SF-400
May 20, 2022

SureFire II™ Electrical High Tension Spark & Sense (HTI/HTSS) Instruction Manual

1. INTRODUCTION

This Instruction Manual contains a description of the type **HTSS High Tension Spark and Sense Igniter** construction, operation principle and the instructions for installation, start-up and service, including the industrial health & safety recommendations.

The type **HTSS** igniter is a reliable source of ignition for natural and forced draft gas igniters and pilots as well as small capacity gas burners. It is designed to ignite a mixture of various types of gaseous fuels with air.
Typical fuel gases for HTSS igniter are: Natural gas, Propane or LPG gases. In case of or Refinery off gases, especially including high hydrogen, sulphur compounds like hydrogen sulphide and other chemicals increasing the corrosion rate, and in case of other waste gases, like low calorific value gas or wet and dirty gas consult Fireye.
After ignition it can also be used as a continuous flame sensing device serving as a "Spark and Sense" Igniter. The igniter is made of high quality materials, and it is rigorously checked and tested prior to dispatch.

Familiarization with the following instructions will reduce the possibility of equipment failure to a minimum and ensure safe operation.

2. OPERATION PRINCIPLE AND TECHNICAL DESCRIPTION

This HTI (High Tension Igniter) igniter is the ignition element of intermittent and continuous (pilot) operation gas igniters. Both safe and hazardous area Zone 1 HTI versions are available.

The **HTSS** igniter can be used in gas pilots (igniters) which can accept a 16 mm diameter rod, with coaxial electrode arrangement e.g. with the **SP-32-NG/PG-FD, SP-32-NG/PG-ND, SP-48-NG/PG-ND** or **SP-48-NG/PG-FD** gas pilots offered by Fireye.

The igniter can be configured as igniter only or as igniter with "Spark & Sense" mode in following options: <u>Operation as igniter only, necessary parts:</u>

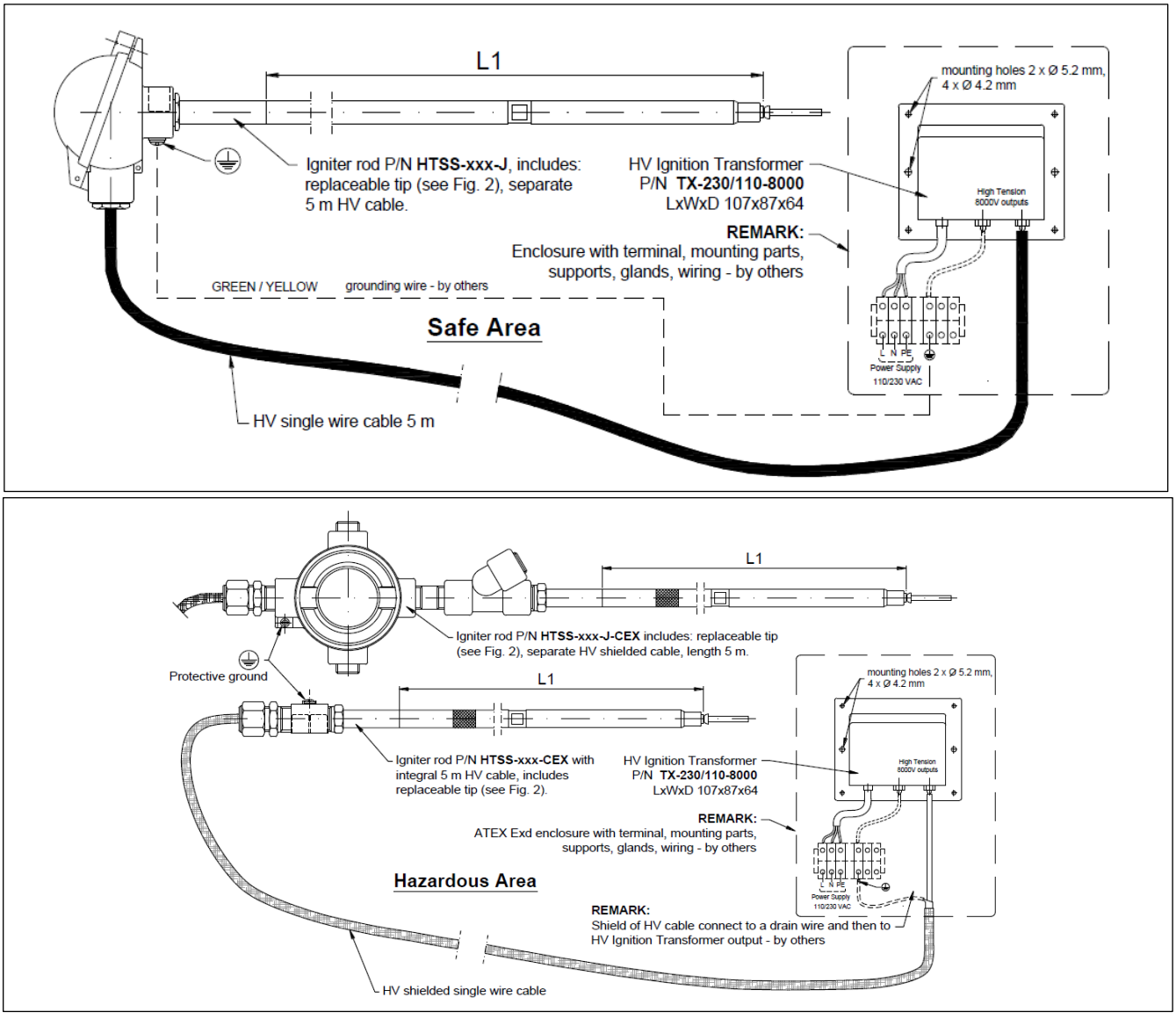
When ignition transformer is powered, the high voltage 7,500V to 10,000V, between the central electrode and outer tube at the igniter rod tip produces a continuous electric arc of rod of energy allowing the ignition of air-gas mixture on gas pilots.

It can be used as **"igniter only"** in two options:

- **<u>without Power Pack</u>**, scope is: **one of High Tension Rods** P/N: **HTSS-xxx-J**, **HTSS-xxx-CEX** or **HTSS-xxx-J-CEX** (each including HV cable) and **Ignition Transformer** P/N **TX-230/110-8000** (see p. 3).
  HTSS rods and tips are designed to work with this ignition transformer. Its output parameters are: 15 mA at 8000 V. Transformer should be mounted in a box or cabinet out of igniter scope of delivery (see Fig. 1 and 3 for Safe or Hazardous Area).
  The ignition is activated by applying supply voltage to ignition transformer terminals (see p. 1).
- **<u>with Power Pack</u>**, scope is: **one of High Tension Rods** P/N: **HTSS-xxx-J**, **HTSS-xxx-CEX** or **HTSS-xxx-J-CEX** (each including HV cable) and **Power Pack** P/N: **HTSS-PP-230/110** or **HTSS-PP-230/110-CEX without Fireye MBCE-110/230FR flame module** (see Fig. 2 or 4, 5 for Safe or Hazardous Area).

Supply voltage 230/110VAC has to be connected to power pack terminal. The ignition is activated with a 24 VDC triggering signal (see below). Lack of **MBCE** module does not affect the ignition sequence.

FIGURE 1. High Tension Igniter type HTSS including rod, HV cable and ignition transformer for Safe or Hazardous Areas



Operation as a "Spark & Sense" igniter:

HTSS can be used as a "Spark & Sense" igniter i.e. as igniter with additional flame safeguard operation mode based on the principle of measuring of the ionization current in electrically conductive ionized gas in a flame. This flame detection method used in HTSS is called ionization (rectification) method.

In such case the scope is: **one of High Tension Rods** P/N: **HTSS-xxx-J**, **HTSS-xxx-CEX** or **HTSS-xxx-J-CEX** (each including HV cable) and **Power Pack** P/N: **HTSS-PP-230/110** or **HTSS-PP-230/110-CEX including Fireye MBCE-110/230FR flame module** plugged in the wiring base (order separately) ((see Fig. 2 or 4, 5 for Safe or Hazardous Area).

In both operation modes the **HTSS** power pack must be permanently powered with 230/110VAC which is confirmed by "POWER ON" red indication LED on the enclosure door.

