

**ACL**

Manufacturing Inc.

**ACL 5100 COMBUSTION SAFETY CONTROL**

# **INSTALLATION MANUAL**

## **FOR**

# **ACL 5100**

# **COMBUSTION SAFETY**

# **CONTROLLER**



## **WARNING**

**This manual must be read in its entirety before installation of this controller.  
Installation must be performed by a qualified technician and  
must adhere to the standards set by the local regulatory bodies.**

**ACL is not responsible for the misuse or incorrect application of this product.**

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# ACL 5100 COMBUSTION SAFETY CONTROL



**ACL 5100 PROVIDES**

- **IGNITION**
- **FLAME MONITORING**
- **INDICATION OF PILOT ON & SYSTEM ON**
- **ALARM INDICATION OF FLAME FAIL, POWER FAIL & SHUTDOWN**
- **REMOTE STOP AND START CAPABILITIES**
- **PRE- PROGRAMMED LOGIC** (NO PROGRAMING NECESSARY)

- Power supply 12/24 VDC, 120/240 VAC 50/60 Hz, low power consumption, suitable for solar applications.
- Flame out response time of 0.8 seconds.
- CSA approved for Class 1, Div 2 location.
- CSA approved C22.2 No 199-M89. Combustion safety controls and solid-state Ignitors for Gas & Oil burning equipment.
- CSA B149.3 Compatible.
- Nema 4x enclosure, corrosion resistant and weatherproof.



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# ACL 5100 COMBUSTION SAFETY CONTROL

## APPLICATION

The ACL 5100 combustion safety controller is designed to ignite and prove a continuous pilot and monitor and annunciate shutdowns for all types of gas fired heaters and industrial sized burner applications.

## THEORY OF OPERATION

The ACL 5100 utilizes a single ignitor/flame rod to provide both flame acknowledgement and ignition at the pilot tip. When the ACL 5100 starts its ignition sequence, fuel gas travels to the pilot tip where the ignitor/flame rod is located and sparking. Once the gas is lit, the flame becomes a current path for flame acknowledgement and the unit stops sparking. After the pilot has been proven for 20 seconds (factory set) the ACL 5100 will allow gas to the main burner.

If the pilot flame is extinguished, the current path is broken and the ignitor/flame rod starts sparking within 1 second to attempt to re-light the pilot. The main is shut off during this re-light period. If a flame is not established within the 5 second sparking period, the controller will immediately drop the output to solenoid # 1 pilot gas valve. The flame fail alarm will be indicated by a continuous alarm light.

If any of the shutdowns are tripped, the controller will not attempt any re-light, solenoid outputs will de-energize immediately and a shutdown will then be indicated by the flashing alarm light. The shutdown must be cleared before the controller will allow an ignition cycle.

The controller also has a power fail indicator to determine brownouts or power disconnection and this is indicated by a flashing system on light after power has been restored.

## INSTALLATION

- ACL 5100 controller c/w mounting hardware
- ACL M-50 pilot mixer & nozzle
- 10' ground wire
- 10' high voltage wire complete with ends
- 6.5' non-metallic flex complete with connectors
- Ignitor/flame rods complete with mounting hardware
- Speed control valve
- 1/2" conduit seal
- Flame current test leads
- Operator's manual

**ACL 5100 comes complete with**

The ACL 5100 can be mounted in a Class 1 Div 2 area, usually close to the burner. The 10' of high voltage ignition lead, (longer lengths not recommended) must be run in the non metallic flex (provided) or free air. If the high voltage lead is run in the non-metallic flex, a conduit seal (provided) must be installed. Note: Lead lengths in excess of 10' or use of metal or metallic sheathed conduit may result in a diminished ignitor rod voltage. A ground wire (also supplied) must be connected between the ground lug on the burner assembly and the bonding ground terminal on the main circuit board. **If the controller must be mounted farther away from the burner assembly, the ignition module, which is mounted on the main circuit board, may be mounted in or near the burner housing using the optional, CSA approved, ACL 5000R remote mount kit.** NOTE: Do not coil excess high voltage lead inside controller enclosure. High voltage magnetic field may damage sensitive components. **NOTE:** Electronic components and cables in close proximity to the ignition module and ignition cable may be affected by the high voltage magnetic field

**MOUNTING**

The ACL 5100 is available in 12-24 VDC & 120/240 VAC . Voltage requirements must be specified when ordering. The supply voltage of each unit is clearly marked inside the door on the specification label and on the circuit board beside its respective terminal. **Incorrect polarity on 12-24 VDC units may result in damage to circuit board components.** The terminal marked ground is for power supply or system ground and the terminal marked bonding ground is strictly for the ground wire to the burner assembly. It is important that a ground wire (supplied) be connected between the bonding ground terminal and the burner assembly to provide an uninterrupted path for the flame acknowledgement current.

**POWER CONNECTION**

There are two solenoid output terminals on the main circuit board marked pilot solenoid and main solenoid, . The output voltage at these terminals is always the same as the controller supply voltage. The pilot solenoid output connects to the pilot or low fire solenoid and is energized when a start is initiated. Main solenoid, (main burner) energizes only after the pilot or low fire flame has been proven. The time delay between proof of flame and energizing of main output is factory set at 20 seconds. The solenoid outputs are rated at 5A 250V each. (ACL Manufacturing carries a line of Class 1 Div 1 extra low watt solenoid valves available in all three voltages).

