

# Robertshaw®

## INSTALLATION DATA

### 110 SERIES

### GAS WATER HEATER THERMOSTAT

### L.P. GAS MODELS

The Robertshaw® 110 Series Water Heater Thermostat Uni-Kit® is designed for universal replacement applications. All models feature a built-in, noncycling Energy Cut-Off (ECO) system to shut off all gas to the heater in case of excessive water temperatures. All models have a 5-1/2" sensing element and vary by inlet and outlet size, shank length, high temperature stop, and regulator type and setting.



To avoid possible injury, fire and explosion, please read and follow these precautions and all instructions on the appliance. This bulletin is intended as a guide to qualified servicemen installing or servicing Robertshaw Controls. Repairs, adjustments and servicing should be limited to the operations listed in this bulletin or on the appliance.

#### FOR YOUR SAFETY - WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas suppliers instructions.
- If you cannot reach your gas supplier, call the fire department.

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



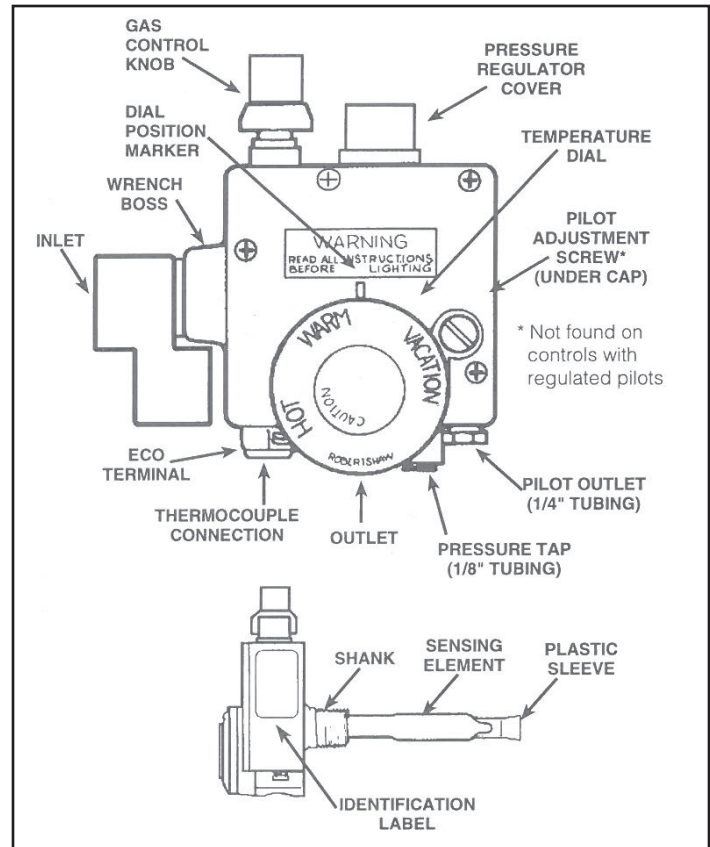
#### CAUTION

THIS DEVICE SHOULD BE INSTALLED BY A QUALIFIED SERVICE TECHNICIAN WITH DUE REGARD FOR SAFETY AS IMPROPER INSTALLATION COULD RESULT IN A HAZARDOUS CONDITION.

#### PRE-INSTALLATION INSTRUCTIONS

Turn off gas to equipment before servicing.

1. Shut off water supply to heater and all hot water outlets.
2. DO NOT remove the protective plastic sleeve from the copper sensing tube. Apply a small amount of pipe thread compound to the brass shank threads. Remove the defective thermostat and install the new unit. DO NOT use a pipe wrench on the control body. Recommended method to tighten the thermostat is to screw a short (8"-10") piece of correctly sized pipe into the INLET boss and use this pipe as a handle. Insertion of any other object can cause internal damage resulting in a hazardous condition.
3. Prior to connecting piping to the thermostat, check inlet gas pressure to make sure it does not exceed 1/2 PSI (14" W.C.). High pressure can damage the control causing a hazardous condition.
4. If it is not already installed, a drip leg (sediment trap) should be added to the gas supply line to the control. All piping must comply with local codes and ordinances and with National Fuel Gas Code (ANSI Z223 .1/NFPA. No. 54).



