IRIS

IRIS GE and GHE SERIES IGNITORS OPERATION MANUAL

WORLD LEADER IN FLAME MONITORING

INTRODUCTION

The IRIS GE series Pilot ignitors are High Tension Gas Electric ignitors that use a high voltage transformer to produce a spark of about 10,000 Volts AC for the ignition source. These ignitors are available for a 2-7/8 diameter support tube in lengths to suit the application. Installation of these ignitors are quite straightforward, and location and mounting should follow the burner manufactures recommendation.

The IRIS GHE1-3 and GHE2-5 Ignitors are non-fouling, inextinguishable, high energy electric Ignitors that are suitable for all common oil and gas fuels. These ignitors are available for both 1-7/8 inch and 2-7/8 inch diameter support tubes in lengths to suit the application. FIGURE 2 shows an example of the GHE2-5 ignitor.

IRIS HIGH ENERGY IGNITORS

The unique PowerArc High Energy circuit makes use of a controlled capacitor discharge to produce a high temperature arc at a pulse rate of approximately 3 to 5 times per second, that ignites fossil fuels more efficiently than a gas or oil torch.

These High Energy ignitors are supplied with two basic segments that make up the ignition source: an *Arc Probe* that is the actual part of the ignitor that touches the fuel and provide the high temperature arc and a *Power Pack,* shown in FIGURE 3, that is the power supply that provides the pulsating energy.

Both units are designed to work together and therefore an evaluation of either one necessitates an understanding of the circuit as a whole. In particular the pulsating aspect of the Power Pack only becomes apparent when connected to the Arc Probe.

SAFETY WARNING !!

The IRIS High Energy PowerArc System deals with:

- Stored Energy in a Large Capacitor,
- Sizable Electric Currents,
- High Voltages,
- A Bright, High Temperature Arc.

PLEASE TAKE PRECAUTION: Extreme maturity and professional knowledge must be used when dealing with and evaluating these Ignitors. They can be lethal, or at the very least, cause pain, if not dealt with in a sensible manner.

High Voltage is stored in the capacitor and may be present EVEN AFTER power has been disconnected. A discharge path has been provided on the power pack. See the label shown in FIGURE 1. Use a large screwdriver with an insulated handle to discharge the capacitor. Contact the ground post first, and then short it to the spark gap.

THEORY OF OPERATION

Unlike the spark of a High Tension Ignitor, which uses a 10,000 Volt AC transformer to produce the spark, the IRIS High Energy ignitor produces a high current DC Arc at a relatively low voltage.

The energy output of the PowerArc is rated in joules, and refers to the energy of each pulse. The Standard 12 joule power pack supplied with the GHE series ignitors produces about 3-5 pulses per second.

A joule is equal to one watt second, that is, disbursing one watt in one second. When a unit is rated in 12 joules it means that each arc of the Ignitor is delivering 12 joules of energy. Since the discharge duration of each arc is approximately 6 microseconds, the calculated energy output amounts to 2,000,000 watts per arc. Or, in other words, a 12 joule Power Arc system delivers ten 2 Megawatt pulses for each second it is on.

It is this high current Arc, accomplished by taking the energy stored in a capacitor and discharging it over a short time duration, that accounts for it's ability to ignite any fuel and "burn" through all sorts of dirt and contamination on the Arc Probe.

The actual arc of the Arc Probe occurs directly on the end surface of the probe. The spark that one might see, if actually looking at it, is the corona effect of the surface arc – not the arc itself. As a result, the Arc Probe that is delivering the pulsed energy must actually be in the fuel stream such that the fuel spray is touching the surface of the tip of the Arc Probe.

The spark of the Arc Probe, in almost all cases, reliably lights the small bit of fuel that it touches. This

