

INSTALLATION INSTRUCTIONS FOR SERIES 9  
INTERMITTENT PILOT IGNITION CONTROL

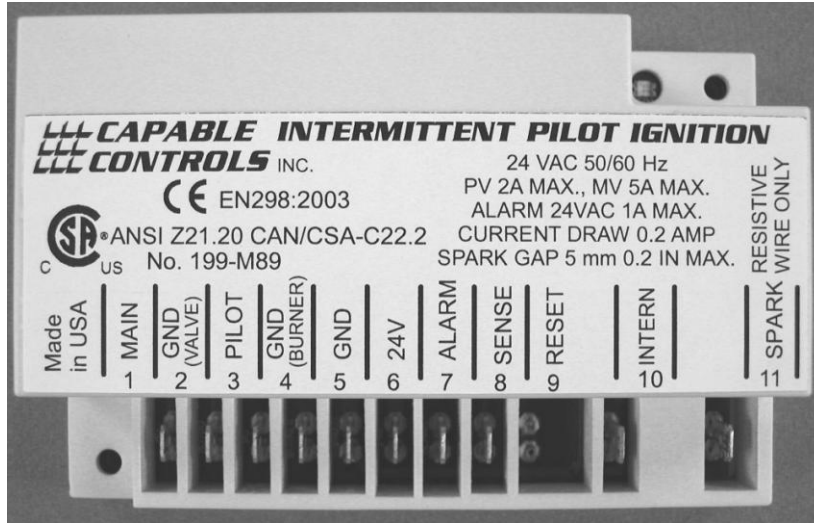


Figure 1 Series 9 Intermittent Pilot Ignition Control

**Application**

The Series 9 Intermittent Pilot Ignition Control is a microprocessor based ignition control. The microprocessor provides reliable software control of all timings and operates a diagnostic led. It is designed for indirect burner ignition and supervision and can be used with all gases. It provides ignition sequence, flame monitoring, and safety shutout for intermittent pilot boilers, furnaces and other heating appliances.

**Specifications see part number matrix on page 2**

Electrical ratings: Voltage 24VAC (+/- 20%) 50/60 Hz  
Pilot valve 2A maximum  
Main valve 5A maximum  
Alarm output 1A maximum  
Operating current 0.2A  
Wiring connections 1/4" male spade

Environmental: -40 to +80 degrees C (-40 to +176 F)  
Waiting time; 0 to 99 (1 second minimum diagnostic)  
Safety time: 4 to 125 seconds (see table)  
Flame loss response: spark restoration or recycling  
Flame loss waiting time: for recycle 1 to 99 seconds  
Retries: 1 to 9 tries or continuous retry  
Inter-Purge time: 1 to 99 seconds or 1 to 99 minutes  
Flame failure response time: 1 second maximum  
Minimum flame current required: 0.15 microamperes

Type of gas: Natural, LP, or manufactured  
Recommended Spark Gap: 5 mm, 0.2 inches maximum  
Pilot burner rating: 1,500 Btu/hr. maximum  
Main burner rating: 400,000 Btu/hr. maximum



**WARNING: Be sure this control is suitable to replace existing control.**

The control replaces many existing intermittent pilot ignition controls with flame rectification flame sense and spark ignition made by various manufacturers. When replacing an existing control be sure characteristics match.

## Model Number Matrix Series 9 CE Ignition Controls

9	Always 9 for series 9 controls
A	Hardware Model see table 1
B	Special Options see Note 1 0 = None, 1 = Flame Stabilization 2 = Quick Start, 3 = Both
C	Number of Trials 0 = Continuous Retry No Lockout or select 1 to 9
D	Inter-Waiting Time Between Trials 001 to 900 sec in 1 sec steps 901 to 999 = 1 to 99 min in 1 min steps
E	
F	
G	Flame Loss Response See Note 2 If 00 Uses Spark Restoration If 01 to 99 uses Recycle 1 to 99 sec Flame Loss Waiting Time
H	
J	Waiting Time Before Valve On 00 to 99 sec in 1 sec steps
K	
L	Safety Time 000 = Infinite No Lockout 004 to 124 sec in 4 sec steps 005 to 125 sec in 5 sec steps and 006 seconds
M	
N	
O	Special Customer Options

