Phone (203) 776-0473 • www.hydrolevel.com

IMMERSION WELLS

Fuel Smart HydroStat can be installed on a Hydrolevel Electro-Well™ or on an existing immersion well already in the boiler.
IMPORTANT: The control will only provide low water cut-off protection when installed on an Electro-Well™.

Fuel Smart HydroStat installed with Hydrolevel Electro-Well™

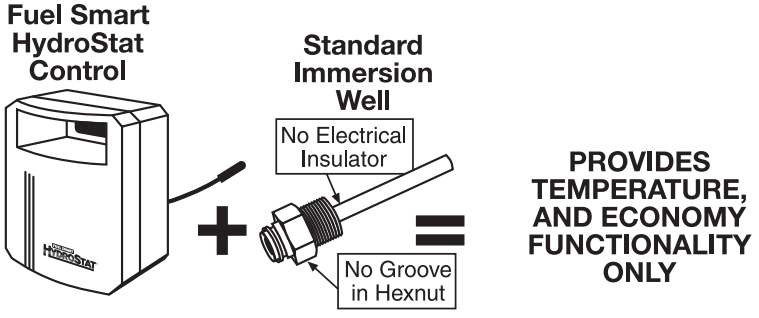
The Electro-Well can be identified by the black electrical insulator or, if installed, by the groove cut into the hexnut.



IMPORTANT: For proper operation of the low water cut-off function, there must be a minimum of ½" clearance between the copper well tube and any surface within the boiler.

See Electro-Well models on page 15.

Fuel Smart HydroStat installed with standard immersion well



NOTE: When installed on a standard immersion well, the “LWCO Active” LED will not illuminate.

MOUNTING THE CONTROL

⚠ WARNING **Electro-Well installation.** Make sure the immersion well or Electro-Well™ is installed in the boiler manufacturer's designated temperature limit control tapping and that the sensor is fully inserted into the well to ensure proper temperature sensing. Failure to follow these instructions could result in boiler overheating, creating a risk of severe injury or death from burns, scalding, or fire.

NOTICE **Teflon Tape:** When installing an Electro-Well™, do not use Teflon tape. Use of Teflon tape can interfere with low water cut-off operation and may cause nuisance lockouts. Pipe sealing compound should be used.

Removable Cover: For convenience, the HydroStat cover can be removed for easier access when installing/servicing. To remove, open the front cover 90 degrees, then lift. Reverse these steps to re-install the cover.

STEP 1 Two mounting positions are available on the back of the control (Fig. 1). Select which of the two positions (2 knockouts) is best for the location of the control. Remove the knockout.

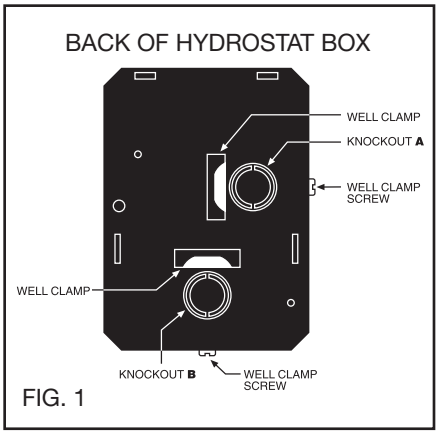


FIG. 1

STEP 2 Place control on the well. While holding box against well nut, tighten well clamp screw. (Fig. 2)

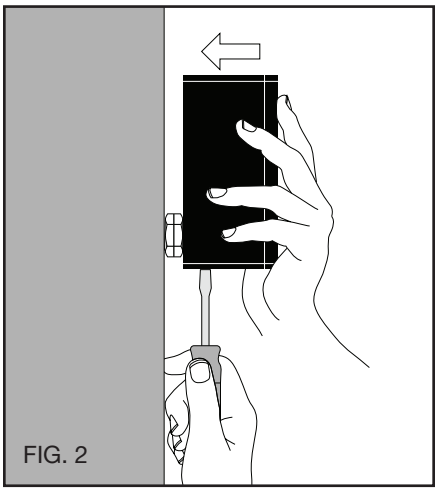


FIG. 2

STEP 3 Insert sensor **ALL THE WAY** into well through the knockout (A or B) you have chosen. (Fig. 3)

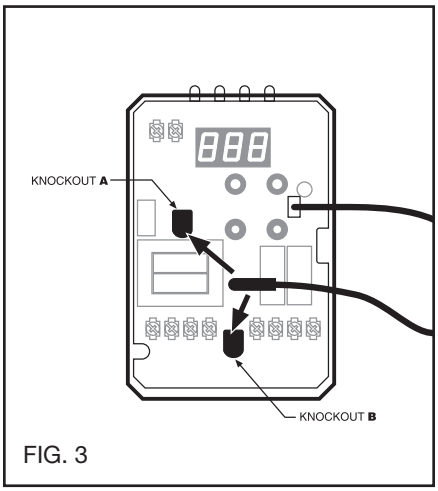
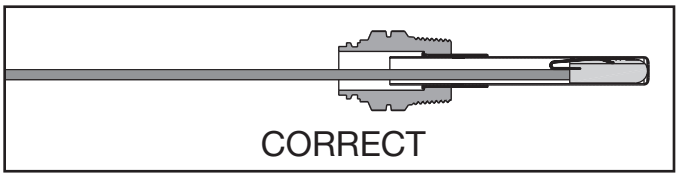
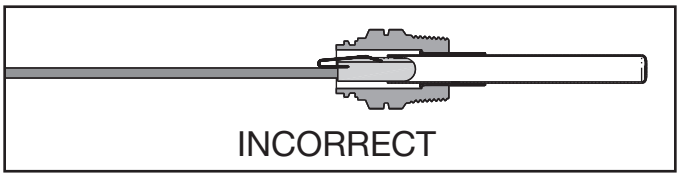


FIG. 3

IMPORTANT – Sensor must be inserted all the way into the well for proper operation.


CORRECT


INCORRECT

NOTICE In the case of space restrictions, the HydroStat control may be mounted in a horizontal orientation without any loss of function. Hydrolevel recommends vertical mounting, when possible, for proper orientation of LED display.