5. Make sure that the piping is clean and free from scale and burrs. To the gas inlet being used. (NOTE: Do not use Teflon tape or Teflon compound.) Connect piping to inlet and outlet of control. Thread compound should be used sparingly and on male threads only, leaving first two threads clean. Pipe dope or thread compound should never be used on female threads as it may be pushed into control body, possibly causing the valve to stick or fail to close. **CAUTION:** Do not use pipe compound on outlet connections when control has a "flare" outlet.
6. Connect pilot line making sure it is free of burrs and dirt. Use fitting provided and tighten for gas seal. **DO NOT** bend tubing after tightening.
7. Connect thermocouple. The thermocouple nut should be started and turned all the way in by hand. An additional quarter turn with a small (4") wrench will then be sufficient to set the lock washer. **DO NOT** overtighten nuts as this may damage the thermocouple or magnet and is unnecessary.
8. Leak test after installations with main burner "ON" and "OFF". Coat pipe and tubing joints with soap solution. Bubbles indicate leaks that must be corrected.





## LP. GAS WARNING



To avoid possible injury, fire and explosion, please read and follow these precautions and all instructions on appliance before lighting the pilot. L.P. (Propane) gas is heavier than air and will remain at **floor level** if there is a leak. Before lighting, sniff at **floor level**. **If you smell gas**, follow these rules:

1. Get all people out of building.
2. **DO NOT** light matches. **DO NOT** turn electric lights or switches on or off in area. **DO NOT** use an electric fan to remove gas from area.
3. Shut off gas at L.P. tank outside of building.
4. Telephone gas company and fire department. Ask instructions.

Before hanging up, give your name, address, and phone number. **DO NOT** go back into building. If help is coming wait for them to arrive.

If L.P. tank runs out of fuel, turn off gas at the appliance. After L.P. tank is refilled, appliance must be relit according to manufacturer's instructions. If the gas control has been exposed to **WATER** in any way, **DO NOT** try to use it. It must be replaced. **DO NOT** attempt repair on gas control or appliance.

Tampering is **DANGEROUS** and voids all warranties.



### CAUTION

WE RECOMMEND REPAIR AND ADJUSTMENTS BE LIMITED TO THE OPERATIONS LISTED, WHICH OUR EXPERIENCE SHOWS ARE PRACTICAL SERVICE OPERATIONS.

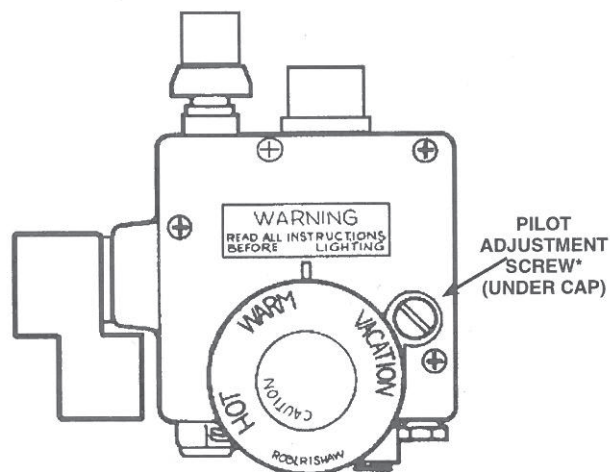
**CAUTION:** If control has been exposed to water in any way, it must be replaced.

## PILOT BURNER ADJUSTMENT

**NOTE:** Pilot cannot be adjusted on controls with a pilot regulator. Such controls are easily identified because they do not have a pilot adjustment screw.

