



Single-Station Level Switches

Instruction Bulletin No. 72947

Series	Mounting	HEX Size	Float Diameter
LS-1700**	1/8" NPT	1/2"	1" (Slosh Shield Version 1-13/32")
LS-1700TFE*	1/8" NPT	1/2"	1-1/8"
LS-1750**	1/8" NPT	1/2"	1-1/2" (Slosh Shield Version 1-13/16")
LS-1755**	1/8" NPT	1/2"	1-1/32"
LS-1800**	1/8" NPT	1/2"	1-1/4"
LS-1850**	1/2" NPT	3/4" Wrench Flat	3-1/2"
LS-1900**	1/4" NPT	5/8"	1-7/8"
LS-1900TFE*	1/4" NPT	21/32"	2-1/8"
LS-1950**	1/4" NPT	5/8"	2-1/16"
LS-19735*	1/4" NPT	5/8"	1-1/2"
LS-3*	1/8" NPT	1/2"	1"
	3/8" - 16 Str. Thd.	1/2"	1"
	1/8" NPT	1/2"	1-1/4" (Slosh Shield Version)
	1/8" NPT	1/2"	1-7/8" (P/N 76707)
	1/8" NPT	1/2"	3/4" (P/N 201540)
LS-30*	1/4" NPT	5/8"	1-7/8"
LS-38760**	1/4" NPT	9/16" Wrench Flat	1-7/8"
LS-74780*	1/4" NPT	5/8"	1-1/2"
LS-77700**	1/8" NPT	1/2"	1"
	3/8" - 24 Str. Thd.	3/4"	1-1/2"
TH 800-A*** Level Temp	1/4" NPT	5/8"	1-1/4"

* Plastics

** Alloys

*** **Specialty Switches:** Please use caution when handling these units, as shock may damage the thermostat temperature setting. Thermostat units not CE approved.

Installation

A standard NPT female boss in tank top, bottom or side is all that is required. Units operate in any attitude - from the vertical to a 30° inclination - with lead wires up or down. Standard IPS pipe extends units to any intermediate level in the tank. **(Figure 1)**

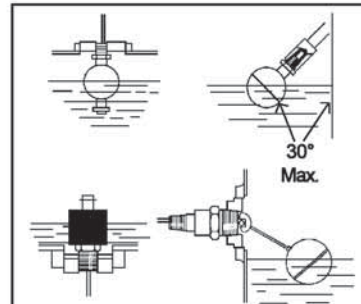
Moisture Protection: When moisture exists in conduit and extension pipes, the potential for this moisture to "wick" down the wire leads and into the switch assembly exists. Should this happen, the switch will appear to be closed due to a high resistance path through the moisture. The following suggestions may help to prevent this from happening:

1. Pitch conduit away from the level switch when possible, so that condensation will drip away from the level switch assembly. **(Figure 2)**

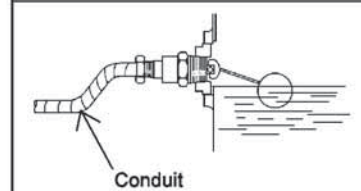
2. When a vertical run of extension pipe is used to extend a level switch down from the top of the tank, a non-conductive silicone oil should be used to fill the vertical run. Alternatively, an appropriate potting may be used to fill the vertical run to occupy the space in which condensation will normally form. **(Figure 3)**

CAUTION

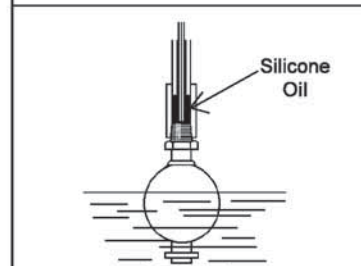
Most of GEMS level products incorporate a potting cap or are fully potted. Due to the bonding characteristics of the potting to the wire leads, there is no way of assuring a water-tight seal at the potting joint. Our potting cap will resist moisture to some degree, but the precautions mentioned above should be used to assure moisture doesn't enter the switch and cause a short.



- Figure 1 -



- Figure 2 -



- Figure 3 -

Consult your GEMS representative for more suggestions on how to lessen the effects of moisture.

