

# SmartSpark®

## High Energy Ignition System Installation and Operation Manual



Part Numbers:

07000124-AZ

07000124-AK

07000124-BZ

07000124-BK

**KEEP THIS MANUAL IN A SAFE PLACE  
FOR FUTURE REFERENCE**

**READ THIS MANUAL BEFORE USING THIS PRODUCT. FAILURE TO FOLLOW THE INSTRUCTIONS AND SAFETY PRECAUTIONS IN THIS MANUAL CAN RESULT IN SERIOUS INJURY OR DEATH OR DAMAGE TO EQUIPMENT.**

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## 1.0 Important Safety Information



### Read All Instructions before Using Equipment



The instructions provided in this manual have been prepared to serve as a general guide. It is intended for use by qualified personnel with knowledge of equipment of this type. It is not intended to cover all possible variations in equipment or to provide for specific operating problems which may arise.

You are responsible for adhering to all warnings or cautions provided in this Manual.

In addition to any general safety measures provided in this Manual, you must comply with all current national, state, local and company safety regulations at all times.

### Safety Symbols used in this manual comply with ISO 3864.

**THESE SYMBOLS ARE USED TO ALERT YOU TO POTENTIAL PERSONAL INJURY HAZARDS.**

**OBEY ALL SAFETY MESSAGES THAT FOLLOW THESE SYMBOLS TO AVOID POSSIBLE INJURY OR DEATH.**



Indicates a hazard with a high level of risk which, if not avoided will result in death or serious injury.



Indicates a hazard with a medium level of risk which, if not avoided could result in death or serious injury.



Indicates a hazard with a low level of risk which, if not avoided will result in minor or moderate injury.



## HAZARDOUS VOLTAGE

The equipment contains a High Energy Ignition System which contains **DANGEROUS AND POTENTIALLY LETHAL VOLTAGE**. To avoid risk of serious injury from electric shock, always follow the safety precautions listed below:

Disconnect power before servicing the equipment.

Warning-Explosion Hazard. Do not connect or disconnect when energized

Ensure the equipment is appropriately bonded to earth before use. See Section 5.5 regarding equipment earth bond locations.

Do not join or separate any connection to the equipment when the equipment is energized.

Do not apply power to the equipment without an igniter.

Keep the igniter firing end away from all personnel and flammable material.

The equipment must be installed and serviced by qualified personnel in accordance with this manual and applicable local and national codes, standards, and ordinances.

The equipment is not field-repairable. Do not attempt to disassemble or repair the equipment.



## **EXPLOSION HAZARD**

Do not service the equipment if an Explosive Atmosphere may be present.

Do not separate any cables from the enclosure until the power has been disconnected for 5 minutes.

Do not energize the cable while it is disconnected from the enclosure.

The equipment must be installed and serviced by qualified personnel in accordance with applicable local and national codes, standards, and ordinances.

The equipment's enclosure may not be modified.

The equipment is not user/field repairable and must be returned to the manufacturer for evaluation in the event of an equipment malfunction.

Substitution of components may impair suitability for Class 1 Division 2.

**Les symboles de sécurité utilisés dans ce manuel sont conformes à la norme ISO 3864.**

**CES SYMBOLES SONT UTILISÉS POUR VOUS AVERTIR DES RISQUES DE BLESSURES POTENTIELS. RESPECTEZ TOUS LES MESSAGES DE SÉCURITÉ QUI SUIVENT CES SYMBOLES POUR ÉVITER LES BLESSURES POTENTIELLES OU LA MORT.**



Indique un danger avec un niveau élevé de risque qui, s'il n'est pas évité, entraînera la mort ou des blessures graves.



Indique un danger avec un niveau de risque moyen qui, s'il n'est pas évité, pourrait entraîner la mort ou des blessures graves.



Indique un danger avec un niveau de risque bas qui, s'il n'est pas évité, entraînera des blessures mineures ou modérées.



