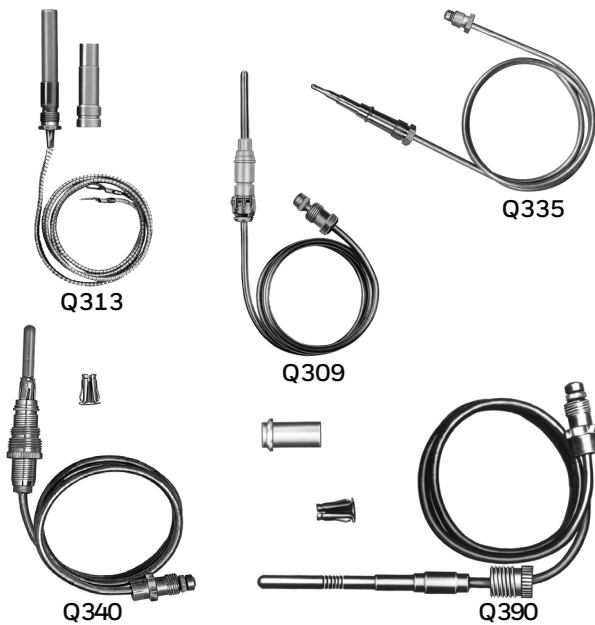




Q309A,B; Q335C; Q340A; Q390A Thermocouples and Q313A,B,C,F Thermopile Generators

PRODUCT DATA



Q335 Thermocouple is a quick dropout thermocouple used in conjunction with the Q313 Thermopile Generator in the Q382 Pilot Burner. The flame in the pilot burner is directed toward the thermocouple and the thermopile. As long as pilot flame is present, the millivolt output from the thermocouple keeps the safety valve in the gas control open, allowing the main gas to flow to the appliance on demand. The millivolt output from the thermopile energizes the operator in the valve on demand.

Q313 Thermopile Generator contains multiple thermocouples connected in series to increase the millivoltage output. The power generated is sufficient to operate an automatic millivolt gas control system, independent of any outside power source.

FEATURES

- **Push-in clip, split nut, and adapter assembly for easy pilot burner installation.**
- **Spade or quick-connect terminals available for millivolt gas control connections.**
- **Male nut connector for Pilotstat® safety control power units.**
- **Available in a variety of lead lengths.**

APPLICATION

Q309, Q340, and Q390 Thermocouples generate a thermoelectric current that senses a pilot flame on gas-fired heating systems. The pilot flame heats the tip of the thermocouple, producing a temperature differential between it and the base. This temperature difference generates a small amount of DC power, measured in millivolts.

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SPECIFICATIONS

Models:

Thermocouples:

Q309A.

Q309B Includes junction box for series hookup with high limit switch.

Q335C Quick dropout model.

Q340A.

Q390A.

Thermopile Generators:

Q313A.

Q313B Includes junction box for series hookup with high limit switch.

Q313C with 1/4 in. female quick-connects.

Q313F with polarity identified spade terminals.

Dimensions:

See Fig. 1.

Lead Lengths in in. (mm):

Q309:

Standard: 18 (457), 24 (610), 30 (762), 36 (914).

Other: 13 (330), 21 (533), 48 (1219).

Q335:

17.75 (450), 23.6 (600), 29.5 (750), 39 (1000)

Q340:

Standard: 18 (457), 24 (610), 30 (762), 36 (914).

Other: 48 (1219).

Q390:

Standard: 18 (457), 24 (610), 30 (762), 36 (914).

Q313:

Standard: 15 (381), 23 (584), 35 (889).

Other: 47 (1192).

Output (Open Circuit):

Q309, Q340, and Q390:

Normal Range: 26 to 32 mV.

Lowest Acceptable: 18 mV.

Turndown: 2 mV

Q335:

Normal Range: 20 to 30 mV.

Lowest Acceptable: 15 mV.

Turndown: 4 mV

Q313:

Normal Range: 600 to 750 mV.

Lowest Acceptable: 540 mV.

