

# ACL

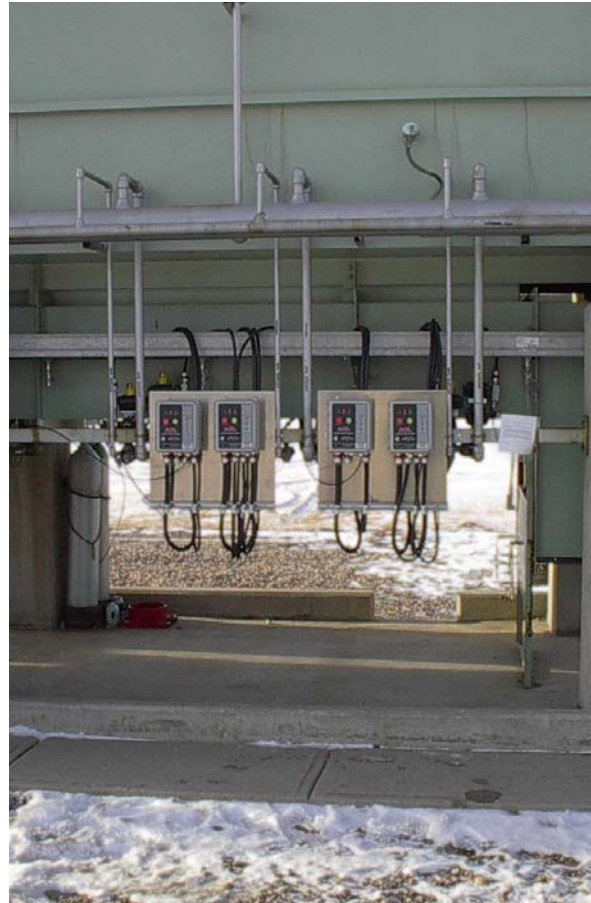
Manufacturing Inc.

## **ACL 5000** **Combustion Safety Control**

The ACL 5000 provides ignition, flame fail, alarm and shutdown capabilities for all gas fired heaters.

### **Features**

- Simple to use, no programming necessary
- Built in logic allows for automatic ignition & re-light, shutdown interlocks, alarm out, remote stop & remote start.
- Versatile power supply 9-30 VDC, 120 VAC 50/60 Hz. & Solar.
- Fastest 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 Igniters for Gas & Oil burning equipment.
- CSA B149.3 Compatible.
- Nema 4x enclosure, corrosion resistant and weatherproof.

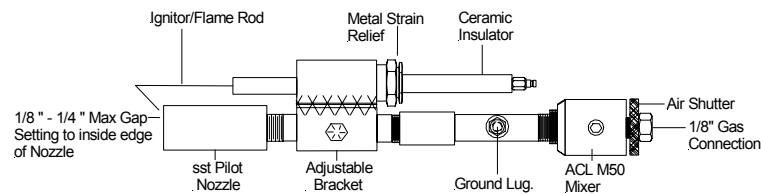


### **Simple Design**

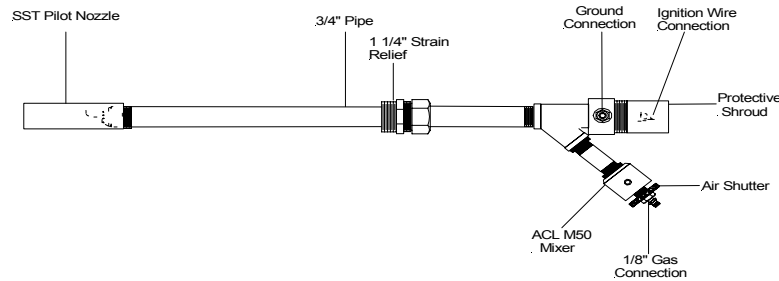
- No programming necessary
- Two button operation (Stop & Start)
- New innovative design allows ignition and flame fail with the use of one flame rod
- Control and ignition components are all housed in the Nema 4x enclosure control box
- Easily installed into any burner.

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## Pilot Assembly



## Optional Pilot Assembly



## Application

The ACL 5000 ignition control system is designed to be used for industrial sized single burner applications where a continuous pilot is used. The burners must not exceed 3,500,000 BTU/h at time of ignition. An approved slow opening valve must be used for larger BTU heaters.

## Theory of Operation

The ACL 5000 utilizes a single ignitor/flame rod to provide both flame acknowledgement and ignition at the pilot tip. When the ACL 5000 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 the ignitor/flame rod for flame acknowledgement and the unit stops sparking. If the pilot flame is extinguished, the current path is broken and the ignitor/flame rod starts sparking within 1 second.

