

SureSpark™

RF-20 High Energy Ignition System Installation and Operation Manual



PN: 07000502-xxx
PN: 0700M502-xxx



PN: 07000512-xxx



PN: 07600502-xxx

**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.

Ensure the equipment is appropriately bonded to earth before use. See Section 5.6 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.

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.

S'assurer que l'équipement est correctement mis à la terre avant l'utilisation. Voir la section 5.6 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.

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.

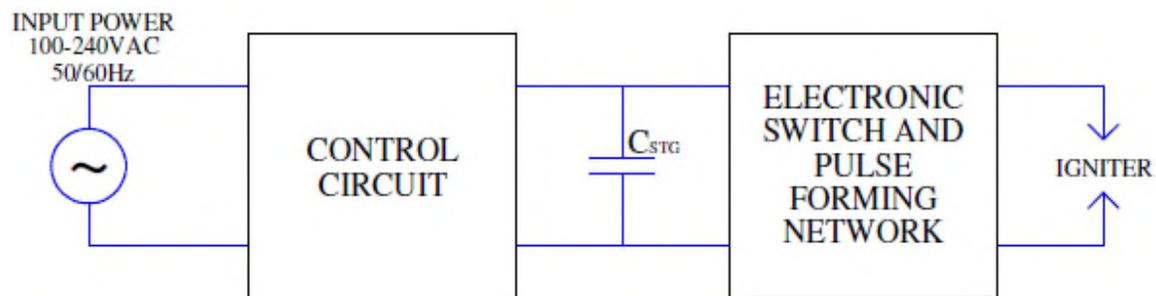


Figure 1: High Energy Exciter basic schematic.

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 SureSpark RF-20 high energy ignition system is specifically designed to ignite Residual Oil (#6) directly while operating in a wide range of environmental conditions. For convenience, there is an external Spark LED which indicates when the igniter is sparking and when the igniter tip needs to be replaced. This allows the user to replace igniter tips before they fail and prevent ignition faults from occurring. There is also an Igniter Wear indicator which turns on red when an igniter fault is detected and remains on until the run signal is cycled. This additional feature allows for easier location of failed units when multiple units are being operated simultaneously.

4.2 General Arrangements

4.2.1 RF-20 Ordinary Area

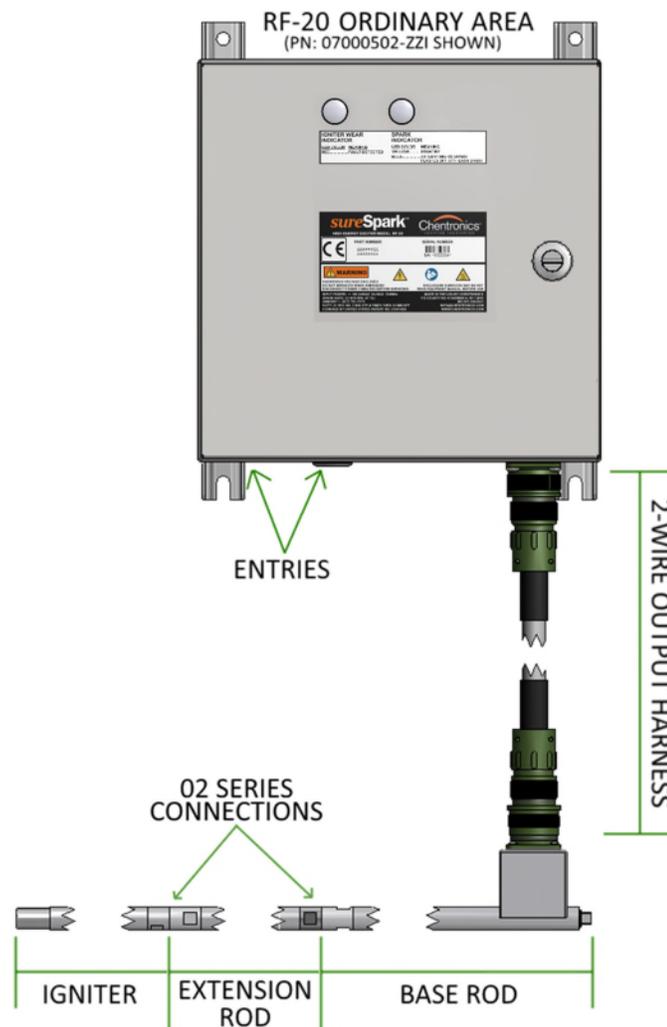


Figure 3: Ordinary Area RF-20 ignition system general arrangement.
NOTE: Harness, base rod, extension rod (optional), and igniter are sold separately.

