Small Size – Alloys
LS-700 Series Combines Durability of Metal With a Compact Design for Restricted Spaces

- Stainless Steel or Brass Mountings and Stems
- 1 to 5 Actuation Levels
- Lengths to 48 inches

These compact units feature the rugged durability of stainless steel or brass construction in a lightweight package. Ideal for tanks less than 4 feet.

LS-700 Series switches are exceptionally versatile because of the many useful options available. Described briefly below, these options can extend the functionality of your GEMS LS-700 Series custom switch.

Temperature Sensing
To save space and simplify wiring, GEMS can incorporate a temperature sensor in the end of the float stem on any model type LS-700. Two sensor types are available: Transducers for continuous output, and Thermostats for switch actuation. See Page B-25 for details.

Solid-State Relays
Control motors, pumps, valves and other “load” devices with GEMS Solid-State Relays. Intrinsically-safe relays and barriers allow safe operation of level switches in hazardous areas. See Section I for details.

Factory Mutual Approved Explosion Proof
LS-700-EP Series offers 1 to 5 actuation levels with lengths to 48” for use in hazardous locations. Call Gems factory for details.

1. Mounting Types
Each mounting type can be configured with stem lengths \( L \) and float material indicated in this table.

<table>
<thead>
<tr>
<th>Type</th>
<th>1/8” NPT</th>
<th>3/4” NPT</th>
<th>1 NPT</th>
<th>3-5/8” Dia. Flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 2</td>
<td>1/16” HEX</td>
<td></td>
<td>1-5/16” HEX</td>
<td>BOLT CIRCLE 3” DIA. (76.2 mm)</td>
</tr>
<tr>
<td>Type 5</td>
<td>1-5/16-12UNF-2A</td>
<td>3/8-24</td>
<td>1-1/4” NPT</td>
<td>3-5/8” DIA (92.1 mm)</td>
</tr>
<tr>
<td>Type 6</td>
<td></td>
<td></td>
<td></td>
<td>5/16” DIA (7.9 mm) THRU (6) HOLES</td>
</tr>
<tr>
<td>Type 7</td>
<td></td>
<td></td>
<td></td>
<td>3/16” (4.8 mm)</td>
</tr>
</tbody>
</table>

Stem and Mounting Material
Brass or 316 Stainless Steel

Max Length
48 inches (121.9 cm) – 21” Max On Bent Stem Versions (Consult Factory)

Mounting Position
Vertical ± 30° Inclination

Float Stoppers
Brass Units: Beryllium Copper Grip Rings; Stainless Steel Units: S.S. ARMCO PH-15-7 MO Grip Rings

Pressure Rating, PSI, Max.
See Float Value on Following Page 50

Notes:
1. Mounting Types 2, 3 & 7 are available with a 1/2” MNPT conduit adaptor. This option can be selected on the checklist.
2. Mounting Type 7 is not U.L. Approved.
3. In some instances, concentrations of chlorine and other corrosive compounds in the media require the use of collar type float stops. Consult factory for details.
4. Mounting only. Maximum pressure rating for complete unit will be the lower of this pressure or the selected float pressure (see Float Types, on next page).

Mounting Options and Float Selection on following pages.
2. Float Types

A single float type is selected for use at all actuation points.

<table>
<thead>
<tr>
<th>Float Materials</th>
<th>Buna N</th>
<th>PTFE – Spring Biased</th>
<th>Polypropylene</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible Mounting Types</td>
<td>1, 2, 3, 4, 5, 6, 7</td>
<td>1, 3, 4, 5, 6, 7</td>
<td>1, 3, 4, 5, 6, 7</td>
</tr>
</tbody>
</table>

### Float Dimensions

<table>
<thead>
<tr>
<th></th>
<th>1-1/16” (27.8 mm)</th>
<th>1-3/32” (23.0 mm)</th>
<th>1-1/16” (25.4 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>0.75”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diameter</td>
<td></td>
<td>1” DIA</td>
<td>1” DIA</td>
</tr>
</tbody>
</table>

### Part Number

<table>
<thead>
<tr>
<th></th>
<th>187553</th>
<th>39049</th>
<th>133764</th>
<th>145730</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>Water: to 180°F (82.2°C)</td>
<td>-40°F to +300°F (-40°C to +149°C)</td>
<td>-40°F to +225°F (-40°C to +107°C)</td>
<td>-40°F to +300°F (-40°C to +149°C)</td>
</tr>
<tr>
<td>Pressure, PSI, Max.</td>
<td>300*</td>
<td>1000*</td>
<td>50 PSI @ 70°F*</td>
<td></td>
</tr>
<tr>
<td>Min. Liquid Specific Gravity</td>
<td>0.65</td>
<td>0.45</td>
<td>0.65</td>
<td>0.65</td>
</tr>
</tbody>
</table>

*De-rated with increasing temperature above 70°F (21°C).

