

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.

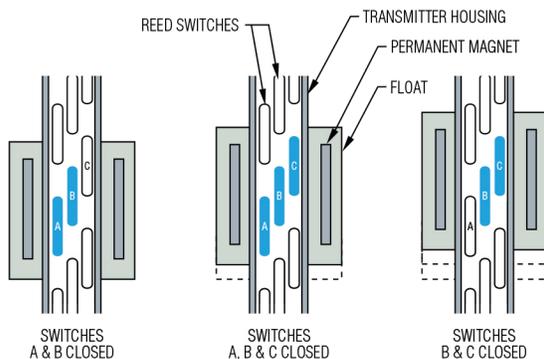
Typical Applications

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

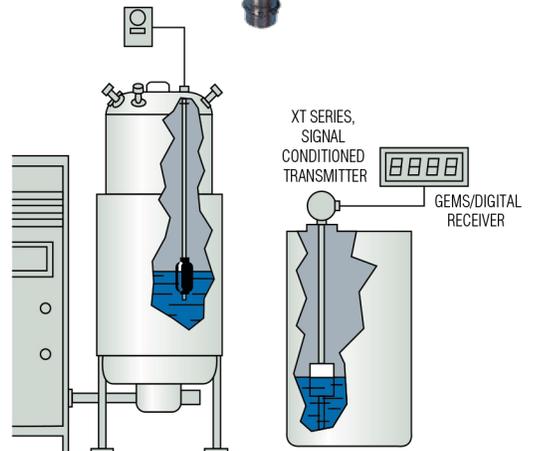
Operating Principle

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.

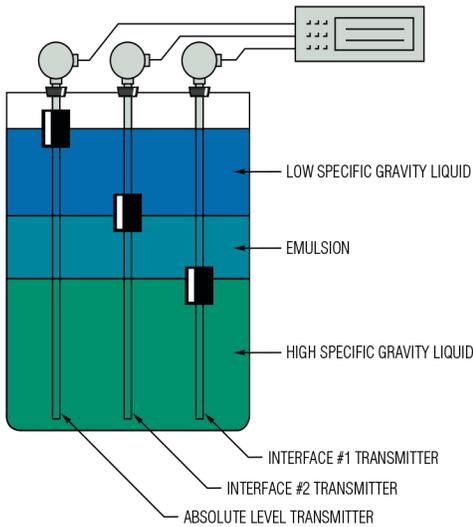


What does this mean to you?

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.



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.

Only a Float Can Show True Interface!

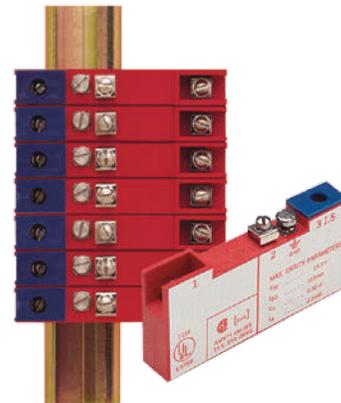
- By design or otherwise, dissimilar liquids often reside in the tank — one floating atop another. Most tank gauging methods are limited in these cases, and can only indicate the level of the uppermost surface. With GEMS Transmitters, you can easily monitor the interface between liquids...including the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

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

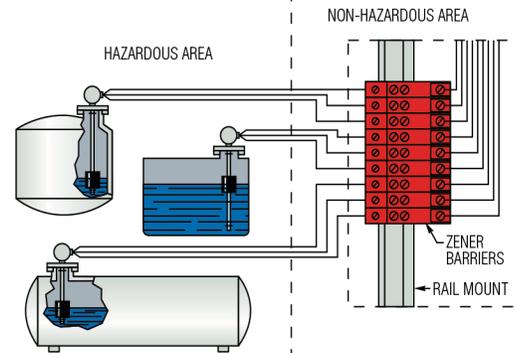
- Notes:
1. Proportional Voltage = DC voltage proportional to liquid level and source voltage.
Ex. 5 VDC input, 0-5 VDC output.
 2. Signal Conditioned = Regulated 0-5 VDC, 0-10 VDC, 0-12 VDC and 4-20 mA outputs.

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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, CSA and MSHA approved. See Section I.



Any non-voltage-producing sensor or switch is rendered intrinsically safe for hazardous locations when properly connected to the output of GEMS Zener Barriers. These are described in Section I.

ORDER IT!

Ordering is Easy! See Page C-5.
Easy online ordering too!

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.



LEVEL SENSORS – CONTINUOUS

NPT Threads		Straight Threads		
Type 21 1/8" NPT 	Type 22 1" NPT 	Type 31 3/8" - 24 	Type 32 1-5/16" - 12 	Type 33 5/8" - 11
Metric Threads		Compression Types		
Type 41 G 1/4" (1/4" - 19 BSP) 	Type 42 G 1" (1" - 11 BSP) 	Type 51 M12 x 1.5 Straight Thread 	Type 71¹ 5/8" - 11 	Type 11 No Mounting
Flange Mountings²				
Type 61 2" O.D. Flange 		Type 63 Pop Flange 		

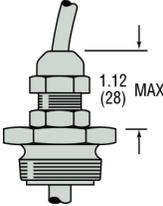
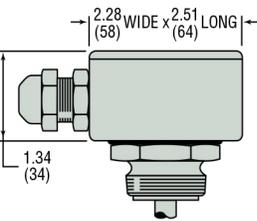
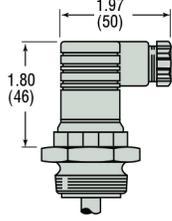
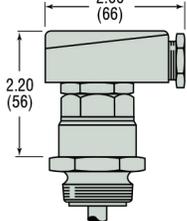
Stem, Mounting and Collar Material	Polysulfone or Noryl [®]
Max Length (L_0)	20 inches (50 cm), Tolerance of $L_0 = \pm 1/16"$ (2 mm)
Mounting Position	Vertical $\pm 30^\circ$ Inclination

Notes:

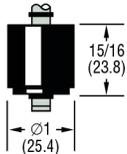
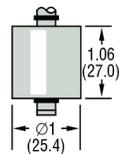
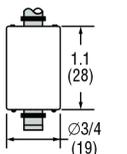
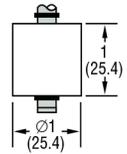
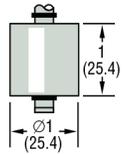
1. Type 71 mounting to be used with 3/4" diameter float only.
2. Not recommended for pressure applications.