1. Remove Pilot Adjustment Cap.
2. Adjust Pilot Adjustment Screw to provide properly sized flame on the thermocouple. The flame should cover the upper 3/8" of the tip.
3. Replace Pilot Adjustment Cap.

**CAUTION:** The gas control knob must be in either the "OFF", "PILOT" or full "ON" position. Do not use it to adjust gas flow. An incorrect burner flame can result.



## TO TURN WATER HEATER ON

1. Turn gas control knob clockwise to "OFF" position.
2. Turn temperature dial to its lowest temperature setting. **CAUTION:** Temperature dial and the gas control knob and reset button should only be operated by hand. If more force is required, control must be replaced. Never use any tools.
3. Remove burner outer and inner door.
4. **CAUTION:** Wait five minutes to allow gas which may have accumulated in burner compartment to escape. (See WARNING above for L.P. applications.)
5. If you don't smell gas, turn gas control knob counterclockwise to "PILOT" position.
6. Hold lighted match at pilot burner. **CAUTION:** If pilot lights without depressing gas control knob, replace control. Depress and hold gas control knob down completely and light the pilot. Continue to hold the gas control knob down for about one (1) minute after the pilot is lit. Release gas control knob and it will pop back up. Pilot should remain lit. If it goes out repeat steps 4 and 6. **CAUTION:** If gas control knob does not pop up when released or if pilot will not stay lit after several tries, turn the gas control knob to "OFF" and test system as explained under "SERVICE INSTRUCTIONS - AUTOMATIC PILOT SYSTEM."
7. Replace burner inner and outer door.
8. Turn gas control knob counterclockwise to "ON" position.
9. Set water temperature dial to desired temperature. **CAUTION:** Hotter water increases the risk of scald injury.

**CAUTION:** Keep combustible material away from gas appliance. Keep burner area clean and free of dust and lint.

## TO SHUT WATER HEATER OFF

1. Turn temperature dial to lowest setting.
2. Turn gas control knob to "OFF" Do not force.
3. IF CONTROL FAILS TO TURN OFF, shut off gas ahead of control at line valve or meter. Replace control.

## MAIN BURNER PRESSURE REGULATOR AUTOMATIC PILOT SYSTEM

There are four major causes of pilot outage in the automatic pilot systems.

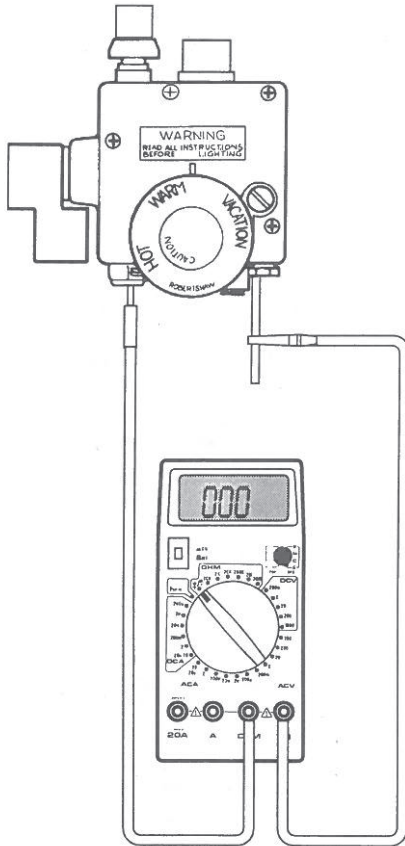
1. ECO contacts have opened due to an over-temperature condition.
2. Improper pilot operation.
3. Low output thermocouple.
4. Inoperative automatic pilot magnet.

## SERVICE INSTRUCTIONS (Continued)

### ECO check

To perform the following test, use your test meter.