**SOLENOID OUTPUTS**

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# ACL 5100 COMBUSTION SAFETY CONTROL

## S/D INPUTS

The shutdown input provides a means of connecting other shutdown devices such as low level, high temperature, low gas and high gas shutdowns for additional protection. A jumper is installed at the factory and should only be removed to utilize this feature. Shutdown devices connected (in series) to the shutdown terminals **must be dry contacts** and be in a closed state during normal operating conditions. If any of the S/D switches go to a fault condition, their contacts will open, de-energizing the solenoid outputs and shutting down fuel to the pilot and main burners and disabling the re-light sequence. This will be indicated by the alarm light flashing. Once the fault condition is corrected the system can be restarted by pressing the stop/reset and then the start buttons. **Note:** if a restart is attempted without clearing the fault condition, the controller will not attempt a re-light. **NOTE:** Do not run shutdown loop wire in the same conduit as solenoid wiring. Induced voltage may be damage sensitive circuit board components.

## REMOTE S/D (STOP)

The remote S/D function is available when the jumper is removed and a momentary normally closed contact button or remote relay contact (N/C) is utilized. **Note: Must be dry contacts.**

## REMOTE START

The remote start function is available when a momentary normally open contact button or remote relay contact (N/O) is utilized. When contacts close momentarily the unit initiates starting sequence. **Note: Must be dry contacts.**

## PROOF OF CLOSURE (P.O.C)

This feature allows controller to use valves with proof of closure switches for ensuring main valve is closed before initiating an ignition. When valve switch contacts are in an open state indicating the valve may be open, the controller will not start. The contacts must be closed in order for controller to start. Once start is initiated, the contacts from proof of closure switch can then change state.

## SYSTEM ON LIGHT

The system on light indicates power supplied to the ACL 5100. When it is flashing it indicates there has been a power failure.

## ALARM LIGHT

A solid light indicates the pilot has failed to ignite. A flashing light indicates a shutdown is open

## ALARM STATUS

Alarm status is provided from a set of normally open/normally closed **dry contacts** which change state when a pilot flame is detected. If the pilot goes out due to any of the shutdowns or fails to re-light, the contacts return to normal or alarm state.

# ACL 5100 COMBUSTION SAFETY CONTROL

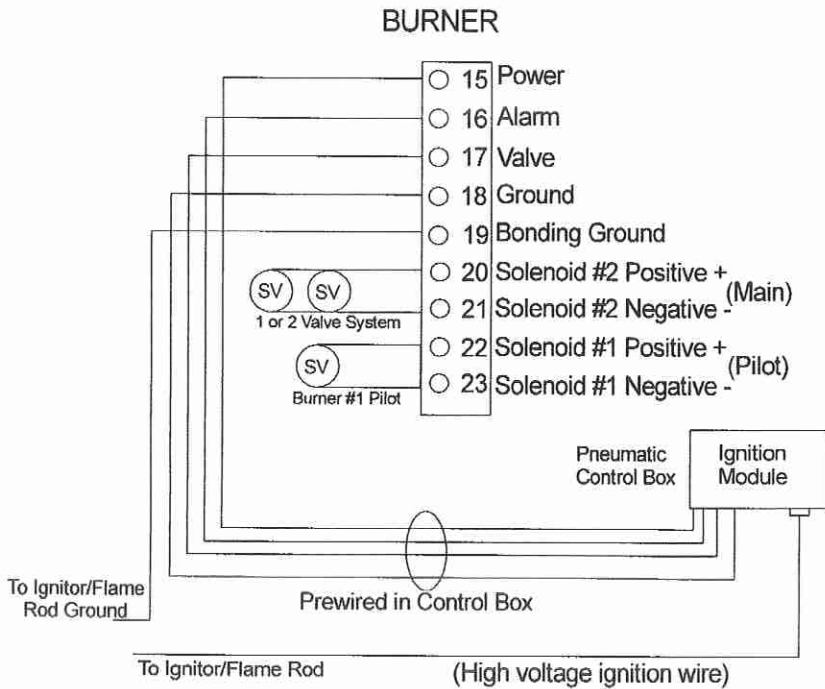
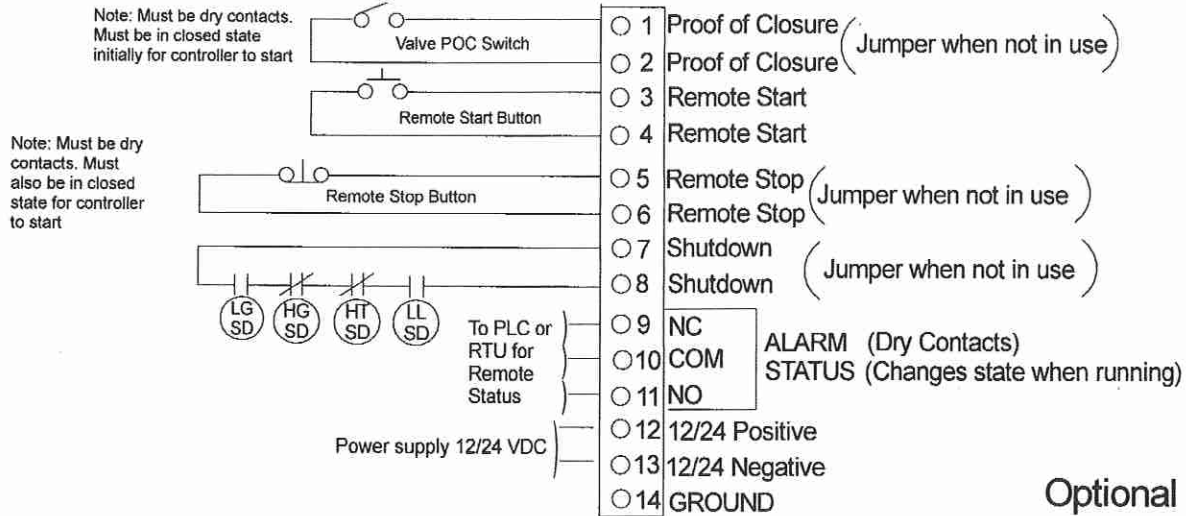
SPECIFICATIONS DC		
	ONE BURNER	
VOLTAGE	12 VDC	24 VDC
CURRENT	0.204A	0.186A
POWER	2.4W	4.5W
SOLENOID OUTPUT RATINGS	5 amp 250 V Per Output	
OPERATING TEMPERATURE	-40 C to 60 C	
FLAME SENSITIVITY	1 micro amp minimum	
FLAME FAILURE RESPONSE TIME	0.8 seconds maximum	
SPARK RATE	25 sparks/second	

