GEMS Continuous Electrical Output Transmitters Provide Direct Liquid Measurement

- Lengths to 18 feet (5.5 m)
- Alloys or Engineered Plastic Wetted Parts
- Analog Output

Completely electronic, Gems Liquid Level Transmitters provide reliable and durable remote tank gauging. A wide variety of material combinations provide compatibility for most liquid media. Gems XM- & XT-300, 700 and 800 Series provide solutions for most small to mid-size tanks in both process and OEM applications; for deeper tanks (to 18 feet) look to Gems 36000 and 66000 Series.

Gems experienced engineering and sales staff can provide customized solutions for applications not satisfied by the standard transmitters shown in this catalog. Do not hesitate to contact Gems if you require a configuration not shown here.

Single Probe or Complete Systems
As a component, Gems transmitters provide the output options compatible with most programmable controllers and other digital receivers. Combined with Gems Digital Receivers you can create a complete tank gauging system.

Typical Applications
Consider GEMS’ versatile transmitters for all your continuous liquid level monitoring needs — water, diesel, lube oils and fuels, as well as various chemical and petrochemical liquids. Here are just a few areas where GEMS’ transmitters are used:

- Utilities • Beverage Industry • Medical • Pharmaceuticals • OHV
- Food Processing • Wineries • Printing • HVAC • Semiconductor

Operating Principle
Gems voltage divider design uses a staggered series of reed switches. As the float moves with the liquid level, the magnets in the float close these reed switches in a “2-3-2 at-a-time” sequence. With every movement of the float, either one additional switch closes or one drops off.

What does this mean to you?
Ensures better accuracy — if one switch was to fail, the signal would be affected only at that point.

GEMS Transmitters monitor water, diesel or lube oils, chemicals and petrochemicals in industries such as pharmaceuticals, municipalities, breweries, textiles, automotive, pulp and paper and others.
Only a Float Can Show True Interface!

- By design or otherwise, dissimilar liquids often reside in the tank — one floating atop another. Most tank gauging methods are limited in these cases, and can only indicate the level of the uppermost surface. With GEMS Transmitters, you can easily monitor the interface between liquids...including the emulsions and slurries that sometimes form between them.

- By adjusting the density of the magnetic float, GEMS can adapt the transmitter to monitor the interface of a broad range of media. This principle applies to oil and water, slurries, acids, bilge and other dissimilar liquids.

- In conjunction with low level alarms, or automatic controllers, GEMS Transmitters will help assure that only the “correct” liquid is taken from a tank, or introduced into a process system.

Selection Guide

<table>
<thead>
<tr>
<th>Tank Depth</th>
<th>Maximum Pressure</th>
<th>Primary Material</th>
<th>Resolution</th>
<th>Output</th>
<th>Transmitter Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less Than 12 Feet (3.7 m)</td>
<td>150 psi (10 bar)</td>
<td>Alloy</td>
<td>1/4 inch (6.4 mm)</td>
<td>10-30 VDC Proportional</td>
<td>XM- &amp; XT-700 XM-800/860</td>
</tr>
<tr>
<td></td>
<td>50 psi (3.4 bar)</td>
<td>Engineered Plastic</td>
<td>1/4 inch (6.4 mm)</td>
<td>10-30 VDC Proportional</td>
<td>XM- &amp; XT-300 XMP-800</td>
</tr>
<tr>
<td></td>
<td>300 psi (2 bar)</td>
<td>Alloy</td>
<td>1/2 inch (12.7 mm)</td>
<td>0-12 VDC Proportional</td>
<td>XM-860</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1/4 inch (6.4 mm)</td>
<td>10-30 VDC Proportional</td>
<td>XM-800</td>
</tr>
<tr>
<td>12 to 18 Feet (3.7 m to 5.5 m)</td>
<td>500 psi (35 bar)</td>
<td>Alloy</td>
<td>1/2 inch (12.7 mm)</td>
<td>10-30 VDC Proportional</td>
<td>XM-66400 XM-36490</td>
</tr>
<tr>
<td></td>
<td>2000 psi (138 bar)</td>
<td>Alloy</td>
<td>1/2 inch (12.7 mm)</td>
<td>10-30 VDC Proportional</td>
<td>XM-66400</td>
</tr>
</tbody>
</table>

Notes:
1. Proportional Voltage = DC voltage proportional to liquid level and source voltage. Ex. 5 VDC input, 0-5 VDC output.
2. Signal Conditioned = Regulated 0-5 VDC, 0-10 VDC, 0-12 VDC and 4-20 mA outputs.

Intrinsic Safety

GEMS transmitters are intrinsically safe for hazardous area operation when properly connected to a GEMS Zener Barrier, a solid-state, energy limiting device. Any need for explosion-proof housings or special wiring of any kind is eliminated. GEMS Zener Barriers are variously UL, FM, CSA and MSHA approved. See Section I.

Contents   Page Start
XM/XT-300 Series.................................C-3
XM/XT-700 Series.................................C-6
XM/XT-800 Series.................................C-9
XM/XT-860 Series.................................C-12
XMP/XTP-800........................................C-16
XT-1000.............................................C-19
CT-1000.............................................C-21
XM/XT-36490........................................C-23
XM/XT-66400........................................C-23
Signal Conditioning Modules...............C-26
Receivers..........................................D-24

Got Mud?
Here’s a tip. Gems Float Sensors are the best, most reliable method to monitor mud pits. See our Large Size Alloy models on Page C-23, and use with the 8” float for best results.

Use multiple Gems Transmitters to accurately monitor proportions of dissimilar liquids and emulsions within a single tank.

Small Size – Engineered Plastics
XM/XT-300 Engineered Plastics Series
Brings Continuous Output to Shallow Tanks

Your most complete line of small, polysulfone liquid level sensors...all from Gems Sensors.

- All-Plastic Wetted Parts
- 4mm Resolution
- Indicating Length to 14” (35.5 cm); Stem Length to 20” (50 cm)
- U.L. Pending

Designed for the high quantity needs of the OEM, XM/XT-300 Series transmitters are the ideal level sensor for shallow tanks and reservoirs. Compact and versatile, these plastic level sensors offer a broad choice of mountings and float materials. The following pages illustrate the various design parameters available to configure custom XM/XT-300 Series Sensors.

1. Mounting Types

Each mounting type can be configured with stem lengths \( (L_0) \) and float materials indicated in this bulletin.

<table>
<thead>
<tr>
<th>NPT Threads</th>
<th>Straight Threads</th>
<th>Metric Threads</th>
<th>Compression Types</th>
<th>Type 11 No Mounting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 21 1/8˝ NPT</td>
<td>Type 22 1˝ NPT</td>
<td>Type 31 3/8” - 24</td>
<td>Type 32 1-5/16” - 12</td>
<td>Type 33 5/8” - 11</td>
</tr>
<tr>
<td>0.49 (12.3)</td>
<td>1.38 (35)</td>
<td>0.25 (6.4)</td>
<td>0.49 (12.3)</td>
<td>0.437 (11.1)</td>
</tr>
<tr>
<td>0.50 (13)</td>
<td>1˝ NPT</td>
<td>0.50 (13)</td>
<td>0.20 (5)</td>
<td>0.437 (11.1)</td>
</tr>
<tr>
<td>0.14 (4)</td>
<td>0.20 (5)</td>
<td>0.20 (5)</td>
<td>0.25 (13)</td>
<td>0.50 (12.5)</td>
</tr>
<tr>
<td>0.14 (4)</td>
<td>0.20 (5)</td>
<td>0.20 (5)</td>
<td>0.25 (13)</td>
<td>0.50 (12.5)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type 41 G 1/4” (1/4” - 19 BSP)</th>
<th>Type 42 G 1” (1” - 11 BSP)</th>
<th>Type 51 M12 x 1.5 Straight Thread</th>
<th>Type 71* 5/8” - 11</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.48 (12.3)</td>
<td>0.20 (5)</td>
<td>0.47 (11.9)</td>
<td>0.437 (11.1)</td>
</tr>
<tr>
<td>0.63 (16)</td>
<td>0.63 (16)</td>
<td>0.63 (16)</td>
<td>0.13 (3)</td>
</tr>
<tr>
<td>0.15 (4)</td>
<td>0.15 (4)</td>
<td>0.15 (4)</td>
<td>0.19 (4.8)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Flange Mountings*</th>
<th>Type 61 2” O.D. Flange</th>
<th>Type 63 Pop Flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>(4) HOLES EQUALLY SPACED AS SHOWN ON A 1.50”/38 B.C.</td>
<td>BUNA “N” GASKET</td>
<td>0.13 (3)</td>
</tr>
<tr>
<td>0.25 (6)</td>
<td>0.10 (2.5)</td>
<td></td>
</tr>
<tr>
<td>0.30 (7.6)</td>
<td>0.13 (3)</td>
<td></td>
</tr>
<tr>
<td>0.50 (13)</td>
<td>0.10 (2.5)</td>
<td></td>
</tr>
</tbody>
</table>

Stem, Mounting and Collar Material: Polysulfone or Noryl®

Max Length \( (L_0) \): 20 inches (50 cm), Tolerance of \( L_0 = \pm 1/16” \) (2 mm)

Mounting Position: Vertical ±30° Inclination

Notes:
1. Type 71 mounting to be used with 3/4” diameter float only.
2. Not recommended for pressure applications.
### 2. Electrical Connections

<table>
<thead>
<tr>
<th></th>
<th>Type 1 Leadwire</th>
<th>Type 2 Cable</th>
<th>Type 3 Liquid-Tight Cable</th>
<th>Type 4 Junction Box Assembly</th>
<th>Type 5 DIN43650 Plug</th>
<th>Type 6 DIN43651 Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible Mounting Type(s)</td>
<td>All</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
<td>42</td>
</tr>
<tr>
<td>Protection Rating</td>
<td>IP64</td>
<td>IP68</td>
<td>IP65</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extended Leads</td>
<td>#22 AWG PVC Wire, 24” (610mm) Min.</td>
<td>#22 AWG PVC Jacketed Cable, 24” (610mm) Min.</td>
<td>Terminal Box (7 Terminals)</td>
<td>3 Poles</td>
<td>6 Poles</td>
<td></td>
</tr>
</tbody>
</table>

