Y99AB-4 BASO® Test Kit

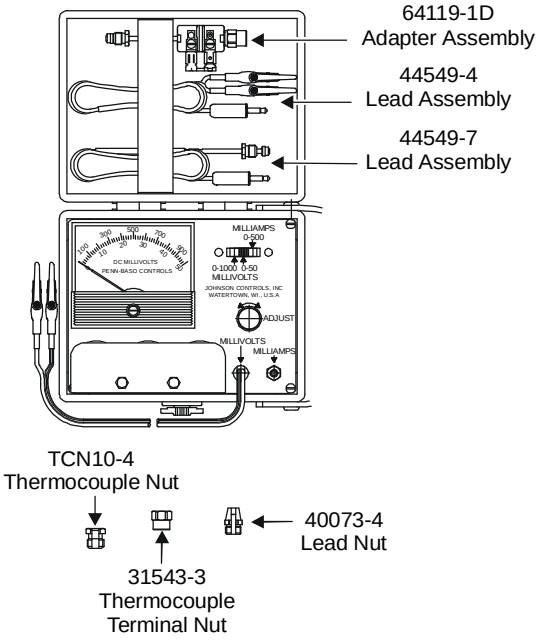

Figure 1: Y99AB-4 Test Kit

Description

The Y99AB-4 Test Kit combines four test functions to enable service contractors to test BASO® controls and thermocouples in the field. These four functions are:

- **Millivoltmeter** with 0 to 50 and 0 to 1000 ranges for checking the open and closed circuit millivoltage of thermocouple leads.
- **Performance Tester** with a source of power for holding open BASO power units while taking open circuit millivolt readings of the thermocouple when the main burner is in operation.
- **Milliammeter** with a 0 to 500 (50 on scale) range for checking the current dropout range of BASO power unit assemblies. (There are 10 milliamperes for each division on the dial.)
- **Continuity Tester** for detecting a broken or open circuit.

Definitions

Automatic Pilot - A device employed with gas burning equipment, which automatically shuts off the gas supply to the burner being served by either direct or indirect means when the pilot flame is extinguished. The pilot burner may or may not be constructed integrally with the device.

Closed Circuit - Millivoltage measured with the BASO control attached to the thermocouple.

Couple Lead - The thermocouple, current carrying conductors, and attaching nut.

Dropout - The point, defined by a millivolt or milliampere reading, at which the electromagnet releases the armature.

Milliampere - One thousandth of an ampere. Abbreviation mA used to check BASO control dropout.

Millivolt - One thousandth of a volt. Abbreviation mV used to measure thermocouple output.

Open Circuit - Millivoltage measured without the BASO control attached to the thermocouple.

Power Unit - Electromagnet unit that is internally connected to the seat of the gas valve and cuts off the gas when pilot flame fails. Also called a power unit assembly or hood.

Reset Button - The button that is manually depressed to place the BASO control in operation.

Thermocouple - The pair of dissimilar metallic elements joined to produce a millivoltage when the junctions are at different temperatures.

General Instructions

When using the test kit, insert the plugs securely and squarely into the jacks. The thermocouple adapters and nuts must be clean and tight. Any meter fluctuation caused by the movement of these parts may be due to loose connections. Poor connections cause false readings. Three “D” size batteries are required.

WARNING: Risk of Fire or Explosion.
In order to test the thermocouple under actual flame conditions, it is necessary to hold the BASO power unit open with the DC power pack provided with the test kit. This eliminates the safety function provided by the BASO power unit. Care must be exercised during this test to ensure that gas is not permitted to flow to the main burner.

CAUTION: Risk of Equipment Damage.
This meter is designed and calibrated for Direct Current (DC) voltages up to 1000 millivolts only. Any attempt to measure Alternating Current (AC) voltage or DC voltage over 1000 millivolts will damage the meter.

Open Circuit Millivolt Readings

Refer to Figure 8 through Figure 10 for typical thermocouple-operated gas valve, electrically-operated gas valve, and safety shutoff device connection diagrams.