Dimensions expressed as: $\frac{\text{inches}}{\text{millimeters}}$

2. Electrical Connections

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

3. Float Types

Float Material	Buna N	Polysulfone	Polypropylene		PVDF	
			Solid Foamed	Hollow – 20% Glass Filled		
Float Dimensions						
Part Number	39048	39005	231500	119455	145730	174515
Float Material Suitable for...	Oil, Fuels	Water-based Liquids	Broad Chemical Use		Low Specific Gravity Liquids	Broad Chemical Use
Operating Temperature ¹	Water: to 180°F (80°C) Oil: -40°F to +221°F (-40°C to +105°C)	-40°F to +221°F (-40°C to +105°C)	-40°F to +212°F (-40°C to +100°C)		-40°F to +221°F (-40°C to +105°C)	-40°F to +250°F (-40°C to +121°C)
Pressure, psi (bar) Max. ²	250 (17)	50 (3.5)	Atmospheric	250 (17)	50 (3.5)	50 (3.5)
Min. Media Specific Gravity	0.45	0.75	0.95	0.90	0.60	0.86

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

Dimensions expressed as: $\frac{\text{inches}}{\text{millimeters}}$

Also Available

XM/XT-350 Combination Siphon and Level Transmitter

Contact Gems for more details. **800-378-1600**

FAX!!!
860-747-4244

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.

This is a Request for a Quote Order P.O.# _____

Name _____

Quantity Needed _____ Company _____

Date Required ____/____/____ Street _____

Shipping Method: _____ City _____ State ____ Zip _____

Partials Accepted: Yes Phone (_____) _____

No Fax (_____) _____

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

Operational Parameters

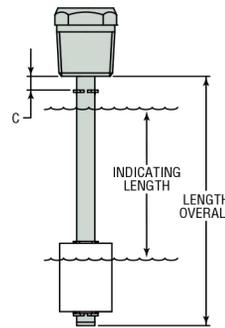
This information is essential to the accurate and proper operation of your GEMS configurable sensor. Please complete fully and accurately before ordering.

- 1. Liquid Media:** _____
- 2. Pressure:** Minimum _____ psig bar Maximum _____
- 3. Temperature:** Minimum _____ °F °C Maximum _____ °F °C
- 4. Specific Gravity:** Minimum _____ Maximum _____
- 5. Viscosity:** _____ SSU
- 6. Tank Material:** _____
- Tank Depth:** _____
- 7. Unit is Mounted In:** T – Top Mounted B – Bottom Mounted

Product Parameters

- 1. Mounting Type (select one):**
- | | |
|--|---|
| <input type="checkbox"/> 11 – No Mounting | <input type="checkbox"/> 21 – 1/8" NPT |
| <input type="checkbox"/> 22 – 1" NPT | <input type="checkbox"/> 31 – 3/8"-24 Straight Thread |
| <input type="checkbox"/> 32 – 1-5/16"-12 | <input type="checkbox"/> 41 – G1/4" (1/4"-19BSP) |
| <input type="checkbox"/> 42 – G1" (1"-11BSP) | <input type="checkbox"/> 51 – M12 x 1.5 Straight Thread |
| <input type="checkbox"/> 61 – 2" O.D. Flange | <input type="checkbox"/> 33 – 5/8"-11 |
| <input type="checkbox"/> 63 – Pop Flange | <input type="checkbox"/> 71 – 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)

2. Electrical Connections:

<input checked="" type="checkbox"/> Type	Description	Compatible Mounting Types
1	Lead Wires, 24" to 26" (610mm, Min.)	All
2	Cable, 24" to 26" (610mm, Min.)	All
3	Liquid-Tight Cable Fitting	42
4	Junction Box Assembly	42
5	DIN43650 Plug Connector, 3 Poles	42
6	DIN43651 Plug Connector, 6 Poles	42

* Select one

3. Float Type (select one):

- Buna-N – P/N 39048
- Polysulfone – P/N 39005
- Solid Foamed Polypropylene – P/N 119455
- Solid Foamed Polypropylene – P/N 231500
- Hollow Polypropylene – P/N 145730
- PVDF – P/N 174515

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
Planned Input 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**

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.



ORDER IT!

Ordering is Easy! See Page C-8.
Easy online ordering too!

LEVEL SENSORS – CONTINUOUS

1. Mounting Types

Each mounting type can be configured with stem lengths (L₀) 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 ¹	Type 3 1" NPT ¹	Type 4 3-5/8" Dia. Flange
<p>NEOPRENE O-RING</p>			

Dimensions expressed as: $\frac{\text{inches}}{\text{millimeters}}$

Stem and Mounting Material	Brass or 316 Stainless Steel	
Max Length	20" (50 cm)	
Mounting Position	Vertical ± 30° Inclination	
Float Stops²	Brass Units: Beryllium Copper Grip Rings; Stainless Steel Units: S.S. ARMCO PH-15-7MO Grip Rings	
Pressure Rating, PSI, Max.³	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. 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

	Polypropylene		
Float Materials	Hollow	Foamed	Molded
Compatible Mounting Types	1, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7
Float Dimensions			
Part Number	145730	119455	231500
Operating Temperature	-40°F to +221°F (-40°C to +105°C)	-40°F to +221°F (-40°C to +105°C)**	-40°F to +200°F (-40°C to +95°C)
Pressure, PSI, Max.	50	250	Atmospheric
Min. Liquid Specific Gravity	0.65	0.90	0.95

Float Materials	Buna N	Nylon	Polysulfone	316/316L SS
Compatible Mounting Types	1, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7	1, 2, 3, 4, 5, 6, 7	1, 3, 4, 5, 6, 7
Float Dimensions				
Part Number	39048	220488	39005	233580
Operating Temperature	Water: to 180°F (82.2°C) Oil: -40°F to +221°F (-40°C to +105°C)	Water: to 180°F (82.2°C) Oil: -40°F to +300°F (-40°C to +149°C)	-40°F to +221°F (-40°C to +105°C)**	-40°F to +400°F (-40°C to +204°C)**
Pressure, PSI, Max.	300*	50	50	275
Min. Liquid Specific Gravity	0.45	0.70	0.75	0.85

* De-rated with temperature.

** -40°F to 300°F (Standard Construction)

301°F to 400°F (Ceramic Potting Construction Required)

Dimensions expressed as: $\frac{\text{inches}}{\text{millimeters}}$

Options

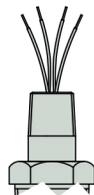
Integral Receptacle

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**

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

ORDER IT!
Ordering is Easy! See Page C-11.
Easy online ordering too!

Lengths
to 12 ft!



1. Mounting Types

Type 1 1/2" NPT	Type 2 1-1/4" NPT	Type 3 2" NPT	Type 4 3" 150# Flange	Type 6 2-1/2" Sanitary Flange

Stem Material	Brass or 316 Stainless Steel	316 Stainless Steel	
Mounting Material	Brass or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel	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		
With Stem Mounted Signal Conditioners	+5°F to +160°F (-15°C to +70°C)		
Operating Pressure	Dependent on Float Type; See Next Page		
Overall Length, Max.	72" (183 cm) Tubing; 144" (366 cm) Pipe (Types 3 & 4 only)		

* Consult factory for higher temperature ranges.