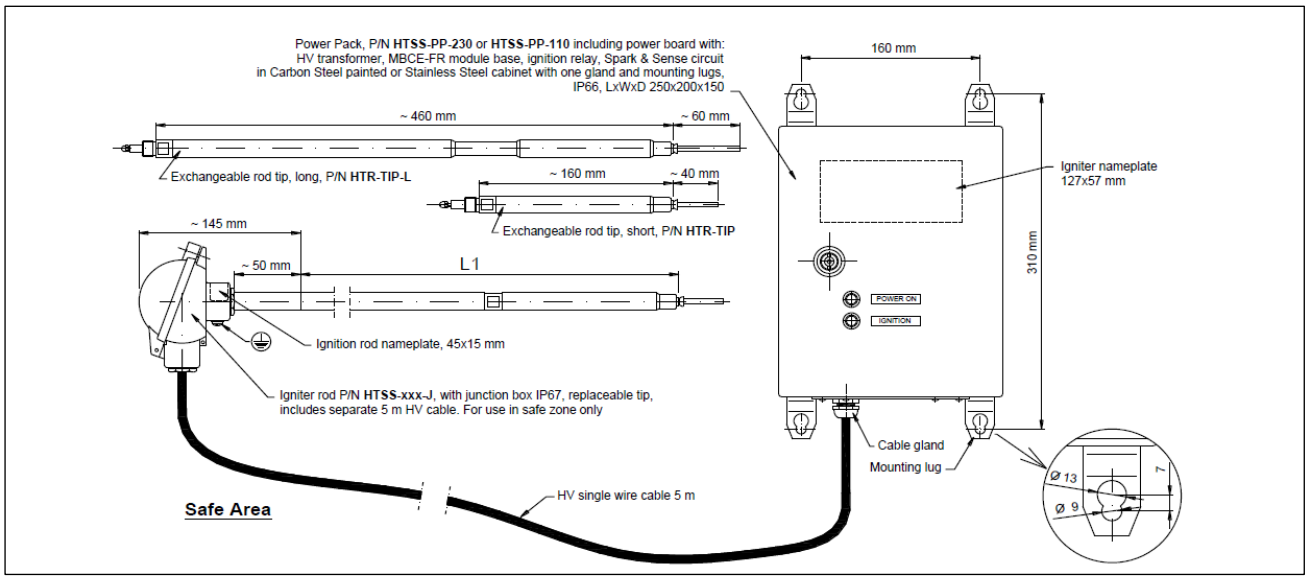
The igniter function is activated with a 24 VDC triggering signal from the burner management system (terminals 3, 4 on Fig. 4 and 5). Once energized, the green "IGNITION" indication LED on the enclosure door will light. The 24VDC control signal from the Burner Management System operates an internal relay which powers the HV ignition transformer, which in turn creates an 8,000 VAC spark at the igniter tip. In case another triggering voltage is needed contact Fireye.

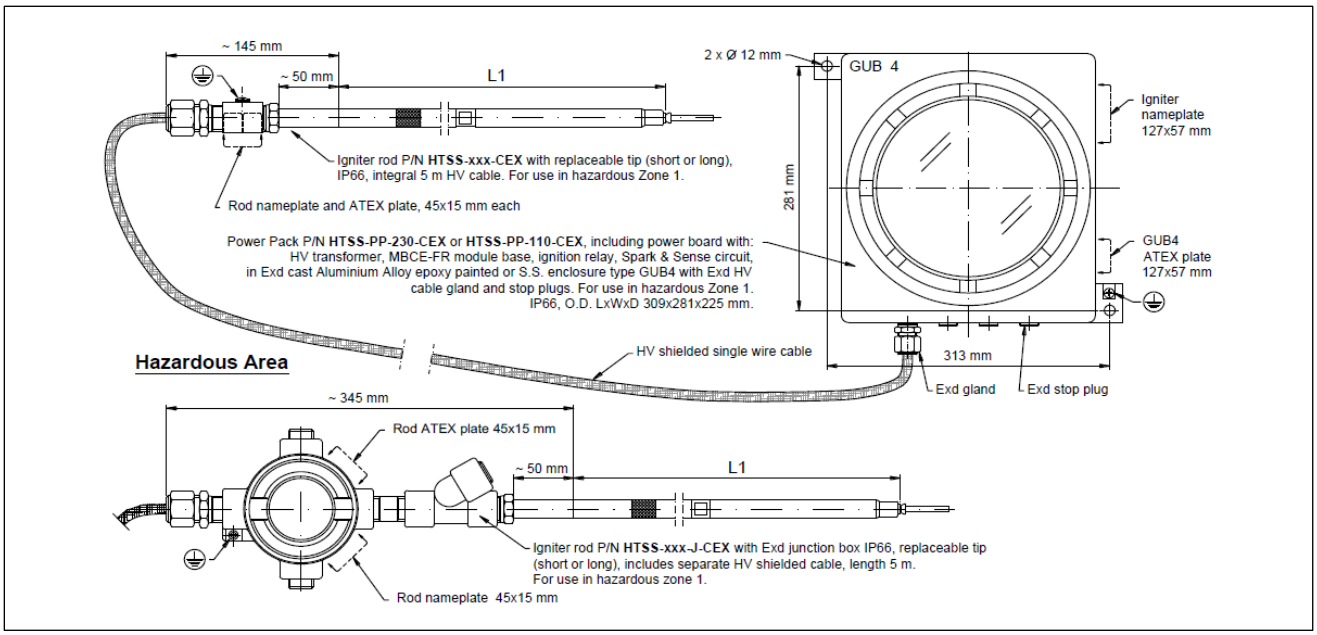
After the Trial for Ignition, the control signal is switched off, the relay changes state to allow ionization detection to indicate presence of flame.

This signal from the ionization rod is connected to **MBCE-110/230FR** flame sensor module in **HTSS-PP** or **HTSS-PP-CEX** power packs, which provides an isolated Flame Relay signal.

The **MBCE** module, also provides a 4-20 mA signal to display flame intensity (see the Fireye Instruction Manual no **MBCE-1001**). Be aware that for proper ionization measurement a pilot body should be properly constructed and connected (grounded) to the ionization circuit terminals in power pack (see Fig. 4 or 5).

FIGURE 2. High Tension Igniter type HTSS including rod, HV cable and Power Pack for ignition and Spark & Sense as an option, for Safe or Hazardous Areas.





The complete Spark and Sense HTSS igniter consists of an igniter rod with ignition & ionization electrode to be inserted in the gas igniter, a 5 metre HV cable and a power pack box containing high-voltage ignition transformer and the burner controller module option. See description below:

Rods

The rod of the **HTSS-type** ignition device has an **insertion length "L1" in range of 0.65 to 3.15 metres**. This means that the rod can be inserted into the gas igniter not more than L1 to the ignition point.

This length corresponds with **SP-32-NG/PG-FD-xxx, SP-32-NG/PG-ND-xxx**, **SP-48-NG/PG-ND-xxx** or **SP-48-NG/PG-FD-xxx gas pilot reference insertion length "L" indicated in HTSS and SP-32/48 Part Numbers as "-xxx" in metres**. **L range is 0.5 to 3.0 m and length L1= L + 0.15 m.**

The **HTSS** rod comprises 2 parts:

- the basic part of rod of the required length (defined by L – "xxx") is constructed of stainless steel outer tube (16 mm OD) with centrally positioned electrode ended with an internal spring loaded connector, designed to receive the replaceable tip,
- the replaceable **HTSS** tip, available in two variants: 160 mm long P/N **HTR-TIP** or 460 mm long P/N **HTR-TIP-L** both with a further 40-60 mm electrode tip used for "sensing" the flame.
  For ignition, on tip's central electrode there is a special spherically shaped plate. It ensures correct position of the electrical arc in the air-gas mixture flow, between electrode and the outer tube edge and thereby provides effective ignition. The central electrode tip must be in gas flow continuously.
  Attention: **The short tip is used on the shortest rods of length L=0.5, 0.6 and 0.7 only**.
  All rods 0.8 m long and longer are equipped with the long tip.

When the voltage from the transformer is applied to the **HTSS** rod, the electric arc is generated on the tip and the gas-air mixture on gas igniter/pilot nozzle should be ignited.

3 versions of the ignition rod are available (see Fig.2):

- Part No **HTSS-xxx-J** (**xxx = length in metres** - see p. 11 ORDERING INFORMATION) - with j. box IP67, replaceable tip, for use in safe area only, including separate 5 m HV cable,
- Part No **HTSS-xxx-CEX** (**xxx = as above**) - with an integrated 5 m long, shielded HV cable (no j. box) connected with the rod via IP66 gland, replaceable tip, ATEX certificate for use in hazardous Zone 1,
- Part No **HTSS-xxx-J-CEX** (**xxx = as above**) - with Exd j. box, IP66, replaceable tip, ATEX certificate for use in hazardous Zone 1, including separate 5 m shielded HV cable.

The basic part of explosion-proof rod **HTSS-xxx-CEX** and **-J-CEX** is constructed such that the rear section of the outer tube is potential-free, thus ensuring that there is no potential source of ignition in an explosive atmosphere during normal igniter operation. Despite this, there is also a grounding screw on the end of the rod or junction box which must be connected to the protective grounding system of the installation (see Fig. 5, 6).
The **HTSS-xxx-J** rod outer tube is not potential free so it must be grounded via grounding screw to the burner control ionization circuit grounding point (terminal 11 on Fig. 4). This rod is for use in safe area only.

Cables, rod connection

The ignition cable used in the safe area is single wire conductor. It is connected to the phase output of the transformer's secondary circuit (see Fig. 1, 3, 4). The other end of HV cable central wire is connected to the HOT screw terminal in j.box of rod P/N **HTSS-xxx-J** (Fig. 6).
A separate ionization circuit grounding cable should connect the ground screw on rod j.box (outside) with ground terminals in power pack (Fig. 1, 3, 4, 6).

The ignition cable for use in hazardous areas is of the shielded single-wire type. The HV cable is connected to igniter rods the following way (see Fig. 1, 3, 5, 6):

- the rod P/N **HTSS-xxx-CEX**: integrated shielded cable is permanently connected to the rod - cable wire to the rod's central electrode, shield is connected to the outer tube of rod (see description of rod above)
- the rod P/N **HTSS-xxx-J-CEX**, inside rod j.box: connect cable central wire to the HOT screw terminal, connect cable shield to the NEUTRAL / GROUND screw terminal.

Inside the power pack enclosure the shield is connected to the grounding terminal and the central wire to the phase output of the transformer's secondary circuit (see Fig. 5).

Notice: **The 5 m long cable is included in each rod P/N. However it can be ordered as a replacement in 5 or 10 m long pieces – see p. 3 and 11 for P/N and specification.**

Power Packs for ignition and Spark and Sense mode

Inside of power pack enclosure, on the mounting board there are mounted: transformer P/N **TX-230/110-8000** of input 230 or 110VAC output 8 000 VAC, wiring base for **MBCE-FR** module, ignition relay, Spark & Sense circuit and connection terminal block (see Fig. 4, 5 and power pack layout on Fig. 7).

