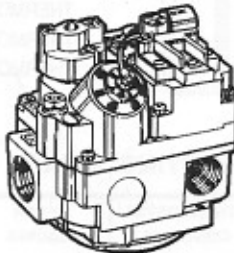




MILLIVOLT SYSTEMS and TROUBLESHOOTING

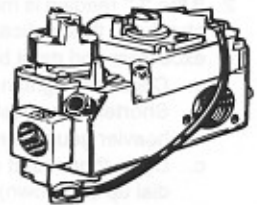
MILLIVOLT GAS VALVES

The Robertshaw - Uni-Line 700-500 and 710-500 Series millivolt gas valves are thermostatically actuated combination gas valves. These controls combine a manual gas cock, automatic pilot safety valve and a millivolt operator. The automatic pilot safety is separate from the gas cock and provides gas shut off in case of pilot outage. Regulated and unregulated models are available in a variety of piping sizes and Btu capacities.



700-500 Series

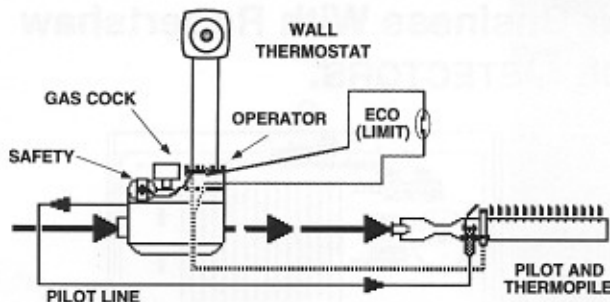
The power source of millivolt gas valves is a pilot generator which is usually called a Thermopile and which produces approximately 500 to 750 millivolts (open circuit reading). Each millivolt equals 1/1000th of a volt. Two identification characteristics of millivolt gas valves are the lead wire between the electromagnet and the TH/TP terminal of the operator, and the terminal block which is molded in a red phenolic to set it apart from other voltages found in gas valve operators.



710-500 Series

MILLIVOLT SYSTEMS

Millivolt systems generate their own power by use of a thermopile in place of a thermocouple in the automatic pilot system. The thermopile is actually a number of thin blade thermocouples connected in series and enclosed in a circular housing. Thermopiles are easily distinguished from thermocouples by the larger diameter of the tip. (Approximately 1/2" diameter.)



Robertshaw produces two styles of thermopiles, both of which produce approximately 750 Millivolts. They are the **1950 Series** which is a two-lead style and connects to the operator screw terminals marked TH/TP and TP, and the **1951 Series** which is a coaxial connect style which screws in like a thermocouple in a special tap on the valve operator. The terminal nut of a coaxial style thermopile is of a larger size than that of a standard thermocouple to prevent interchangeability or misapplication.

Manufacturers of commercial appliances using millivolt gas valve systems are the most common users of the coaxial style thermopile. The coaxial connection is no longer available on the 710 Series compact gas valves.

MILLIVOLT SYSTEM CHECKS

When checking a millivolt system, the following steps should be performed first, then proceed to step A thru D on next page.

1. The thermostat must be a type suitable for millivolt operations. Thermostats with heat anticipators generally will not work properly in millivolt applications.
2. Inspect system for proper size and lengths of wiring. The following are recommended maximum lead lengths (double wire) for thermostat wires:

Wire Size	Max. Length
14 Ga.	100 feet
16 Ga.	64 feet
18 Ga.	40 feet
20 Ga.	25 feet
22 Ga.	16 feet

3. The thermostat leads and all other wires in the system should be checked for crimps or exposed bare wire, which would cause a high resistance.
4. The thermostat leads and all wire connections should be cleaned and tightened to eliminate all unnecessary resistance.
5. Clean and/or adjust pilot for maximum flame impingement (3/8") of the tip of the thermopile. Observe that the main burner flame does not impinge on the body of the thermopile as this will reduce the output voltage.
6. If the pilot will not remain lit when the gas cock is released, check the automatic pilot (Step D).

Note: When performing steps A thru D a test meter having a millivolt scale will be necessary.

