

# Float Type Level Switches Installation and Maintenance

# Orientation

A standard NPT female boss in tank top, bottom or side is all that is required for rapid installation. Units operate normally 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.

## Accuracy and Repeatability

The accuracy of many GEMS level switches is  $\pm 1/8$ " (3.2 mm) of true liquid level. In order to assure the proper accuracy for your liquid, please specify the specific gravity of the media. GEMS will automatically calibrate for the submergence of the float, based on this specific gravity information. Furthermore, accuracy may be enhanced by specifying whether the circuit condition should be measured on decreasing or increasing liquid level. The repeatability of the actuation point is approximately 1/32 inch (.79 mm).

## **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 may fail to close due to a high resistance path through the moisture.

There are several means that can be used 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.

By working closely with your GEMS representative, there are many design considerations that can help lessen the effects of moisture.

- 1. Consider a product such as the GEMS LS-270 Single Level Switch which has a water-tight molded cable.
- 2. Consider using a unit with a connector and gasket seal.
- 3. Consider using moisture resistant heat shrink tubing on the switch capsule assembly.
- 4. Consider using Scotchcast<sup>®</sup> 2114 sealing compound and electrical insulator. Part No. 157636.

A WORD OF 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.

Please refer to Gems Instruction Bulletins for detailed installation and maintenance procedures. Instruction Bulletins are available at www.GemsSensors.com





# Thread Treatment

### Sealing

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

## Tiahtenina

When threading a plastic level switch into a metal coupling, the installer should use a suitable wrench and tighten the threads 1 to 1-1/2additional turns past hand tight. Over torquing of the threads will result in damage to the plastic mounting plug.

### 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 T dimension into any calculation of switch actuation levels (L) and overall length  $(L_{o})$ .

	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″

Examples: To solve for "L" use the formulas shown in the examples below. To calculate the Actual Tank Intrusion, substitute the  $L_0$  value in place of  $L_1$  in any of the formulas.

#### Internally Mounted – Standard Length

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

 $L = L_1 + (A - T)$ 

L = 1-3/16'' + (21/32'' - .39'')L = 1.46''



#### Internally Mounted – Configurable Length

LS-800 Series (Type 1) internally mounted through a 1/2" NPT hole. To calculate L dimension:

 $L = L_1 + (A - T)$ L = 6'' + (1 - 1/4'' - .53'')L = 6.72''



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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.
- L = Switch actuation level as measured from inside surface of tank or bracket to fluid surface.
- $L_1$  = Switch actuation level, nominal, as measured from bottom of mounting (based on a liquid specific gravity of 1.0).

#### Externally Mounted – Configurable Length

LS-700 Series (Type 3) externally mounted through a 1" NPT hole. To calculate L dimension:

$$L = L_1 - (P - T)$$
  

$$L = 6^{"} - (1^{"} - .68^{"})$$
  

$$L = 5.68^{"}$$

L