1. Remove thermocouple from control.
2. Set test meter for checking continuity: set dial to  $\frac{1}{2}$ .
3. Attach alligator clip to pilot tubing.
4. Insert probe fully into magnet opening where thermocouple was attached. Be sure probe is straight and apply a slight upward pressure. Make sure probe touches only the contact in the center of the magnet, and not the thermocouple threading. (Wrap probe with tape to within 1/32" of tip.)
5. If continuity is indicated (listen for audible beep), Energy Cut-Off is



good. If continuity is not indicated, replace control. DO NOT operate the control with the ECO removed from circuit as this can create an unsafe condition.

**CAUTION:** The ECO is designed to open in an over-temperature situation, it is a noncycling safety device. If ECO is shown to be open (no continuity), you must determine the nature of the cause and take corrective action before installing another replacement control.

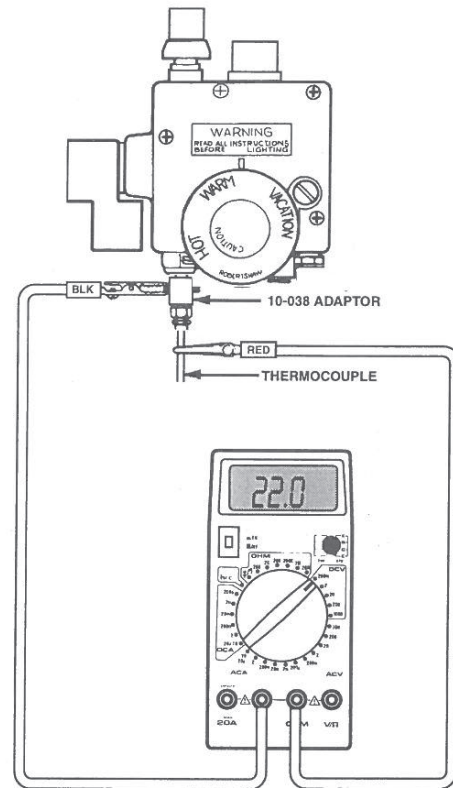
**NOTE:** Every control has its ECO 100% inspected for proper operation four times during the manufacturing process. Therefore controls with open (blown) ECOs will not be eligible under warranty.

### Thermocouple check

To perform the following test, use your test meter.

1. Check for proper pilot operation. Flame should cover the upper 3/8" of the thermocouple tip.
2. Unscrew thermocouple from control.

3. Screw Robertshaw adaptor 10-038 (ordered separately) into control as shown below.



4. Screw the thermocouple into the 10-038 adaptor as shown above.
5. Connect the test meter leads as shown in the figure above: black lead to thermocouple, red lead to the 10-038 adaptor.
6. Set test meter to the DCV/200m scale.
7. Follow normal pilot lighting procedure with adaptor and millivolt meter attached as shown. Light pilot and allow it to heat tip of thermocouple for three minutes.
8. If meter reads below 13 millivolts, replace thermocouple. If meter reads 13 millivolts or more, the thermocouple is good.

### Magnet check

To perform the following test, use your test meter.

1. After testing thermocouple and replacing if necessary as described above, and checking Energy Cut-Off, follow normal pilot lighting procedure with adaptor and millivolt meter attached as shown for thermocouple check.
2. Allow pilot to burn for three minutes.
3. Note millivolt reading on meter and blow out pilot.
4. Magnet should continue to hold for a drop of five millivolts or more before it releases. A "snap" can be heard when magnet releases. If magnet does not hold for a drop of at least five millivolts, replace control. Magnet is good if it holds for a drop of five millivolts or more.

## SERVICE INSTRUCTIONS (Continued)

### MAIN BURNER PRESSURE REGULATOR ADJUSTMENT

The main burner pressure regulator adjustment screw is located under a plastic cover. The adjustment screw slot is filled to seal the factory pressure setting. The regulator should never need adjustment.

