

## EC7823A;RM7823A 7800 SERIES Relay Modules

### INSTALLATION INSTRUCTIONS

### APPLICATION

The Honeywell EC/RM7823A Relay Module is a microprocessor based flame detector relay that can be fitted with any 7800 SERIES Flame Amplifier to provide relay action from one dpdt relay when flame is or is not present. The EC/RM7823A system consists of a relay module, wiring subbase and flame amplifier. Options include keyboard display module (KDM), personal computer interface, Data ControlBus Module™, remote display mounting and Combustion System Manager™ Software.

Functions provided by the EC/RM7823A include flame monitoring, self-diagnostics and troubleshooting. The EC/RM7823A is a solid state replacement for the R7023B,C Flame Detector Relays.

The EC7823/RM7823 is a flame detector relay only. A switchable primary control must be used to provide safe-start check, safety lockout, load switching and other functions required in Flame Safeguard systems.

This document provides installation and static checkout instructions. Other applicable publications are:

Form Number	Description
63-2278	Q7700A Network Interface Unit Product Data
65-0084	Q7800A,B 22-Terminal Wiring Subbase Product Data
65-0090	S7800A Keyboard Display Module Product Data.
65-0091	S7810A Data ControlBus Module™ Product Data
65-0095	S7820 Remote Reset Module Product Data
65-0097	221729C Dust Cover Packing Sheet
65-0109	R7824, R7847, R7848, R7849, R7851, R7861, R7886 Flame Amplifiers for the 7800 SERIES Product Data
65-0131	221818A Extension Cable Assembly Product Data
65-0229	7800 SERIES Relay Modules Checkout and Test

### SPECIFICATIONS

#### Electrical Ratings, see Table 3:

Voltage and Frequency:

EC7823A: 220-240 Vac +10%/-15%, 50/60 Hz ±10%.

RM7823A: 120 Vac, +10%/-15%, 50/60 Hz, ± 10%.

Power Dissipation:

10W maximum.

Maximum Total Connected Load: 2000 VA.

Fusing: Total Connected Load: 15A, type SC, Fast Blow, or equivalent.

#### Environmental Ratings:

Ambient Temperature:

Operating: -40°F to 140°F (-40°C to +60°C).

Storage: -40°F to 150°F (-40°C to +66°C).

Humidity: 85% relative humidity continuous, noncondensing.

Vibration: 0.5G environment.

#### Approvals:

RM7823A:

Underwriters Laboratories Inc. Listed: File No. MP268, Guide No. MCCZ.

Canadian Standards Association Certified: LR9S329-3.

Factory Mutual Approved: Report No. J.I.1V9A0.AF.

IRI Acceptable.

Federal Communications Commission:

Part 15, Class B, Emissions.

EC7823A:

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Part 15, Class B, Emissions.



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

### WARNING

**Fire or Explosion Hazard.  
Can cause property damage, severe injury or death.**

To prevent possible hazardous burner operation, verify safety requirements each time a control is installed on a burner.

### WARNING

**Electrical Shock Hazard/Equipment Damage Hazard.  
Can cause severe injury, death or property damage.**

Disconnect the power supply before beginning installation. More than one power supply disconnect may be required.

### IMPORTANT

1. *Wiring connections for the relay modules are unique; refer to Fig. 2 or the correct Specifications for proper subbase wiring.*
2. *Wiring must comply with all applicable codes, ordinances and regulations.*
3. *Wiring must comply with NEC Class 1 (Line Voltage) wiring.*
4. *Loads connected to the EC/RM7823A must not exceed those listed on the EC/RM7823A label or the Specifications; see Table 3 or 4.*
5. *All external timers must be listed or component-recognized by authorities who have proper jurisdiction.*
6. *For on-off gas-fired systems, some authorities who have jurisdiction prohibit the wiring of any limit or operating contacts in series between the flame safeguard control and the main fuel valve(s).*
7. *Two flame detectors can be connected in parallel with the exception of Infrared Flame Detectors (C7015).*
8. *This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, can cause interference with radio communications. It has been tested and found to comply with the limits for a Class B computing device of Part 15 of FCC rules which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference; in which case, the users at their own expense may be required to take whatever measures are required to correct this interference.*
9. *This digital apparatus does not exceed the Class B limits for radio noise for digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.*

## Location

### Humidity

Install the relay module where the relative humidity never reaches the saturation point. The relay module is designed to operate in a maximum 85% relative humidity continuous, noncondensing, moisture environment. Condensing moisture can cause a safety shutdown.

