



4200 SERIES

Multi-Function Gas Boiler Control

120 VAC Input / 24 VAC Burner Circuit

PATENT NO. 8,931,708; 8,844,834; 7,891,572; others pending

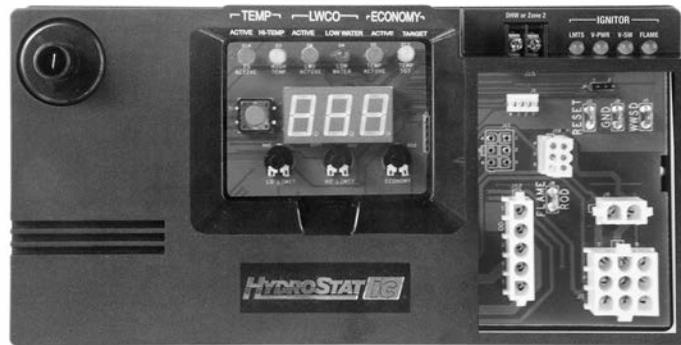
INSTALLATION INSTRUCTIONS and OPERATING MANUAL

Five Function Control

- **Ignition** – Intermittent Spark Ignition with single rod flame sensing
- **Temperature Limit Control**
- **Low Water Cut-Off**
- **Boiler Temperature Reset**
- **Two Zone** – Circulator outputs for DHW or second heating zone
Optional primary/secondary operation

Available for atmospheric or induced draft boilers.

See model designations below.



MODEL NUMBERS

MODEL 4200a

Series _____
 Vent Option _____
 a = Atmospheric
 i = induced
 Mounting _____
 Blank = Internal
 X = External

PART NUMBERS

48-4200

Series _____
 Vent Option _____
 0 = Atmospheric
 1 = Induced
 Sensor _____
 0 = 12" Sensor
 1 = 24" Sensor
 2 = 48" Sensor
 Mounting _____
 Blank = Internal
 X = External

NOTICE

Read these instructions completely before proceeding with the installation and retain instructions for future reference.

WARNING **Electrical shock hazard.** To prevent electrical shock, death or equipment damage, disconnect power supply before installing or servicing control. Only qualified personnel may install or service this control in accordance with local codes and ordinances. Read instructions completely before proceeding.

CAUTION To prevent serious burns, boiler should be thoroughly cooled before installing or servicing control.

WARNING **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 other precautions is recommended for unattended dwellings in climates subject to sustained below-freezing temperatures.

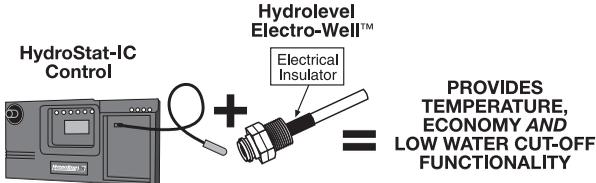
IMMERSION WELLS

HydroStat-IC can be installed with an existing immersion well already in the boiler or with a Hydrolevel Electro-Well™ (sold separately). The low water cut-off function is automatically activated when installed with an Electro-Well™.

IMPORTANT: The control will not provide low water cut-off protection when installed with a standard immersion well.

NOTE: Do not use heat-conducting grease.

**HydroStat-IC installed
with Hydrolevel Electro-Well™**

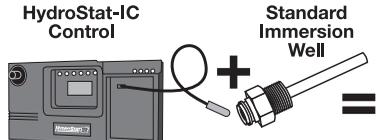


**PROVIDES
TEMPERATURE,
ECONOMY AND
LOW WATER CUT-OFF
FUNCTIONALITY**

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.

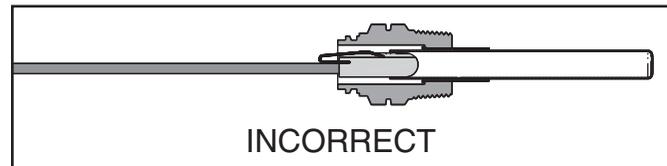
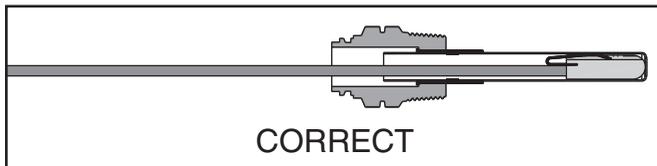
**HydroStat-IC installed
with standard immersion well**



**PROVIDES
TEMPERATURE,
AND ECONOMY
FUNCTIONALITY
ONLY**

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

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



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

REPLACING THE CONTROL

IMPORTANT Make sure that the immersion well or Electro-Well™ is installed in the boiler manufacturer's designated temperature limit control tapping.

NOTE: If installing an Electro-Well, pipe sealing compound should be used. Teflon tape is not recommended.

WARNING All work must be performed by a qualified and licensed professional in accordance with all applicable codes and ordinances.

- 1** Turn off power to the system.
- 2** Unplug the line voltage connection, circulator connector, transformer connector, damper connector, low voltage connector, and ignition wire from the existing control. See Figure 1 next page.
Note: When replacing a Honeywell control with Envirocom, disconnect the wires from the Envirocom terminals and terminate safely. That feature will not be used with the new control.
- 3** Remove the old control from the boiler jacket and install the new control in the same mounting slots.
Note: To activate the low water cut-off feature of the new control, remove the existing immersion well and replace it with a Hydrolevel Electro-Well.

- 4** Reconnect all plug connectors.
- 5** Insert the sensor fully into the well.

WIRING

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

NOTICE All wiring must comply with the National Electric Code or any other state or local codes or regulations.