Turndown: 141 mV

Maximum DC Cold Resistance at 80°F (27°C):

Q309, Q340, Q335, and Q390:

For all lead lengths less than 39 in.: 0.02 ohms.

For 39 in. and 48 in. lead lengths: 0.03 ohms.

Q313 Resistance (Lead Length):

2.87 ohms (15 in.).

2.88 ohms (23 in.).

2.89 ohms (35 in.).

2.90 ohms (47 in.).

NOTE: Use W129A Millivoltmeter to determine maximum resistance.

Hot and Cold Junction Temperature Ratings:

Q309, Q340, Q390, Q313:

Hot Junction: 1400°F (760°C).

Cold Junction: 780°F (416°C).

Q335:

Hot Junction: 1200°F (649°C).

Cold Junction: 775°F (413°C).

Accessories:

390012C Power Unit Female Adapter.

392451 ECO Adapter.

Q357A Thermocouple Terminal Adapter.

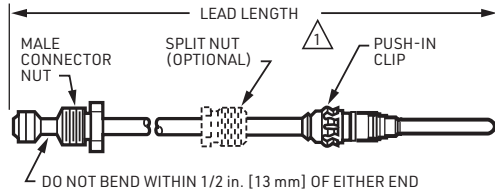
Pilot Burner Usage:

See Table 1.

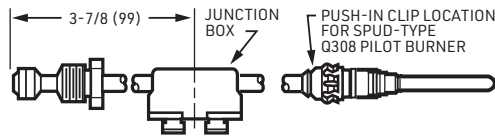
Q340 Replacement Information:

See Table 2.

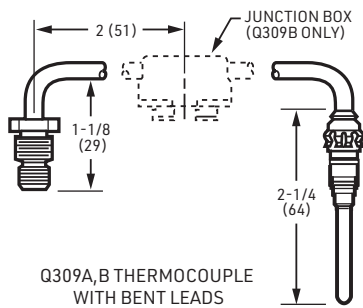
Q309A,B; Q335C; Q340A; Q390A THERMOCOUPLES AND Q313A,B,C,F THERMOPILE GENERATORS



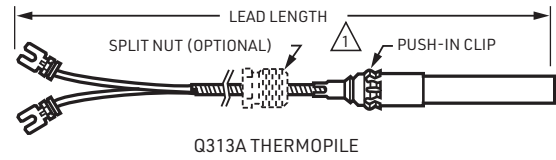
Q309A THERMOCOUPLE



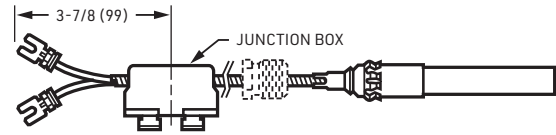
Q309B THERMOCOUPLE WITH JUNCTION BOX



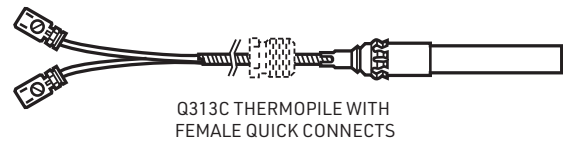
Q309A,B THERMOCOUPLE WITH BENT LEADS



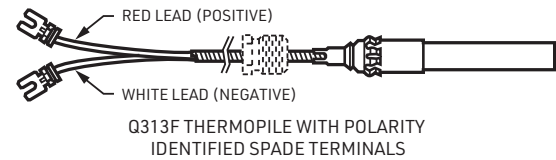
Q313A THERMOPILE



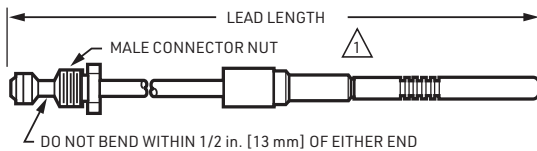
Q313B THERMOPILE WITH JUNCTION BOX



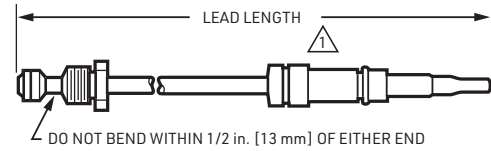
Q313C THERMOPILE WITH FEMALE QUICK CONNECTS