Perform the following procedure for taking open circuit millivolt readings.

1. Shut off the gas supply at the main manual shutoff valve.
2. Disconnect the thermocouple from the BASO control.
3. Attach the test cable lead 44549-8 to the thermocouple. Connect the red clip to the copper tubing of the thermocouple and the black clip to the terminal at the end of the thermocouple (see Figure 2).
4. Set the slide switch on the meter to the 0-50 or 0-1000 position.
5. Re-establish pilot flame.
6. The millivolt reading should agree with the values listed in Table 1 with a normal pilot flame (see Figure 3).

Note: When taking an open circuit millivolt reading on a junction block thermocouple, the junction block terminal must be shorted (see Figure 4). This will isolate the thermocouple from the high limit.

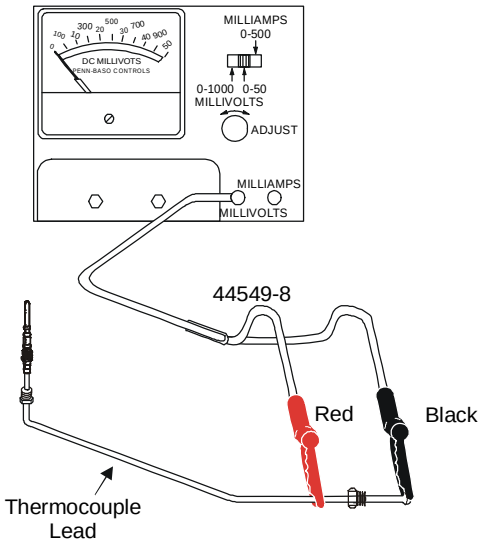

Figure 2: Open Circuit Millivolt Reading Connection Diagram

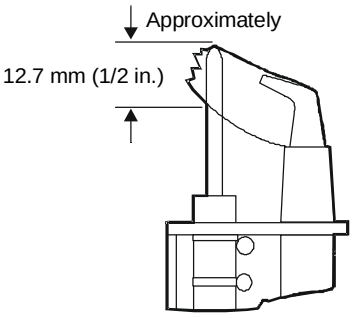

Figure 3: Normal Pilot Flame

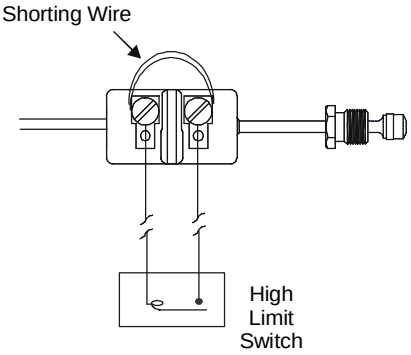

Figure 4: Junction Block Thermocouple

Table 1: Thermocouple Output

Thermocouple Lead	Turndown	mV Range		Minimum Fixed Load Adapter Voltage
		Normal	Not Less Than	
K14	4 mV	20-28	15	8
K15	4 mV	20-28	15	8
K16	4 mV	25-35	17	8
K19	4 mV	25-35	17	8

Fixed Load Millivolt Readings

Perform the following procedure for taking fixed load millivolt readings:

1. Disconnect the thermocouple from the BASO control and attach the adapter assembly (64119-1D) to the thermocouple.
2. Attach the test cable lead 44549-8 to the adapter assembly. Connect the red clip to the copper tubing of the adapter assembly and the black clip to the control end of the adapter assembly (see Figure 5).
3. Set the slide switch on the meter to the 0-50 or 0-1000 position.
4. Reestablish pilot flame.
5. The millivolt reading should agree with the values listed in Table 1 with a normal pilot flame (see Figure 3).

   Note: When taking a fixed load millivolt reading on a junction block thermocouple, the junction block terminal must be shorted (see Figure 4).