A. COMPLETE MILLIVOLT SYSTEM CHECK

("A" Reading - Thermostat contacts Closed - Gas Cock Dial "On" - Main Burner should come On)

1. If the reading is more than 100 millivolts and the automatic valve does not come on - replace the gas valve.
2. If the closed circuit reading ("A" reading) is less than 100 millivolts, determine the cause for low reading - proceed as follows:

B. THERMOPILE OUTPUT CHECK

("B" Reading - Thermostat contacts Open - Main Burner Off)

1. 325 millivolts minimum.
If minimum millivolt reading is not obtainable, readjust the pilot for maximum millivolt output. If millivolt reading is still below minimum specified, replace the thermopile.

C. SYSTEM RESISTANCE CHECK

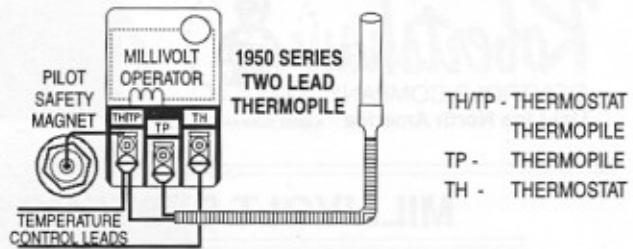
("C" Reading - Thermostat contacts Closed - Gas Cock Dial "On" - Main Burner should come On)

1. Less than 80 millivolts.
2. If the "C" reading is more than specified for the system being checked, this indicates the resistance in the system is excessive and must be reduced. To correct:
 - a. Clean and tighten thermostat leads and connections.
 - b. Shorten thermostat lead wires and/or replace with a heavier gauge wire. (See pre-check info).
 - c. Cycle thermostat rapidly (manually turn the temperature dial up and down) to clean the contacts. (Should not be necessary with Robertshaw sealed-in-glass mechanical switch thermostats). (Older mercury style thermostats may become "gummy" and act as if contacts are dirty).

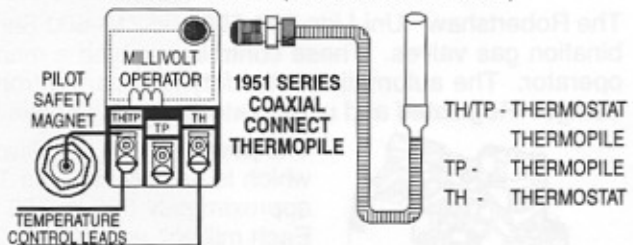
D. AUTOMATIC PILOT VALVE DROPOUT CHECK

1. Establish pilot flame and observe meter. Hold gas cock dial depressed until maximum output is observed. Then extinguish pilot flame.
2. Dropout of automatic pilot safety magnet (sound should be audible) should occur between 120 millivolts and 30 millivolts. If dropout occurs outside these limits, the automatic pilot safety magnet is bad and the valve should be replaced.

MILLIVOLT GAS VALVE WIRING 700-500 AND 710-500 SERIES



COAXIAL TERMINAL (700 SERIES VALVES ONLY)



MILLIVOLT TROUBLESHOOTING CHART

CHECK TEST	TO TEST	CONNECT METER TO	THERMOSTAT CONTACTS *	METER READING
A	COMPLETE SYSTEM	TP & TH	CLOSED	100 MV OR MORE
B	THERMOPILE OUTPUT	TH/TP & TP	OPEN	GREATER THAN 325 MV
C	SYSTEM RESISTANCE	TH/TP & TH	CLOSED	LESS THAN 80 MV
D	AUTO/PILOT DROPOUT	TH/TP & TP	OPEN	BETWEEN 120 - 30 MV

* Contacts "Closed" = Call for heat.

Protect Your Customers And Your Business With Robertshaw CARBON MONOXIDE DETECTORS.

Statistics indicate that carbon monoxide is responsible for about half of all fatal poisonings in the United States. As many as 700,000 homes may reach dangerous levels of carbon monoxide during the winter months.

These statistics should help to convince your customers that carbon monoxide detectors are a necessity. Plus, CO detectors insure that any additional work you've completed is functioning properly.

Robertshaw carbon monoxide detectors use a semiconductor sensor to sample the air for CO every 3 minutes. For maximum protection, the detectors are designed to trigger an 85dB alarm at CO levels of 100 parts per million or more within 10 minutes of the initial detection.



7605-521 Direct Outlet Plug-in
(Other Models Available)



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