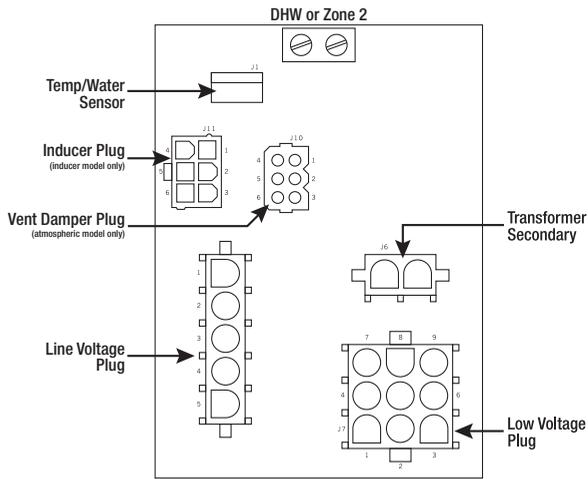
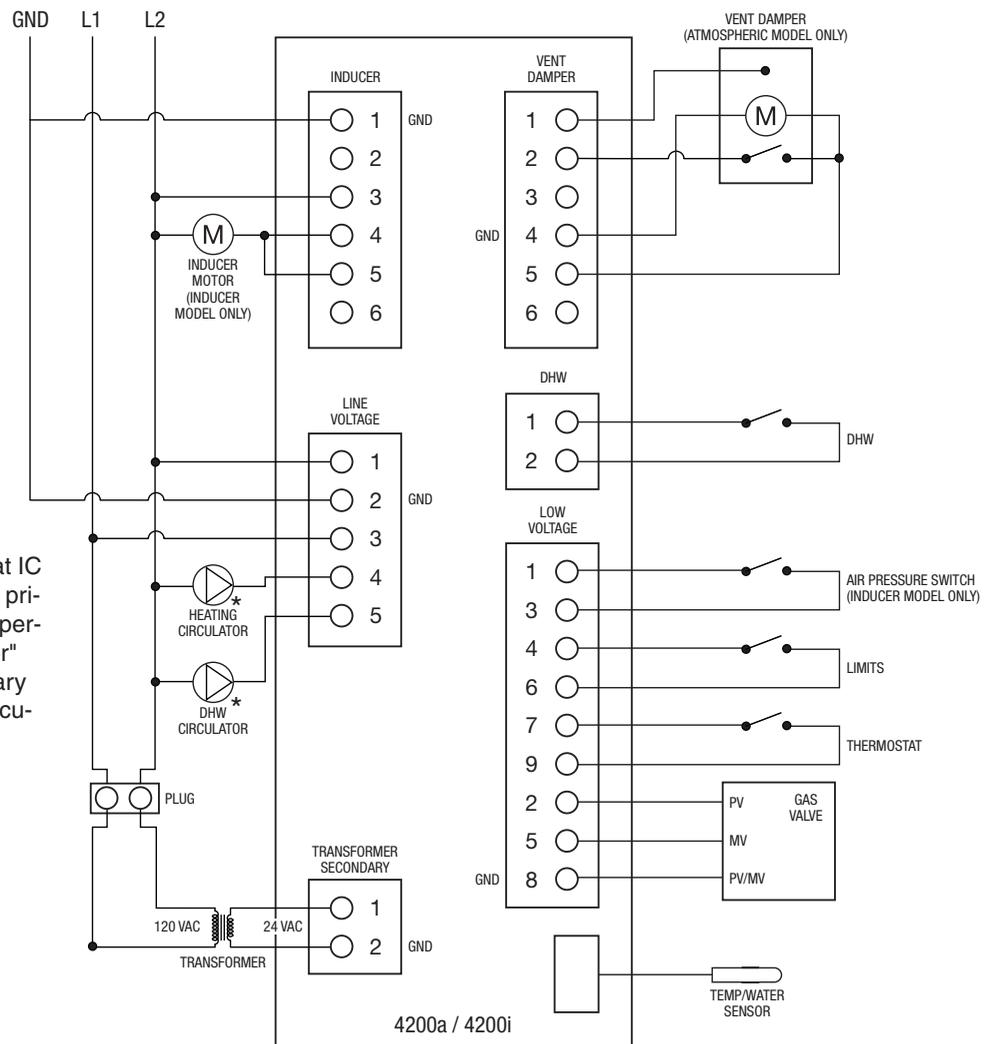
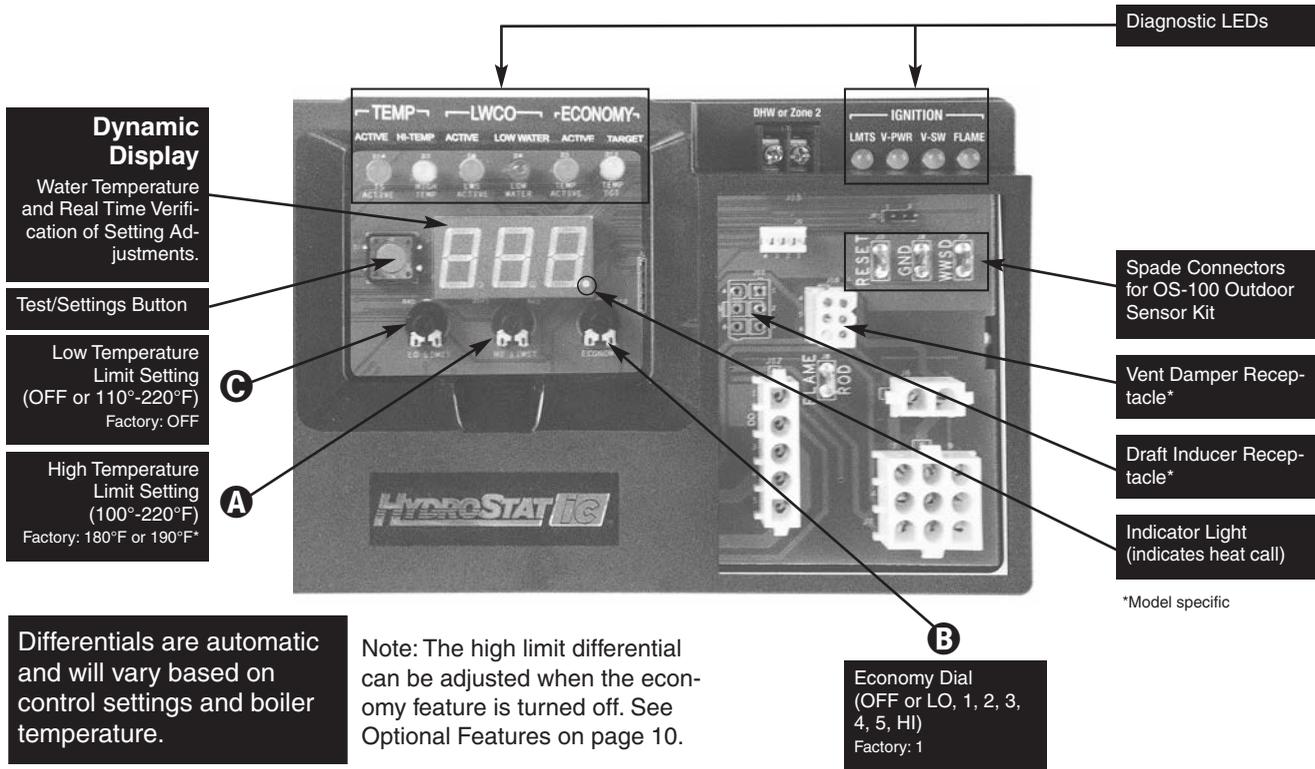