2. Float Types

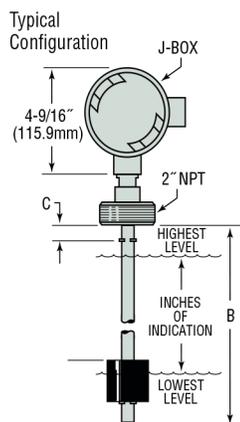
Based on the overall length required by your tank, select from two main subsets of floats below; further refine selection based on material and performance parameters.

Float Material	For Overall Lengths To 72"				For Lengths Greater Than 72" (144" Max.)	
	Buna N		Stainless Steel		Buna N	Stainless Steel
Float Dimensions						
Compatible Mountings	1, 2, 3, 4, 6	1, 3, 4	1, 3, 4, 6	1, 3, 4	3, 4	3, 4
Part Number	164255 ²	43359	156490	43590	69654	52084
Min. Liquid Spec. Gravity	.55	.55	.70	.75	.55	.75
Operating Pressure, Max. ¹	150 psi (10 bar)	150 psi (10 bar)	80 psi (6 bar)	300 psi (21 bar)	150 psi (10 bar)	300 psi (21 bar)
Operating Temp., Max.	Water: 180°F (82°C) Oil: 230°F (110°C)		230°F (110°C) ³		Water: 180°F (82°C) Oil: 230°F (110°C)	230°F (110°C)*

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.

Float Factor – X

Float Part Number	X
164255	2.0" (50.8)
43359	2.5" (63.5)
156490	2.062" (52.4)
43590	3.437" (87.3)
69654	2.687" (68.3)
52084	3.625" (92.1)

Inch (mm)

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.

Series	Input Voltage	Output Signal	Part Number	Electrical Termination	Compatible Mountings				
					Type 1	Type 2	Type 3	Type 4	Type 6
XM-800	10 to 30 VDC	Proportional Voltage	—	Lead Wires (3), #22 AWG, 24" (60.9 cm), PTFE Jacket	•	•	•	•	•
XT-800	8 to 24 VDC*	0-5 VDC	51965	Lead Wires, #22 AWG, 24" (60.9 cm), PTFE Jacket	•	•	•	•	•
	14 to 30 VDC*	0-12 VDC	51970		•	•	•	•	•
	8 to 24 VDC*	0-5 VDC	52536	Junction Box	•	•	•	•	•
	15 to 30 VDC*	0-12 VDC	52537		•	•	•	•	•
	10 to 40 VDC	4-20 mA	52555		•	•	•	•	•
		4-20 mA	112300 ⚡	Panel Mount with Plug-in Base	•	•	•	•	•
	7 to 24 VDC*	4-20 mA	239896	Lead Wires (2), #22 AWG, 24" (60.9 cm), PTFE Jacket	•	•	•	•	•

* Stem mounted.

⚡ = Stock item

FAX IT!
860-747-4244

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.

This is a Request for a Quote Order P.O.# _____

Name _____

Quantity Needed _____ Company _____

Date Required ____/____/____ Street _____

Shipping Method: _____ City _____ State ____ Zip _____

Partials Accepted: Yes Phone (_____) _____

No Fax (_____) _____

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:** _____
- Tank Depth:** _____
7. **Unit is Mounted In:** Tank Top Tank Bottom
8. **Moisture Protection Required?** Yes No

1. Series:

- XM/XT-800 (1/4" Resolution)

2. Mounting Type:

- Type 1 (1/2" NPT) Type 2 (1-1/4" NPT) Type 3 (2" NPT)
- Type 4 (3" 150# flange) Type 6 (2-1/2" sanitary flange)

3. Materials:

- a. Stem:
- Brass¹ 316 Stainless Steel
- b. Mounting:
- Brass¹ 316 Stainless Steel
- Carbon Steel (Type 4 flange only)
- c. Collar Float Stops²:
- Brass 316 Stainless Steel

4. Float Type¹:

Match to Overall Length of Transmitter Stem

To 72 Inches	Over 72 Inches
<input type="checkbox"/> 164255 – Buna N ²	<input type="checkbox"/> 69654 – Buna N
<input type="checkbox"/> 43359 – Buna N	<input type="checkbox"/> 52084 – Stainless Steel
<input type="checkbox"/> 156490 – Stainless Steel	
<input type="checkbox"/> 43590 – Stainless Steel	

Notes:

1. Stainless Steel float required for FM Approved Explosion Proof units.
2. Recommended for Type 2 mounting.

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):

Float Selected	Indicating Length (Half Inches)	+	"C" Dimension ±1/16" (1.8 mm)	+	Float Factor X Inch (mm)	=	Overall Length
43359		+		+	2.5 (63.5)	=	
43590		+		+	3.44 (87.3)	=	
52084		+		+	3.63 (92.1)	=	
69654		+		+	2.69 (68.3)	=	
156490		+		+	2.06 (52.3)	=	
164255		+		+	2 (50.8)	=	

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

6. Input/Output:

- a. Optional 24 VDC Power Supply:
- 115 VAC input 230 VAC input
- b. Signal Conditioners (XT-800 Series Only)
- 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)
- 120650 (0-5 VDC – panel mount)
- 149600 (0-10 VDC – panel mount)
- 112300 (4-20 mA – panel mount)
- 239896 (4-20 mA – stem)

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

Quote: \$ _____ Date Quoted: ____/____/____



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



ORDER IT!
 Ordering is Easy! See Page C-15.
 Easy online ordering too!

LEVEL SENSORS – CONTINUOUS

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

* 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.

Output Resistance				
Resistance Code	Top Hard Stop	Individual Step R	Full Transition	Unit
R1	33	$\frac{240-33}{A}$ (In.)	240	Ohms
R2	33	$\frac{255-33}{A}$ (In.)	255	Ohms
R3	240	$\frac{240-33}{A}$ (In.)	33	Ohms
R4	255	$\frac{255-33}{A}$ (In.)	33	Ohms

High Resistance = ± 2.75
 Low Resistance = 33 ± 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

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.

Resistance Code	Resistance Value			
	R _{Lead}	R	R _{Lag}	Unit
P1	0	100	0	Ohms

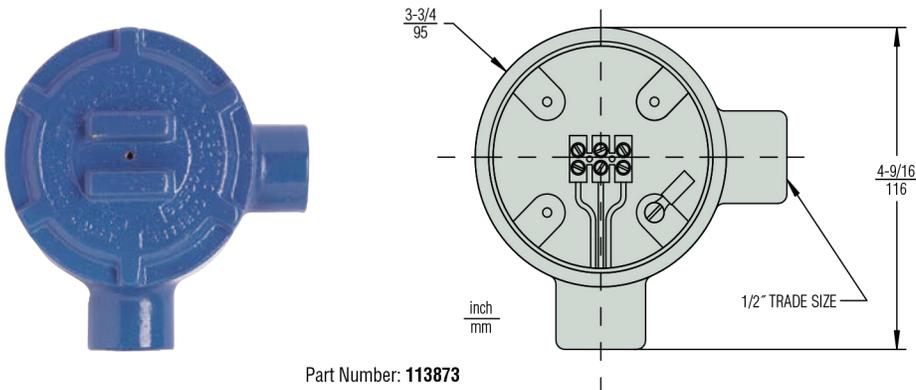
Total Indicating R = $R_{Lead} + (A \text{ (In.)} * R) + R_{Lag}$