## Sequence of Operation

	System On Light	Pilot Light	Solenoid #1	Solenoid #2	Alarm Light/ Alarm Contacts	Ignition
Stop/reset pressed	OFF	OFF	OFF	OFF	OFF	OFF
Push start 5 second trial for ignition	ON	ON	ON	OFF	OFF	ON
<b>Pilot flame lit</b>	ON	ON	ON	OFF	OFF	OFF
<b>20 seconds later (T1 adjustable)</b>	ON	ON	ON	ON	OFF	OFF
<b>Pilot flame blows out</b>	ON	ON	ON	ON	OFF	ON
<b>Fails to light after 5 seconds</b>	ON	OFF	OFF	OFF	OFF	OFF
<b>25 seconds later (T2 adjustable)</b>	OFF	OFF	OFF	OFF	ON	OFF

## Installation

Every ACL 5000 comes complete with:

- ACL 5000 controller
- ACL M-50 pilot mixer & nozzle
- 10' ground wire
- 10' high voltage wire complete with ends
- 7' non-metallic flex complete with connectors
- Ignitor/flame rod complete with mounting hardware

## Mounting

The ACL 5000 can be mounted in a Class 1 Div 2 area, usually close to the burner end. The unit comes with a maximum of 10' of ignition wire and a 7½' piece of non-metallic flex and connectors, which must be used. **Do not use metallic flex for ignition wire and ground.** The pilot assembly is to be mounted inside the fire tube and beside the burner. This assembly consists of an ignitor/flame rod, pilot mixing valve and pilot nozzle. The pilot assembly gas connection is 1/8" npt and requires approximately 3 –7 psi of clean dry fuel gas. The ignitor rod in the pilot assembly is connected with a high voltage ignition wire (provided) between it and the ignition module mounted in the control box. A ground wire (also provided) must be connected between the ground lug on the pilot assembly and the bonding ground terminal on the terminal strip inside the control box. **Note: If the controller must be mounted farther away from the Burner Assembly, the ignition module, which is mounted in the controller, can be remotely mounted in the burner housing.**

## Power Connection

The ACL 5000 comes with different power supply voltages from solar to 12 VDC, 24 VDC, 120 VAC 50/60 Hz. These voltage requirements must be determined before they are ordered so they can be factory set. The supply voltage of each unit is clearly marked inside the cover and on the circuit board beside its respective terminal connection. The terminal marked Ground is for the power supply or system ground and the Bonding Ground is strictly for the ground wire going to the pilot assembly. It is very important to ensure that there is a ground wire connected between the pilot assembly and the bonding ground terminal inside the ACL 5000 control box to provide an uninterrupted current path for the flame acknowledgement.

## Solenoid Outputs

There are 2 solenoid outputs marked solenoid #1 and solenoid #2. These solenoids operate at the same voltage as the power supply voltage and should be rated for Class 1 Div 2 areas and shouldn't have a rating of more than 12 watts for 12 VDC operation, 24 watts for 24 VDC operation or 30 watts for 120 VAC operation. In operation, solenoid #1, is energized when ignition begins. Solenoid #2, doesn't get energized until pilot flame is proven. This time is factory set at 20 seconds and is adjusted by T1 selector switch on circuit board.

### **S/D Interlock**

S/D or shutdown interlock provides the user with a means of connecting other shutdowns such as a low level switch to operate in conjunction with the ACL 5000 to shutdown the heater. A jumper is installed in the factory and should be removed if user wishes to utilize this shutdown feature. When utilized, the shutdown switch being used should have a set of normally closed dry contacts and when shutdown is in alarm state the contacts open. When this occurs the ACL 5000 will de-energize both solenoid #1 and solenoid #2 therefore not allowing any fuel gas to the pilot or burner. The ignitor will continue with 1 attempt to ignite but will be unsuccessful and then go into alarm. The only way to restart the 5000 will be to clear the shutdown, press the stop/reset button and then press the start button.

### **Alarm Output**

Alarm output status provides the user with a normally closed and normally open set of dry contacts. The only time these contacts change state is when the controller has been unsuccessful in lighting the pilot assembly after 1 try.