4.2.2 RF-20 With Explosion Proof Enclosure

RF-20 W/EXPLOSION PROOF ENCLOSURE
(PN: 07600502-ZAZ SHOWN)

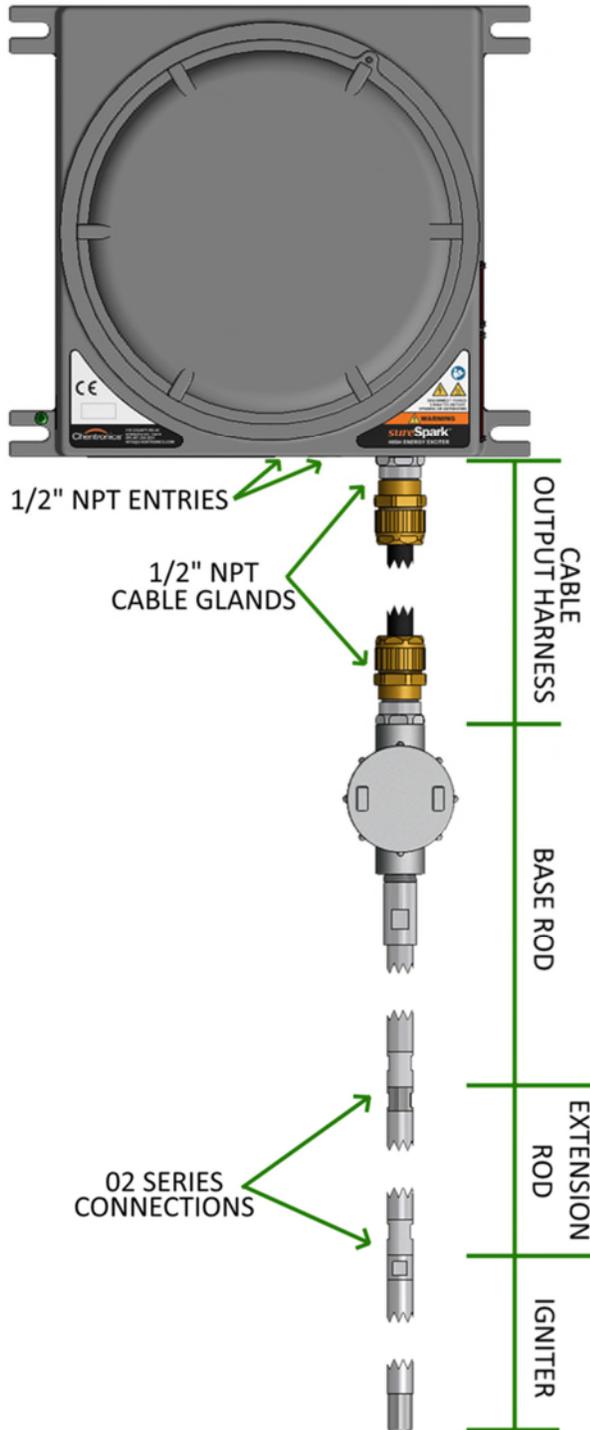


Figure 4: RF-20 ignition system with explosion proof enclosure general arrangement. Not to scale.

NOTE: Harness, base rod, extension rod (optional), and igniter are sold separately.

4.3 Configurations:

The SureSpark RF-20 is available in three enclosures as described below:

- **0700x502-xxx** – Plate-metal enclosures with painted mild steel, 304 stainless steel, or 316 stainless steel options. Available with optional spark switch.



- **07000512-xxx** – Fiberglass enclosure with optional spark switch.



- **07600502-xxx** – Explosion proof enclosure with optional.



4.4 Equipment Enclosure

The equipment is sealed in an enclosure which has an IP66 rating. The 304/316 stainless steel or fiberglass enclosure options provide NEMA Type 4X rating. The painted mild steel enclosure provides NEMA Type 4 rating.