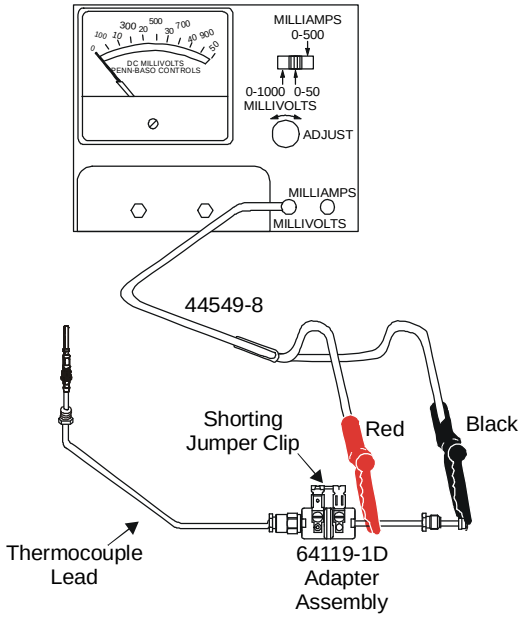

Figure 5: Fixed Load Millivolt Reading Connection Diagram

Dropout Testing

Refer to Figure 8 through Figure 10 for typical thermocouple-operated gas valve, electrically-operated gas valve, and safety shutoff device connection diagrams.

Perform the following procedure using the milliammeter for dropout testing.

1. Shut off the gas at the main manual shutoff valve.
2. Disconnect the thermocouple lead from the BASO control.
3. Connect the test cable lead 44549-7 to the milliamperes jack on the test kit meter, connect the other end to the BASO control (see Figure 6).
4. Set the slide switch on the meter to the 0-500 (50 on scale) position.
5. Turn the adjust knob on the meter clockwise to the full scale deflection of the needle. Reset the control by pressing in the reset button on the control firmly.
6. Turn the adjust knob on the meter counterclockwise slowly until the BASO control power unit releases. The milliampere reading at the moment of release is the dropout point of the BASO power unit. Take two more readings by the same process, and average the readings. The milliampere dropout point must lie within the high and low range listed in Table 2.
7. Pilot and main burner should extinguish within a few seconds. If flames do not extinguish, refer to the Troubleshooting section.

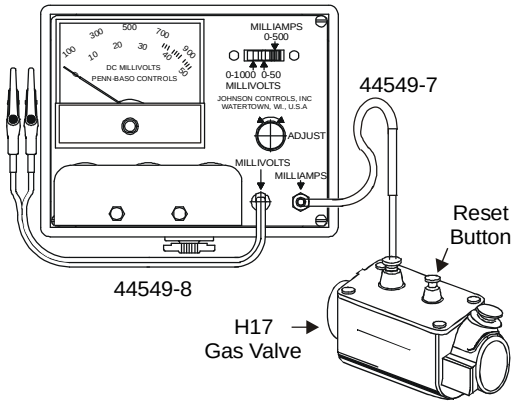

Figure 6: Dropout Testing Connection Diagram

Table 2: Milliampere Dropout Range

BASO Control Part Number	mA Range of Power Unit Assembly	
	Low	High
H15A_, H15C_, H15D_, H15H_	100	300
H15E_, H15F_	60	150
H17_A	100	300
H17_B	50	165
H19A_	100	300
H19ME	45	165
H19L_, H19N_, H19R_, H19T_	100	300
H43AA, H43BA, H43GA	100	300
H43AB, H43BB	50	165
G92 (All models except G92CAA-19 and G92CBA-10)	100	300
G92CAA-19 and G92CBA-10	100	200
G93	100	300
G292	100	300
L61LL	75	200
L62AA	100	300
L62GB	100	300

Continuity Testing

CAUTION: Risk of Equipment Damage. Turn off the power to the appliance. When the meter is being used as a continuity tester, it should never be put across line voltage potential.

Perform the following procedure for continuity testing.

1. Connect the test cable lead 44549-4 to the milliampere jack on the test kit meter.
2. Set the slide switch on the meter to the 0-500 (50 on scale) position.
3. Connect the red and black alligator clips together; turn the adjust knob clockwise until the needle is above 500 (50 on scale). If unable to get a reading of 500, check the alligator clip connection or replace the batteries.
4. Test for open circuits by touching or connecting the alligator clips to terminals or points in the circuit.