Thread Treatment

1. **Sealing:** When threading metal threads into a metal coupling, pipe sealant or Teflon® tape is recommended. Due to potential compatibility problems, when sealing plastic threaded units, a compatible pipe sealant such as **No More Leaks™** from Permatex® is recommended.

2. **Tightening:** When threading a plastic level switch into a metal coupling, the installer should use a suitable wrench and tighten the threads one to one and one-half additional turns past hand-tight. Over-torquing of the threads will result in damage to the plastic mounting plug.

No More Leaks is a trademark of Permatex® Industrial Corp., a subsidiary of Loctite Corporation. **Teflon** is a registered trademark of DuPont Corporation

3. The Effect of Thread Engagement on Actuation Points

The length of mounting threads engaged at installation is important in calculating switch actuation points and the actual length of stem extending into the tank. Use **the chart below** to find the thread engagement length (T) for a given NPT size. Factor the dimension into any calculation of switch actuation levels (L) and overall length (L₀).

NPT	1/8"	1/4"	1/2"	3/4"	1"	1-1/4"	2"	3"
T Dim.	.27"	.39"	.53"	.55"	.68"	.71"	.76"	1.20"

- See Examples Below -

Definition of Variables Used in Examples Below

- A = Mounting Length
- T = Thread Engagement
- P = Distance from coupling (bung) top to inside surface of tank or bracket
- L₀ = Overall length from bottom of mounting
- L = Switch actuation level as measured from inside surface of tank or bracket to fluid surface
- L₁ = Switch actuation level, nominal, as measured from bottom of mounting (based on a liquid specific gravity of 1.0)

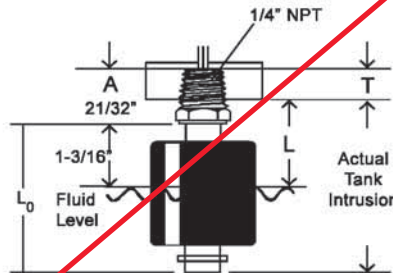
Internally Mounted LS-1900
(Standard Length)

LS-1900 Series internally mounted through a 1/4" NPT hole. To calculate "L" dimension:

$$L = L_1 + (A - T)$$

$$L = 1\text{-}3/16" + (21/32" - .39")$$

$$L = 1.46"$$



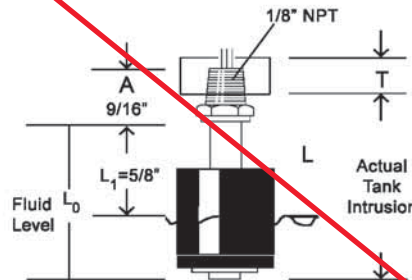
Internally Mounted LS-1700/1750
(Standard Length)

LS-1700/1750 internally mounted through a 1/8" NPT hole. To calculate "L" dimension:

$$L = L_1 + (A - T)$$

$$L = .63" + (.56" - .27")$$

$$L = .92"$$



Electrical Data

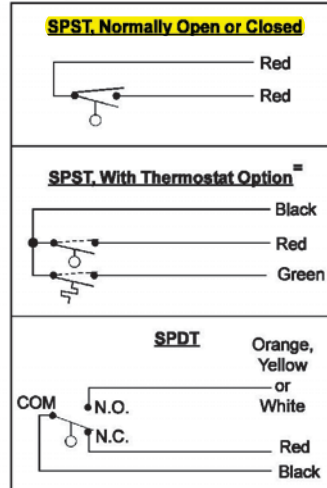
Standard reed switches in GEMS level switch units are hermetically-sealed, magnetically actuated, make-and-break type. Switches are SPST or SPDT and are rated in Volt-Amps (VA).

See the chart below for maximum load characteristics of GEMS level switches. CAUTION: Contact protection is required for transient or high in-rush current. Refer to GEMS Bulletin #133702 or call your GEMS representative.

VA	Volts	Amps AC	Amps DC
10 General Use	0-50	.2	.13
	120	.08	N.A.
	100	N.A.	.10
20 Pilot Duty	0-30	.4	.3
	120	.17	.13
	240	.08	.06
50 General Use	0-50	0.5	0.5
	120	.4	.4
	240	.2	.2
100*	120	.8**	N.A.
	240	.4	N.A.