4.5 Equipment Conditions of Use

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

1. All wiring must be rated at or above 90°C. The installation must use conduit or an entry hub to protect wiring from damage.
2. A switch or circuit-breaker to separate the device from mains must be included in the installation. The switch or circuit-breaker must be suitably located and easily reached. It is recommended that it be located near the exciter enclosure.
3. The cover shall not be unlocked or opened until the power has been turned off for at least 5 minutes.
4. The equipment shall not be subjected to ambient temperatures greater than +75°C or less than -25°C while operating.
5. The equipment's connections shall not be joined or separated when the equipment is in use (powered).
6. The equipment shall not be operated without an igniter attached.
7. The equipment shall be properly grounded. Please see Section 5.6 regarding earth bond requirements.
8. The igniter, extension rod, or base rod must be secured to the grounded building frame using a metal fixture.

4.6 System Electrical and Physical Specifications

Application:	High-energy, direct-spark ignition system
Input Power:	100-240VAC 50/60Hz, 5A MAX
Exciter Type:	High Energy Ignition
Exciter Duty Cycle:	[2 min on / 5 min off] for 4 cycles, then off for 60 min
Exciter Spark Command:	With jumper, apply power to begin sparking. Without jumper, apply 24V DC, close contacts, or push-button switch (optional) to begin sparking.
Exciter Spark Indicator:	When powered and in standby, LED is on solid Yellow . When attempting to spark, LED turns Blue and flashes off at steady rate when successful spark output currents detected.
Igniter Wear Indicator:	When an igniter fault is detected, LED turns on solid Red and remains on until spark signal is removed and reapplied.
Exciter Energy:	12J min per Spark
Exciter Spark Rate:	20 SPS min
Operating Temperature Limits:	-25°C to 75°C
Storage Temperature Limits:	-55°C to 105°C
Humidity:	0 to 100% condensing
Enclosure:	
07000502:	Brushed Stainless Steel (304 or 316) or Gray Painted Mild Steel
07000512:	Fiberglass
07600502:	Copper Free Cast Aluminum
Weight:	
07000502:	Approximately 20lb (9 kg)
07000512:	Approximately 20lb (9 kg)
07600502:	Approximately 50lb (23 kg)
Dimensions:	
07000502:	12 x 7 x 12 in
07000512:	10 x 8.4 x 12 in
07600502:	12 x 8.4 x 12 in

5.0 Installation Instructions

5.1 Instructions for Lifting

The exciter should be carried only by someone who is capable of safely lifting 50lb equipment.

5.2 Mounting

For mounting dimensions, refer to the equipment datasheet. The exciter should be mounted to a firm structure.

5.3 2-Wire Harness and Base Rod Installation

Insert the male end of the harness into the connector on the exciter and fully hand-tighten. Next connect the female end of the harness to the base rod and fully hand-tighten. See Figure 5.

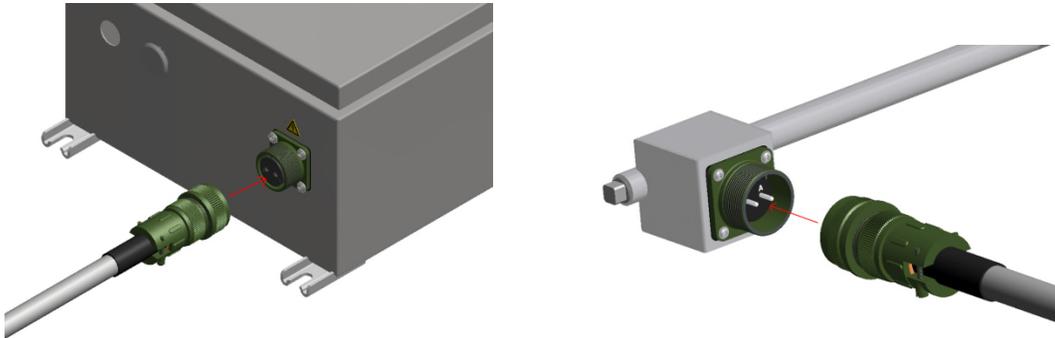


Figure 5: Output Harness and Base Rod installation for units with 2-Wire connectors.

5.4 ½in NPT Male Harness and Base Rod Installation

Install one end of the harness to the exciter enclosure by following the provided manufacturer instructions for cable-gland installation. Next connect the **black** harness wire to the terminal marked “LO” and connect the remaining harness wire (**red**) to the terminal marked “HI” on the exciter top board. A correct connection is shown in Figure 6 below.

