

# Robertshaw®

## INSTALLATION DATA 710 SERIES LOW CAPACITY GAS HEATING CONTROLS

The Robertshaw® 710 Series gas controls are designed for a wide variety of low capacity heating applications. Models are available for Manual, Millivolt, Hydraulic and 24 Volt. Models are available with and without a pressure regulator. Controls are multiposition and can be mounted in any position (except upside down).

### SPECIFICATIONS

#### ELECTRICAL RATINGS

24 Volt Models	12 VDC - 0.18 Amps
	24 VAC - 0.2 Amps
Millivolt models	250 MV to 750 MV
	(Two-lead Thermopile only)

#### PRESSURE REGULATOR (Optional by Model)

Natural Gas	Factory set at 3.5" W.C.
L.P. Gas	Separate or field addable only

CAPILLARY LENGTH (Hydraulic Models Only) 18" or 36"

BULB O.D. & LENGTH (Hydraulic Models Only) 1/4" x 8"

INLET/OUTLET 3/8" FPT or 1/2" pipe depending on model

PILOT/OUTLET 1/4" Tubing

AMBIENT TEMPERATURE - 40°F to 175°F

MAXIMUM INLET PRESSURE 1/2" PSI Max.

#### CAPACITY

1" Pressure Drop	40,000 BTU/Natural Gas
	64,000 BTU/L.P. Gas
Maximum	70,000 BTU/Natural Gas
	112,000 BTU/L.P. Gas

TEMP. RANGE (Hydraulic Heating Models Only) 58°F to 90°F

#### DIAL EQUIVALENTS (approximate)

Dial Position	Low	1	2	3	4	5	6	7	8	HI
Temperature °F	53	58	62	66	70	74	78	82	86	90

TEMP. RANGE (Catering Truck Model) 100°F to 250°F

#### DIAL EQUIVALENTS (approximate)

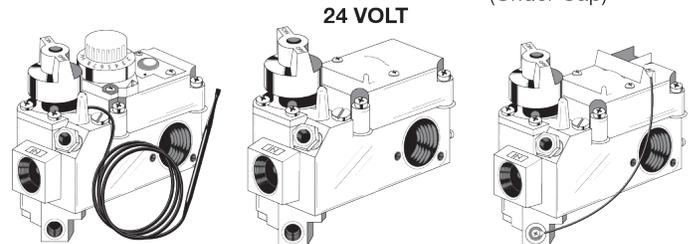
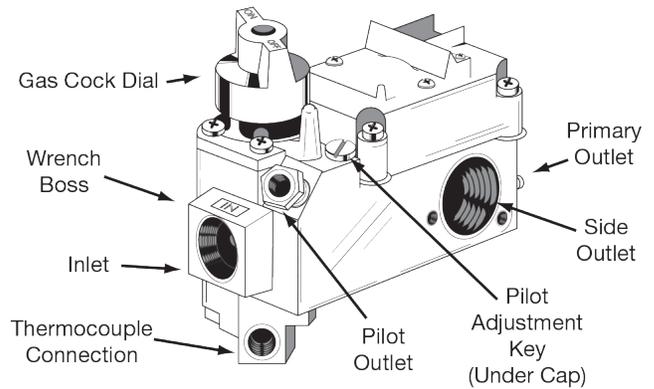
Dial Position	Low	1	2	3	4	5	6	7	8	HI
Temperature °F	100	128	145	160	175	194	208	223	238	250

### INSTALLATION INSTRUCTIONS

**Turn off gas supply and electrical power to equipment before servicing.**

#### PIPING

1. Check replacement valve for multiple outlets (side outlets). If it has them, be sure all unused outlets are plugged using the socket plugs provided.
2. Pipe or tubing must be clean and free of scale and dirt.
3. Make sure gas piping is pressure tested before control is connected. High pressure can damage control causing a hazardous condition. Do not subject control to more than 1/2 PSI, (14" W.C.) inlet pressure.
4. If it is not already installed, a drip leg (sediment trap) must be added to the gas supply line to control. (See figure to the right.) All piping must comply with local codes and ordinances and with National Fuel Gas Code (ANSI Z223. 1/NFPA, No. 54).
5. Using pipe thread compound or tape (suitable for gas), apply a small amount on the male pipe threads. Leave the first two threads clean. Never use compound on female threads as it might be pushed into the control body.
6. The gas valve is multiposition and can be mounted in any position (except upside down) without affecting its operation.