* Not U.L. Recognized ** Limited to 50,000 operations

Typical Wiring Diagrams
(Circuit Condition Dry)



Thermostat switches open or close when ambient temperature reaches specified setpoint. Thermostat units not CE approved.

European Pressure Directive Addendum

The product is designed and manufactured in accordance with Sound Engineering Practice as defined by the Pressure Equipment Directive 97/23/EC. This product must not be used as a "safety accessory" as defined by the Pressure Equipment Directive, Article 1, Paragraph 2.1.3. The presence of a CE Mark on the unit does not relate to the Pressure Equipment Directive.



This product is suitable for Class I and Class II applications only, per the requirements of standard EN60730 and any additional specific requirements for a particular application or medium being sensed. Class I compliance of metal bodied units requires a ground connection between the metal body and the earthing system of the installation. Class I compliance of plastic bodied units in contact with a conductive medium requires that the medium be effectively earthed so as to provide an earthed barrier between the unit and accessible areas. For Class III compliance, a supply at safety extra-low voltage (SELV) must be provided. Please consult the Factory for compliance information on specific part numbers.

Important Points!

Product must be maintained and installed in strict accordance with the National Electrical Code and GEMS product catalog 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.

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

Pressure and temperature limitations shown on individual catalog pages and drawings for the specified level switches 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 level switches. 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.

Level switches 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.

Level switches must not be field repaired.

Physical damaged sustained by the product may render it un-serviceable.

P/N 72947
Rev. Y



Gems Sensors Inc.
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Model LS-750

Steel Tank Sensor

Instruction Bulletin No. 157728



Environmental Products

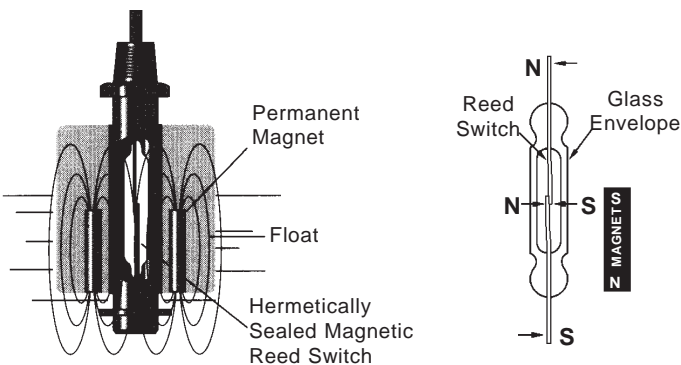
These Sensors may not be compatible with indicating and alarm equipment supplied by other manufacturers

Note: LS-750 sensors are non-voltage producing devices and do not contain energy storing components. However, since primary use is in hazardous locations, an appropriate intrinsically safe interface device is required.

With its compact size, the Gems LS-750 single float, liquid level sensor is ideally suited for use in steel double-wall tanks. It requires no calibration, and is easy to install and maintain. When positioned vertically at the bottom of a steel tank's stand pipe, it reliably senses the presence of a liquid. It detects hydrocarbons and water as low as 3/4" from the bottom of a tank or sump. The LS-750 sensor features an epoxy-encapsulated design providing an environmental seal, that makes it a fine choice for harsh environments. An integral slosh shield guards the float from debris; thereby assuring dependable service.