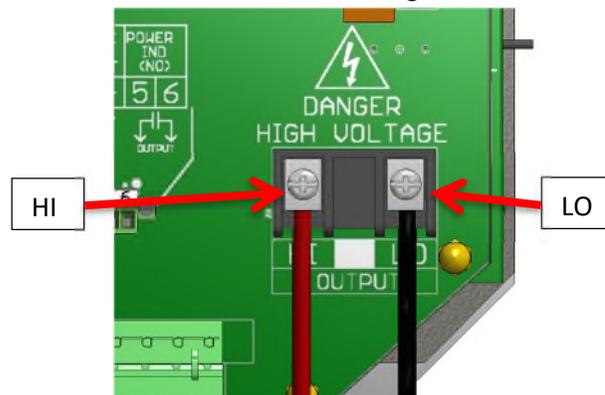


Figure 6: Correct connection of output harness wires with ½in NPT Male Harness.

Next, unscrew the cover on the base rod and install the other end of the harness to the base rod by following the provided manufacturer instructions for cable gland installation. Connect the **black** harness wire to the green ground terminal (Figure 6) and tighten. Next connect the remaining harness wire (**red**) to the rod wire using either the provided ceramic wire nut or the brass in-line connector. For the ceramic wire nut option, twist the wires together and terminate the connection by inserting the twisted pair into the ceramic wire nut and tightening by hand. For

the brass inline connector option, pull back the white sleeve on the base rod wire to reveal the brass inline connector, make the connection, and **pull the sleeve back to insulate the connector.**

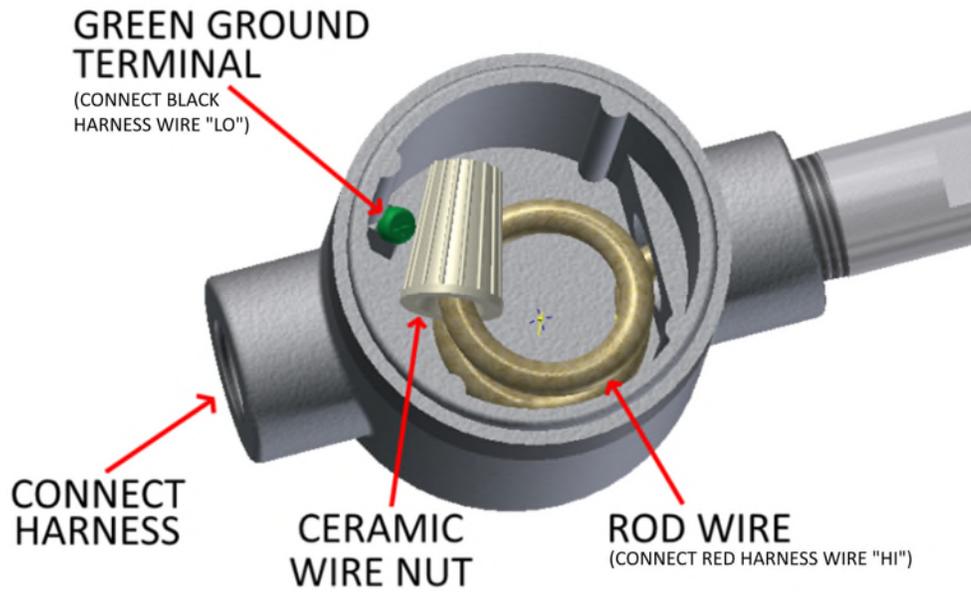


Figure 7: The case of the base rod.

NOTICE: Verify the rod wire is fully connected to the harness wire (RED or WHITE).

5.5 02 Series Igniter and Extension Rod Installation

To install the extension rod or igniter, press the male connector to the female connector and fully hand tighten.

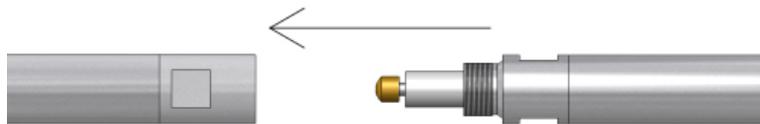


Figure 8: Series 02 igniter/extension rod connection.