0	Intermittent Pilot Int.Sense Volatile
1	Intermittent Pilot Ext.Sense Volatile
2	Intermittent Pilot Univ.Sense Volatile
8	Intermittent Pilot Int.Sense Non-Volatile
9	Intermittent Pilot Ext.Sense Non-Volatile
A	Intermittent Pilot Univ.Sense Non-Volatile

### Hardware Flame Sense Options

Int. Internal through spark wire only

Ext. External with probe only

Univ. Universal Internal or External Jumper selected

### Hardware Lockout options

Volatile turning off power resets lockout

Non-Volatile must operate external reset switch to reset lockout

### Note 1 Special Options

Flame stabilization is only for controls with flame loss waiting time (G-H) 1 sec or more. If flame is lost within 5 sec use spark restoration. If flame lost after 5 sec use recycling. See note 2  
Quick Start is only for controls with external sense only. Can turn on main valve in 1 sec instead of 4 or 5 sec.

### Note 2 Flame Loss Response

With Spark Restoration main valve turns off pilot valve stays on and spark and new cycle start immediately.

With Recycling pilot and main valve turn off and new cycle starts after Flame Loss Waiting Time (G-H).

**Capable  
Controls** inc.

**! WARNING** Fire or explosion hazard. Follow these instructions carefully.

**! Control** must only be installed by a qualified service technician.

**! Warning:** This control is approved for use with only noise suppression (resistive) spark wires. If application has copper wire it must be replaced.

**! Control** must be protected from water dripping or condensing on it. A wet control may malfunction causing hazardous conditions.

**! Appliance** must be inspected for any hazardous conditions before starting up. Must be checked for proper wiring, gas leaks, water leaks, burners must be clean and vents clear.

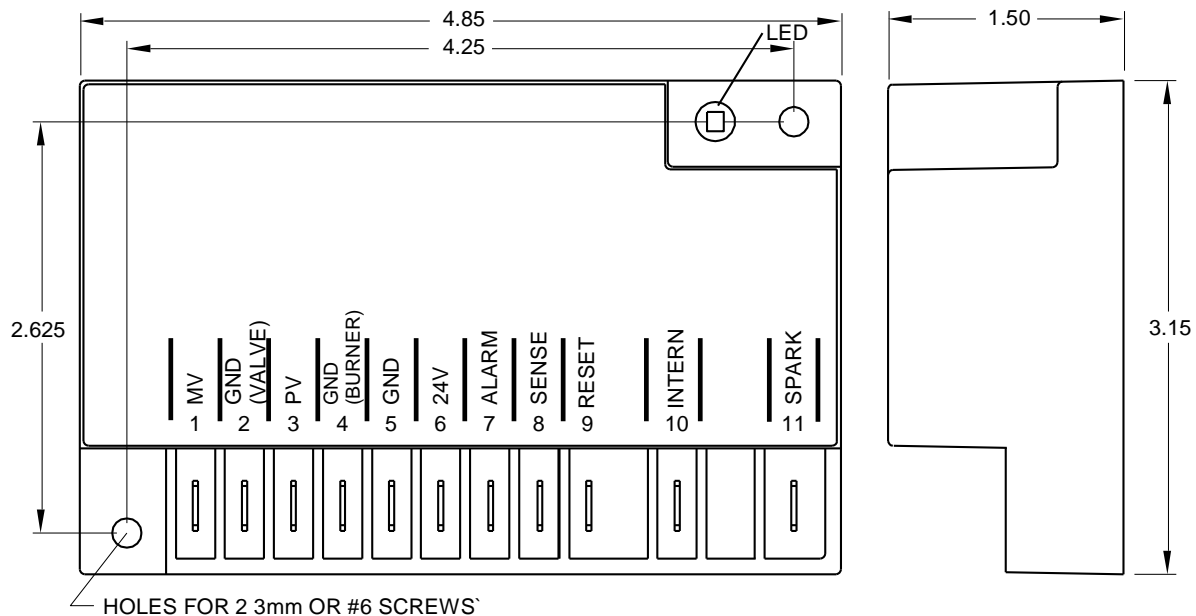
## Replacement instructions

### Mounting the new control

**! Before** replacing existing control turn off power to the appliance being serviced.

Mark wires to existing control. Disconnect wires and remove existing control.