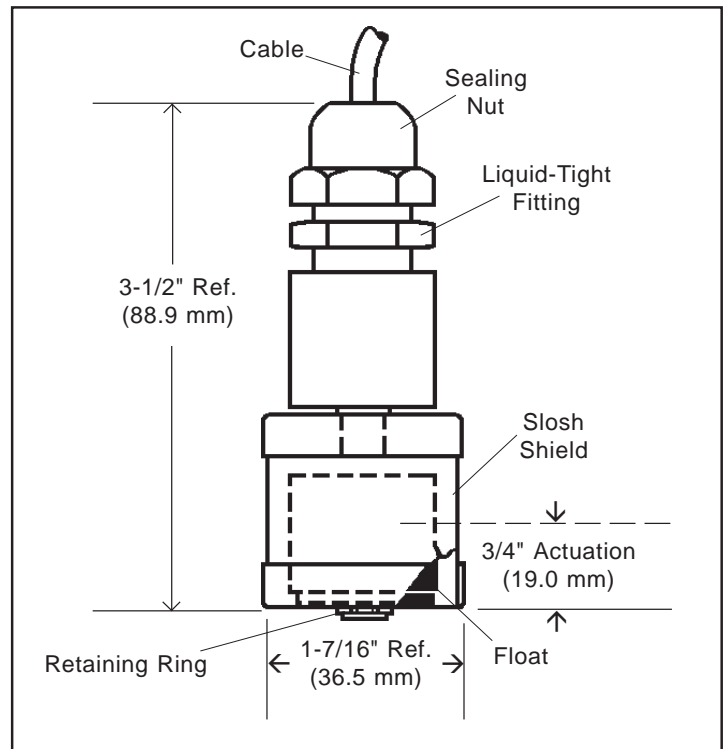
Sensor Operating Principle

Gems LS-750 liquid level sensor operates on a direct, simple principle. A float is equipped with powerful, permanent magnets. As the float rises or lowers with liquid level, it actuates a magnetic reed switch mounted within the stem. This condition either opens or closes the electrical circuit to operate an external alarm or control circuit. When mounted vertically, this basic design provides a consistent accuracy of $\pm 1/8$ th inch.

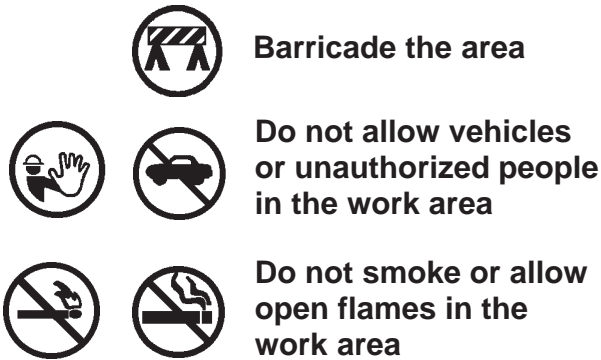


Note: Please refer to specific Gems outline drawings for operational specifications.

Dimensions



Read all instructions before beginning - Follow all safety precautions



WARNING

Dangerous environment. Failure to install this equipment in accordance with NFPA 30A and NFPA 70 could result in severe injury or death. Read, understand and follow NFPA 30A and NFPA 70.