Power pack for use in safe area has Part No **HTSS-PP-230** or **-110**. It is mounted in IP66, lockable cabinet (CS powder coated or as an option SS). The cabinet has 2 door mounted LED's showing: "POWER ON" and "IGNITION". P/N includes: the door key, mounting lugs and a gland for HV cable.

Power pack for use in Zone 1 hazardous area applications has Part No **HTSS-PP-230-CEX** or **-110-CEX**.
It is enclosed in the ATEX Exd (detailed marking in p. 4) cast aluminum or as an option stainless steel enclosure type GUB4, which houses the power pack components (see above) with 4 - 6 cable entry holes $^{1}/_{2}$" NPT.
The status diodes "SYSTEM" and "FLAME" on **MBCE** module are visible through the cover enclosure window.

The GUB4 enclosure has threaded holes to fit correct Ex glands for the power and control cables.
P/N includes one Exd gland for HV cable and up to 4 pcs of Exd stop plugs as the amount of holes can vary.
Other glands are not in the scope of delivery.

Application features

The design of the unit provides a very stable electric arc and repeatable ignition.

The use of interchangeable tip and no adjustable parts ensures long operation with low maintenance costs.

This type of igniter rod design provides trouble-free reliable performance in gas applications, which are relatively clean.

Heavy dust, humidity, oil and dirt caused by combustion products in the combustion chamber may cause problems with HT igniters. Fireye recommends High Energy for these applications.

Basic principles on the HTSS igniter use

Strictly observe the temperature limits for individual parts of the igniter - see p. 3. In the case of expected work at the limit of permissible operating temperatures, appropriate measures should be taken (e.g. change of the mounting position and method of fixing, use of purge-cooling air)

Igniter tip location should be in the area of the air-gas mixture, as it is recommended for a particular pilot type. Rod tip position adjustment in each type of gas pilot (igniter) is described in the gas pilot Instruction Manuals.

After ignition of a gas pilot **SP-32-NG/PG-FD, SP-32-NG/PG-ND, SP-48-NG/PG-ND** or **SP-48-NG/PG-FD** types offered by Fireye, the **HTSS** rod does not require retraction due to the fact that its tip is located in a low energy primary pilot flame. Consequently, it does not overheat, as it is protected from the more aggressive influence of the combustion chamber environment. See rod igniter position adjustment in pilot's Manuals.

In other applications, consult Fireye and be aware of the possible need to retract the igniter rod once the main flame is established, to prevent overheating. Fireye offers coaxial retraction systems, refer to **SF-2001** High Energy Igniter tech bulletin, which also shows the retractor options.

FIGURE 3. Electric wiring diagram of High Tension Igniter type HTSS including rod, HV cable and ignition transformer for Safe or Hazardous Areas

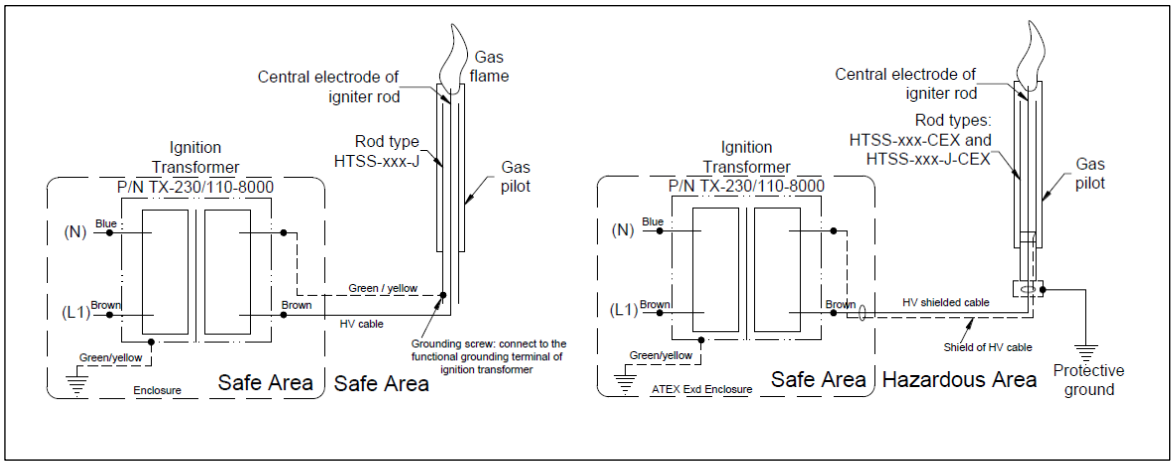


FIGURE 4. Electric wiring diagram of Igniter type HTSS including rod, HV cable and Power Pack for ignition and Spark & Sense as an option for use in Safe Area. Use this diagram if you have either an HTSS-PP-230 or HTSS-PP-110" Power Pack.

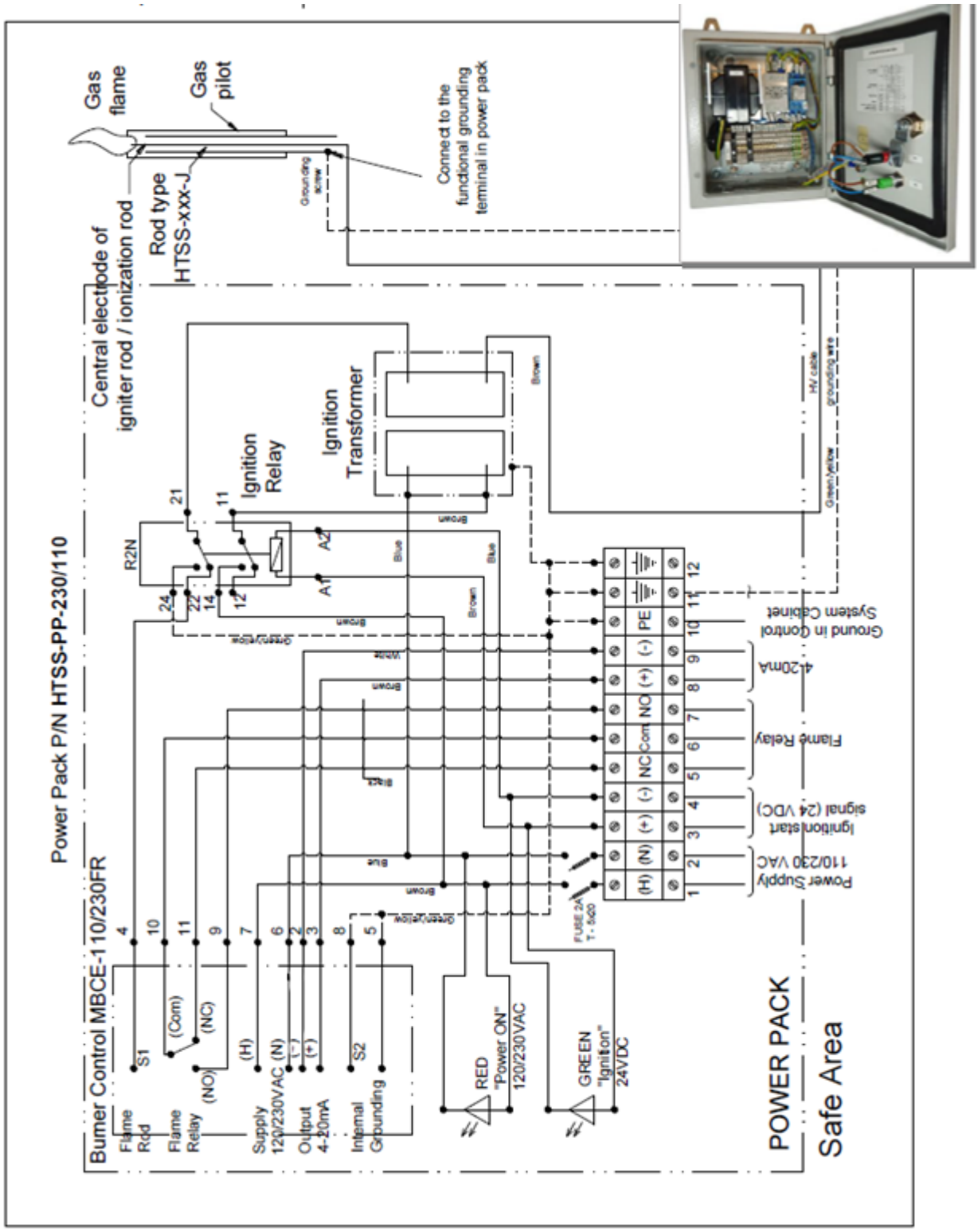


FIGURE 4B. Electric wiring diagram of Igniter type HTSS including rod, HV cable and Power Pack for ignition and Spark & Sense as an option for use in Safe Area. Use this diagram if you have an HTSS-PB-230-230.