5.6 Wiring Installation

The SureSpark includes two enclosure entries for power/control wiring. Wiring must be rated at least 90°C. Connections should be made only when the equipment and wiring are not energized. Once connected, the wiring should not be removed from the exciter until it has been de-energized for at least 5 minutes. See sections 6.1 and 6.2 for terminal descriptions.

To power the exciter, apply 100-240VAC at 50/60 Hz, between terminals L1 and L2, and connect the terminal marked with the ground symbol \perp to earth ground. Control wiring is connected to terminals 1-6 and terminals 7-9. The power/control terminals are shown in Figure 9.

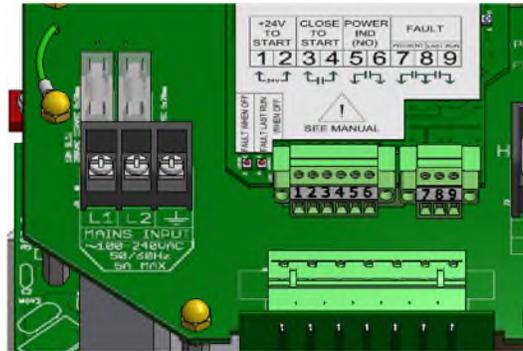


Figure 9: Exciter Power/Control Wiring.

5.7 Installing the Igniter into a Burner

Consult the burner manufacturer's instruction manual for igniter installation into your specific burner. Clamp the igniter rod in place using metal fixtures/clamps.

5.8 Equipment Earth Bond

Main earth bond is located at the input terminal referenced in Section 5.6 of this manual. Provide additional enclosure earth bonds per local electrical installation code, if required.

6.0 System Operational Inputs and Outputs

6.1 Terminal Key

The following functions illustrate the input and output functionality of the SureSpark exciter.

MAINS TERMINAL

L1

L2

TERMINAL DESCRIPTION

Input power (L1/HOT) wire, 14AWG min., 300V min.

Input power (L2/NEUTRAL) wire, 14AWG min., 300V min.

Input (GROUND) wire, 14AWG, 300V min.

OUTPUT TERMINAL

HI

LO

TERMINAL DESCRIPTION

Output, Igniter center wire, 14AWG, 2400V min.

Output, Igniter shell return, 14AWG, 2400V min.

Return wire must connect directly from this output to harness/igniter shell, NOT to enclosure chassis.

NOTE: Chentronics harnesses and igniters are designed to be in compliance with Chentronics exciter requirements.

+24V TO START

1-2

TERMINAL DESCRIPTION

Input Spark Control – Applying a 24VDC signal to these terminals will energize the exciter to spark. Current draw is approximately 6mA.

CLOSE TO START

3-4

TERMINAL DESCRIPTION

Input Spark Control – Closing terminals 3-4 using a ZVC signal or a jumper wire will energize the exciter to spark.

NOTICE: Do not connect to the 24VDC START terminals and the CLOSE TO START terminals at the same time.

POWER INDICATOR

5-6

TERMINAL DESCRIPTION

Provides a closed contact output signal when proper input voltage is applied.

IGNITER WEAR: PRESENT

7-8

TERMINAL DESCRIPTION

Provides a closed contact output signal when spark rate is greater than the minimum spark rate.

Provides an open contact output signal when spark rate is less than the minimum spark rate.

IGNITER WEAR: LAST RUN

8-9

TERMINAL DESCRIPTION

Provides a latched open contact output signal when igniter wear is detected. Contacts will remain open until a start signal is re-applied, at which point they will reset closed until another fault is found. Pin 8 is shared in common between terminals 7 and 9.



HAZARDOUS VOLTAGE

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.

TENSION DANGEREUSE

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. Alertez tout individu dans la zone avant de faire fonctionner l'équipement.

6.2 System Schematic Diagram

The following schematic block diagram describes equipment functionality. See Section 6.1 for a description of the terminals.