SPECIFICATIONS AC		
	ONE BURNER	
VOLTAGE	120 VAC	240 VAC
CURRENT	0.282A	
POWER	33.84W	
FREQUENCY	50/60 HERTZ	
SOLENOID OUTPUT RATINGS	5 amp 250 V Per Output	
OPERATING TEMPERATURE	-40 C to 60 C	
FLAME SENSITIVITY	1 micro amp minimum	
FLAME FAILURE RESPONSE TIME	0.8 seconds maximum	
SPARK RATE	25 sparks/second	

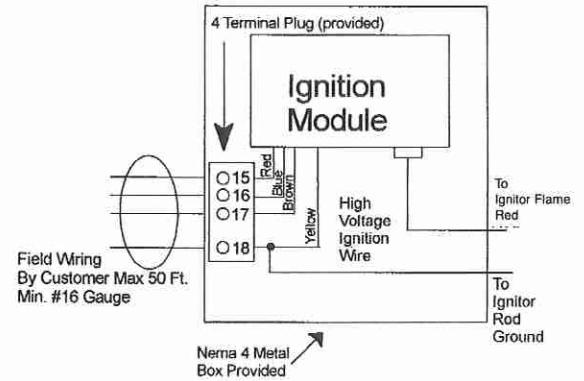
**NOTE:** Low power solenoids of 1.8 Watts are available in all voltages; 12/24 VDC and 120 VAC.  
The 12 VDC, 1/8 " solenoid used in the P.O.C. circuit is rated at only 0.85 watts.

# ACL 5100 COMBUSTION SAFETY CONTROL

## ACL 5100 12/24 VDC



### Optional Remote Mount Ignition Module



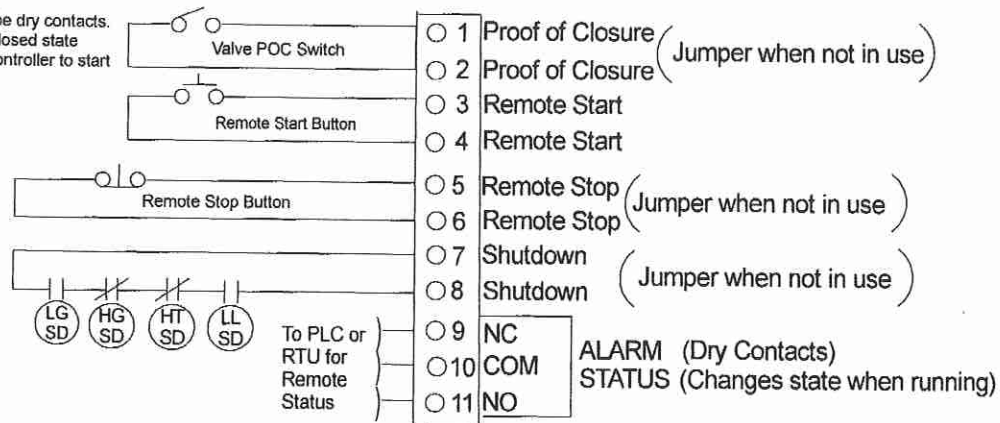
**Note:** If remote mounting of ignition module is preferred, the ACL 5000R remote mount kit is available upon request.