### 3. Float Types

<table>
<thead>
<tr>
<th>Float Material</th>
<th>Buna N</th>
<th>Polysulfone</th>
<th>Polypropylene</th>
<th>PVDF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Solid Foamed</td>
<td>20% Glass Filled</td>
<td></td>
</tr>
<tr>
<td>Float Dimensions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Part Number</td>
<td>39048</td>
<td>39005</td>
<td>231500</td>
<td>119455</td>
</tr>
<tr>
<td>Float Material Suitable for...</td>
<td>Oil, Fuels</td>
<td>Water-based Liquids</td>
<td>Broad Chemical Use</td>
<td>Low Specific Gravity Liquids</td>
</tr>
<tr>
<td>Operating Temperature¹</td>
<td>Water: to 180°F (80°C)</td>
<td>-40°F to +221°F (-40°C to +105°C)</td>
<td>-40°F to +212°F (-40°C to +100°C)</td>
<td>-40°F to +221°F (-40°C to +105°C)</td>
</tr>
<tr>
<td>Pressure, psi (bar) Max.²</td>
<td>250 (17)</td>
<td>50 (3.5)</td>
<td>Atmospheric</td>
<td>250 (17)</td>
</tr>
<tr>
<td>Min. Media Specific Gravity</td>
<td>0.45</td>
<td>0.75</td>
<td>0.95</td>
<td>0.90</td>
</tr>
</tbody>
</table>

Notes:
1. Operating temperature range based on float ratings.
2. When used with mounting Type 21, 32 or 22 only; Mounting Type 61, and 63 are not recommended for pressure applications. Pressures are derated with increasing temperature above 70°F

Also Available
XM/XT-350 Combination Siphon and Level Transmitter
Contact Gems for more details. 800-378-1600

XM/XT-300 Engineered Plastics Custom Length, Float Type Level Transmitter Check List

Operational Parameters
This information is essential to the accurate and proper operation of your GEMS configurable sensor. Please complete fully and accurately before ordering.

1. Liquid Media: ____________________________________________

2. Pressure: Minimum ________________ Maximum ________________
   - psig
   - bar
   - °F
   - °C

3. Temperature: Minimum ________________ Maximum ________________
   - °F
   - °C

4. Specific Gravity: Minimum ________________ Maximum ________________

5. Viscosity: ________________ SSU

6. Tank Material: ____________________________________________

7. Unit is Mounted In: □ T – Top Mounted □ B – Bottom Mounted

Product Parameters

1. Mounting Type (select one):
   □ 11 – No Mounting
   □ 21 – 1/8˝ NPT
   □ 22 – 1” NPT
   □ 32 – 1-5/16”-12
   □ 42 – G1” (1/4”-19BSP)
   □ 42 – G1” (1-11BSP)
   □ 51 – M12 x 1.5 Straight Thread
   □ 61 – 2˝ O.D. Flange
   □ 63 – Pop Flange
   □ 63 – 5/8˝-11 with 3/4˝ floats only

5. Dimensions:
   - C: Minimum distance from bottom of mounting to upper float stop.
   - XM Series = 0.25˝ (6.4 mm)
   - XT Series = 1.0˝ (25.4 mm)

   Provide values for both items and check the box next to the most critical value.
   □ Indicating Length ___________ □ Inches □ Millimeters
   □ Length Overall ___________ □ Inches □ Millimeters

6. Output:
XM-300
   □ Proportional Voltage
   □ Resistive (Quantity Dependent)
   Preferred Value @ Maximum Indication ___________ Ohms
   Preferred Value @ Minimum Indication ___________ Ohms

XT-300
   □ 2-Wire, Loop Powered 4-20mA Output (Insert Mounted)
   Note: “C” dimension = 1” minimum

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

* Select one

For use by Gems Sensors & Controls

Quote: $_________ Date Quoted: _____/_____/_____
Small Size – Alloys
XM/XT-700 Series Combines Durability of Metal With a Compact Design for Restricted Spaces

- Stainless Steel or Brass Mountings and Stems
- 4mm Resolution
- Indicating Length to 14” (35.5 cm); Stem Length to 20” (50 cm)

These compact units feature the rugged durability of stainless steel or brass construction in a lightweight package. Ideal for tanks less than 2 feet.

XM/XT-700 Series transmitters are exceptionally versatile because of the many useful options available.

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

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

<table>
<thead>
<tr>
<th>Mounting Type</th>
<th>Stem Material</th>
<th>Max Length</th>
<th>Mounting Position</th>
<th>Float Stops</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1 1/8” NPT</td>
<td>Brass or 316 Stainless Steel</td>
<td>20” (50 cm)</td>
<td>Vertical ± 30° Inclination</td>
<td>Brass Units: Beryllium Copper Grip Rings; Stainless Steel Units: S.S. ARMCO PH-15-7MO Grip Rings</td>
</tr>
<tr>
<td>Type 5 1-1/16” NPT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 6 3/8-24</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type 4 3-5/8” Dia. Flange</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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. 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.
3. 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

<table>
<thead>
<tr>
<th>Polypropylene</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Float Materials</strong></td>
<td><strong>Hollow</strong></td>
</tr>
<tr>
<td>Compatible Mounting Types</td>
<td>1, 3, 4, 5, 6, 7</td>
</tr>
</tbody>
</table>

**Float Dimensions**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>145730</th>
<th>119455</th>
<th>231500</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>-40°F to +221°F (-40°C to +105°C)</td>
<td>-40°F to +221°F (-40°C to +105°C)</td>
<td>-40°F to +200°F (-40°C to +95°C)</td>
</tr>
<tr>
<td>Pressure, PSI, Max.</td>
<td>50</td>
<td>250</td>
<td>Atmospheric</td>
</tr>
<tr>
<td>Min. Liquid Specific Gravity</td>
<td>0.65</td>
<td>0.90</td>
<td>0.95</td>
</tr>
</tbody>
</table>

**Float Materials**

<table>
<thead>
<tr>
<th></th>
<th><strong>Buna N</strong></th>
<th><strong>Nylon</strong></th>
<th><strong>Polysulfone</strong></th>
<th><strong>316/316L SS</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible Mounting Types</td>
<td>1, 3, 4, 5, 6, 7</td>
<td>1, 3, 4, 5, 6, 7</td>
<td>1, 2, 3, 4, 5, 6, 7</td>
<td>1, 3, 4, 5, 6, 7</td>
</tr>
</tbody>
</table>

**Float Dimensions**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>39048</th>
<th>220488</th>
<th>39005</th>
<th>233580</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating Temperature</strong></td>
<td>Water: to 180°F (82.2°C)</td>
<td>Water: to 180°F (82.2°C)</td>
<td>-40°F to +221°F (-40°C to +105°C)</td>
<td>-40°F to +400°F (-40°C to +204°C)**</td>
</tr>
<tr>
<td>Pressure, PSI, Max.</td>
<td>300*</td>
<td>50</td>
<td>50</td>
<td>275</td>
</tr>
<tr>
<td>Min. Liquid Specific Gravity</td>
<td>0.45</td>
<td>0.70</td>
<td>0.75</td>
<td>0.85</td>
</tr>
</tbody>
</table>

* De-rated with temperature.
** -40°F to 300°F (Standard Construction)
301°F to 400°F (Ceramic Potting Construction Required)

Options

**Integral Receptacle**

3-5 Pin miniature receptacle for mounting Type 2, 3 or 7; eliminates splicing and eases connections.

**Conduit Adapter**

A 1/2” MNPT conduit is available for Mounting Type 2, 3, 4, 5 & 7. Select from list of options on the Check List.

Also Available

XM/XT-750 Combination Siphon and Level Transmitter
Contact Gems for more details. **800-378-1600**

XM/XT-700 Types Custom Length Float Type Level Transmitters

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:
   □ XM/XT-700

2. Mounting Type and Materials:
   A. Mounting Type (select one):
      □ Type 1 □ Type 2 □ Type 3 □ Type 4
      □ Type 5 □ Type 6 □ Type 7
      Options
      □ 3-5 Pin Receptacle □ 1/2˝ MNPT Conduit Adapter
      (Types 2, 3 or 7 only)
      (Types 2, 3, 4, 5 or 7 only)
   B. Mount and Stem Material (select one):
      □ Brass
      □ 316 Stainless Steel

3. Float Part Number: __________

4. Electrical Connections (select one type plus length value):
   □ Lead Wire: Length □ 12˝ □ 24˝ □ Other __________
   □ Cable: Length □ 12˝ □ 24˝ □ Other __________
   □ Other ______________________________________

5. Dimensions:
   C: Minimum distance from bottom of mounting to upper float stop.
   XM Series = 0.25˝ (6.4 mm)
   XT Series = 1.0˝ (25.4 mm)

   Provide values for both items and check the box next to the most critical value.
   □ Indicating Length __________ □ Inches □ Millimeters
   □ Length Overall __________ □ Inches □ Millimeters

6. Output:
   XM-700
   □ Proportional Voltage
     Planned Input Voltage __________
   □ Resistive (Quantity Dependent)
     Preferred Value @ Maximum Indication __________ Ohms
     Preferred Value @ Minimum Indication __________ Ohms
   XT-700
   □ 2-Wire, Loop Powered 4-20mA Output (Insert Mounted)
   Note: “C” dimension = 1” minimum

Please contact GEMS Sensors Inc. for any configuration or special requirements not covered on this form. 800-378-1600
Additional minimum charges may apply on special orders.

For use by Gems Sensors & Controls
Quote: $ __________ Date Quoted: __ ___/___/____

Small Size – Alloys

XM/XT-800 Series – Compact Analog Sensors

- Stainless or Brass Construction
- 1/4" Resolution
- Lengths to 144 inches (366 cm)
- OEM Configurations Available

These compact transmitters feature the rugged durability of stainless steel or brass construction. The XM-800 series provides analog output, and can be combined with GEMS Digital Meter Receiver Stations and compact Level Cubes described in this catalog. Our versatile XT-800 Series adds a choice of signal conditioning for use with GEMS digital bargraph receivers or other digital display and control equipment.

Approvals
XM-800 and XT-800 Series transmitters may carry the following commercial approvals:
- FM Approved, Explosion-Proof (J-Box and Stainless Steel Float required).
- UL-Recognized.

XM-800 Series transmitters only:
- CSA Certified

XT-800 Series transmitters only:
- FM Approved, Intrinsic Safety (J-Box and Stainless Steel Float required).

