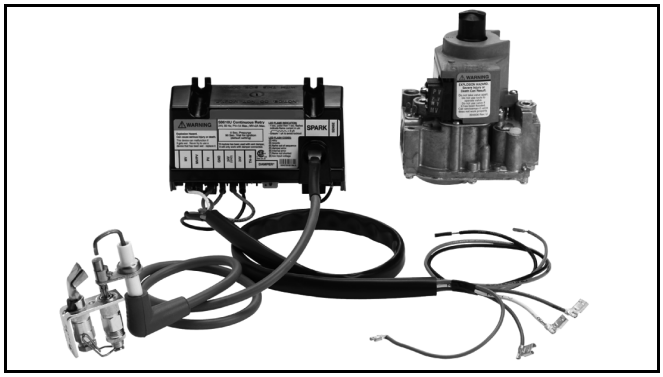
resideo

Y8610U Intermittent Pilot Retrofit Kit

PRODUCT DATA



GENERAL

The Y8610U is a complete kit for converting conventional standing pilot systems to intermittent pilot systems. It is used on gas-fired atmospheric furnaces, boilers, and heating appliances. Not for use on direct vent, induced draft, or power burner equipment. Meets ANSI Z21.71 standard for automatic intermittent pilot ignition systems on central furnaces and boilers.

FEATURES

- Y8610U kits can be used with either natural or LP gas.
- The S8610U ignition control provides a 90 second maximum ignition trial, shuts off, waits five minutes nominal, then re-initiates the pilot ignition sequence. The ignition trial, shutoff, and wait cycle repeat until the pilot lights or the call for heat ends.

Each kit includes:

- S8610U Intermittent Pilot Module
- VR8304M Dual Valve Combination Gas Control
  or
  VR8204A Dual Valve Combination Gas Control
- 392431 Igniter-Sensor
- 394800-30 Ignition Cable
- 393691 Natural to LP Gas Conversion Kit
- Wiring Harness
- 393690-14 Straight Flange Kit (3/4 in.)
- Reducer adapters for gas control with VR8304M
- Installation hardware

Temperature Ratings:

- S8610U: -40°F to 165°F (-40°C to 74°C)
- VR8304M: -40°F to 175°F (-40°C to 79°C)
- VR8204A: 0°F to 175° F (-18°C to 79°C)

Intermittent Pilot Gas Ignition Control Module

- Uses flame rectification for flame sense
- Internal spark generator lights pilot gas; main burner lights after pilot flame lights and proves
- 100% shutoff of pilot and main gas if burner fails to light
- Continuous retry ignition sequence prevents nuisance lockouts
- Two LEDs indicate system status and flame signal strength

Gas Control Valve

- Straight through body pattern
- VR8304M capacity is 270 ft^3/hr (7.6 m^3/hr)
- VR8204A capacity with or without 1/2" x 3/4" adapter is 150 ft^3/hr (4.2 m^3/hr)
- Manual ON-OFF valve blocks gas flow into the gas control when in the OFF position
- Two main automatic valves: one solenoid-operated, and one a servo-operated diaphragm system

Igniter-Sensor

- Single electrode made of Kanthal provides both ignition and flame sensing
- Rated for 1775°F (968°C) at electrode tip; 1250°F (677°C) at ceramic insulator

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Automatic Ignition Systems
ANSI Z21.20

68-0291-05

Table 1. S8610U Universal Intermittent Pilot Gas Ignition Control Module.

Igniter-Sensor Type	Valve Current Rating @ 24 Vac	Prepurge Timing (field selectable)	Trial for Pilot Ignition (field selectable)	Ignition Sequence Type	Ignition Sequence (After prepurge, if prepurge is selected)	Integral Damper Connector
Combination (one rod; local flame sensing)	1.0 A Pilot and 2.0 A Main	0 (zero) or 30 seconds; 0 (zero) seconds recommended	15 or 90 seconds; 90 seconds recommended	Retry	Spark and pilot gas ON until lightoff or trial for ignition ends. If established flame is lost, trial for ignition restarts immediately. If pilot fails to light, pilot gas and spark turned off (100% shutoff). After 5 minute delay, a new trial for ignition is initiated. This sequence continues until lightoff or "Call for Heat" is removed.	Included for use as needed. If initially installed and powered up with damper attached, unit must always have a vent damper connected.

SPECIFICATIONS

IMPORTANT

The specifications given in this publication do not include normal manufacturing tolerances. Therefore, units might not match the listed specifications exactly. Also, units are tested and calibrated under closely controlled conditions, and some minor differences in performance can be expected if those conditions are changed.

Y8610U Intermittent Pilot Retrofit Kit

Electrical Ratings:

- Voltage and Frequency: 24 Vac, 60 Hz
- Current Rating: 0.7A (includes both module and gas control)
- Thermostat Anticipator Setting: 0.7A plus current ratings of other devices in the thermostat control circuit

S8610U Intermittent Pilot Gas Ignition Control Specifications

Control Voltage: Line 24 Vac (18-30 Vac) 50/60 Hz

Trial for Ignition: See Table 1 above

Prepurge: See Table 1 above

Flame Failure Response Time: 2 seconds maximum

LEDs: The green LED provides system status, error codes and indicates flame sensing

Operating Temperature:
Minimum ambient temperature rating is -40°F (-40°C)
Maximum ambient temperature rating when used with 2.0 A main valve is 165°F (74°C)

Relative Humidity: 0% to 95% non condensing

Dimensions: See Fig. 2 on page 4.

Thermostat Compatibility:
Compatible with any Resideo 24V thermostat and with competitive 24V thermostats that are powered independently of the module.

Transformer Sizing:
Add current ratings of Y8610, vent damper, and any other control system components. Multiply this total by 24V to determine the transformer VA requirement.

Mounting:
Mounts in any position except with terminals up. Recommended mounting position is with terminals down to provide maximum protection from dripping water or dust accumulation. Refer to Fig. 14 on page 12.

Fasten with No. 6-32 machine screws or No. 8 sheet metal screws or 8-18 x 5/8 pan head tapping screws of appropriate length.

Wiring Connections:
- Between the module and gas control: 30 in. (762 mm) wiring harness with 1/4 in. quick-connect terminals.
- Between the module and the igniter-sensor: 30 in. (762 mm) ignition cable with stud terminal and 1/4 in. quick-connect terminal.

Terminals:
1/4 in. male quick-connects. S8610U has Molex plug for connection to a vent damper harness. Once the S8610U has powered a vent damper, the module works only if the vent damper is connected.

VR8204A and VR8304M Dual Valve Combination Gas Controls Specifications

Table 2. VR8204A and VR8304M Dual Valve Combination Gas Controls Specifications.

Model	Capacity[a]	Pipe Size	Ambient Temperature Rating	Dimensions
VR8204A	150 ft^3/hr (4.2 m^3/hr); (with or without 1/2" x 3/4" adapter)	1/2 in. X. 1/2 in. NPT inlet x outlet[b]	0° to 175° F (-18° to 79° C)	See Fig. 4 on page 5
VR8304M	270 ft^3/hr (7.6 m^3/hr)	1/2 in. X. 3/4 in. NPT inlet x outlet	-40° to 175°F (-40° to 79°C)	See Fig. 3 on page 5

[a] Based on 1,000 Btu/ft^3, 0.64 specific gravity natural gas at 1 in. wc pressure drop (37.3 MJ/m^3, 0.64 specific gravity natural gas at 0.25 kPa pressure drop).

[b] 3/4 in. straight flange included to provide 3/4" NPT outlet if needed.

Mounting:
Can be mounted from 0 to 90 degrees, in any direction, from the gas control upright position

Pressure Rating: 1/2 psig (3.45 kPa) inlet pressure

Terminals: 1/4 in. male quick-connect terminals

Igniter-Sensor Specifications

Model:
392431 Igniter-Sensor; includes igniter-sensor assembly, ground rod, and adapter (refer to Fig. 1 on page 4)

Electrode/Flame Rod Material: Kanthal

Maximum Temperature Ratings:
Ground Rod Tip: 1775°F (968°C)

Ceramic Insulator: 1250°F (677°C)

Dimensions: See Fig. 5 on page 6.

Mounting:
Attach the supplied ground rod and adapter, which replace the thermocouple on the existing pilot burner

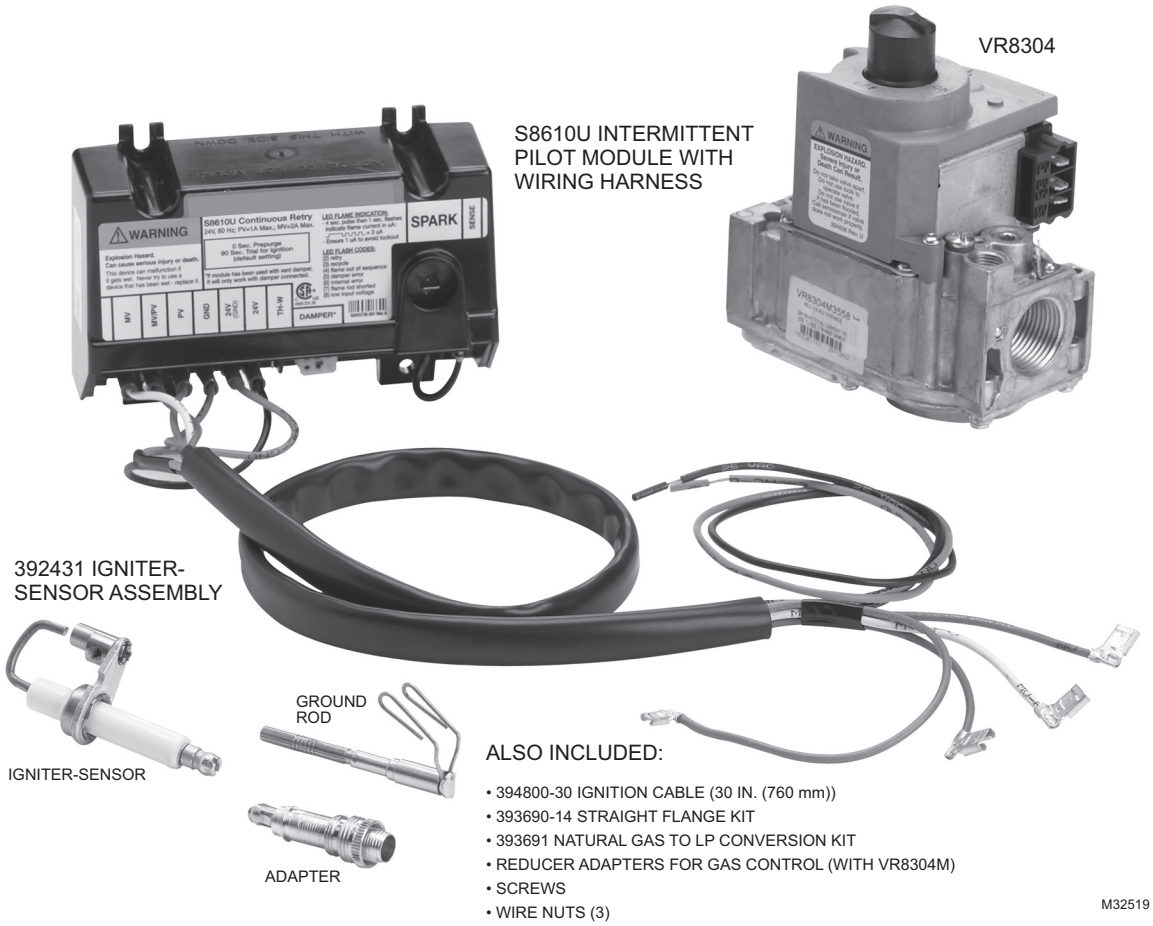


Fig. 1. Y8610U retrofit kit components.