Electrical Rating – Red to Black Wire

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

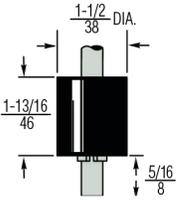
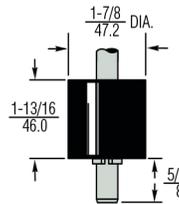
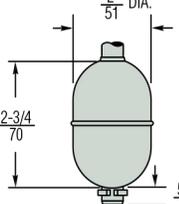
- A. Non-Rated Units.** Supplied with lead wire output; junction box optional. (See below.)
- B. Explosion-Proof Rated Units.** Supplied from factory with explosion-proof junction box.
- C. Intrinsically-Safe Rated Units.** Supplied with lead wire output; junction box optional. (See below.)
- D. Optional 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.

Float Material	Buna N	Buna N	316 Stainless Steel
Compatible Mountings	Type 1, 2, 3, 4	Type 1 & 3	Type 1 & 3
Float Dimensions inch mm			
Part Number	197428	43359	43590
Min. Liquid Specific Gravity	.63	.55	.75
Operating Pressure, Max*	150 PSI (10.3 bar)		300 PSI (20.7 bar)
Operating Temperature, Max.	Water: 180°F (82°C) Oil: 230°F (110°C)		300°F (149°C)

*@ Ambient Temperature

5. To Determine Dimensions

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

B: Overall Length = Inches of Indication + C** + 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** + 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.

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

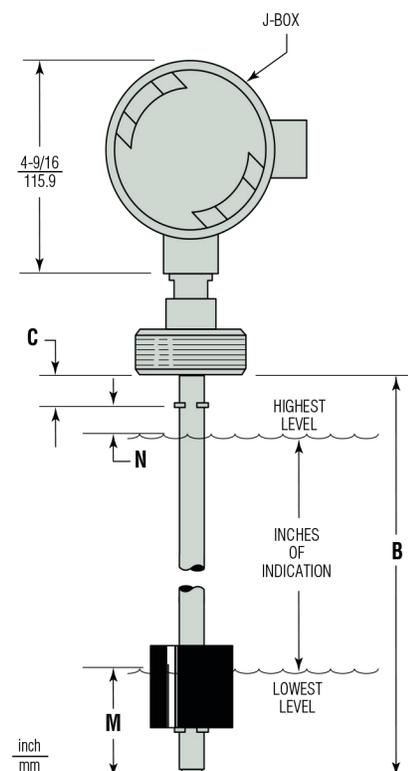
Float Factors

Float Part Number	X Factor	M Dimension	N Dimension
197428	2.5 (63.5)	1.312 (33.3)	1.187 (30.1)
43359	2.5 (63.5)	1.312 (33.3)	1.187 (30.1)
43590	3.437 (87.3)	2.187 (55.5)	1.25 (31.7)

inch (mm)

M and N Dimensions are based on water (specific gravity 1.0).

Typical Configuration



 <p>Photocopy This Form</p> <p>Use one form for each product type you are selecting.</p> <p><small>This form may also be completed online at gemssensors.com for RFQ.</small></p>	<p>This is a <input type="checkbox"/> Request for a Quote Name _____</p> <p style="padding-left: 100px;"><input type="checkbox"/> Order P.O.# _____ Company _____</p> <p>Quantity Needed _____ Street _____</p> <p>Date Required ____/____/____ City _____ State ____ Zip _____</p> <p>Shipping Method: _____ Phone (_____) _____</p> <p>Partials Accepted: <input type="checkbox"/> Yes Fax (_____) _____</p> <p style="padding-left: 100px;"><input type="checkbox"/> No</p>
--	--

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:** _____
- Tank Depth:** _____
- 7. Unit is Mounted In:** Tank Top Tank Bottom
- 8. 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 ¹ (Whole Inches)	+	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.

ORDER IT!
Ordering is Easy! See Page C-18.
Easy online ordering too!

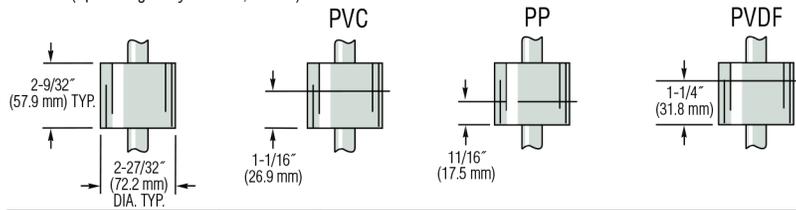


LEVEL SENSORS – CONTINUOUS

	Type A	Type B	Type C
	1" NPT	3" NPT	3" 150# Flange
XMP-800 Dimensions			
XTP-800 Dimensions			
Stem, Mounting and Float Stop Material	PVC, Polypropylene or KYNAR® (PVDF)		
Operating Temperature	See Chart, Next Page		
Operating Voltage	10-30 VDC		
Overall Length, Max.	70" (177.8 cm); please consult factory for longer lengths		

2. Float Types

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

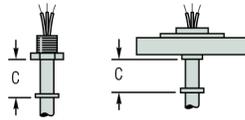
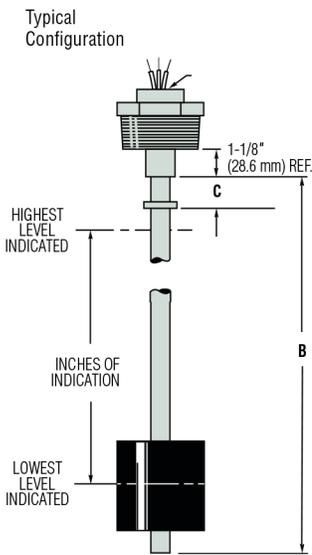


Material	Min. Liq. Specific Gravity	Part Number	Maximum Pressure vs. Temperature							
			0°F (17.8°C)	70°F (21.1°C)	100°F (37.8°C)	125°F (51.7°C)	140°F (60.0°C)	170°F (76.7°C)	200°F (93.3°C)	210°F (98.9°C)
PVC	.60	61326	50 PSI	50 PSI	35 PSI	20 PSI	10 PSI			
Polypropylene	.40	61327	50 PSI	50 PSI	40 PSI	35 PSI	30 PSI			
PVDF	.75	61328	50 PSI	50 PSI	45 PSI	40 PSI	35 PSI	30 PSI	25 PSI	25 PSI

■ = Not recommended at these temperatures

3. Dimensions

Typical Configuration



"C" Dimension begins at point where stem meets the mounting.

- 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.

Float Factor – X

Float Part Number	X
61326	3.5" (88.9)
61327	3.5" (88.9)
61328	3.5" (88.9)

Inch (mm)

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.