## TENSION DANGEREUSE

L'appareil contient un système d'allumage à haute énergie qui contient une **TENSION DANGEREUSE ET POTENTIELLEMENT MORTELLE**. Pour éviter les risques de blessures graves par électrocution, suivez toujours les précautions de sécurité indiquées ci-dessous:

Coupez l'alimentation avant l'entretien du matériel.

Avertissement-risque d'explosion. Ne pas connecter Ou Débrancher lorsqu'il est sous tension.

S'assurer que l'équipement est correctement mis à la terre avant l'utilisation. Voir la section 5.5 concernant l'emplacement des liaisons à la terre de l'équipement.

Ne pas connecter ou séparer toute connexion à l'équipement lorsque l'appareil est sous tension.

Ne pas appliquer de tension à l'appareil sans un allumeur.

Gardez l'extrémité de l'allumeur loin de tout personnel et de matériels inflammables.

L'équipement doit être installé et entretenu par du personnel qualifié, conformément à ce manuel, aux codes locaux et nationaux applicables, et aux normes et règlements en vigueur.

L'appareil n'est pas réparable sur site. Ne tentez pas de démonter ou de réparer l'équipement.



## **RISQUE D'EXPLOSION**

Ne pas réparer l'appareil si une atmosphère explosive peut être présente.

Ne pas séparer les câbles du boîtier jusqu'à ce que le courant a été coupé pendant 5 minutes.

Ne pas alimenter le câble tandis qu'il est déconnecté du boîtier.

L'équipement doit être installé et entretenu par du personnel qualifié, conformément aux codes locaux et nationaux applicables, aux normes et règlements en vigueur.

Le boîtier de l'appareil ne doit pas être modifié.

L'équipement n'est pas réparable par l'utilisateur/sur site et doit être retourné au fabricant pour évaluation dans le cas d'une défaillance de l'appareil.

La substitution de composants peut nuire à la conformité pour la Classe 1 Division 2.



## 2.0 Definitions

**Spark** – An electric current arc.

**High Energy Ignition** – Electric spark ignition system utilizing high energy sparks for direct ignition of hydrocarbon fuels such as gas, diesel, or #6 oil.

**High Energy Exciter** – An electronic device that stores electric charge and releases it cyclically in abrupt bursts to an igniter to create high power sparks.

## 3.0 Chentronics High Energy Ignition Systems

Chentronics High Energy Ignition (HEI) systems directly ignite burner fuels by providing short time duration (impulse), high current electrical arcs commonly referred to as *sparks*. These sparks are generated by abruptly releasing electrical energy (charge) stored in large capacitors. The energy is released through an igniter driver circuit called a *pulse forming network* to specialized high energy igniters. The result is a high power spark with increased ability to ignite fuels.

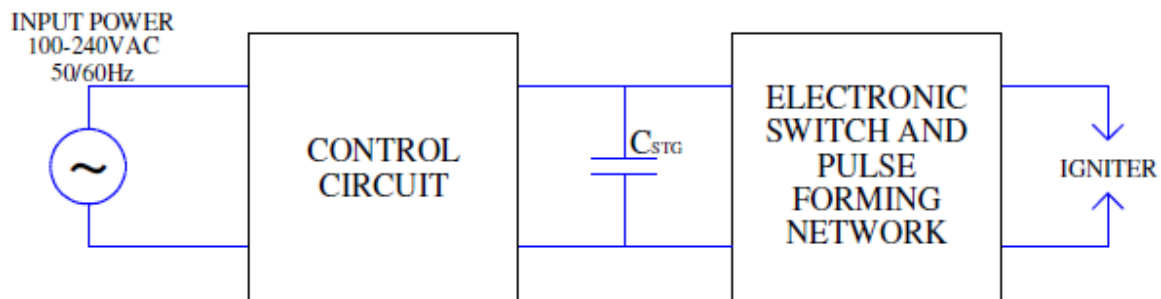


Figure 1: High Energy Exciter basic schematic.