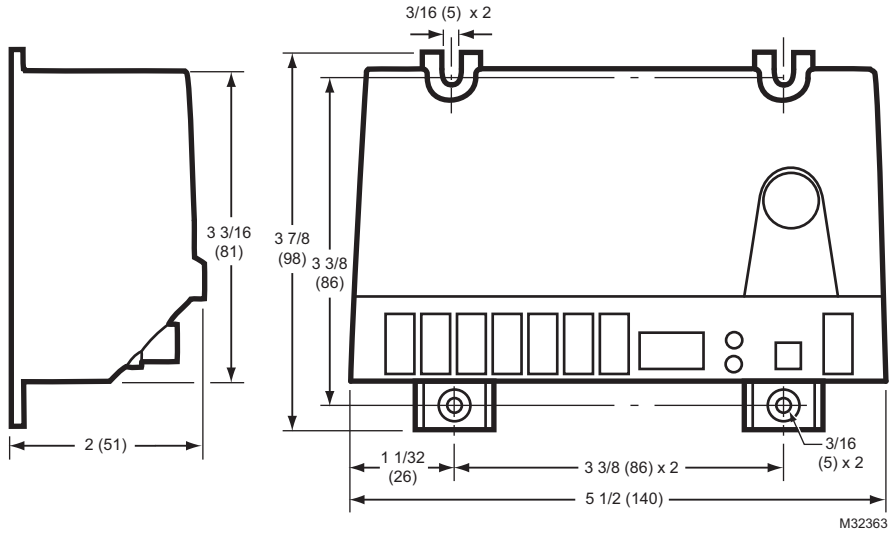


Fig. 2. S8610U module dimensions in inches (mm).

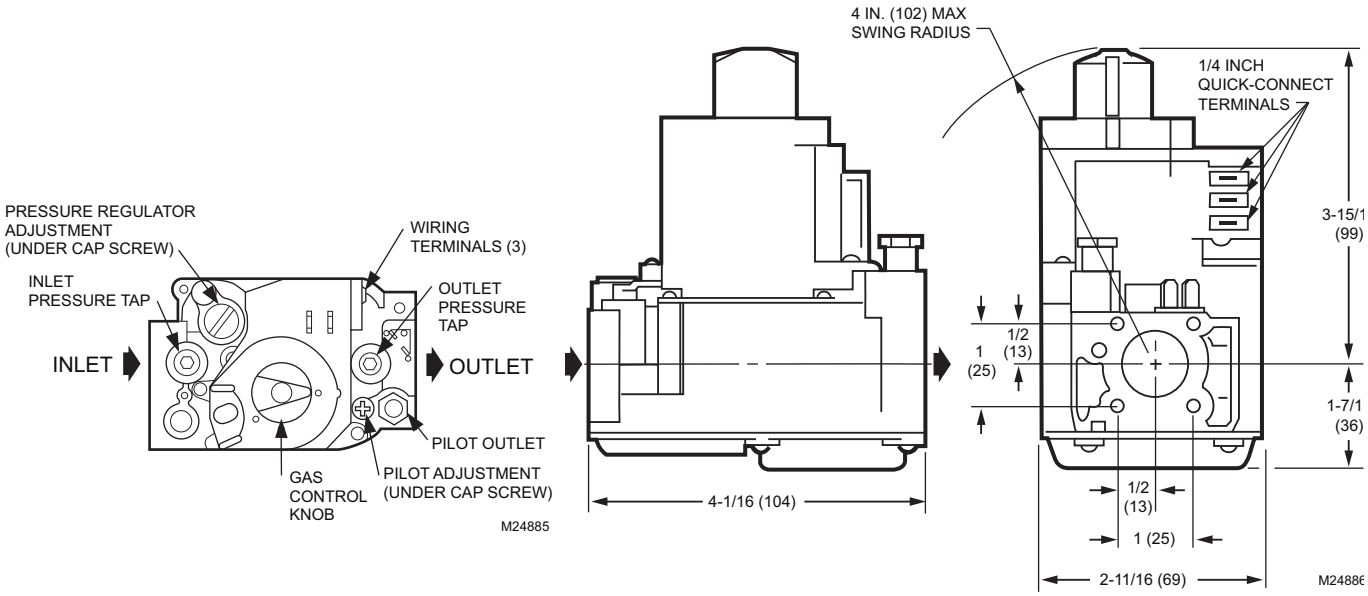


Fig. 3. VR8304M mounting dimensions in inches (mm).

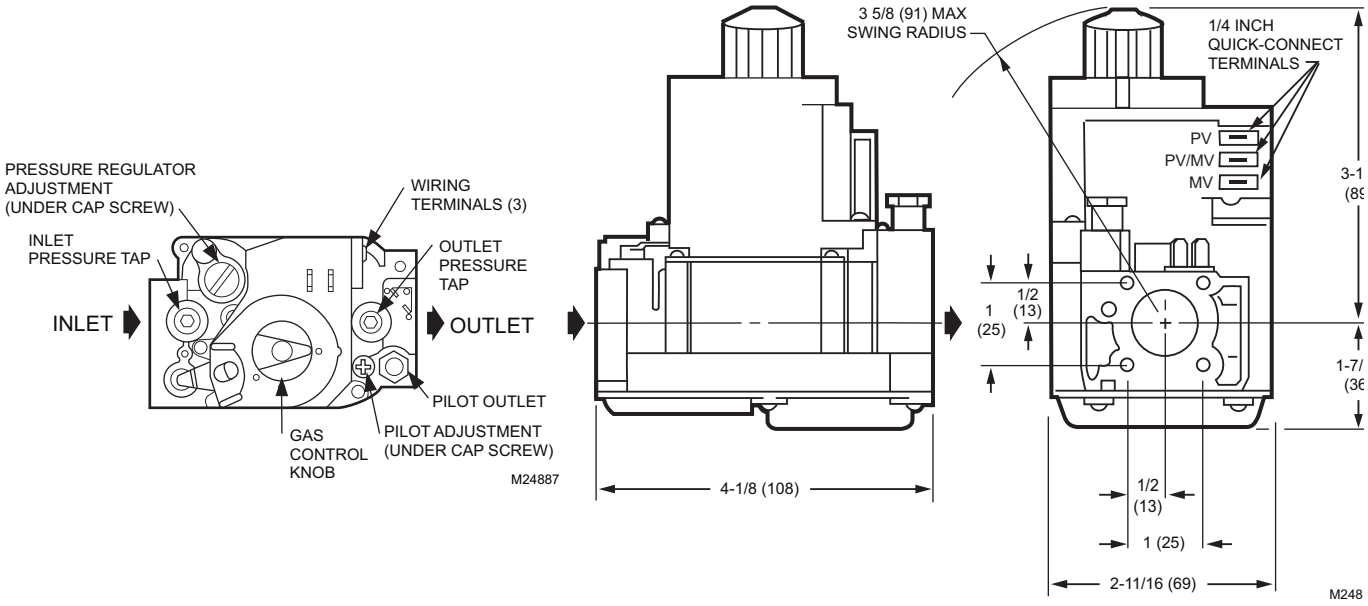


Fig. 4. VR8204A mounting dimensions in inches (mm).

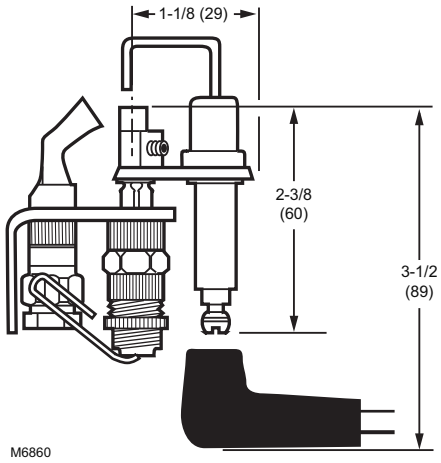


Fig. 5. 392431 Igniter-sensor mounting dimensions in inches. (mm).

PLANNING THE INSTALLATION

⚠ WARNING

Fire or Explosion Hazard.
Can cause severe injury, death or property damage.
1. Plan the installation as outlined below.
2.Plan for frequent maintenance as described in the Maintenance section.

Intermittent pilot systems are used on a wide variety of central heating equipment and on heating appliances such as commercial cookers, agricultural equipment, industrial heating equipment and pool heaters. Some of these applications may make heavy demands on the controls, either because of frequent cycling, or because of moisture, corrosive chemicals, dust or excessive heat in the environment. In these situations, special steps may be required to prevent nuisance shutdowns and premature control module failure. These applications require special review; contact your Sales Representative for assistance.

Review the following conditions that can apply to your specific installation and take the precautionary steps suggested.

Frequent Cycling

These controls are designed for use on appliances that typically cycle three to four times an hour only during the heating season. In year-round applications with greater cycling rates, the control module can wear out more quickly; perform a monthly checkout.

Water or Steam Cleaning

If the control module gets wet, replace it. If the appliance is likely to be cleaned with water or steam, protect (cover) the controls and wiring from water or steam flow. Mount the controls high enough above the bottom of the cabinet so they do not get wet during normal cleaning procedures. Use a NEMA 4 enclosure for the ignition control module.

High Humidity or Dripping Water

Dripping water can cause the control module and the gas control to fail. Never install an appliance where water can drip on the controls.

In addition, high ambient humidity can cause the control module and the gas control to corrode and fail.

If the appliance is in a humid atmosphere, make sure air circulation around the controls is adequate to prevent condensation. Also, regularly check out the system. A NEMA 4 enclosure is recommended for the ignition control module.

Corrosive Chemicals

Corrosive chemicals can attack the ignition control module and gas control, eventually causing a failure. If chemicals are used for routine cleaning, make sure they do not reach the controls. Where chemicals are suspended in air, as in some industrial or agricultural applications, use a NEMA 4 enclosure for the ignition control module.