Closed Circuit Test

Perform the following procedure for closed circuit testing.

1. Disconnect the thermocouple from the BASO control.
2. Attach the adapter assembly (64119-1D) to the control and thermocouple.
3. Remove the shorting jumper clip from the adapter assembly.
4. Set the slide switch on the meter to the 0-50 position.
5. Attach the test cable lead 44549-8. Connect the red clip to the copper tubing of the thermocouple and the black clip to the adapter block terminal (see Figure 7).
6. Depress the reset button on the BASO control and light the pilot using a safe lighting procedure. Hold the reset button in for approximately 60 seconds or until the output is high enough to hold the energized valve.
7. Observe output. The millivolt reading should agree with the values listed in Table 1.

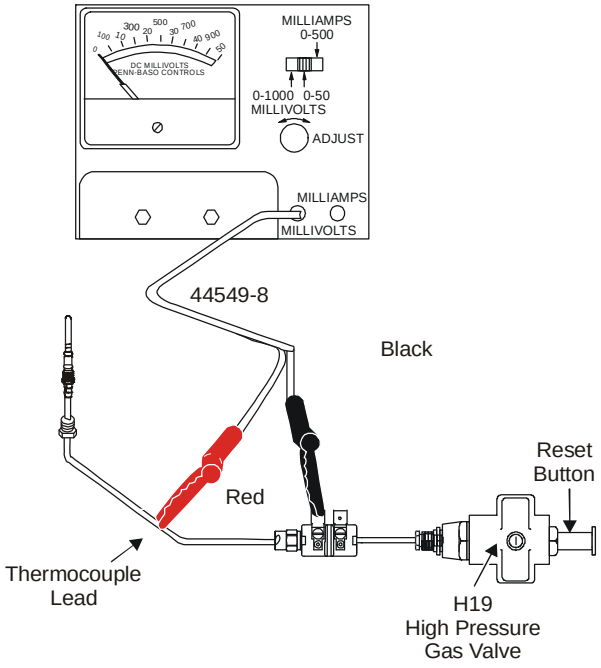

Figure 7: Closed Circuit Test Connection Diagram

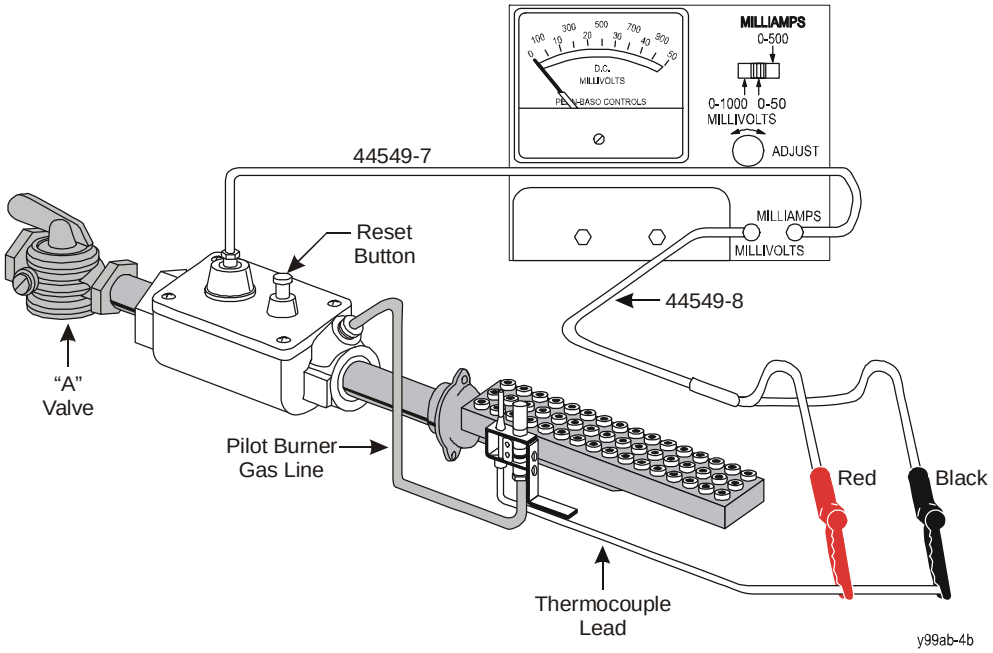

Figure 8: Typical Thermocouple-operated Gas Valve Connection Diagram