Figure 1

*Note: When the HydroStat IC control is programmed for primary / secondary pump operation, The "DHW circulator" (pin 5) becomes the primary pump and the "heating circulator" (pin 4) becomes the secondary pump.



SETTING THE CONTROL



NOTE: Settings can be checked using the TEST/SETTINGS Button. See page 8 for details.

Setting the High Limit

The high limit is factory set at 180°F or 190°F.* To adjust, turn the HI TEMP Dial **A** until the desired setting is displayed. (Setting range: 100°-220°F)

Setting the Economy Feature

The Economy Feature is factory set for a 1 zone heating system. To adjust, turn the ECONOMY Dial **B** until the number displayed equals the number of heating zones. **Do not include indirect water heaters in the number of heating zones.** The Economy Feature conserves fuel by reducing boiler temperature (see “How Thermal Targeting Works” below). If the heating system is unable to supply needed heat to the house, the ECONOMY Dial should be turned to a lower setting (example: In a three zone house, turn the dial to 2 or 1). Conversely, if the boiler provides adequate heat, added fuel savings can be achieved by selecting a higher setting (example: 4 or 5). If the heating and indirect water heater signals were not separated when wiring the control, the Economy Feature should be turned OFF to ensure the boiler supplies adequate temperature to heat the indirect tank.

*Factory Setting for High Limit may vary by model.

Program/Low Limit Dial

The Program/Low Limit Dial **C** can be used to enter the control’s programming mode to select optional features described on pages 10-12 of this manual. At all other times it should be rotated fully counter-clockwise in the OFF position.

NOTE: One of the features (described on page 12) enables the dial to be programmed for use as a Low Temperature Limit setting. This feature should only be activated for boilers equipped with tankless coils used for domestic hot water production.

SETTING

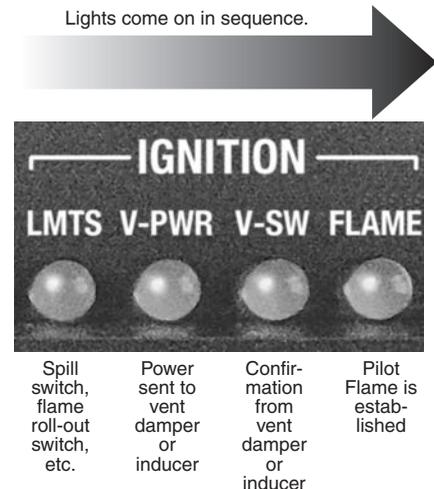
- OFF** Disables economy function. Will allow boiler to fire until hi-limit temp is reached and re-fire with a 10° subtractive differential.
- LO** Provides lowest level of fuel savings. Use this setting only if the house does not stay warm at higher settings.
- 1** Recommended setting for single zone systems
- 2** Recommended setting for Two zone systems
- 3** Recommended setting for Three zone systems
- 4** Recommended setting for Four zone systems
- 5** Recommended setting for Five zone systems
- HI** Provides highest level of fuel savings

HOW THERMAL TARGETING WORKS

Thermal Targeting technology analyzes thermostat activity and continually evaluates how much heat the house requires. When it is very cold outside, the heat demand is high and the HydroStat IC will raise the boiler’s Target temperature to provide needed heat to the home. When the outside temperature is milder, the heat demand is lower. During these periods, the HydroStat IC will lower the boiler’s Target temperature – saving fuel – while continuing to provide comfort to the house.

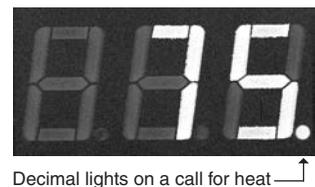
IGNITION SEQUENCING AND FLAME SAFETY

The HydroStat-IC proves the safety limit devices on the boiler before igniting the pilot. As each limit is checked, the corresponding light will turn on indicating the limit is satisfied. If any limits are not satisfied, the corresponding light will blink and the ignition sequence will stop. After ignition, the HydroStat-IC continues to monitor the limit devices, vent damper or air pressure switch, and pilot flame. If any of these are open or the pilot flame is lost, the main valve is immediately de-energized and the corresponding light will blink.