1. Mounting Types

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
<th>Type 4</th>
<th>Type 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot; NPT</td>
<td>1-1/4&quot; NPT</td>
<td>1-1/4&quot; NPT</td>
<td>1-1/4&quot; NPT</td>
<td>1-1/2&quot; NPT</td>
</tr>
<tr>
<td>2-1/4&quot; (63.5 mm)</td>
<td>2-1/2&quot; (69.8 mm)</td>
<td>5-1/4&quot; (150 mm) Flange</td>
<td>2-1/4&quot; (51.2 mm)</td>
<td>2-1/2&quot; Sanitary Flange</td>
</tr>
</tbody>
</table>

- Stem Material: Brass or 316 Stainless Steel
- Mounting Material: Brass or 316 Stainless Steel
- Float Stop Material: Brass Units: Beryllium Copper Grip Rings; Stainless Steel Units: S.S. ARMCO PH-15-7MO Grip Rings
- Operating Temperature* With J. Box Mounted or XM Signal Conditioners: Oil: -40°F to +230°F (-40°C to 110°C), Water to +180°F (82.2°C)—Buna N Float; -40°F to +230°F (-40°C to 110°C)—Stainless Steel Float
- Operating Pressure: +5°F to +160°F (-15°C to +70°C)
- Overall Length, Max.: 72" (183 cm) Tubing; 144" (366 cm) Pipe (Types 3 & 4 only)

* Consult factory for higher temperature ranges.
2. Float Types
Based on the overall length required by your tank, select from two main subsets of floats below; further refine selection based on material and performance parameters.

<table>
<thead>
<tr>
<th>Float Material</th>
<th>Buna N</th>
<th>Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/4” (31.8mm)</td>
<td>1-7/8” (47.6mm)</td>
<td>1.63” (40.9mm)</td>
</tr>
<tr>
<td>1-5/16” (33.9mm)</td>
<td>1-3/16” (46.0mm)</td>
<td>2-1/16” (50.4mm)</td>
</tr>
<tr>
<td>5/16” (7.9mm)</td>
<td>5/16” (7.9mm)</td>
<td>1.81” (46mm)</td>
</tr>
<tr>
<td>5/16” (8mm)</td>
<td>5/16” (8mm)</td>
<td>2.68” (68mm)</td>
</tr>
</tbody>
</table>

Compatible Mountings

<table>
<thead>
<tr>
<th>Part Number</th>
<th>164255</th>
<th>43359</th>
<th>156490</th>
<th>43590</th>
<th>69654</th>
<th>52084</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Liquid Spec. Gravity</td>
<td>.55</td>
<td>.55</td>
<td>.70</td>
<td>.75</td>
<td>.55</td>
<td>.75</td>
</tr>
<tr>
<td>Operating Pressure, Max.</td>
<td>150 psi (10 bar)</td>
<td>150 psi (10 bar)</td>
<td>80 psi (6 bar)</td>
<td>300 psi (21 bar)</td>
<td>150 psi (10 bar)</td>
<td>300 psi (21 bar)</td>
</tr>
<tr>
<td>Operating Temp., Max.</td>
<td>Water: 180°F (82°C)</td>
<td>Oil: 230°F (110°C)</td>
<td>230°F (110°C)</td>
<td>Water: 180°F (82°C)</td>
<td>Oil: 230°F (110°C)</td>
<td>230°F (110°C)</td>
</tr>
</tbody>
</table>

Notes:
1. @ Ambient Temperature
2. Recommended for Type 2 mounting only.
3. Consult factory for higher temperature range.

3. To Determine Dimensions

B: Overall Length = Inches of Indication + C + X (See Table at Right)
C: Distance From Bottom of Mounting to Float Stop (Customer Specified):
- 1/4” (6.4mm) Minimum
- 1-1/4” (31.8mm) Minimum on Type 1, XT Series only.

Calculating Length
To find Overall Length when Inches or Indication is known:
- Inches of Indication + C * + X = Overall Length
To find Maximum Inches of Indication when Overall Length is known:
- Overall Length - C * - X = Maximum Inches of Indication
*C dimension is determined by customer.

4. Input/Output
For XM-800 Series, no special output designation is necessary.
For XT-800 Series, specify the desired signal conditioning by Part Number.
Additional information about GEMS signal conditioning modules is found on Page C-26.
Request for a Quote

Order P.O.# ______

Quantity Needed ____________

Date Required ____/____/_____

Shipping Method: ____________

Partials Accepted: [ ] Yes [ ] No

Name ________________________________________

Company ______________________________________

Street ________________________________________

City _____________________ State ____ Zip ________

Phone ( _____ ) _________________________________

Fax ( _____ ) _________________________________

Use one form for each product type you are selecting.

Photocopy This Form

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Float Type Level Transmitters – XM/XT-800 Series

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 _______ psig

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

4. Specific Gravity: Minimum _______ Maximum _______

5. Viscosity: ____________ SSU

6. Tank Material: ____________________________

7. Unit is Mounted In: [ ] Tank Top [ ] Tank Bottom

8. Moisture Protection Required? [ ] Yes [ ] No

---

1. Series:
   - [ ] XM/XT-800 (1/4˝ Resolution)

3. Materials:
   - a. Stem:
     - [ ] Brass
     - [ ] 316 Stainless Steel
   - b. Mounting:
     - [ ] Brass
     - [ ] 316 Stainless Steel
     - [ ] Carbon Steel (Type 4 flange only)
   - c. Collar Float Stops:
     - [ ] Brass
     - [ ] 316 Stainless Steel

Notes:
   1. Type 1, Type 2 and Type 3 only
   2. Standard Float Stops supplied in PH 15-7 MO on S.S. units and Beryllium Copper on Brass units. Brass and S.S. Float Stops with Brass and S.S. units only, respectively.

5. Dimensions:

   Overall Length (complete one line only):

<table>
<thead>
<tr>
<th>Float Selected</th>
<th>Indicating Length (Half Inches)</th>
<th>“C” Dimension ±1/16˝ (1.8 mm)</th>
<th>Float Factor X Inch (mm)</th>
<th>Overall Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>43359</td>
<td>+</td>
<td>+</td>
<td>2.5 (63.5)</td>
<td>=</td>
</tr>
<tr>
<td>43590</td>
<td>+</td>
<td>+</td>
<td>3.44 (87.3)</td>
<td>=</td>
</tr>
<tr>
<td>52084</td>
<td>+</td>
<td>+</td>
<td>3.63 (92.1)</td>
<td>=</td>
</tr>
<tr>
<td>69654</td>
<td>+</td>
<td>+</td>
<td>2.69 (68.3)</td>
<td>=</td>
</tr>
<tr>
<td>156490</td>
<td>+</td>
<td>+</td>
<td>2.06 (52.3)</td>
<td>=</td>
</tr>
<tr>
<td>162455</td>
<td>+</td>
<td>+</td>
<td>2 (50.8)</td>
<td>=</td>
</tr>
</tbody>
</table>

Notes:
   1. Indicating Length: 1/2˝ increments
   2. Minimum C Dimension = 1/4˝; or 1/2˝ on units greater than 72˝ in length.

7. Options:

   - [ ] Explosion Proof J-Box*
   - [ ] NEMA 4 J-Box

* Required for FM Approved Explosion Proof units

Please contact Gems for any configuration or special requirements not covered on this form. 800-378-1600

---

Gems Sensors & Controls

Small Size – Alloys

XM/XT-860 Series – Compact, Resistive Output Level Sensors

- High Volume/Low Cost OEM Design
- Brass or Stainless Steel Construction
- 1/2” or 1” Resolution
- Lengths to 24 inches (610 mm)

OEMs with fluid gauging requirements now have an affordable, yet robust continuous output sensor they can use to great value. Gems XM-860 liquid level sensors are a durable, low-cost solution for applications that don’t require high-resolution output. Made of brass or stainless steel, this series offers rugged construction, utilizing a new, coated reed switch core that stands up to high levels of shock and vibration. They are equally at home in applications ranging from tranquil storage day tanks to the challenge of off-highway vehicle fluids tank gauging. Minimum order for this series is 250 units.

Gems XM-860 Advantages

- Floats provide true reading of liquid’s surface position
- Floats can be used to sense dissimilar liquid interfaces (e.g. water/oil interface), including resulting emulsions.
- Unaffected by dielectric property of fluid
- Intrinsically-safe and Explosion-proof models available
- Unaffected by turbulence and motion

Typical Applications

- Generator Sets Fuel Tanks
- Reclamation Systems
- Coolant Reservoirs
- Auto Transmissions Fluid Reservoirs
- OHV Fuel Tanks
- Storage Day Tanks

1. Mounting Types

<table>
<thead>
<tr>
<th>Stem Material</th>
<th>Type 1 1/2” NPT Internal Mount</th>
<th>Type 2 1-1/4” NPT External Mount</th>
<th>Type 3 2” NPT External Mount</th>
<th>Type 4 SAE Flange External Mount</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Brass or 316 Stainless Steel</td>
<td>Brass</td>
<td>Brass</td>
<td>Brass</td>
</tr>
<tr>
<td>Mounting Material</td>
<td>Brass or 316 Stainless Steel</td>
<td>Brass</td>
<td>Brass</td>
<td>Brass</td>
</tr>
<tr>
<td>Float Stop Material</td>
<td>Brass Units: Beryllium Copper Grip Rings; Stainless Steel Units: S.S. ARMCO PH-15-7MO Grip Rings</td>
<td>Brass</td>
<td>Brass</td>
<td>Brass</td>
</tr>
<tr>
<td>Stem Length</td>
<td>24 inches (610 mm), Max.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output Wiring</td>
<td>Lead Wires Only</td>
<td>Lead Wires or Junction Box*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Explosion-Proof (EP) units are supplied with junction box. Junction boxes for IS- or non-rated units may be ordered separately—P/N 113873.
2. Output Types

Make ordering selections from either the 2-wire or 3-wire output types detailed below.

2a. 2-Wire Versions, 1-inch Resolution

Designed for simplicity and economy, 2-wire resistive-output versions connect directly to many common automotive-type panel meters. Accuracy is 1 inch. Select the output resistance code from the table below for your Order Check List.

