

## 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<sub>0</sub>) and float material indicated in this table.

Note: Sanitary flange mountings are also available, but not shown. Please contact factory.



Type 1 1/8" NPT	Type 2 3/4" NPT <sup>1</sup>	Type 3 1" NPT <sup>1</sup>	Type 4 3-5/8" Dia. Flange
Type 5 1-5/16-12UNF-2A	Type 6 3/8-24	Type 7 1-1/4" NPT <sup>1,2</sup>	

<b>Stem and Mounting Material</b>	Brass or 316 Stainless Steel	
<b>Max Length</b>	48 inches (121.9 cm) – 21" Max On Bent Stem Versions (Consult Factory)	
<b>Mounting Position</b>	Vertical ± 30° Inclination	
<b>Float Stops<sup>3</sup></b>	Brass Units: Beryllium Copper Grip Rings; Stainless Steel Units: S.S. ARMCO PH-15-7MO Grip Rings	
<b>Pressure Rating, PSI, Max.<sup>4</sup></b>	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).

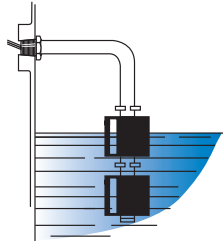
Mounting Options and Float Selection on following pages.

### Optional Mountings

Please contact Gems Sensors about these mountings or other requirements not seen here.

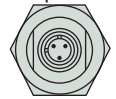
#### Bent Stem (LS-77700)

Used when tank top or bottom is inaccessible.



#### Integral Receptacle

2-5 Pin miniature receptacle for mounting



Type 2 or Type 3; eliminates splicing and eases connections.



#### Conduit Adapter

A 1/2" MNPT conduit is available for Mounting Type 2 & 3. Select from list of options on the Check List.

## 2. Float Types

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

Float Materials	Buna N		PTFE – Spring Biased	Polypropylene
<b>Compatible Mounting Types</b>	1, 2, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7
<b>Float Dimensions</b>				
<b>Part Number</b>	<b>187553</b>	<b>39049</b>	<b>133764</b>	<b>145730</b>
<b>Operating Temperature</b>	Water: to 180°F (82.2°C) Oil: -40°F to +300°F (-40°C to 149°C)		-40°F to +300°F (-40°C to +149°C)	-40°F to +225°F (-40°C to +107°C)
<b>Pressure, PSI, Max.</b>	300*		1000*	50 PSI @ 70°F*
<b>Min. Liquid Specific Gravity</b>	0.65	0.45	0.65	0.65

\*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.

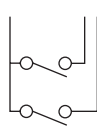
**Lead Wires:** #22 AWG, 24" L., PTFE.

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

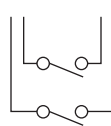
#### Typical Wiring Diagrams

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.

SPST Switches			
Wiring	Group I	Group II	
<b>Common Wire</b>	Black	None	
	NO/NC	SW Com.	NO/NC
<b>L1</b>	Red	Red	Red
<b>L2</b>	Yellow	Yellow	Yellow
<b>L3</b>	Blue	Blue	Blue
<b>L4</b>	Brown		
<b>L5</b>	Orange		

#### Notes:

- Units with 100 VA switches are not U.L. Recognized or CSA Listed.
- 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**

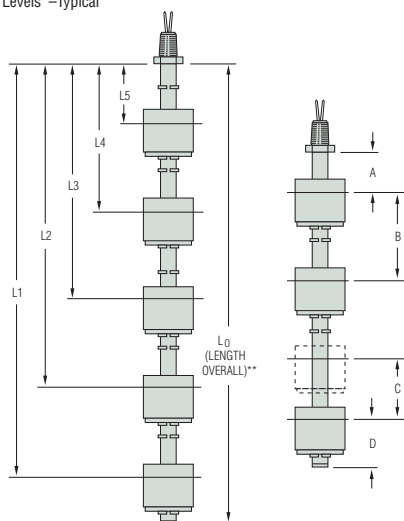


Polypropylene	316 Stainless Steel**				
1, 2, 3, 4, 5, 6, 7	1, 4, 6	1, 3, 4, 5, 6, 7	1, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7
<b>197732</b>	<b>60241</b>	<b>141750</b>	<b>156900</b>	<b>136550</b>	<b>158369</b>
-40°F to +250°F (-40°C to +121°C)	-40°F to +300°F (-40°C to +149°C)**				
Atmospheric	100	275	600	400	150
0.95	0.70	0.85	0.90	1.10	.85

\*\* 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

Actuation Levels\*—Typical



\* Actuation level distances and L<sub>0</sub> (overall unit length) are measured from inner surfaces of mounting plug or flange.

\*\* Length Overall (L<sub>0</sub>) = L<sub>1</sub> + Dimension D. See Mounting Types for Maximum Length values.

Switch 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.