# ACL 5100 COMBUSTION SAFETY CONTROL

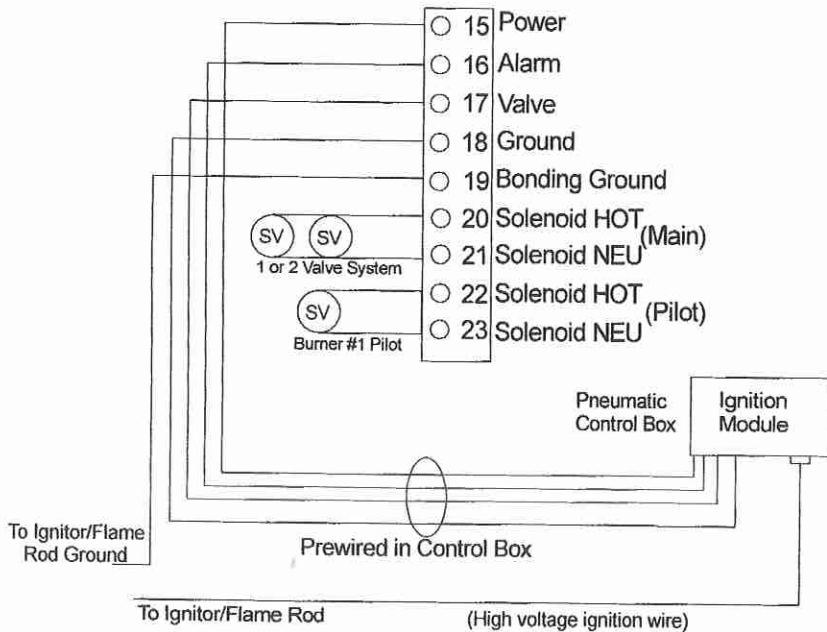
## ACL 5100 120/240 VAC

Note: Must be dry contacts. Must be in closed state initially for controller to start