### Vibration

Do not install the relay module where it could be subjected to vibration in excess of 0.5G continuous maximum vibration.

### Weather

The relay module is not designed to be weather tight. When installed outdoors, the relay module must be protected by an approved weather-tight enclosure.

## Mounting Q7800 Wiring Subbase

1. Mount the Q7800 Subbase in any position except horizontally with the bifurcated contacts pointing down. The standard vertical position or with the bifurcated contacts point up is recommended. Any other position decreases the maximum ambient temperature rating.
2. Select a location on a wall, burner or electrical panel. The wiring subbase can be mounted directly in the control cabinet. Be sure to allow adequate clearance for servicing, installation, access or removal of the EC/RM7823A, dust cover, flame amplifier, flame amplifier voltage probes, electrical signal voltage probes and electrical field connections.
3. For surface mounting, use the back of the subbase as a template to mark the four screw locations. Drill the pilot holes.
4. Securely mount the subbase using four no. 6 screws (not provided).

## Wiring Subbase

### WARNING

**Electrical Shock Hazard.  
Can cause serious injury, death or equipment/control damage.**

Disconnect the power supply before beginning installation. More than one power supply disconnect may be required.

1. For proper subbase wiring, refer to Figs. 2, 3, 4 or 5.
2. For proper remote wiring of the Keyboard Display Module, refer to the Specifications for the Keyboard Display Module (65-0090), Network Interface Unit (63-2278), Data ControlBus Module™ (65-0091) or Extension Cable Assembly (65-0131).
3. Disconnect the power supply from the main disconnect before beginning installation to prevent electrical shock and equipment damage. More than one disconnect may be required.
4. All wiring must comply with all applicable electrical codes, ordinances and regulations. Wiring must comply with NEC, Class 1 (Line Voltage) wiring.
5. For recommended wire size and type, see Table 1.
6. For recommended grounding practices, see Table 2.