REMOTE MOUNTING

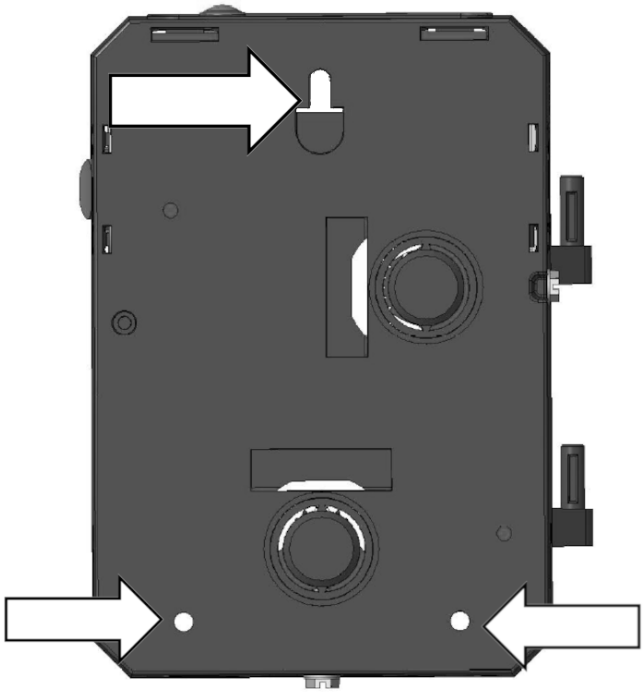
When not mounted on the well, the Fuel Smart HydroStat can be installed on a flat surface and fitted with a longer sensor (sold separately – see below). First, drive the top screw into the mounting surface. Hang the control on this screw using the top keyhole slot on the back of the HydroStat. Then secure the control with two additional screws through the mounting holes at the bottom.

NOTE: The HydroStat ships standard with a 12" sensor. Additional lengths are available separately including 24", 36", 48", 60", 10', 20'.

Remote Mounting Kits are also available for legacy jobs. Each kit includes mounting hardware and a remote sensor.

GROUNDING: When using Remote Mounting Kits, ensure your incoming voltage ground wire is connected to the HydroStat's ground screw (see "GROUNDING" section on next page).

Hydrostat (Back View)
Mounting Locations for zip screw mounting



GROUNDING

⚠ WARNING **Electrical shock hazard.** To prevent electrical shock, death or equipment damage, disconnect power supply before installing or servicing this control.

Improper grounding of the control may result in ignition noise interference or nuisance low-water lockouts. To ensure proper operation, connect the ground wire from the electrical panel to the HydroStat's ground plate screw located at the bottom of the control. For installations where grounding is provided through metal conduit, install the optional conduit ground insert plate (Part No. 51088, not included with all models). Attach the green wire from the insert plate to the HydroStat's ground plate screw (see Fig. 2). Note: If a direct equipment ground cannot be established, connect the ground plate screw to a reliable earth ground in accordance with local electrical codes.

NOTICE When the HydroStat 3150 is mounted remotely and not installed on the Electro-Well (immersion well), it may be necessary to add a wire from the HydroStat ground plate screw to the Electro-Well and secure it with a clamp.

Fig. 1 Ground Wiring

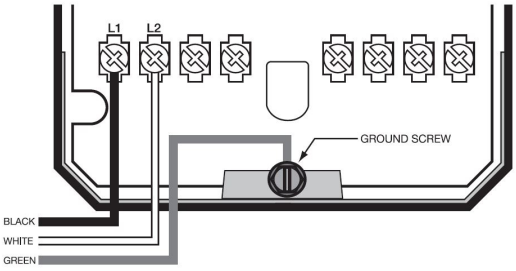
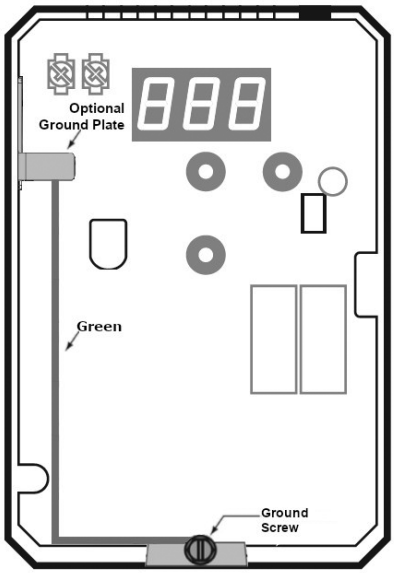
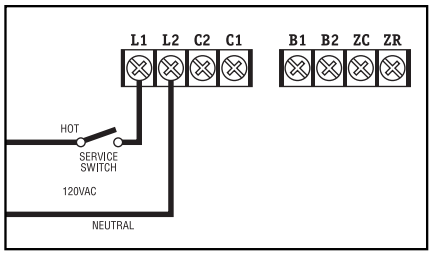


Fig. 2 Optional Ground Plate

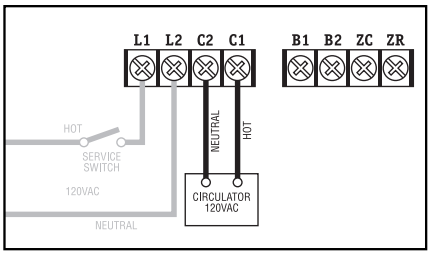


WIRING

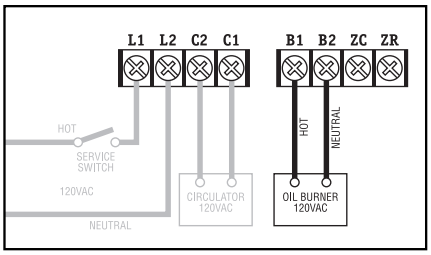
⚠WARNING **Electrical shock hazard.** To prevent electrical shock, death or equipment damage, disconnect power supply before installing or servicing this control.



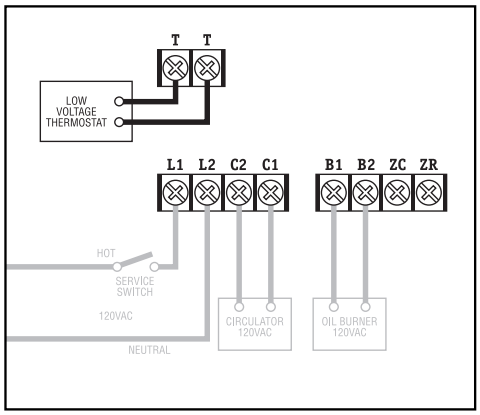
STEP 1 Connect 120 VAC Hot to terminal **L1.** Connect 120 VAC Neutral to terminal **L2.** Disconnect means and overload protection as required (provided by others).