The control is not position sensitive. It may be mounted horizontally or vertically with two #6 sheet metal or machine screws



**Figure 2 Mounting Dimensions**

## Wiring Control

Power must be provided from a properly sized 24 volt class 2 transformer. All wiring must be done in accordance with both local and national electrical code. All wiring and initial operation must be performed by a qualified service technician.

Controls with universal flame sense are supplied with a jumper wire between SENSE and INTERN terminals and is ready for internal (one rod) flame sense. With the jumper in, flame is sensed through the high voltage spark wire. For external (two rod) flame sense the jumper must be removed and discarded and the sense electrode wired to SENSE terminal.

## Spark Cable

Cable must be noise suppression (resistive) type rated for at least 15kV and must not be in continuous contact with a metal surface. If separate flame sense probe is used, the sense wire must be separated from the high voltage wire by a minimum of 1/4".



**Warning: This control is approved for use with only noise suppression (resistive) spark wires. If application has copper cable it must be replaced.**

The schematics in Figures 3, 4, 5 and 6 show typical wiring hookups for the control.

## Startup and Checkout



**WARNING: The control module can not be serviced by user. If any faults are detected control module must be replaced.**

1. Before starting the appliance perform a safety inspection of piping, burners and venting. Check for water leaks, etc. Check all wiring for proper connections. Be sure system is properly grounded including ground connection to pilot burner.
2. With gas shut off, turn on power to appliance with thermostat contacts closed. Verify led on module flashes rapidly and that there is a good spark at the pilot burner. If spark is not present see troubleshooting flow chart figure 8.
3. Turn off power to appliance and turn on gas shutoff valves. Check for gas leaks using a soap solution or gas detector.
4. Turn on power to appliance with thermostat contacts closed. Verify that spark lights pilot burner followed by main burner. If there are any problems shut down the appliance and refer to the troubleshooting flow charts figures 7 and 8.
5. Verify normal operation with both burners on for at least 5 minutes. Check for any gas leaks after the valves.
6. Cycle thermostat open/closed and verify proper ignition sequence at least 5 times.



