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REMOTE AUTOMATIC FLARE IGNITION SYSTEM

Elyxxon Remote Automatic Flare Ignition System;

The ELYXXON range of quality high - energy, low-tension flare ignition products, are for use, especially where high reliability is demanded in hazardous environments, and in extremes of temperature, and climate. Our igniters and systems, includes the new ignition torch (with optional flame detection unit), which have a specific application in oil and gas exploration, and petrochemical flare stacks.



(a)

ABOVE: Pictorial views of remote ignition system in operation;

(a) an offshore platform

(b) a land based flow station



(b)

With a dedicated team of experienced process engineers we have designed, and developed a remotely operated, automatic flare ignition technology for both horizontal gas flaring systems, and vertical flare towers, used in the daily oil field platform production operations.

This is a reliable application that allows continuous operation under the worst possible weather conditions –year in year out.

Moisture dirt, water and oil, does not affect the performance of this ignition torch.

OPERATIONAL MECHANISM

Our flare ignition torch is designed to provide optimum performance and safety.

Elyxxon flare ignition torch ET-2 is a spark ignition system, which features a spark electrode installed on the igniter's head, which is energised by an installed high-tension transformer. This design provides a very high-density spark generation at the ignition chamber, located inside the flare ignition pilot line. The spark is discharged at intervals of five seconds, via a low tension, high energy spark plug.

Ignition gas is injected into the pilot line via an installed pilot venturi, using a natural draft self-aspirated mechanism, this ensures instant and dependable ignition of the induced air/gas mixture.

Optional flame sensing device may be installed on the pilot ignition line to automatically shut down the ignition panel, once the flare-stack flame has been established, and automatically re-ignite the flare-stack, if the flame is accidentally extinguished.

High temperature, stainless steel materials are chosen for the fabrication of the igniter head (ignition tube), in order to guarantee durability, reliability, and optimum stability even at extreme temperatures.



Elyxxon ignition torch

Use of high temperature power transmission cables offers a safe, reliable, and efficient operation even during a blow-out or flare flashback.



Twin Ignition Torches energises simultaneously, offering a reliable ignition mechanism.

This ignition technology offers a dual high-energy ignition torch, mounted the ignition head, which are activated Simultaneously, from the skid-mounted flameproof (Eex-d) enclosure.

Thereby assuring efficient flare gas ignition, even through the most severely contaminated atmospheres.

High temperature cables capable of withstanding over 1000 degree centigrade are used in the transmission of the required energy to the ignition head.

Duty cycle monitor is installed, in order to prevent continuous operation of equipment beyond the specified duty limits.

The fabrication of this equipment is carried out at our fabrication shop, where high quality workmanship and skills are applied, to ensure standard product finishing.

Post fabrication processes includes, sand blasting of the equipment in a moisture-free environment and subsequent application of multiple coats of thermal resistant paints.

In conformance with ISO 9001 & 9002, Total Quality Procedures are applied in order to achieve product quality of international standard. To achieve that, trained and competent quality control personnel are involved in every bit of the construction process.

All the flare tips are made of light thermal resistant stainless steel material.

MATERIAL SPECIFICATION

(COMPONENT LIST)

Explosion - proof Power Panel Enclosure:

An electric panel through which the entire ignition system is powered, and also provides the holding circuit for the system operation.

Material: Aluminium Light Alloy

Window: Tempered Glass

Rated Voltage: 12-110 Vdc

24-220 Vac

Working Temperature: -20 to +40 deg. C

Type of protection: EExd (ia) IIA T5

Degree of Protection: IP65 according to IEC 529.

Flame - proof Pushbutton control station (Panel):

An electrical / instrument control panel, through which the entire ignition system is operated, (operator's panel).

Explosion category: EEx de IIc T6

Ingress Protection: IP 67

Cable Entry: M20 bottom c/w gland

Material: Stainless Steel

Push Button Control Station

Featuring:

A push button control station, comprising of;

1. A start and stop button, each fitted with 1 N/O, and 1 N/C contact complete with suitable cable gland.
- 2 An Automatic / Manual Operation switch button
- 3.An AC/DC Change over switch button.
4. An alarm system signalling the initiation of every sequence in the system operation.