Series	Input Voltage	Output Signal	Part Number	Electrical Termination	Compatible Mountings		
					Type A	Type B	Type C
XMP-800	10 to 30 VDC	Proportional Voltage	—	Lead Wires (3), #22 AWG, 24" (60.9 cm), Polymeric Jacket	•	•	•
XTP-800	8 to 24 VDC	0-5 VDC*	51965	Lead Wires, #22 AWG, 24" (60.9 cm), PTFE Jacket	•	•	•
	14 to 30 VDC	0-12 VDC*	51970		•	•	•
	8 to 24 VDC	0-5 VDC	154687	ABS Junction Box		•	•
	15 to 30 VDC	0-12 VDC	154685			•	•
	10 to 40 VDC	4-20 mA	116970			•	•
4-20 mA		112300 ⚡	Panel Mount with Plug-in Base	•	•	•	

* Stem mounted.

⚡ = Stock item

 <p>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.</p>	This is a <input type="checkbox"/> Request for a Quote <input type="checkbox"/> Order P.O.# _____		Name _____	
	Quantity Needed _____		Company _____	
Date Required ____/____/____		Street _____		
Shipping Method: _____		City _____ State ____ Zip _____		
Partials Accepted: <input type="checkbox"/> Yes <input type="checkbox"/> No		Phone (____) _____		
		Fax (____) _____		

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: _____ | 5. Viscosity: _____ SSU |
| 2. Pressure: Minimum _____ psig Maximum _____ psig | 6. Tank Material: _____ |
| 3. Temperature: Minimum _____ °F Maximum _____ °F | Tank Depth: _____ |
| 4. Specific Gravity: Minimum _____ Maximum _____ | 7. Unit is Mounted In: <input type="checkbox"/> Tank Top <input type="checkbox"/> Tank Bottom |

1. Series:

- XMP-800 XTP-800

2. Mounting Type:

- Type A Type B Type C

5. Dimensions:

a. Overall Length:

Indicating Length C Dimension X
 _____ + _____ " + 3.5" = " 70" (177.8 cm) maximum.

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)

3. Mounting and Stem Material:

- PVC Polypropylene PVDF

4. Float Type:

- 61326 – PVC 61327 – Polypropylene 61328 – PVDF

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 $\pm 0.008''$ (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:

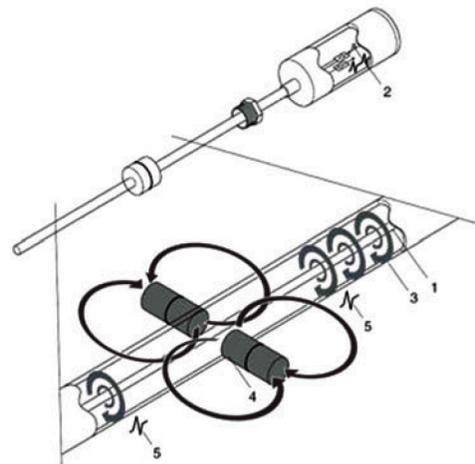
The explosion-proof version of the level sensor can be installed in potentially explosive atmospheres in which electrical equipment of category 1 (zone 0) or category 1/2 (zone 0/1) are required. Operating on the digital HART protocol, the HART level sensor is able to output the position of the first,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

Specifications

Housing	
Protection Type	IP 68
Material	Stainless Steel
Cable Diameter	0.19" to 0.394" (5 to 10 mm)
Probe Tube	
Diameter	0.472" (12 mm)
Material	Stainless Steel 316 Ti; Hastelloy C
Length	8" to 157" (200 to 4,000 mm)
Electrical	
Connection	2-wire
Supply	10 to 30 VDC
Current Signal	4 to 20 mA
Error Message	Adjustable to 3.6 or 21.5 mA
Measuring Accuracy	
Filling Level	Up to $0.020''$ (0.5 mm)
Resolution	Up to $0.004''$ (0.1 mm)
Analog Part	$\pm 0.1\%$ / K, resolution better 0.5 μ A

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

Size	Material	Mounting Type	Code
R 1-1/2*	Brass	Threaded	1
2" NPT	316 Stainless Steel	Threaded	2
3" - 150#		Flange	3
G 1/2"		Threaded	4
DN 25 PN6 DIN		Flange	5
DN 50 PN6 DIN		Flange	6

* Includes adjustable mounting option

Float Types

Min. Specific Gravity	Max. Operating Pressure	Float Type	Material	Diameter	Code
≥0.50	290 psi (20 bar)	Ball	Titanium	1.99" (50 mm)	11
≥0.60			316 Ti	2.05" (52 mm)	02
≥0.70	145 psi (10 bar)	Cylinder	C276	1.81" (46 mm)	12
	232 psi (16 bar)				07
≥0.85	290 psi (20 bar)	Ball	316 Ti	1.69" (43 mm)	09
≥0.95	725 psi (50 bar)				03

Temperature Ranges

Ambient	-40°F to +185°F (-40°C to +85°C)
----------------	----------------------------------

Process Medium

Temperature	Range	Code
Standard	-40°F to +257°F (-40°C to +125°C)	1
Low	-85°F to +257°F (-65°C to +125°C)	4
High	-40°F to +482°F (-40°C to +250°C)	3
Highest	-40°F to +842°F (-40°C to +450°C)	5

How to Order

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

XT-1000 - 0 - XXXX - XX - 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), ≥ 0.85 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

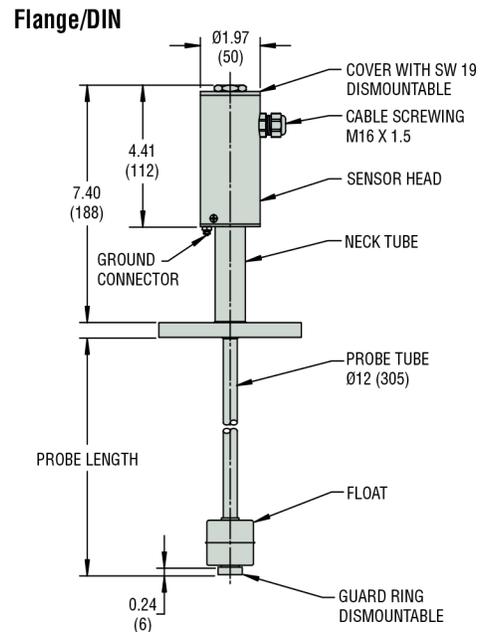
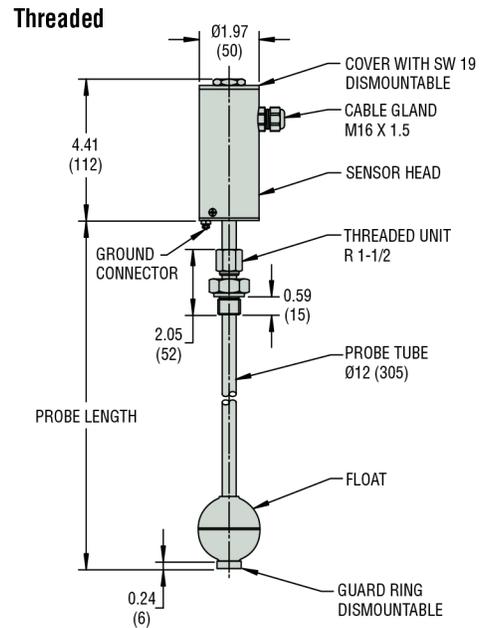
HART
0 - None
1 - Hart Protocol

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

Dimensions – in. (mm)



Note:
 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.