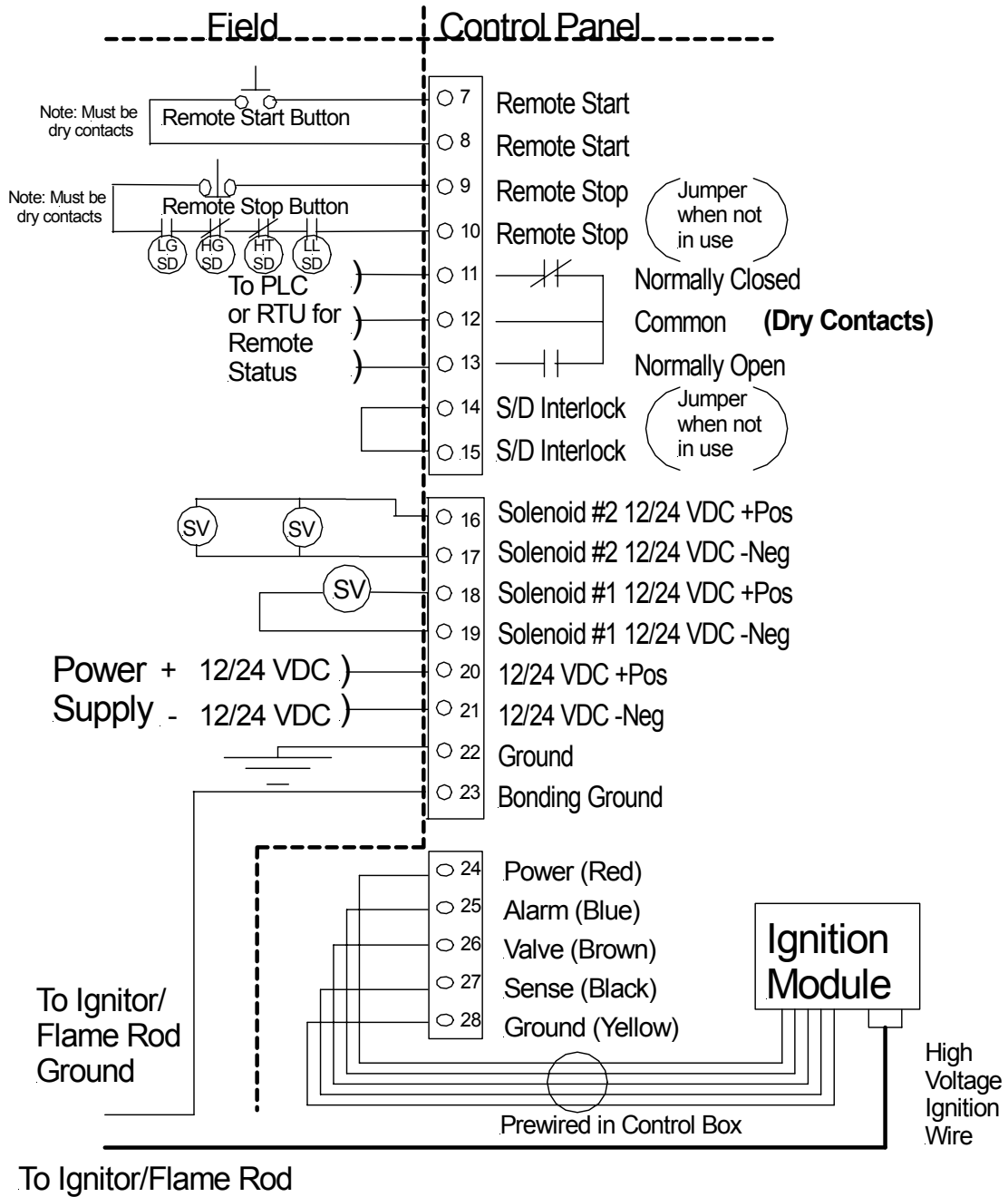
### **Remote Stop**

The remote stop function is available when the jumper is removed and a momentary normally closed contact button or remote relay contact (N/C) is utilized. This remote stop shuts down the ACL 5000 completely. NOTE: Must be dry contacts. The remote stop can also be used to wire in the heater shutdown. See drawings on page 6,7,8 &9.

