

### 3. Installation of Sensor Switch and Running of Field Wiring: (Cont)

Reference: Item D, previous page:

PIN 144600

GROUP	CAPACITANCE	INDUCTANCE
A & B	0.6 uf	1.3 mh
C, E	1.9 uf	5.4 mh
D,F,G	1.9 uf	10 mh

**Example:** Typical values of capacitance for a twisted pair of copper wires is between 20 and 60 pf per foot. Using a maximum value of 60 pf/Ft, groups A & B could have a run of 1500+ feet with safety. Inductance of a typical twisted pair is between 0.10 and 0.20 uH/Ft, thus making a cable run in this example essentially determined by the capacitance.



#### Important Points!

Product must be maintained and installed in strict accordance with the National Electrical Code and GEMS technical brochure and instruction bulletin. Failure to observe this warning could result in serious injuries or damages.

An appropriate explosion-proof enclosure or intrinsically safe interface device must be used for hazardous area applications involving such things as (but not limited to) ignitable mixtures, combustible dust and flammable materials.

Pressure and temperature limitations shown on individual catalog pages and drawings for the specified GEMS products must not be exceeded. These pressures and temperatures take into consideration possible system surge pressures/temperatures and their frequencies.

Selection of materials for compatibility with the media is critical to the life and operation of GEMS products. Take care in the proper selection of materials of construction; particularly wetted materials.

Life expectancy of switch contacts varies with applications. Contact GEMS if life cycle testing is required.

Ambient temperature changes do affect switch set points, since the specific gravity of a liquid can vary with temperature.

GEMS products have been designed to resist shock and vibration; however, shock and vibration should be minimized.

Liquid media containing particulate and/or debris should be filtered to ensure proper operation of GEMS products.

Electrical entries and mounting points may require liquid/vapor sealing if located in an enclosed tank.

GEMS products must not be field repaired. Physical damaged sustained by the product may render it unserviceable.



**SAFE-PAK Model 144600**

**Instruction Bulletin  
No. 121440**

For use as “intrinsically safe switch connections” to non-voltage producing sensors in the hazardous location. When the SAFE-PAK installation is in accordance with this guide, these switch terminals are suitable for connection to Class I; Division 1,2; Groups A, B, C & D and Class II; Division 1, 2; Groups E, F, G and Class III, as defined by Article 500 of the National Electric Code.

#### **IMPORTANT!**

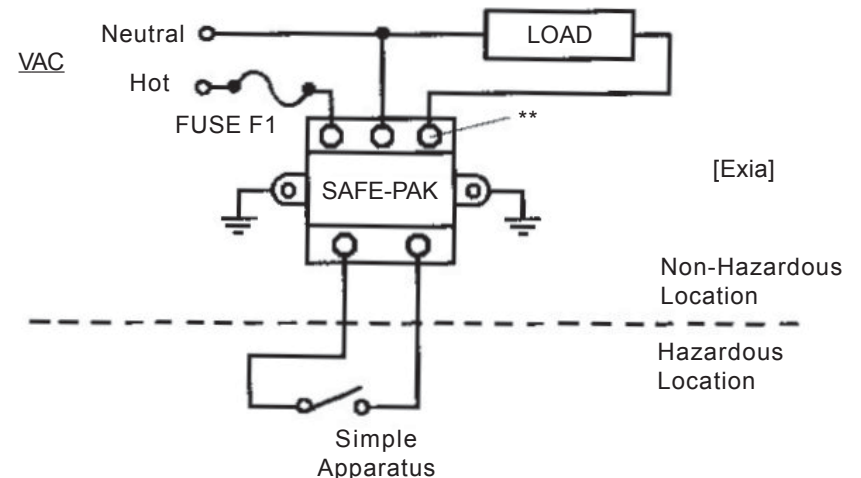
Read the following carefully and completely before installing or connecting SAFE-PAK units:

**\*\*\* Warning:** To prevent ignition of flammable or combustible atmospheres, disconnect power before servicing.

1. **Associated Equipment - Caution:** The SAFE-PAK must be mounted outside the hazardous area. Only the switch or sensor terminals provide an intrinsically safe switch circuit (see Fig. 1.) [Exia] means associated equipment: “Appareillage connexe”; located in safe area.