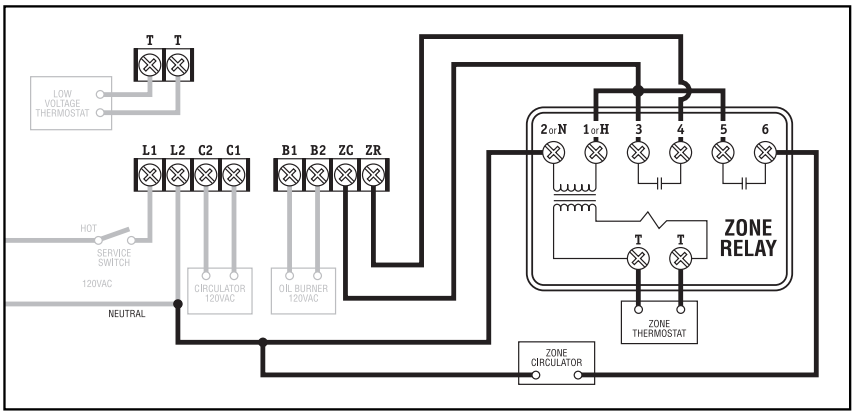
STEP 2 Connect the circulator to **C1** and **C2.** (C2 is neutral.)



STEP 3 Connect the burner circuit to **B1** and **B2.** (B2 is neutral.)

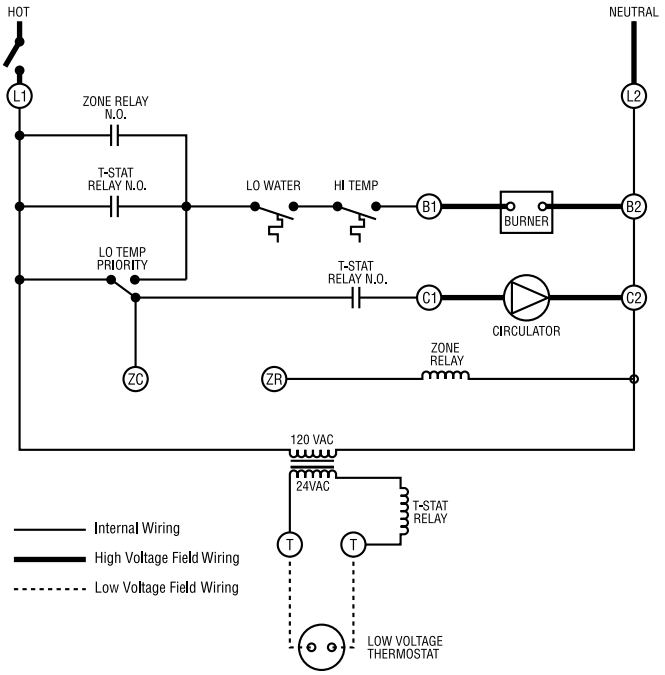


STEP 4 Connect the thermostat to **T** and **T.**

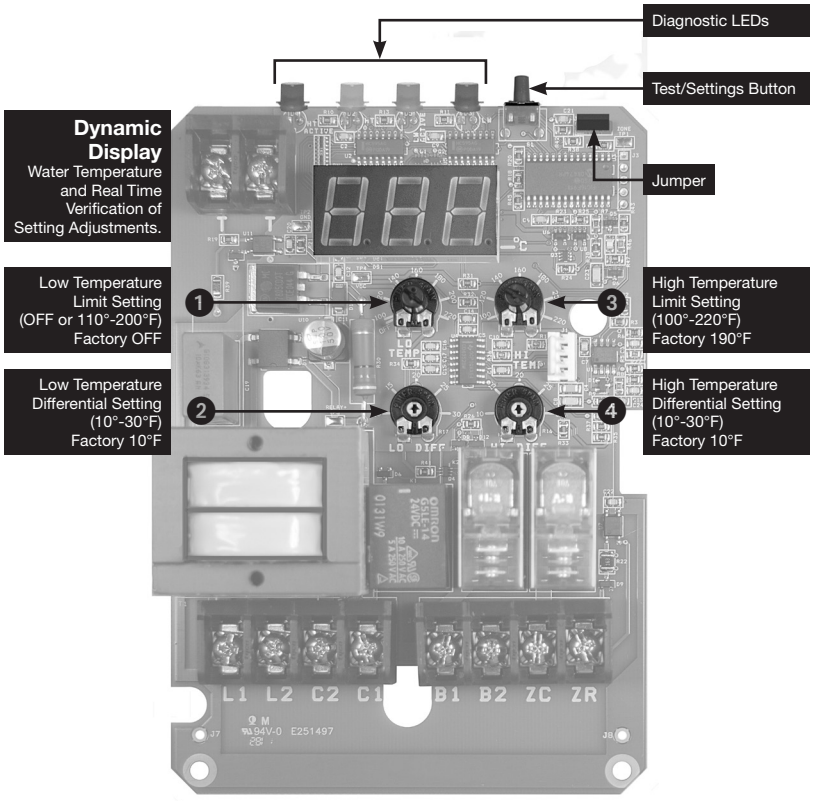


Multi-Zones Adding additional zones.

SCHEMATIC/LADDER DIAGRAM



SETTING THE CONTROL



To set COLD START operation

Operates on call for heat only.

❶ **Low Temperature Limit**
Make sure Low Temperature Limit is turned fully counter-clockwise (OFF position).

❷ **Low Temperature Differential**
No change is required.

❸ **High Temperature Limit**
(factory setting = 190°F)
Adjust setting until desired temperature is displayed.

❹ **High Temperature Differential**
(factory setting = 10°F)
Using a small screwdriver, adjust setting until desired differential is displayed.

To set WARM START operation

Maintains temperature for domestic hot water.

❶ **Low Temperature Limit**Adjust setting until desired temperature is displayed. Prior to adjusting, remove the jumper located at the top right corner of the circuit board (not equipped on all units).
IMPORTANT: If low limit temperature cannot be set above 140°F, remove jumper.

❷ **Low Temperature Differential**
Using a small screwdriver, adjust setting until desired differential is displayed.