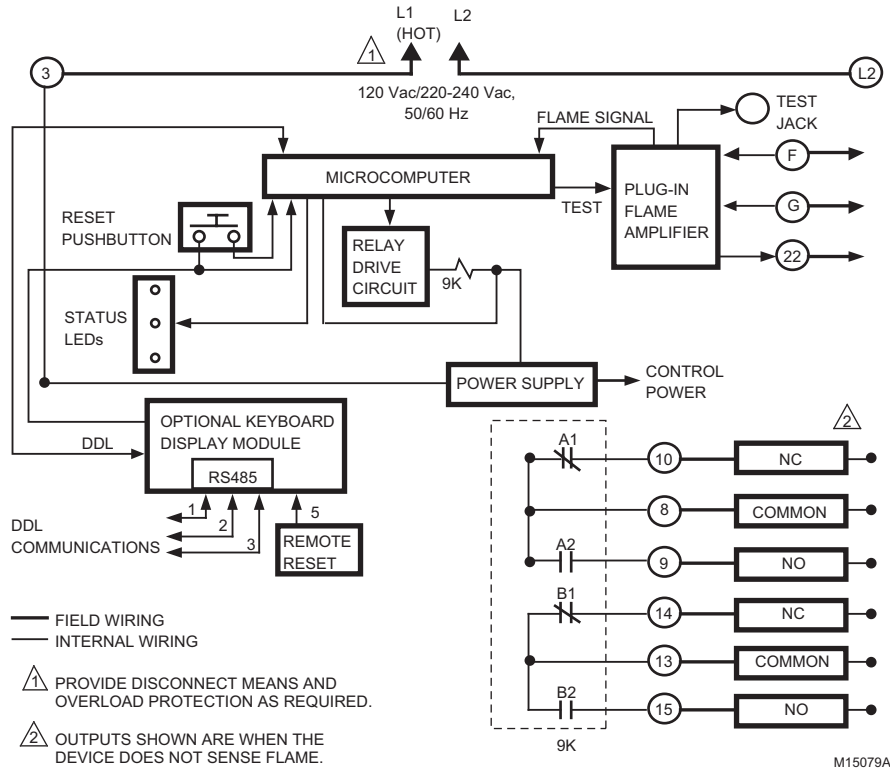


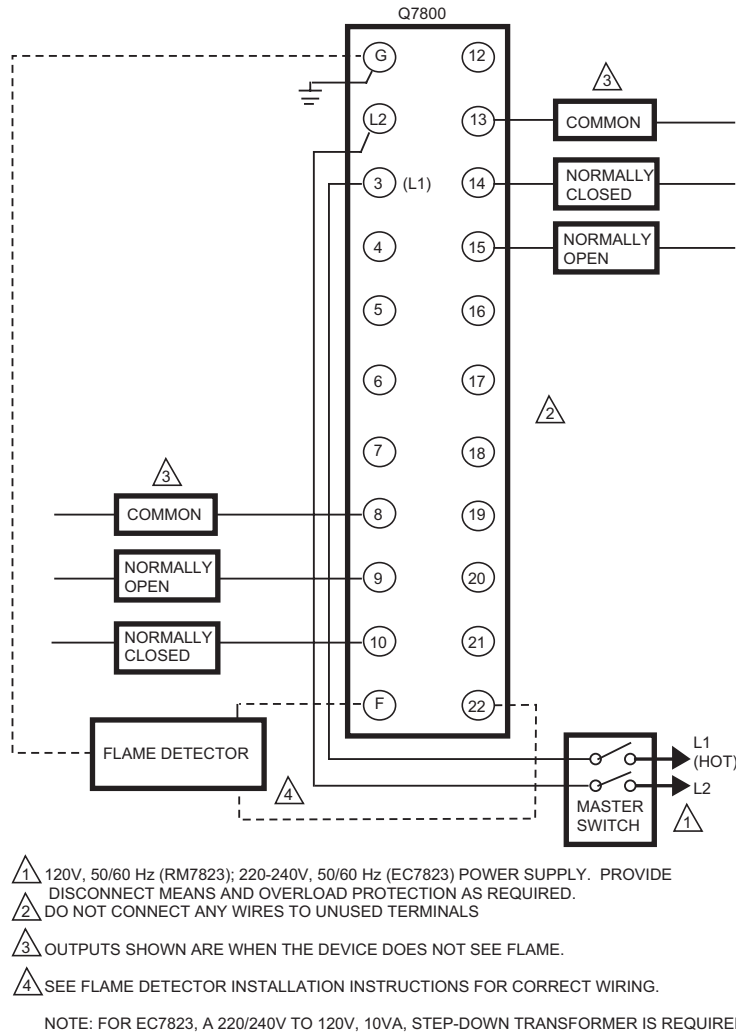
Fig. 1. Internal block diagram of the EC/RM7823A (See Fig. 6 for detailed wiring instructions).

Table 1. Recommended wire sizes and part numbers.

Application	Recommended Wire Size	Recommended Part Numbers
Line voltage terminals	14, 16 or 18 AWG copper conductor, 600 volt insulation, moisture-resistant wire.	TTW60C, THW75C, THHN90C.
Keyboard Display Module	22 AWG two-wire twisted pair with ground, or five wire.	Belden® 8723 shielded cable or equivalent.
Data ControlBus Module™	22 AWG two-wire twisted pair with ground, or five wire.	Belden® 8723 shielded cable or equivalent.
Remote Reset Module	22 AWG two-wire twisted pair, insulated for low voltage.	—
Communications Interface ControlBus Module	22 AWG two-wire twisted pair with ground.	Belden® 8723 shielded cable or equivalent.
13 Vdc full-wave rectified transformer power input.	18 AWG wire insulated for voltages and temperatures for given application.	TTW60C, THW75C, THHN90C.

Table 2. Recommended grounding practices.

Ground Type	Recommended Practice
Earth ground (subbase and relay module).	<ol style="list-style-type: none"> <li>1. Use to provide a connection between the subbase and the control panel of the equipment. Earth ground must be capable of conducting enough current to blow the 15A fast acting fuse (or breaker) in the event of an internal short circuit.</li> <li>2. Use wide straps or brackets to provide minimum length, maximum surface area ground conductors. If a leadwire must be used, use 14 AWG copper wire.</li> <li>3. Make sure that mechanically tightened joints along the ground path are free of nonconductive coatings and protected against corrosion on mating surfaces.</li> </ol>



**Fig. 2. Wiring subbase for EC/RM7823A.**

7. Recommended wire routing of leadwires:
  - a. Do not run high voltage ignition transformer wires in the same conduit with the flame detector.
  - b. Do not route flame detector leadwires in conduit with line voltage circuits.
  - c. Enclose flame detector leadwires without armor cable in metal cable or conduit.
  - d. Follow directions in flame detector instructions.
8. Maximum wire lengths:
  - a. EC/RM7823A leadwires: The maximum leadwire length is 300 feet to terminal inputs.
  - b. Flame Detector leadwires: The maximum flame sensor leadwire length is limited by the flame signal strength.