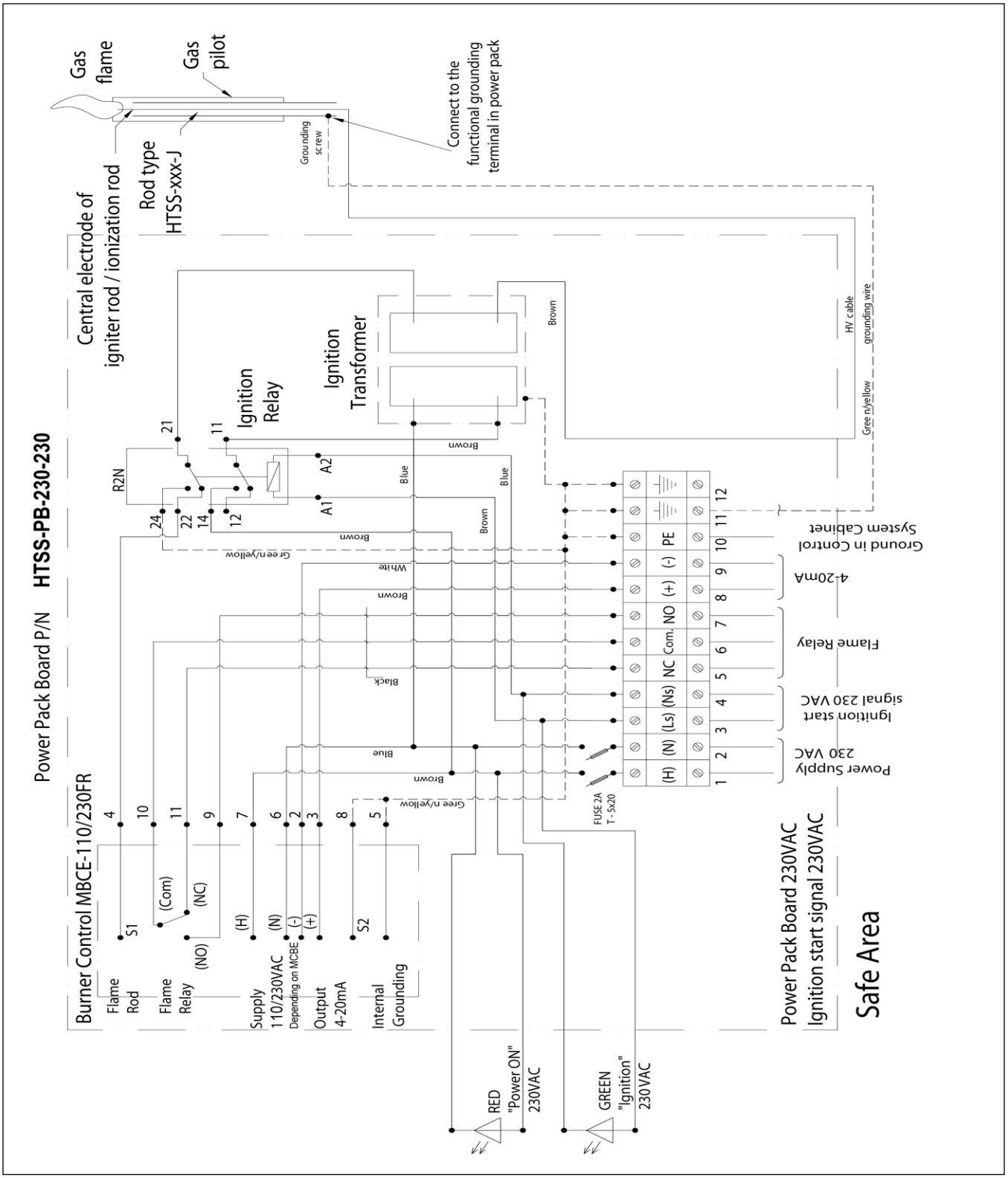


FIGURE 5. Electric wiring diagram of Igniter type HTSS including rod, HV cable and Power Pack for ignition and Spark & Sense as an option for use in Hazardous Area

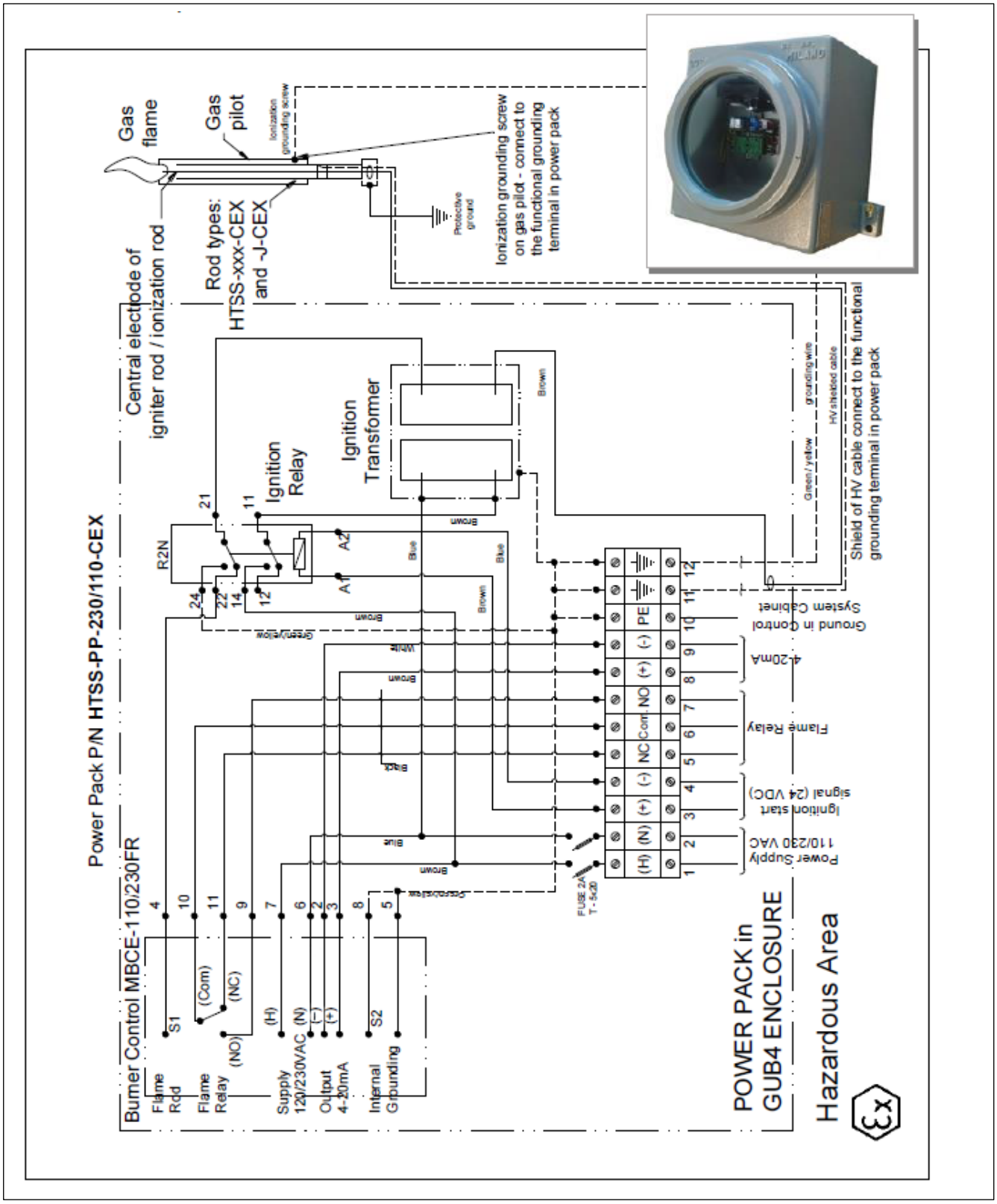
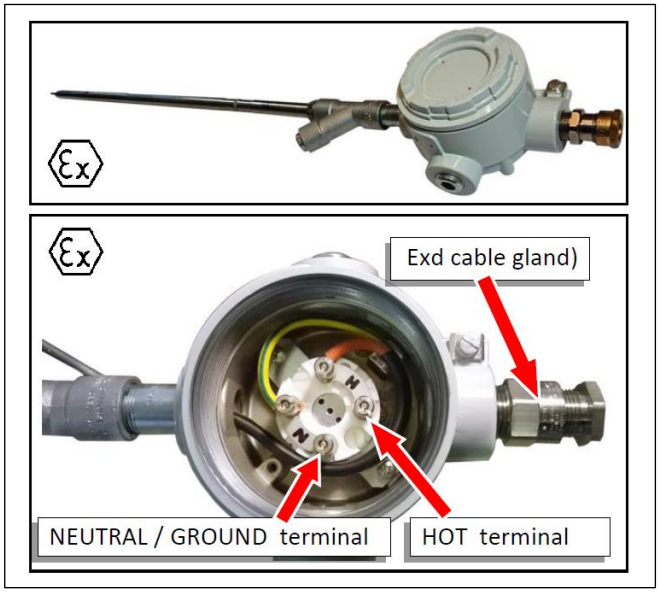
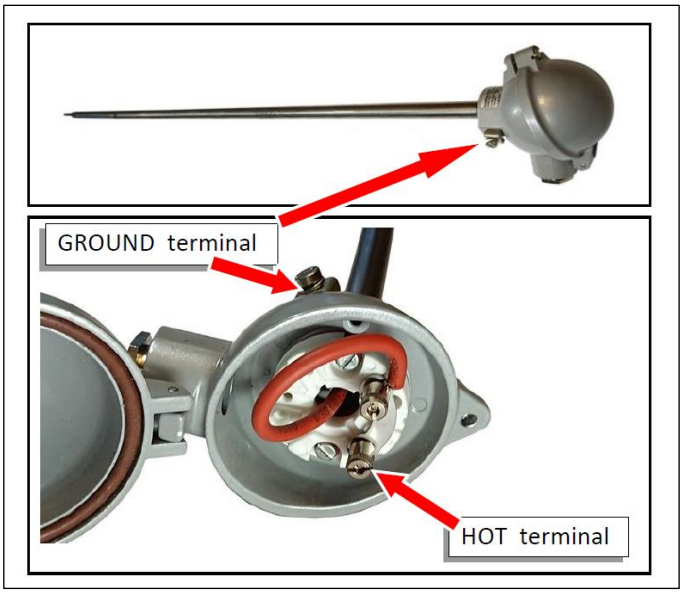