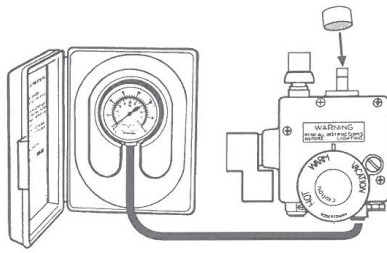
If however, the main burner flame appears too high or too low, the main gas pressure regulator may be checked and adjusted as follows by a qualified serviceman.

Attach manometer or pressure gauge to outlet pressure tap. With main burner "ON" outlet pressure should equal "main burner pressure" specified on side of control. If it does not, adjust the regulator as follows:

1. Remove regulator adjustment cap by pulling it straight off.
2. With a small screwdriver, remove sealant from the adjustment screw slot if necessary.
3. Watching manometer, rotate adjustment screw clockwise to increase, or counterclockwise to decrease pressure.

Problems															
PILOT LIGHTS WITHOUT DEPRESSING RESET BUTTON	DELAYED IGNITION	SOOTING	BURNER FLAME YELLOW LAZY	BURNER FLAME NOISY	BURNER FLAME TOO HIGH	BURNER POPS OFF	FLAME IN MIXING TUBE	PILOT WILL NOT STAY ON	NOT ENOUGH HOT WATER	HEATS TO SLOWLY	BURNER WILL NOT COME ON	BURNER WILL NOT SHUT OFF	BURNER FLAME FLOATS	COMBUSTION ODORS	WATER TOO HOT
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Possible Causes	Possible Cures
TOO MUCH PRIMARY AIR	ADJUST AIR SHUTTER
NOT ENOUGH PRIMARY OR SECONDARY AIR	ADJUST AIR SHUTTER AND SUPPLY
DIRT IN BURNER ORIFICE	CLEAN ORIFICE
BURNER VENTURI & PORTS CLOGGED	CLEAN VENTURI & PORTS
WRONG ORIFICE	INSTALL CORRECT ORIFICE
DRAFTS	SHIELD OR ELIMINATE DRAFT
CLOGGED FLUE	CLEAN FLUE
DEFECTIVE MAGNET VALVE	REPLACE THERMOSTAT
FAULTY THERMOCOUPLE	REPLACE THERMOCOUPLE
POOR THERMOCOUPLE CONNECTION	CLEAN AND RETIGHTEN
PILOT LINE OR ORIFICE CLOGGED	CLEAN PILOT LINE AND ORIFICE
WRONG PILOT SIZE OR LOCATION	CHECK ORIFICE OR RELOCATE PILOT
PILOT FLAME NOT ON THERMOCOUPLE	ADJUST PILOT
IMPROPER GAS PRESSURE	ADJUST PRESSURE REGULATOR
DIRT ON VALVE SEAT	REPLACE THERMOSTAT
NO GAS	CHECK GAS SUPPLY
HEATER UNDERSIZED	INSTALL LARGER HEATER
FAULTY THERMOSTAT	REPLACE THERMOSTAT
ENERGY CUT-OFF OPEN	CHECK ENERGY CUT-OFF †
THERMOSTAT SET TOO LOW	SET TO HIGHER TEMPERATURE *
THERMOSTAT SET TOO HIGH	SET TO LOWER TEMPERATURE
INCORRECT CONVERTIBLE SETTINGS	CHECK MAIN & PILOT CONVERTIBLE SETTINGS



4. Replace regulator adjustment cap and outlet pressure cap.

CAUTION: The gas control knob must be in either the "OFF", "PILOT", or full "ON" position. Do not use it to adjust gas flow. An incorrect burner flame can result.

### TROUBLESHOOTING

1. Discuss complaint with users to get their version of problems.
2. Refer to water heater manufacturer instructions.
3. Inspect water heater and surrounding area.
4. Check for gas leaks, water leaks, soot, drafts and the availability of fresh air.
5. Note temperature dial setting and gas control knob position.
6. Check main burner flame and pilot flame characteristics. The chart below shows a partial list of problems and possible cures.

\* CAUTION: Hotter water increase the risk of scald injury.



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