INITIATING BOILER IGNITION

Power the system and set the thermostat to call for heat. The decimal on lower right of the temperature display will light indicating the HydroStat-IC is receiving the call for heat. **Note:** *The HydroStat HI-TEMP, LOW WATER, and TARGET lights must all be off for the startup sequence to continue. If any are on, review page 8 for more information.*



1. Limit Check: The control will check all limits in the burner circuit (ex. spill switch, flame roll out switch) prior to ignition. If all limits are satisfied, the LIMITS light will turn on and the control will proceed to check the venting. If any limit device is not satisfied, the LIMITS light will blink and the control will not proceed with ignition.

2. Venting Check:

- **4200a Control:** Once the limits are confirmed, the control sends power to the vent damper and the green V-PWR light comes on. When the vent damper fully opens and triggers the end switch on the damper, the V-SW light comes on. **Note:** *If the damper end switch does not make within 30 seconds, the green V-SW light will blink. The startup sequence will stop until the damper end switch makes and the green V-SW light comes on.*
- **4200i Control:** Once the limits are confirmed, the control sends power to the inducer motor and the green V-PWR light comes on. When the inducer motor triggers the air pressure switch, the green V-SW light comes on. **Note:** *If the air pressure switch does not make within five seconds, the green V-SW light will blink. The startup sequence will stop until the air pressure switch makes and the green V-SW light comes on.*

DANGER

Carbon Monoxide Hazard: If the burner fires when the vent damper is not fully opened (atmospheric boilers), the inducer fan is not operating (induced draft boilers) or there is any other blockage in the flue, dangerous flue products, such as carbon monoxide, will escape into the living space causing severe personal injury or death. The flue as well as the vent damper or inducer motor must be checked for proper operation before allowing the system to operate.

Initiating Boiler Ignition continued next page

INITIATING BOILER IGNITION continued

3. Pilot Ignition: Once the control receives confirmation from the vent damper or inducer fan, the control will initiate the spark ignitor and turn on the pilot valve to light the pilot. The control will spark the pilot intermittently (approximately one second on followed by one second off) until it verifies that the pilot is lit. Prior to each one-second spark, the display will show the number corresponding to the ignition attempt (01, 02, 03, etc.).

DANGER **Electrical Shock Hazard: The ignition circuit of the control can produce 10,000 volts which can cause severe injury or death.**

4. Pilot Flame Sense: When the pilot flame is sensed, the green FLAME light will turn on. If, after 30 ignition attempts (75 seconds), the control does not sense pilot flame, the pilot valve will de-energize, the spark trials will terminate and the green FLAME light will blink. After a five minute delay, the ignition sequence will retry to ignite the pilot (starting at step 3 above).*

5. Main Burner Ignition: When the pilot flame is sensed, the control energizes the main gas valve to fire the boiler.

*NOTE: The five minute delay will be reset if the call for heat is removed for 45 seconds.

OPERATING CHECK

1. Check Flame Current: With the boiler in operation, press and release the TEST/SETTINGS button four times in short intervals (see page 8 for more details). The display will show the flame current. A good reading is 2.0 (or higher) micro amps. If the reading is not in this range, refer to PROPER PILOT FLAME on page 9 for instructions on adjusting the pilot.

2. High Temperature Limit Check: The high limit shut-off functionality of the control must be tested following installation. On the first run cycle following the system being powered, the control will allow the boiler to fire to the high limit setting. Thereafter, the Economy function (when active) will establish target temperatures often below the high limit setting. To test the high limit shut-off function, recycle power to the control prior to initiating the call for heat. NOTE: The Economy function can also be turned off prior to testing the high limit shut-off. If this method is used, the Economy dial will need to be reset to the desired setting following the test (see page 4 for more details).

Flame Shut Down Sequencing: When the boiler reaches the HI LIMIT setting or the call for heat goes away, the main burner, pilot flame and FLAME light will all turn off.

- **4200a Control:** The damper will begin to close and the V-PWR, V-SW, and LIMITS lights will turn off.
- **4200i Control:** After 15 seconds, the inducer motor will turn off and the V-PWR, V-SW, and LIMITS lights will turn off.

CIRCULATOR OPERATION

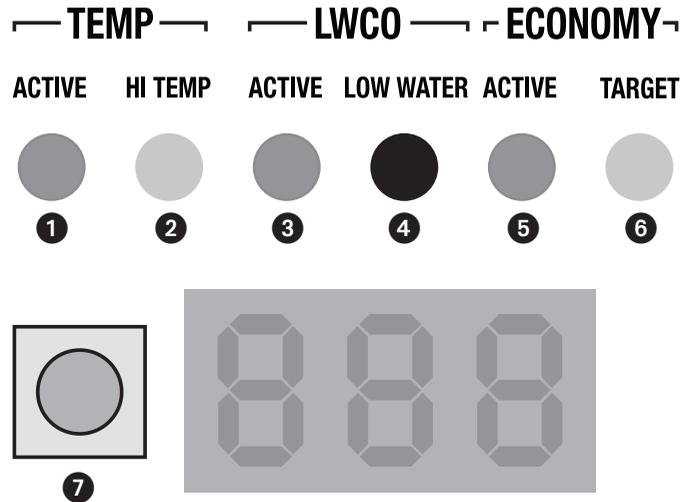
Circulator Hold Off Feature: To reduce the potential for condensing, on a call for heat the HydroStat-IC will allow the boiler to heat to 125°F prior to energizing the heating circulator. Once energized, the circulator will remain on for the duration of the heating call unless the boiler temperature drops below 115°F. If this occurs, the circulator will re-energize when the boiler returns to 125°F. Circulator Hold Off will expire after 15 minutes. This feature can be deactivated – see page 11 for more details.