Liquid Crystal Display screen showing;

1. Power on/off indicator
2. Input Voltageindicator

Ignition Gas Piping:

Steel pipe (tubing) assembly, complete with the associated fittings, that conveys ignition gas from the gas-liquid strainer to the ignition chamber.

Material: Stainless steel (316 L)

Size: Tubing 3/8 to 1 inch diameter SCH 80.

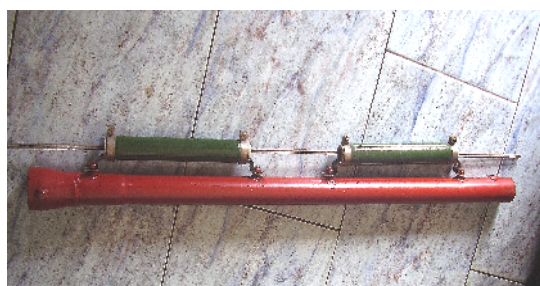
Ignition Tube:

Consisting of a high thermal resistant stainless steel housing; and sparking electrode.

Arrangement: Parallel,

Housing: Stainless steel (316 L),

Configuration: Cylindrical section,



Ignition Tube

Windscreen:

To shield ignition flame from excessive wind, and maintain pre-pilot ignition flame stability even during a high wind current.

Material: Stainless steel (316 L),

Configuration: Cylindrical section

Venturi Mixer/Strainer:

Designed to ensure the aspiration of stoichiometric air-ignition-gas mixture, through the pre-ignition tube.

Material: Stainless Steel (316 L)

Configuration: Conical section.



Venturi mixer

Cabling: Fire-resistant, surge-resistant, High Temperature cable, complete with moisture resistant insulation which supplies electric power from the control station (flame proof enclosure), to the ignition chamber.

Maintains circuit integrity during flashback or even blow out.

Flame Retardant To BS4066 Pt. 1 (IEC 332 Pt.1).

OPERATIONAL SEQUENCE:

- I. Engage the explosion-proof circuit breaker on the power panel in order to establish power supply to ignition system.
- II. On the flame-proof control (Operator's) panel; select the mode of operation i.e. (AUTOMATIC OR MANUAL) using the auto/manual switch.

START UP PILOT BURNER:

Do NOT switch on the power supply until all connections have been checked and the boxes have been closed.

Check whether pilot gas and main voltage are available. Set the 'Burner' selector switch into the position "on".

Supply gas to the pilot burner by opening the gas inlet valve.

The ignition unit will produce a spark; via the ignition cable the spark plugs (electrode) will spark and ignite the gas/air mixture.

In manufacturing our products, we use predominantly standard products of our own design (many of which are locally made), which means that there are no problems in subsequent delivery of products, and a lasting supply of spares is guaranteed. We have workshop and test facilities where all products are made and functionally tested.