Chentronics High Energy Ignition Systems are designed to operate in conditions of extreme temperature, moisture, and contamination; creating high power sparks that dependably provide direct spark ignition to a wide range of fuels in a wide range of adverse conditions. The igniter can spark even under water.



Figure 2: Igniter firing in water.

**NOTE:** Firing igniters submerged in water will cause them to excessively wear and reach end of life very quickly.

## 4.0 System Specifications

### 4.1 Description of Equipment

The Chentronics SmartSpark is a high energy ignition system for use with gas, #2 distillate, and diesel fuels. Designed with durability in mind, the SmartSpark is able to withstand temperature extremes, operate in up to 100% humidity, and operate safely in Class 1 Division 2 hazardous areas. For convenience, there is an LED indicator on the back of the exciter which indicates when the igniter is sparking, when the igniter tip is failing, and when the igniter tip has failed. This allows the user to replace igniter tips before they fail, and prevent ignition faults from occurring. Finally, the compact on-the-rod design makes the SmartSpark convenient to use and makes it the smallest, most powerful ignition system available.

### 4.2 General Arrangement

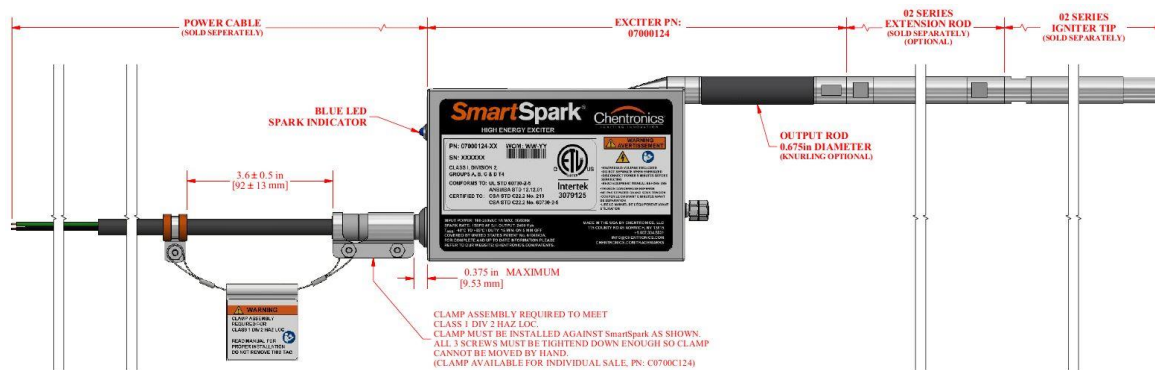


Figure 3: System general arrangement.

### 4.3 Configurations:

The SmartSpark system model number 07000124 is available in four configurations:

#### **Model 07000124-AZ**

Configured with 304 stainless steel enclosure and non-knurled output rod.

#### **Model 07000124-AK**

Configured with 304 stainless steel enclosure and knurled output rod.

#### **Model 07000124-BZ**

Configured with 316 stainless steel enclosure and non-knurled output rod.

#### **Model 07000124-BK**

Configured with 316 stainless steel enclosure and knurled output rod.

#### **4.4 Equipment Enclosure**

The electrical control and measurement equipment are completely encased in potting and the enclosure is welded shut to prevent water ingress. The 304 or 316 stainless steel enclosure prevents corrosion which could compromise the enclosure. Finally, the power cable has a pull-collar latch which prevents the cable from being accidentally removed.

#### **4.5 Equipment Conditions of Use**

The SmartSpark system equipment is subject to the following conditions of use and limitations:

1. Only the Chentronics C07000124 Power Cable may be used to power the exciter.
2. The power cable shall not be disconnected from the exciter until the power has been turned off for at least 5 minutes.
3. Power shall not be applied to the power cable while it is disconnected.
4. The equipment shall not be subjected to ambient temperatures greater than +85°C or less than -40°C while operating.
5. The equipment's igniter connections should not be joined or separated when the equipment is in use (powered).
6. The equipment shall not be operated without an igniter attached.
7. Precautions to avoid electrostatic discharge from the non-metallic nameplate should be minimized and considered by the end user. Please see Section 5.5 regarding earth bond requirements in this manual.