**Fig. 1.**

**Connection Diagram: Gems SAFE-PAK Models**



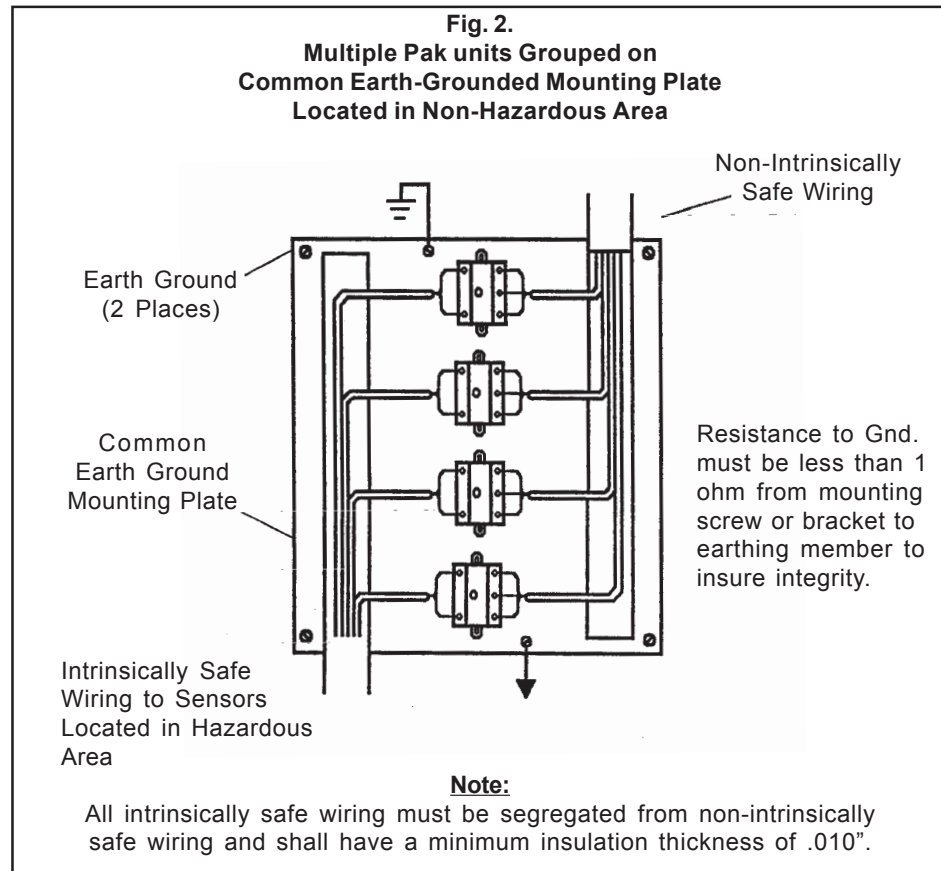
**Note:** For 120V application, only one fuse is required in the ungrounded circuit of the input line.

\*\* Required torque on these terminals not to exceed 10 IN-LB on stranded wire; 8 IN-LB on solid wire.



## 2. Mounting and Enclosure Considerations:

- A. Field wiring of intrinsically safe circuits is to be segregated from non-intrinsically safe wiring by use of suitable barriers, separate wireways or trays (See Fig. 2). Wire insulation to be .010", minimum.

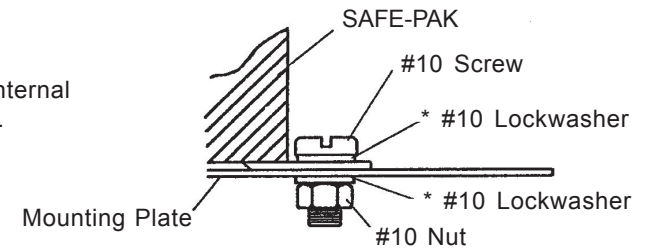


- B. Intrinsically safe and non-intrinsically safe connection points should be located sufficiently apart to prevent any possibility of bypassing or miswiring during installation or servicing of equipment.
- C. The enclosure shall contain a cautionary statement as follows: "CAUTION: ANY SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY".
- D. The PAK mounting bracket must be grounded to insure intrinsic safety. Resistance between bracket and ground electrode should be below one ohm. (See Fig. 3 and Fig. 4 for recommended selection of grounding hardware and refer to Article 250 of the National Electrical Code for methods and practices.)

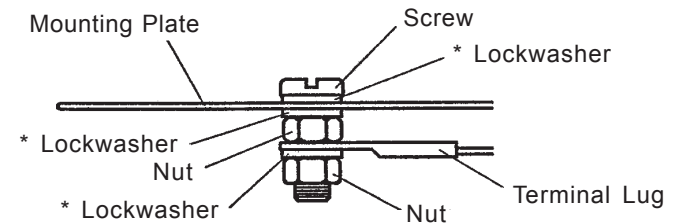
**Fig. 3. Unit Mounting Detail**

\* Note:

Lockwashers to be internal or external tooth-type.



**Fig. 4. Mounting Plate Grounding Detail**



- Notes:
1. Grounding Hardware to be #8 or larger and Stainless Steel.
  2. \* Lockwashers to be internal or external tooth-type.

## 3. Installation of Sensor Switch and Running of Field Wiring:

- A. It is expected that the installation will be in accordance with Article 504 of the N.E.C., ANSI/NFPA 70 and/or C.E.C. Part 1\*.  
\*Note: This is a CSA requirement. C.E.C. = Canadian Electrical Code.
- B. The nature of the sensor switch must be that it is a non-voltage-producing, essentially resistive device, containing no energy-storing components. (Simple Apparatus -flow switches, level switches, pressure switches.)
- C. The conductors of the intrinsically safe circuit should be sealed in a rigid metal conduit at the point where the wiring enters the hazardous area. The wiring and contacting device should be such that conductive dusts in the area will not close the circuit in place of the contacts.
- D. Hazardous area field wiring will store energy due to distributed capacitance and inductance in proportion to its length. It is therefore recommended that the characteristics (available from the manufacturer) of the cable be known and judged against the length of run and atmosphere of exposure. **The conservative chart on the next page** is presented as a requirement in determining the limits of reactance for signal loops in the hazardous area wiring for the SAFE-PAK series.
- E. Whenever possible, the actual measured parameters should be used in making the determination of allowable length.
- F. Shielded cable is not required; but if used in the application, the shield must be returned to ground - the same as the PAK mounting bracket.
- G. Non-intrinsically safe wiring cannot be run in conduit or open raceways together with intrinsically safe wiring.