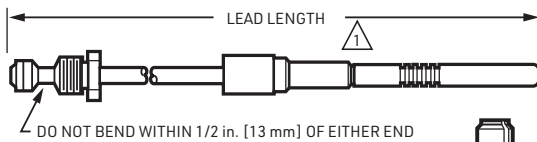
Q313F THERMOPILE WITH POLARITY IDENTIFIED SPADE TERMINALS



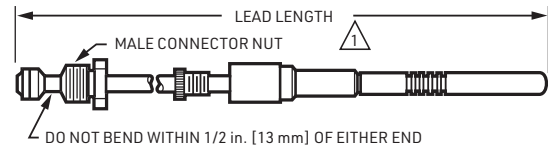
Q340A,B THERMOCOUPLE



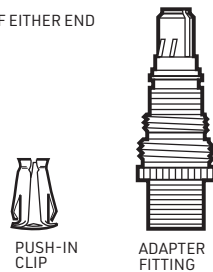
Q335 THERMOCOUPLE



Q340A THERMOCOUPLE



Q390A THERMOCOUPLE



LEAD LENGTH IS DEPENDENT ON THE SPECIFIC MODEL NUMBER. SEE SPECIFICATIONS, LEAD LENGTH IN in. (mm) SECTION FOR AVAILABLE LENGTHS.

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Fig. 1. Thermocouple and Thermopile Generator Dimensions in in. (mm).

Table 1. Pilot Burner Usage.

Thermocouple or Generator-Thermopile	Pilot Burner									
	Q303	Q308	Q314	Q324	Q327	Q350	Q380	Q382 ^a	CS894	CS897
Q309	■	■	■	■	■	■	■			
Q313			■	■	■			■ ^a	■	■
Q335								■ ^a		
Q340 (with adapter) Q390 (with adapter)	■	■	■	■	■					

^aThe Q382 Pilot Burner requires both a Q313 and a Q335.

Table 2. Q340 Replacement Information.
The Q340A replaces all of the following thermocouples:

Resideo	ROBERTSHAW	PENN-BASO	ITT-GENERAL	WHITE ROGERS	JADE
Q309	1980	K15	2500 SERIES	HO SERIES	TK5
Q326	T45	K16	2500 SERIES		
Q337	T46	K19 88D			

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 ratings given in instructions and on product to make sure product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is complete, check out product operation as provided in these instructions.

! WARNING

Fire or Explosion Hazard.
Fuel gas accumulation can cause property damage, severe injury, or death.
Turn off gas supply at appliance service valve before starting installation.

! CAUTION

Equipment Damage or Electrical Shock Hazard.
Can short equipment circuitry or shock individuals.
Disconnect power supply before installation.

Follow appliance manufacturer's instructions, if available. Otherwise, use instructions provided below as a guide.

Push-in Clip Design

1. Insert thermocouple/thermopile tip into hole or barrel provided beneath the pilot burner (see Fig. 2).
2. Push in firmly until locked into place.

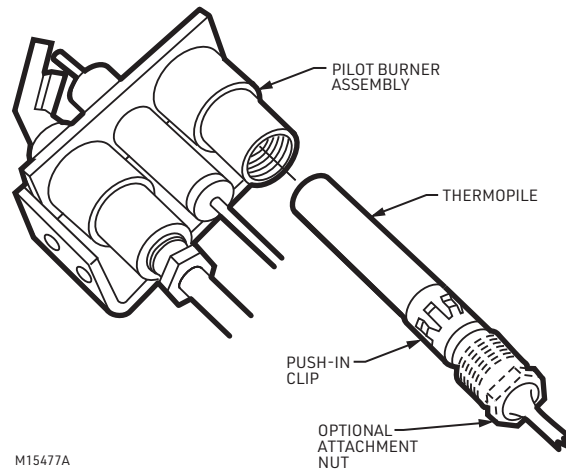


Fig. 2. Installing thermocouple/thermopile with push-in clip.