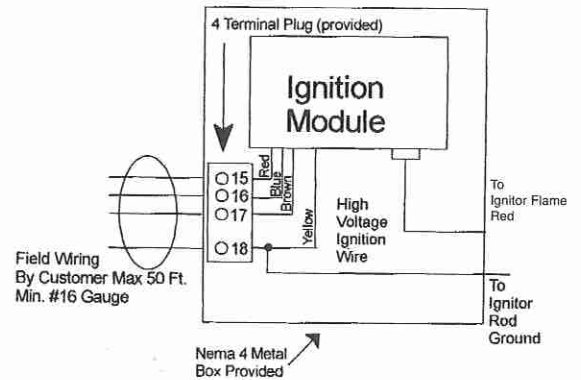


Note: Must be dry contacts. Must also be in closed state for controller to start

### BURNER

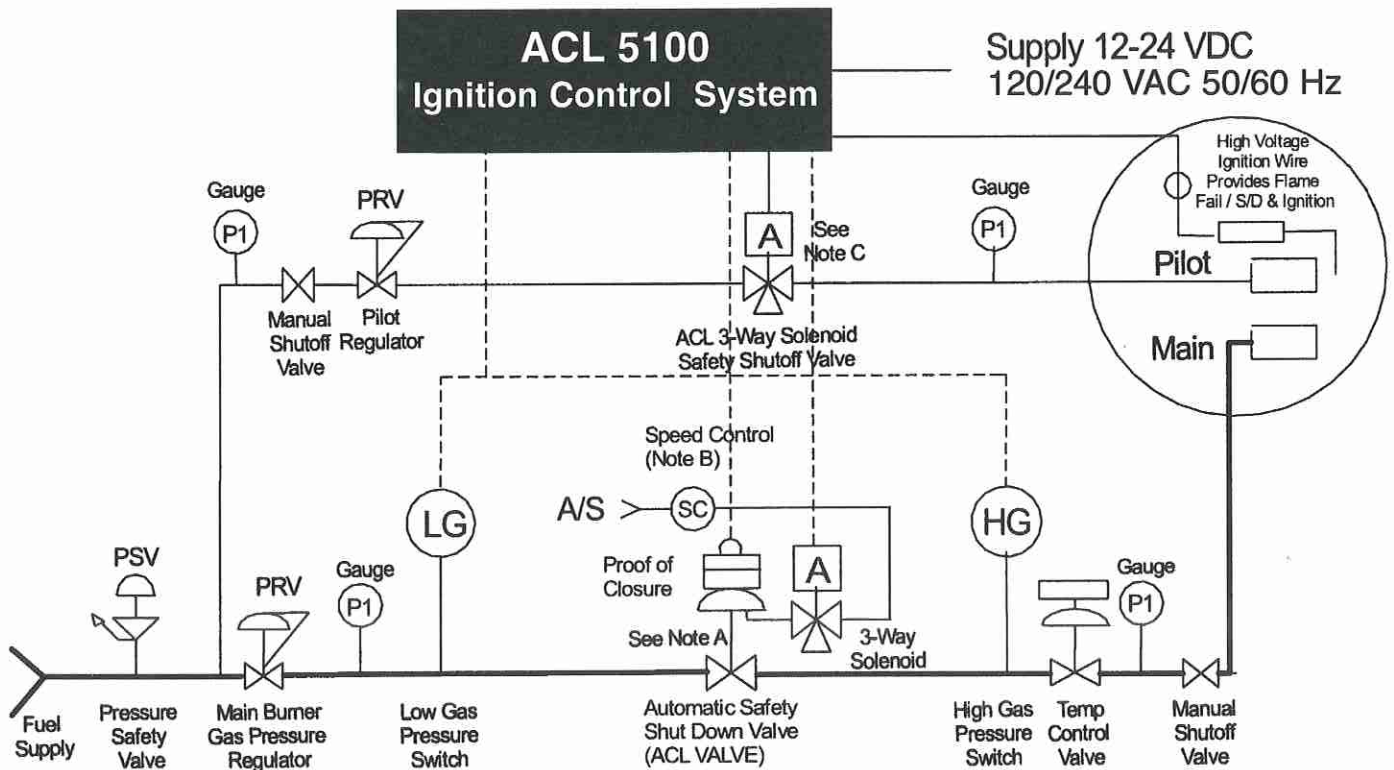


### Optional Remote Mount Ignition Module



**Note:** If remote mounting of ignition module is preferred, the ACL 5000R remote mount kit is available upon request.

**Valve Train - Pneumatic Configuration**



Note A: Auto safety shutdown valve with proof of closure switch-ACL-ASSV  
Is in accordance with CSA Standard 6.5/ANSI Z21.21  
and marked C/1 or in accordance with CGA Standard 3.9

Note B: 1/4" x 1/4" Speed Control Valve Supplied

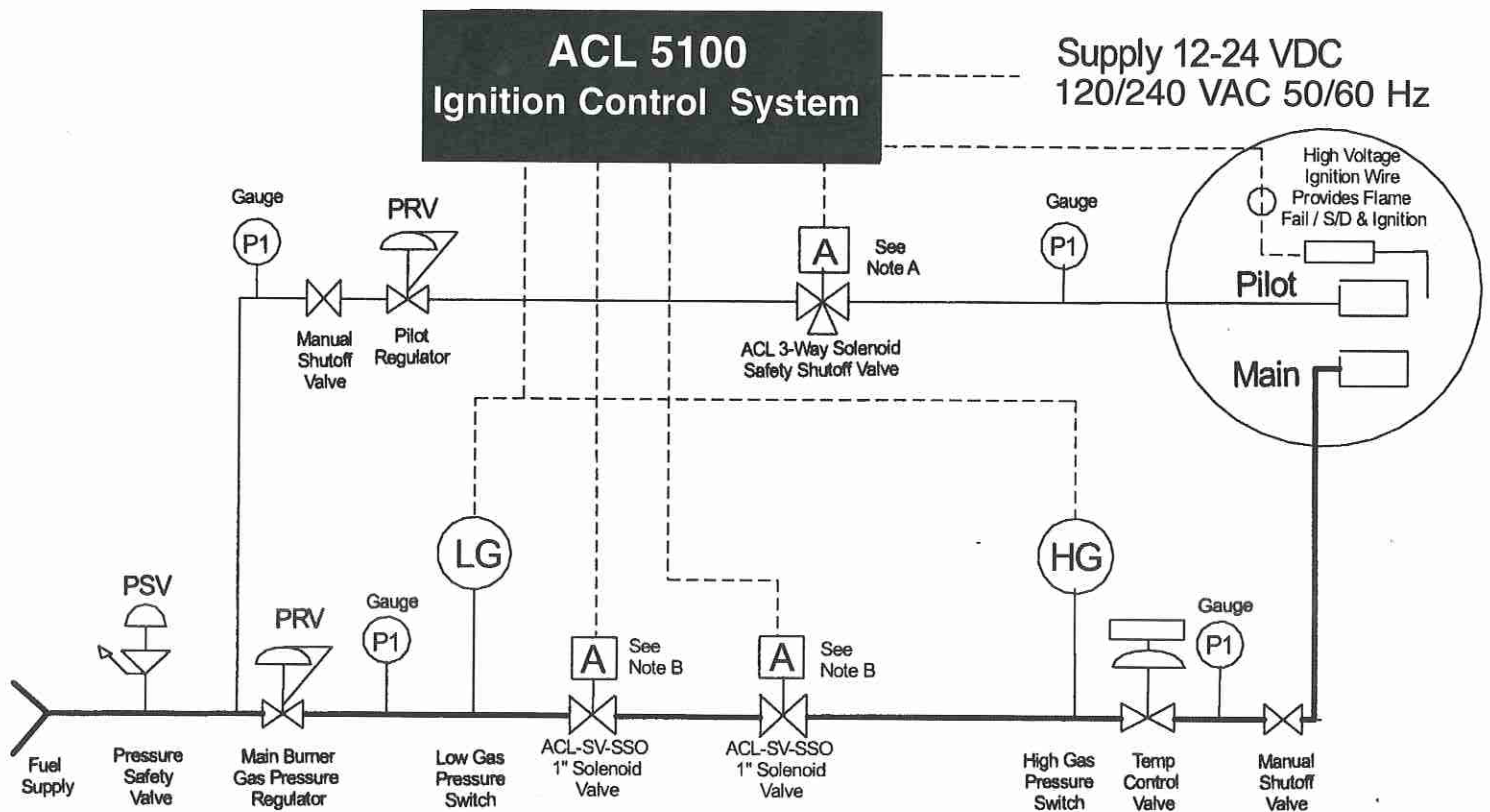
Note C: CSA approved Class 1 Div 1 solenoid valve-ACL-SV-SSO 1/8" solenoid valve

NOTE: This drawing is recommended for use with gas appliances that must conform to CSA B149.3.