3. Number of Actuation Levels and Electrical Specifications

Typically, one float is required for each point at which you need a switch action to occur. The number of actuation levels available depends on the Group Type Wiring selected; see below.

- **Group I Wiring:** 1 to 5 Actuation Levels.
- **Group II Wiring:** 1 to 3 Actuation Levels.

**Switch (SPST, N.O. or N.C.):** 20 /100 VA.

**Lead Wires:** #22 AWG, 24” L., PTFE.

**Approvals:** LS-700 Series switches are U.L. Recognized – File No. E45168; CSA Listed – 30200.

For clarity, only two actuation levels are shown in each group diagram.

**GROUP I**

**SPST**

**GROUP II**

**SPST**

**Wiring Color Code**

Tinted area designates U.L. Recognized wiring configurations.

<table>
<thead>
<tr>
<th></th>
<th>SPST Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common Wire</td>
<td>Group I</td>
</tr>
<tr>
<td>Black</td>
<td>None</td>
</tr>
<tr>
<td>NO/NC</td>
<td>SW Com.</td>
</tr>
<tr>
<td>Red</td>
<td>Red</td>
</tr>
<tr>
<td>L2</td>
<td>Yellow</td>
</tr>
<tr>
<td>Blue</td>
<td>Blue</td>
</tr>
<tr>
<td>Brown</td>
<td></td>
</tr>
<tr>
<td>L5</td>
<td>Orange</td>
</tr>
</tbody>
</table>

**Notes:**
1. Units with 100 VA switches are not U.L. Recognized or CSA Listed.
2. See “Electrical Data” on Page X-5.

Factory Mutual Approved Explosion-Proof

For Hazardous areas give Gems a call and ask about the LS-700-EP Series. These custom-length sensors provide up to 5 actuation levels, with lengths up to 48”. Multiple mounting, float and material options. 800-378-1600

**FM**
** 316 Stainless Steel floats are available with ceramic potting that allows temperatures to 400°F (204°C); contact factory for these high-temperature applications.

### 4. Actuation Level Dimensions

Swich actuation levels are determined following the guidelines below.

A = Minimum distance to highest actuation level.

B = Minimum distance between actuation levels.

C = Minimum distance between two actuation levels with one float (Note: One float for two levels can be used only when low level is N.C. dry and high level is N.O. dry).

D = Minimum distance from end of unit to lowest level.

<table>
<thead>
<tr>
<th>Float Part Number</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>39049</td>
<td>11/16”</td>
<td>1-5/8”</td>
<td>3/4”</td>
<td></td>
</tr>
<tr>
<td>60241</td>
<td>9/16”</td>
<td>1-15/16”</td>
<td>15/16”</td>
<td></td>
</tr>
<tr>
<td>133764</td>
<td>3/4”</td>
<td>7/8”</td>
<td>1-7/8”</td>
<td></td>
</tr>
<tr>
<td>136550</td>
<td>5/16”</td>
<td>13/16”</td>
<td>136/16”</td>
<td></td>
</tr>
<tr>
<td>141750</td>
<td>1/2”</td>
<td>1-9/16”</td>
<td>13/16”</td>
<td></td>
</tr>
<tr>
<td>145730</td>
<td>5/8”</td>
<td>1-3/8”</td>
<td>13/16”</td>
<td></td>
</tr>
<tr>
<td>156900</td>
<td>9/16”</td>
<td>1-9/16”</td>
<td>13/16”</td>
<td></td>
</tr>
<tr>
<td>158369</td>
<td>5/8”</td>
<td>1-7/8”</td>
<td>13/16”</td>
<td></td>
</tr>
<tr>
<td>197732</td>
<td>11/16”</td>
<td>1-7/16”</td>
<td>1”</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. A, B and D dimensions based on a liquid specific gravity of 1.0.
2. Tolerance on actuation levels is ±1/8” (3.2 mm).
3. For bent stem versions, please request drawing LS-77700.
Optional Integrated Temperature Sensors

- Compatible with LS-700 and LS-800 Series Units
- Thermostat Switches or Thermistor Versions

Advantages of integrated temperature sensors:
- Space Saving.
- Fewer intrusions into the tank.
- Electrical wiring emanates from a single source – eliminate multiple conduits.
- Economical – typically less expensive than separate sensors.