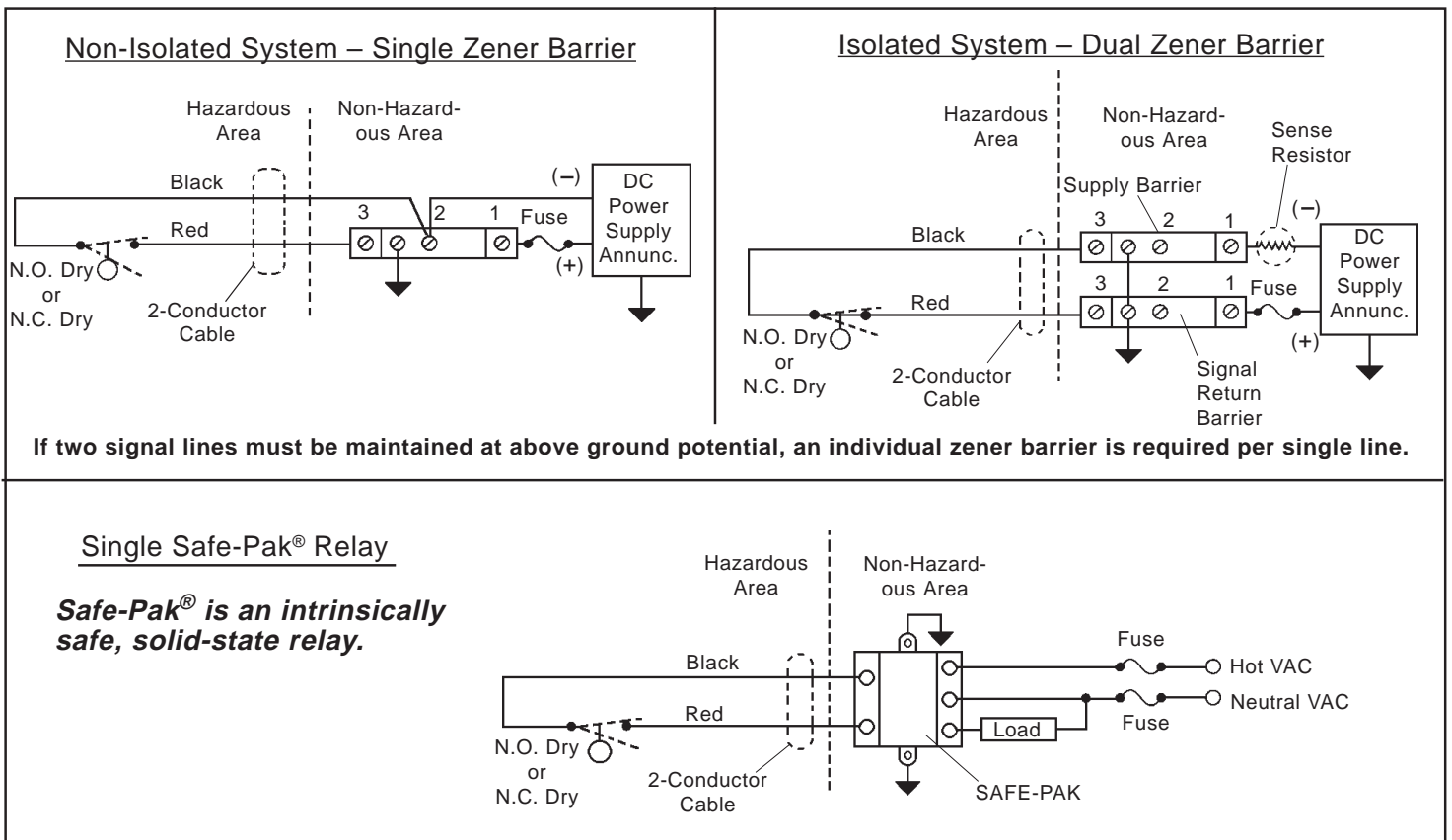
WARNINGS

Read the instructions and warnings carefully before installing the sensor. This unit must be installed in accordance with National Electrical Code ANSI/NFPA-70, 1990; as well as Federal, State and local codes and any other applicable safety codes.

1. To avoid electrical shock, which could kill you, be sure AC power to monitor is off during installation.
2. The nature of the sensor is that it is a non-voltage producing device, containing limited energy-storing components. However, since its primary use is in a hazardous location, an appropriate intrinsically safe interface device must be used.

Note: Failure to observe these warnings could result in serious injury and death, as well as undetected potential environmental and health hazards.

Typical Wiring Diagrams



- IMPORTANT -

This manual assumes all preliminary site preparation is completed and that field wiring from the monitor to the sensor junction box is in place.

Installation Instructions

A. Pre-installation Sensor Testing

1. Temporarily connect the two-wire sensor cable to the field wires in the sensor junction box. Turn Power on.
3. Turn the LS-750 upside down. Audible and visual indicators should alarm.
4. To remove alarm condition, turn the sensor right side up.
5. Secure the riser cap to the riser pipe.
6. Feed the sensor cable through the cord grip on the junction box.
7. Tighten the cable bushing nuts on the riser cap and junction box to ensure a watertight seal at the cable entry.
8. Using wire nuts, connect the two-wire sensor cable to the field wires in the sensor junction box.