Valve train diagram #3 Single Burner Application.

NOTE: If using separate fuel gas supply for Pilot, a Low Gas Pressure Switch is recommended in the pilot line.

## Valve Train - Electric Configuration



Note A: Solenoid CSA Certified 6.5-2005 C/I Div I ACL-SV-SSO 1/8" solenoid valve

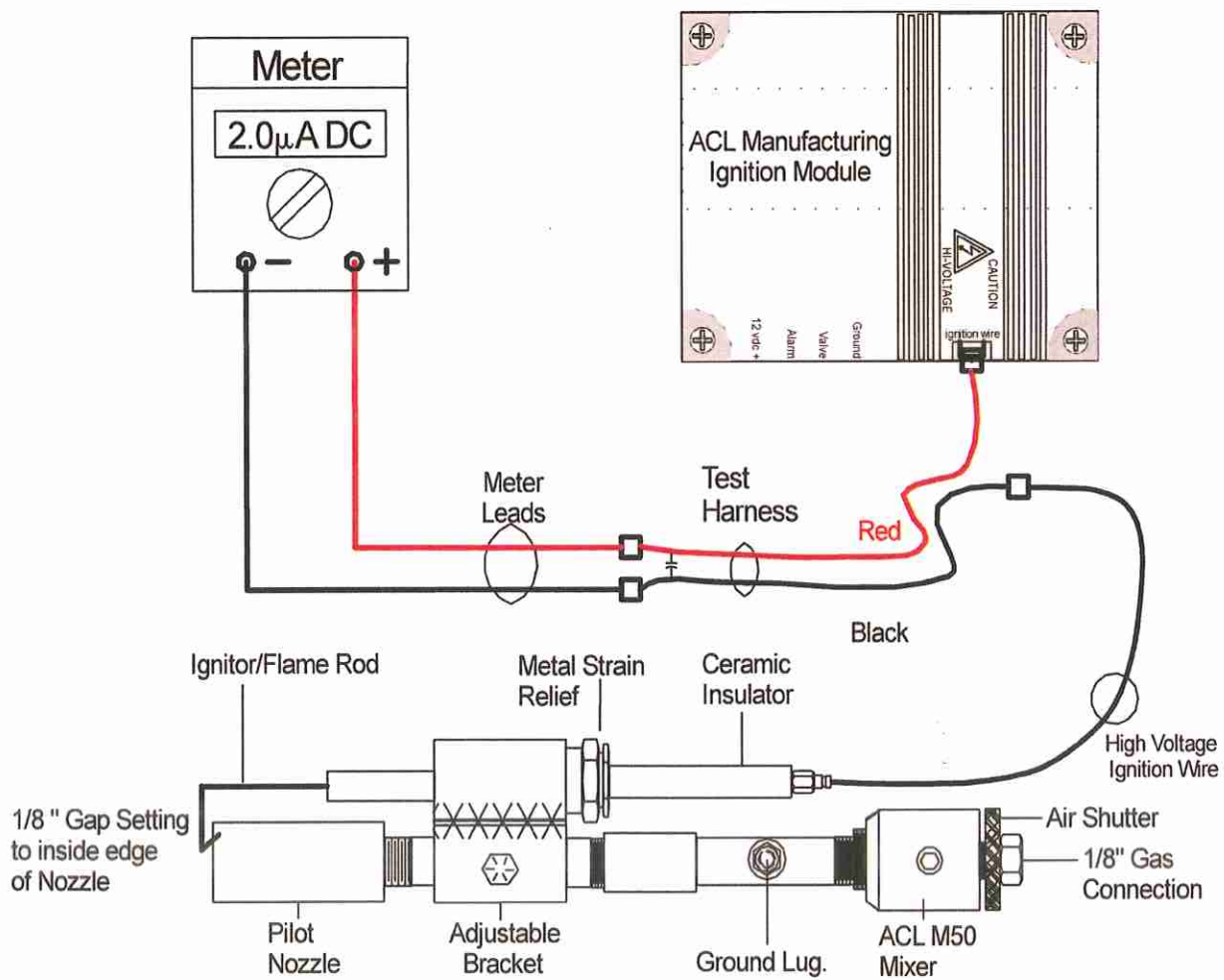
Note B: Solenoid CSA Certified 6.5-2005 C/I Div I ACL-SV-SSO 1" solenoid valve

NOTE: This drawing is recommended for use with gas appliances that must conform to CSA B149.3 Valve Train diagram #3 Single Burner Application.