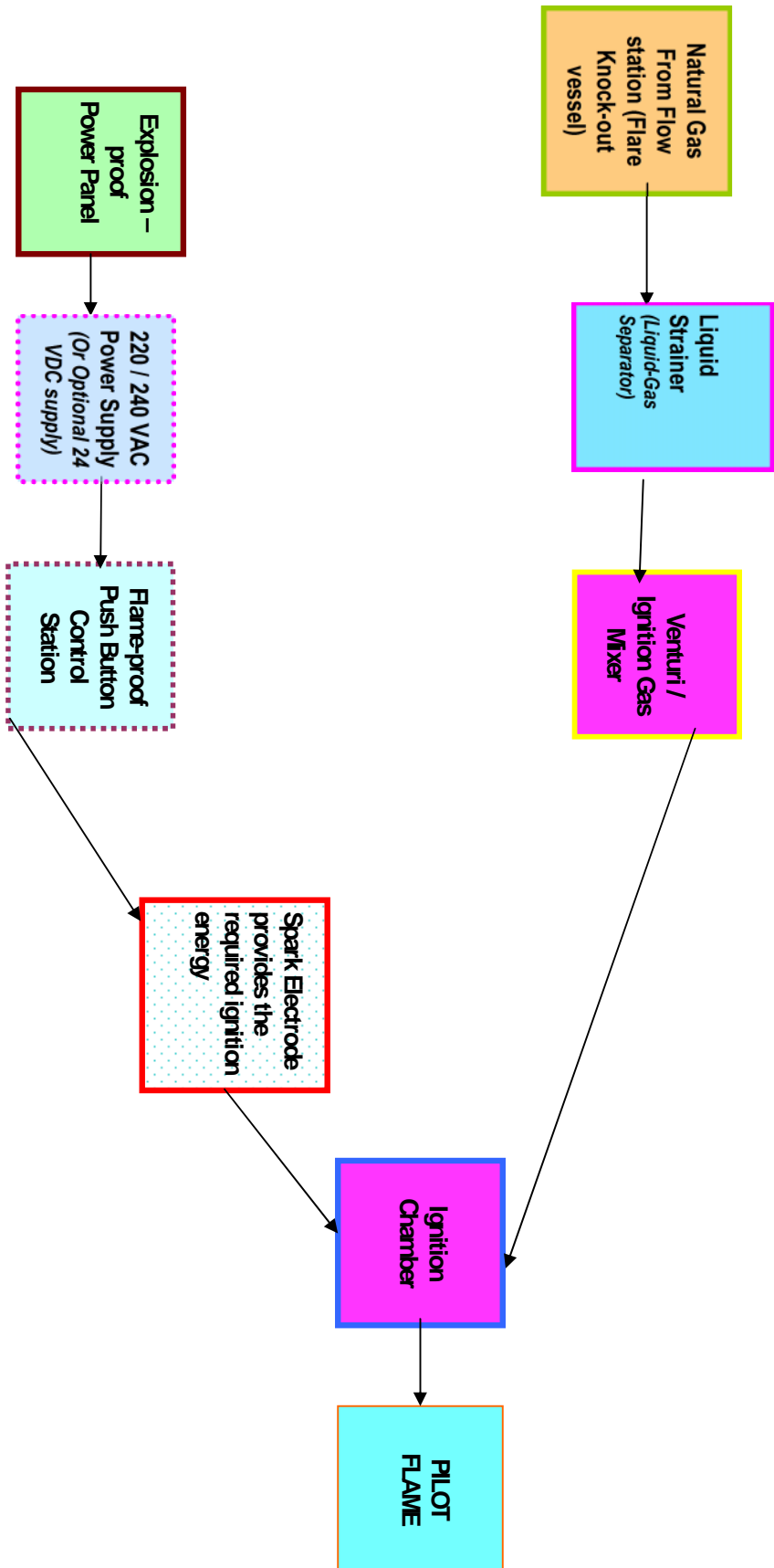


Elyxxon Ignition Control Module



Pilot burner ignited by Elyxxon flare ignition torch

SCHEMATIC DIAGRAM OF
ELYXXON REMOTE FLARE IGNITION EQUIPMENT



FIELD INSTALLATION

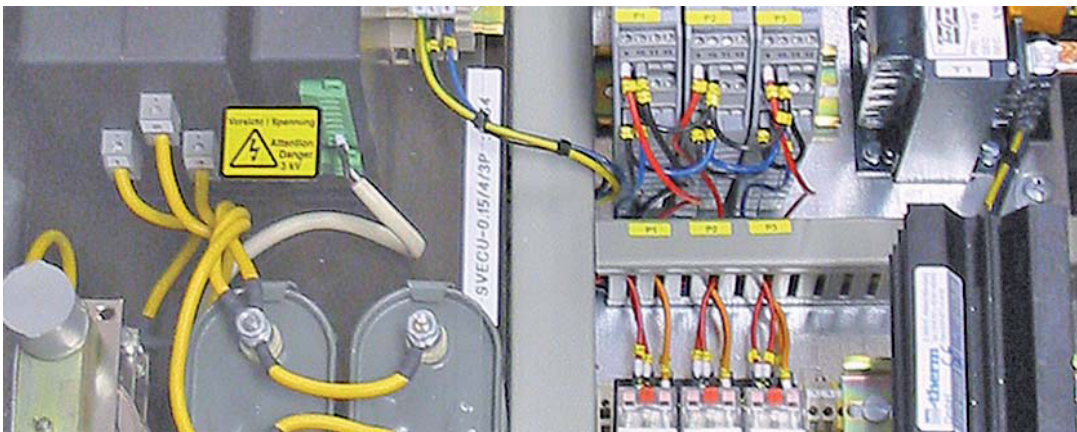
- Prefabricated skid mounted canopy shall be installed to shield the flameproof / explosion-proof ignition panel and the explosion proof start / stop pushbutton switch. Depending on the clients choice, the control panel may be installed inside an existing signal control room.