2-ZONE CIRCULATOR OPTIONS

The HydroStat IC is equipped with a second zone for use with a 120 volt circulator. Unless the control is factory installed on a boiler designed for primary/secondary heating loops, the zone will be set to function with an indirect water heater for domestic hot water (DHW). The T-T input for this zone is the small screw terminals labeled "DHW or Zone2". The zone output is located in the LINE VOLTAGE plug receptacle (see page 3). Note: If the boiler's plug connected to this receptacle does not have 5 wires, then this second zone feature is not available. See page 11 for instructions on selecting one of the following three operating modes.

- **Domestic Hot Water (DHW):** During a call from an indirect water heater, the control will allow the boiler to fire to the high limit setting. It will prioritize the DHW call by de-energizing the heating circulator in the event there is also a call for heat. The control will re-energize the heating circulator when the indirect tank is satisfied or if the boiler temperature reaches 170°F. If the indirect call continues for 45 minutes, the control will override the priority function and re-energize the heating circulator to provide space heating.
- **Zone Heating:** During a call from a second zone thermostat, the control will operate the second zone as it does the primary zone; the Economy function (when Active) will regulate the boiler temperature and no priority will be given to either zone.
- **Primary/Secondary Circulator Operation:** This mode of operation should only be used for boilers or installations utilizing a primary/secondary piping system. When the control is set in this mode, the primary circulator will be controlled by pin 5 of the LINE VOLTAGE connector (See page 3) and the secondary circulator will be controlled by pin 4. The primary pump will turn on any time there is a call for heat, DHW, or low limit. It will remain on after the call is gone until the boiler temp drops to 120°F. The secondary pump will turn on when there is a call for heat (T-T input) and the boiler temp is over 140°F. If the secondary is on and the boiler temp drops below 130°F, the secondary pump will turn off. The secondary pump will not run on a call for DHW or if the control is off on warm weather shutdown. Note: When the control is set for Primary/Secondary pump operation, program mode options 1 (Thermal Pre-Purge) and 5 (Circulator hold off) will default to OFF.

LED LEGEND and TEST/SETTINGS BUTTON



1 TEMP ACTIVE Indicates that the Fuel Smart HydroStat-IC 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-IC prevents burner operation while this LED is on. See Differential explanation on page 12.

3 LWCO ACTIVE Indicates that the low water cut-off (LWCO) function of the HydroStat-IC 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-IC 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 10). 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: ALLOW THE BOILER TO FULLY COOL BEFORE ADDING WATER.

5 ECONOMY ACTIVE Indicates that the Thermal Targeting function is active and the HydroStat-IC will reduce boiler temperature to conserve fuel. The Economy feature is activated using the ECONOMY dial. (See “How Thermal Targeting Works” on page 4 for more information).

6 ECONOMY TARGET When the Economy feature is active, the HydroStat-IC continually sets target temperatures below the high limit setting to maximize fuel efficiency. When the boiler water reaches the target temperature, the LED illuminates and the burner will shut down. The boiler water

will continue to circulate and heat the house as long as the thermostat call continues. The LED will stay lit until the boiler temperature drops below the differential set point at which point the boiler will be allowed to fire again. See Differential explanation on page 12.

NOTE: This LED illuminates regularly during normal boiler operation.

7 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 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:

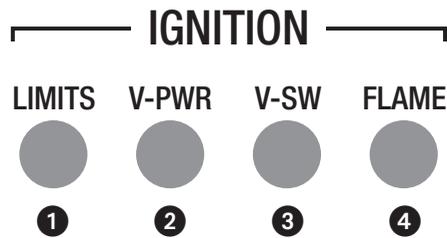
HIGH LIMIT SETTING HL
 ↓
 LOW LIMIT SETTING LL
 ↓
 ECONOMY SETTING ECO
 ↓
 CURRENT TARGET TEMPERATURE* ex. 170
 ↓
 FLAME CURRENT FLR

*NOTE: The “Current Target Temperature” will not be displayed if the “Economy Setting” is off.

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

NOTE: Flame Current reading will remain in the display for 30 seconds to allow for pilot adjustment

IGNITION LED LEGEND and OPERATION



1 LIMITS Illuminates on a call for heat to indicate the external limits are satisfied. (External limits may include flame rollout, spill switch, secondary low water cut-off etc.). If the external limits are open, the LIMITS light will blink.

2 V-PWR Indicates power has been sent to the vent damper (Model 4200a) or the inducer motor (Model 4200i).

3 V-SW Illuminates when the vent damper switch (on an atmospheric boiler) or the air pressure switch (on an induced draft boiler) has made. If the damper end switch (Model 4200a) or the air pressure switch (Model 4200i) fail to make in 30 seconds, the V-SW light will blink.

4 FLAME Illuminates when the pilot flame is lit. If the pilot flame is not sensed within 75 seconds or if flame is lost, the FLAME light will blink.

PROPER PILOT FLAME (with main valve on)

A properly adjusted pilot should have a blue, steady flame with an inner cone that engulfs 3/8" - 1/2" of the flame rod. The flame rod should glow bright orange from the heat and the flame current should be 1.0 μ A to 1.5 μ A with pilot only, or 2.0 μ A+ with main burners operating.