FIGURE 6. Electrical connection of HTSS Rods:

Rod P/N **HTSS-xxx-J-CEX**



Rod P/N **HTSS-xxx-J**



Rod P/N **HTSS-xxx- CEX**

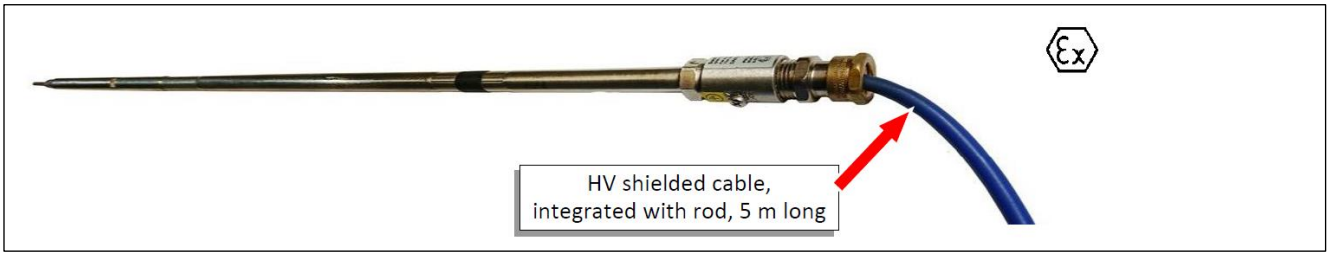
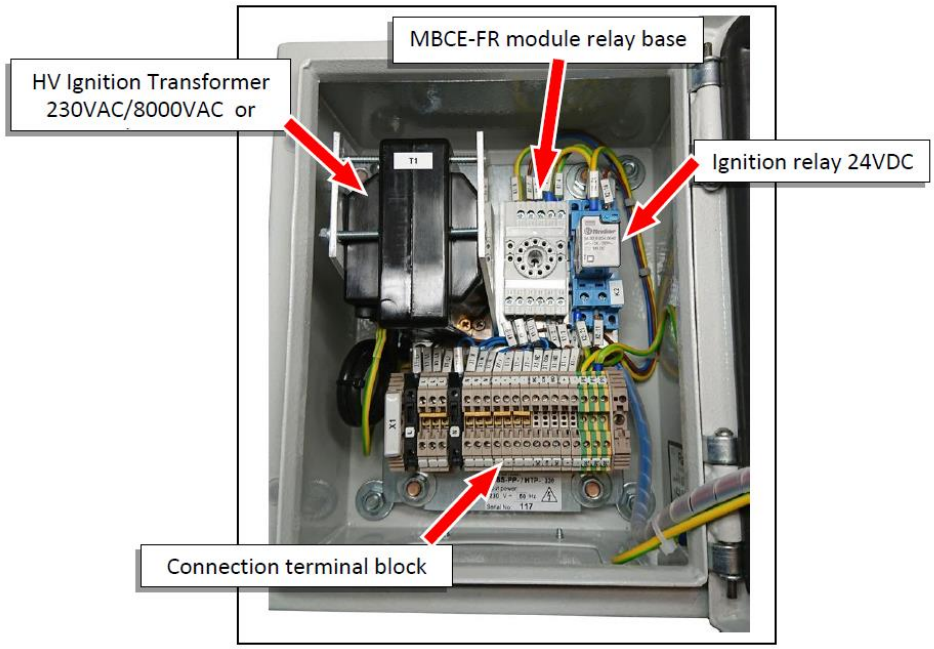


FIGURE 7. High Tension Igniter Power Pack layout



3. TECHNICAL DATA

Power supply voltage; current: 230/110(115) VAC (50/60 Hz); 0.5/1.2 A (230/110 VAC)

Ignition HT transformers: input, output, weight, dimensions:

- P/N **TX-230-8000** input: 230 VAC at 0.5A; output: 8000 VAC, 15 mA, 100% duty cycle
- P/N **TX-110-8000** input: 110/115 VAC at 1.2A; output: 8000 VAC, 15 mA, 100% duty cycle

  weight, dimensions: 1.8 kg, LxWxD 107x87x64

Method of operation: electrical arc

Ignition control signal: 24 VDC, max. 12A (20A peak)

Available rod insertion length L1: 0.65 – 3.15 m

Rods and tips outer diameter, material: Ø16 mm, 316 SS

Rods optimal electrical operation parameters: 15-20 mA at 7,500–10,000 V

Rods and tips: operating temperature, IP rating, weight:

- P/N **HTSS-xxx-J** -40°C – +100°C, IP67 (j. box), +200°C rod tube; L1=0.65 m - 0.77 kg
- P/N **HTSS-xxx-CEX** -40°C – +80°C, IP66 (cable entry), +200°C rod tube; L1=0.65 m - 1.00 kg
- P/N **HTSS-xxx-J-CEX** -40°C – +80°C, IP66 (j. box), +200°C rod tube; L1=0.65 m - 1.73 kg

  rods weight adder: approx. 0.44 kg / meter
- Tip P/N **HTR-TIP** length 160 mm, 0.16 kg; ***caution:*** used on rods lengths L=0.5, 0.6, 0.7 only
- Tip P/N **HTR-TIP-L** length 460 mm, 0.32 kg

  tip operating temperature: +300°C tip continuously, over +1,000°C in flame for short period central Kanthal electrode over +1,000°C continuously

Power packs: operating temperature, IP rating, weight, material:

- P/N **HTSS-PP-230/110** -40°C – +65°C, IP66, 6 kg; C. Steel powder-coated or option S. Steel
- P/N **HTSS-PP-230/110-CEX** -40°C – +65°C, IP66, 20 kg; Cast Alum. powder-coated or option S. Steel

HV ignition single wire cable data:

- P/N **HT-CAB-5**: type FZ-LSi, OD 7 mm, 15kV, wire 1.0 mm^2, oper. temp.: -50 +180°C
- P/N **HT-CAB -5-CEX**: type FZ-LSIekw, shielded, OD 8 mm, 15kV, wire 1.0 mm^2, oper. temp.: -50 +180°C
- P/N **HT-CAB-5** and **HT-CAB-5-CEX (5 m working length)** weight: 0.37 kg and 0.42 kg

Notice: **The recommended length of the ignition cable is 5 m. The 10 m long cable is also offered but its use will decrease the arc energy, which should be remembered. For that reason one should not use a longer cable.**

Flame monitoring (in case of S&S mode used): MBCE-110/230FR flame rod module:

- operation mode: continuous
- functional safety: suitable for installations up to and including ***SIL2*** (Exida's FMEDA report)

Notes: **1. If the above parameters are different than those required please contact Fireye**

2. For Imperial Units please refer to the Appendix 2 Unit Conversion Table

3. Device complies with the requirements of the European Directive 2011/65/EU (RoHS 2)

MARKING: The **HTSS** igniter was independently tested and evaluated by the EMC Accredited Laboratory. Assessment of compliance of the device with the essential requirements of the European directive no. 2014/30/EU was carried out. Declaration of Conformity was issued and igniter was CE marked accordingly.

4. HAZARDOUS ZONE ATEX CERTIFIED SUBASSEMBLIES:

1. Igniter rods type **HTSS-xxx-CEX** and **HTSS-xxx-J-CEX**:

   ATEX Certificate, marking: II-/2G Ex d IIC T4 Gb, II -/2D Ex t IIIC 135ºC Db
2. Power pack P/N **HTSS-PP-xxx-CEX** enclosure type GUB4, IP66:

   a) ATEX Certificate, marking: Ex II 2G Exdb IIC T4-T6; Ex II 2D Ex tb IIIC T85°C, T100°C, T135°C

   b) IECEx Certificate, marking: Ex db IIC T6, T5, T4; Ex tb IIIC T85°C, T100°C, T135°C

5. MOUNTING OF THE IGNITION DEVICE

5.1 The HTI-15 igniter should be connected depending on the application (see in p. 2):

- **as igniter only with rod and transformer** to be mounted without the Power Pack. Please follow the wiring diagram Fig. 3. In case of a third party ignition transformer used follow also its wiring diagram.
- **as igniter only with rod and Power Pack without the flame safeguard module MBCE-110/230FR**. Please follow the wiring diagram Fig. 4 or 5 for safe or hazardous area.
- **as "Spark and Sense" igniter with rod and Power Pack with the flame safeguard module MBCE-110/230FR plugged in**. Please follow the wiring diagram Fig. 4 or 5 for safe or hazardous area.

5.2 The power supply should be connected in accordance with the igniter's schematic diagram of the power pack board and igniter wiring diagram separate for standard power pack and rod for use in safe area (see Fig. 3, 4) and separate for explosion proof versions of power pack and rod application in hazardous areas (see Fig. 3, 5), with particular attention to the correct grounding to the plant grounding system which is different for each zone and following the local codes.
Connection of rods and cables: follow description in p. 2 "Cables", Fig. 6 and wiring diagrams Fig. 3, 4 and 5.

5.3 **Check environmental conditions and ensure that the specified operating temperatures of components like in p. 3 will not be exceeded**.