**4.6 System Electrical and Physical Specifications**

Application:	High-energy, direct-spark ignition system
Input Power:	100-240VAC 50/60Hz, 1A MAX
Exciter Type:	High Energy Ignition
Exciter Duty Cycle:	15 min on / 5 min off
Exciter Spark Command:	INPUT – Apply power to start exciter
Exciter Spark Detect Visual:	LED, <b>Blue</b> , flashes off at steady rate when successful spark output current detected
Exciter Power:	4J min per Spark
Exciter Spark Rate:	15Hz for 30 seconds, then 1Hz†
Operating Temperature Limits:	-40°C to 85°C
Storage Temperature Limits:	-55°C to 100°C
Humidity:	0 to 100% condensing
Enclosure:	Polished Stainless Steel (304 or 316), TYPE 4X (NEMA)
Weight:	Approximately 5lb [2.3 kg]
Dimensions:	Approximately 4.6 x 6.4 inches with output connectors
Output Voltage:	2200V <sub>PK</sub>

**EXPLOSION HAZARD**

Do not exceed equipment operating specifications. Operating the system outside its prescribed specifications could compromise its hazardous area protective systems and can result in serious injury or death or damage to equipment.

**RISQUE D'EXPLOSION**

Ne pas dépasser les spécifications de fonctionnement de l'équipement. Un fonctionnement du système en dehors des spécifications prescrites pourrait compromettre ses systèmes de protection pour zone dangereuse et peut entraîner des blessures graves ou la mort ou des dommages matériels.

†Nominal. Varies by  $\pm 15\%$  over operating ambient temperature range.

## 5.0 Installation Instructions

### 5.1 Igniter Installation

The SmartSpark system is compatible with Chentronics High Energy Igniters that have a Chentronics 02 series connector. The equipment has been designed to work best with the system components listed in Section 7.0.

To install the exciter, thread the igniter/extension rod male connector into the female 02 series connector on the exciter and fully hand-tighten the two together. Repeat this step to connect the igniter to the extension rod if an extension rod is used.

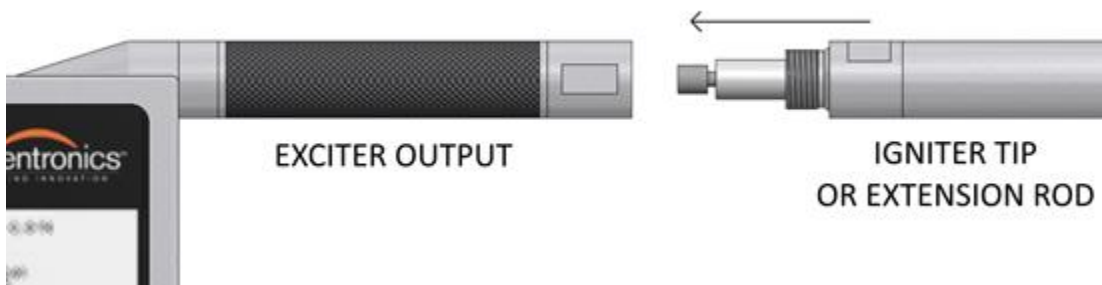


Figure 4: Igniter installation.

The igniter should be installed only while there is no power being supplied to the exciter.

### 5.2 Input Power Cable Installation

The SmartSpark Input Power connector is only compatible with the Chentronics C07000124 Power Cable; the cable must be connected as shown in Figure 5, with the red dot on the exciter input connector lining up with the red dot on the power cable connector.