9. Make sure loads do not exceed the terminal ratings. Refer to the label on the EC/RM7823A or to the ratings in Tables 3 and 4.

### Final Wiring Check

1. Check the power supply circuit. The voltage and frequency tolerance must match those of the EC/RM7823A. A separate power supply circuit may be required for the EC/RM7823A. Add the required disconnect means and overload protection.
2. Check all wiring circuits and complete the Static Checkout in Table 5 before installing the EC/RM7823A on the subbase.
3. Install all electrical connectors.
4. Restore panel power.

**Table 3. Terminal Ratings for RM7823A.**

Terminal Number	Description	Ratings
G	Flame Sensor Ground <sup>a</sup>	—
Earth G	Earth Ground <sup>a</sup>	—
L2(N)	Line Voltage Common	—
3	Line Voltage Supply (L1)	120 Vac (+10%/-15%), 50/60 Hz (±10%).
4-7	Unused	—
8	9KA Common	—
9	9KA1 N.O.	9.8 FLA, 58.8 ALR at 120 Vac.
10	9KA2 N.C.	1A Pilot Duty at 120 Vac.
F(11)	Flame Sensor	60 to 220 Vac, current limited.
12	Unused.	—
13	9KB Common	—
14	9KB1 N.C.	1A Pilot Duty at 120 Vac; also rated for 5V control circuits.
15	9KB2 N.O.	1A Pilot Duty at 120 Vac; also rated for 5V control circuits.
16-21	Unused	—
22	Shutter	120 Vac, 0.5A.

<sup>a</sup> See Table 2.

**Table 4. Terminal Ratings for EC7823A.**

Terminal Number	Description	Ratings <sup>a</sup>
G	Flame Sensor Ground <sup>a</sup>	—
Earth G	Earth Ground <sup>a</sup>	—
L2(N)	Line Voltage Common	—
3	Line Voltage Supply	220-240 Vac (+10%/-15%), 50/60 Hz (±10%).
4-7	Unused	—
8	9KA Common	—
9	9KA1 N.O.	220-240 Vac, 4A at PF = 0.5, 20A inrush.
10	9KA2 N.C.	220-240 Vac, 2A at PF = 0.2.
F(11)	Flame Sensor	16 to 220 Vac, current limited.
12	Unused	—
13	9KB Common	—
14	9KB1 N.C.	220-240 Vac, 0.5A at PF = 0.5.
15	9KB2 N.O.	220-240 Vac, 0.5A at PF = 0.5.
16-21	Unused	—
22	Shutter	220-240 Vac, 0.25A <sup>b</sup>

<sup>a</sup> Total load current, excluding burner/boiler motor, cannot exceed 5A, 25A inrush.

<sup>b</sup> A 220-240 Vac to 120 Vac, 10 VA minimum stepdown transformer (not provided) must be used to drive the shutter.

## Mounting EC/RM7823A Relay Module

1. Mount the EC/RM7823A on the Q7800 Subbase vertically, or mount horizontally with the knife blade terminals pointing down. When mounted on the Q7800A Wiring Subbase, the EC/RM7823A must be in an electrical enclosure.
2. When mounting in an electrical enclosure, provide adequate clearance for servicing, installation and removal of the EC/RM7823A, keyboard display module, flame amplifier, flame amplifier signal voltage probes, electrical signal voltage probes, and electrical connections.
  - a. Allow an additional two inches below the EC/RM7823A for the flame amplifier mounting.
  - b. Allow an optional three inches minimum to both sides of the EC/RM7823A for electrical signal voltage probes.

3. Make sure no subbase wiring is projecting beyond the terminal blocks. Tuck in wiring against the back of the subbase so it does not interfere with the knife blade terminals or bifurcated contacts.

### IMPORTANT

*The EC/RM7823A must be installed with a plug-in motion rather than a hinge action.*

4. Mount the EC/RM7823A by aligning the four L shaped corner guides and knife blade terminals with the bifurcated contacts on the wiring subbase and securely tightening the two screws without deforming the plastic.

## Mounting Other System Components (Fig. 3)

Some other system components are shown in Fig. 3. Mount other required and optional system components by referring to the instructions provided with each component.