LEVEL SENSORS – CONTINUOUS

CT-1000 Series

Potentiometric Level Sensors

- ▶ Suitable in all electrically conductive liquids
- ▶ Resolution better than $\pm 0.039''$ (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

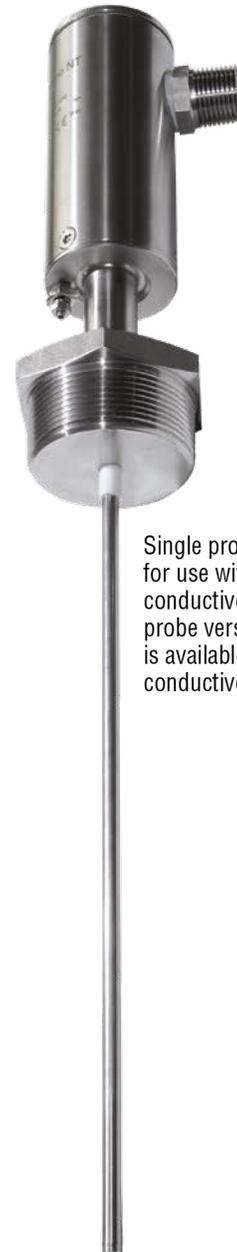
Housing	
Protection Type	IP 68
Material	Stainless Steel (Options: Hastelloy®, Tantalum, Titanium) ¹
Cable Diameter	0.2" to 0.4" (5 to 10 mm)
Probe Tube	
Diameter	0.236" (6 mm)
Material	Stainless Steel - 316 TI
Length	8" to 19.7' (0.2m to 6m)
Pressure Range	2175 PSI (150 bar) @ 68°F (20°C) 362 PSI (25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

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 ($\geq 1 \mu\text{S/cm}$) 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 $\geq 1 \mu\text{S/cm}$.



Single probe version for use with electrically-conductive tanks. A dual probe version (not shown) is available for non-conductive tanks.

Mounting Types

Size	Material	Mounting Type	Code
2" NPT	316 Stainless Steel	Threaded	2
3" - 150# ANSI		Flange	3
R 3/4"		Threaded	4
R 1/2"		Threaded	5
R 1"		Threaded	6

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**; 125 inches = **125in**

2830 millimeters = **2830mm**; 350 millimeters = **350mm**

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

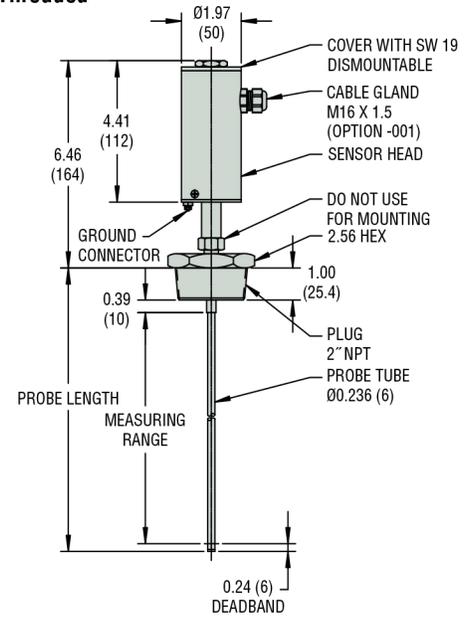
Options

001 - Cable Gland

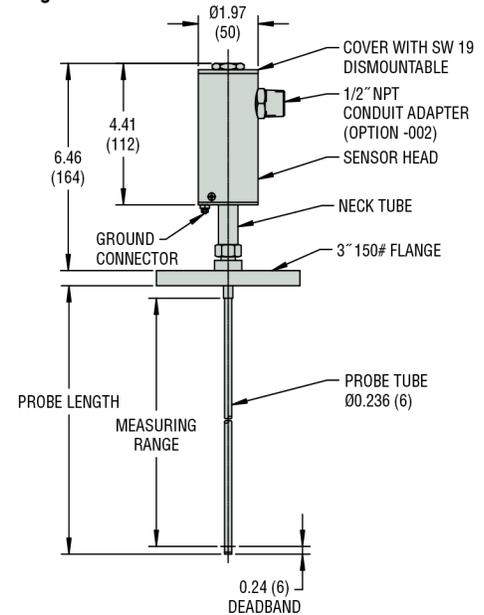
002 - 1/2" NPT Conduit Adapter

Dimensions - in. (mm)

Threaded



Flange



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.

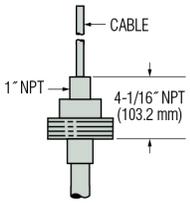
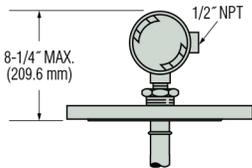
* Contact GEMS about solutions for deeper tanks.

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

Series	XM/XT-66400	XM/XT-36490
Mounting	4" NPT	5" ANSI Flanges; 150#, 300#, or 600#
		
Stem Material	316L Stainless Steel	316L Stainless Steel
Mounting Material	316L Stainless Steel; or Carbon Steel	316L Stainless Steel; or Carbon Steel Flange
Float Stop Material	316L Stainless Steel	316L Stainless Steel
Overall Length, Max.	216" (549 cm)	

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

Got Mud?

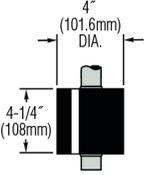
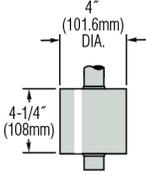
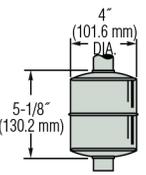
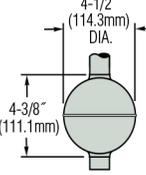
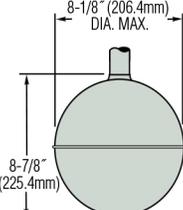
These Gems Alloy Float Level Sensors are the best, most reliable method to monitor mud pits. The large diameter, stainless steel stems are rugged and strong to handle heavily viscous mud and slurries. Use with the exceptionally-buoyant 8" float for best results.

ORDER IT!

Ordering is Easy! See Page C-25.
Easy online ordering too!