<table>
<thead>
<tr>
<th>Resistance Code</th>
<th>Top Hard Step</th>
<th>Individual Step R</th>
<th>Full Transition</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>33</td>
<td>240-33</td>
<td>240</td>
<td>Ohms</td>
</tr>
<tr>
<td>R2</td>
<td>33</td>
<td>255-33</td>
<td>255</td>
<td>Ohms</td>
</tr>
<tr>
<td>R3</td>
<td>240</td>
<td>240-33</td>
<td>33</td>
<td>Ohms</td>
</tr>
<tr>
<td>R4</td>
<td>255</td>
<td>255-33</td>
<td>33</td>
<td>Ohms</td>
</tr>
</tbody>
</table>

Total Indicating R = R_{Lead} + (A (In.) * R) + R_{Lag}

Electrical Rating – Red to Black Wire

Resistance 33-240 or 33-255
Minimum Resistance 1000 Ohms
Maximum Voltage 30.0 VDC
Maximum Current 0.030 Amps
Maximum Power Dissipation 0.10 Watts/Inch of Indication

2b. 3-Wire Versions, 1/2-inch Resolution

These versions connect to Gems signal-conditioners (optionally selected in step 6b) for a variety of VDC and mA outputs. Accuracy is 1/2 inch. The standard resistance code is shown below. Consult factory for other resistance values.

<table>
<thead>
<tr>
<th>Resistance Code</th>
<th>R_{Lead}</th>
<th>R</th>
<th>R_{Lag}</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>Ohms</td>
</tr>
</tbody>
</table>

High Resistance = ±2.75
Low Resistance = ±±0.50

Electrical Rating – Red to Black Wire

Resistance 33-240 or 33-255
Minimum Resistance 1000 Ohms
Maximum Voltage 30.0 VDC
Maximum Current 0.030 Amps
Maximum Power Dissipation 0.10 Watts/Inch of Indication

3. Output Options

A. Non-Rated Units. Supplied with lead wire output; junction box optional. (See below.)

B. Explosion-Proof Rated Units. Supplied from factory with explosion-proof junction box.

C. Intrinsically-Safe Rated Units. Supplied with lead wire output; junction box optional. (See below.)

D. Optional Junction Boxes – P/N 113873. Simplify and protect wire connections for any non-Explosion-Proof Rated Unit. Optional Junction Boxes are supplied separately and must be assembled and wired by customer.
4. Float Types

Make selection based on Mounting Type being used and performance requirements.

IMPORTANT: If you are specifying either an Explosion-Proof or Intrinsically-Safe output, you must select a stainless steel float here.

<table>
<thead>
<tr>
<th>Float Material</th>
<th>Buna N</th>
<th>Buna N</th>
<th>316 Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatible Mountings</td>
<td>Type 1, 2, 3, 4</td>
<td>Type 1 &amp; 3</td>
<td>Type 1 &amp; 3</td>
</tr>
</tbody>
</table>

**Float Dimensions**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>197428</th>
<th>43359</th>
<th>43590</th>
</tr>
</thead>
<tbody>
<tr>
<td>Min. Liquid Specific Gravity</td>
<td>.63</td>
<td>.55</td>
<td>.75</td>
</tr>
<tr>
<td>Operating Pressure, Max*</td>
<td>150 PSI (10.3 bar)</td>
<td>300 PSI (20.7 bar)</td>
<td>300°F (149°C)</td>
</tr>
<tr>
<td>Operating Temperature, Max.</td>
<td>Water: 180°F (82°C) Oil: 230°F (110°C)</td>
<td>300°F (110°C)</td>
<td></td>
</tr>
</tbody>
</table>

*® Ambient Temperature

5. To Determine Dimensions

**X:** Dimensional factor based on selected float (see table below)

**B:** Overall Length = Inches of Indication + C**2** + X

**C:** Distance from bottom of mounting to float stop (customer specified):

• 1/4˝ (6.4mm) minimum

• 1-1/4˝ (31.8mm) minimum on Type 1, XT Series only

**M:** Distance from stem bottom to lowest level of indication

**N:** Distance from upper float stop to highest level of indication

Calculating Length

Note: 2-wire output units must specify Inches of Indication in even increments of 1 inch; 3-wire output units must be specified in even increments of 1/2 inch.

To find Overall Length when Inches or Indication is known:

• Inches of Indication + C**2** + X = Overall Length

To find Maximum Inches of Indication when Overall Length is known:

• Overall Length - C**2** - X = Maximum Inches of Indication

**C** dimension is determined by customer.

If not specified, the float stop will be located at the minimum value (1/4”).

**Float Factors**

<table>
<thead>
<tr>
<th>Float Part Number</th>
<th>X Factor</th>
<th>M Dimension</th>
<th>N Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>197428</td>
<td>2.5 (63.5)</td>
<td>1.312 (33.3)</td>
<td>1.187 (30.1)</td>
</tr>
<tr>
<td>43359</td>
<td>2.5 (63.5)</td>
<td>1.312 (33.3)</td>
<td>1.187 (30.1)</td>
</tr>
<tr>
<td>43590</td>
<td>3.437 (87.3)</td>
<td>2.187 (55.5)</td>
<td>1.25 (31.7)</td>
</tr>
</tbody>
</table>

M and N Dimensions are based on water (specific gravity 1.0).
This is a ☐ Request for a Quote
☐ Order P.O.# ______

Quantity Needed __________

Date Required / / 

Shipping Method: __________

Partials Accepted: ☐ Yes ☐ No

Name __________________________________________

Company ______________________________________

Street _________________________________________

City ____________________ State ___ Zip __________

Phone (____) ____________________________

Fax (____) ________________________________

---

Photocopy This Form

Use one form for each product type you are selecting.

This form may also be completed online at gemssensors.com for RFQ.

---

**Float Type Level Transmitters – XM/XT-860 Series**

**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 _______ psig

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

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

5. **Viscosity:** _______________ SSU

6. **Tank Material:**

7. **Tank Depth:**

8. **Unit is Mounted In:** ☐ Tank Top ☐ Tank Bottom

9. **Moisture Protection Required?** ☐ Yes ☐ No

---

**1. Series**

☐ XM/XT-860 (1/2” Resolution) – 3 wire output

☐ XM/XT-860 (1” Resolution) – 2 wire output

---

**2. Mounting Type**

☐ Type 1 (1/2” NPT) ☐ Type 2 (1-1/4” NPT)

☐ Type 3 (2” NPT) ☐ Type 4 (SAE Flange)

---

**3. Materials**

a. Stem:

 ☐ Brass ☐ 316 Stainless Steel

b. Mounting:

 ☐ Brass ☐ 316 Stainless Steel*

*Type 1, 2, & 3 only

---

**4. Float Type**

☐ 197428 – Buna N (Use with any Mounting Type)

☐ 43359 – Buna N (Use only with Mounting Type 1 or 3)

☐ 43590 – Stainless Steel (Use only with Mounting Type 1 or 3)

---

**5. Dimensions**

Overall Length (complete one line only):

| Float Selected | Indicating Length | + | C Dimension ±1/16” (1.6mm) + | Float Factor X Inch (mm) ÷ | Overall Length 24” (610 mm) Max. |
|----------------|-------------------|---|-----------------------------|---------------------------|---------------------------------
| 197428         | +                 | + | 2.5 (63.5)                  | =                         | =                               |
| 43359          | +                 | + | 2.5 (63.5)                  | =                         | =                               |
| 43590          | +                 | + | 3.44 (87.3)                 | =                         | =                               |

Notes:

1. Indicating Length: 1” increments

2. Minimum C Dimension = 1/4”

---

**6. Input/Output**

a. Optional 24 VDC Power Supply:

☐ 115 VAC input  ☐ 230 VAC input

b. Signal Conditioners

Output Shown in Parenthesis:

☐ 51965 (0-5 VDC – stem)

☐ 51970 (0-12 VDC – stem)

☐ 52536 (0-5 VDC – J-box)

☐ 52537 (0-12 VDC – J-box)

☐ 52555 (4-20 mA – J-box)

☐ 112300 (4-20 mA – panel mount)

---

Please contact Gems for any configuration or special requirements not covered on this form. 800-378-1600

Quote: $ ___________ Date Quoted: / / 

---

## Small Size – Engineered Plastics

**XMP/XTP-800 Series**

Delivers Excellent Chemical Compatibility

- PVC, Polypropylene or PVDF Materials
- 1/4” Resolution
- Lengths to 70 inches (177.8 cm)

Specifically designed to monitor chemical tanks and vats, the XMP-800 Series provides superb resistance to corrosive liquids and vapors. Use XMP-800 transmitters with GEMS Digital Bargraph Display Receiver or Level Cube Receivers described in this catalog. The XTP-800 Series adds a choice of signal conditioning for use with GEMS digital bargraph display receivers or other digital instrumentation and control equipment.

<table>
<thead>
<tr>
<th>Stem, Mounting and Float Stop Material</th>
<th>PVC, Polypropylene or KYNAR® (PVDF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>See Chart, Next Page</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>10-30 VDC</td>
</tr>
<tr>
<td>Overall Length, Max.</td>
<td>70” (177.8 cm); please consult factory for longer lengths</td>
</tr>
</tbody>
</table>

### Type A

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>1” NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>XMP-800</td>
<td>1-5/8” (28.6 mm) HEX PVC</td>
</tr>
<tr>
<td>XTP-800</td>
<td>1-5/8” (28.6 mm) HEX PVC</td>
</tr>
</tbody>
</table>

### Type B

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>3” NPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>XMP-800</td>
<td>2-5/8” (66.7 mm) HEX PP or PVDF</td>
</tr>
<tr>
<td>XTP-800</td>
<td>3-3/8” (85.7 mm) HEX</td>
</tr>
</tbody>
</table>

### Type C

<table>
<thead>
<tr>
<th>Dimensions</th>
<th>3” 150# Flange</th>
</tr>
</thead>
<tbody>
<tr>
<td>XMP-800</td>
<td>1-1/8” (28.6 mm) REF.</td>
</tr>
<tr>
<td>XTP-800</td>
<td>3-3/8” (85.7 mm)</td>
</tr>
</tbody>
</table>

2. Float Types

Float submersion depths:
In water (specific gravity of 1.00 ± 0.3”)

<table>
<thead>
<tr>
<th>Material</th>
<th>Min. Liq. Specific Gravity</th>
<th>Part Number</th>
<th>Maximum Pressure vs. Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0°F (17.8°C)</td>
</tr>
<tr>
<td>PVC</td>
<td>.60</td>
<td>61326</td>
<td>50 PSI</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>.40</td>
<td>61327</td>
<td>50 PSI</td>
</tr>
<tr>
<td>PVDF</td>
<td>.75</td>
<td>61328</td>
<td>50 PSI</td>
</tr>
</tbody>
</table>

3. Dimensions

Typical Configuration

B: Overall Length = Inches of Indication + C + X (See Table at Right)

C: Distance From Bottom of Mounting to Float Stop (Customer Specified):
• 3/8” minimum when float stop is used.
• 0” minimum when no float stop is used.