- The field installation of the ignition equipment shall be carried as per CENELEC standard, for hazardous area classification equipment and to EN50014 &EN50018, for flameproof equipment.

- ▶ Connection of the igniter to pilot burner shall be adjustable and retractable with the ignition head.

- ▶ Pre-ignition gas shall be introduced into the ignition head, through a separate stainless steel tubing, via the strainer / venturi mixer. The pre-ignition gas shall be supplied from the flow stations' Fuel gas supply mains.

- ▶ All power cable ends shall be made of crimped terminal. All wiring and cable connections must be properly earthed.



OUR QUALITY

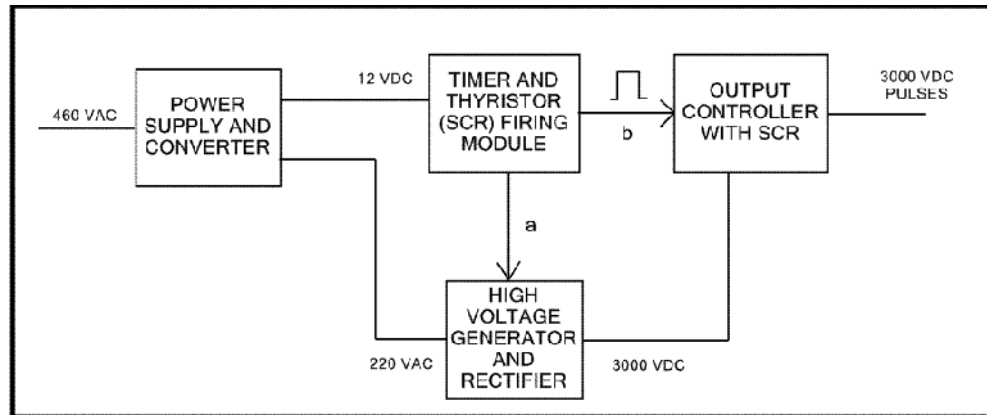
- ❖ Our products and services are delivered in consonance with ISO 9001 for both design and manufacture.
- ❖ Design is modular, allowing the unit to be customized to suit different requirements.
- ❖ Features include integral scanner module with explosion proof low wattage display lamps to indicate the successful discharge of energy at the igniter and successful establishment of the flare-stack flame.

How it works

The system comprises of four basic sections:

- 1) Power supply and converter.
- 2) Timer and SCR firing unit.
- 3) High voltage generator and rectifier.
- 4) Output controller

Block diagram of operation



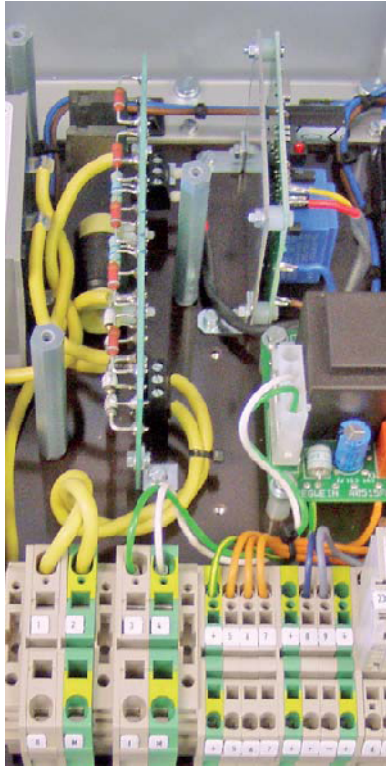
Power supply and converter consists of power step down transformers for and rectifiers. It receives 460-480 volts AC at 50/60Hz and produces outputs of 220 volts AC 50/60Hz (supplied to high voltage generator and rectifier) and 12 volts (supplied to timer and thyristor firing module).

The timer and thyristor firing module consists of electronic timers with two outputs. One output feeds the high voltage generator and rectifier through path "a", while the other output feeds the Output controller with SCR. The two outputs function alternately in such a way that when path "a" is on, path "b" is off and vice versa. Trimmers and potentiometers on the timer module are used to adjust the timing duration from 1 second to 10 seconds.