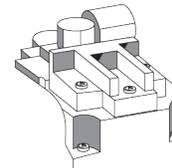


HYDRAULIC

MANUAL

MILLIVOLT

#### CONTROL VOLTAGE VERIFICATION



#### TERMINAL BLOCK COLOR CODING

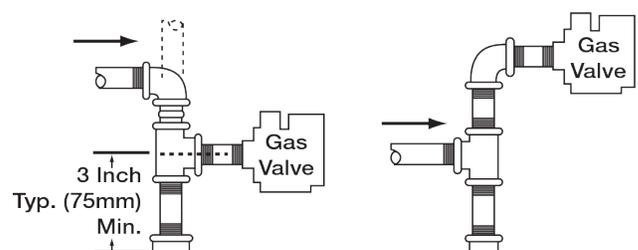
RED = MILLIVOLT  
BLACK = 24 VOLT



#### 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.

7. Install gas valve so gas flow conforms with the inlet and outlet of the control.
8. **DO NOT** insert any object other than suitable pipe or tubing in the inlet or outlet of this control. Internal damage may occur and result in a hazardous condition. A backup wrench should only be used on the wrench boss provided for this purpose, never on the body of the control, as this could distort the casting. **NOTE:** Do not overtighten any pipe connections, as this could crack the valve body. A valve with a cracked valve body will not be warranted.



DRIP LEG

## INSTALLATION INSTRUCTIONS (Cont'd)

### PILOT TUBING

1. Make sure tubing is free of burrs and dirt.
2. We strongly recommend that the pilot orifice be checked and cleaned if necessary at this time.
3. Connect pilot tubing into the control using fitting provided, and tighten for a gas tight seal.

### PRESSURE REGULATOR VENT

The 710, when equipped with a pressure regulator, has as standard equipment a built-in Vent Limiter. The regulator vent is tapped 1/8" tubing. Use 4590-065 tubing fitting if vent tubing is required.

**CAUTION:** If bleed tubing is used, do not allow main burner or pilot flame impingement on the tubing as this will eventually cause clogging of the tubing and improper regulator operation. If bleed tubing is not used, the regulator vent must be properly shielded from moisture.

### THERMOCOUPLE CONNECTION

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. **CAUTION:** Overtightening may cause damage to the thermocouple or magnet and is unnecessary.

### HYDRAULIC MODELS

1. **NOTE:** Capillary is liquid-filled and sharp bends are to be avoided.
2. Sensing bulb positioning is important. Attach remote sensing bulb into the existing clips provided by the manufacturer of the equipment.
3. On models with oval capillary or remote dial, install remote dial unit into panel opening provided by the manufacturer.
4. For installations requiring a remote dial drive rod to operate the gas cock dial, order 1751-009 Drive Rod Adaptor Kit. Install as follows:
  - A. Remove and discard original screw in the center of the gas cock dial.
  - B. Position adaptor on top of the gas cock dial as shown.
  - C. Using the new longer screw provided, tighten adaptor into place and install drive rod.

## WIRING

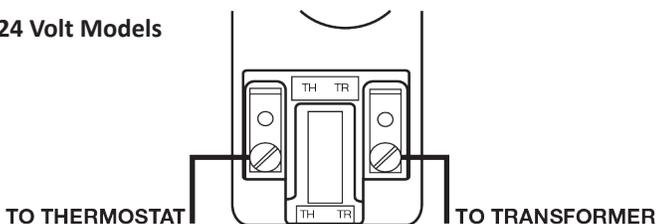
### 24 Volt Models

1. Check the system for the proper transformer by comparing the VA ratings of the transformer and the system. The system rating is determined by multiplying the voltage draw times the Amp draw. Normally 20VA transformers are sufficient for heating only applications and 40VA for heating/cooling applications.
2. Connect lead from transformer to "TR" terminal on gas valve operator-see drawing below.
3. Connect lead to wall thermostat to "TH" terminal on gas valve operator-see drawing below.

### Millivolt Models

Most appliances manufactured in the USA and Canada manufacture to meet the standards set forth by the American National Standards Institute (ANSI). A recent revision in the standards "miswiring requirements for gas valves" was effective January 1, 1996. The reason for this standard was so that you as a service technician could disconnect the gas valve wires and reconnect them without making a mistake. Therefore all Robertshaw millivolt gas valves now meet the