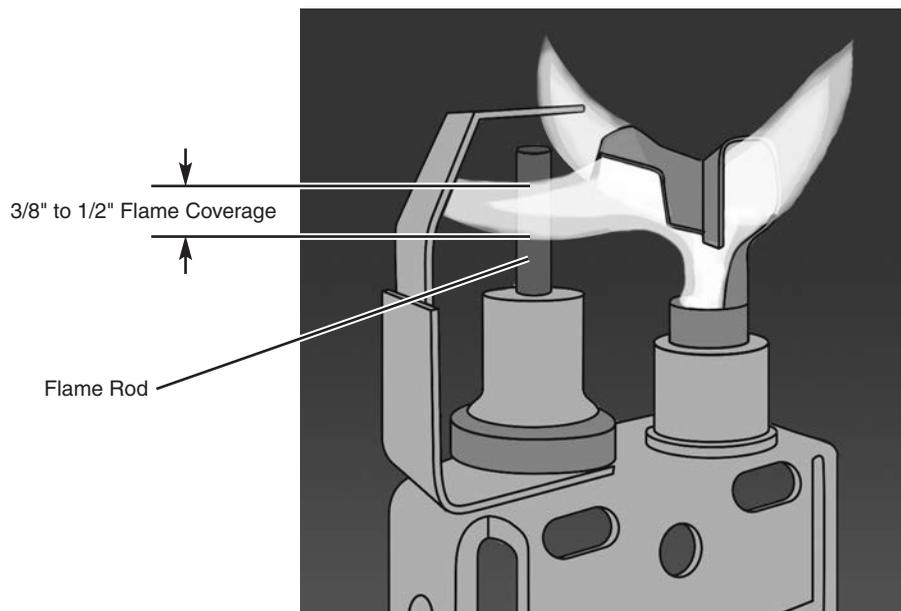
Note: To read flame current see TEST/SETTINGS button on page 8.

If the pilot flame is over sized, orange in color, and blowing far beyond the flame rod then the pilot is over fired. The flame current will read outside of the nominal range and the pilot should be adjusted down.

If the flame is small and the inner cone does not engulf the flame rod then the pilot is under fired. When the pilot is under fired, the flame rod does not glow bright orange. The flame current will read below the nominal range and should be adjusted up.

Note: If the flame current reads below 0.8 μ A, the control will continue to spark as it does not recognize an acceptable flame current.

Refer to the gas valve manufacturer's instructions for adjusting the gas valve.



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. **Note:** When the control is set for Primary/Secondary pump operation, this feature will default to OFF.

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 4)

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 4)

Manual Reset Low Water Cut-Off

The low water cut-off operation on the HydroStat-IC 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.

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

WARNING: DO NOT ADD WATER UNTIL THE BOILER HAS FULLY COOLED.

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 select 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 4)

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.

MORE OPTIONAL FEATURES ON NEXT PAGE

2-Zone Circulator Settings:

The HydroStat-IC is equipped with a second zone designed for a 120-volt circulator that can be set to operate in one of three ways:

- Domestic Hot Water (DHW) for use with an indirect water heater
- A Second Heating Zone
- Primary/Secondary Circulator Operation (Important: For use with primary/secondary piping systems only)

See page 7 for details on the operation of each setting as well as the input and output connections for the second circulator. All controls (except those that are factory equipped on boilers offering primary secondary circulator operation) are factory set in the Domestic Hot Water (DHW) mode. If, the second zone is going to be used for an additional heating zone, or the boiler is installed with a primary/secondary piping system, the setting should be changed using the following instruction:

To change the second zone between DHW (priority), Heating (no-priority), and Primary/Secondary Operation

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 **d** for DHW, **h** for a second Heating zone, or **P** for Primary/Secondary operation.
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 4)

Circulator Hold Off (Enhanced Condensing Protection)

To reduce the potential for condensing, on a call for heat the control will allow the boiler to heat to 125°F prior to energizing the circulator. Once energized, the circulator will remain on for the duration of the heating call unless the boiler temperature drops below 115°F. If this occurs, the circulator will re-energize when the boiler returns to 125°F. Circulator Hold Off will expire after 15 minutes. **Note:** When the control is set for Primary/ Secondary pump operation this feature will default to OFF.

To activate Circulator Hold Off

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 **5**
3. Push the Test/Settings Button to turn Circulator Hold Off **on** or **OFF**
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 4)

MORE OPTIONAL FEATURES ON NEXT PAGE

Low Limit Setting

The HydroStat IC control can provide Low Limit functionality for boilers equipped with tankless coils. When activated, the control will operate the burner to maintain the selected temperature in the boiler at all times.

To activate the Low Limit feature

1. Turn the PROGRAM / LO TEMP dial clockwise to enter the Program Mode –
The display will read **PrO**
2. Turn the HI TEMP dial to select feature **7**
3. Push the Test/Settings Button once. The display will show **On** indicating that the function is now activated (Note: Pushing the button a second time will turn the feature OFF).
4. Adjust the PROGRAM/LO LIMIT dial to set the desired Low Limit temperature you want the boiler to maintain. Note: The Low Temperature setting range is 110° - 220°F. It should be at least 10° lower than the Hi Limit setting.
DANGER: Scald Hazard – Exposure to 125°F or hotter water can cause scalding injuries. A mixing valve should be installed on installations where point of use water temperatures are 125°F or higher.
5. Reset the HI TEMP settings to the desired temperature (see page 4)

Setting the Well Type (Electro-Well vs. Standard Immersion Well)

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 14 for more information).

High Limit Differential

When the Economy feature is on, the control's Thermal Targeting feature actively sets varying differentials based on system conditions. Alternately, if an operator prefers to set a fixed differential, this option allows for selecting a 10, 20 or 30 degree differential when the Economy feature is turned OFF. These optional differential settings are subtractive from the HIGH LIMIT setting.

Note: If the Economy feature is on, this setting will be overridden by the control's Thermal Targeting function.