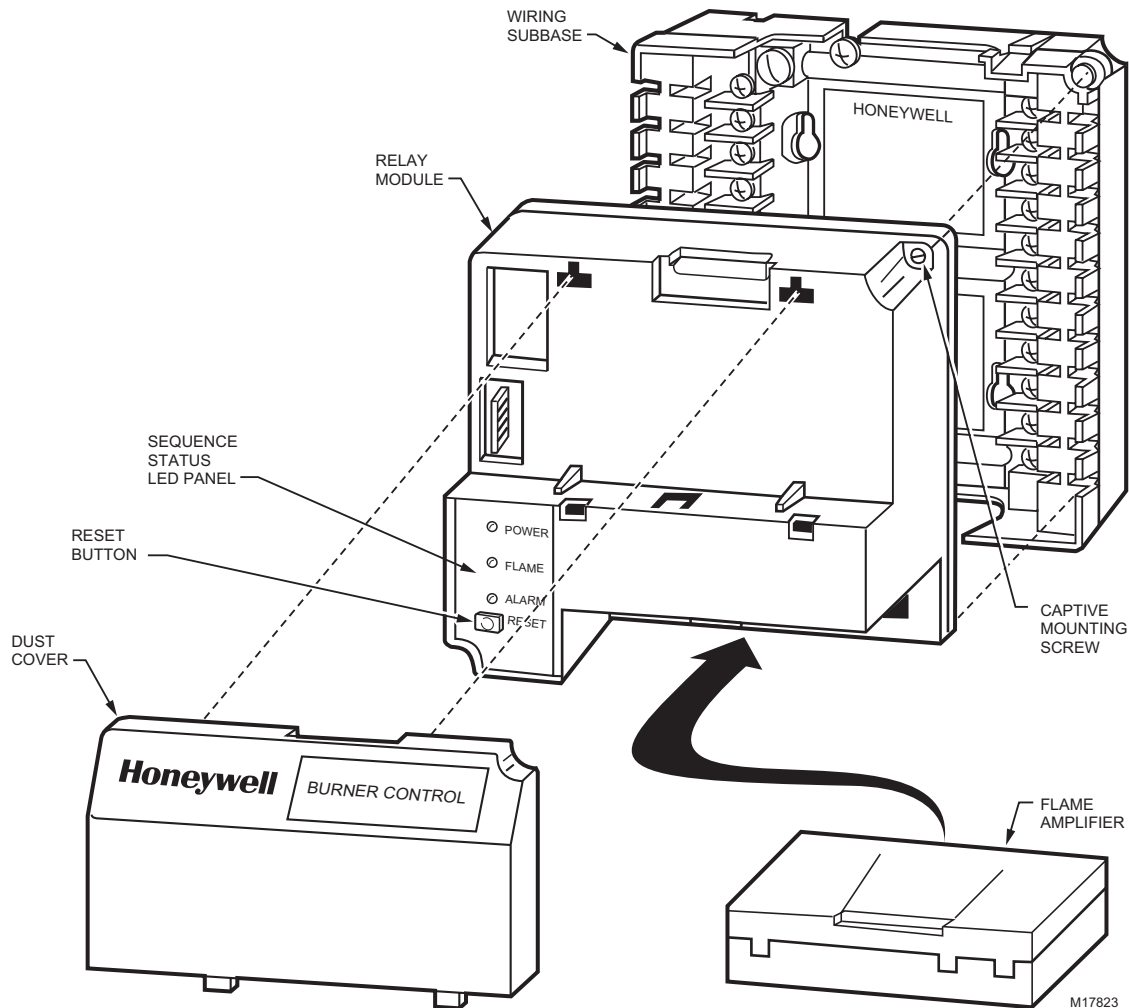


Fig. 3. EC/RM7823A Relay Module, exploded view.

# OPERATION

## Sequence of Operation

The EC/RM7823A has the following operating sequences, see Fig.4 and Table 5. The EC/RM7823A LED provide positive visual indication of the program sequence: POWER, FLAME and ALARM.

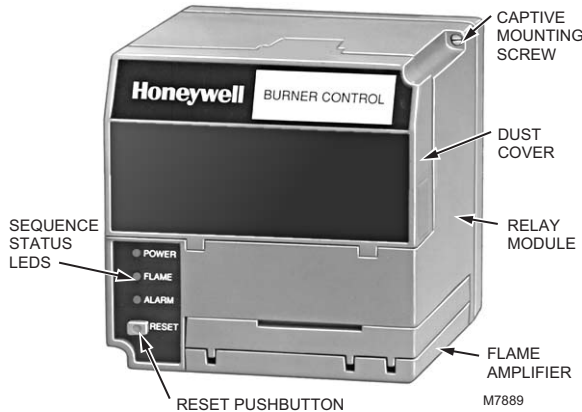


Fig. 4. Sequence status LEDs.