Dust or Grease Accumulation

Heavy accumulations of dust or grease can cause controls to malfunction. Where dust or grease can be a problem, provide covers for the ignition control module and the gas control to limit contamination. A NEMA 4 enclosure is recommended for the ignition control module.

Heat

Excessively high temperatures can damage controls. Make sure the maximum ambient temperature at the control module does not exceed the rating of the control module. If the appliance operates at very high temperatures, use insulation, shielding, and air circulation, as necessary, to protect the controls. Proper insulation or shielding should be provided by the appliance manufacturer; verify proper air circulation is maintained when the appliance is installed.

INSTALLATION

When Installing this Product...

1. Read these instructions carefully. Failure to follow them could damage the product or cause a hazardous condition.
2. Check the ratings given in these instructions and on the product to ensure the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After completing installation, use these instructions to check product operation.

IMPORTANT

1. *Installer must comply with local codes and ordinances of the National Fuel Code (ANSI Z223.1—NFPA No. 54) and National Electrical Code (ANSI NFPA No. 70).*
2. *Installer must fill in and attach label to appliance being converted.*
3. *Use Y8610 Retrofit Kit only with atmospheric burners. Do not use on direct vent appliances, appliances with induced draft, or power burners.*
4. *Do not use the Y8610 Retrofit Kit with mercury pilots or 250 to 750 mV pilot systems.*

⚠ WARNING

FIRE OR EXPLOSION OR ELECTRICAL SHOCK HAZARD CAN CAUSE PROPERTY DAMAGE,SEVERE INJURY, OR DEATH.

Follow these warnings exactly:

1. Disconnect the power supply before wiring to prevent electrical shock or equipment damage.
2. To avoid dangerous accumulation of fuel gas, turn off gas supply at the appliance service valve before starting Installation and perform the Gas Leak Test immediately following the installation. (See "Checkout" on page 15.)
3. Never install where water can flood, drip, or condense on module or gas control. Never use a module or gas control that has been wet. If wet, controls can malfunction and lead to an accumulation of explosive gas.
4. Do not light or operate electric switches, lights, or appliances until you are sure the appliance area is free of gas. Liquefied petroleum (LP) gas is heavier than air and does not vent upward naturally.

Maintenance Requirements in Severe Environments

Regular preventive maintenance is important in any application, but especially so in commercial cooking, agricultural, and industrial applications because:

- In many such applications, particularly commercial cooking, the equipment operates 100,000-200,000 cycles per year. Such heavy cycling can wear out the gas control in one to two years. A normal forced air furnace, for which the controls were originally intended, typically operates less than 20,000 cycles per year.
- Exposure to water, dirt, chemicals, and heat can damage the ignition control module or the gas control and shut down the control system. A NEMA 4 enclosure can reduce exposure to environmental contaminants.

The maintenance program should include regular checkout of the system as outlined under "Checkout" on page 15.

⚠ WARNING

FIRE OR EXPLOSION HAZARDCAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

Do not attempt to disassemble or clean the module. Improper reassembly and cleaning can cause unreliable operation.

Maintenance frequency must be determined individually for each application based on:

- *Cycling frequency:* Appliances that cycle more than 20,000 times annually should be checked monthly.
- *Intermittent use:* Appliances that are used seasonally should be checked before shutdown and again before the next use.
- *Consequence of unexpected shutdown:* Where the cost of an unexpected shutdown is high, the system should be checked more often.
- *Dusty, wet, or corrosive environment:* Because these environments can cause the controls to deteriorate more rapidly, the system should be checked more often.

Any ignition control module or gas control should be replaced if it does not perform properly on checkout or troubleshooting. In addition, replace any ignition control module or gas control if it is wet or looks like it has ever been wet. Protective enclosures as outlined under "Planning the Installation" on page 6 are recommended regardless of checkout frequency.

Perform the Pre installation Safety Inspection

The pre-installation checks described below must be completed before the Y8610U Intermittent Pilot Retrofit Kit is installed. If a condition that could result in unsafe operation is detected, the appliance should be shut off and the owner advised of the unsafe condition. Correct any potentially unsafe condition before proceeding with the installation. See "Exhibit A" on page 22.

The following safety checklist should be followed in making the safety inspection:

1. Conduct a Gas Leakage Test of the appliance piping and control system downstream of the shut-off valve in the supply line to the appliance.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restrictions, leakage or corrosion or other deficiencies which could cause an unsafe condition.
3. Shut off all gas to the appliance and shut off any other fuel-burning appliance within the same room. Use the shutoff valve in the supply line to each appliance. If a manual gas valve is not in the gas supply line within 6 feet of the appliance in an accessible location, one shall be installed.
4. Inspect burners and crossovers for blockage and corrosion.

5. Applicable only to warm air heating appliances. Inspect heat exchangers for cracks, openings or excessive corrosion.
6. Applicable only to boilers. Inspect for evidence of water or combustion product leaks.
7. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliance is located and other spaces of the building. Turn on clothes dryers. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers. If, after completing steps 7 through 12, it is believed sufficient combustion air is not available, refer to 1.3.4 of the National Fuel Gas Code (Z223.1) for guidance.
8. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
9. Determine the following:
   a. Determine that the pilot is burning properly and that main burner ignition is satisfactory by interrupting and re-establishing the electrical supply to the appliance in any convenient manner.
   b. Determine manifold pressure in order to match input after the new control is installed.
10. Perform the following tests:
    a. Visually determine that main burner gas is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
    b. If appliance is equipped with high and low flame control or flame modulation, check for proper main burner operation at low flame.
11. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use a draft gauge, the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
12. Return doors, windows, exhaust fans, fireplace dampers and all other fuel-burning appliances to their previous conditions of use.
13. Applicable only to warm air heating appliances. Check both limit controller and fan controller for proper operation. Limit controller operation can be checked by temporarily disconnecting the electrical supply to the blower motor and determining that the limit control acts to shut off the main burner gas.
14. Applicable only to boilers:
    a. Determine that the circulating water pumps are in operating condition.
    b. Test low water cutoffs, automatic feed controls, pressure and temperature limit controls and relief valves in accordance with the manufacturer's recommendations and instructions to determine they are in operating condition.

Shut Down Appliance

1. Turn off the gas supply at the appliance service valve. Do not use the gas control knob.
2. Turn off the electricity at the service entrance.

Check Appliance Wiring

The existing standing pilot gas control wires are used to control Y8610U Retrofit Kit. Carefully identify and tag the wires before disconnecting. See Fig. 6 for the most common types of terminal arrangements.

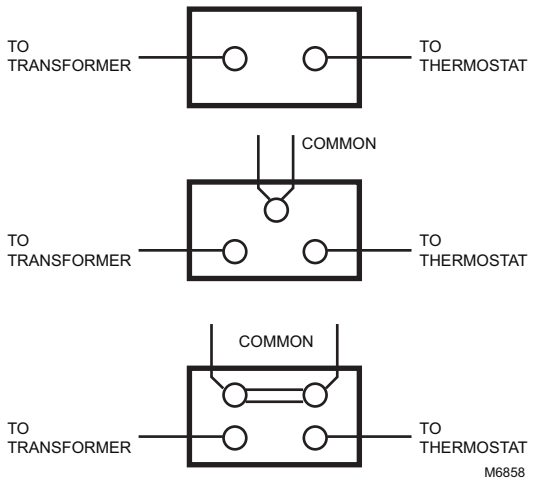


Fig. 6. Wiring connections on standing pilot gas controls.

Remove Standing Pilot Gas Control

1. If the gas control has a common terminal(s), remove the wires connected to the common terminal(s) and splice together with one of the wire nuts provided.
2. Label and remove the remaining wires.

⚠ WARNING

FIRE OR EXPLOSION HAZARDCAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

Do not bend the pilot gas tubing at the gas control or at the pilot burner to prevent gas leakage at the connection.

3. Disconnect the pilot tubing at the gas control. Cut off and discard the compression fitting. Do not disturb the compression fitting or pilot tubing at the pilot burner.
4. Disconnect the thermocouple lead at the gas control.
5. Disconnect the gas piping at the gas control.
6. Discard the gas control.

Remove Thermocouple

Unscrew or snap the thermocouple out of the pilot burner and discard. See Fig. 7.

NOTE: It could be necessary to pull out the main burner for access to the pilot burner. Do not move or relocate the pilot burner. Do not bend tubing near the pilot burner.

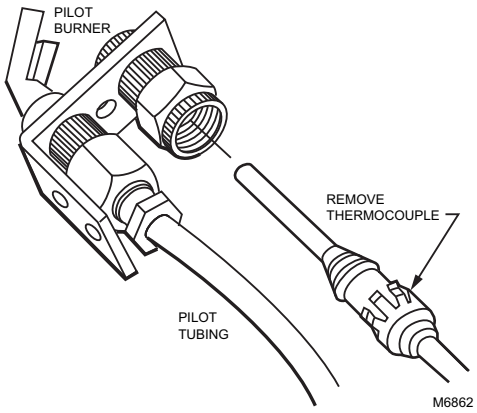


Fig. 7. Remove thermocouple from pilot burner.

Install Igniter-Sensor Assembly

1. Install the ground rod. See Fig. 8.
   - Mount adapter to the ground rod, if needed.
   - Insert the ground rod in place of the thermocouple on the pilot burner. Push the ground rod all the way up and fasten as shown in Fig. 8.
   - Align the ground rod so the clip hugs the pilot burner and keeps the ground rod from rotating. See Fig. 9.
2. Loosen the setscrews on the mounting bracket and slide the igniter-sensor mounting bracket over the top of the ground rod. See Fig. 9.
3. Tighten the setscrews on the mounting bracket using the hex wrench provided. See Fig. 9.
4. Adjust the electrode position so the electrode tip and gap are in the pilot flame. Push/pull the ground rod to move the igniter-sensor up and down.
5. Check that the chosen position allows room to connect the ignition cable to the stud terminal. Rotate the igniter-sensor as necessary.
6. Tighten the setscrews on the mounting bracket using the hex wrench provided.

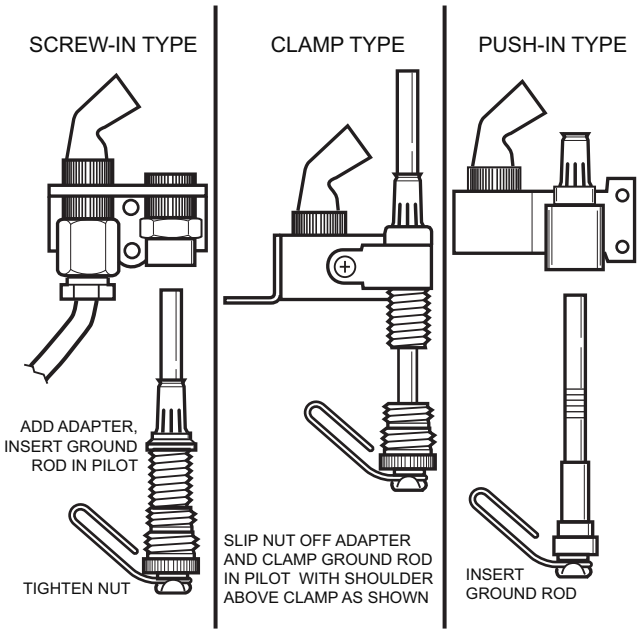


Fig. 8. Mount ground rod on pilot burner.