### 24 Volt Models



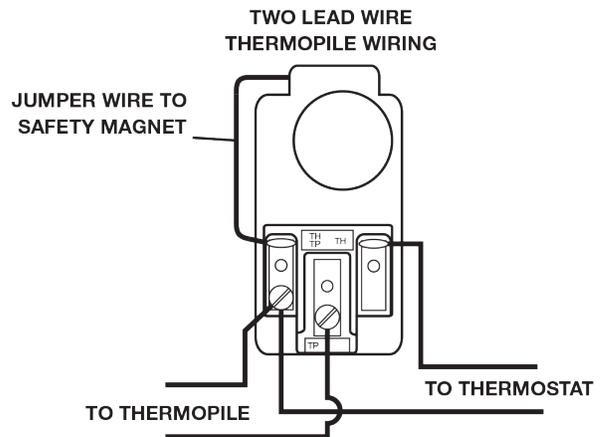
## Wiring (Cont'd)

new standard. The 710-500 series millivolt gas valves now have a 1/4" quick connect terminal and a 3/16" quick connect terminal on the terminal block. There is NO terminal screw (or threads) on the side that has the 3/16" terminal. If your old application used a terminal screw, you will need to use a 3/16" adaptor terminal.

The 710-500 Series millivolt valves are designed to operate with 1950 Series two-lead thermopiles only. These valves will also operate with any competitive (two-lead) thermopiles having outputs of 250 MV to 750 MV.

For best operation of a Millivolt system, the lead wires from the valve to the wall thermostat should not exceed the recommended maximum length shown below:

Wire Size	Wire Length	Wire Size	Wire Length
14 GA.	100 FT.	20 GA.	25 FT.
16 GA.	64 FT.	22 GA.	16 FT.
18 GA.	40 FT.		



## Operating Instructions

### WARNING

#### L.P. GAS APPLICATIONS

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:

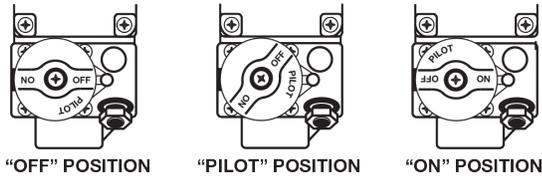
1. Get all people out of building.
2. **DO NOT** light matches. **DO NOT** turn electrical lights or switches on or off in area. **DO NOT** use an electric fan to remove gas from area.
3. Shut off gas at L.P. tank outside of building.
4. Telephone gas company and fire department. Ask instructions. Before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

**DO NOT** go back into the building. If help is coming, wait for them to arrive.

If L.P. tank runs out of fuel, turn off gas 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 valve or appliance.

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

## PROCEDURE FOR LIGHTING OR RELIGHTING



Dials must be operated by hand. DO NOT use pliers, wrenches or other tools to turn dials.

The Gas Cock Dial has a dual function:

- A) Complete control of gas to pilot and main burner.
- B) When in pilot position, it is the reset mechanism for the automatic pilot.

The Gas Cock Dial cannot be turned to "OFF" position without first depressing dial in "PILOT" position and then rotating to "OFF".

1. Depress and turn Gas Cock Dial to "OFF" position.
2. Turn temperature dial (hydraulic models) or wall thermostat (24V and millivolt models) to "OFF" or lowest setting.
3. Wait at least 5 minutes (10 minutes for L.P. gas) to allow gas which may have accumulated in burner compartment to escape.
4. Turn Gas Cock Dial to the "PILOT" position.
5. Hold match at pilot burner. **CAUTION:** If pilot lights without depressing Gas Cock Dial replace control. Depress and hold Gas Cock Dial while lighting pilot burner. Allow pilot to burn approximately one half minute. (1-1/2 minutes for millivolt models) before releasing Gas Cock Dial. If pilot does not remain lighted, repeat operation allowing longer period before releasing Gas Cock Dial. (Adjust pilot, if necessary, as noted under "Pilot Burner Adjustment.") The thermocouple or thermopile may also be defective and should be checked out. (See SERVICE INSTRUCTIONS.)
6. Refer to specific model to the right.

### Manual Models Only

The appliance is now in operation. When heat is desired, turn Gas Cock Dial to "ON" position. When heat is no longer required, turn Gas Cock Dial back to "PILOT" position.

### Hydraulic Models

Turn Gas Cock Dial to "ON" position and turn temperature dial to desired position. Allow burner to cycle on and off.

### 24 Volt and Millivolt Models

Turn Gas Cock Dial to "ON" position and set wall thermostat to desired temperature. Allow burner to cycle on and off.

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

### LEAK TEST

Test for gas leaks after valve installation with main burner on. Use a rich soapy water, and paint all piping and tubing joints liberally. Bubbles are indicative of a leak.

### SERVICE INSTRUCTIONS

**CAUTION:** If control has been exposed to water in any way, it must be replaced. If gas valve fails to shut off, do not turn off electrical power. Turn off gas supply allowing fan or circulating pump (if so equipped) to continue running until system has cooled. Replace control.