Split Nut Design

1. Remove push-in clip and discard.
2. For Q390A models, attach adapter fitting over thermocouple.
3. Insert thermocouple/thermopile tip into hole or barrel provided beneath the pilot burner (see Fig. 3).
4. Engage attachment nut threads and tighten.

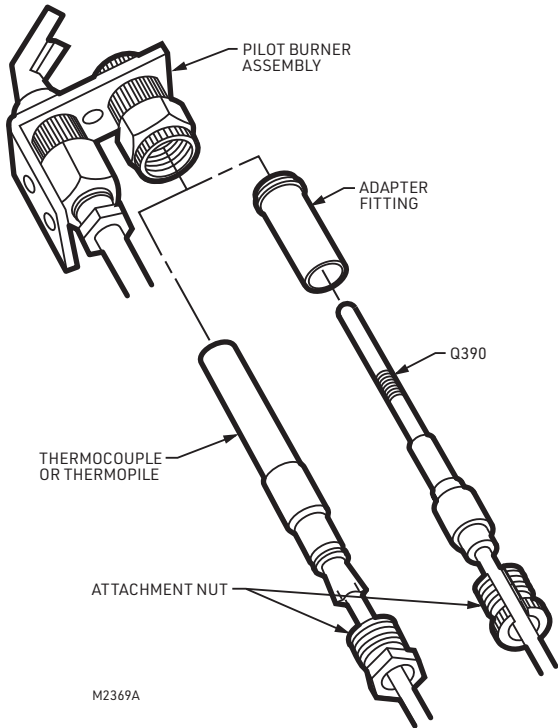


Fig. 3. Installing thermocouple/thermopile with attachment nut.

PG9 Adapter (Q313A only)

1. Insert thermopile tip into barrel of PG9 Adapter (see Fig. 4).
2. Engage attachment nut threads and tighten until finger tight.
3. Remove PG9 Generator Clip and set aside.
4. Replace PG9 Generator with thermopile and PG9 Adapter.
5. Replace PG9 Generator Clip to hold thermopile and PG9 Adapter in place.

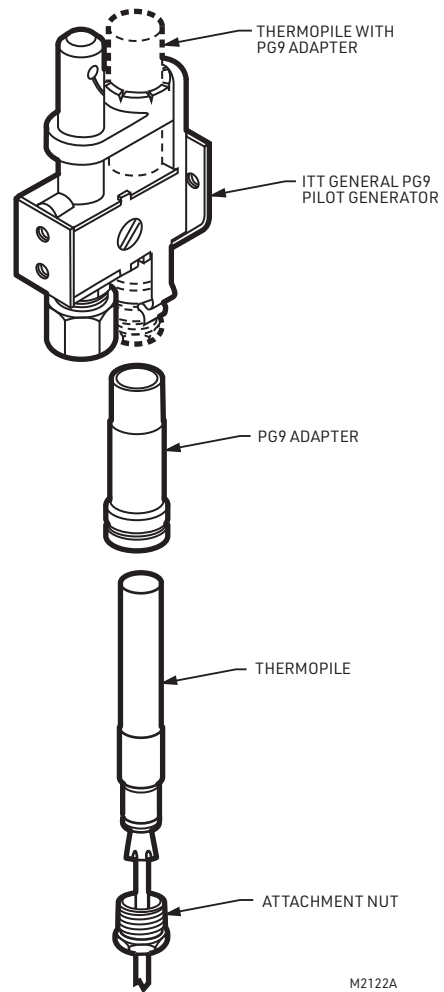


Fig. 4. Installing thermopile with PG9 Adapter.

Gas Control Connection (Q313A only)

IMPORTANT

This is an electrical connection. Ensure that all connections are clean and tight for proper operation.

1. Route leadwire from pilot burner to gas control. Avoid hot surfaces and high temperatures.
2. If available, attach quick-connect terminals to spade connectors (see Fig. 5).
3. Connect leads to terminals marked PP on the gas control (see Fig. 6).