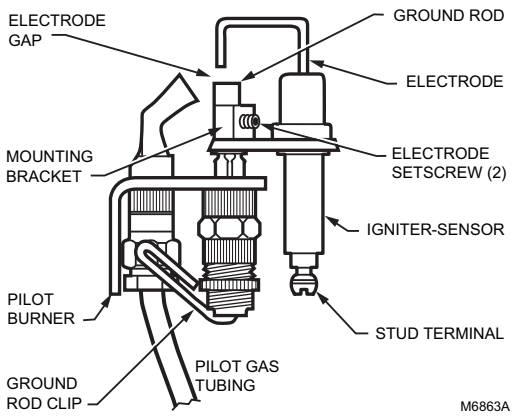


Fig. 9. Fasten igniter-sensor to ground rod.

Install the Gas Control

WARNING

FIRE OR EXPLOSION HAZARDCAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.
Follow these warnings exactly:

1. Do not bend the pilot gas tubing at the gas control or at the pilot burner after the compression fitting is tightened. Gas leakage at the connection can result.
2. Always install a sediment trap in the gas supply line to prevent contamination of the gas control.
3. Do not force the gas control knob. Use only your hand to turn the gas control knob. If the gas control knob does not operate by hand, the gas control should be replaced by a qualified service technician. Force or attempted repair can result in a fire or explosion.

IMPORTANT

These gas controls are shipped with protective seals over the inlet and outlet tappings. Do not remove the seals until ready to connect the piping.

Converting Between Natural and LP Gas

WARNING

FIRE OR EXPLOSION HAZARDCAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

1. Do not attempt to use a gas control set for natural gas on LP gas or a gas control set for LP gas on natural gas.
2. When making a conversion, main and pilot burner orifices must be changed to meet appliance manufacturer specifications.

To convert from natural gas to LP, use the 393691 LP Conversion Kit that is included with the Y8610U Intermittent Pilot Retrofit Kit. To convert from LP to natural gas, use the 394588 Natural Gas Conversion Kit (ordered separately). Step-opening gas controls cannot be converted.

To convert control from one gas to another:

1. Turn off the main gas supply to the appliance.
2. Remove the regulator cap screw and pressure regulator adjusting screw. See Fig. 3 or Fig. 4 on page 5.
3. Remove the existing spring.
4. Insert the replacement spring with the tapered end down. See Fig. 10.
5. Install the new plastic pressure regulator adjustment screw so that the top of the screw is flush (level) with the top of the regulator. Turn the pressure regulator adjustment screw clockwise six complete turns. This provides a preliminary pressure setting of about 10.0 in. wc (2.5 kPa) for LP regulator and 3.5 in. wc (0.9 kPa) for natural gas regulator.
6. Check the regulator setting either with a manometer or by clocking the gas meter. See “Checkout” on page 15.
7. Install the new cap screw.
8. Mount the conversion label on the control.
9. Install the control and appliance according to the appliance manufacturer instructions.

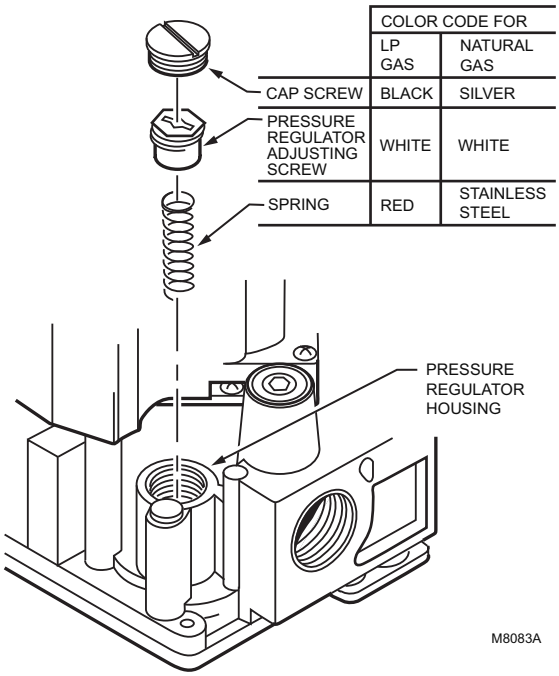


Fig. 10. Installation of conversion kit in regulated gas control.

Install Adapters to Gas Control (if used)

393690-14 Straight Flange (3/4 in.)

1. Remove the seal over the gas control inlet or outlet.
2. Make sure that the O-ring is fitted in the flange groove. If the O-ring is not attached or is missing, do not use the flange.
3. With the O-ring facing the gas control, align the gas control threaded holes with the flange clearance holes.
4. Insert and tighten the screws provided with the flange. Tighten the screws to 25 inch pounds of torque to provide a gas tight seal.

Bushings

1. Remove the seal over the gas control inlet or outlet.
2. Apply a moderate amount of good quality pipe compound to the bushing, leaving the two end threads bare. For an LP installation, use a compound resistant to LP gas. Do not use Teflon tape.
3. Insert the bushing in the gas control and thread the pipe carefully into the bushing until tight.

Install Gas Control Piping

All pipe must comply with local codes and ordinances or with the National Fuel Code (ANSI Z223.1 NFPA No. 54), whichever applies. Tubing installation must comply with approved standards and practices.

1. Use new, properly reamed pipe free from chips. If tubing is used, ensure that ends are square, deburred, and clean. All tubing bends must be smooth and without deformation.
2. Run the new pipe or tubing to the gas control. When tubing is used, obtain a tube-to-pipe coupling to connect the tubing to the gas control.

3. Install a sediment trap in the gas supply line. See Fig. 11 on page 11.

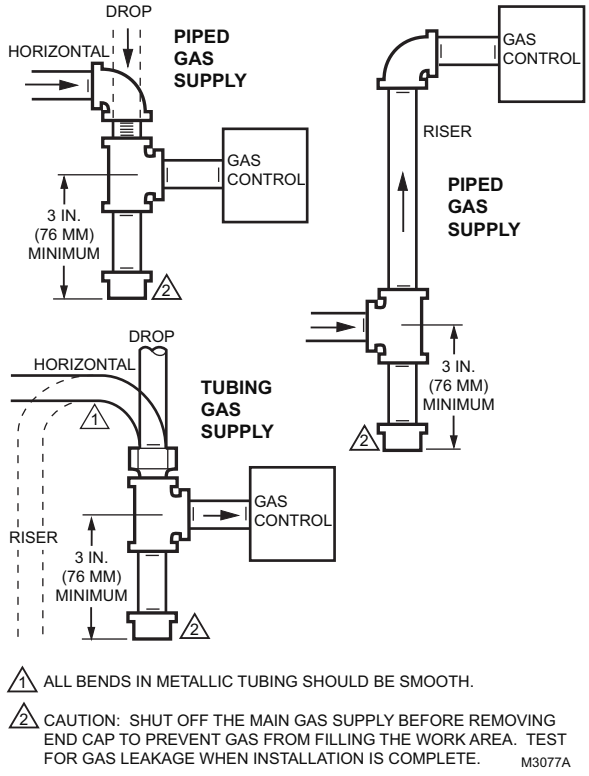


Fig. 11. Install sediment trap.

Mount Gas Control

1. The gas control can be mounted from 0 to 90 degrees, in any direction including vertically, from the upright position of the gas control knob.
2. Mount the gas control so the gas flow is in same direction as the arrow on the gas control bottom.
3. Thread the pipe as listed in Table 3.

NOTE: See Table 3 for maximum pipe threading depth. If the pipe is inserted too deeply into the gas control, the second main valve or safety valve can distort or malfunction.

Table 3. NPT pipe thread length (in.)

Pipe Size	Overall Thread Length	Maximum Depth Pipe Can Be Inserted Into Gas Control
3/8	9/16	3/8
1/2	3/4	1/2
3/4	13/16	3/4

4. Apply a moderate amount of good quality pipe compound to pipe only; leave the two end threads bare. Do not use teflon tape. In LP installations, use a compound resistant to LP gas. See Fig. 12.

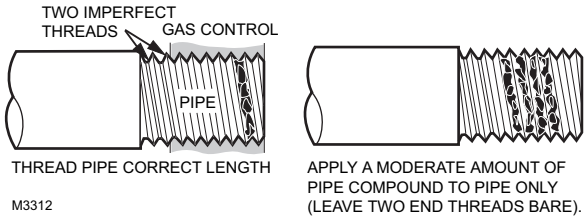


Fig. 12. Use moderate amount of pipe compound.

5. Remove protective seals over the gas control inlet and outlet, if necessary.
6. Connect the pipe to the gas control inlet and outlet. Tighten the inlet and outlet connections using a wrench on the gas control projecting wrench boss. See Fig. 3 or Fig. 4 on page 5 depending on the valve used.

Connect Pilot Gas Tubing

1. Cut the pilot gas tubing and bend as necessary for routing to the pilot burner.
   - Do not make sharp bends or deform the tubing.
   - Do not bend the tubing at the gas control after the compression nut has been tightened; gas leakage at the connection can result.
2. Square off and remove the burrs from the tubing end.
3. Unscrew the brass compression fitting from pilot gas outlet (see Fig. 3 or Fig. 4 on page 5 depending on the valve used). Slip the fitting over the pilot gas tubing and slide out of the way.

NOTE: When replacing a gas control, cut off the old compression fitting and replace with the new compression fitting provided on the new gas control. Never use the old compression fitting as it might not provide a gas tight seal. See Fig. 13.

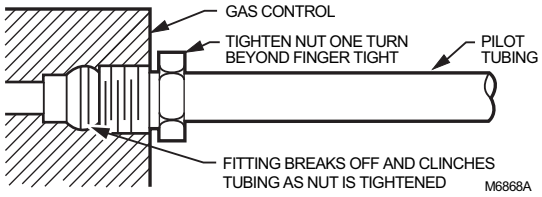


Fig. 13. Always use new compression fitting.

4. Push pilot gas tubing into the pilot gas tapping until it bottoms. While holding the tubing all the way in, slide the compression fitting into place and engage the threads. Turn the fitting until finger tight. Use a wrench to tighten one more turn. Do not overtighten.
5. Connect the other end of the pilot gas tubing to the pilot burner according to the pilot burner manufacturer instructions.