5.4 **HV cables used for HTSS are unarmored. If it is required by local codes, install cable in a suitable conduit or reinforced tray. It concerns mainly applications in hazardous areas.**

5.5 During the rod mounting and aiming, the conditions and recommendations mentioned in p. 2 should be observed (see also below).

5.6 For general use (other than in **SP-32-NG/PG-FD**, **SP-32-NG/PG-ND**, **SP-48-NG/PG-ND** or **SP-48-NG/PG-FD** gas pilot types offered by Fireye), the use of a guide tube with a diameter of 1" and utilization of a retraction for the **HTSS** rod should be considered. The tube must allow the rod tip to reach the correct position in primary combustion zone to ignite the fuel-air mixture and ensure correct operating temperature and tip protection. For long **HTSS** rods, a guide tube should ensure that there is no more than 700 mm of unsupported rod in the combustion chamber.

When **HTSS** ignition rod is being used in high temperature applications:

- always use retractor with min. stroke 300 mm to pull the tip back inside the guide tube,
- increase the guide tube length so that rod tip is completely hidden in guide tube when retracted,
- use purging of the tube to cool the rod.

WARNING: NEVER START IGNITER WITHOUT THE TIP MOUNTED ON ROD ! THIS MAY CAUSE ACCIDENTAL ARC-OVER TO A NON-EARTHED PARTS OR HUMAN BODY !

NOTICE: ONLY QUALIFIED AND COMPETENT PERSONS AUTHORISED BY THE PLANT MANAGEMENT OR MANUFACTURER, , ARE PERMITTED TO INSTALL, MAINTAIN AND SERVICE HTSS IGNITERS, ACCORDING TO LOCAL LAW.

NOTICE: THE SAFETY INSTRUCTIONS IN THIS INSTRUCTION MANUAL SHOULD BE STRICTLY OBSERVED DURING INSTALLATION, OPERATION AND MAINTENANCE.

WARNING: ALL WORK ON BURNER INSTALLATION MAY ONLY BE CARRIED OUT WEARING PROTECTIVE CLOTHING, INCLUDING: PROTECTIVE UV-BLOCKING GLASSES, HARD HAT AND GLOVES.

NOTICE: CONNECT THE **HTSS** IGNITER PARTS ACCORDING TO THE WIRING DIAGRAM IN INSTRUCTION MANUAL.

NOTICE: POWER AND GROUNDING SHOULD BE CONNECTED IN ACCORDANCE WITH THE IGNITER WIRING DIAGRAM (SEE FIG. 3, 4 and 5), WITH PARTICULAR ATTENTION TO THE CORRECT GROUNDING TO THE IONIZATION CIRCUIT AND TO THE PLANT GROUNDING SYSTEM.

5.7 Mounting of the igniter in a retractor: the igniter's rod should be placed inside the guide pipe and fixed in the retractor clamps. Mounting of the igniter in a retractor must be done so as to enable adjustment of the rod tip position relative to the burner's/pilot's nozzle. See retractor Instruction Manual and burner manufacturer recommendations.

5.8 The guide tube should not be placed in the flame.

5.9 The power pack enclosure should be positioned as close to the burner as possible to reduce cable lengths, as energy is lost with increasing cable length. The power pack must be in a location where the temperature does not exceed its max. operating temperature. The box should be mounted with cable glands at the bottom, to reduce moisture as well as dust and dirt ingress.

5.10 **ATEX Certificate condition of safe use of igniter rods types HTSS-xxx-CEX and –J-CEX**: **the length of the rod and the manner of its installation should ensure that the temperature of the outer surface of the rod located in the hazardous area does not exceed 120°C.**

5.11 Choose the correct glands depending on the hazardous zone rating. Mounting of ATEX glands should be carried out in accordance with their mounting instructions. After installation, check if the gland is correctly tightened.

5.12 The cable should be placed away from any hot elements to minimize the possibility of damage.

5.13 When installing in a hazardous area it is absolutely necessary to observe all ATEX regulations and recommendations.

NOTICE: MAKE SURE TO CONSULT THE MANNER OF MOUNTING THE IGNITER WITH THE PRODUCT MANUFACTURER/DISTRIBUTOR

6. OPERATING INSTRUCTIONS

INDUSTRIAL HEALTH AND SAFETY ISSUES. STORAGE, HANDLING, TESTING:

6.1 The igniter, unless mounted on the burner, should be stored in a dry place, protected against mechanical damage. Do not hit, step on igniter components.

6.2 The rod should be transported with care, avoiding impact against other objects or bending.
The rod should not be lifted by its ends to ensure no damage to rod, tip and connections.

6.3 Prior to starting the igniter it is necessary to check the condition of the cable and glands for mechanical damage and make sure that the boxes (enclosures) are properly closed and glands are tightly fixed.

6.4 Powering the igniter's circuit should only be done after complete assembly of the rod, tip and only when fitted in its operation-ready position at the burner. Check the proper insertion length L1 inside the gas igniter as well as the position of igniter rod tip against the gas nozzle - follow the gas pilot Manual.

6.5 Check the correct grounding of the igniter housings and circuit. Powering the rod outside a burner should only be done to test its operation.

6.6 The igniter supply should have effective grounding. Correct connection of the grounding of the igniter should be checked first, then the line can be connected.

6.7 Do not open the ATEX Exd enclosures in a hazardous area without a permit for Zone de-classification.

6.8 Do not touch, lift, carry the igniter rod or power pack when the igniter is energized or is not disconnected from a potential source of electrical power.

6.9 Once assembled, the igniter can undergo the functional test. The rod should be positioned clear of equipment, flammable materials and personnel. If these conditions are met, power can be applied.

6.10 Do not open the power pack enclosure, disconnect rod tip, HV cable and grounding cables when the equipment is energized or is not disconnected from potential source of electrical power supply.

6.11 Never use water to wash igniter components when it is connected to source of electrical power.

IGNITER START-UP AND OPERATION:

6.12 Igniter must always be used in accordance with its intended purpose and following approved installation documentation, operation algorithms and procedures as well as service manuals.

6.13 **The ignition transformer is designed for continuous use, however the type of applications for which he is intended to be used is intermittent operation. Following applicable standards, typical Trial for Ignition operating time is 5 - 10 seconds, repeatable in short periods. Operating time in such cases should not exceed time of few minutes.**
In order to protect the device from unintentional and unnecessary continuous operation, adequate time delay protection must be provided in the control system.

6.14 During the burner start-up the main voltage 110/230VAC can be applied to the power pack, provided that correct igniter installation has been executed, the wiring and correct grounding have been verified, as well as the correct assembly of the igniter has been inspected (according the burner documentation). When main voltage is applied the "POWER ON" red LED should light on power pack doors. In GUB4 enclosure, on MBCE module the "SYSTEM" diode is visible through the cover window. If not, please refer to p. 8 TROUBLESHOOTING.

6.15 After applying the 24VDC control voltage to the power pack, for ignition triggering, the electric arc should be visible on the rod tip and the "IGNITION" green LED should light up (on safe area power pack doors). Check the presence and repeatability of electrical arc on the rod tip.

6.16 No other sparking should be visible on rod connections, grounding points and cable glands. Should that be the case, de-energize igniter immediately and follow the p. 8 instructions.

6.17 In the case of no arc present during energizing please refer to p. 8.

6.18 If, after correct assembly, arc is strong and stable a full pilot/burner test with fuel can be performed. If the spark is present but the igniter does not light the fuel, check gas settings and the presence of gas at the nozzle. If the fuel settings are within the recommended range and during the Trial for Ignition the fuel is present at the nozzle the rod position should be adjusted to ensure that the electric arc is in the correct location. After moving the rod in new position the test of ignition should be repeated.

6.19 If the flame is present, rod tip is in proper position, but there is no flame confirmation at MBCE module refer to p. 8.

6.20 It is recommended to ignite the burner at a low gas flow and with a limited quantity of combustion air. It is further recommended to use shut-off valves with a slow opening and fast closing capability.

6.21 In the case of use on gas pilot, without protected pilot primary combustion zone, a retractor is required to pull the igniter back from the flame zone and its tip is completely hidden into the guide pipe (stroke min. 300 mm).

WARNING: DO NOT PERFORM ANY MODIFICATIONS TO THIS EQUIPMENT AND NEVER USE UNAUTHORIZED SPARE PARTS AS THIS WOULD RESULT IN A BREACH OF THE ATEX CERTIFICATES CONDITIONS AND COULD PROVE HAZARDOUS TO YOUR HEALTH AND LIFE !

7. PERIODICAL MAINTENANCE AND REPAIRS

The equipment manufacturer recommends a thorough inspection of the igniter every six months if possible to ensure long life and reliability.

CAUTION, DANGER HIGH VOLTAGE !
BEFORE ANY WORK ON IGNITER IS UNDERTAKEN, DISCONNECT THE POWER PACK POWER SUPPLY. ONLY THEN THE POWER PACK ENCLOSURE MAY BE OPENED OR CABLE AND ROD DISCONNECTED.
STRICTLY FOLLOW THE RULES OF ELECTRICAL EQUIPMENT SERVICE IN SAFE AND HAZARDOUS AREAS!

INSPECTION OF THE IGNITER'S ROD:

7.1 Disconnect the power source and then disconnect the HV cable and disassemble the igniter's rod from the igniter/burner following the above safety rules. Unscrew the rod's tip.

7.2 Check the condition of the rod tip, central electrode, the ceramic insulator and tip thread joint. The parts must be clean, not burnt, ceramic not broken and should not bear any traces of high temperature influence, erosion or mechanical damage. If the rod's tip is damaged, it must be replaced. Clean the tip and remove all traces of erosion and overheating.