### AUTOMATIC PILOT SYSTEM

To perform the following test, we recommend using our 900-040 test meter. There are three major causes of pilot outage in the automatic pilot systems.

1. Improper pilot operation.
2. Low output thermocouple or thermopile.
3. Inoperative automatic pilot magnet.

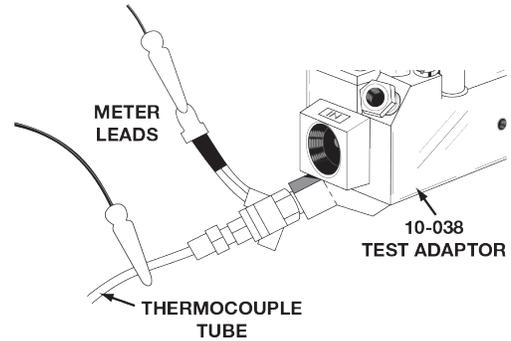
Test procedures and steps to follow in checking each component of the automatic pilot systems are listed.

### Thermocouple Check (Except Millivolt)

A closed circuit millivolt check is used to check thermocouple output.

This check is performed as follows:

1. Check for proper pilot operation.
2. Use a millivolt meter with a 0-50 millivolt range.
3. Connect Adaptor Part No. 10-038 and millivolt meter leads as shown in figure below. Be sure connections are snug.
4. Follow standard lighting procedure.
5. Check closed circuit thermocouple output, if less than eight millivolts, replace with Robertshaw 1970 or 1980 thermocouple.
6. Repeat standard lighting procedure after thermocouple replacement.



### Automatic Pilot Magnet Check (Thermocouple Type)

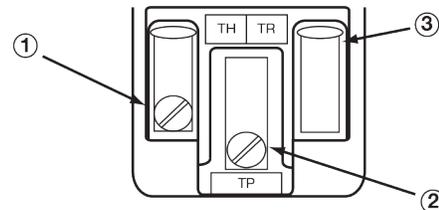
If the closed circuit check shows thermocouple output is greater than eight millivolts and pilot will not remain lit when reset button is released after initial lighting procedure, check operation of pilot magnet as follows:

1. Adaptor Part No. 10-038 should remain connected in system as shown in figure on bottom of page.
2. Follow standard lighting procedure and continue holding reset button down.
3. Allow thermocouple output to stabilize and note meter reading.
4. Extinguish pilot by releasing reset button and turning GAS COCK DIAL to "OFF" position.
5. A good magnet should remain locked up for a drop of five millivolts or more from the original stabilized reading before releasing.
6. If magnet does not operate properly, replace the valve.
7. Repeat standard lighting procedure.

### Millivolt System

The millivolt system and individual components may be checked with a millivolt meter having a 0-1000 MV range. Before checking system, be certain wall thermostat lead wire does not exceed length recommended in Wiring Section Table, and all connections are clean and tight.

Conduct each check shown in chart shown below by connecting meter test leads to terminals as indicated. All readings are closed circuit.



COMPONENT CHECK	CONNECT METER TEST LEADS TO TERMINALS	WALL THERMOSTAT CONTACTS SHOULD BE	METER READING SHOULD BE	CHECK RESULT ON PAGE 4
Valve Operator System	2 & 3	Closed	Greater Than 100 MV	A
Wall Thermostat	1 & 3	Closed	Less Than 80 MV	C
Thermopile and Magnet	1 & 2	Open	Greater Than 325 MV	B

## SERVICE INSTRUCTIONS (Cont'd)

### A. TEST RESULTS

If the reading is more than 100 millivolts and the automatic valve does not come on, replace the valve operator. If the closed circuit reading is less than 100 millivolts, determine the cause by proceeding with steps "B" and "C".

### B. TEST RESULTS

If "B" reading is less than 325 MV, clean and tighten all electrical connections and adjust pilot if necessary to increase millivolt output. If unable to adjust to at least the specified minimum, change the thermopile.

When proper thermopile output is obtained the magnet may then be checked. With pilot in operation, allow meter reading to stabilize. Extinguish pilot burner and note meter reading at dropout point of magnet. If magnet remains locked up to a reading of 120 MV or less, the magnet is good.

### C. TEST RESULTS

If "C" reading is more than that specified for the system being checked, clean and tighten thermostat leads and connections, shorten lead wires if possible or use heavier gauge wire. Rapidly cycle thermostat to clean contacts, or change the thermostat.