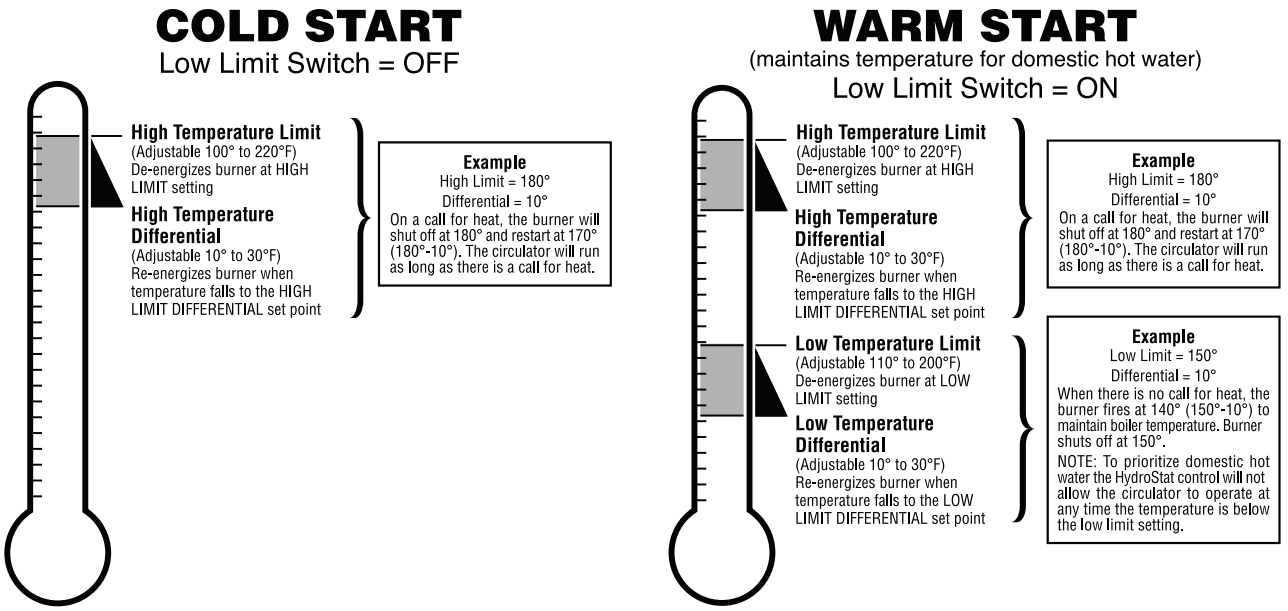
❸ **High Temperature Limit**
(factory setting = 190°F)\
Adjust setting until desired temperature is displayed.

❹ **High Temperature Differential**
(factory setting = 10°F)
Using a small screwdriver, adjust setting until desired differential is displayed.

NOTE: Be careful not to select overlapping temperature settings. For example: If the HIGH TEMPERATURE LIMIT is set at 190°F with a HIGH TEMPERATURE DIFFERENTIAL set at 20°F, then the LOW TEMPERATURE LIMIT needs to be set at 170°F (190°F - 20°F = 170°F) or below.

IMPORTANT: To prevent flue gas condensation and reduce fatigue caused by thermal cycling on conventional (non-condensing) boilers, both HIGH and LOW LIMIT set points should be 150°F or above (Limit Setting - Differential Setting ≥ 150°F). Boiler manufacturer's temperature requirements supercede these recommendations.

OPERATION



OPTIONAL FEATURES

NOTE: The Program Mode – Pro – is accessed by turning the LO TEMP dial to a position just above OFF.

Thermal Pre-Purge

Thermal Pre-Purge is designed to maximize boiler efficiency. When activated, the control will supply latent heat that may remain in the boiler from a previous run cycle to the next heating zone that calls. The control monitors how quickly the boiler temperature is declining and activates the burner only when it determines that the latent heat is insufficient to satisfy the call. During the purge cycle, the display will indicate Pur. This feature works with single-zone and multi-zone heating systems utilizing circulators or zone valves. No change in wiring is needed.

To activate Thermal Pre-Purge

1. Turn the LO TEMP dial to access the Program Mode – indicated in the display as Pro
2. Turn the HI TEMP dial to select feature 1
3. Push the Test/Settings Button to turn Thermal Pre-Purge on or OFF
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 7)

Degrees Fahrenheit or Celsius

The control has the ability to operate in degrees Fahrenheit or Celsius. When operating in Celsius, a C will appear in the display next to the temperature whenever the temperature is below 100 degrees.

To change between degrees Fahrenheit and degrees Celsius

1. Turn the LO TEMP dial to access the Program Mode – indicated in the display as Pro
2. Turn the HI TEMP dial to select feature 2
3. Push the Test/Settings Button to C for Celsius or F for Fahrenheit
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 7)

OPTIONAL FEATURES continued

Manual Reset Low Water Cut-Off

The low water cut-off operation on the HydroStat can be set to operate in automatic (default) or manual reset mode. When in manual reset mode, the control will shut-down the burner immediately when a low water condition is detected. If the low water condition is sustained for 30 seconds, the low water light will blink, indicating that the control has locked out the burner. The control can only be reset by pushing the Test Settings button on the top of the control. The manual reset feature meets CSD-1 code requirements.

⚠WARNING **Thermal Shock Warning:** To avoid Thermal Shock, allow the boiler to fully cool before adding water.

RESUMING OPERATION: The heating system must be checked by a qualified service technician prior to resuming operation.

Failure to follow these warnings can result in severe appliance damage, explosion, injury, or death.

To activate Manual Reset LWCO mode

1. Turn the LO TEMP dial to access the Program Mode – indicated in the display as Pro
2. Turn the HI TEMP dial to selec † feature 3
3. Push the Test/Settings Button to A for Automatic Reset Mode or b for Manual Reset Mode
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 7)

To Test the Manual Reset Feature: Press and hold the Test/Settings button located on the top of the control for 30 seconds to simulate a low water condition. After 30 seconds, the Low Water light will blink indicating that the control is locked out. To reset the lock-out condition, press the Test/Settings button momentarily.

Circulator Activation Options

When in the default mode, the HydroStat activates the circulator (**C1/C2** contacts) on calls to **T/TV.** The control can be programmed to activate the circulator on calls to **I1/I2** in place of, or in addition to, calls to **T/TV.**

To change how the Circulator is activated

1. Turn the LO TEMP dial to access the Program Mode – indicated in the display as Pro
2. Turn the HI TEMP dial to select feature 4
3. Push the Test/Settings Button to select between the following options:
   - A - Circulator on **T/TV** call only
   - b - Circulator on **I1/I2** call only
   - C - Circulator on both **T/TV** & **I1/I2** calls
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 7)

Setting the Well Type

When used to replace older temperature-only controls, the HydroStat can be installed on the existing well. (The Hydrolevel Electro-Well is required to activate low water cut-off operation – see page 2 for details). Older wells may contain hardened heat transfer grease or other contaminants that could interfere with metal-to-metal continuity between the sensor head and the inside of the well. Insufficient contact could lead to false low water conditions and burner shut downs. Setting the well type to Standard Well prevents the possibility of this occurring.