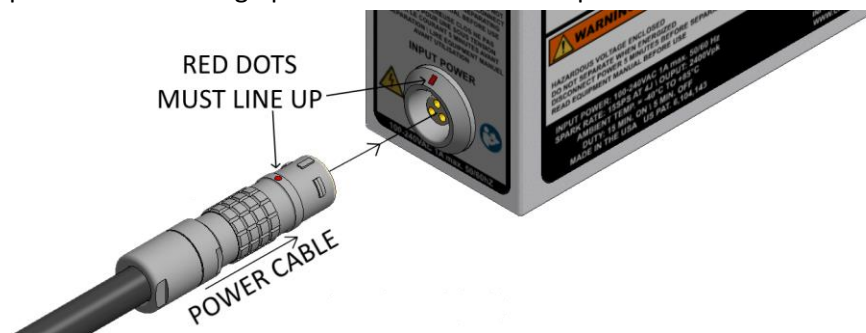


Figure 5: Input power cable installation.

The power cable should be installed only when the cable is not energized. Once connected, the cable should not be removed from the exciter until it has been de-energized for at least 5 minutes. To maintain Ingress Protection (dust, water from entering in to input power slot) do not disconnect power cable unless necessary (inspection, repair or replacement).

### 5.3 HAZ LOC CLAMP KIT Installation

To meet North American Hazardous Location Certification Class 1 DIV 2 requirements the Clamp Assembly Kit (070CC124) must be installed,

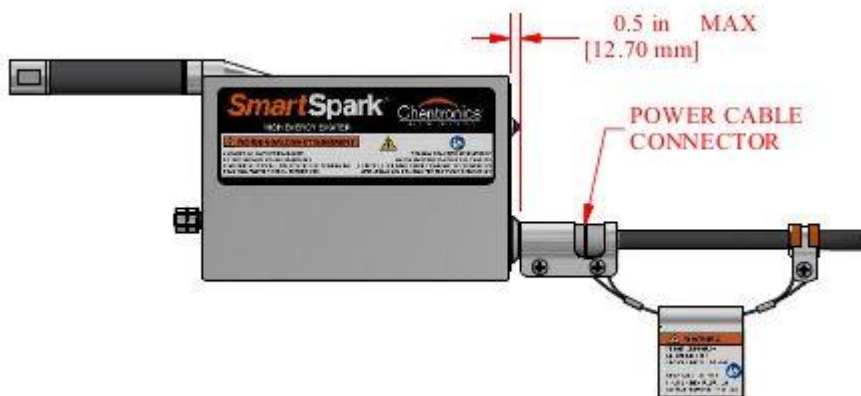


Figure 6: Haz-Loc cable clamp installation.

#### Installation Instructions:

1. Slide the metallic clamp and the orange clamp over the input power cable as shown. Loosen screws as needed, spread orange clamp as needed to fit over the cable.
2. Install power cable in to SmartSpark.
3. Place clamp on top of connector and tighten down screws of metallic clamp.
4. Place loop of Lanyard between flanges of the orange clamp, insert screw and tighten using a nut as shown.