2. Float Types

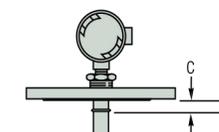
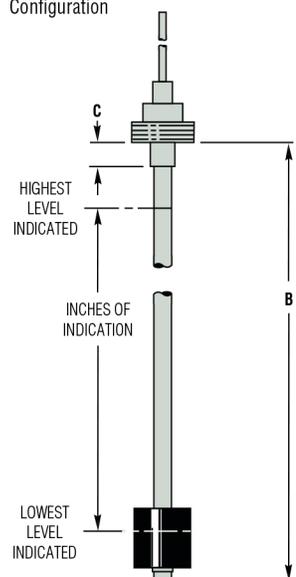
Material	Buna N	4" Dia. Syntactic Foam	4" Dia. Stainless Steel	4-1/2" Dia. Stainless Steel	8" Dia. Stainless Steel**
Float Dimensions					
Part Number	32230	31830	125520	35560	38609
Minimum Liquid Specific Gravity	0.59	0.87	0.57	0.78	0.53
Operating Temperature	-40°F to +180°F (-40°C to +82°C)	-40°F to +225°F (-40°C to +107°C)	-40°F to +230°F (-40°C to +110°C)		
Operating Pressure, Max*	150 PSI (10 bar)	2000 PSI (138 bar)	15 PSI (1 bar)	500 PSI (35 bar)	150 PSI (10 bar)

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

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

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" (12.7mm) 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.

Float Factor – X

Float Part Number	X
32230	6.75" (171.5)
31830	6.75" (171.5)
125520	7.75" (196.5)
35560	6.75" (171.5)
38609	11.375" (288.9)

Inch (mm)

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.

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

⚡ = Stock item

FAX IT!
860-747-4244

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.

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 (____) _____

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:

Float Selected	Indicating Length (Whole Inches)	+	C Dimension (1/2" min.)	+	Float Factor X	=	Overall Length (180" {457.2 cm}, Max.)
31830							
32230		+		+	6.75" (171.5 mm)	=	
35560							
38609		+		+	11.375" (288.9 mm)	=	
125520		+		+	7.75" (196.8 mm)	=	

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**

Quote: \$ _____ Date Quoted: ____/____/____

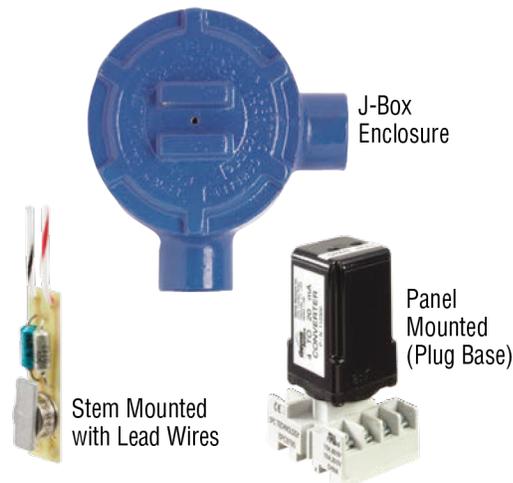


Signal Conditioning Modules, 0-5 VDC, 0-12 VDC and 4-20 mA Outputs

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

- ▶ Stem Mounted
- ▶ J-Box Enclosed
- ▶ Panel Mounted
- ▶ 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)

System Accuracy	With XT-36000 Series Transmitters: ±0.4% of full scale or ±1", whichever is greater. With XT-800 Series Transmitters: ±0.4% of full scale or ±1/2", whichever is greater.
Operating Temperature	+5°F to +160°F (-15°C to +71°C)
Storage Temperature	-40°F to +212°F (-40°C to +100°C)
Output Temperature Coefficient (% of full scale, max.)	±0.00388%/°F (±0.007%/°C)
20 mA Types	To within ±1% of 16 mA

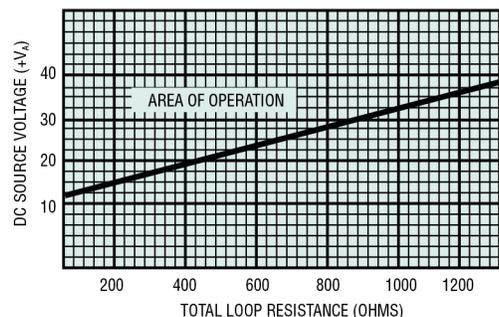
Power Supply Module

Input Power	Part Number
115 VAC, 60 Hz	52560
230 VAC, 60 Hz	52570

Operates on 115 VAC or 230 VAC inputs to supply a regulated 24 VDC to the signal conditioned transmitter where external VDC power is not available. Maximum Load: 70 mA.

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.

Electrical Termination Method	Output Signal	Input Voltage	Module Part Numbers For:		
			XT-800, XT-860 Series	XTP-800	XT-36490 XT-66400
 Stem Mount, Lead Wires #22 AWG, Teflon® Jacket, 24" Length	0-5 VDC	8-24 VDC	51965	51965	—
	0-12 VDC	14-30 VDC	51970	51970	—
 Junction Box	0-5 VDC	8-24 VDC	52536	154687	52532
	0-12 VDC	15-30 VDC	52537	154685	52533
	4-20 mA	10-40 VDC	52555	116970	52550
 Panel Mount with Plug-In Base	4-20 mA	10-40 VDC	112300 ⚡	112300 ⚡	112300 ⚡

⚡ = Stock item

NOTES

A large grid of dashed lines for taking notes, consisting of 20 columns and 30 rows.

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 ($\pm 0.2\%$ of maximum range). Level/Distance measurements are automatically temperature-compensated throughout the operating temperature range of the sensor.

Contents	Page Start
UCL-510.....	C-29
UCL-520.....	C-31



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" (1.25m), 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

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



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 un-matched 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

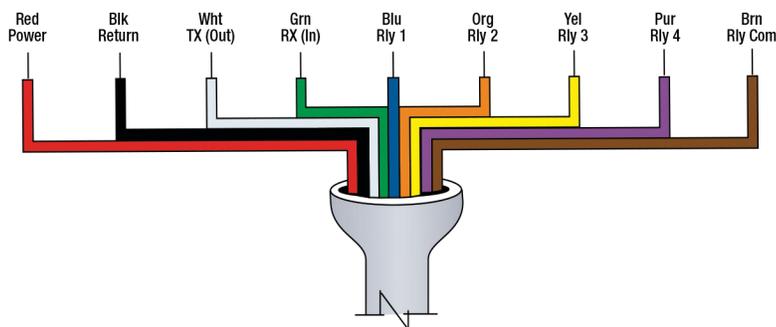
The UCL-510 provides a non-contact alternative to our float and conductivity probes multipoint level switches. It combines 4 built in SPST relays, with a selectable hysteresis that eliminates relay chatter from turbulent media. Additionally, non-contact sensors are immune to the performance issues influenced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



How To Order

Select by Part Number.