Calculating Length
To find Overall Length when Inches or Indication is known:
• Inches of Indication + C + X = Overall Length
To find Maximum Inches of Indication when Overall Length is known:
• Overall Length - C - X = Maximum Inches of Indication

* C dimension is determined by customer.

4. Input/Output

For XM Series, no special output designation is necessary.
For XT Series, specify the desired signal conditioning by Part Number.
Additional information about GEMS signal conditioning modules is found on Page C-26.

<table>
<thead>
<tr>
<th>Series</th>
<th>Input Voltage</th>
<th>Output Signal</th>
<th>Part Number</th>
<th>Electrical Termination</th>
<th>Compatible Mountings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Type A</td>
</tr>
<tr>
<td>XMP-800</td>
<td>10 to 30 VDC</td>
<td>Proportional Voltage</td>
<td>—</td>
<td>Lead Wires (3), #22 AWG, 24” (60.9 cm), Polymeric Jacket</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>8 to 24 VDC</td>
<td>0-5 VDC*</td>
<td>51965</td>
<td>Lead Wires, #22 AWG, 24” (60.9 cm), PTFE Jacket</td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>14 to 30 VDC</td>
<td>0-12 VDC*</td>
<td>51970</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td></td>
<td>8 to 24 VDC</td>
<td>0-5 VDC</td>
<td>154687</td>
<td>ABS Junction Box</td>
<td>•</td>
</tr>
<tr>
<td>XTP-800</td>
<td>10 to 40 VDC</td>
<td>4-20 mA</td>
<td>112300</td>
<td>Panel Mount with Plug-in Base</td>
<td>•</td>
</tr>
</tbody>
</table>

* Stem mounted.
**Float Type Level Transmitters – XMP/XMT-800 Series**

**Small Size, Engineered Plastics**

**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 _____ psig
3. **Temperature:** Minimum _____ °F Maximum _____ °F
4. **Specific Gravity:** Minimum _____ Maximum _____
5. **Viscosity:** ____________ SSU
6. **Tank Material:**
7. **Unit is Mounted In:** □ Tank Top □ Tank Bottom

**1. Series:**
- □ XMP-800
- □ XTP-800

**2. Mounting Type:**
- □ Type A
- □ Type B
- □ Type C

**3. Mounting and Stem Material:**
- □ PVC
- □ Polypropylene
- □ PVDF

**4. Float Type:**
- □ 61326 – PVC
- □ 61327 – Polypropylene
- □ 61328 – PVDF

**5. Dimensions:**
- a. Overall Length: Indicating Length + C Dimension + 3.5” = 70” (177.8 cm) maximum.
- b. Notes:
  1. Consult factory for longer lengths.
  2. Indicating Length: 1/2” Increments.
  3. C Dimension: 3/8” minimum when float stop is used; 0” minimum when no float stop is used.

**6. Input/Output:**
- a. Optional 24 VDC Power Supply:
  - □ 115 VAC input
  - □ 230 VAC input
- b. Signal Conditioners (XTP-800 Series Only):
  - □ 51965 (0-5 VDC – stem)
  - □ 51970 (0-12 VDC – stem)
  - □ 154687 (0-5 VDC – J-box)
  - □ 154685 (0-12 VDC – J-box)
  - □ 116970 (4-20 mA – J-box)
  - □ 112300 (4-20 mA – panel mount)

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

Quote: $ ____________ Date Quoted: __/__/____
XT-1000 Series

Magnetostrictive Level Sensors

- Measuring accuracy up to ±0.008” (0.2 mm)
- Resolution better than 0.004” (0.1 mm)
- Temperature-compensated
- 2-wire terminal (4-20mA)
- Measuring range along the complete probe length
- Lengths of 8” to 157” (200 to 4,000 mm)

The high-precision and robust level sensor is designed to provide continuous gauging of liquid media levels in tanks. The measuring principle used by the sensor exploits the physical effect of magnetostriction and is largely unaffected by temperature. Magnetostriction is particularly ideal where level measurements are required to be extremely accurate, e.g. in the chemical industry. The level sensor outputs measuring signals in the range 4 to 20 mA. Available in lengths of 8” to 157” (200 to 4,000 mm), it is compatible with a variety of tank dimensions. It also comes in the following versions:

The explosion-proof version of the level sensor can be installed in potentially explosive atmospheres in which electrical equipment of category 1 (zone 0) or category 1/2 (zone 0/1) are required. Operating on the digital HART protocol, the HART level sensor is able to output the position of the first, second or both floats.

Specifications

<table>
<thead>
<tr>
<th>Housing</th>
<th>Protection Type</th>
<th>IP 68</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Material</td>
<td>Stainless Steel</td>
</tr>
<tr>
<td>Cable Diameter</td>
<td>0.19” to 0.394”</td>
<td>(5 to 10 mm)</td>
</tr>
<tr>
<td>Probe Tube</td>
<td>Diameter</td>
<td>0.472” (12 mm)</td>
</tr>
<tr>
<td></td>
<td>Material</td>
<td>Stainless Steel 316 Ti; Hastelloy C</td>
</tr>
<tr>
<td></td>
<td>Length</td>
<td>8” to 157” (200 to 4,000 mm)</td>
</tr>
<tr>
<td>Electrical</td>
<td>Connection</td>
<td>2-wire</td>
</tr>
<tr>
<td></td>
<td>Supply</td>
<td>10 to 30 VDC</td>
</tr>
<tr>
<td></td>
<td>Current Signal</td>
<td>4 to 20 mA</td>
</tr>
<tr>
<td></td>
<td>Error Message</td>
<td>Adjustable to 3.6 or 21.5 mA</td>
</tr>
<tr>
<td>Measuring Accuracy</td>
<td>Filling Level</td>
<td>Up to 0.020” (0.5 mm)</td>
</tr>
<tr>
<td></td>
<td>Resolution</td>
<td>Up to 0.04” (0.1 mm)</td>
</tr>
<tr>
<td></td>
<td>Analog Part</td>
<td>±0.1% / K, resolution better 0.5 µA</td>
</tr>
</tbody>
</table>

Operating Principle

Inside the probe tube there is a rigid wire (1) made of magnetostrictive material. The sensor circuitry emits pulses of current (2) through the wire, generating a circular magnetic field (3). The level transmitter is a magnet (4), which is integrated into the float. Its magnetic field magnetizes the wire axially. Since the two magnetic fields are superimposed, around the float magnet a torsion wave (5) is generated which runs in both directions along the wire. One wave runs directly to the probe head while the other is reflected at the bottom of the probe tube. The time is measured between emission of the current pulse and arrival of the wave at the probe head. The position of the float is determined on the basis of the transit times.
### Mounting Types

<table>
<thead>
<tr>
<th>Size</th>
<th>Material</th>
<th>Mounting Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 1-1/2*</td>
<td>Brass</td>
<td>Threaded</td>
<td>1</td>
</tr>
<tr>
<td>2&quot; NPT</td>
<td>316 Stainless Steel</td>
<td>Threaded</td>
<td>2</td>
</tr>
<tr>
<td>3&quot; - 150#</td>
<td>316 Stainless Steel</td>
<td>Flange</td>
<td>3</td>
</tr>
<tr>
<td>G 1/2&quot;</td>
<td>316 Stainless Steel</td>
<td>Threaded</td>
<td>4</td>
</tr>
<tr>
<td>DN 25 PN6 DIN</td>
<td>Flange</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>DN 50 PN6 DIN</td>
<td>Flange</td>
<td></td>
<td>6</td>
</tr>
</tbody>
</table>

* Includes adjustable mounting option

### Float Types

<table>
<thead>
<tr>
<th>Min. Specific Gravity</th>
<th>Max. Operating Pressure</th>
<th>Float Type</th>
<th>Material</th>
<th>Diameter</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥0.50</td>
<td>290 psi (20 bar)</td>
<td>Ball</td>
<td>Titanium</td>
<td>1.99&quot; (50 mm)</td>
<td>11</td>
</tr>
<tr>
<td>≥0.60</td>
<td>145 psi (10 bar)</td>
<td>Cylinder</td>
<td>C276</td>
<td>1.81&quot; (46 mm)</td>
<td>12</td>
</tr>
<tr>
<td>≥0.70</td>
<td>290 psi (20 bar)</td>
<td>Ball</td>
<td>316 Ti</td>
<td>2.05&quot; (52 mm)</td>
<td>02</td>
</tr>
<tr>
<td>≥0.85</td>
<td>290 psi (20 bar)</td>
<td>Ball</td>
<td>316 Ti</td>
<td>1.69&quot; (43 mm)</td>
<td>09</td>
</tr>
<tr>
<td>≥0.95</td>
<td>725 psi (50 bar)</td>
<td>Ball</td>
<td>316 Ti</td>
<td>1.69&quot; (43 mm)</td>
<td>03</td>
</tr>
</tbody>
</table>

### Temperature Ranges

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Range</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient</td>
<td>-40°F to +185°F (-40°C to +85°C)</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>-40°F to +25°F (-40°C to +125°C)</td>
<td>1</td>
</tr>
<tr>
<td>Low</td>
<td>-85°F to +25°F (-65°C to +125°C)</td>
<td>4</td>
</tr>
<tr>
<td>High</td>
<td>-40°F to +482°F (-40°C to +250°C)</td>
<td>3</td>
</tr>
<tr>
<td>Highest</td>
<td>-40°F to +842°F (-40°C to +450°C)</td>
<td>5</td>
</tr>
</tbody>
</table>

### How to Order

Use the **bold** characters from the chart below to construct a product code:

**XT-1000** - **0** - **XXXX** - **X** - **X** - **X** - **X** - **X**

- **Signal Current**
  - 0 - 4-20 mA

- **Probe Lengths**
  - Probe Length is 8-157 inches or 200-4000 millimeters, and may be specified in either unit. Label with "in" when using inches, or with "mm" when using millimeters.
  - Length Ordering Code Examples:
    - 12 inches = 12in; 125 inches = 125in
    - 2830 millimeters = 2830mm; 350 millimeters = 350mm