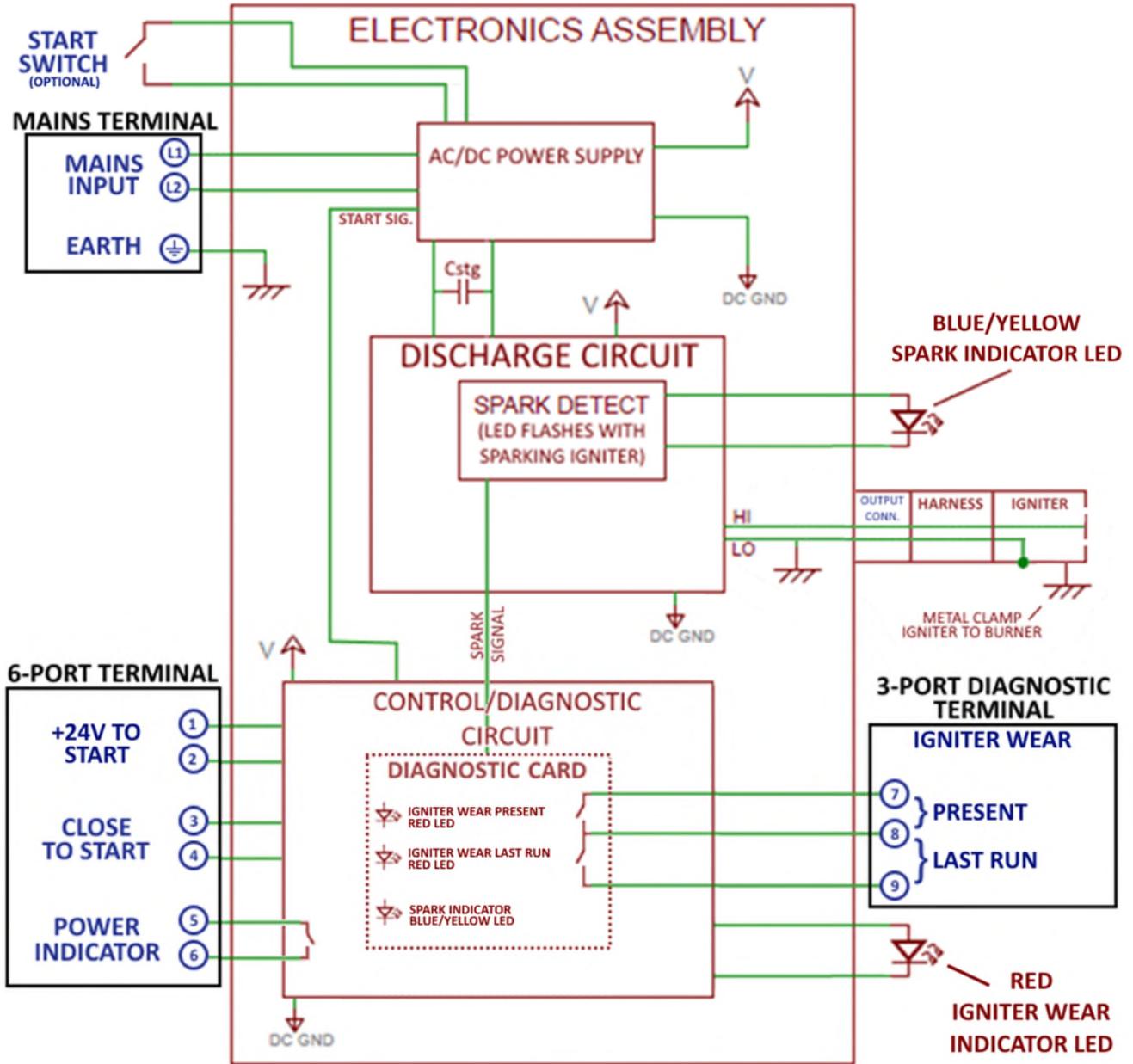


Figure 10: System schematic diagram.

6.3 Firing the Igniter

If a jumper is connected between pins 3 and 4 on the top board (CLOSE TO START Terminal), applying mains power to the input power terminals will begin sparking the igniter immediately. If a jumper is not used, the unit will power up in standby mode and can be fired using one of the following methods:

- Apply 24 V_{bc} between terminals 1 and 2 (+24V TO START) to spark the igniter.
- Close (apply a ZVC signal) between terminals 3 and 4 (CLOSE TO START) to spark the igniter.
- If included, use the switch on the enclosure to fire the exciter.

NOTICE: Enclosure switches come in momentary (hold to fire) and sustained (push on/push off) varieties.

NOTICE: Do not connect to the +24V TO START terminals and the CLOSE TO START terminals at the same time. See Section 6.1.