Description	Part Number
UCL-510 Transmitter/Multipoint Switch with Configuration Software and Fob	225100
Replacement/Additional Configuration Fob	227100

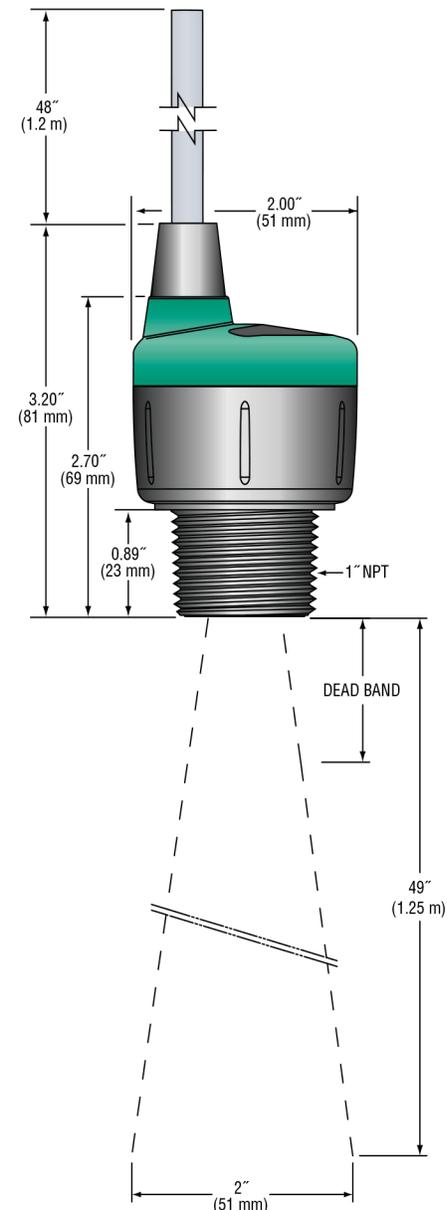
Configuration Software

- Free download @ GemsSensors.com/software
- Windows XP or 2000 compatible; USB 2.0 connection
- Provides configuration, file management (saving, printing, backup), and troubleshooting

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



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

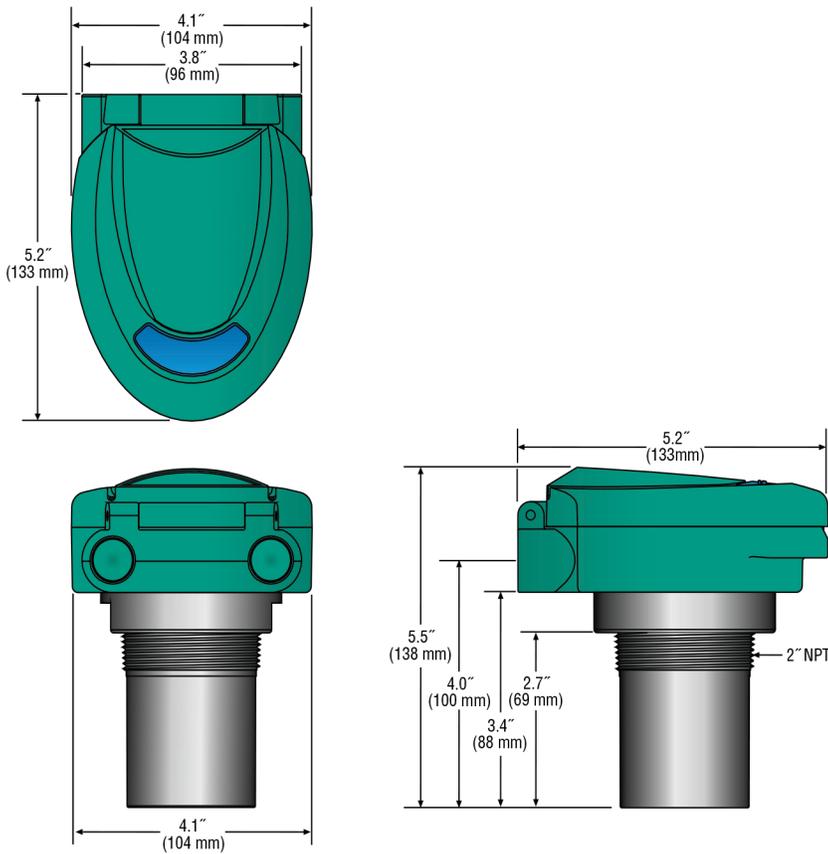
Range	6' to 26.2' (1.8 m to 8 m)
Accuracy	± 0.2% of span in air
Resolution	0.039" (1 mm)
Beam Width	3" (7.6 cm) dia.
Dead Band	8" (20 cm)
Display Type	LCD, 6-digit
Display Units	Inch, cm or percent
Display Mode	Air gap or liquid height
Memory	Non-volatile
Supply Voltage	12-28 VDC
Loop Resistance	500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



Typical Applications

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

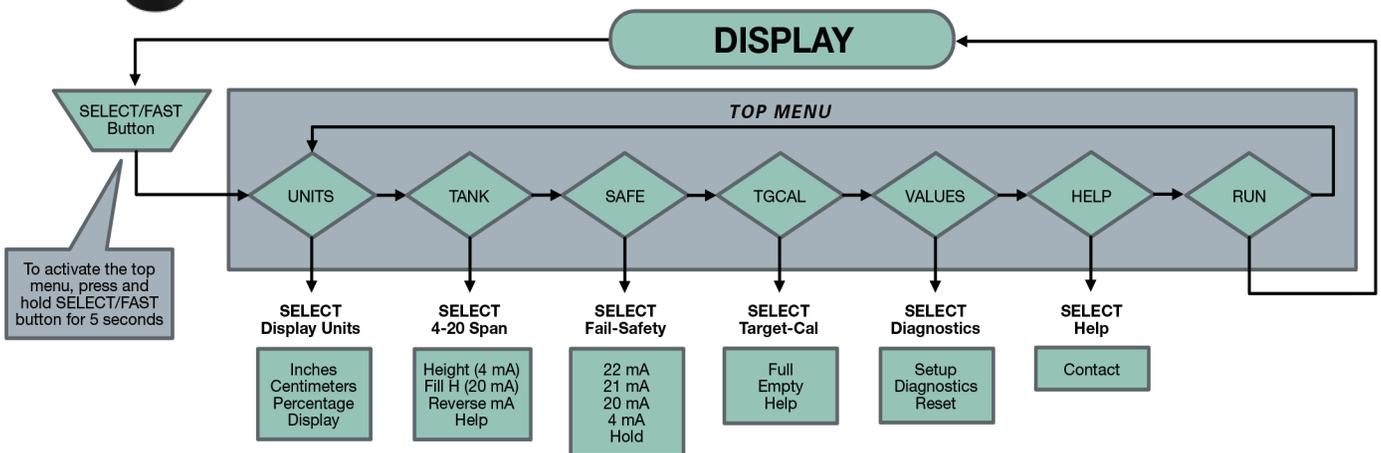
Dimensions



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.

Description	Part Number
UCL-520 2-Wire Transmitter	225200

NOTES

A large grid of dashed lines for taking notes, consisting of 20 columns and 30 rows.