B. Sensor Installation Instructions

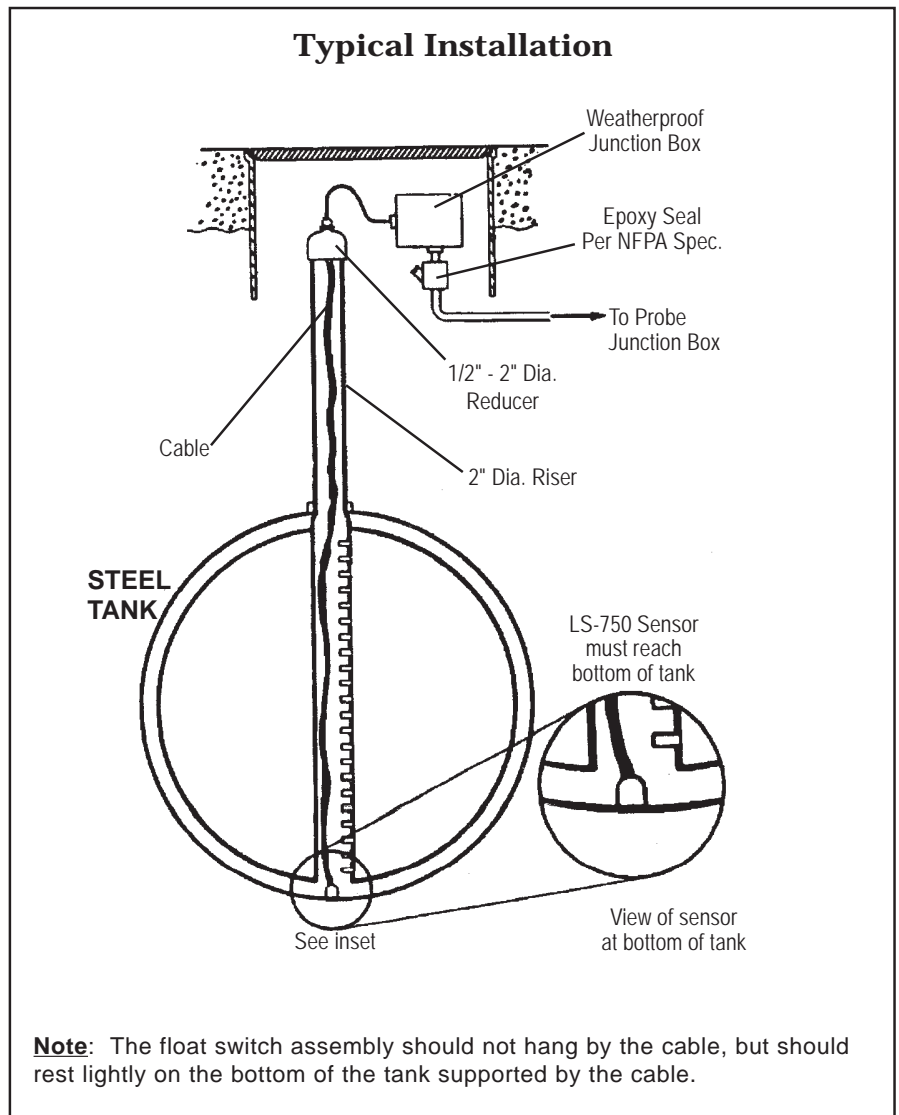
1. Turn off power to the control. **Note: Do not install the sensor if any liquid is present in the annular space. Failure to comply will lead to an alarm.**

2. Make sure no liquid is present in the annular space.
3. To be sure the sensor will reach the bottom of the annular space, first measure the sensor riser pipe from the bottom of the pipe to the top. Then measure the same distance up the leader cable from its connection to the sensing element and mark the leader cable.
4. Lower the float switch assembly into the riser pipe until the float switch touches the bottom of the tank.

5. Keeping the cable taut, secure the sensor assembly in place by attaching the grip cord.

Note: The float switch assembly should not hang by the cable, but should rest lightly on the bottom of the tank supported by the cable.

CE This product is suitable for Class I and Class II applications only, per the requirements of standard EN60730 and any additional specific requirements for a particular application or medium being sensed. Class I compliance of metal bodied units requires a ground connection between the metal body and the earthing system of the installation. Class I compliance of plastic bodied units in contact with a conductive medium requires that the medium be effectively earthed so as to provide an earthed barrier between the unit and accessible areas. For Class III compliance, a supply at safety extra-low voltage (SELV) must be provided. Please consult the Factory for compliance information on specific part numbers.



Maintenance

Note: Please consult your state E.P.A. office or appropriate regulatory agency regarding periodic inspection of the sensor. There are no user serviceable parts.

WARNING

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

Warranty

Gems' standard warranty applies



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