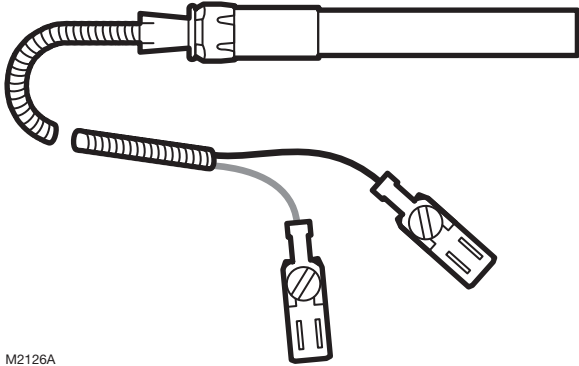


Fig. 5. Attach quick-connect terminals.

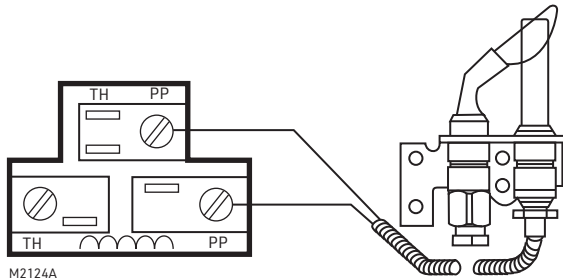


Fig. 6. Typical wiring connections for thermopile.

Pilotstat Safety Control Connection (Q309, Q340, and Q390)

IMPORTANT

This is an electrical connection. Ensure that all connections are clean and tight for proper operation.

1. Insert the end of the lead into the female connector on the Pilotstat power unit (see Fig. 7).
2. Engage male nut and turn until finger tight.
3. Using a wrench, tighten 1/4 turn beyond finger tight.

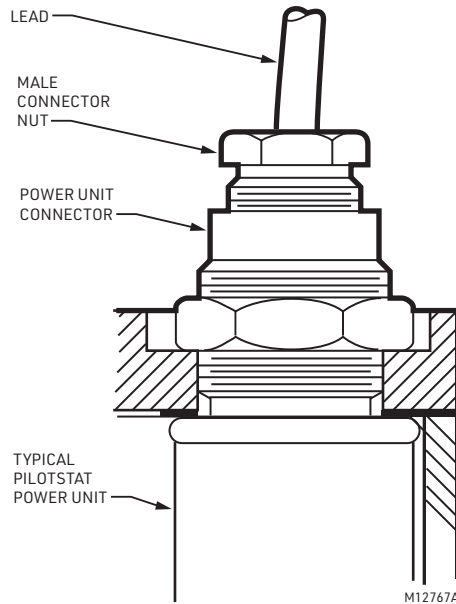


Fig. 7. Typical Pilotstat power unit connection.

High Limit Terminal Connection (Q309B and Q313B)

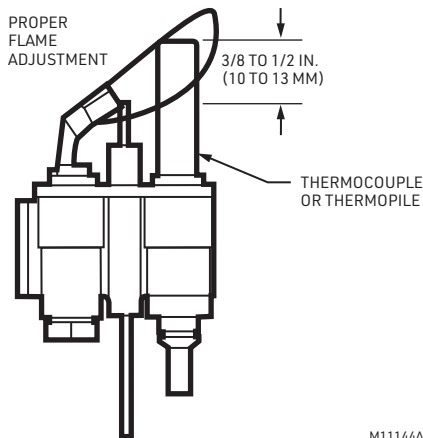
Follow the instructions provided by the appliance manufacturer or with the high limit connection. Make certain the connections are clean and tight, or nuisance shutdown will result.

START-UP AND CHECKOUT

Adjust Pilot Flame

The pilot flame should envelop 3/8 to 1/2 in. (10 to 13 mm) of the thermocouple/thermopile tip (see Fig. 8). To adjust the pilot flame:

1. Remove the pilot adjustment cover screw.
2. Turn the inner pilot adjustment screw clockwise ↻ to decrease, or counterclockwise ↻ to increase the pilot flame.
3. Always replace the pilot adjustment cover screw and tighten firmly after completing adjustment to ensure proper operation.



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Fig. 8. Tip of thermocouple/thermopile must be in pilot flame.