7.3 In case of rod type **HTSS-xxx-J** and type **HTSS-xxx-J-CEX** – open the junction box cover and check the condition of the cables and terminals. The inside of box and cables must be clean and should not bear any traces of mechanical or thermal damages. In case of water ingress traces check the condition of box gasket and tightness of glands. Replace damaged components. Clean if necessary.
Check the rod surface for mechanical damages. The rod cannot be bent or squashed. The outer pipe must not be burned or cracked. In case of considerable damages, it must be replaced.

7.4 In the case of the rod type **HTSS-xxx-CEX** - unscrew the gland on the end of the rod and check the condition of the gland, cable and sealant inside **only in case if there is evidence of possible damage, overheating, short circuit inside**. The parts must be clean, not cracked and should not bear any traces of mechanical or thermal damages.
Check the rod surface like above. In case of considerable damages, it must be replaced

7.5 In the event of any damage that may affect the safety and the rod performance - replace or return the part to the manufacturer for repair.

7.6 Removal of the igniter rod and disconnection of the tip may only be done wearing protective gloves due to the presence of hot surfaces.

NOTICE: DURING THE INSPECTION HANDLE THE IGNITER WITH CARE. DO NOT THROW OR BEND THE ROD. PROTECT FROM HITS, OTHER MECHANICAL DAMAGES, MOISTURE AND DIRT.

INSPECTION OF THE POWER PACK:

7.7 Disconnect the power source and disconnect the HV cable.

7.8 Open the door of the power pack box or unscrew the Exd power pack enclosure cover and check the condition of connections on the power pack board terminals as well as the condition of glands. Check electrical components on the board - HV transformer, MBCE module, flame relay and other components for loose cable connections, excessive wear, burn marks and water ingress traces. In the case of burn marks test the power pack or components, in case of water traces check the power pack tightness. Replace components or whole power pack if necessary.

INSPECTION OF THE HV CABLE:

7.9 Check the cable for nicks or kinks. Make sure the cable entry glands are not loose. In case of damages replace the cable set or complete rod with cable.

8. TROUBLESHOOTING. ELIMINATION OF DEFECTS.

8.1 If the main voltage is present and when control voltage 24VDC is applied: no electrical arc is generated at the rod's tip and there is no voltage at the HV ignition transformer input, perform the following:

a) After opening the power pack box, check electrical connections on power pack board, terminals and condition of components, especially the presence of main supply (check fuses) and control voltage on the ignition relay terminals. Check the parameters at different points of the circuit. Replace any failed component.

b) Assemble the igniter, connect the power supply and carry out the functional test following the rules in this manual, repeat functional test after every component replacement.

8.2 If the main voltage is present and when control voltage 24VDC is applied: no electrical arc is generated at the rod's tip when there is correct voltage at the HV ignition transformer input and output terminals (if it can be measured), perform the following:

a) Disconnect the power source.

b) Check the condition of the cable and electric connections for possible mechanical damage.

c) Check the condition of the tip and it's screw joint for possible mechanical damage that could cause internal electrical breakdown as in p. 7.2.

d) Follow the guidelines in points 7.3, 7.4 respectively.

e) After opening the door of the power pack box or unscrewing the Exd power pack enclosure cover, check visually electrical connections on the board, check HV transformer and other components for burn marks. In the case of excessive wear or burn marks replace the component.

f) Assemble the igniter, connect the power supply and grounding, make the functional test.

g) If no arc is generated after the above measures have been taken, replace the original rod tip, reconnect the power source and make the functional test again, following the rules in this manual.

h) If again no arc is generated, replace the complete rod, and further the cable (if separate) and repeat the functional test each time.

i) If still no arc is generated, replace the complete power pack and repeat the functional test. If the spark will appear check circuit components one by one in broken power pack to find the broken part.

j) After every step assembly the igniter, reconnect the power supply/grounding and make the functional test again.

8.3 The main components can be checked the following way:

a) Rod Tip P/N **HTR-TIP** or **-L**: check on reference igniter rod.

b) Transformer P/N **TX-230-8000** or **TX-110-8000**: disconnect output, apply supply voltage. Measure output voltage using high voltage probe – the measured value should be 8,000V.

c) Ignition relay P/N **HT-REL-24**: check if when voltage applied relay switches.

8.4 If the main voltage is present and when control voltage 24VDC is applied: the sparking is visible in other places: on rod connections, grounding points and cable glands - perform the steps as above especially looking for bad connections, cracked cables, rod damage, bad grounding connections. Try to identify and correct/replace faulty part. Repeat test after every component replacement following the rules in this manual.

8.5 If the main voltage is applied and there is no supply on **MBCE** module, follow the steps:

a) After opening the power pack box, check the presence of power supply on the power pack terminals.

b) Check the fuse and, if necessary, replace it.

c) Check visually electrical connections on power pack board, terminals, especially the wiring of the **MBCE** module, ignition relay. Check condition of components. In the case of excessive wear or burn marks replace the component.

d) Measure the input parameters on the module base terminals and at different points of the circuit, also on ignition relay. In case of correct voltage present on wiring base, replace the complete module, replace also any other failed component.

e) Assemble the igniter, connect the power supply and carry out the functional test following the rules in this manual, repeat functional test after every component replacement.

8.6 If there is no flame confirmation on flame safeguard module and the rod is in correct position in gas igniter and also flame is present there, perform the steps as in p. 8.1 a) to e), in particular perform measurements and check connections of a pilot body to the ionization circuit (see Fig 3 or 4, 5). Try to identify and replace faulty part by performing the steps as above. If still there is no flame confirmation replace the **MBCE** module.

8.7 For any services and troubleshooting of **MBCE-FR** module refer to Fireye Bulletin No **MBCE-1001**.

8.8 For any services and troubleshooting of **SP-32-NG/PG-FD**, **SP-32-NG/PG-ND**, **SP-48-NG/PG-ND** or **SP-48-NG/PG-FD** gas pilot refer to Fireye Bulletins No **SF-200**, **SF-300**, **SF-500** or **SF-600**.

8.9 If, after all above measures have been taken, the **HTSS** igniter does not work properly, contact the manufacturer's service department.

8.10 Before any changes in igniter circuit, replacing components always disconnect the supply.

8.11 Before performing any functional tests connect the grounding and only then connect supply.

9. SPARE PARTS, WARRANTY CONDITIONS

9.1 Igniter operation-consumable parts and suggested spare parts quantity:

- Rod Tip, short or long	P/N **HTR-TIP** or **HTR-TIP-L**	- one for 4 igniters,
- Rod Tip Long rear ceramic sleeve - 2 pcs	P/N **HTR-TIP-L-CER**	- one for 8 igniters,
- HV transformer 230VAC/8000VAC	P/N **TX-230-8000**	- one for 8 igniters,
- HV transformer 110VAC/8000VAC	P/N **TX-110-8000**	- one for 8 igniters,
- Ignition relay 24VDC/12 A	P/N **HT-REL-24**	- one for 8 igniters,
- HV cable, 5 m long	P/N **HT-CAB-5** or **-CEX**	- one for 8 igniters.

Complete list of igniter spare parts Part Numbers is in Table 5.

9.2 **HTSS** construction includes two types of wearing parts:
Rod Tips, short and long P/N **HTR-TIP** and **HTR-TIP-L** - their lifetime is 200,000 arc cycles
***ATTENTION*:** Above lifetime refers to laboratory test conditions.
In the real combustion chamber environment, these values are lower. Operation in high temperature conditions, corrosive properties of fuel, impacts and mechanical damages, residues and slag on the tip - can significantly reduce the tip's life.

9.3 The warranty (see page 20) does not apply to ignition rod tips P/N HTR-TIP or HTR-TIP-L as their life time depend on the quantity of ignition cycles and the conditions they have to work under.
Each rod tip has one month warranty to be checked on receipt or within 1 month, for damage and tested for the proper functioning. Fireye should be notified of any failure. After 1 month, the warranty on tip expires.

9.4 This guarantee covers delivered devices and materials under conditions of proper installation, start-up, operation and maintenance, it means the use in accordance with applicable instructions and manuals. This is particularly applicable to overheated parts i.e. working above their maximum operating temperature defined in Instruction Manual.

9.5 The defective device or part will be replaced or repaired at manufacturer’s option.
The warranty applies to and may be executed only on a failed device send to the manufacturer warehouse for examination or warranty repair.

9.6 The manufacturer does not accept liability for damage to persons or property resulting from:

- mechanical damages, overheating
- improper installation, operation, maintenance of igniter contrary to the instructions in the user manual,
- unauthorized igniter modifications or repairs made by unauthorized personnel,
- use of components or spare parts other than original.

9.7 During the guarantee period any repairs must be carried out by the manufacturer service department, or the user, upon the service's notification and consent.

9.8 Replacement of the consumables can be user-performed only after expiration of the guarantee.

10. STORAGE

SureFire IITM HTSS electrical high tension igniter should be stored in a clean, dry environment and in its original packaging if possible.

In the case of long length rods always keep them in a horizontal position by supporting both ends and in the middle. The igniter should also be protected from contamination using the original packaging or wrapping it with foil.

Storage over 30 days: relative humidity of no more than 85%, temperature below 50°C.

NOTICE: THE MANUFACTURER RESERVES THE RIGHT TO CARRY OUT MODIFICATIONS TO THE PRODUCT DESCRIBED IN THIS INSTRUCTION MANUAL AT ANY TIME AND WITHOUT ANY ADVANCE NOTICE.

11. ORDERING INFORMATION

Before ordering, please provide the data as in Appendix 1.