- **Float Type**
  - 00 - None
    - 02 - Ball dia. 2.05" (52 mm); 316 Ti, 290 psi (20 bar), ≥0.60 SG
    - 03 - Ball dia. 1.69" (43 mm); 316 Ti, 725 psi (50 bar), ≥0.95 SG
    - 07 - Cylinder dia. 1.69" (43 mm); 316 Ti, 232 psi (16 bar), ≥0.70 SG
    - 09 - Ball dia. 1.69" (43 mm); 316 Ti, 290 psi (20 bar), ≥0.83 SG
    - 10 - Ball dia. 2.05" (52 mm); 316 Ti, 580 psi (40 bar), ≥0.70 SG
    - 11 - Ball dia. 1.99" (50 mm), Titanium, 290 psi (20 bar), ≥0.50 SG
    - 12 - Cylinder dia. 1.81" (46 mm); C276, 145 psi (10 bar), ≥0.70 SG

- **HART**
  - 0 - None
  - 1 - Hart Protocol

- **Certificate**
  - 0 - None
  - 1 - Ex (ATEX)¹

- **Medium Temperature Range**
  - 1 - Standard Temperature
  - 3 - High Temperature
  - 4 - Low Temperature
  - 5 - Highest Temperature

- **Mounting Type**
  - 0 - None
  - 1 - R 1-1/2" Threaded, Brass
  - 2 - 2" NPT Threaded, 316 Stainless Steel
  - 3 - 3" 150# Flange, 316 Stainless Steel
  - 4 - G 1/2" Threaded, 316 Stainless Steel
  - 5 - DN 25 PN6 DIN Flange, 316 Stainless Steel
  - 6 - DN 50 PN6 DIN Flange, 316 Stainless Steel

¹ The explosion-proof version of the level sensor can be installed in potentially explosive atmospheres in which electrical equipment of category 1 (zone 0) or category 1/2 (zone 0/1) are required. Operating on the digital Hart Protocol, the Hart level sensor is able to output the position of the first, second or both floats.
CT-1000 Series

Potentiometric Level Sensors

- Suitable in all electrically conductive liquids
- Resolution better than ±0.039” (1mm)
- Micro-controlled measurement analysis
- 2-wire terminal (4-20mA)
- Measuring result independent of pressure, temperature and density
- Filling level or separating layer coverage
- Very short measuring times
- Hart protocol version 6.0
- Temperature range up to 390°F (200°C)
- Pressure up to 2,175 PSI (150 bar)—at room temperature
- Lengths from 8” to 19.7’ (0.2 to 6 meters)

The high precision and robust level sensor is designed for use in continuous filling level measurement or continuous separating layer coverage. It is suitable for all electrically conductive liquids.

Specifications

<table>
<thead>
<tr>
<th>Housing</th>
<th>Protection Type</th>
<th>IP 68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Stainless Steel (Options: Hastelloy®️, Tantalum, Titanium)¹</td>
<td></td>
</tr>
<tr>
<td>Cable Diameter</td>
<td>0.2” to 0.4” (5 to 10 mm)</td>
<td></td>
</tr>
<tr>
<td>Probe Tube</td>
<td>Diameter</td>
<td>0.236” (6 mm)</td>
</tr>
<tr>
<td>Material</td>
<td>Stainless Steel - 316 Ti</td>
<td></td>
</tr>
<tr>
<td>Length</td>
<td>8” to 19.7’ (0.2m to 6m)</td>
<td></td>
</tr>
<tr>
<td>Pressure Range</td>
<td>2175 PSI (150 bar) @ 68°F (20°C)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>362 PSI (25 bar) @ 302°F (150°C)</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>Ambient</td>
<td>-13°F to +176°F (-25°C to +80°C)</td>
</tr>
<tr>
<td>Process</td>
<td>Normal Temp: -40° to 257°F (-40° to 125°C)²</td>
<td></td>
</tr>
<tr>
<td>Electrical</td>
<td>Connection</td>
<td>2-wire</td>
</tr>
<tr>
<td>Supply</td>
<td>10 to 30 VDC</td>
<td></td>
</tr>
<tr>
<td>Current Signal</td>
<td>4 to 20 mA</td>
<td></td>
</tr>
<tr>
<td>Error Message</td>
<td>Adjustable to 3.6 or 21.5 mA</td>
<td></td>
</tr>
<tr>
<td>Measuring Accuracy</td>
<td>Linearity</td>
<td>±1%</td>
</tr>
<tr>
<td>Filling Level</td>
<td>Better than ±0.039” (1mm)</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>&lt; 0.004” (0.1mm)</td>
<td></td>
</tr>
<tr>
<td>Analog Part</td>
<td>±0.1% (20°C) + 0.005% / °K</td>
<td></td>
</tr>
<tr>
<td>Interfaces</td>
<td>4-20 mA (2-wire technology)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HART Communication Protocol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>USB</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Please contact Gems for alternate housing materials.
2. High temperature version (to 392°F / 200°C) available. Please contact Gems.

Operating Principle

The sensor works according to the potentiometric measuring principle. By means of the micro-controlled sensor electronics the current impulses are transmitted through the sensor electrode which is electrically insulated from the tank or external tube. This leads to a linear voltage drop on its electrical resistance. If the sensor electrode is dipped into a conductive liquid (≥1 µS/cm) an electrical connection to the environment is created. The electrical potential is proportional to the filling level and is measured via a counterelectrode or the tank wall. In order for the input resistance of the measuring electronics to be big enough compared to the electrical resistance of the medium the conductivity of the liquids has to be ≥1 µS/cm.
### Mounting Types

<table>
<thead>
<tr>
<th>Size</th>
<th>Material</th>
<th>Mounting Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2&quot; NPT</td>
<td>316 Stainless Steel</td>
<td>Threaded</td>
<td>2</td>
</tr>
<tr>
<td>3&quot; - 150# ANSI</td>
<td></td>
<td>Flange</td>
<td>3</td>
</tr>
<tr>
<td>R 3/4&quot;</td>
<td></td>
<td>Threaded</td>
<td>4</td>
</tr>
<tr>
<td>R 1/2&quot;</td>
<td></td>
<td>Threaded</td>
<td>5</td>
</tr>
<tr>
<td>R 1&quot;</td>
<td></td>
<td>Threaded</td>
<td>6</td>
</tr>
</tbody>
</table>

### Dimensions – in. (mm)

- **Threaded**
  - Ø1.97 (50)
  - 4.41 (112)
  - 6.46 (164)
  - 0.24 (6) deadband

- **Flange**
  - Ø1.97 (50)
  - 4.41 (112)
  - 6.46 (164)
  - 0.24 (6) deadband

### How to Order

Use the **bold** characters from the chart below to construct a product code:

**CT-1000 - 0 - XXXX - X - X - 1 - 0 - X - XXX**

- **Probe Lengths**
  - Probe Length is 8-236 inches or 200-6000 millimeters, and may be specified in either unit. Label with "in" when using inches, or with "mm" when using millimeters.
  - Length Ordering Code Examples:
    - 12 inches = 12in
    - 2830 millimeters = 2830mm
  - Example Code: 12in

- **Rod Type**
  - 0 - 1 Rod
  - 1 - 2 Rods (for non-conductive tanks)

- **Mounting Type**
  - 2 - 2" NPT Threaded, 316 Stainless Steel
  - 3 - 3" 150# Flange, 316 Stainless Steel
  - 4 - R 3/4" Threaded, 316 Stainless Steel
  - 5 - R 1/2" Threaded, 316 Stainless Steel
  - 6 - R 1" Threaded, 316 Stainless Steel

- **HART**
  - 0 - None
  - 1 - HART Protocol

- **Options**
  - 001 - Cable Gland
  - 002 - 1/2" NPT Conduit Adapter

Large Size – Alloys

Sized for Deep Tanks and Rugged Duty

- Stainless Steel Construction
- Standard Lengths to 18 feet (549 cm)

These rugged transmitters are designed for tanks up to 18 feet (549 cm) in depth. Heavy duty stems resist turbulence, and float options accommodate liquids with minimum specific gravity as low as 0.53. Standard resolution is 1/2 inch; higher resolutions are available on request.

* Contact GEMS about solutions for deeper tanks.

Approvals

XM-36490 and XT-36490 Series transmitters may carry the following commercial approvals:

- FM Approved, Explosion-Proof for lengths up to 10 feet (305 cm)
- UL-Approved, Explosion-Proof

1. Mounting Types

<table>
<thead>
<tr>
<th>Series</th>
<th>XM/XT-66400</th>
<th>XM/XT-36490</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mounting</td>
<td>4˝ NPT</td>
<td>5˝ ANSI Flanges;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150#, 300#, or 600#</td>
</tr>
<tr>
<td>Stem Material</td>
<td>316L Stainless Steel</td>
<td>316L Stainless Steel</td>
</tr>
<tr>
<td>Mounting Material</td>
<td>316L Stainless Steel; or Carbon Steel</td>
<td>316L Stainless Steel; or Carbon Steel Flange</td>
</tr>
<tr>
<td>Float Stop Material</td>
<td>316L Stainless Steel</td>
<td>316L Stainless Steel</td>
</tr>
<tr>
<td>Overall Length, Max.</td>
<td>216˝ (549 cm)</td>
<td></td>
</tr>
</tbody>
</table>

Note: XM/XT-36490 will be manufactured with matching Stem and Float Stop material. Consult factory for longer lengths.

Got Mud?

These Gems Alloy Float Level Sensors are the best, most reliable method to monitor mud pits. The large diameter, stainless steel stems are rugged and strong to handle heavily viscous mud and slurries. Use with the exceptionally-buoyant 8” float for best results.
2. Float Types

<table>
<thead>
<tr>
<th>Material</th>
<th>Buna N</th>
<th>4&quot; Dia. Syntactic Foam</th>
<th>4&quot; Dia. Stainless Steel</th>
<th>4-1/2&quot; Dia. Stainless Steel</th>
<th>8&quot; Dia. Stainless Steel**</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>4-1/2&quot; (101.6 mm) DIA</td>
<td>4-1/2&quot; (101.6 mm) DIA</td>
<td>4-1/2&quot; (114.3 mm) DIA</td>
<td>8-1/8&quot; (205.4 mm) DIA MAX</td>
</tr>
</tbody>
</table>

** Float P/N 38609 must be installed on the transmitter stem from within the tank; or consult factory for larger flanges.