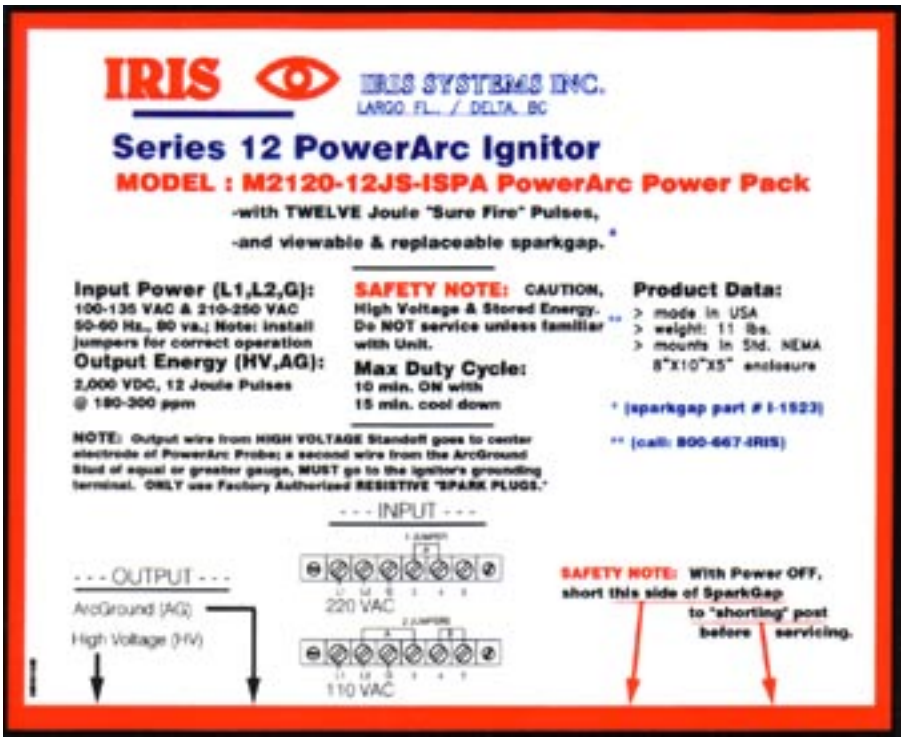

Figure 1: IRIS 12 JOULE POWER PACK

can usually be observed by yellow-white flames coming from the blue-white spark. However, this small amount of combusted fuel is only a portion of the total fuel spray. Complete ignition of the burner happens, therefore, by propagation of this small amount of heat to the balance of the fuel pattern.

The Model M2120-12JS-ISPA Power Pack (IRIS Part # Power Pack-12) is designated for intermittent operation. The duty cycle is 10 minutes on, with a 15 minute off cool down period.

Under no circumstances should this power pack be used for continuous firing of the ignitor.

INSTALLATION

The IRIS GHE Pilot Ignitor should be mounted to the burner at the location specified by the burner manufacturer. Care should be taken to ensure adequate clearance for removal if servicing should be required.

For the GHE1-3, a starting point for gas pressure would be 1 to 4 psi, and air supply approximately 25 cfm.

The driving energy for the Arc Probe comes from the Power Pack. Since the Power Pack is delivering high pulsating currents (see the "Theory of Operation" section for review of this aspect), the distance between the Power Pack and the Ignitor Tip can be critical. Line losses can reduce the amount of energy delivered. Generally the cable between the Power Pack and Ignitor should be as short as possible, and preferably, no more than 20 feet.

The power pack can be mounted in an optional standard NEMA 8" x 10" x 5" standard enclosure. See FIGURE 4 for dimensions.

EQUIPMENT STORAGE

For long-term storage, it is advisable to store the Ignitor in a heated facility to minimize condensation build up. Normal temperature extremes (-20 degrees F to +180 degrees F) will not affect the unit. However, if it is suspected that the unit has been exposed to excess water or temperatures, it is advisable to trouble-shoot the system as outlined under the "No Spark" subsection, or at least thoroughly pre test the Ignitor as outlined in the "Initial Check Out" section below.

INITIAL CHECK OUT

It is best to operate the Ignitor and its control system before a light off is actually tried. This can often be accomplished by manually shutting off the fuel valve

and then bypassing various interlocks.

However this should only be attempted with the knowledge and consent of the burner's operator(s).

For the initial start-up, check all physical, electrical and air connections. The ignitor can now be powered up to make sure that it is arcing correctly.

Caution: Since the Ignitor is delivering the spark into a combustion area, ensure that the furnace is free from combustion vapors.

Any difficulty at this point should be evaluated as described later in this manual. If the Ignitor is arcing, one is now ready to try a light-off. Read the "Theory of Operation" section of this manual and "Combustion Setting" subsection (in the "Trouble Shooting" area) to understand how the Ignitor lights a burner to anticipate light-off problems.

TROUBLE SHOOTING

If a fuel ignition problem is experienced, first determine if the Ignitor is sparking at the tip. If it is, then an ignition problem must either be caused by a combustion setting or an incorrect positioning situation.

Combustion Setting

If the Ignitor is arcing and touching the oil spray, it will light the fuel that it encounters. However, the propagation of this small flame to the balance of the oil spray (that is, a successful burner light-off) can be retarded. Too high a wind velocity or too high an oil flow can quench the initial ignition effort.

Generally, one has selected a light-off position or conditions that have or have created a stagnation area to allow more time for the initial old flame to propagate. As an example, the sequence of operation might have the air dampers deliberately being closed at light off to facilitate this. Or too, the fuel or air pressure settings might be specifically selected downward for the light-off situation.

The following are potential criteria that could negatively affect ignition of the complete burner: low oil temperature, short duration of oil spray, a different spray angle, wet atomizing stream, cold air temperature, clogged oil nozzle, fuel or air pressures that are different than the designed start-up settings.

Some burners are more affected by the above criteria than others and, therefore, an acquaintance with the normal light-off condition is helpful in trouble shooting a combustion situation.

No Spark

If no spark is observed during the Ignitor cycle, check the following:

Caution: High voltages may be present even if the power is disconnected. Trouble shooting this equipment should be done by trained personnel only! See the safety warning on page 1.