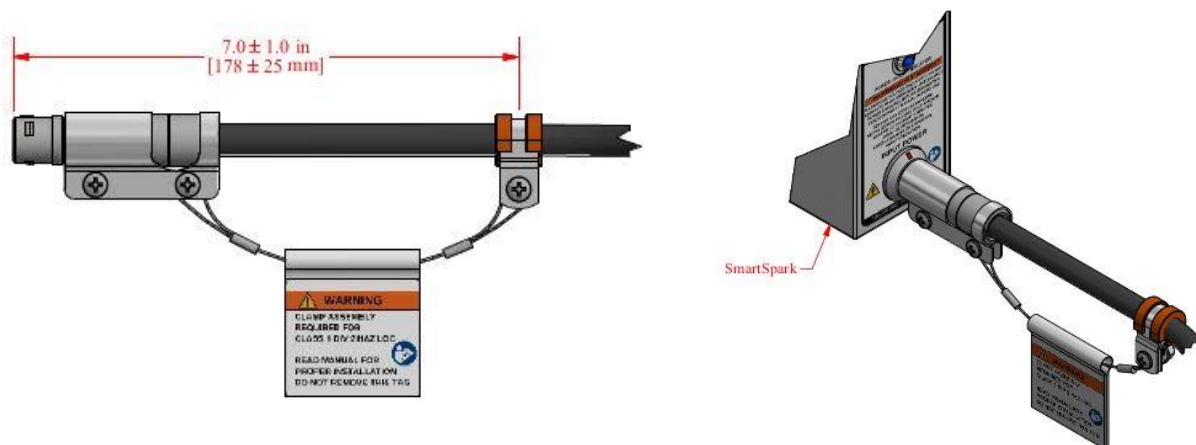


Figure 7: Haz-Loc cable clamp (C070CC124) assembly

#### 5.4 Installing the Exciter on a Burner

Fully insert the ignition rod into the burner's igniter guide tube and secure the rod with a clamp, compression fitting, etc.

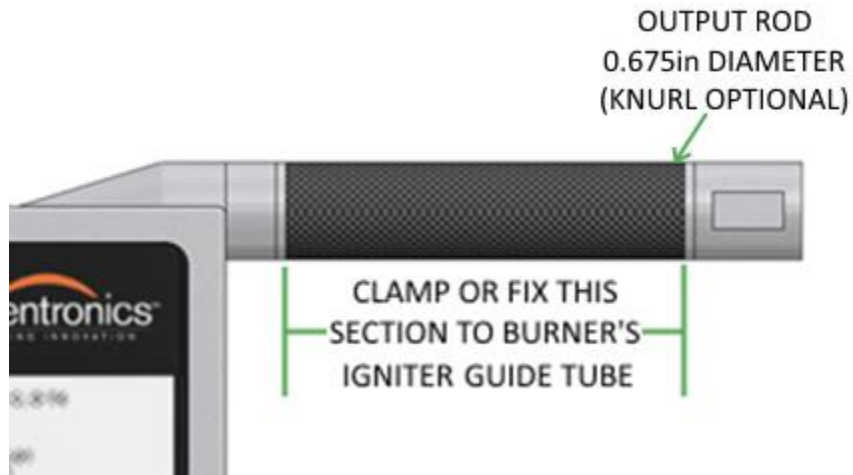


Figure 6: Exciter burner installation.

**Note:** For models with a knurled output, a clamp is recommended. For models without a knurled output, a compression fitting is recommended.



**DANGER**

**EXPLOSION HAZARD**



Do not service the equipment if an explosive atmosphere may be present.

Do not separate any cables from the enclosure until the power has been disconnected for 5 minutes.

Do not energize the cable while it is disconnected from the enclosure.

**RISQUE D'EXPLOSION**

Ne pas réparer l'équipement si une atmosphère explosive peut être présente.

Ne pas séparer les câbles du boîtier jusqu'à ce que le courant a été coupé pendant 5 minutes.


Ne pas alimenter le câble tandis qu'il est déconnecté du boîtier.

## 5.5 Equipment Earth Bond Location

The equipment includes an earth bond stud just under the output rod as shown in Figure 8. Use a 12 AWG wire with a 1/4in ring terminal to connect the stud to earth, tightly securing the ring terminal between the two nuts on the stud.



Figure 7: Earth bond location.




**DANGER**

**EXPLOSION HAZARD**

**POTENTIAL ELECTROSTATIC CHARGING HAZARD**

Ensure the equipment is properly earth bonded before energizing to prevent a potential buildup of electrostatic charge. A buildup of electrostatic charge can result in potential electrical arcing to earth, which can ignite hazardous atmospheres or result in potential shock hazard from contact with the equipment enclosure.

**RISQUE D'EXPLOSION**

**RISQUE DE CHARGE ELECTROSTATIQUE**

**POTENTIELLE**

S'assurer que le matériel est correctement mis à la terre avant de mettre sous tension pour éviter une accumulation potentielle de charge électrostatique. Une accumulation de charges électrostatiques peut entraîner de potentiels arcs électriques à la terre, qui peuvent enflammer des atmosphères dangereuses ou entraîner des risques d'électrocution par contact avec le boîtier de l'équipement.