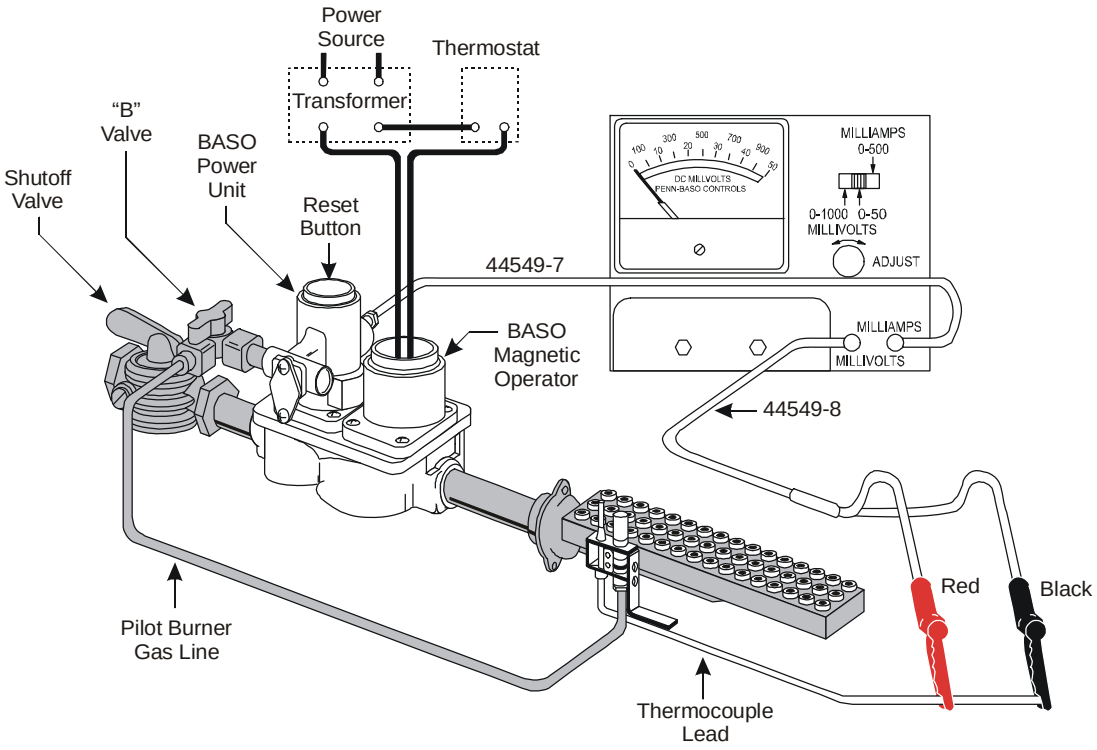

Figure 9: Typical Electrically-operated Gas Valve Connection Diagram

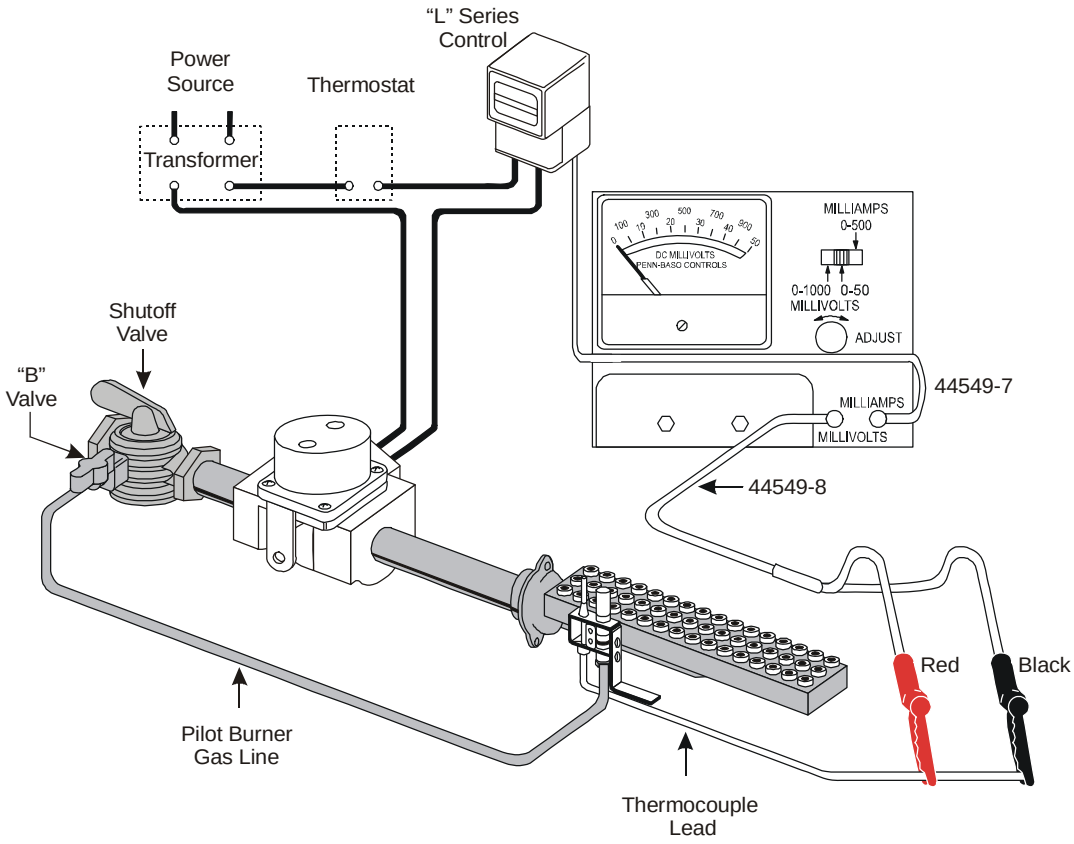

Figure 10: Typical Safety Shutoff Device Connection Diagram

Troubleshooting

The following table indicates symptoms and corrective actions.

Table 3: Troubleshooting Symptoms and Corrective Actions

Symptom	Possible Cause	Corrective Action
Pilot burner outage, varying performance, or poor mV output.	Excessive draft	Baffle secondary air or shield pilot burner.
	Recirculation of flue products	Check venting and main orifice sizing and correct where necessary.
	Excessive temperature	Check main burner input and correct if necessary.
	Improper pilot flame size or characteristic	Check gas pressure, clean pilot burner, and adjust flame.
	Defective thermocouple	Perform the *Open Circuit Millivolt Readings* procedure.
	Weak holding BASO power unit	Perform the *Dropout Testing* procedure.
Pilot burner burning, manual valve (if included) turned to the "On" position, thermostat calling for heat. Main burner does not come on.	Defective thermostat	Perform the *Continuity Testing* procedure.
	Defective operator	Check for operator input voltage. If present, replace the valve. If not, check voltage source.
Thermostat not calling for heat, or turned down, manual valve (if included) in the "On" position. Main burner does not shut off.	Shorted thermostat circuit	Perform the *Continuity Testing* procedure.
	Foreign particles lodged between the valve seat	Replace the valve.
No burner flame or flame does not stay on.	Thermocouple out of position	Reposition thermocouple properly.
	Thermocouple lead dirty or loose	Clean and tighten thermocouple lead connection.
	Defective thermocouple	Perform the *Open Circuit Millivolt Readings* procedure.
	Defective BASO power unit	Perform the *Dropout Testing* procedure.
	Defective orifice	Clean or replace orifice.
	Unusually strong drafts	Baffle secondary air or shield burner.

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