## PILOT BURNER ADJUSTMENT

1. Remove pilot adjustment cap.
2. Adjust pilot key to provide properly sized flame on the thermocouple or thermopile. The flame should cover the upper 3/8" of the tip.
3. Replace pilot adjustment cap.

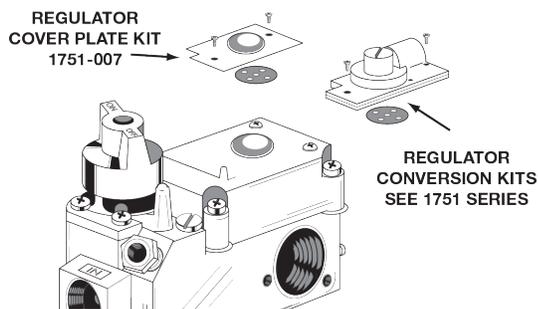
**IMPORTANT: Do not use GAS COCK DIAL to adjust gas output on 710 models.**

## REGULATOR CONVERSION OR REPLACEMENT

**CAUTION:** Main burner and pilot orifices must be changed when regulator is converted from one type gas to another.

710 Series valves can be converted from nonregulated to regulated operation by adding one of the 1751 Series regulators. To convert from regulated to nonregulated, order Part Number 1751-007.

To convert L.P. gas 11.0" W.C. use 1751-013.



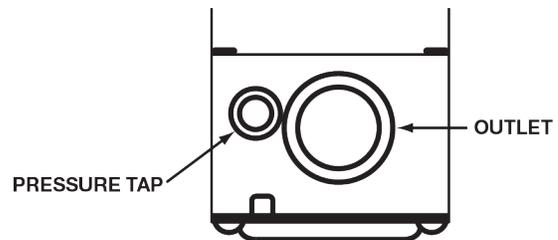
1. Depress and turn Gas Cock Dial to "OFF".
2. Remove two screws, regulator cartridge and gasket.
3. Install new gasket and regulator (this assembly must be positioned properly). Use new screws supplied with regulator.
4. Relight appliance by following steps 4, 5 and 6 of procedure for lighting and relighting.
5. Test for leaks around the regulator using soap solution with main burner "ON".

## PRESSURE REGULATOR ADJUSTMENTS

Adjustment of the pressure regulator is not normally necessary since it is preset at the factory. However, field adjustment may be accomplished as follows:

**NOTE:** Manometer attachment may be accomplished at pressure tap plug, below control outlet, as shown in figure below.

### MODELS WITH OUTLET PRESSURE TAP NEXT TO OUTLET.

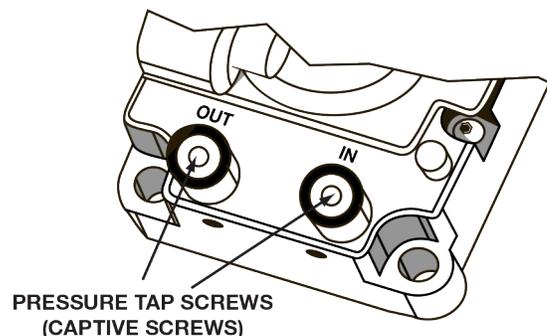


1. Manometer or gauge attachment may be accomplished at pressure tap plug.
2. Remove regulator adjustment screw cap. (Top of regulator.)
3. With a small screwdriver, rotate adjustment screw "clockwise" to increase or "counterclockwise" to decrease pressure.
4. Replace regulator adjustment screw cap.

### MODELS WITH PRESSURE TAPS ON TOP OF VALVE.

Some models will have the inlet and outlet pressure taps located on the top of the valve. Field adjustment may be accomplished as follows:

1. Turn Gas Cock Dial to "OFF" position.
2. Loosen, but do not attempt to remove, the inlet or outlet pressure screen. Turn screw counterclockwise.
3. Attach manometer to the inlet or outlet pressure tap boss.  
**Note:** Hose should be 5/16" I.D. for best operation.
4. Turn Gas Cock Dial to the "PILOT" position and light pilot.
5. With pilot safety stabilized, turn Gas Cock Dial to the "ON" position.
6. Turn wall thermostat to highest setting to bring gas valve "ON".
7. Remove regulator adjustment screw cap. (Top of regulator.)
8. With a small screwdriver, rotate adjustment screw "clockwise" to increase, or "counterclockwise" to decrease pressure.
9. Replace regulator adjustment screw cap.
10. Turn the Gas Cock Dial to "OFF" position. Lower thermostat to comfort temperature.
11. Remove manometer hose from inlet/outlet pressure tap(s). Tighten the pressure cap screw.
12. Light pilot and put control into normal operation.



**Robertshaw**

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