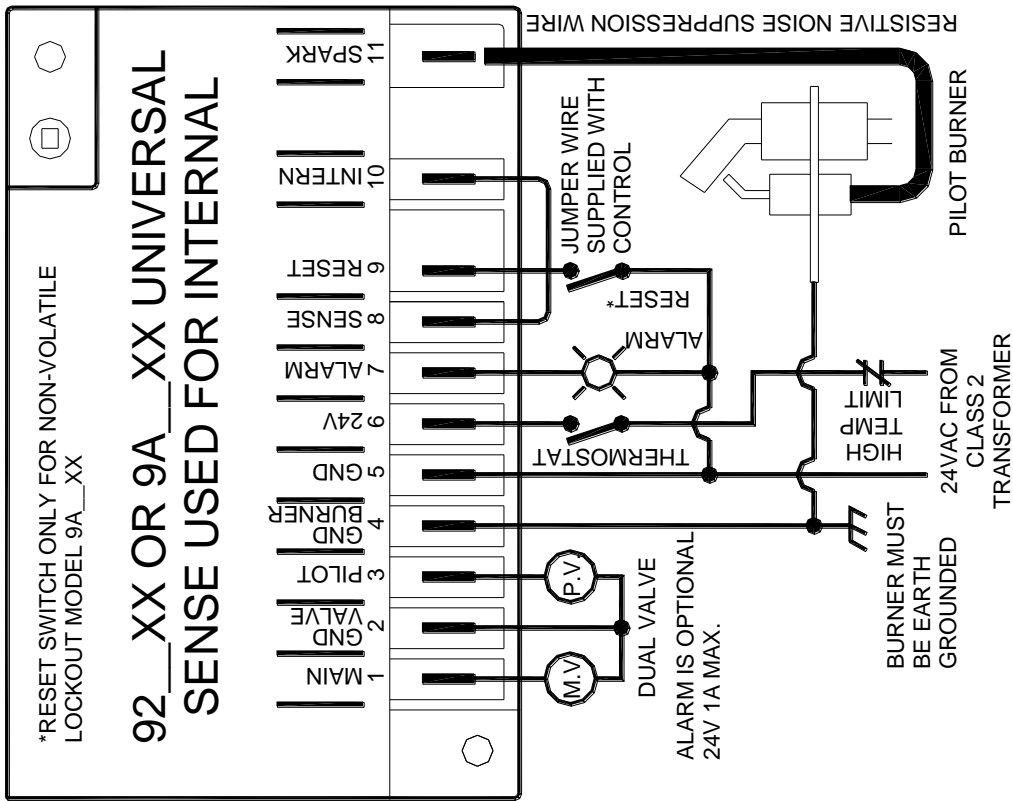


Figure 5 Wiring for Models 92\_XX AND 9A\_XX Universal Flame Sense used for Internal Sense

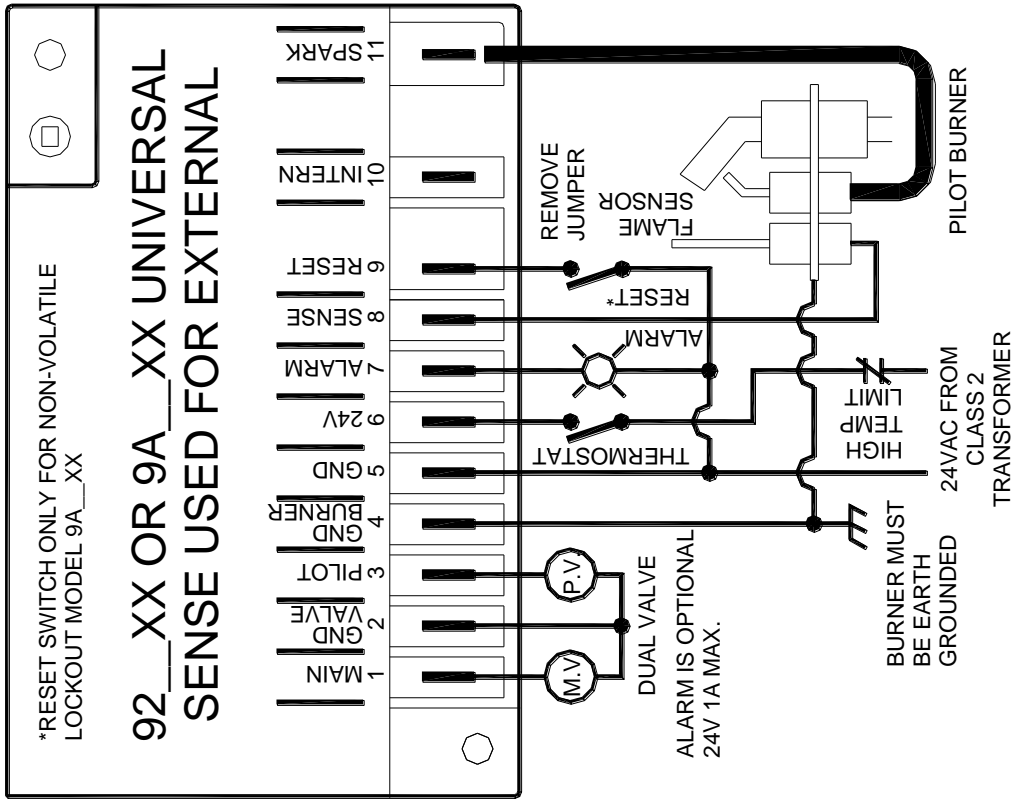


Figure 6 Wiring for Models 92\_XX AND 9A\_XX Universal Sense used for External Sense

Note: Letters and numbers in parenthesis refer to matrix on page 2.

### **Sequence of Operation Basic Control Software (B = 0)**

Heating cycle starts when call for heat from thermostat supplies 24VAC to 24V terminal. Control will perform a 1 second maximum diagnostic. If waiting time is specified (J-K = 02 to 99) the control will wait for the specified time with led blinking orange once a second. Then the spark will start and pilot valve will turn on starting safety time.