### **Remote Start**

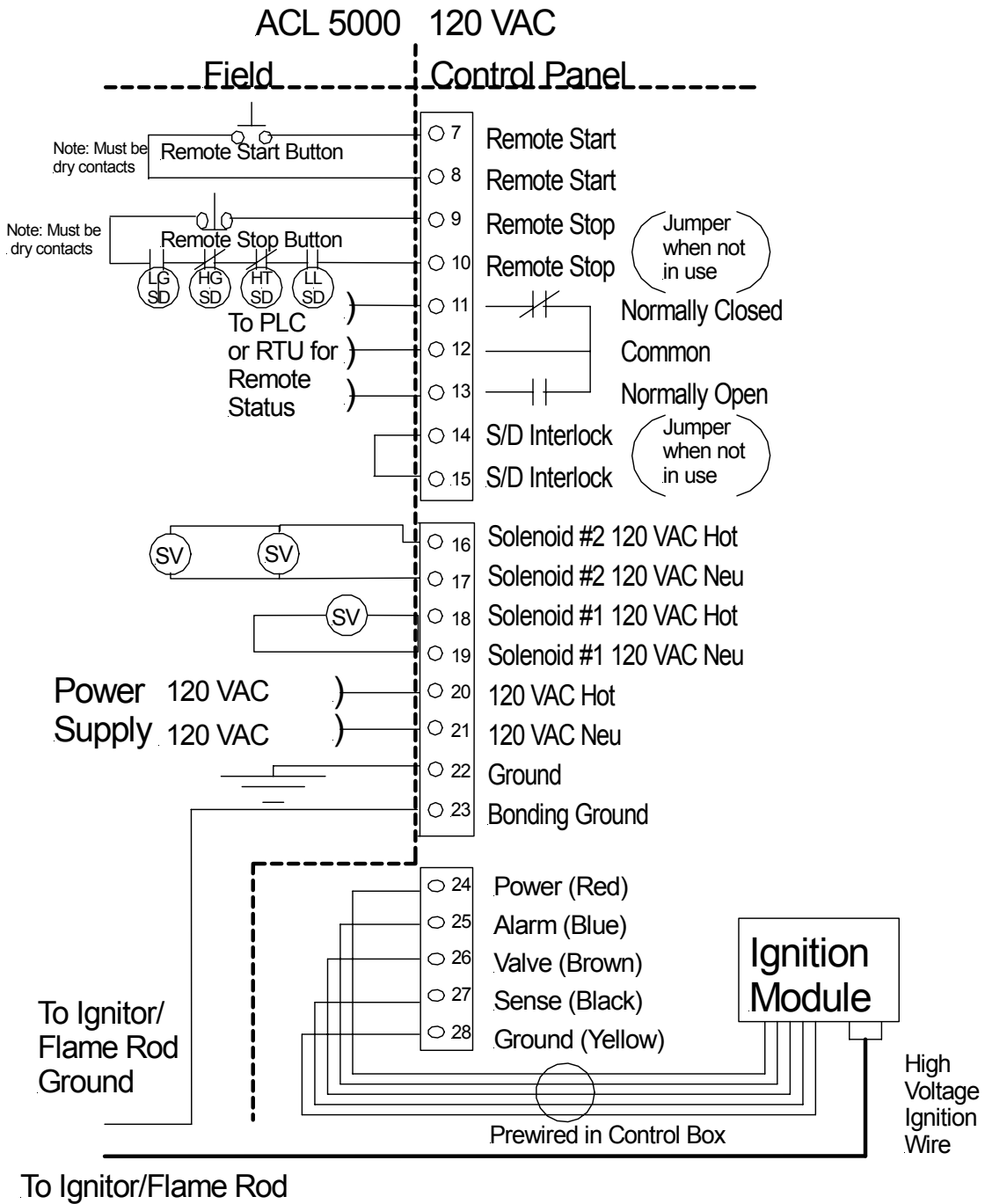
The remote start function is available when a momentary normally open contact button or remote relay contact (N/O) is utilized. When contacts close momentarily the unit initiates starting sequence. NOTE: Must be dry contacts.

# ACL 5000 12/24 VDC



Specifications		
Voltage	12 VDC	24 VDC
Current	.204 amps	.102 amps
Power	2.45 W	2.45 W
Solenoid valve rating per solenoid output	24 W	24 W
Operating temp	-40 C to 60 C	
Flame sensitivity	1 micro amp minimum	
Flame failure response time	0.8 seconds maximum	
Spark rate	25 sparks/second	