Tables 1 – 4 below show examples of the rod Part Numbers every 0.5 metre as well as power packs and spare parts for HTI igniter type **HTSS**.

Part Number coding sample:

HTSS-0.5-J - means **HTSS** rod for the **SP-32-NG/PG-FD-0.5**, **SP-32-NG/PG-ND-0.5**, **SP-48-NG/PG-ND-0.5** or **SP-48-NG/PG-FD-0.5** gas pilot of insertion length 0.5 metre.
This **HTSS** rod has real insertion length of 0.65 m to the ignition point (see p. 2). The additional length of 150 mm allows the igniter to pass though the active end of Fireye gas igniters (pilots).

If the igniter is to be used for general use (not in **SP-32** or **SP-48** Fireye gas pilots), please take into account the real insertion length of rod to the spark point, in any calculation.

REMARKS: HTSS igniters can be ordered in size increments of 0.1 metre lengths, from 0.5 to 3.0 metres.
The short tip is used on the shortest rods of length L=0.5, 0.6 and 0.7 only.
All rods 0.8 m long and longer are equipped with the long tip P/N HTR-TIP-L.

Table 1: High Tension Rod, Spark & Sense, for safe area with junction box, replaceable tip and separate 5 m HV cable

Part No	Description
HTSS-0.5-J	HT Rod, S&S, for SP-32, SP-48 gas pilots of 0.5 m ins. length (0.65 mtr ins. to spark point), with j. box, 5 m cable
HTSS-1.0-J	HT Rod, S&S, for SP-32, SP-48 gas pilots of 1.0 m ins. length (1.15 mtr ins. to spark point), with j. box, 5 m cable
HTSS-1.5-J	HT Rod, S&S, for SP-32, SP-48 gas pilots of 1.5 m ins. length (1.65 mtr ins. to spark point), with j. box, 5 m cable
HTSS-2.0-J	HT Rod, S&S, for SP-32, SP-48 gas pilots of 2.0 m ins. length (2.15 mtr ins. to spark point), with j. box, 5 m cable
HTSS-2.5-J	HT Rod, S&S, for SP-32, SP-48 gas pilots of 2.5 m ins. length (2.65 mtr ins. to spark point), with j. box, 5 m cable
HTSS-3.0-J	HT Rod, S&S, for SP-32, SP-48 gas pilots of 3.0 m ins. length (3.15 mtr ins. to spark point), with j. box, 5 m cable

Table 2: High Tension Rod, Spark & Sense, for hazardous Zone 1 with replaceable tip and integrated 5 m HV cable

Part No	Description
HTSS-0.5-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 0.5 m ins. length (0.65 mtr ins. to spark point), 5 m integrated cable
HTSS-1.0-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 1.0 m ins. length (1.15 mtr ins. to spark point), 5 m integrated cable
HTSS-1.5-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 1.5 m ins. length (1.65 mtr ins. to spark point), 5 m integrated cable
HTSS-2.0-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 2.0 m ins. length (2.15 mtr ins. to spark point), 5 m integrated cable
HTSS-2.5-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 2.5 m ins. length (2.65 mtr ins. to spark point), 5 m integrated cable
HTSS-3.0-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 3.0 m ins. length (3.15 mtr ins. to spark point), 5 m integrated cable

Table 3: High Tension Rod, Spark & Sense, for hazardous Zone 1 with junction box, replaceable tip and separate 5 m HV cable

Part No	Description
HTSS-0.5-J-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 0.5 m ins. length (0.65 mtr ins. to spark point), with j. box, 5 m cable
HTSS-1.0-J-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 1.0 m ins. length (1.15 mtr ins. to spark point), with j. box, 5 m cable
HTSS-1.5-J-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 1.5 m ins. length (1.65 mtr ins. to spark point), with j. box, 5 m cable
HTSS-2.0-J-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 2.0 m ins. length (2.15 mtr ins. to spark point), with j. box, 5 m cable
HTSS-2.5-J-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 2.5 m ins. length (2.65 mtr ins. to spark point), with j. box, 5 m cable
HTSS-3.0-J-CEX	HT Rod, S&S, for SP-32, SP-48 gas pilots of 3.0 m ins. length (3.15 mtr ins. to spark point), with j. box, 5 m cable

Table 4: High Tension Igniter: Transformers, Spark & Sense Power Packs, Flame Sensor Modules

Part No	Description
TX-230-8000	HV transformer 230VAC/8000VAC, for use directly with igniter rod or as spare part
TX-110-8000	HV transformer 110VAC/8000VAC, for use directly with igniter rod or as spare part
HTSS-PP-230	HTI S&S Power Pack, S&S, 230VAC, IP66, for safe area, with: lugs, HV gland, door key, EXCLUDING MBCE-FR
HTSS-PP-110	HTI S&S Power Pack, S&S, 110VAC, IP66, for safe area, with: lugs, HV gland, door key, EXCLUDING MBCE-FR
HTSS-PP-230-CEX	HTI S&S Power Pack, S&S, 230VAC, IP66, for hazard. area, with: HV gland, stop plugs, EXCLUDING MBCE-FR
HTSS-PP-110-CEX	HTI S&S Power Pack, S&S, 110VAC, IP66, for hazard. area, with: HV gland, stop plugs, EXCLUDING MBCE-FR
MBCE-230FR-1	Flame Sensor Module, Flame Rod, 230VAC
MBCE-110FR-1	Flame Sensor Module, Flame Rod, 110VAC

Table 5: High Tension Igniter: Spare Parts

Part No	Description
HTR-TIP	HTSS rod interchangeable tip, OD 16 mm, length 160mm
HTR-TIP-L	HTSS rod interchangeable tip, long, OD 16 mm, length 460mm
HTR-TIP-L-CER	HTR-TIP-L rod tip rear ceramic sleeve - 2 pcs
TX-230-8000	HV transformer 230VAC/8000VAC, for use directly with igniter rod or as spare part for S&S power
TX-110-8000	HV transformer 110VAC/8000VAC, for use directly with igniter rod or as spare part for S&S power
HT-REL-24	HV ignition relay 12A for 24VDC
HT-CAB-5	5 metres standard HT cable, for use with HTSS-xxx–J rod
HT-CAB-10	10 metres HT cable, for use with HTSS-xxx–J rod
HT-CAB-5-CEX	5 metres shielded HT cable, for use with HTSS-xxx–J-CEX rod
HT-CAB-10-CEX	10 metres shielded HT cable, for use with HTSS-xxx–J-CEX rod

APPENDIX No 1

Proposal Data Sheet

SureFire II™ HTSS - Electrical High Tension Spark & Sense Igniter

rod types: **HTSS-xxx-J**, **HTSS-xxx-CEX** and **HTSS-xxx-J-CEX**

Please provide the following data before placing the Order for HTSS igniter:

1.	**Information about End User**		
	— Plant Name:		
	— Owner:		
	— Country:		
	— Localization (address):		
2.	**Insertion length:**		
	— Insertion length "L" of gas pilot: *rod for SP-32, SP-48 Fireye gas pilots (see Instruction Manuals)*	**L= .....**	[m]
	— Insertion length "L1" of igniter rod: *rod for general use (other than SP-32, SP-48 pilots) (see Fig. 2)*	**L1= .....**	[m]
3.	**Spark and Sense needed:** *ignition and ionization flame safeguard modes*	**If YES check the box**	
4.	**The hazardous zone application:** *enclose detailed zone classification*	**If YES check the box**	
5.	**Required Ingress Protection Level:**	**IP .....**	
6.	**The operating temperature range:**	**..... –.....**	[°C]
7.	**Special power pack enclosure material:** *stainless steel for aggressive atmospheres*	**If YES check the box**	
8.	**Power pack supply:** *kind of supply: 230VAC or 115VAC*		[VAC]

APPENDIX No 2

UNIT CONVERSION TABLE

Quantity	Metric Units	Imperial Units	
Length	1 millimetre [mm]	x 0.003281 = foot [ft; ’]	x 0.03937 = inch [in; ”]
	1 metre [m]	x 3.281 = foot [ft; ’]	x 39.370 = inch [in; ”]
Volume	1 cubic metre [m^3]	x 35.315 = cubic foot [cu. ft]	
Air flow rate	1 cubic metre/hour [m^3/h]	x 0.589 = standard cubic feet/min [SCFM]	
Weight	1 kilogram [kg]	x 2.2046 = pound [lb]	
Pressure	1 kilopascal [kPa]	x 6.895 = pound square inch gauge [psig]	x 4.015 = inch H_2O
Power (capacity)	1 kilowatt [kW]	x 293.1 = million BTU/hr [mmBTU/Hr]	
Temperature	Deg. Celsius [°C]	*Formula:* °C x1.8 + 32 = Deg. Fahrenheit [°F]	

NOTICE

When Fireye products are combined with equipment manufactured by others and/or integrated into systems designed or manufactured by others, the Fireye warranty, as stated in its General Terms and Conditions of Sale, pertains only to the Fireye products and not to any other equipment or to the combined system or its overall performance.

WARRANTIES

FIREYE guarantees for *one year from the date of installation or 18 months from date of manufacture* of its products to replace, or, at its option, to repair any product or part thereof (except lamps, electronic tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of the product on the face of its sales order. **THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES AND FIREYE MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.** Except as specifically stated in these general terms and conditions of sale, remedies with respect to any product or part number manufactured or sold by Fireye shall be limited exclusively to the right to replacement or repair as above provided. In no event shall Fireye be liable for consequential or special damages of any nature that may arise in connection with such product or part.