Locate and Mount the S8610U Intermittent Pilot Module

Location

Identify a mounting location for the S8610U ignition control. The mounting location must provide:

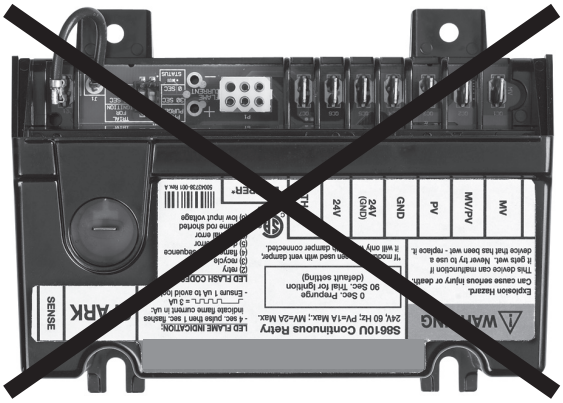
- Good, clear access to the field wiring terminals.
- Operating ambient temperatures between -40°F (-40°C) and 165°F (74°C).
- Direct the cable route to the pilot burner. The cable route must be 30 inches (762 mm) or less and not expose the cable to excessive heat.
- Relative humidity below 95% non condensing.
- Protection from water, steam or corrosive chemicals that are used to clean the appliance.
- Protection from dripping water, such as from an overfilled humidifier or from condensation.
- Protection from dust or grease accumulation.

Mounting

Mount the ignition control module with the terminals down to protect them from dripping water and dust. The control module can also be mounted with the terminals on either side. Do not mount with the terminals pointing up. Fig. 14 illustrates the incorrect mounting position. Use the S8610U as a template to mark the mounting hole pattern. Drill new holes, as required. Fasten securely with four – No. 6-32 machine screws, or No. 8 sheet metal screws, or 8-18 x 5/8 Pan Head tapping screws.

IMPORTANT

Do not mount with terminals facing up.



M29889

Fig. 14. Incorrect mounting.

Wire the System

CAUTION

ELECTRICAL SHOCK OR EQUIPMENT DAMAGE HAZARD.

Disconnect the power supply before making wiring connections to prevent electrical shock or equipment damage.

All wiring must comply with local codes and ordinances. Refer to Fig. 15 and Table 5 on page 13 for typical connections.

IMPORTANT

1. *As shown in the wiring diagrams, a common ground is required on:*
   The pilot burner mounting bracket, ***and*** *the GND (BURNER) terminal on the ignition control module. Failure to use the GND (BURNER) terminal may result in intermittent loss of spark and/or loss of flame current sensitivity.*
2. *Make sure the transformer has adequate VA. The* ignition control module *requires at least 0.1 A at 24 Vac. Add the current draws of all other devices in the control circuit, including the pilot and main valves in the gas control, and multiply by 24 to determine the total VA requirement of these components. Add this total to 2.4 VA (for the* ignition control module*). The result is the minimum transformer VA rating. Use a Class II transformer if replacement is required.*

Connect Vent Damper (Optional)

If the ignition control module is to be used with an existing vent damper and harness to be connected to the module's integral damper connector in an atmospheric appliance, perform the following to connect it to the module:

IMPORTANT

After the initial power-up, the ignition control module senses the presence of the vent damper connection. If the vent damper is connected, the ignition control module permanently configures itself to operate ***only*** *with the damper connected.*

Once an ignition control module powers up with a vent damper connected, the module will not function without a vent damper being connected.

Using the wiring harness on the appliance, insert the matching 6-pin plug into the connector labeled P1 (see Fig. 15 on page 13) on the S8610U ignition control module and connect the other end to the vent damper.

NOTE: The connector (P1) accepts a Molex 03-06-2061 plug on the existing vent damper harness.

Connect Ignition Cable

Use the provided ignition cable to connect the S8610U module to the pilot burner.

Be sure the ignition cable is not exposed to high temperature while the appliance is operating.

NOTE: The cable must not run in continuous contact with a metal surface or spark voltage may be greatly reduced. Use ceramic or plastic standoff insulators as required.

To install:

1. Connect one end of the cable to the male quick connect SPARK terminal on the ignition module.
2. Connect the other end of the cable to the igniter or igniter-sensor stud on the pilot burner/igniter-sensor.

Wiring Connections

Connect the provided harness to the ignition module and the gas control. The harness ends are labeled for easy installation. See Table 4.

Table 4. Wiring Harness Connections.

Harness Wire Color / Wire Label	S8610U Terminal	Gas Control Terminal / Tstat Load
Black / 25 VAC	TH-W	Thermostat call for heat to original standing pilot valve
Orange / 25 VAC-GND	24V (GND)	Transformer 24 VAC ground lead to original standing pilot valve
Red / MV	MV	MV
White / MV-PV	MV-PV	MV-PV
Blue / PV	PV	PV
Green / GND	GND	Ground terminal on gas control

Use Fig. 15 and Table 5 to make the remaining wiring connections.

NOTE: The 24V terminal on the S8610U is used only when a vent damper is installed.

Fig. 16 on page 14 illustrates the typical wiring connections in a heating system with an atmospheric burner.

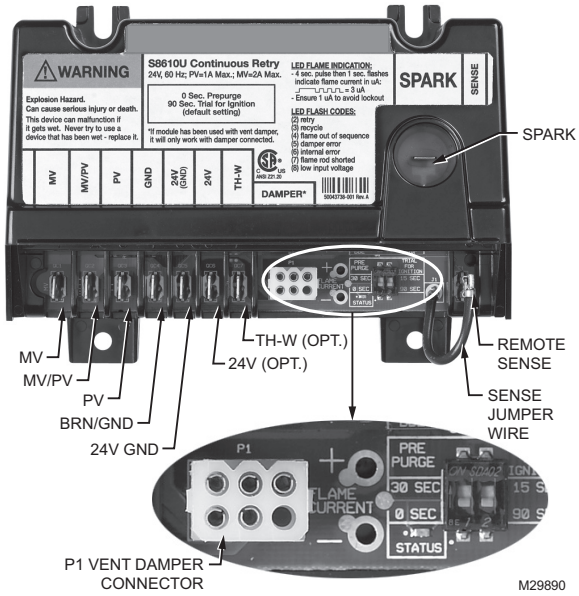
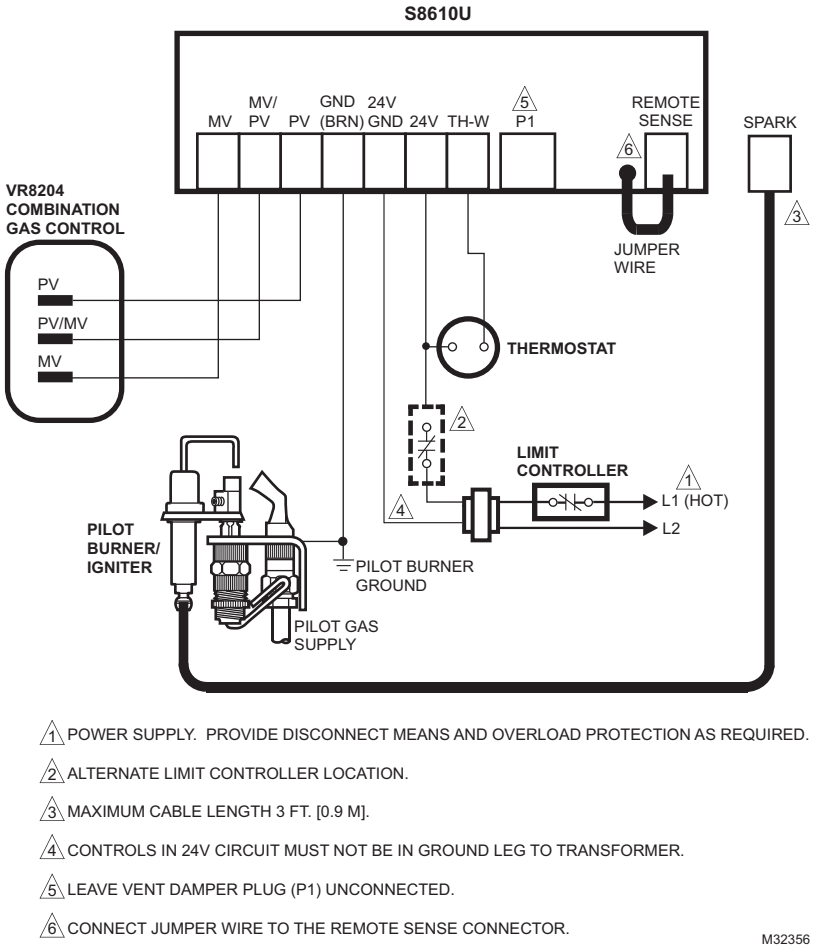


Fig. 15. S8610U Typical wiring connections.

Table 5. S8610U Typical Wiring Connections.

Connector Label	Size or Type	Description
MV	1/4 inch	Main Valve connection
MV/PV	1/4 inch	Common terminal for gas valves
PV	1/4 inch	Pilot Valve connection
BRN GND	1/4 inch	Burner Ground
24V GND	1/4 inch	Return path to transformer
24V	1/4 inch	Optional— 24 Vac power connection for Vent Damper
TH-W	1/4 inch	Connector for “Call for Heat” signal from thermostat
P1	6-pin keyed plug	Connector for Vent Damper connection (used to control a connected damper in atmospheric appliances)
Flame Current	Two holes	Micro-ammeter connector
P4 (Jumper)	Jumper	Provides a lockout for the DIP switch settings (See “Jumper” on page 15.)
SENSE JUMPER WIRE	Wire with 3/16 inch quick connect	Connects to the REMOTE SENSE connector for installations with a single spark rod (local flame sensing)
REMOTE SENSE	3/16 inch	Flame Sensor connector For single rod installations, connect the SENSE JUMPER WIRE to this terminal connector.
SPARK	1/4 inch	High voltage sparking electrode connection



1 POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED.

2 ALTERNATE LIMIT CONTROLLER LOCATION.

3 MAXIMUM CABLE LENGTH 3 FT. [0.9 M].

4 CONTROLS IN 24V CIRCUIT MUST NOT BE IN GROUND LEG TO TRANSFORMER.

5 LEAVE VENT DAMPER PLUG (P1) UNCONNECTED.

6 CONNECT JUMPER WIRE TO THE REMOTE SENSE CONNECTOR.

M32356

Fig. 16. Y8610U connections in a heating system with an atmospheric burner and no vent damper.

SETTINGS

DIP Switch (S1) Settings

The factory default settings for the S8610U are recommended for retrofit applications. These settings will provide the most reliable system operation.

Table 6. DIP Switch (S1) Settings.