To change the well type

1. Turn the LO TEMP dial to access the Program Mode – indicated in the display as Pro
2. Turn the HI TEMP dial to select feature 8
3. Push the Test/Settings Button to select A for Electro-Well or b for Standard Well.

NOTE: To ensure that the low water cut-off is always active when the control is installed on an Electro-Well, setting b will ONLY be available when installed on a standard well. The Hydrostat sensor checks to determine if a standard well is used by looking for low resistance to ground, a condition that can only exist with a standard well. If you are installing on a standard well and either Low Water LED's are on, setting b will not be available. Check to see if the inside of the well tube is badly oxidized or contaminated with heat transfer grease. It may be necessary to clean the well to allow for setting b to be selected (See Troubleshooting Guide on page 12 for more information).

OPTIONAL FEATURES continued

Restore Factory Default Settings

To restore all features to the factory default settings (see following chart for default settings)

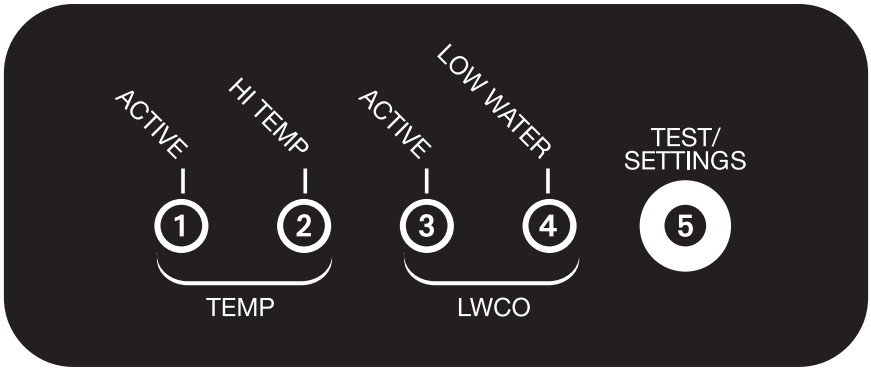
1. Turn the LO TEMP dial to access the Program Mode – indicated in the display as Pro
2. Turn the HI TEMP dial to select feature dEF
3. Push the Test/Settings Button to Y to reset all features to the default settings.
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 7)

Dial Setting	Feature	Options	Description	Default Setting
1	Thermal Pre-Purge	OFF on	Purge Inactive Purge Active	OFF
2	Fahrenheit or Celsius	F C	Degrees Fahrenheit Degrees Celsius	F
3	LWCO Manual or Automatic Reset	A b	Automatic Reset Manual Reset	A
4	Circulator Options	A b C	Circulator operation on TT call only Circulator operation on ZC/ZR call only Circulator operation on call from either	A
5	*Not available on this control*			
6	*Not available on this control*			
7	*Not available on this control*			
8	Well Type	A b	Hydrolevel Electro-Well Standard Immersion Well	A
def	Restore Factory Defaults	Y n	Restore Defaults Do Not Restore Defaults	n

NOTE: Not all features are available on older HydroStat models.

SEE PAGE 7 FOR ADDITIONAL SETTINGS

LED LEGEND



1 TEMP **ACTIVE** Indicates that the HydroStat control is powered and that the temperature function is active.

2 TEMP **HI TEMP** Illuminates when the boiler water temperature reaches the high limit setting. It will remain lit until the water temperature falls 10°. The HydroStat control prevents burner operation while this LED is on. See Differential explanation on page 7.

3 LWCO **ACTIVE** Indicates that the low water cut-off (LWCO) function of the HydroStat is active. When the control is installed with a Hydrolevel Electro-Well™, this LED will be on at all times when the control is powered.
IMPORTANT: If the control is installed with a well other than the Electro-Well™, this LED will not illuminate indicating that the control is not providing low water cut-off functionality.

4 LWCO **LOW WATER** Indicates that the boiler is in a low water condition. The HydroStat control will prevent burner operation during this condition. If the LOW WATER light is blinking, the control has been programmed to provide lock-out protection in the event a low water condition is detected (see Manual Reset Low Water Cut-Off on page 9). Pressing the TEST/SETTINGS button will reset the control.

IMPORTANT: The system must be checked by a qualified heating professional prior to resuming operation.

⚠WARNING To avoid Thermal Shock, allow the boiler to fully cool before adding water. Failure to do so can result in severe appliance damage, explosion, injury, or death.

5 TEST/SETTINGS Button

To Test Low Water Cut-Off: Press and hold the Test/Settings button for 5 seconds. The display will read LCO.

LWCO TEST LCO

The red Low Water light should illuminate and the burner circuit (B1 and B2) should de-energize. **NOTE:** The control must be installed with a Hydrolevel Electro-Well™ for low water cut-off functionality (see page 2 for more details).

To View Current Settings: Press and release the Test/Settings Button in short intervals to sequentially display the following settings:

HIGH LIMIT SETTING HL

▼

HIGH DIFFERENTIAL SETTING HdF

▼

LOW LIMIT SETTING LL

▼

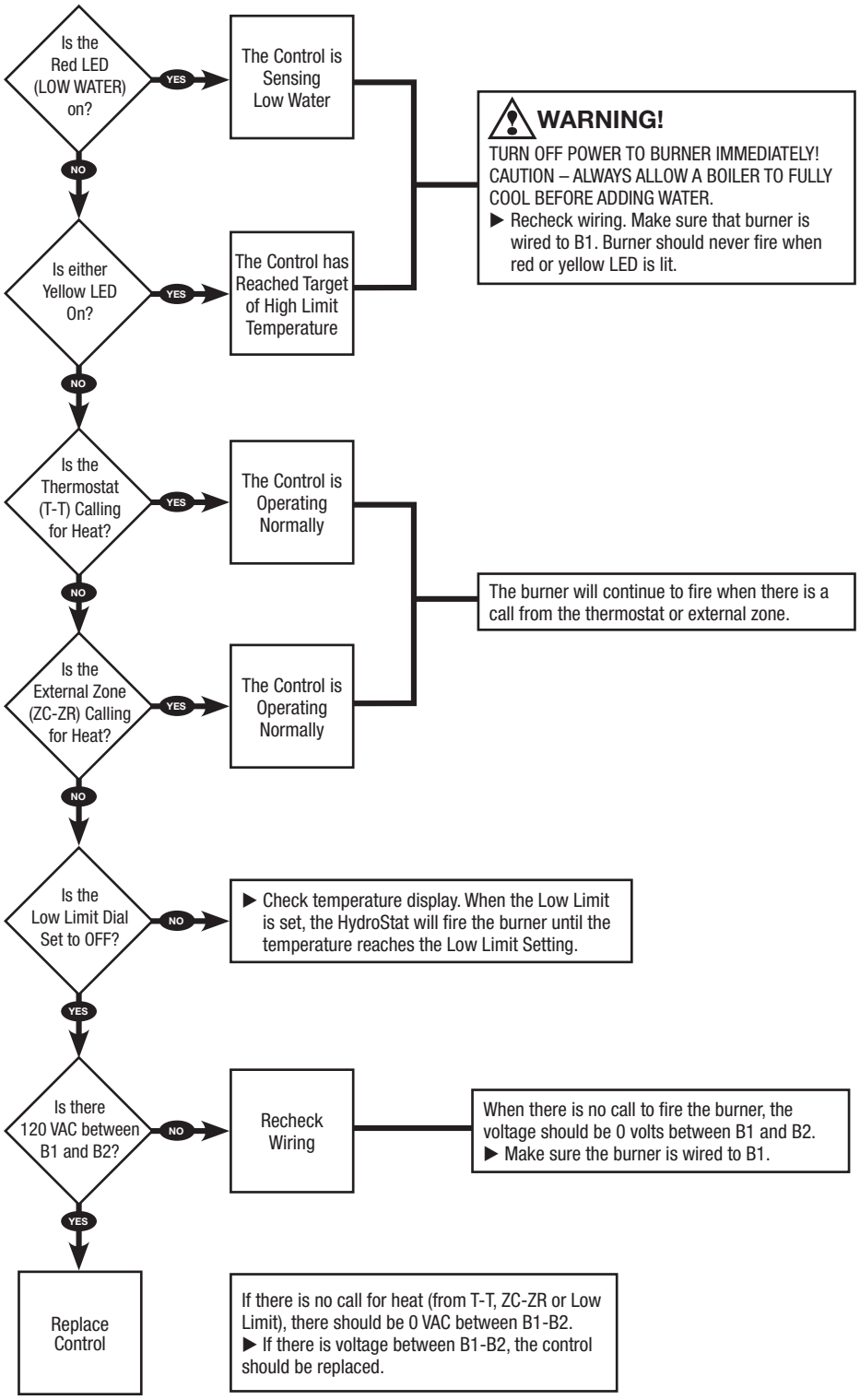
LOW DIFFERENTIAL SETTING LdF

The display will return to boiler temperature (default) if Test/Settings Button in not pressed for 5 seconds.