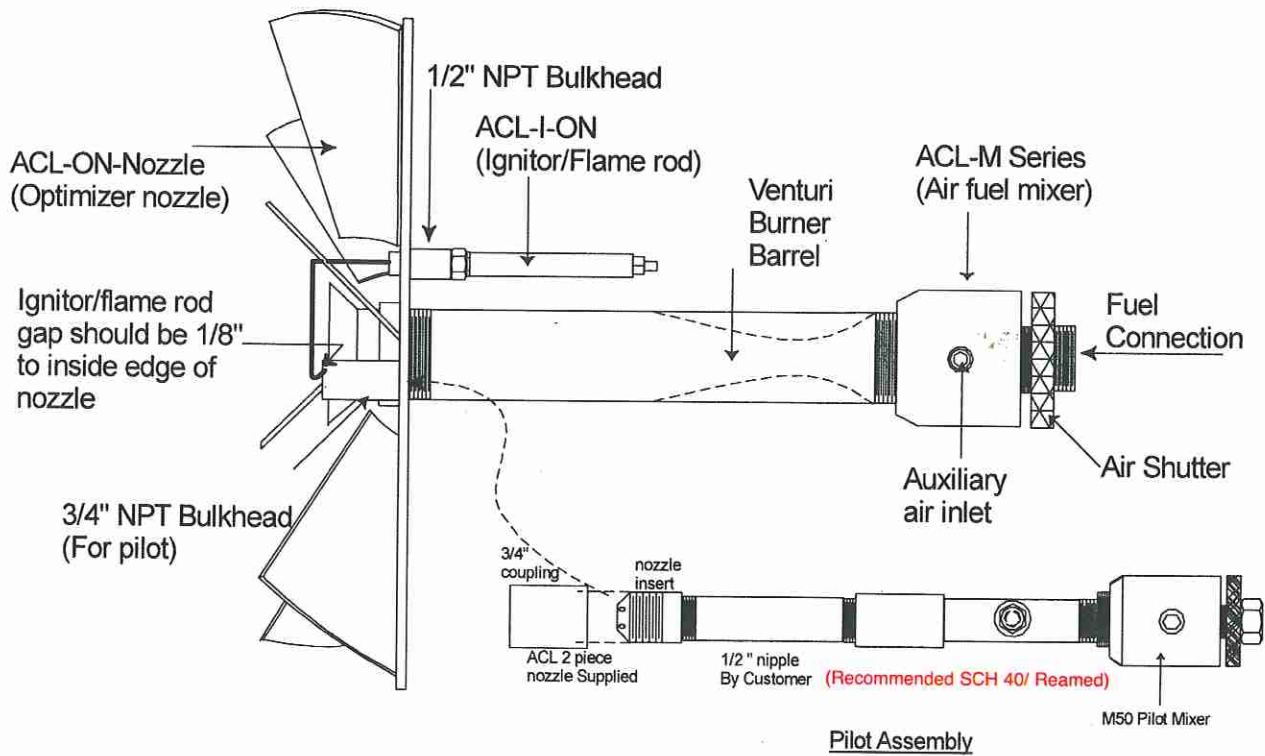
NOTE: If using separate fuel gas supply for Pilot, a Low Gas Pressure Switch is recommended in the pilot line.

## Flame Signal Test Procedure

1. Turn Power Off to ACL Controller
2. Remove High-voltage Ignition wire from Ignition Module and insert meter leads w/test harness as shown
3. Turn on power and initiate start sequence
4. Meter will give erratic readings during ignition period but should settle down between 1-2  $\mu\text{A}$  reading on meter
5. Adjust air shutter on pilot mixer and adjust pressure on regulator to achieve a flame signal close to 2  $\mu\text{A}$  which is optimum

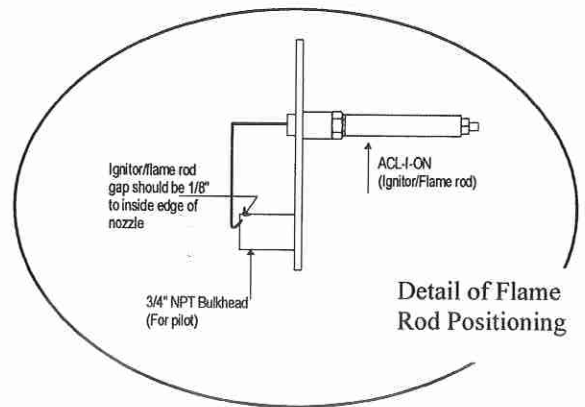
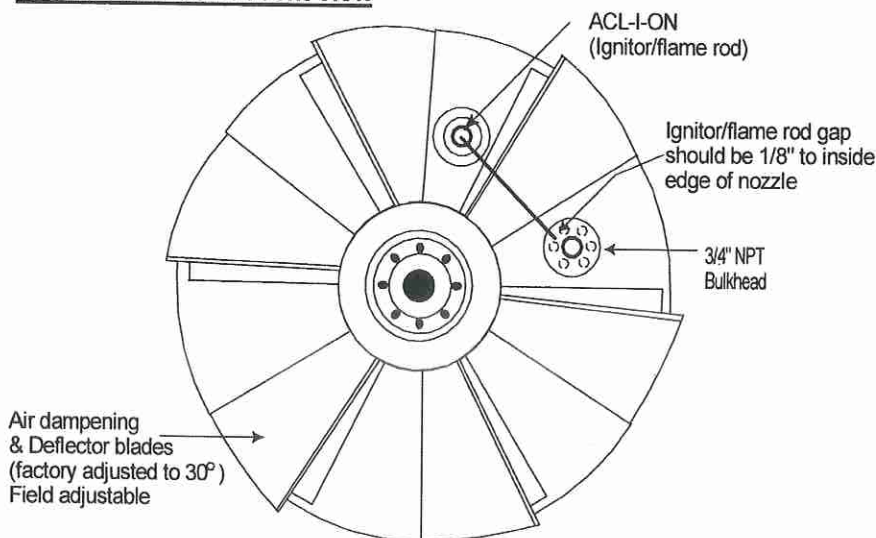