1. Check supply power to the Power Pack; make sure there is proper voltage to the correct terminals. Check that the proper jumpers are installed as per Power Pack drawing.
2. Turn off power. Make a visual check of Ignitor cables, electrical connectors and arc tip. Insure that the Ignitor cable is not damaged, that connectors are seated properly and the arc tip is not eroded (carbon build up will not effect spark). Check that all wires are connected properly to their termination points
3. With the cable disconnected, check continuity.
4. Replace the Spark Gap on the Power Pack (IRIS part # Spark)
5. Check the resistance of the Arc Probe tip by putting a meter across the two terminals in the probe housing.

   The tip is a semi-conductor device and can have a resistance between a few ohms and 10 Meg ohms, but it should not be much above that and definitely not infinity. Carbon build up will not affect the spark, but it will affect the resistance readings. To replace the tip, hold the tip nut and loosen the socket nut. To remove pull the tip straight out.
6. Check for shorting in the single conductor wire. Since the Arc Probe is neither an open circuit nor a pure conductor, one must remove the Arc Probe and then measure continuity. With the Arc Probe removed, there should be NO RESISTANCE between the central conducting wire and ground. If

there is, this is an indication of a shorted pathway for the pulsating voltage and might be causing "No Spark" being delivered to the Arc Probe tip when the tip when the tip is otherwise installed.

7. Try the Ignitor with a Power Pack, known to be good. If the ignitor sparks, replace the Power Pack. A defective Power Pack cannot be field repaired; return it to a factory repair facility. Before removing make sure the power is off and short each terminal to ground, to make sure all voltage is drained.

Sparking along cable

– if the Ignitor is sparking from the cable to ground:

1. Turn off the power. Make a visual check of the Ignitor cables and electrical connectors. Ensure that the cables are not damaged, connectors are seated properly and all wires are connected properly to their termination points.

2. Check the cable connectors and make sure both ends of the cable braid are well grounded, if using armored cable.

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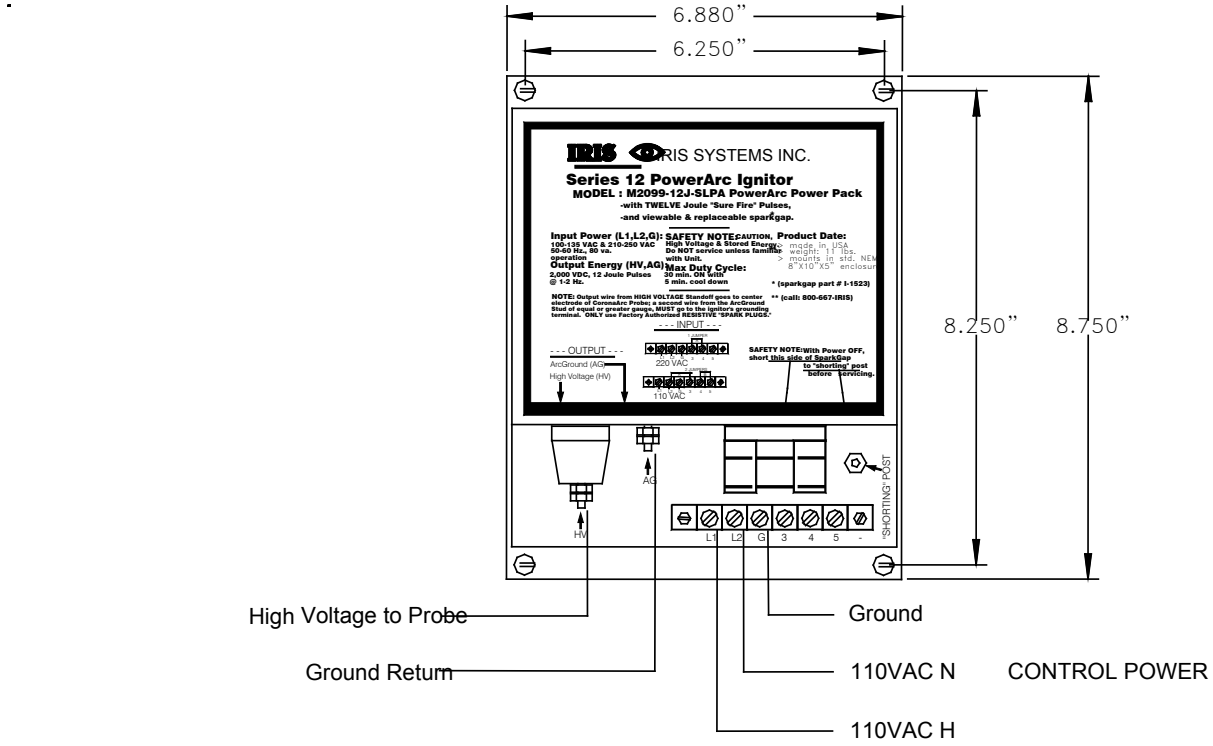
FIGURE 2: IRIS GHE SERIES PILOT IGNITOR

FIGURE 3: IRIS 12 JOULE POWER PACK



Shown in Optional NEMA 12 Enclosure.
Also compatable with 4, 4X and Explosion Proof Enclosures.

FIGURE 4: IRIS 12 JOULE POWER PACK DIMENSIONS