Check Safety Shutdown Performance

1. Follow appliance manufacturer's instructions for lighting pilot and main burner.
2. Ensure the gas control (if used) opens properly when the pilot is burning normally.
3. Extinguish the pilot flame. Make certain the pilot gas flow stops within 2-1/2 minutes.

NOTE: Safety shutoff of pilot gas proves complete shutdown because safety shutoff valve blocks flow of gas to main burner and pilot.

4. Relight pilot burner using manufacturer's instructions.

Check System Operation

Set the thermostat to call for heat and observe the appliance through one complete cycle to ensure proper operation.

SERVICE

⚠ WARNING

Fire or Explosion Hazard.

Fuel gas accumulation can cause property damage, severe injury, or death.

Perform Gas Leak Test every time work is done to the system.

Thermocouple/Thermopile Performance

Thermocouples and thermopiles require proper temperature differential between the hot-junction (tip) and the cold-junction (base) to provide satisfactory operation of millivoltage gas controls. Thermocouples and thermopiles perform less effectively when exposed to excessive cold-junction or hot-junction temperatures.

Eliminate excessive hot-junction temperatures by proper pilot flame adjustment (see Adjust Pilot Flame section in Start-up and Checkout).

Heat radiation from adjacent surfaces or high ambient air temperatures often causes excessive cold-junction temperatures. Eliminate excessive cold-junction temperatures by shielding the pilot flame (see Fig. 9), or by constructing a baffle to direct secondary air over the pilot burner base.

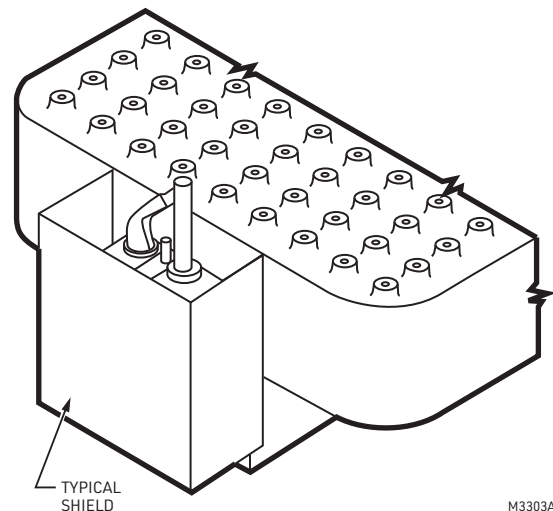


Fig. 9. Proper shielding of pilot flame.

Effective Ignition Test

The Effective Ignition Test assures that the pilot flame ignites the main burner within four seconds from the time gas reaches the main burner. In this test, the pilot flame is just sufficient to open the main gas valve.

1. Light the main burner according to the appliance manufacturer's instructions and allow to burn at least five minutes.
2. Remove one thermostat lead (TH) at the gas control terminal.
3. Using the pilot gas adjustment screw, decrease the pilot flame until it begins to pull away from the thermocouple/thermopile. Allow the thermocouple/thermopile to cool for one minute.
4. Temporarily jumper the thermostat terminals (TH) on the gas control.
5. If the main burner ignites, reduce the pilot flame—until the valve fails to pull in—by turning the pilot adjustment screw 1/4 turn at a time. Allow the thermocouple/thermopile to cool at least one minute between each reduction of the pilot flame level.
6. Increase the pilot flame just enough to pull in the gas control main valve.
7. Jumper the thermostat terminals. The main burner should light within four seconds and without flame roll-out.
 - a. If it does not light, check the Location and Mounting instructions in the pilot burner instructions.
 - b. Repeat steps 1 through 6.
 - c. If the main burner still does not light, the thermocouple/thermopile output is too low; replace the thermocouple/thermopile and repeat steps 1 through 6.
8. Remove the jumper to shut off the main burner.
9. Readjust the pilot burner flame (see Adjust Pilot Flame section in Start-up and Checkout).
10. Reconnect the thermocouple/thermopile lead and ensure all connections are correct and the system is functioning properly.

Refer to appliance manufacturer's instructions for further service information.



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