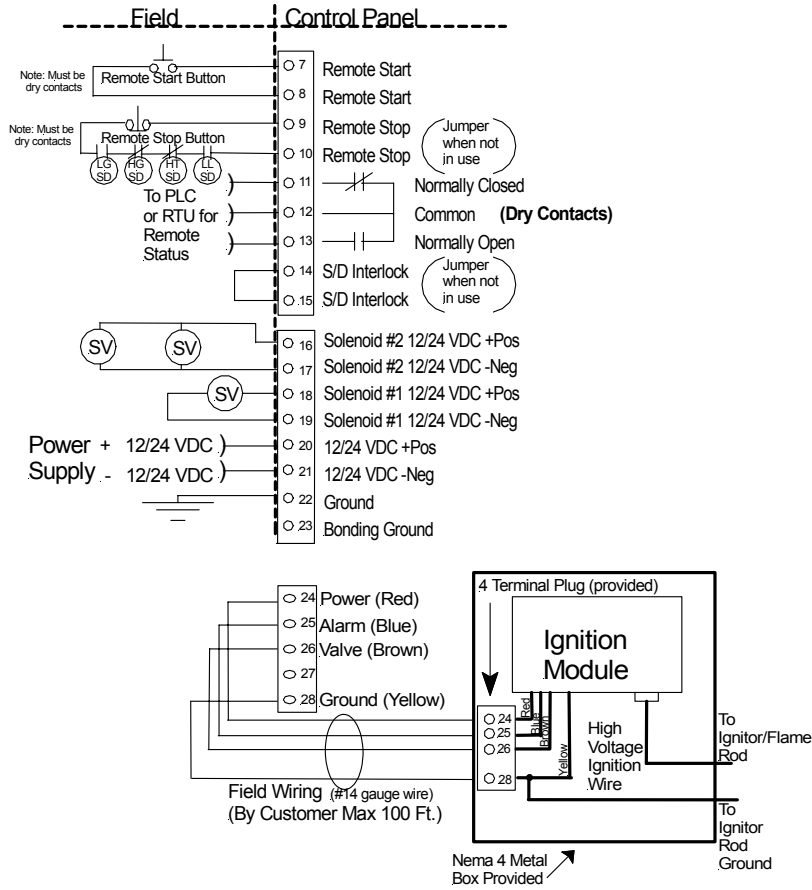
Note: low power solenoids of .85 and 1.8 watts are available for solar power operations as well as all voltages



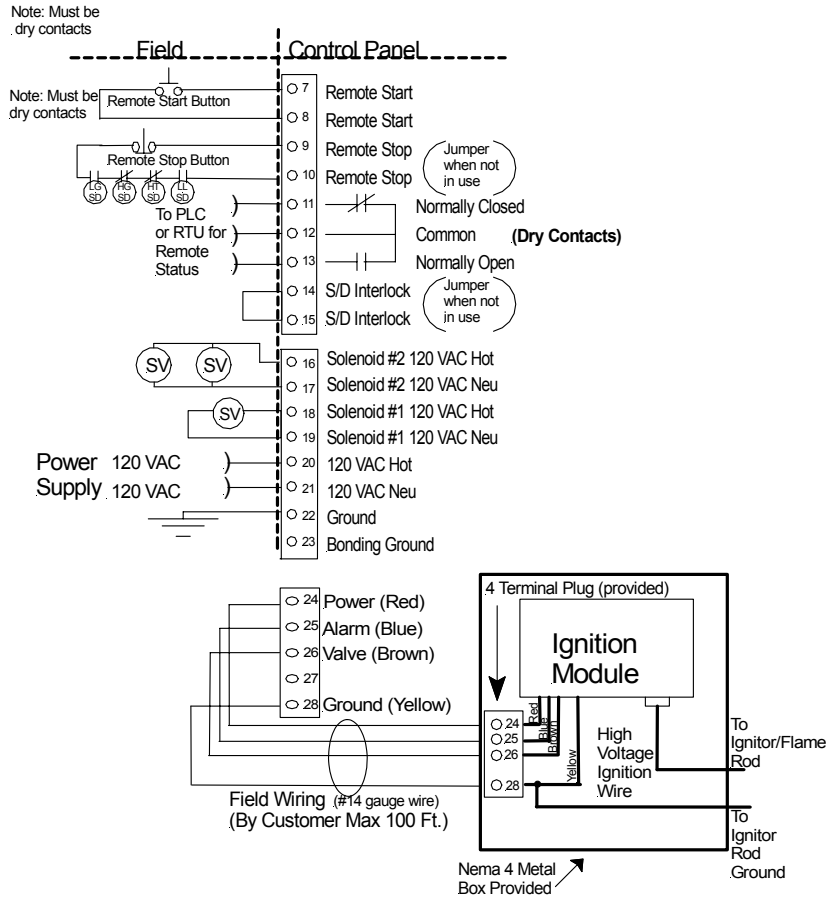
Specifications	
Voltage	120 VAC
Current	.058 amps
Power	12.75 W
Solenoid valve rating per solenoid output	30 W
Operating temp	-40 C to 60 C
Flame sensitivity	1 micro amp minimum
Flame failure response time	0.8 seconds maximum
Spark rate	25 sparks/second