### 5.6 System Schematic Diagram

The following schematic block diagram describes equipment functionality. Inputs are noted in blue text on the left, and outputs are located on the right.

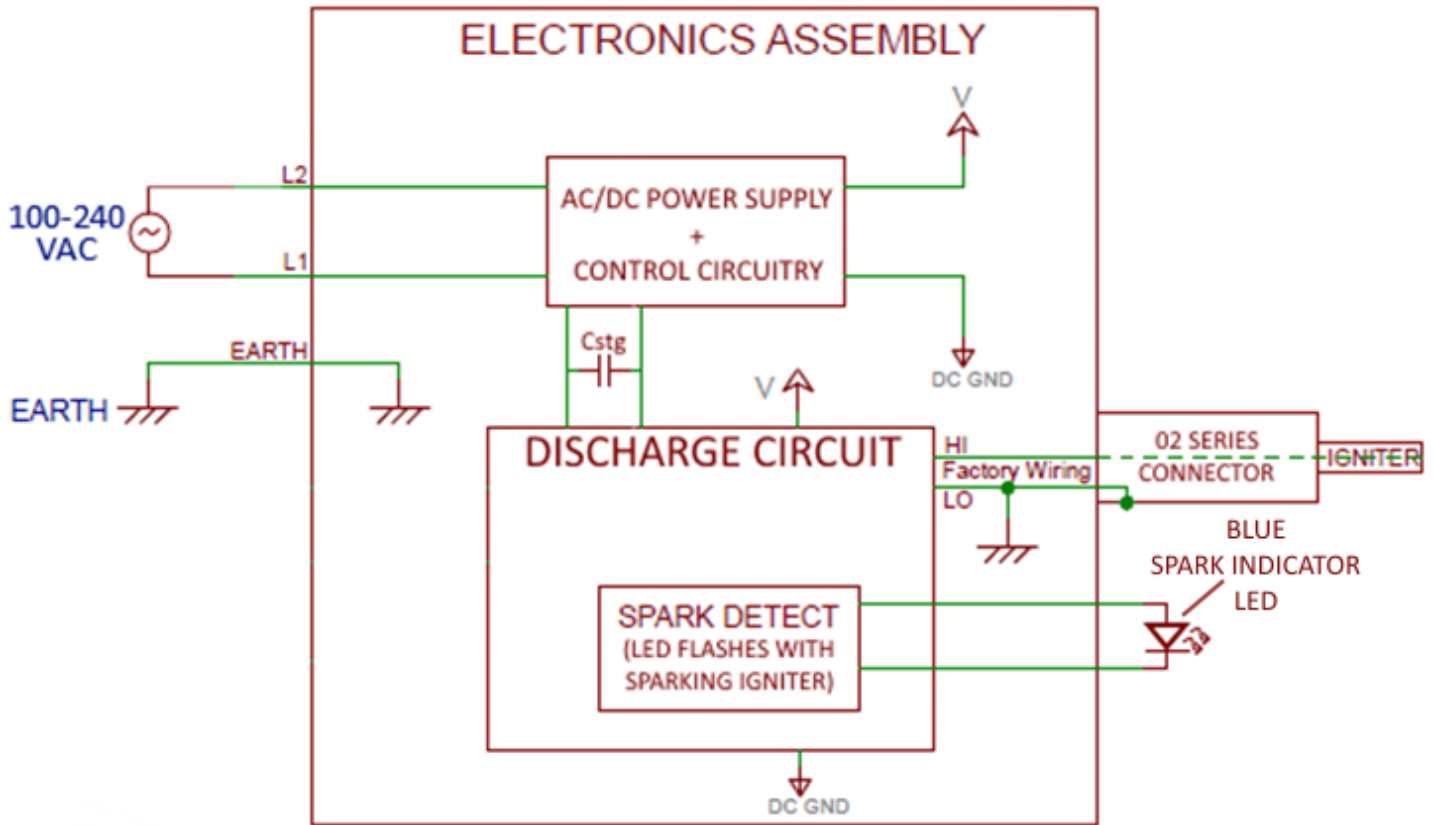


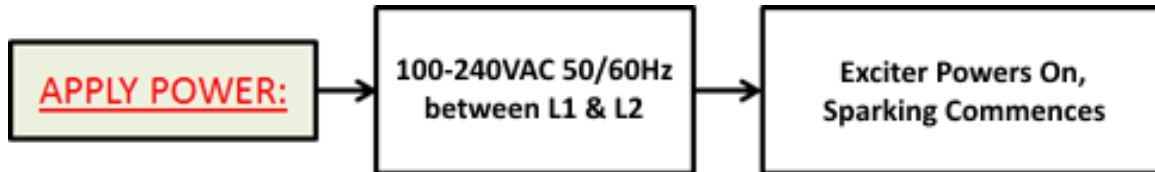
Figure 8: System schematic diagram.

## 6.0 System Operational Inputs and Outputs

The following functions illustrate the input and output functionality of the **SmartSpark**.

### 6.1 Applying Power to Equipment

To power the equipment, apply 100-240VAC 50/60Hz between wires L1 & L2, and connect the wire labeled GROUND to earth ground. This will initiate sparking at the igniter tip.








**EXPLOSION HAZARD**

Do not separate any cables from the enclosure until the power has been disconnected for 5 minutes, and do not energize the cable while it is disconnected from the enclosure.

**RISQUE D'EXPLOSION**

Ne pas séparer les câbles du boîtier jusqu'à ce que le courant a été coupé pendant 5 minutes, et ne pas alimenter le câble tandis qu'il est déconnecté du boîtier.



**STARTLING NOISE**

Igniters can make a loud “snapping” or “popping” noise when fired. Anticipate this noise and warn others to expect it before operating the equipment. Alert others in area before operating equipment.

**BRUITS SAISSANTS/SURPRENANTS**

Les allumeurs peuvent faire un fort bruit de « claquement » ou un bruit « sec » lors de l'allumage. Anticipez ce bruit et avertissez les autres de s'attendre à ce bruit avant de faire fonctionner l'équipement. Alerte tout individu dans la zone avant de faire fonctionner l'équipement.

## 6.2 Firing the Igniter

The igniter fires when power is connected to the exciter. See Section 6.1.