6.4 Spark Indicator

The SureSpark system is equipped with a yellow/blue LED enclosure spark indicator which will visually represent the functionality of the Exciter circuit. The LED indicator is on the front of the enclosure 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 solid yellow, it means the exciter is in standby mode and is ready to fire. If the LED is on blue and flashing at a constant rate, it means the igniter is firing correctly. If the LED is on blue 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 blue, it means the igniter tip has failed and must be replaced. See Table 1 for a quick reference.

Table 1: LED Indicator Key

Flash Rate	Color	Meaning
Always Off	OFF	Device Not Powered
Solid	YELLOW	Ready to Fire (Standby)
Steady Rate	BLUE	Normal Operation
Intermittent	BLUE	Igniter tip near end of life (replace soon)
Solid	BLUE	Igniter tip end of life (replace now)

6.5 Diagnostic Feature

There is a spark diagnostic feature which gives the exciter the ability to detect igniter faults. See Section 6.1 for a description of the IGNITER WEAR: PRESENT and IGNITER WEAR: LAST RUN terminals. There are also LEDs that correspond to these terminals. The IGNITER WEAR: PRESENT LED turns on when the spark rate drops below threshold. The IGNITER WEAR: LAST RUN LED turns on when the spark rate drops below threshold and stays off until the next start signal is applied, at which point it resets on. This LED is located both on the exciter and on the front panel of the enclosure. The diagnostic card also includes a blue/yellow Spark Indicator LED which serves the same function as the external Spark Indicator (See Section 6.4).

7.0 Maintenance

7.1 Service

The unit is not field-repairable. The exciter internal electronic assembly may be replaced on-site, but the power must be disconnected for at least five minutes before the cover is unlocked and/or removed.

NOTICE: *Be sure to take careful note of all connections before removing the exciter internal assembly. Reconnect new internal assembly in the same manner. Incorrect connections or failure to connect all leads can result in damage to equipment.*

7.2 Cleaning

- 7.2.1 **EXCITER** – Remove debris that may have accumulated inside the exciter enclosure with a vacuum or non-metallic brush.
- 7.2.2 **HARNESS** – Do not use acid or carbon tetrachloride as cleaning agents on conduit or harness. Clean the exterior with a stiff non-metallic brush moistened in cleaning solvents. Protect cable terminations from solvent contamination during cleaning. Heat or oil stains, which persist on the conduit after cleaning, are permissible.
- 7.2.3 **BASE ROD** – The ceramic well at the Base Rod end of the rod should be sprayed with a cleaning solvent or alcohol and if necessary, cleaned with a lint free rag.
- 7.2.4 **EXTENSION ROD** – The ceramic well at the igniter end of the rod should be sprayed with a cleaning solvent or alcohol and if necessary, cleaned with a lint free rag. The ceramic terminal end should be cleaned with a cleaning solvent or alcohol.
- 7.2.5 **IGNITER TIP** – The ceramic terminal end should be cleaned with a cleaning solvent or alcohol. The tip should be sprayed to remove oil or other hydrocarbons that may contaminate the ceramic surface. Do not clean with a wire brush.



HAZARDOUS VOLTAGE

Disconnect power before servicing the equipment.

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.

TENSION DANGEREUSE

Coupez l'alimentation avant l'entretien du matériel.

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.

8.0 Standard Components and Accessories

The following is a sample of standard parts available for use with the SureSpark RF-20 system. For additional parts and technical drawings please contact Chentronics.

8.1 Standard Ordinary Area System Components

Harnesses – 2-Wire MS3102A Connection PN: 03000300

Base Rods – 2-Wire MS3102A to 02 Series PN: 02000300

Extension Rods – 02 Series connection PN: 02000400

Igniters – 02 Series connection PN: 02000500-A2-12

NOTE: Contact Chentronics for additional component selection.

8.2 Standard Explosion Proof Enclosure System Components

Harnesses – 2-Wire Male Barrier-Gland PN: 06000115

Base Rods – Barrier Gland to 02 Series PN: 02600300

Extension Rods – 02 Series connection PN: 02000400

Igniters – 02 Series connection PN: 02000500-A2-12

NOTE: Contact Chentronics for additional component selection.

9.0 Warranty Instructions

For warranty related inquires please contact Chentronics at TEL: +1.607.334.5531 or info@chentronics.com

10.0 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