* Unit pressure rating is determined by the flange and float selected. Consult factory for higher pressure ratings.

3. Dimensions

Typical Configuration

B: Overall Length = Inches of Indication + C + X (See Table at Right)
C: Distance From Bottom of Mounting to Float Stop (Customer Specified):
• 1/2" (12.7 mm) Minimum

Calculating Length

To find Overall Length when Inches or Indication is known:
• Inches of Indication + C* + X = Overall Length

To find Maximum Inches of Indication when Overall Length is known:
• Overall Length - C* - X = Maximum Inches of Indication

* C dimension is determined by customer.

4. Input/Output

For XM-Series, no special output designation is necessary.
For XT-Series, specify the desired signal conditioning by Part Number.
Additional information about GEMS signal conditioning modules is found on Page C-26.

<table>
<thead>
<tr>
<th>Series</th>
<th>Input Voltage</th>
<th>Output Signal</th>
<th>Part Number</th>
<th>Electrical Termination</th>
</tr>
</thead>
<tbody>
<tr>
<td>XM-36490</td>
<td>10 to 30 VDC</td>
<td>Proportional Voltage</td>
<td>—</td>
<td>Junction Box</td>
</tr>
<tr>
<td>XM-66400</td>
<td>8 to 24 VDC</td>
<td>0-5 VDC</td>
<td>52532</td>
<td>Cable, (4) Conductor, 30 ft. long, Nitrile Jacket</td>
</tr>
<tr>
<td></td>
<td>15 to 30 VDC</td>
<td>0-12 VDC</td>
<td>52533</td>
<td>Junction Box</td>
</tr>
<tr>
<td>XT-Series</td>
<td>10 to 40 VDC</td>
<td>4-20 mA</td>
<td>52550</td>
<td>Panel Mount with Plug-In Base</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4-20 mA</td>
<td>112300</td>
<td></td>
</tr>
</tbody>
</table>

= Stock item

This is a Request for a Quote
Order P.O.# ______
Quantity Needed ____________
Date Required ____/____/_____
Shipping Method: ____________
Partials Accepted: ☐ Yes ☐ No
Name ____________________________________________
Company _________________________________________
Street ____________________________________________
City ____________________ State ____ Zip __________
Phone ( _____ ) ____________________
Fax ( _____ ) ________________

Photocopy This Form
Use one form for each product type you are selecting.
This form may also be completed online at gemssensors.com for RFQ.

Float Type Level Transmitters – Large Size
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 ____________ psig
3. Temperature: Minimum ____________ °F Maximum ____________ °F
4. Specific Gravity: Minimum ____________ Maximum ____________

5. Viscosity: ____________ SSU
6. Tank Material: ____________________________
   Tank Depth: ____________________________
7. Unit is Mounted In: ☐ Tank Top ☐ Tank Bottom

1. Series:
☐ XM/XT-66400 ☐ XM/XT-36490

2. Mounting Type:
☐ 4˝ NPT (66400)
   Flange Size: ☐ 4˝ ☐ 5˝ ☐ 6˝
   Flange: ☐ 150# ☐ 300# ☐ 600# (36490 Series Only)

3. Material:
   ☐ a. Stem: ☐ 316L Stainless Steel
   ☐ b. Mounting:
       ☐ 36990: ☐ 316L Stainless Steel ☐ Carbon Steel
       ☐ 66400: ☐ 316L Stainless Steel

4. Float Type P/N – Description:
   ☐ 32230 – Buna N
   ☐ 125520 – 4˝ Stainless Steel
   ☐ 35560 – 4-1/2˝ Stainless Steel
   ☐ 38609 – 8˝ Stainless
   ☐ 31830 – 4˝ Syntactic Foam

5. Dimensions:

<table>
<thead>
<tr>
<th>Float Selected</th>
<th>Indicating Length (Whole Inches)</th>
<th>+</th>
<th>C Dimension (1/2˝ min.)</th>
<th>+</th>
<th>Float Factor X</th>
<th>=</th>
<th>Overall Length (180˝ (457.2 cm), Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>31830</td>
<td></td>
<td>+</td>
<td></td>
<td>+</td>
<td>6.75˝ (171.5 mm)</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>32230</td>
<td></td>
<td>+</td>
<td></td>
<td>+</td>
<td>11.375˝ (288.9 mm)</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>35560</td>
<td></td>
<td>+</td>
<td></td>
<td>+</td>
<td>7.75˝ (196.8 mm)</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>38609</td>
<td></td>
<td>+</td>
<td></td>
<td>+</td>
<td>6.75˝ (171.5 mm)</td>
<td>=</td>
<td></td>
</tr>
<tr>
<td>125520</td>
<td></td>
<td>+</td>
<td></td>
<td>+</td>
<td>6.75˝ (171.5 mm)</td>
<td>=</td>
<td></td>
</tr>
</tbody>
</table>

Note: Indicating Length = Whole Inch Increments

6. Input/Output:
   a. Optional 24 VDC Power Supply:
      ☐ 115 VAC input
      ☐ 230 VAC input
   b. Signal Conditioners:
      ☐ 52550 (4-20 mA)
      ☐ 52532 (0-5 VDC)
      ☐ 52533 (0-12 VDC)

Please contact Gems for any configuration or special requirements not covered on this form. 800-378-1600

Signal Conditioning Modules, 0-5 VDC, 0-12 VDC and 4-20 mA Outputs

Provide signal conditioning as an integral part of the XT-Series Transmitters

- Stem Mounted
- Panel Mounted
- J-Box Enclosed
- Units with Preset High and Low Alarm

GEMS’ signal conditioners provide outputs for direct connection to a wide range of instrumentation. They are ideal for large, multi-tank complexes. Units with 4-20 mA outputs are particularly well suited for instrumentation control loops. No intermediate receiver is required.

Specifications (Not included in table below)

<table>
<thead>
<tr>
<th>System Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>With XT-36000 Series Transmitters: ±0.4% of full scale or ±1&quot;, whichever is greater.</td>
</tr>
<tr>
<td>With XT-800 Series Transmitters: ±0.4% of full scale or ±1/2&quot;, whichever is greater.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5°F to +160°F (-15°C to +71°C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Storage Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40°F to +212°F (-40°C to +100°C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Output Temperature Coefficient (% of full scale, max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>±0.00388%/°F (±0.007%/°C)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>20 mA Types</th>
</tr>
</thead>
<tbody>
<tr>
<td>To within ±1% of 16 mA</td>
</tr>
</tbody>
</table>

Excitation Required for Transmitters using 4-20 mA Signal Conditioners

The minimum excitation required for operation of transmitters with 4-20 mA, DC signal converters (See chart at right) can be determined for a given total loop resistance from the graph shown. (Total loop resistance = the sum of the DC termination resistance plus loop resistance.) For optimum operation, which is a function of source voltage (+V_A) and total loop resistance, the source voltage value used should be above the minimum load line for the related loop resistance.

How To Order

Select Part Number based on Output Signal desired and XT-Series sensor being used.

<table>
<thead>
<tr>
<th>Electrical Termination Method</th>
<th>Output Signal</th>
<th>Input Voltage</th>
<th>Module Part Numbers For:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>XT-800, XT-860 Series</td>
</tr>
<tr>
<td>Stem Mount, Lead Wires #22 AWG, Teflon® Jacket, 24&quot; Length</td>
<td>0-5 VDC</td>
<td>8-24 VDC</td>
<td>51965</td>
</tr>
<tr>
<td></td>
<td>0-12 VDC</td>
<td>14-30 VDC</td>
<td>51970</td>
</tr>
<tr>
<td></td>
<td>0-5 VDC</td>
<td>8-24 VDC</td>
<td>52536</td>
</tr>
<tr>
<td></td>
<td>0-12 VDC</td>
<td>15-30 VDC</td>
<td>52537</td>
</tr>
<tr>
<td></td>
<td>4-20 mA</td>
<td>10-40 VDC</td>
<td>52555</td>
</tr>
<tr>
<td>Junction Box</td>
<td>0-5 VDC</td>
<td>8-24 VDC</td>
<td>52536</td>
</tr>
<tr>
<td></td>
<td>0-12 VDC</td>
<td>15-30 VDC</td>
<td>52537</td>
</tr>
<tr>
<td></td>
<td>4-20 mA</td>
<td>10-40 VDC</td>
<td>52555</td>
</tr>
<tr>
<td></td>
<td>4-20 mA</td>
<td>10-40 VDC</td>
<td><strong>112300</strong></td>
</tr>
<tr>
<td>Panel Mount with Plug-In Base</td>
<td>4-20 mA</td>
<td>10-40 VDC</td>
<td><strong>112300</strong></td>
</tr>
</tbody>
</table>

= Stock Item
Ultrasonic Continuous Liquid Level Sensors

- Accurate and reliable sensing method
- Ideal technology for difficult fluids
- Sized and priced for most applications
- Easy to install—simple to use

Gems delivers the answer for challenging fluid measurement and monitoring with our new ultrasonic UCL Series Continuous Non-Contact Level Transmitters. These accurate and reliable sensors are designed for the most difficult fluids to monitor — including ultrapure, dirty, coating, scaling or corrosive types.

Typical Media
- Acids
- Wastewater
- Inks and Paints
- Slurries
- Food and Beverage
- Semiconductor Process Chemicals
- Oils and Petroleum Distillates

How Ultrasonic Monitoring Works

**UCL Series Continuous Non-Contact Transmitters:** Mounted at the top of a tank, the sensor continuously transmits pulses of high-frequency sound waves that travel away from the sensor, hit the surface of the liquid and return to the sensor. Solid-state electronics measure the time it takes from transmitted sound to return of the echo. With reference to the speed of sound in air, the exact distance of the liquid surface from the sensor can be calculated with high accuracy (±0.2% of maximum range). Level/Distance measurements are automatically temperature-compensated throughout the operating temperature range of the sensor.
UCL-510 — Transmitter/Multipoint Switching Combo

- 49-inch (1.25m) range. Compact sensor with 2” dead band and beam width are optimized for small tank applications
- 1” NPT mounting
- Reliable, non-contact alternative to float and conductivity level sensors for corrosive, sticky or dirty media
- Outputs continuous level and provides full pump or valve control
- PVDF transducer for corrosive liquid media

The UCL-510 is a general purpose ultrasonic sensor providing non-contact level detection up to 49.2” (1.25 m), with 4 relays for switch or control functions and continuous level measurement. This compact unit offers a non-contact alternative to our float or conductance sensors in small tank chemical feed or handling applications when corrosive, sticky or dirty media is involved.