Look for units in this catalog with the temperature sensor icon:

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Thermistor for Continuous Indication – TM-800 and TM-700

- Excellent repeatability.

**Value:** 10,000 ohms @ 77°F (25°C)

**Tolerance:** ±0.2°C from 32°F to 158°F (0°C to 70°C)

**Operating Temperature:** 302°F (150°C), Max.

**Alpha @ 25°C:** -4.39%/°C

**Dissipation Constant:** 1mW/°C in Still Air; 8mW/°C in Oil Bath.

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**How to Order**

Temperature thermistors are available on LS-700 Series units with up to three actuation levels, and on LS-800 Series units with up to five actuation levels. To have thermistor added, order model TM-800 or TM-700.

Note: This option is not CE Approved.

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Thermostat for Switch Actuation

- Standard Settings from 100°F to 200°F.
- Open or close switch on increasing temperature.

Use these switches to set off High/Low temperature alarms. Or, combine with GEMS relays to control tank heating and cooling, motor-operated valves, etc.

To designate the thermostat switch option, order model **TH-700** or **TH-800**.

Also specify the choice from selections A, B and C below.

A. **Switch Rating**:
   - For LS-800 Series: 6A/120V, 4A/240V, 100VA (non-inductive).
   - For LS-700 Series: 2.6A/120V (inductive).

B. Contact Operation on Increasing Temperature:
   - “Opens” when Set Point reached or “Closes” when Set Point reached.

C. Standard Temperature Set Point (±7.2°F; ±4°C):
   - 100°F (37.7°C), 125°F (51.6°C), 150°F (65.6°C), 175°F (79.4°C), 200°F (93.3°C)

Note:
1. Other temperature settings and tolerances available; 25 piece minimum order quantity applies.
2. Please call GEMS Sensors Inc. for more information.
3. This option is not CE Approved.

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**LS-700 Types Custom Length Float Type Level Switches**

**Application Environmental Conditions**

This information is essential to the accurate and proper operation of your GEMS configurable sensors. Please complete fully and accurately.

1. **Liquid Media:**
   
   2. **Pressure:**
      - Minimum _______ psig
      - Maximum _______

3. **Temperature:**
   - Minimum _______ °F
   - Maximum _______

4. **Specific Gravity:**
   - Minimum _______
   - Maximum _______

5. **Viscosity:** _______ SSU

6. **Tank Material:**

7. **Tank Depth:**

**5. Switch Actuation Level**

<table>
<thead>
<tr>
<th>Actuation Level</th>
<th>Distance to Actuation Level – Inches*</th>
<th>SPST Switch Operation** (Check Type)</th>
</tr>
</thead>
<tbody>
<tr>
<td>L5</td>
<td></td>
<td>N.O.</td>
</tr>
<tr>
<td>L4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Measured from inner surface of mounting plug or flange.
** Switch position is “normal” with unit dry (tank empty).
*** L1 is the distance to the lowest actuation level with mounting “up,” and is the distance to the highest actuation level with mounting “down.”

**B. Length Overall (L0) _________ inches.**

**6. Lead Wire Length:**

- 12”
- 24”
- Other: _______ inches.

**7. Options:**

- Temperature Switch Settings (*°F): 100 125 150
- 175 200

- On rising temperature, switch... Opens Closes
- Slosh Shield
- Collars
- 1/2” NPT Conduit Connection (available for Types 2, 3 & 7)
- J-box Electrical Connection
- Explosion Proof Type (FM/CSA)
- NEMA 4 Type

Please contact GEMS Sensors Inc. for any configuration or special requirements not covered on this form. **800-378-1600**

Quote: $_________ Date Quoted: ___/___/____

Additional minimum charges may apply on special orders.