Prepurge	Trial For Ignition	SW1	SW2
None	90 seconds	**OFF**	**OFF**

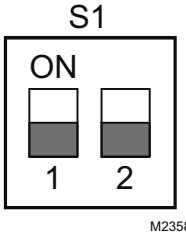


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Fig. 17. DIP switch (S1) - shown with factory default settings (OFF) for SW1 and SW2.

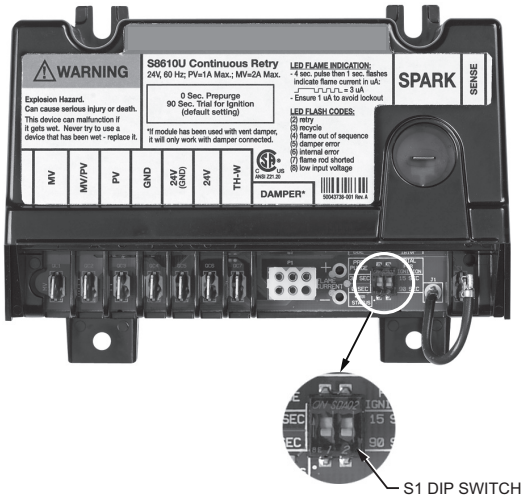

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Fig. 18. DIP switch (S1) and jumper (P4) location.

Jumper

This jumper (labeled P4) is used to lock the operating sequence selected by the DIP switch settings. See Fig. 18.

Table 7. Jumper Usage.

Jumper	Action to lock the control's operating sequence
P4	To ensure proper system operation (after installation and checkout), pull jumper to lock the DIP switch settings. NOTE: If jumper is not removed during installation, the ignition control locks the DIP switch settings after the 10th "Call for Heat" cycle.

IMPORTANT

Once the Jumper has been pulled or the module starts the 10th "Call for Heat", the control operating sequence is permanently locked and cannot be reset by replacing the jumper or by resetting the Dip Switches.

CHECKOUT

Check out the gas control system:
- At initial appliance installation.
- As part of regular maintenance procedures. Maintenance intervals are determined by the application. See "Planning the Installation" on page 6.
- As the first step in troubleshooting.
- Anytime work is done on the system.

⚠ WARNING

FIRE OR EXPLOSION HAZARD CAN CAUSE PROPERTY DAMAGE, SEVERE INJURY, OR DEATH.

1. If you smell gas or suspect a gas leak, turn off the gas at the manual service valve and evacuate the building. Do not try to light any appliance and do not touch any electrical switch or telephone in the building until no spilled gas remains.
2. A gas leak test must be done as described in the steps below on initial installation and any time work is done involving the gas piping.

Step 1: Perform Visual Inspection.

1. With power off, make sure all wiring connections are clean and tight.
2. Turn on power to appliance and ignition control module.
3. Open manual shutoff valves in the gas line to the appliance.
4. Perform a gas leak test ahead of the gas control.

GAS LEAK TEST:
Paint the gas control gasket edges and all pipe connections upstream of the gas control with a rich soap and water solution. Bubbles indicate gas leaks. Tighten the joints and screws or replace component to stop gas leak. Recheck with soap and water solution.

Step 2: Verify Ignition Control System Ground.

The igniter, flame sensor, and ignition control module must share a common ground with the pilot burner. Use thermoplastic insulated wire with a minimum rating of 221°F (105°C) for the ground wire; asbestos insulation is not acceptable. If the temperature at the wire could exceed 221°F (105°C), use a shield to protect the wire from radiant heat generated by the burner. Connect the ground wire as follows:

1. Fit one end of the ground wire with a female 1/4 in. quick-connect terminal and connect it to the male quick-connect GND (BURNER) terminal on the ignition control module.
2. Strip the other end of the wire and fasten it under the igniter bracket mounting screw. If necessary, use a shield to protect the ground wire from radiant heat.
3. The burner serves as the common grounding area. If there is not good metal-to-metal contact between the burner and ground, run a lead from the burner to ground.

NOTE: Earth ground is not required.

Step 3: Review Normal Operating Sequence and Ignition Control Module Specifications.

See the Operation section on this page and "Specifications" on page 2.

Step 4: Reset the Ignition Control Module.

1. Turn the thermostat to its lowest setting.
2. Wait one minute.

As you perform the remaining steps, watch for points where operation deviates from normal. To correct problems, refer to the "Troubleshooting Guide" on page 21.

Step 5: Check Safety Shutoff Operation.

1. Turn gas supply off at the appliance manual shutoff valve.
2. Set thermostat or controller above room temperature to "Call for Heat."
3. Watch for spark at pilot burner. Time spark from start to shutoff. Spark should shut off after 90 seconds. See device label and "Settings" on page 14.
4. Wait 5 minutes. Ignition sequence should start again followed by shutoff.
5. Set thermostat below room temperature and wait one minute before continuing.

Step 6: Check Normal Operation.

1. Turn on the gas supply at the appliance manual shutoff valve.
2. Turn gas control knob to ON and make sure that no gas is flowing to the pilot or main burner.
3. Set thermostat or controller above room temperature to "Call for Heat."
4. Make sure pilot lights smoothly when gas reaches the pilot burner.
5. Make sure main burner lights smoothly without flashback.
6. Make sure burner operates smoothly without floating, lifting, or flame rollout to the furnace vestibule or heat buildup in the vestibule.

7. Perform a gas leak test in the appliance including both the inlet and outlet sides of the gas control.

   GAS LEAK TEST:
   Paint the gas control gasket edges and all pipe connections downstream of the gas control, including the pilot tubing connections, with a rich soap and water solution. Bubbles indicate gas leaks. Tighten the joints and screws or replace component to stop gas leak. Recheck with soap and water solution.

8. Turn the thermostat or controller below the room temperature. Make sure the main burner and pilot flames go out.

OPERATION

Fig. 19 summarizes the normal operating sequence for installations without vent dampers. The ignition control module's operation can be conveniently divided into two phases.
- Trial for pilot ignition
- Main burner operation

Trial for Pilot Ignition

On a "Call for Heat", the ignition control module energizes the spark source and the pilot valve relay simultaneously. The pilot valve opens, allowing gas to flow to the pilot burner for the ignition trial time. The spark lights the pilot flame when pilot gas is present. A flame rectification circuit confirms the presence of the pilot flame, shuts off the spark source, and energizes the main valve relay.

The ignition control module uses a two-level pilot flame proving sequence. When a sufficient flame current is sensed, the spark is turned OFF. However, the pilot flame must generate a higher level of flame current to energize the main valve. This approach assures a stable pilot flame to support reliable burner lightoff. If the pilot flame is weak or unstable, the spark may turn back ON. However, the trial for pilot ignition will not exceed the stated ignition trial time.

Main Burner Operation

When the main valve opens, gas flows to the main burner where it is lit by the pilot flame. There is a short flame stabilization period as the main valve opens to allow the pilot flame to stabilize as the main gas lights. The system is now in the run mode with the presence of the pilot flame continuously monitored by the flame rectification circuit. If the pilot flame goes out, the ignition control module senses loss of pilot flame and shuts off both the pilot valve relay and the main valve relay. Flow of gas to pilot and main burners stops as the valves close (100% shutoff).

Failed Trial for Pilot Ignition

The S8610U control module provides multiple trials for ignition (TFI). If the pilot is not lit or sensed before the end of the trial for ignition time, the ignition control shuts off the spark and pilot gas (100% shutoff). There is a five minute delay before another TFI is initiated. The pattern of TFI followed by a five minute delay continues until the pilot lights and is proved or the "Call for Heat" ends. The five minute delay time can be bypassed by cycling the system thermostat or removing and restoring system power.

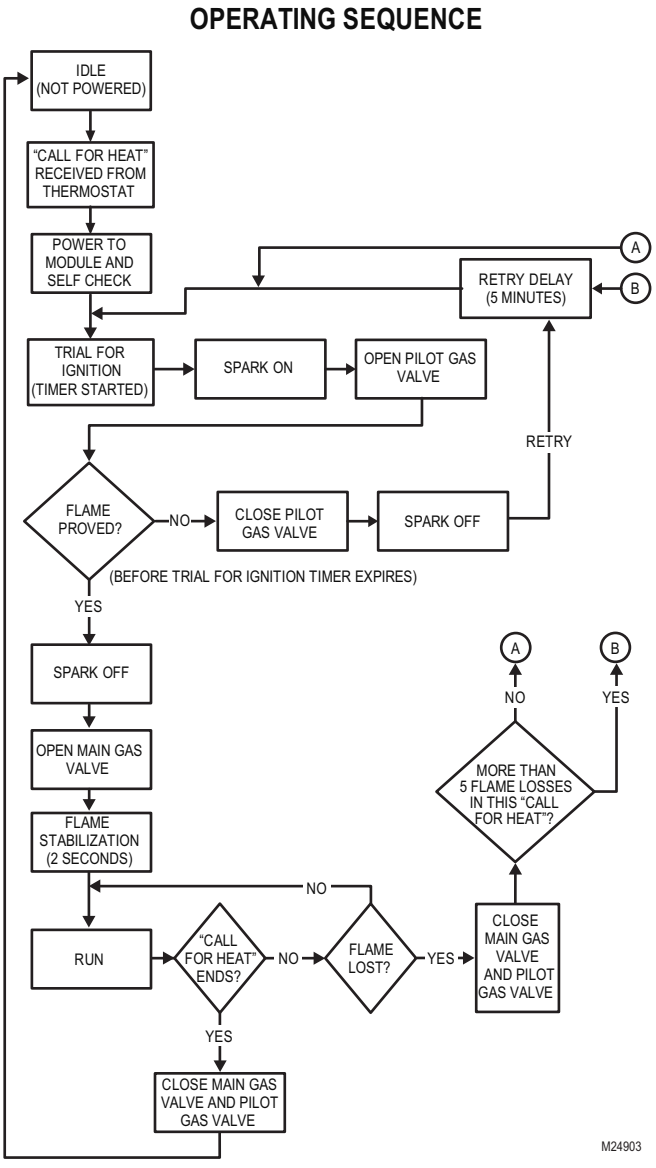

Fig. 19. Normal operating sequence without vent damper.

TROUBLESHOOTING

⚠ WARNING

Fire, Explosion, or Electrical Shock Hazard.
Can cause severe injury, death or property damage.
Do not attempt to modify the physical or electrical characteristics of this device in any way. Replace it if troubleshooting indicates a malfunction.