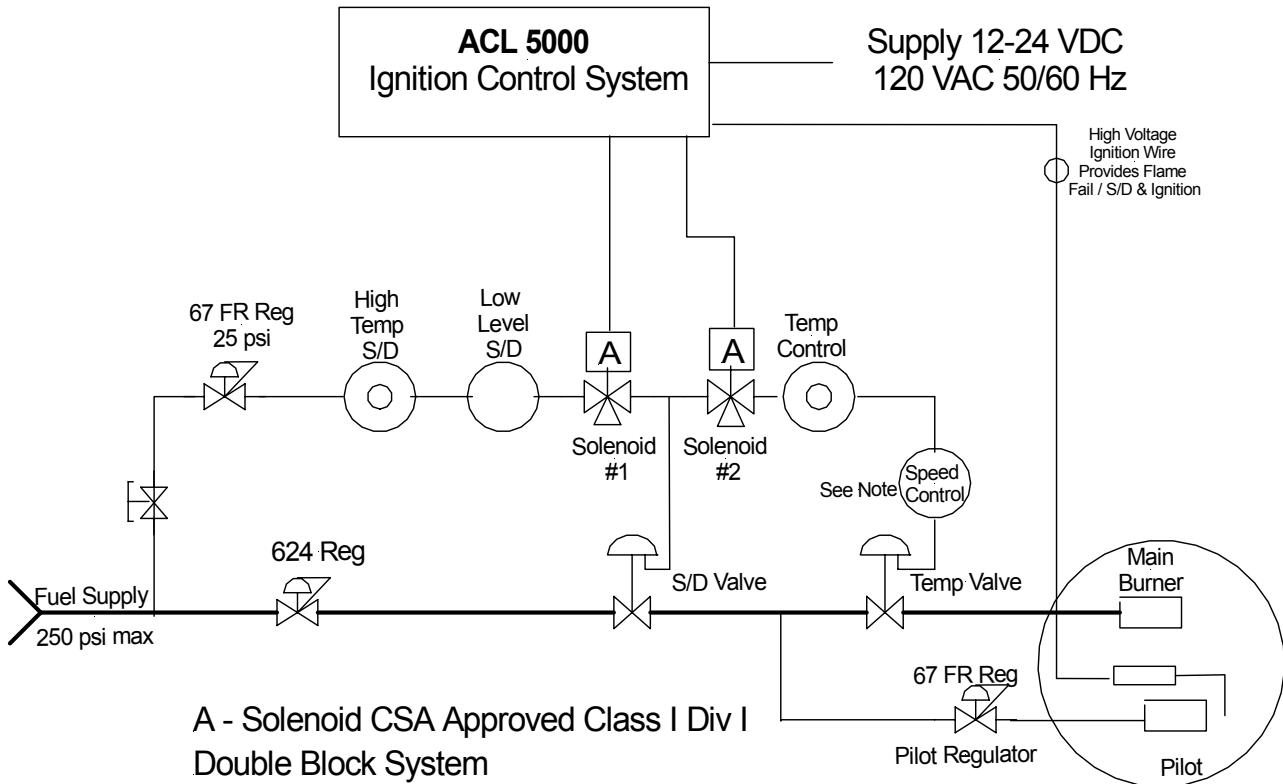
Note: low power solenoids of .85 and 1.8 watts are available for solar power operations as well as all voltages