On controls with internal sense it takes time for the flame sense to recover. Because of this the controls normally work in 4, 5 or 6 second cycles based on the safety time. The control rapidly flashes red led while generating sparks for 2.75, 3.75 or 4.75 seconds. Then turns off spark and led, Then waits 1.25 seconds before checking for flame. This cycle will repeat until pilot flame is detected or safety time is over.

If pilot flame is not detected during safety time limit, the pilot valve will be shut off. If 1 try is specified (C = 1) or number of tries has been completed control will go to lockout. If more than 1 try (C = 2 to 9) is specified The control will wait for inter-waiting time (D-E-F 1 to 99 sec or 1-99 min) while blinking the led orange at the end of each 5 seconds. When the inter-waiting time is over a new ignition sequence will start.

When pilot flame is detected, the spark will stop, main valve will turn on and led will stay on green continuously. The control will remain in this state until pilot flame is lost or thermostat opens.

If pilot flame is lost, and spark restoration is selected (G-H = 00), the main valve turns off and pilot valve stays on. Spark starts immediately and new safety time starts.

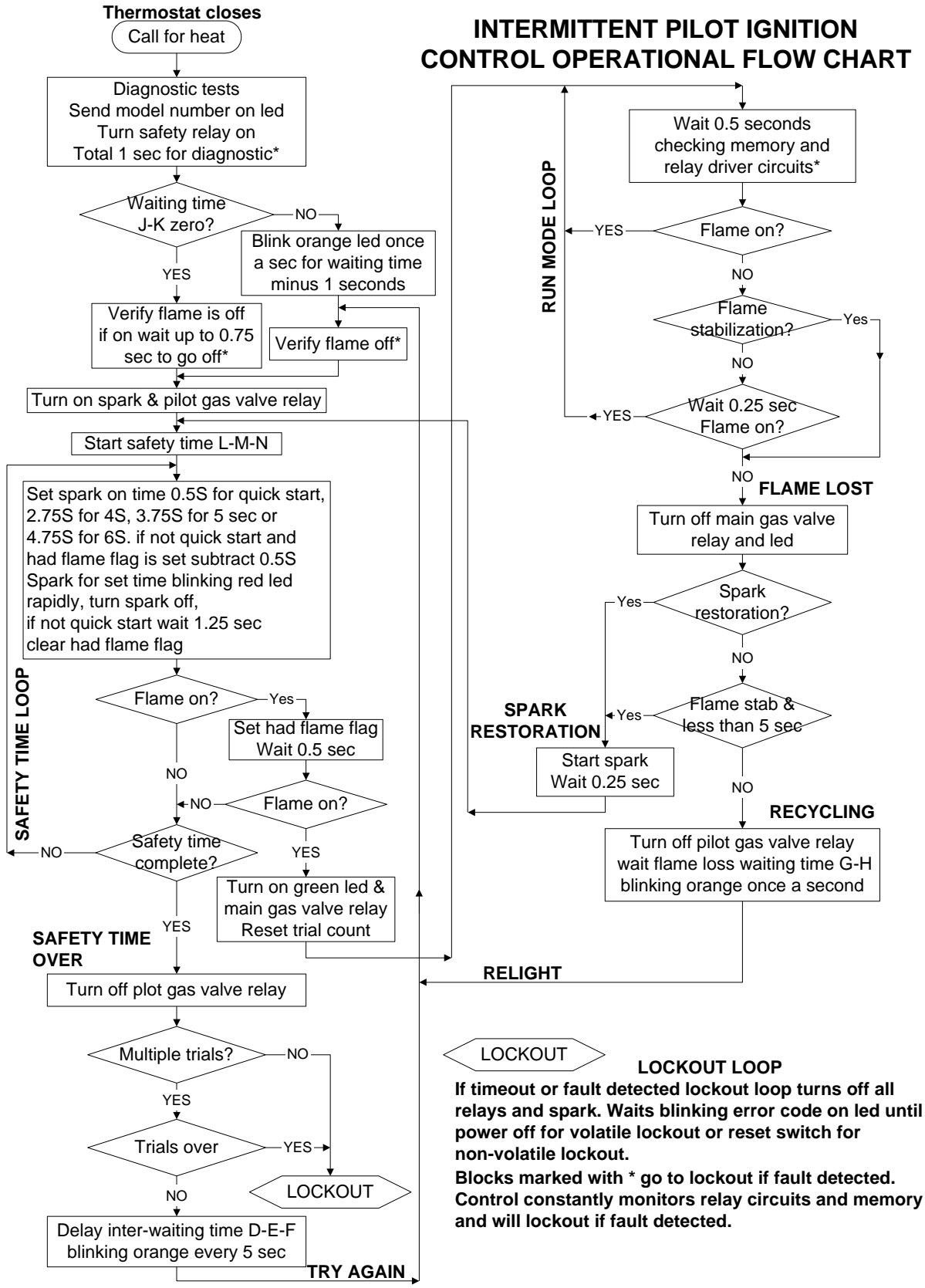
If pilot flame is lost, and recycle is selected (G-H = 01 to 99), the main and pilot valves turn off. Control waits flame loss waiting time (G-H) blinking orange led once a second. Then spark and pilot valve will turn on starting new safety time.