To change the high limit differential

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 **9**
3. Push the Test/Settings Button to select a high limit differential of **10, 20, or 30**
4. Reset LO TEMP and HI TEMP settings to desired temperatures (see page 4)

OPTIONAL FEATURES continued

Restore Factory Default Settings

To restore all features to the factory default settings (see chart on page 13 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 4)

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	Zone 2 Circulator (Primary/Secondary Operation)	d h p	Domestic Hot Water Circulator Heating Circulator Primary/Secondary Circulator	*See below
5	Circulator Hold Off	ON OFF	Circulator Hold Off – Active Circulator Hold Off – Inactive	ON
6	<i>Not available on this control</i>			
7	<i>Low Limit Dial</i>	ON OFF	Low Limit Dial – Functional Low Limit Dial – Disabled	OFF
8	Well Type	A B	Hydrolevel Electro-Well Standard Immersion Well	A
9	High Limit Differential	10 20 30	10° Differential 20° Differential 30° Differential	10
dEf	Restore Factory Defaults	Y N	Restore Defaults Do Not Restore Defaults	N

NOTE: If the HydroStat is factory-equipped on a boiler, some options may be set differently from the default settings.

SEE PAGE 4 FOR ADDITIONAL SETTINGS

*For boilers equipped with primary/secondary circulators, the default setting for Option 4 is **P** for primary/secondary.

For all other boilers, the default setting is **d** for domestic hot water.

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.**

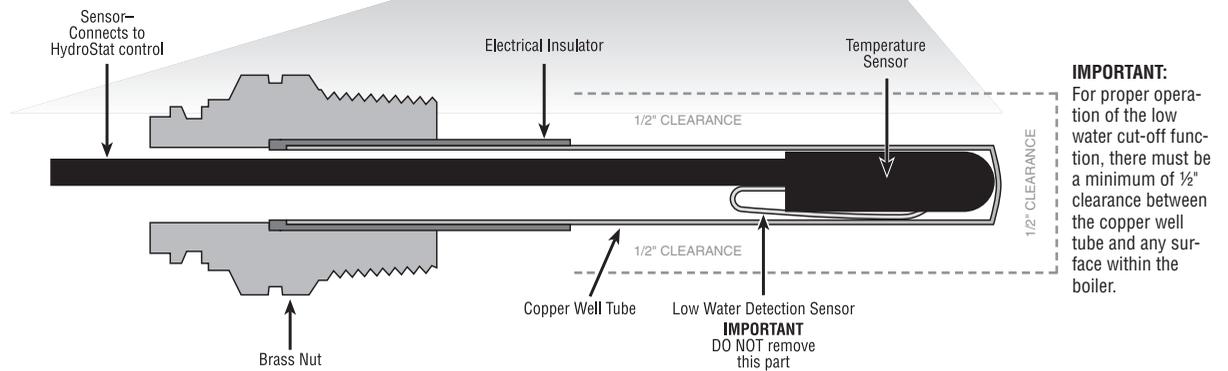
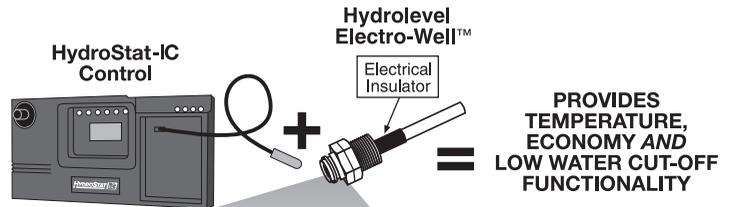
TROUBLESHOOTING

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	For boilers equipped with 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. If installed with an indirect water heater, verify that the end switch in the relay box controlling the indirect water heater is connected to the DHW terminals. This will ensure that the domestic water calls are prioritized.
Low Water Light (Red LED) is On or Blinking	<p> WARNING: A low water condition is a serious and potentially dangerous condition. Do not attempt to add water to a hot boiler. Allow the boiler to fully cool before adding water.</p> <p>When Installed on an Electro-Well™</p> <p>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 10). Pressing the TEST/SETTINGS button after the low water condition is resolved will reset the lock-out condition.</p> <ol style="list-style-type: none"> 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. <p>When Installed on a Standard Immersion Well</p> <p>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. It is recommended when the control is installed on a standard immersion well, set option 8 to b (see page 13 for details).</p>
Error Code in Display	<p>E01 in display: The control is sensing the pilot flame out of sequence. Check the pilot for contamination or check the pilot valve for a leak.</p> <p>E02 in display: The control has an internal circuitry failure and must be replaced.</p>
House Will Not Get or Stay Warm	<ol style="list-style-type: none"> 1. Check for air-bound radiators. 2. Check thermostat settings including heat anticipator settings (common on non-digital thermostats). 3. Check the Economy setting. The Economy feature, much like outdoor reset controls, lowers average boiler temperature and can slow or, in some cases, prevent the house from coming up to temperature. Move to a lower setting (see “Setting the Economy Feature” on page 4).
Heating Circulator Not Energized on Call for Heat	If the Circulator Hold Off is active (see page 11), check to see that boiler water is at or above 125°F. On a call for heat, the control will not permit the circulator to operate if the boiler water temperature is below 125°F.
All LED Lights and Temp Display are Blinking	If the LED lights and the temp display are blinking alternately, this indicates the control has sensed a boiler temperature of 250°F. When this occurs, the control pulses the burner relay and then shuts down and locks out the burner until the temperature falls below 210°F. The system should be analyzed to determine the cause of the overheating condition. Check that the sensor is inserted all the way into the well so it can accurately sense the temperature of the boiler water. Check system wiring and operation as well as the control's high limit setting. If the cause of the overheating condition cannot be determined, the control should be replaced.
5nF in display	Check sensor connection or replace sensor.