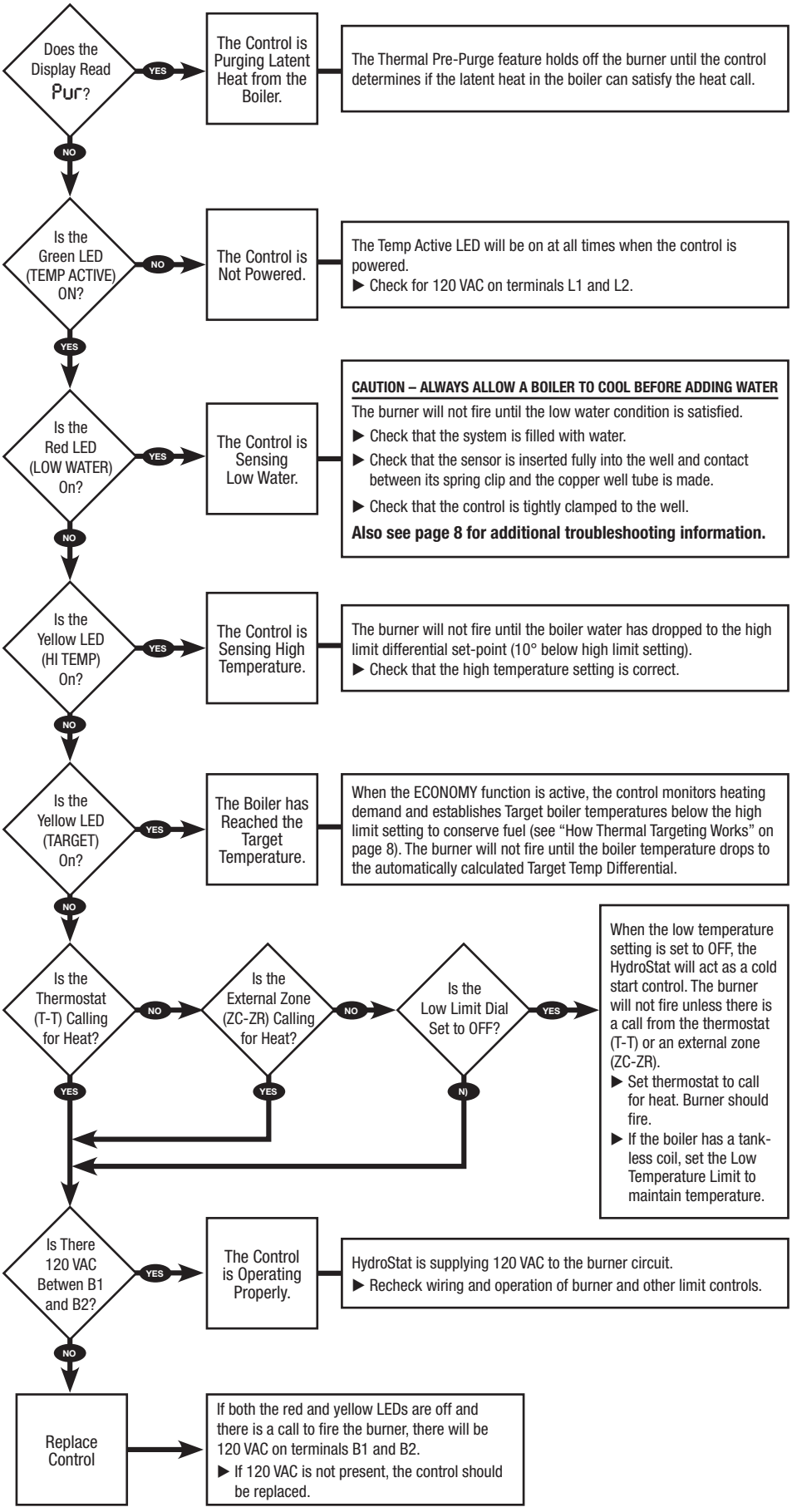
TROUBLESHOOTING

Burner Will Not Shut Down	See Flow Chart 1, page 13
Burner Will Not Fire	See Flow Chart 2, page 14
Temperature Display Exceeds High Limit Setting	Under normal operation, boiler temperature will continue to rise after the control shuts off the burner. This condition, known as “thermal stacking”, results from hot boiler surfaces continuing to release heat into the boiler water.
No or Insufficient Domestic Hot Water	If the boiler has a tankless coil make sure the low limit setting on the HydroStat is set properly. **NOTE:** If the low limit setting is dialed fully counter clockwise, it will shut off the low temperature maintenance feature and will function as a cold start control. Faster hot water response may also beachieved by turning off the Thermal Pre-Purge Feature (see page 8). If boiler is operating in conjunctionwith an indirect water heater, check to be sure the temperature control on the indirect tank is set properly. Make sure any valves in between domestic hot water heating device, boiler, and hot water taps are open.
Boiler Will Not Maintain Low Limit Temperature	Check for overlapping high temperature setting. If the high limit setting is set below the low limit setting, the control will default to the high limit setting and the corresponding high limit differential setting.
Temperature Display Differs from Boiler T&P Gauge Temperature Reading	Temperature variances can result from differing water temperatures within the boiler or different reaction times of the two devices. If the HydroStat temperature is significantly below the T&P gauge temperature, make sure the thermistor is inserted all the way to the end of the well.
LWCO “Active” Light (Green) LED) is Not On	The HydroStat will only provide low water cut-off functionality when used in conjuction with an insulated Electro-Well™. When attached to a standard immersion well, the LWCO “Active” light will remain off and the HydroStat will provide temperature functionality only.
Low Water Light (Red LED) is On or Blinking	**⚠ WARNING** A low water condition is serious and potentially dangerous. To avoid Thermal Shock, allow the boiler to fully cool before adding water. Failure to do so can result in severe appliance damage, explosion, injury or death. ***When Installed on an Electro-Well™*** When the LOW WATER light is on, this indicates that the control is not detecting water in the boiler. When the LOW WATER light is blinking, this indicates that the control has been programmed to provide low water lock-out protection and is currently locked out (see Manual Reset Low Water Cut-Off on page 9). Pressing the TEST/SETTINGS button after the low water condition is resolved will reset the lock-out condition. **1.** If the light is on and the heating system is filled with water, pull the sensor out of the well and inspect it. Make sure that the metal clip is protruding enough to come in contact with the inside of the well tube. Check that the well does not have excessive build-up of heat transfer grease that may interfere with the clip contacting the well. **2.** Remove well and examine for excessive residue build-up. Clean and re-install. ***When Installed on a Standard Immersion Well*** If either LWCO LED lights are illuminated and the control is installed on a standard immersion well, this is a false reading caused by a loss of continuity between the sensor and the inside of the well tube. Follow steps 1 and 2 (above) to ensure that the metal sensor head is making good contact with the inside surface of the copper well.