**Optional Remote Mount Ignition Module**  
 ACL 5000 12/24 VDC



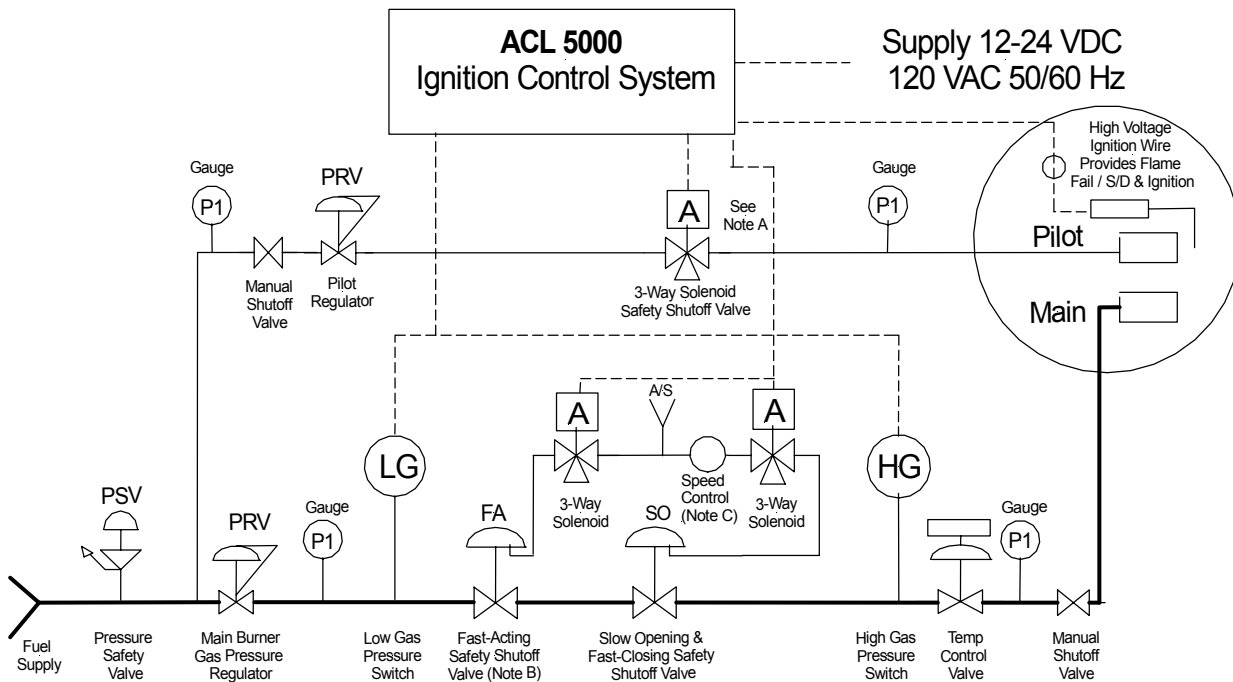
**Optional Remote Mount Ignition Module**  
 ACL 5000 120 VAC





**A - Solenoid CSA Approved Class I Div I Double Block System**

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



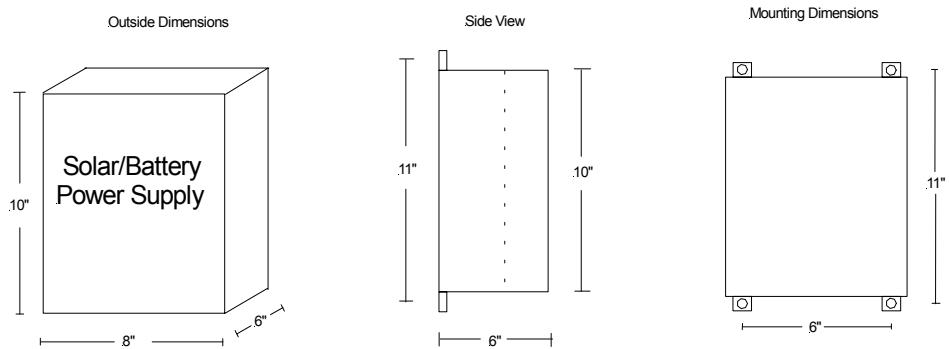
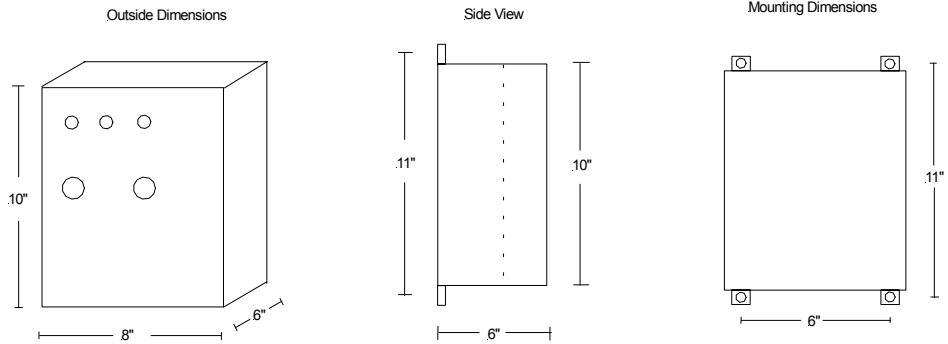
Note A: Solenoid CSA Certified Class I Div I

Note B: Must be in accordance with CGA Standard 6.5/ANSI Z21.21 and marked C/1 or in accordance with CGA Standard 3.9