### **Flame Stabilization Option (B = 1 or 3)**

Flame stabilization is only used on controls with flame loss waiting time (G-H 1 to 99). It is intended for applications with unstable pilot flame. If flame is lost after being on less than 5 seconds, the control uses spark restoration and turns off main valve and starts spark immediately. If flame is lost after 5 seconds, the control turns off pilot and main valves and waits flame loss waiting time (G-H) before starting new ignition cycle.

### **Quick Start Option (B = 2 or 3)**

Quick start is only available for controls with external sense only hardware (A = 1 or 9). External sense controls do not have the flame sense while sparking problem. Quick start controls spark for 0.5 seconds. Turn off spark and check for flame immediately. Quick start controls can turn on main valve within 1 second.



**Figure 7 Operational Flow Chart**

## Alarm output

The alarm output uses the normally closed contact on the safety relay. It will turn on if flame fails to light in the safety time or a fault is detected in the control. The output will also be on for a half second on power up until safety relay turns on.

## Led Indications during normal operation

orange once a second	Waiting Time
rapid red flashing	Safety Time sparking
steady green	Running position flame on
orange once every 5 seconds	Inter-Waiting Time between trials
orange once a second	Flame Loss Waiting Time

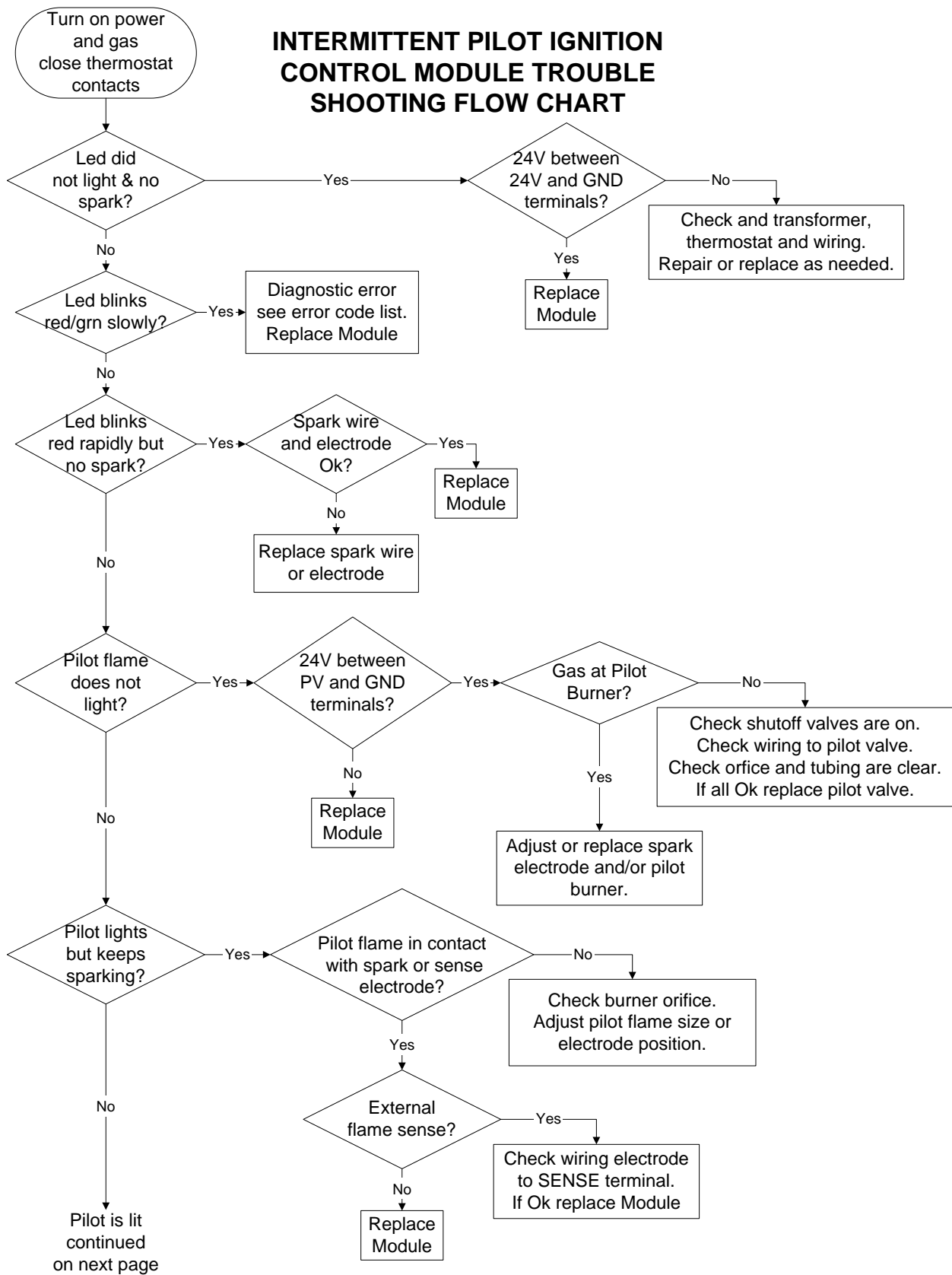
## Led error indications

If the control module internal diagnostics detect a fault it will go to lockout. Spark and both valves will be turned off. The led will flash the error code red .25 sec on and .25 sec off for the error code with then blink green per error code. Will turn off 1 second between codes. The control will remain in this condition until power is removed by turning off call for heat. Note the control contains 2 micros (microprocessors). The safety micro controls a safety relay that enables power to the valves. It monitors operation of master micro and will turn off safety relay if it detects a problem. The master micro controls the spark, flame sense and pilot and main valve relays.

Codes other than 1-0 for no flame within safety time may indicate a problem with the control. Recycle control and if error repeats control must be replaced.