IMPORTANT

1. *The following service procedures are provided as a general guide. Follow appliance manufacturer's service instructions if available.*
2. *Meter readings between the gas control and ignition control module must be taken within the trial for ignition period. Once the ignition control module shuts off, it must be reset by setting the thermostat down for at least 30 seconds before continuing.*
3. *If any component does not function properly, make sure it is correctly installed and wired before replacing it.*
4. *The ignition control module and the gas control cannot be repaired. If either malfunctions, it must be replaced.*
5. *Only trained, experienced service technicians should service intermittent pilot systems.*
6. *After troubleshooting, check out the system again to be sure it is operating normally.*

Troubleshooting Sequence

The general troubleshooting sequence is as follows:

1. Refer to “LED Status and Troubleshooting” on page 19 for LED status codes.
2. Perform the “Checkout” on page 15 as the first step in troubleshooting.
3. Check the Troubleshooting Guide (Fig. 22 on page 21) to pinpoint the cause of the problem.
4. If troubleshooting indicates an ignition problem, see Ignition System Checks below to isolate and correct the problem.
5. Following troubleshooting, perform the “Checkout” on page 15 again to be sure system is operating normally.

Ignition System Checks

Step 1: Check Ignition Cable.

Make sure:

1. Ignition cable is not damaged, cracked, burned, or dirty. Replace if necessary.
2. Ignition cable does not run in contact with any metal surfaces.
3. Ignition cable is no more than 36 in. (0.9 m) long.
4. Connections to the ignition control module and to the igniter or igniter-sensor are clean and tight.
5. Ignition cable provides good electrical continuity.

STEP 2: Check Ignition System Grounding.

Nuisance shutdowns are often caused by a poor or erratic ground. A common ground, is required for the ignition control module and the pilot burner bracket.

1. Check for good metal to metal contact between the pilot burner bracket and the main burner.
2. Check the ground circuit from the GND (BURNER) terminal on the ignition control module to the pilot burner. Make sure connections are clean and tight. If the wire is damaged or deteriorated, replace it with 14 to 18-gauge, moisture-resistant, thermoplastic insulated wire with 221°F (105°C) minimum rating.
   a. Check the ceramic flame rod insulator for cracks or evidence of exposure to extreme heat, which can permit leakage to ground. Replace pilot burner/igniter-sensor and provide shield, if necessary.
   b. If the flame rod or bracket is bent out of position, restore to correct position.

STEP 3: Check Spark Ignition Circuit.

You will need a short jumper wire made from ignition cable or other heavily insulated wire.

1. Close the manual gas valve.
2. Disconnect the ignition cable at the SPARK terminal on the ignition control.

⚠ WARNING

Electrical Shock Hazard.
Can cause severe injury, death or property damage.
When performing the following steps, do not touch the stripped end of jumper or SPARK terminal. The ignition circuit generates over 10,000 volts and electrical shock can result.

3. Energize the ignition control module and immediately touch one end of the jumper firmly to the GND terminal on the ignition control module. Move the free end of the jumper slowly toward the SPARK terminal until a spark is established.
4. Pull the jumper slowly away from the terminal and note the length of the gap when sparking stops. Check Table 8.

Table 8. Arc Troubleshooting.

Arc Length	Action
No arc or arc less than 1/8 in. (3 mm)	Check external fuse, if provided. Verify power at the ignition control module's control input terminal. Replace control if fuse and power are okay.
Arc 1/8 in. (3 mm) or longer	Voltage output is okay.

STEP 4: Check Pilot and Main Burner Lightoff.

1. Set the thermostat to "Call for Heat."
2. Watch the pilot burner during the ignition sequence. See if one of the following occurs:
   a. Ignition spark continues after the pilot is lit.
   b. The pilot lights and the spark stops, but main burner does not light.
   c. The pilot lights, the spark stops and main burner lights, but the pilot and main gas shut down while the "Call for Heat" is still present.
3. If so, ensure adequate flame current as follows.
   a. Turn off furnace at circuit breaker or fuse box.
   b. Clean the flame rod with emery cloth.
   c. Make sure electrical connections are clean and tight. Replace damaged wire with moisture-resistant No. 18 wire rated for continuous duty up to 221°F (105°C).
   d. Check for cracked ceramic insulator, which can cause short to ground, and replace igniter-sensor if necessary.
   e. Check for cracked, damaged, burned, or dirty spark ignition cable and replace if necessary. Be sure ignition cable is not touching any flat metal surface.
   f. At the gas control, disconnect main valve wire from the TH-W or MV terminal.
   g. Turn on power and set thermostat to "Call for Heat." The pilot should light but the main burner will remain off because the main valve actuator is disconnected.
   h. Check the pilot flame. Make sure it is blue, steady and envelops 3/8 to 1/2 in. (10 to 13 mm) of the flame rod. See Fig. 20 for possible flame problems and their causes.
   i. If necessary, adjust pilot flame by turning the pilot adjustment screw on the gas control clockwise to decrease or counterclockwise to increase pilot flame. Following adjustment, always replace pilot adjustment cover screw and tighten firmly to assure proper gas control operation.
   j. Set thermostat below room temperature to end "Call for Heat."
4. Recheck ignition sequence as follows.
   a. Reconnect main valve wire.
   b. Set thermostat to "Call for Heat."
   c. Watch ignition sequence at burner.
   d. If spark still doesn't stop after pilot lights, replace ignition control module.
   e. If main burner doesn't light or if main burner lights but system locks out, check the ignition control module's ground wire and the gas control as described in "Ignition System Checks" on page 17 and refer to the Troubleshooting Guide (Fig. 22 on page 21).

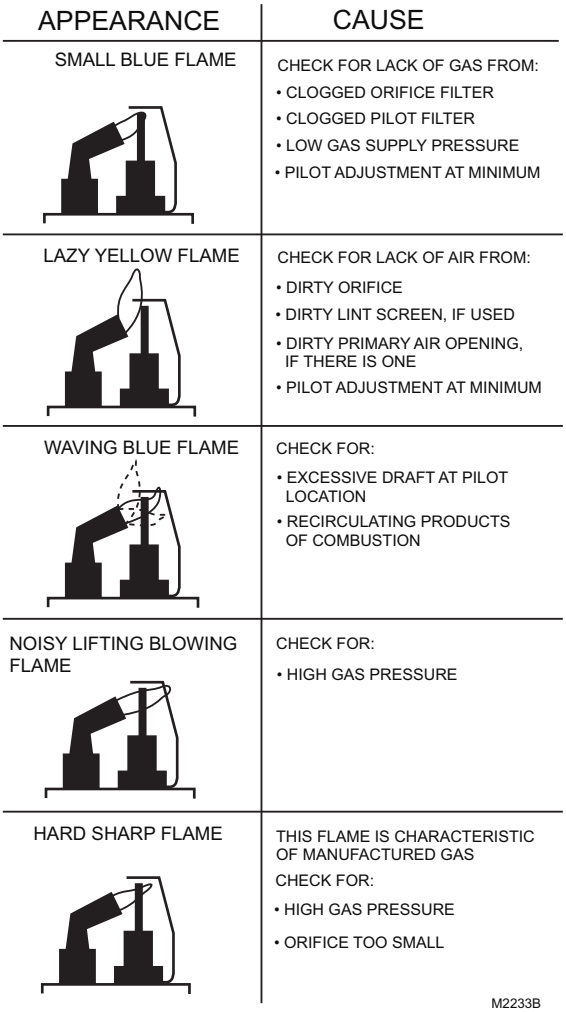

Fig. 20. Examples of unsatisfactory pilot flames.

LED Status and Troubleshooting

The ignition control module has two LEDs; one for flame sensing and one for system status:

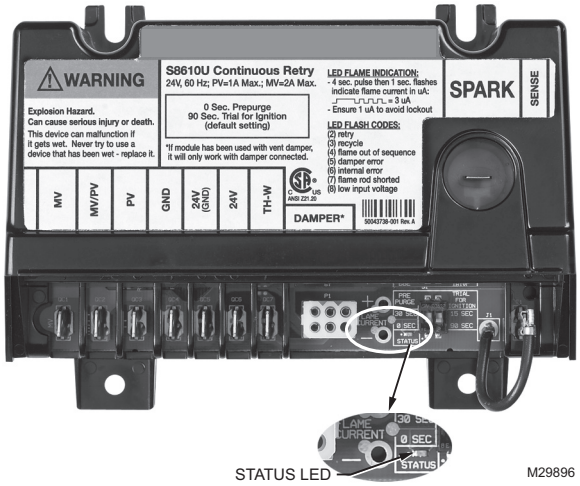

Fig. 21. Location of LEDs.

- **Flame Status and Sense LED**
  - Indicates system operation status and senses error conditions. See Table 9 on page 20 and the “Trouble-shooting Guide" on page 21.

Table 9. Green LED Status Codes.

Green LED Flash Code[a]	Indicates	Next System Action	Recommended Service Action
OFF	No “Call for Heat”	Not applicable	None
Flash Fast	Power up - internal check	Not applicable	None
Heartbeat	Normal startup - ignition sequence started (including prepurge)	Not applicable	None
4 Seconds ON then “x” flashes	Device in run mode. “x” = flame current to the nearest μA.	Not applicable	None
2	5 minute Retry Delay – Pilot flame not detected during trial for ignition	Initiate new trial for ignition after retry delay completed.	If system fails to light on next trial for ignition check gas supply, pilot burner, spark and flame sense wiring, flame rod contaminated or out of position, burner ground connection.
3	Recycle – Flame failed during run	Initiate new trial for ignition. Flash code will remain through the ignition trial until flame is proved.	If system fails to light on next trial for ignition, check gas supply, pilot burner, flame sense wiring, contamination of flame rod, burner ground connection.
4	Flame sensed out of sequence	If situation self corrects within 10 seconds, control module returns to normal sequence. If flame out of sequence remains longer than 10 seconds, control will resume normal operation 1 hour after error is corrected.	Check for pilot flame. Replace gas valve if pilot flame present. If no pilot flame, cycle “Call for Heat." If error repeats, replace control.
5	Damper Error: – Damper required but not present – Damper failed to open within 60 seconds – Damper failed to close within 60 seconds	If damper error corrects, ignition control resumes normal operation.	Check damper connection, damper wiring, and 24V connection on control. Replace damper if necessary.
6	Control Internal Error	Control module remains in wait mode. When the fault corrects, control module resumes normal operation.	Cycle “Call for Heat." If error repeats, replace control.
7	Flame rod shorted to ground	Control module remains in wait mode. When the fault corrects, control module resumes normal operation.	Check flame sense lead wire for damage or shorting. Check that flame rod is in proper position. Check flame rod ceramic for cracks, damage or tracking.
8	Low secondary voltage supply	Control module remains in wait mode. When the fault corrects, control module resumes normal operation.	Check transformer and AC line for proper input voltage to the control. Check with full system load on the transformer.

[a] Flash Code Descriptions:
- Flash Fast: rapid blinking.
- Heartbeat: Constant ½-second bright, ½-second dim cycles.
- 4-second solid on pulse followed by “x” 1-second flashes indicates flame current to the nearest μA. This is only available in run mode.
- A single flash code number signifies that the LED flashes X times at 2 Hz, remains off for two seconds, and then repeats the sequence.