## 6.3 System LED Indicator

The SmartSpark system is equipped with a blue LED indicator which will visually represent the functionality of the Exciter circuit. The LED indicator is on the back of the exciter just above the “input power” connector, and flashes off steadily whenever a spark occurs. If the LED is off, it means that power is not being applied to the exciter. If the LED is on and flashing at a constant rate, this means the igniter is firing correctly. If the LED is on and flashing at an intermittent rate, it means the igniter tip is failing and needs to be replaced. Finally, if the LED is on solid, it means the igniter tip has failed and must be replaced. See Table 1 for a quick reference.

**Table 1: LED Indicator Key**

LED Flash Rate	Meaning
Always Off	Device Not Powered
Steady Rate	Normal Operation
Intermittent	Igniter tip near end of life (replace soon)
Always On	Igniter tip end of life (replace now)

## 7.0 Standard Components and Accessories

The following is a sample of standard parts available for use with the SmartSpark system. For additional parts and technical drawings please contact Chentronics.

### 7.1 Standard System Components

Extension Rods – 02 Series connection PN: 02000400

Igniters – 02 Series connection PN: 02000500

Power Cable – SmartSpark Power Cable PN: C07000124

Haz-Loc cable clamp assembly PN: C070CC124

## 8.0 Warranty Instructions

For warranty related inquires please contact Chentronics at TEL: +1.607.334.5531 or [info@chentronics.com](mailto:info@chentronics.com)

## 9.0 Technical Support

For technical support related inquires beyond the scope of this Installation and Operation Manual, please contact Chentronics at TEL: +1.607.334.5531 or [info@chentronics.com](mailto:info@chentronics.com)