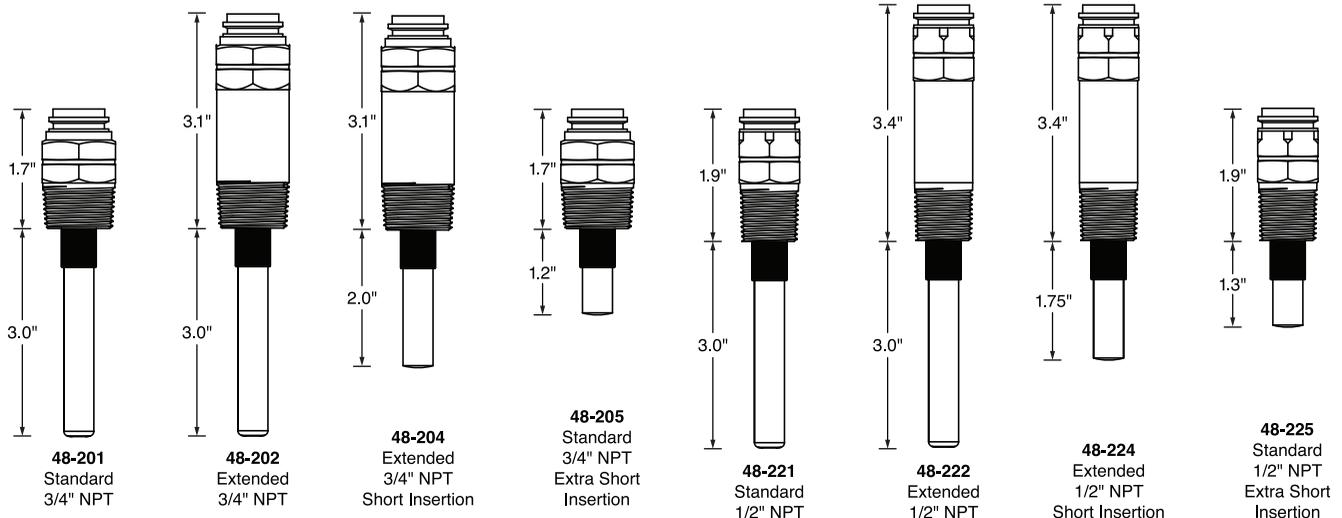
ELECTRO-WELLS

HydroStat-IC installed with Electro-Well™

When installed with the Hydrolevel Electro-Well, HydroStat-IC 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.



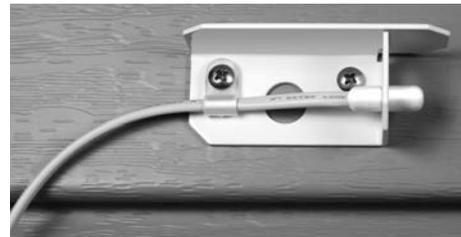
Electro-Well™ Models



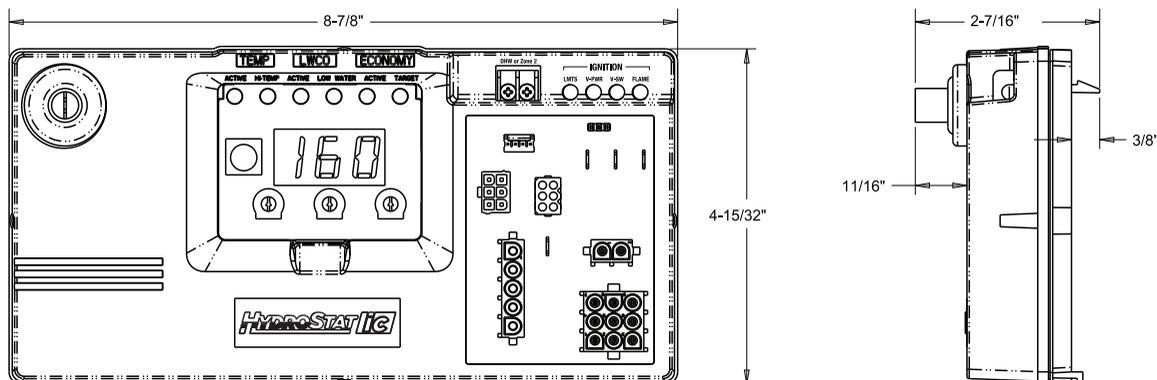
OUTDOOR SENSOR KIT

Hydrolevel's optional Outdoor Sensor Kit automatically activates outdoor reset functionality and warm weather shutdown capability when plugged into the HydroStat-IC control. This low cost, easy to install kit is available separately at Hydrolevel distributors.

Part No.	Description
48-140	Model OS-100 Outdoor Sensor Kit
48-145	Model OS-200 Wireless Outdoor Sensor Kit



DIMENSIONS



SPECIFICATIONS HYDROSTAT-IC 4200 SERIES

<i>Line voltage input:</i>	120 VAC, 50/60 HZ	<i>Main valve:</i>	2 A @ 24 VAC
<i>Low voltage input:</i>	24 VAC, 40 VA	<i>Operating ambient temp:</i>	-4°F (-20°C) to 150°F (66°C)
<i>Inducer (4200i):</i>	6 FLA, 18 LRA @ 120 VAC	<i>Thermostat anticipator:</i>	0.2 A
<i>Vent damper (4200a):</i>	0.5 A @ 24 VAC	<i>Trial for ignition:</i>	75 seconds (may vary by model)
<i>Circulator contacts:</i>	5.8 FLA, 34.8 LRA @ 120 VAC	<i>Re-trial:</i>	5 minutes
<i>Operating range - low limit:</i>	Off or 110°F (43°C) - 200°F (93°C)	<i>Flame current min:</i>	.8 μA
<i>Operating range - high limit:</i>	100°F (38°C) - 220°F (104°C)	<i>Flame current max:</i>	7.3 μA
<i>Pilot valve:</i>	2 A @ 24 VAC		



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.

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