Troubleshooting Guide

Refer to the Fig. 22 for troubleshooting the S8610U control module.

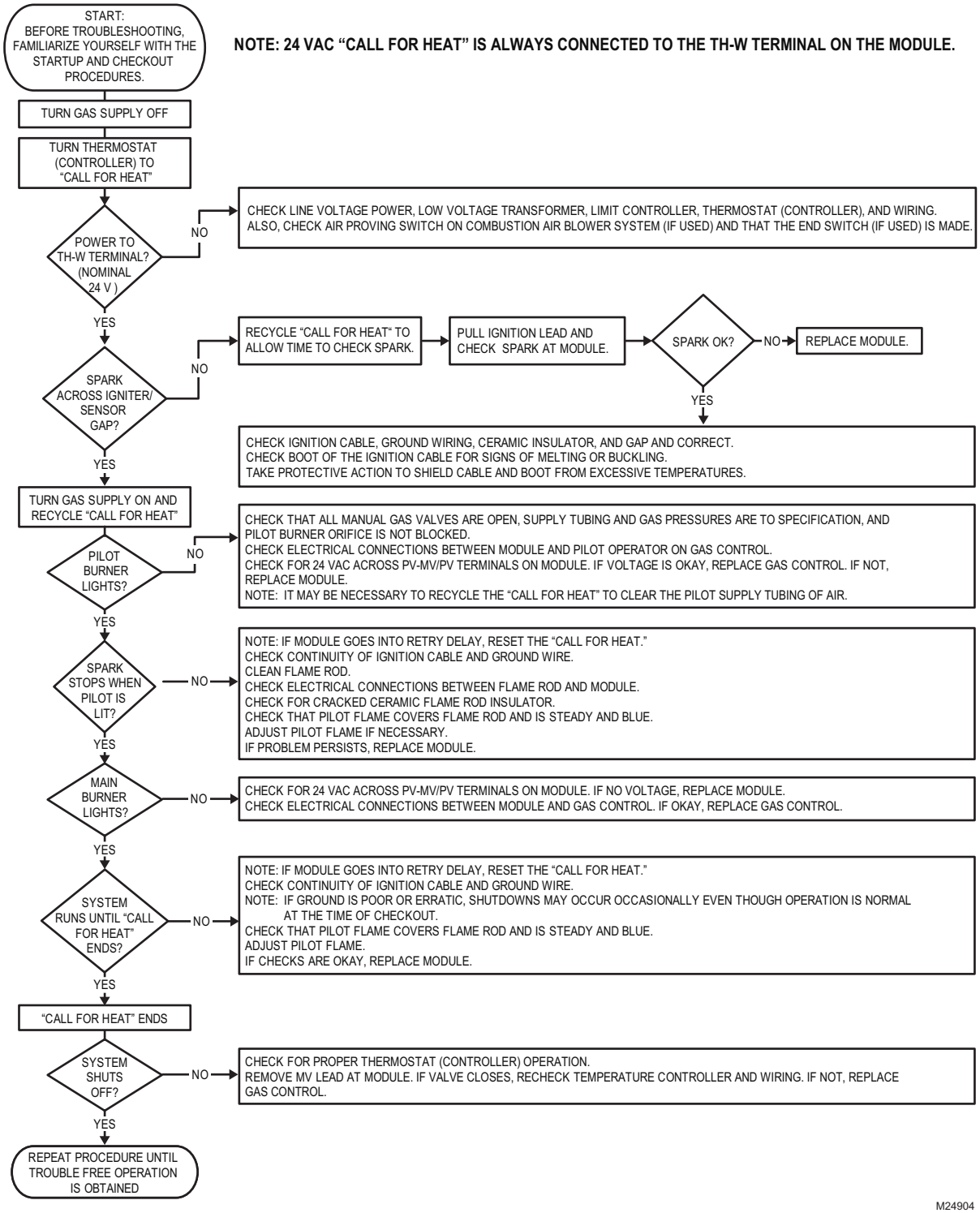

Fig. 22. Troubleshooting Guide.

ANSI STANDARDS

Exhibit A

Recommended Procedure for Safety Inspection of an Existing Appliance Installation as a Preliminary Step to Applying an Automatic Intermittent Pilot System

The following procedure is intended as a guide to aid in determining that an appliance is properly installed and is in a safe condition for continuing use.

This procedure is predicated on central furnace and boiler installations equipped with an atmospheric gas burner(s) and not of the direct vent type. It should be recognized that generalized test procedures cannot anticipate all situations. Accordingly, in some cases, deviation from this procedure may be necessary to determine safe operation of the equipment.

1. This procedure should be performed prior to any attempt at modification of the appliance or the installation.
2. If it is determined there is a condition which could result in unsafe operation, the appliance should be shut off and the owner advised of the unsafe condition.

The following steps should be followed in making the safety inspection:

1. Conduct a Gas Leakage Test of the appliance piping and control system downstream of the shut-off valve in the supply line to the appliance.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restrictions, leakage or corrosion or other deficiencies which could cause an unsafe condition.
3. Shut off all gas to the appliance and shut off any other fuel-burning appliance within the same room. Use the shutoff valve in the supply line to each appliance. If a manual gas valve is not in the gas supply line within 6 feet of the appliance in an accessible location, one shall be installed.
4. Inspect burners and crossovers for blockage and corrosion.
5. Applicable only to warm air heating appliances. Inspect heat exchangers for cracks, openings or excessive corrosion.
6. Applicable only to boilers. Inspect for evidence of water or combustion product leaks.
7. Insofar as is practical, close all building doors and windows and all doors between the space in which the appliance is located and other spaces of the building. Turn on clothes dryers. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers. If, after completing steps 7 through 12, it is believed sufficient combustion air is not available, refer to 1.3.4 of the National Fuel Gas Code (Z223.1) for guidance.
8. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
9. Determine the following:
   a. Determine that the pilot is burning properly and that main burner ignition is satisfactory by interrupting and re-establishing the electrical supply to the appliance in any convenient manner.
   b. Determine manifold pressure in order to match input after the new control is installed.
10. Perform the following tests:
    a. Visually determine that main burner gas is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
    b. If appliance is equipped with high and low flame control or flame modulation, check for proper main burner operation at low flame.
11. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use a draft gauge, the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
12. Return doors, windows, exhaust fans, fireplace dampers and all other fuel-burning appliances to their previous conditions of use.
13. Applicable only to warm air heating appliances. Check both limit controller and fan controller for proper operation. Limit controller operation can be checked by temporarily disconnecting the electrical supply to the blower motor and determining that the limit control acts to shut off the main burner gas.
14. Applicable only to boilers:
    a. Determine that the circulating water pumps are in operating condition.
    b. Test low water cutoffs, automatic feed controls, pressure and temperature limit controls and relief valves in accordance with the manufacturer's recommendations and instructions to determine they are in operating condition.

Exhibit A of ANSI Standard Z21.71 for Automatic Intermittent Pilot Ignition Systems for Field Installation.

Exhibit B

Procedure for Installing Automatic Intermittent Pilot Systems

Prior to beginning this procedure, a preliminary examination of the appliance and the automatic intermittent pilot system should be made to determine that the automatic intermittent pilot system can be properly applied to the appliance.

This procedure is intended as a guide to aid in safely installing a listed automatic intermittent pilot system on an existing listed appliance equipped with an atmospheric gas burner(s) and not of the direct vent type.

This procedure is based on the assumption that the history of the specific installation has been one of safe and satisfactory operation.

This procedure is predicated on central furnace and boiler installations, and it should be recognized that generalized procedures cannot anticipate all situations. Accordingly, in some cases, deviation from this procedure may be necessary to determine safe operation of the equipment.

The following steps should be followed in making the modifications:

1. Perform a safety inspection of the existing appliance installation. See Exhibit A for a recommended procedure for such a safety inspection.
2. Shut off all gas and electricity to the appliance. To shut off gas, use the shutoff valve in the supply line to the appliance. If a manual gas valve is not in the gas supply line within 6 feet of the appliance in an accessible location, one shall be installed. Do not use the shutoff valve which is provided as part of a combination control.
3. Install the automatic intermittent pilot system in strict accordance with the manufacturer's installation instructions.
4. Turn on all gas and electricity to the appliance.
5. Determine that the appliance transformer has adequate capacity by following the steps outlined below:
   a. Compute the approximate current draw by adding the current draw of the automatic intermittent pilot system to (1) the current draw of the associated valving, and (2) the current draw of any relays or other devices operated by the transformer.
   b. Multiply the total current draw as computed above by 24 V to determine the total VA (volt-ampere) required.
   c. The total VA (volt-ampere) required should be equal to or less than the VA rating of the transformer.
   d. If the total VA (volt-ampere) required is greater than the VA rating of the transformer, the transformer must be replaced with a Class 2 transformer of adequate rating.
6. Check the heat anticipator in the comfort thermostat to determine if it is properly adjusted to the current draw of the control system. Follow the thermostat manufacturer's instructions.
7. Make certain wiring connections are tight and wires are positioned and secured so they will not be able to contact high temperature locations.
8. Conduct a Gas Leakage Test of the appliance piping and control system downstream of the shut-off valve in the supply line to the appliance.
9. Perform the following:
   a. Adjust the thermostat to its highest temperature setting, and test manifold pressure and adjust the pressure regulator to match original input as required (refer to Exhibit A, step 9b).
   b. Visually determine that main burner is burning properly; i.e., no floating, lifting or flashback. Adjust the primary air shutter(s) as required.
10. If the appliance is equipped with high and low flame control or flame modulation, check for proper main burner operation at both high and low flame.
11. Determine that the pilot is igniting and burning properly and that main burner ignition is satisfactory by interrupting and reestablishing the electrical supply to the appliance in any convenient manner. Make this determination with the appliance burner both cold and hot. Perform this step as many times as is necessary to satisfy yourself that the automatic intermittent pilot system is operating properly.
12. Test the pilot safety device (1) to determine if it is operating properly, and (2) for turndown characteristics according to the manufacturer's installation instructions. No adjustments should be made other than those recommended by the system manufacturer.
13. Sequence the appliance through at least three operating cycles.
14. Applicable only to furnaces. Check both the limit controller and the fan controller for proper operation. Limit control operation can be checked by blocking the circulating air inlet or temporarily disconnecting the electrical supply to the blower motor and determining that the limit controller acts to shut off the main burner gas.
15. Applicable only to boilers.
    a. Determine that the circulating water pumps are in operating condition.
    b. Test low water cutoffs, automatic feed water controls, pressure and temperature limit controllers and relief valves in accordance with the manufacturer's recommendation to determine they are in operating condition.
16. Add the labels (see 1.6.1-n and -o) on the appliance.

Exhibit B of ANSI Standard Z21.71 for Automatic Intermittent Pilot Ignition Systems for Field Installation.

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