The high voltage generator and rectifier receives 220 volts AC once the equipment is powered and is enabled through path "a" signal to convert the 220 volts AC to 3000 volts DC. This conversion takes 3 stages

- i) Conversion of 220 volts AC to 3000 volts AC using series of step up transformers.
- ii) Conversion of 3000 volts AC to 3000 volts DC using high voltage high current diodes type 6A10.
- iii) Use of 3000 volts, 330uf capacitors (cascaded bank) to store energy ready to be discharged to spark plugs.

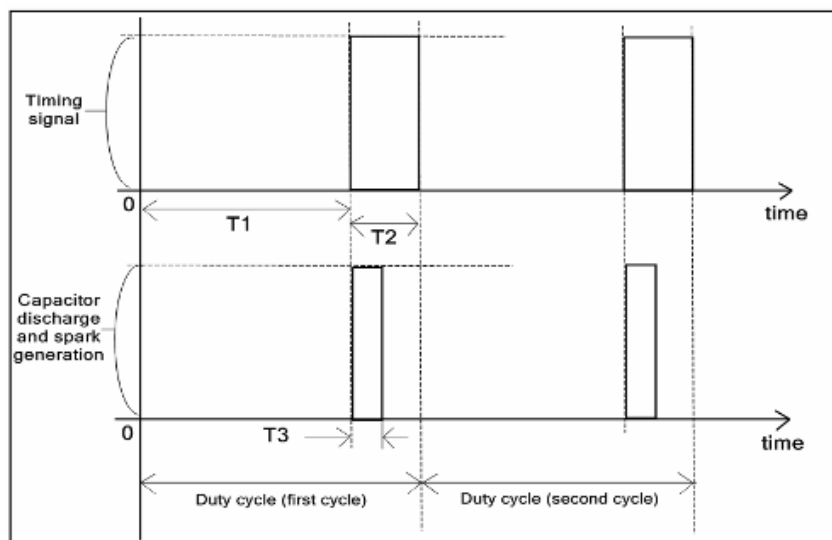
The output controller basically consists of a high current and high voltage thyristor (silicon controlled rectifier, SCR) whose gate circuit is fired or triggered by signal from timer and firing module through path "b". 3000 volts DC is already present at the anode of the SCR waiting for the firing signal. Once the signal comes through path "b", 3000 volts DC becomes present at the SCR cathode thereby supplying high energy low tension power to the self exciting silicon based low tension ignition plug. At this instance, the energy stored in 3000 volts 330uf capacitor bank/ cascade is instantly discharged in form of a flame shaped high energy spark at the plug.



Moisture, oil, dirt, or other contaminants, cannot impede the operation of this self-cleaning spark plug, because of the flame shaped propagation of the spark discharge. Below is the operation sequence.

- 1) System is switched on, timer / firing module and high voltage generator / rectifier receive power. Timing function commences with signal present through path "a". Path "a" signal enables high voltage generator and rectifier and therefore capacitor bank charging process begins.
- 2) After a time T1 (typically 2 seconds to 10 seconds), determined by settings in variable trimmer or potentiometer in timing module, signal through path "a" ceases. At this instance, DC voltage has built up to 3000 volts and becomes present at SCR anode in output controller. At this instance also, as path "a" signal ceases, path "b" signal commences and triggers the SCR, thereby producing high energy sparks.
- 3) Capacitor bank fully discharges, in time T3 (typically less than 500milliseconds, ms) which is less than T2 (pulse width) of timer duty cycle. T2 is relatively constant and has a value of 2 seconds enough to bias and sustain SCR throughout the capacitor bank discharge process.
- 4) Timer circuit resets and cycle commences again initiating capacitor bank charging process.
See signal diagram below.