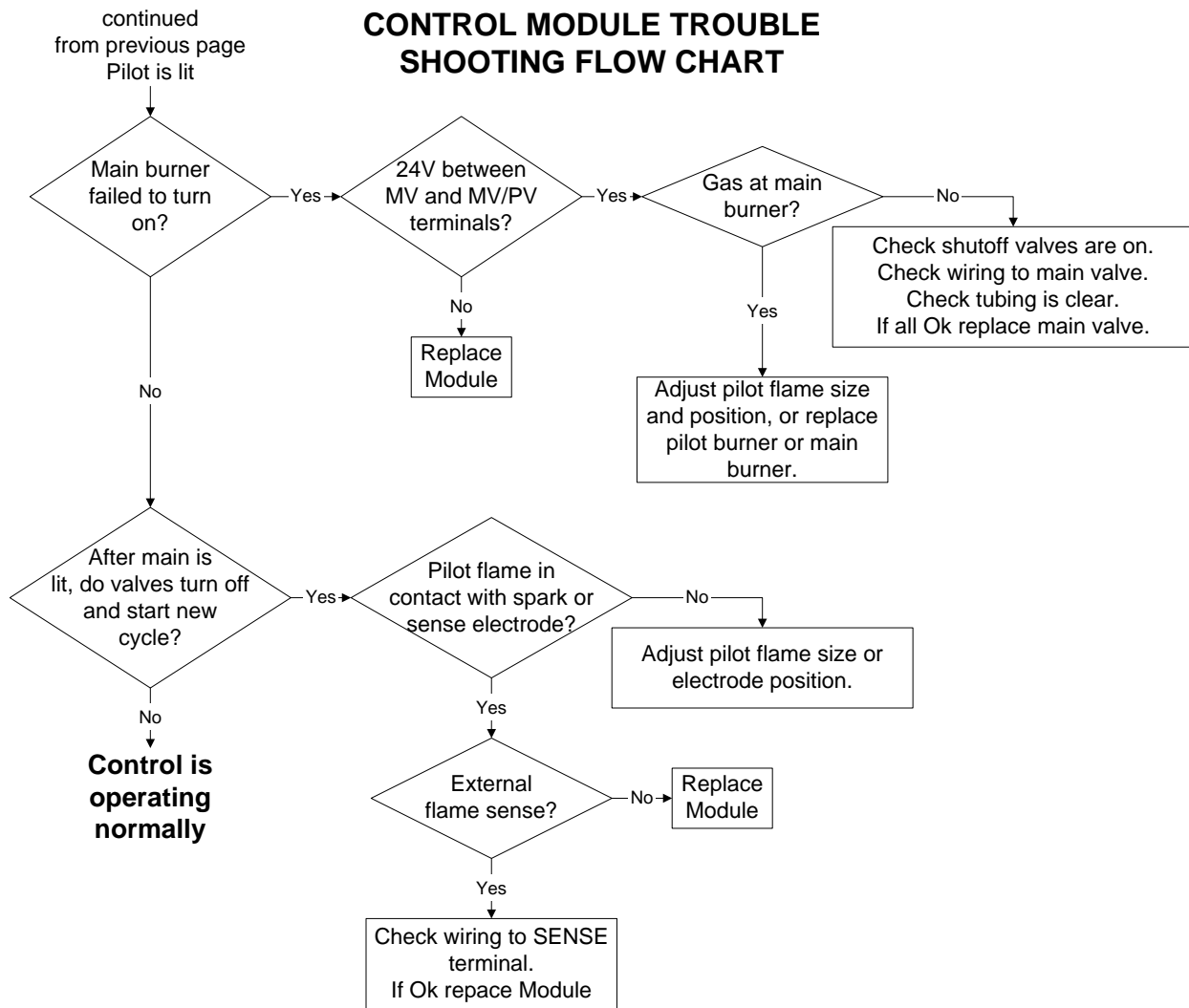
Error codes are:

red	green	
1	0	Flame did not light in safety time
1	1	Flame sense circuit stuck on
1	2	Safety micro fault
1	3	Line frequency or micro clock error
2	1	Pilot valve relay transistor driver circuit fault
2	2	Pilot valve relay contact fault
2	3	Main valve relay transistor driver circuit fault
2	4	Main valve relay contact fault
The following are software faults unlikely to occur		
3	0	Main micro code memory error
3	1	Main micro timing parameter storage error
3	2	Main micro RAM (random access memory) error during operation
3	3	Main micro RAM (random access memory) error on power up
3	4	Main micro program flow error
4	0	Timing parameters in safety micro do not match master micro



**Figure 8 Troubleshooting Flow Chart Part 1**

## INTERMITTENT PILOT IGNITION CONTROL MODULE TROUBLE SHOOTING FLOW CHART



**Figure 9 Troubleshooting Flow Chart Part 2**

## LED INDICATIONS

<b>Led Indications During Normal Operation</b>		
Orange once a second	Waiting Time	
Red rapid flashing	Safety Time Spark On	
Steady green	Running Position Flame On	
Orange once every 5 seconds	Inter-Waiting Time Between Cycles	
Orange once a second	Flame Loss Waiting Time	
<b>Led Error Indications</b>		
Red	Green	Error
1	0	Flame did not light in safety time
1	1	Flame sense circuit stuck on
1	2	Safety micro fault
1	3	Line frequency or micro clock error
2	1	Pilot valve relay transistor driver fault
2	2	Pilot valve relay contact fault
2	3	Main valve relay transistor driver fault
2	4	Main valve relay contact fault
More than 2 red blinks indicate micro memory or software fault		