Table 5. LED sequence status display information.

Burner Sequence	LED Energized
Standby	<b>POWER</b> , FLAME and ALARM.
Run	<b>POWER</b> , <b>FLAME</b> and ALARM.
Reset/Alarm Test	<b>POWER</b> , FLAME and <b>ALARM</b> .

### Standby

The EC/RM7823A is ready to respond to sensing of a flame or flame simulating condition. The green POWER LED blinks every four seconds, indicating that the relay module is doing internal hardware checks.

### Run

The EC/RM7823A pulls in the internal dpdt relay and turns on the FLAME LED when a flame or flame simulating condition exists. The relay module is now in the Run sequence.

## Static Checkout

After checking all wiring, perform this checkout before installing the EC/RM7823A on the subbase. These tests verify the Q7800 Wiring Subbase is wired correctly, and the external controllers, limits, interlocks, actuators, valves, transformers, motors and other devices are operating properly.

## ⚠ WARNING

**Explosion and/or Electrical Shock Hazard. Can cause serious injury, death or equipment damage.**

1. Close all manual fuel shutoff valve(s) before starting these tests.
2. Use extreme care while testing the system. Line voltage is present on most terminal connections when power is on.
3. Open the master switch before installing or removing a jumper on the subbase.
4. Before continuing to the next test, be sure to remove test jumper(s) used in the previous test.
5. Replace all limits and interlocks that are not operating properly. Do not bypass limits and interlocks.

## ⚠ CAUTION

**Equipment Damage Hazard. Improper testing will cause serious internal damage.**

Do not perform a dielectric test with the EC/RM7823A installed. Internal surge protectors can break down and conduct a current. This can cause the EC/RM7823A to fail the dielectric test or possibly destroy the internal lightning and high current protection.

## Equipment Recommended

1. Voltmeter (1M ohm/volt minimum sensitivity) set on the 0 to 300 Vac scale.
2. Two jumper wires, no. 14 wire, insulated, 12 in. (305 mm) long with insulated alligator clips at both ends.


## General Instructions

1. Perform all applicable tests listed in Static Checkout, Table 6, in the order listed.
2. Make sure all manual fuel shutoff valve(s) are closed.
3. Perform only those tests designated for the specific EC/RM7823A model being tested.
4. Raise the setpoint of the operating controller to simulate a call for heat.
5. For each test, open the master switch and install the jumper wire(s) between the subbase wiring terminals listed in the Test Jumpers column.
6. Close the master switch before observing operation.
7. Read the voltage between the subbase wiring terminals listed in the Voltmeter column.
8. If there is no voltage or the operation is abnormal, check the circuits and external devices as described in the last column.
9. Check all wiring for correct connections, tight terminal screws, correct wire, and proper wiring techniques. Replace all damaged or incorrectly sized wires and tighten any loose terminal screws.
10. Replace faulty controllers, limits, interlocks, actuators, valves, transformers, motors and other devices as required.
11. Make sure normal operation is obtained for each required test before continuing the checkout.
12. After completing each test, be sure to remove the test jumper(s).

### **WARNING**

**Explosion hazard.**  
**Can cause serious injury or death.**  
 Be sure all manual fuel shutoff valves are closed.

**Table 6. Static checkout.**

Test Number	Test Jumpers	Voltmeter	Normal Operation	If Operation is Abnormal, Check the Items Listed Below
1	—	L2-3	Line voltage at terminal 3.	<ol style="list-style-type: none"> <li>1. Master Switch.</li> <li>2. Power connected to the master switch.</li> <li>3. Overload protection (fuse, circuit breaker, etc.) has not opened the power line.</li> </ol>
2	8-9	—	Load operation without flame sighting.	Load connections to terminals 8 and 9.
3	8-10	—	Load operation when flame detected.	Load connections to terminals 8 and 10.
4	13-14	—	Load operation without flame sighting.	Load connections to terminals 13 and 14.
5	13-15	—	Load operation when flame detected.	Load connections to terminals 13 and 15.
FINAL	ALL	 <b>CAUTION</b> <b>Equipment Damage Hazard.</b> <b>Leaving jumpers in place will damage the equipment.</b> After completing these tests, open the master switch and remove all test jumpers from the subbase terminals. Remove any bypass jumpers from limits.		

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