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

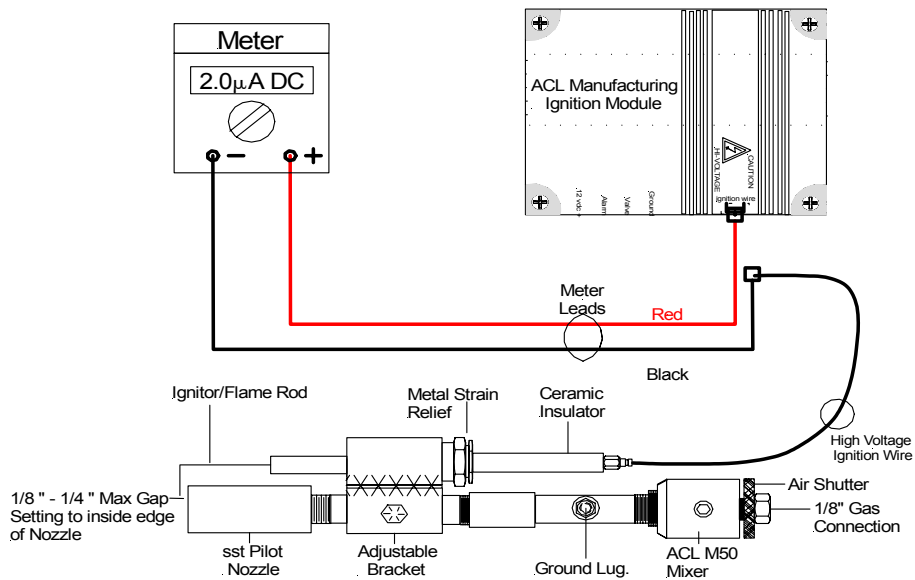
Note: This drawing is recommended for use with gas appliances that must conform to CSA B149.3 Valve Train diagram #3 Single Burner Application

## Control Box Dimensions



## Flame Signal Test Procedure

1. Turn Power off to ACL Controller
2. Remove high-voltage ignition wire from ignition module and insert meter leads in series.
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.



## **Troubleshooting Guide**

### **Fails to attempt ignition**

Blown fuse	Replace fuse 4 amp max-F1,F2 on circuit board
Battery voltage low (solar pkg. only)	Charge battery to minimum of 11.5 volts. Check solar panel connections.
Poor power connections	Check connections on terminal strips
Defective ignition module	Remove module and send for repair/replace
Defective control board	Remove control board & send for repair
Electrode shorted out	Ensure proper gap 1/8" - 1/4" max

### **Attempts ignition but doesn't light**

Fuel gas supply to pilot may be too high or too low	Pilot fuel gas supply should be set at 5 psi, adjust air/fuel mix on pilot, and adjust regulator
Gap setting on ignitor/flame rod not correct	Gap should be approximately 1/8" -1/4" max
Poor ground	Ensure ground connections are good in control box and at pilot assembly in fire tube.
Pilot solenoid failure (if applicable)	Replace solenoid
Plugged orifice on pilot	Clean out pilot orifice

### **Weak or erratic spark**

Ignition cable may be too long, optimum length is 10 ft. or less	Shorten cable
Ignition wire installed in metallic sheathed flex	Install ignition wire in non-metallic sheathed flex or free air
Defective ignition module	Replace ignition module
Gap setting too wide	Shorten gap setting 1/8" - 1/4" max
Ignition cable defective or insulation worn	Replace cable
Poor ground	Check ground at both ends (control box & ignitor end)

### **Pilot & Main Solenoid Cycle On/Off**

Pilot flame may be moving off of flame rod	Adjust rod for more flame exposure
Weak pilot or plugged orifice	Clean orifice and check pilot gas pressure approx 5 psi
Main burner comes on too hard	Install optional speed control valve on burner valve signal
Flame rod not sensing flame correctly	Adjust flame rod into flame maintaining gap setting of less than 1/4". Replace flame rod.

### **Erratic Sparking Sequence**

Controller microprocessor locked up	Remove power to controller for 10 seconds.
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### **Pilot flame lit but doesn't acknowledge**

Ignitor/flame rod not positioned correctly	Position as per diagram on page 2
Pilot gas pressure incorrect	Pressure setting approx 5 psi
Air shutter on mixer closed off	Open & adjust air shutter on mixer until good pilot established
Ground not connected properly	Connect ground between mixer ground and bonding ground in controller
Defective ignition cable or poor connection	Make sure cable ends are connected well. A poor connection interrupts current path for acknowledgement but still allows a spark to occur.
Poor connection between ignition module and board	Check connections on wiring harness between ignition module and main board
Defective ignition module	Replace