**ACL HE-ON BURNER**



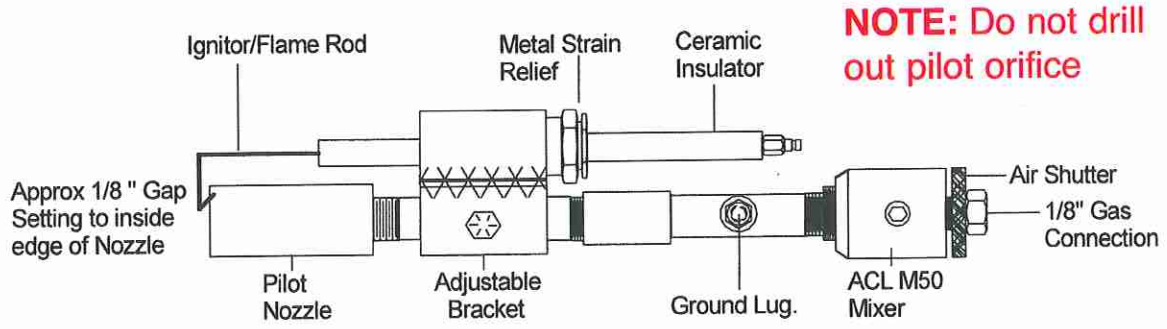
Note: This pilot assembly can be used as a stand alone unit using adjustable bracket or incorporated with our ACL-HE-ON Burner assembly as shown. Simply unscrew 3/4" coupling from nozzle insert and screw pilot assembly into 3/4" bulkhead located on ACL-HE-ON burner.

**ACL HE-ON Burner Front View**

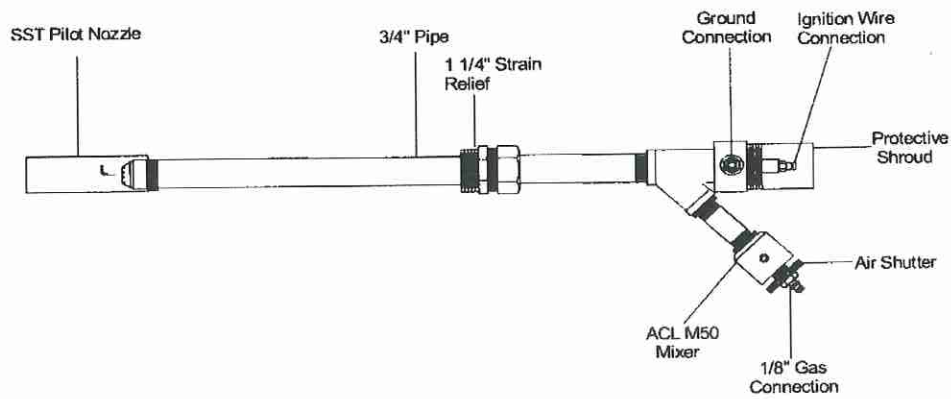


# ACL 5100 COMBUSTION SAFETY CONTROL

## PILOT ASSEMBLY

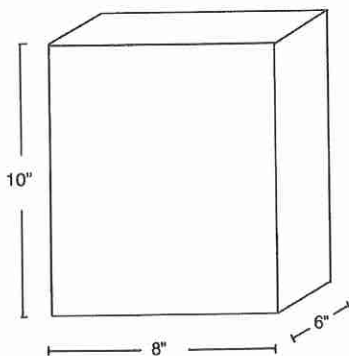


## OPTIONAL PILOT ASSEMBLY

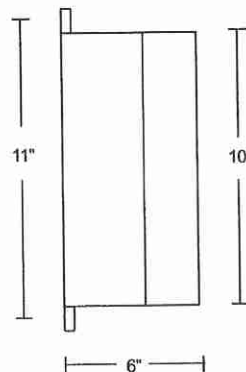


## Control Box Dimensions

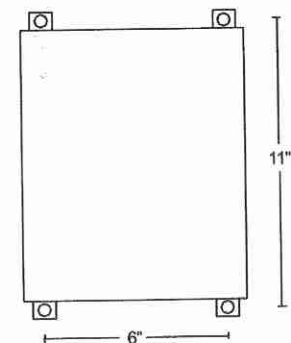
### Outside Dimensions



### Side View



### Mounting Dimensions





website: [www.aclmfg.com](http://www.aclmfg.com)

### **Limited Warranty**

Seller warrants that the product hereby purchased is, upon delivery, free from defects in material and workmanship and that any such product which is found to be defective in such workmanship or material will be repaired or replaced by Seller for a period of one year from purchase date. Warranty of such items do not include shipping, installation or set-up.

### **Liability Statement**

ACL Manufacturing Inc. shall not be liable for any special, indirect, consequential or other damages of a like general nature, including, without limitation, loss of profits or production, or loss of expenses of any nature incurred by the buyer or any third party.

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