Float Part Number	Dimensions			
	A	B	C	D
<b>39049</b>	11/16" (17.5 mm)	1-5/8" (41.3 mm)	1/8" (3.2 mm) Min.	3/4" (19.1 mm)
<b>60241</b>	9/16" (14.3 mm)	1-15/16" (49.2 mm)		15/16" (23.8 mm)
<b>133764</b>	3/4" (19.0 mm)	1-1/2" (38.1 mm)		7/8" (22.2 mm), N.O. 1-3/16" (30.2 mm), N.C.
<b>136550</b>	5/16" (7.9 mm)	1-7/8" (47.6 mm)		1-11/16" (42.9 mm)
<b>141750</b>	1/2" (12.7 mm)	1-9/16" (39.7 mm)		1-1/8" (28.6 mm)
<b>145730</b>	5/8" (15.9 mm)	1-3/8" (34.9 mm)		13/16" (20.6 mm)
<b>156900</b>	9/16" (14.3 mm)	1-9/16" (39.7 mm)		13/16" (23.8 mm)
<b>158369</b>	5/8" (15.9 mm)	1-7/8" (47.6 mm)		1-3/8" (34.9 mm)
<b>187553</b>	11/16" (17.5 mm)	1-7/16" (36.5 mm)		7/8" (22 mm)
<b>197732</b>	1/2" (12.7 mm)	1-3/8" (34.9 mm)		1" (25.4 mm)

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.

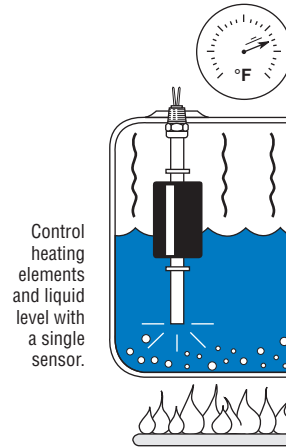
## Optional Integrated Temperature Sensors

- ▶ 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: 



### 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.

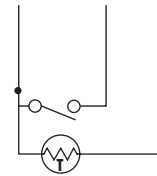
**Alpha @ 25°C:** -4.39%/°C

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

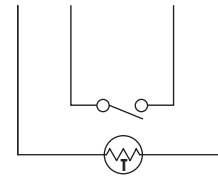
#### How to Order

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.



GROUP I



GROUP II

### Thermostat for Switch Actuation

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

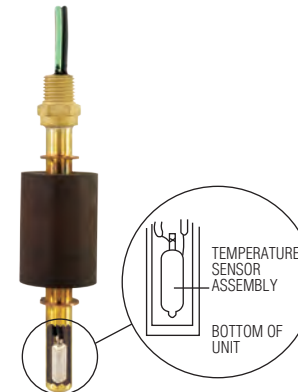
Use these switches to set off High/Low temperature alarms. Or, combine with GEMS relays to control tank heating and cooling, motor-operated valves, etc.

To designate the thermostat switch option, order model TH-700 or TH-800. Also specify the choice from selections A, B and C below.

- Switch Rating:**  
For LS-800 Series: 6A/120V, 4A/240V, 100VA (non-inductive).  
For LS-700 Series: 2.6A/120V (inductive).
- Contact Operation on Increasing Temperature:**  
“Opens” when Set Point reached or “Closes” when Set Point reached.
- 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)

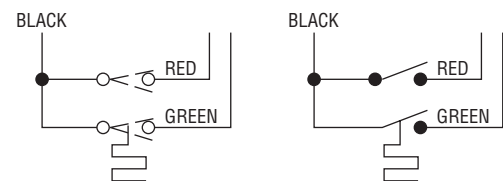
Note:

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




Note: End of unit stem must be submerged a minimum of 2-3/4" for level switch actuation.

#### Typical Wiring Diagram



GROUP I

GROUP II

 <p><b>Photocopy This Form</b> Use one form for each product type you are selecting. This form may also be completed online at <a href="http://gemssensors.com">gemssensors.com</a> for RFQ.</p>	This is a <input type="checkbox"/> Request for a Quote <input type="checkbox"/> Order P.O.# _____	Name _____ Company _____ Street _____ City _____ State _____ Zip _____ Phone (____) _____ Fax (____) _____
	Quantity Needed _____ Date Required ____/____/____ Shipping Method: _____ Partial Accepted: <input type="checkbox"/> Yes <input type="checkbox"/> No	

## 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:** \_\_\_\_\_  
**Tank Depth:** \_\_\_\_\_
- 7. **Unit is Mounted In:**  Tank Top  Tank Bottom

### 1. Series Type:

- LS-700  TH-700 (Thermostat Equipped)
- TM-700 (Thermistor Equipped)

### 2. Mounting Type and Materials:

- A. Mounting Type:**
- Type 1  Type 2  Type 3  Type 4
  - Type 5  Type 6  Type 7
- B. Mount and Stem Material:**
- Brass
  - 316 Stainless Steel

3. **Float Part Number:** \_\_\_\_\_  
 Matching floats will be used at each actuation level specified.

### 4. Switch Type and Rating:

- A.**  Group I  Group II
- B.**  SPST
- C.**  20 VA  100 VA  
 Please indicate if using microprocessor/PLC load:  Yes  No

### 5. Switch Actuation Level

Actuation Level	Distance to Actuation Level – Inches*	SPST Switch Operation** (Check Type)	
		N.O.	N.C.
L5			
L4			
L3			
L2			
L1***			

\* 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 (L<sub>0</sub>) \_\_\_\_\_ 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.