SCHEMATIC LAYOUT OF ELYXXON FLARE IGNITION SYSTEM

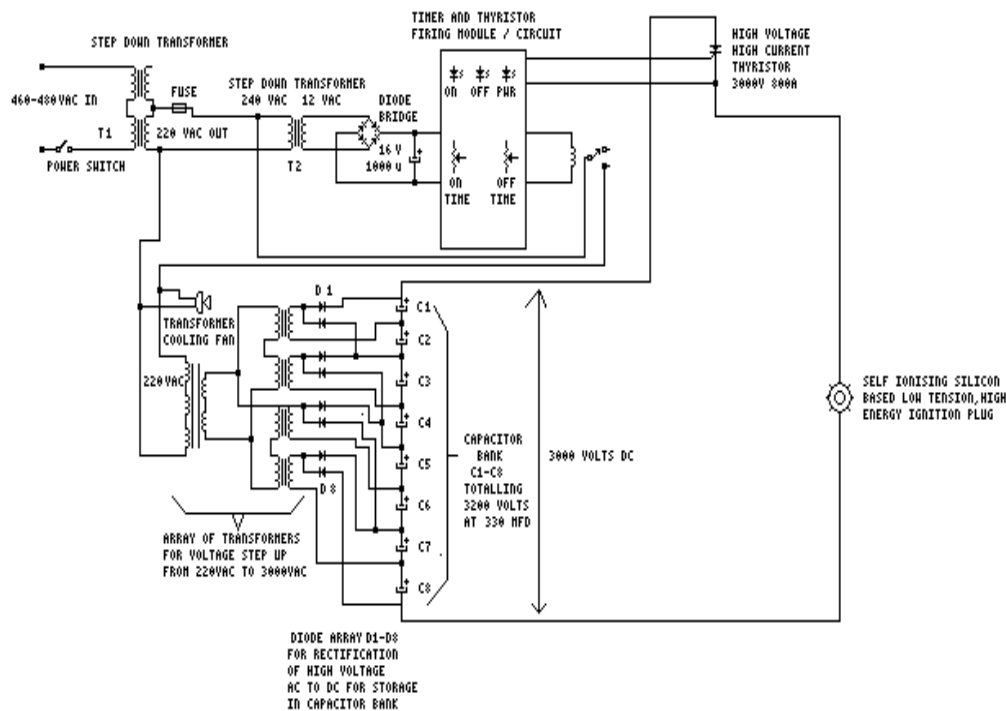


SPECIFICATION:

Ignition Type	Low Tension, High Energy
Spark Energy	3kJ
Spark Tension	3kV
Spark Current	3kA
Spark Plug Gap Resistance at Ionization	1
Set Spark Frequency	0.3Hz
Power Consumption	500W
Input Voltage	415-480 VAC 50/60 Hz Single Phase
Input Current	1A
Protection Class	IP65
Explosion Proof	Eex-d
Housing Material	Cast Aluminium Alloy
Ignition Control Panel Size	300mm x 420mm x 225mm
Ignition Head Size	50 mm dia. x 1905 mm
Ignition Head Material	Stainless Steel AISI 316L (together with tungsten based self cleaning spark plug)
Oxygen Supply	Self-inspirated Atmospheric Air

BENEFITS OF THE ELYXXON (REMOTE) AUTOMATIC FLARE IGNITION SYSTEM

- + Low Cost**
- Easy To Install and Operate**
- ◆ Compactness of Design**
- ▶ Long Warrantee Period (12 Months)**
- Automatic Flare Re-Ignition Guarantees a Dependable Ignition**
- System Needs No Gas Pressure Adjustment Before Operation**
- ⇒ System Can Be Operated From A Remote Location (Over 1000ft)**
- Integral Ignition Hood and Windscreen Secures Reliability**
- System Adaptable To DC Power Supply, and Solar Energy Source**
- ⊕ The Ignition Unit Can Be Retrofitted Into an Existing Flare Stack**



It is a low tension high energy ignition system, designed to meet the requirements of reliable ignition for many industrial applications.

The system is based upon the principle of a capacitor discharge over a special discharge surface. This surface consists of an isolator with semiconductor properties. The isolator and positive and negative electrodes are integrated into a high temperature resistant spark plug. When a charged capacitor is connected, it will be discharged via the spark plug producing sparks, even under wet or soiled conditions.

Process step by step

- 1 Charge capacitor
 - 2 Capacitor connected to spark plug through high voltage thyristor
 - 3 As capacitor discharges a current forms across the semi conductor surface of the spark plug
 - 4 The area above the insulator becomes ionised
 - 5 Resulting flame shaped spark forms a plasma.
- Current from 300–1000 A in 5 to 15 μ s.

Applications

- Ground and elevated flares
- Boilers and Heater Treaters,
- Burners and Incinerators



Weather-proof spark plug

This system has the following advantages

- Moisture, dirt, oil and grease will not impede the ignition process
- Low power consumption
- Insensitive to process pressure
- Self cleaning spark plug surface
- Tension is low in comparison to traditional ignition sources
- Easy construction for explosion proof execution.