Troubleshooting Flow Chart 1 – Burner Will Not Shut Down

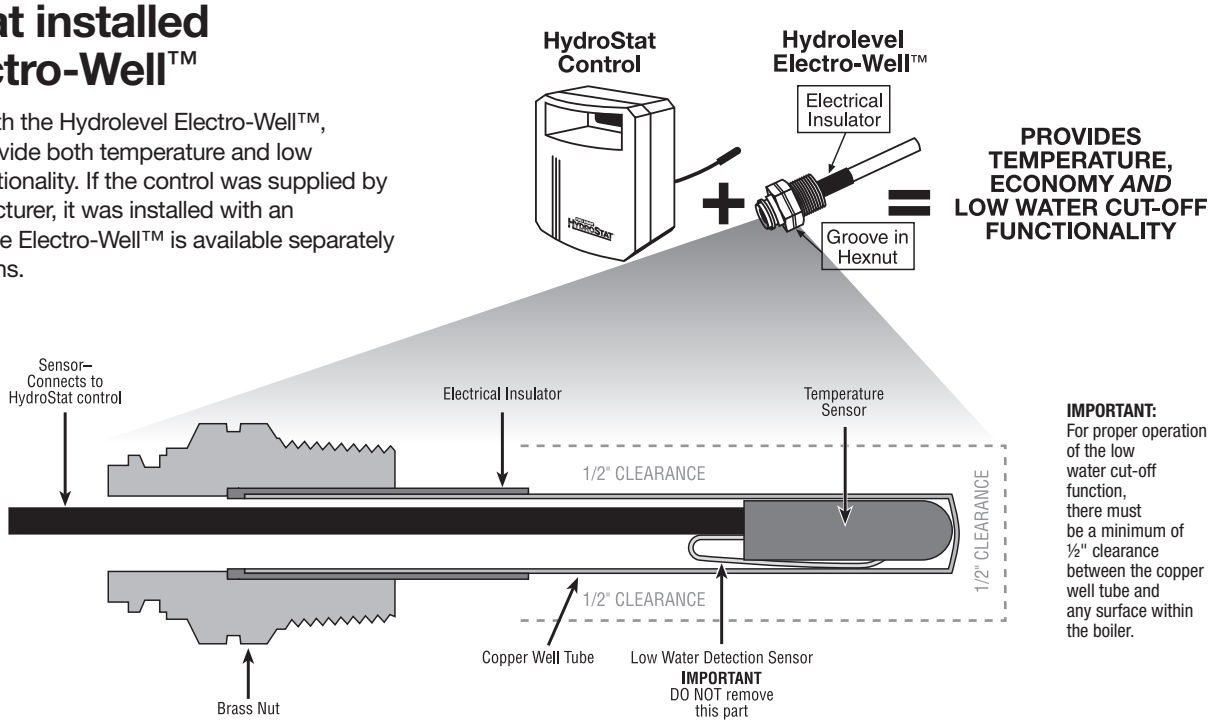


Troubleshooting Flow Chart 2 – Burner Will Not Fire



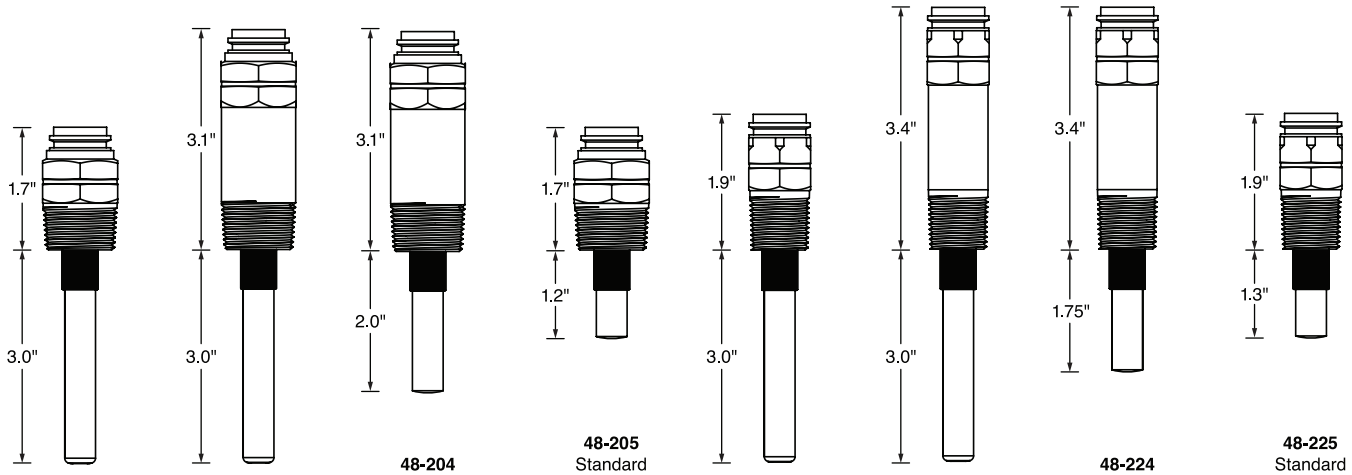
HydroStat installed with Electro-Well™

When installed with the Hydrolevel Electro-Well™, HydroStat will provide both temperature and low water cut-off functionality. If the control was supplied by the boiler manufacturer, it was installed with an Electro-Well™. The Electro-Well™ is available separately for field installations.



IMPORTANT:
For proper operation of the low water cut-off function, there must be a minimum of ½" clearance between the copper well tube and any surface within the boiler.

Electro-Well™ Models



48-201 Standard 3/4" NPT

48-202 Extended 3/4" NPT

48-204 Extended 3/4" NPT Short Insertion

48-205 Standard 3/4" NPT Extra Short Insertion

48-221 Standard 1/2" NPT

48-222 Extended 1/2" NPT

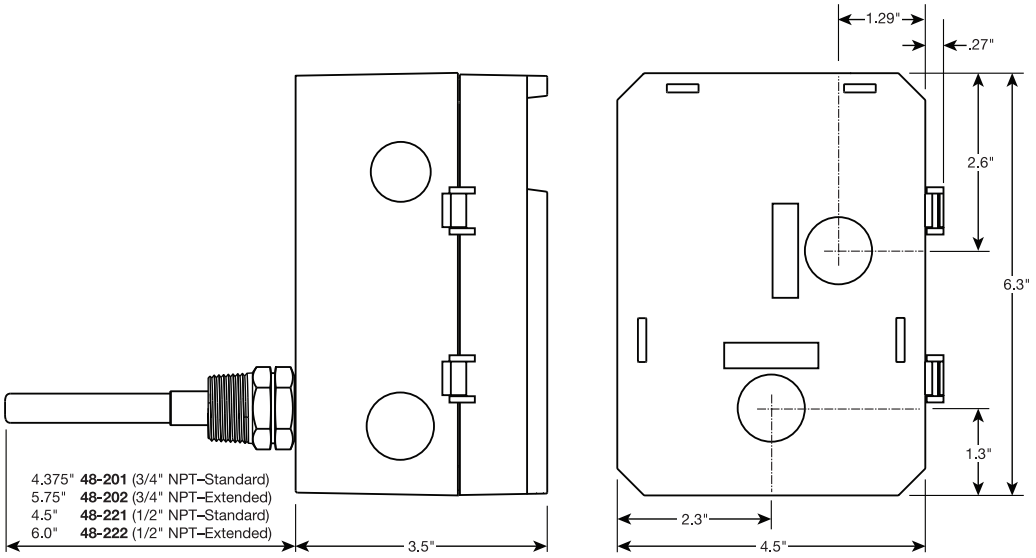
48-224 Extended 1/2" NPT Short Insertion

48-225 Standard 1/2" NPT Extra Short Insertion

MAINTENANCE

Remove the Electro-Well™ from the heating system every five years and clean any scale or sediment deposits from all parts that are exposed to the boiler water. After cleaning, reinstall the well using pipe sealing compound. Teflon tape is not recommended.

DIMENSIONS



SPECIFICATIONS HYDROSTAT MODEL 3150

Input voltage	120 VAC, 60 HZ
Burner contacts	7.4 FLA, 44.4 LRA@120 VAC
Circulator contacts	5.8 FLA, 34.8 LRA@120 VAC
Operating range – low limit	Off or 110°F (43°C) - 200°F (93°C)
Operating range – high limit	100°F (38°C) - 220°F (104°C)
Operating range – differential	10°F (6°C) - 30°F (17°C)
Thermostat heat anticipator setting	0.2A

UL LISTED

Proudly assembled in the USA from domestic and global components.

LIMITED MANUFACTURER'S WARRANTY

We warrant products manufactured by Hydrolevel Company to be free from defects in material and workmanship for a period of two years from the date of manufacture or one year from the date of installation, whichever occurs first. In the event of any claim under this warranty or otherwise with respect to our products which is made within such period, we will, at our option, repair or replace such products or refund the purchase price paid to us by you for such products. In no event shall Hydrolevel Company be liable for any other loss or damage, whether direct, indirect, incidental or consequential. This warranty is your EXCLUSIVE remedy and shall be IN PLACE OF any other warranty or guarantee, express or implied, including, without limitation, any warranty of MERCHANTABILITY or fitness for a particular purpose. This warranty may not be assigned or transferred and any unauthorized transfer or assignment thereof shall be void and of no force or effect.

HYDROLEVEL COMPANY

126 Bailey Road, North Haven, CT 06473 • Phone (203) 776-0473 • www.hydrolevel.com