The configuration software, supplied with the sensor, provides flexible system integration or retrofit of existing level devices with configuration control. Integral level automation functions can further reduce system costs through the reduction of external control hardware. The analog output enables local tank level indication, remote PLC monitoring or automation functions. Gems UCL-510 is the non-contact solution for small tank level switch, control and measurement.

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>49.2” (1.25 m)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.125” (3 mm)</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.019” (0.5 mm)</td>
</tr>
<tr>
<td>Beam Width</td>
<td>2” (5 cm)</td>
</tr>
<tr>
<td>Dead Band</td>
<td>2” (5 cm)</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>24VDC (loop)</td>
</tr>
<tr>
<td>Loop Resistance</td>
<td>400Ω max.</td>
</tr>
<tr>
<td>Consumption</td>
<td>0.5W</td>
</tr>
<tr>
<td>Signal Output</td>
<td>4-20 mA, two-wire (when loop powered)</td>
</tr>
<tr>
<td>Contact Type</td>
<td>(4) SPST relays 1A</td>
</tr>
<tr>
<td>Loop Fail-Safety</td>
<td>4 mA, 20 mA, 21 mA, 22 mA or hold last</td>
</tr>
<tr>
<td>Relay Fail-Safety</td>
<td>Power loss: Hold last; Power on: Open, close or hold last</td>
</tr>
<tr>
<td>Hysteresis</td>
<td>Selectable</td>
</tr>
<tr>
<td>Configuration Software</td>
<td>PC Windows® USB 2.0</td>
</tr>
<tr>
<td>Temp. Comp.</td>
<td>Automatic over range</td>
</tr>
<tr>
<td>Process Temp.</td>
<td>20°F to 140°F (-7°C to +60°C)</td>
</tr>
<tr>
<td>Ambient Temp.</td>
<td>-31°F to +140°F (-35°C to +60°C)</td>
</tr>
<tr>
<td>Pressure</td>
<td>MWP = 30 PSI</td>
</tr>
<tr>
<td>Enclosure</td>
<td>Type 6P encapsulated, corrosion resistant &amp; submersible</td>
</tr>
<tr>
<td>Encl. Material</td>
<td>PC/ABS FR</td>
</tr>
<tr>
<td>Strain Relief Mat.</td>
<td>Santoprene®</td>
</tr>
<tr>
<td>Trans. Material</td>
<td>PVDF</td>
</tr>
<tr>
<td>Cable Length</td>
<td>48” (1.2 m)</td>
</tr>
<tr>
<td>Cable Jacket Mat.</td>
<td>Polyurethane</td>
</tr>
<tr>
<td>Process Mount</td>
<td>1” NPT (1” G)</td>
</tr>
<tr>
<td>Mount. Gasket</td>
<td>Viton®</td>
</tr>
<tr>
<td>Classification</td>
<td>General Purpose</td>
</tr>
<tr>
<td>Approvals</td>
<td>CE, cFMus</td>
</tr>
</tbody>
</table>

Typical Applications

- Water and Waste Water
- Control Automation
- Chemical Feed
- Food and Beverage
- Acids, Inks, Paints
- Slurries

Control and Switch Functions

- 2 pumps with 2 alarms
- 1 pump with 3 alarms
- 2 pumps (lead-lag) with 2 alarms
- 2 pumps (duplexing) with 2 alarms
- 4 level switch points
**Versatile Application**

**Controller**
- Auto fill/empty
- Can control 2 pumps/valves
- Lead/lag
- Duplex

- Unused relays may be used as additional alarms

The UCL-510 feature programmable level intelligence and can be reconfigured for different sensing duties (such as switch actuation points) after installation. This is an advantage over our float or conductivity type sensors. The user-friendly configuration software provides unmatched accuracy and programming for control applications. Multi-function relay control, coupled with 4-20 mA output generates amazing control capabilities. Advanced signal processing techniques provides the UCL-510 with next generation digital processing for control. The UCL-510 is level control made simple.

**Switching**
- High level alarm (1-4)
- Low level alarm (1-4)
- Any combination of high and/or low alarms

The UCL-510 provides a non-contact alternative to our float and conductivity probes multipoint level switches. It combines 4 built in SPST relays, with a selectable hysteresis that eliminates relay chatter from turbulent media. Additionally, non-contact sensors are immune to the performance issues influenced by changes in a media’s specific gravity.

**Continuous Transmitter**
- Adjustable 4-20 mA output
- Reversible output
- Interface directly to local display and/or to PLC, SCADA, DCS systems
- Remote displays/controllers can increase relay functionality

The UCL-510 is a good non-contact alternative to our XT float type transmitters for challenging media that can damage moving parts. The UCL-510 is for sticky, scaling or corrosive media. It provides exceptional measurement accuracy (0.125”), resolution (0.019”) and repeatability ensuring overall system performance reliability.

**Wiring**

The user interface allows you to take complete visual control of your set-up and configuration. Using simple menus and visual representations, the confusion of target calibration are gone. Once you have completed your configuration design, simply click “Write to Unit” and the UCL-510 is configured. It also enables multiple UCL-510’s to be configured with just a click of the button. It even generates viewable and printable PDF wiring diagrams of your configurations to simplify and ensure proper field installation.

Gems supplies the USB Fob required to use the configuration software with each UCL-510 sensor. Replacements or additional Fobs may be ordered separately.

**Dimensions**

**How To Order**

Select by Part Number.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCL-510 Transmitter/Multipoint Switch with Configuration Software and Fob</td>
<td>225100</td>
</tr>
<tr>
<td>Replacement/Additional Configuration Fob</td>
<td>227100</td>
</tr>
</tbody>
</table>
UCL-520 — 2-Wire Transmitter for Midsize Tanks

- To 26-feet (8m) range with 2” transducer
- 2” NPT mounting
- Setup is fast and easy. Incorporates push button calibration and LCD display
- 6-segment LCD display indicates level in inch or centimeter values
- 7.6 cm minimum beam width for applications with restricted space
- Fail-safe intelligence with diagnostic feedback for easy troubleshooting

The UCL-520 is a general purpose two-wire ultrasonic transmitter providing non-contact level measurement up to 26.2’ or 8m. It is ideally suited for challenging ultrapure, corrosive or waste liquids.

Push button calibrated, the UCL-520 is broadly selected for atmospheric bulk storage, day tank and waste sump applications. Media examples include wastewater and sodium hydroxide. The PC/ABS enclosure is rated NEMA 4X, and the transducer is housed in rugged PVDF.

Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>6’ to 26.2’ (1.8 m to 8 m)</td>
</tr>
<tr>
<td>Accuracy</td>
<td>± 0.2% of span in air</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.039” (1 mm)</td>
</tr>
<tr>
<td>Beam Width</td>
<td>3” (7.6 cm) dia.</td>
</tr>
<tr>
<td>Dead Band</td>
<td>8” (20 cm)</td>
</tr>
<tr>
<td>Display Type</td>
<td>LCD, 6-digit</td>
</tr>
<tr>
<td>Display Units</td>
<td>Inch, cm or percent</td>
</tr>
<tr>
<td>Display Mode</td>
<td>Air gap or liquid height</td>
</tr>
<tr>
<td>Memory</td>
<td>Non-volatile</td>
</tr>
<tr>
<td>Supply Voltage</td>
<td>12-28 VDC</td>
</tr>
<tr>
<td>Loop Resistance</td>
<td>500 Ohms @ 24 VDC</td>
</tr>
<tr>
<td>Signal Output</td>
<td>4-20 mA, two-wire</td>
</tr>
<tr>
<td>Signal Invert</td>
<td>4-20 mA or 20-4 mA</td>
</tr>
<tr>
<td>Calibration</td>
<td>Push button</td>
</tr>
<tr>
<td>Fail-Safety</td>
<td>Selectable 4 mA, 20 mA, 21 mA, 22 mA or hold</td>
</tr>
<tr>
<td>Process Temp.</td>
<td>-7°F to +140°F (-20°C to +71°C)</td>
</tr>
<tr>
<td>Temp. Comp.</td>
<td>Automatic</td>
</tr>
<tr>
<td>Electronics Temp.</td>
<td>-40°F to +160°F (-40°C to +71°C)</td>
</tr>
<tr>
<td>Pressure</td>
<td>30 PSI (2 bar) @ 25°C, derated @ 1.667 PSI (0.113 bar) per °C above 25°C</td>
</tr>
<tr>
<td>Enclosure Rating</td>
<td>NEMA 4X (IP65)</td>
</tr>
<tr>
<td>Enclosure Vent</td>
<td>Water tight membrane</td>
</tr>
<tr>
<td>Enclosure Material</td>
<td>PC/ABS FR</td>
</tr>
<tr>
<td>Trans. Material</td>
<td>PVDF</td>
</tr>
<tr>
<td>Process Mount</td>
<td>2” NPT (2” G)</td>
</tr>
<tr>
<td>Mount. Gasket</td>
<td>Viton®</td>
</tr>
<tr>
<td>Conduit Entrance</td>
<td>Dual, 1/2” NPT</td>
</tr>
<tr>
<td>Classification</td>
<td>General Purpose</td>
</tr>
<tr>
<td>CE Compliance</td>
<td>EN 61326 EMC</td>
</tr>
</tbody>
</table>

Typical Applications

- Water and Waste Water
- Petrochemical
- Health Care
- Mining
- Cleaning
- HVAC
- Chemical
- Semiconductor
- Agriculture
- Electric Power
- Water Parks/Swimming Pools

Dimensions

Easy Calibration

Calibration is fast and simple with our scrolling single layer menu, three button interface and 6-segment LCD display. Troubleshooting is easy with our unique Setup and Diagnostic feedback modes. Setup displays the transmitter’s calibration set points. Diagnostics provides users with a snapshot of sensor performance and application variables. Gems UCL-520 is full feature level sensing made simple.

How To Order

Select by Part Number.

<table>
<thead>
<tr>
<th>Description</th>
<th>Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCL-520 2-Wire Transmitter</td>
<td>225200</td>
</tr>
</tbody>
</table>