

Data Sheet

MAGNETIC LIQUID LEVEL INDICATORS

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Registered in England No. 01851002. VAT No. GB 417 2481 61



ORION[®]
INSTRUMENTS
A Magnetrol Company

Magnetic Level Indicators

DESCRIPTION

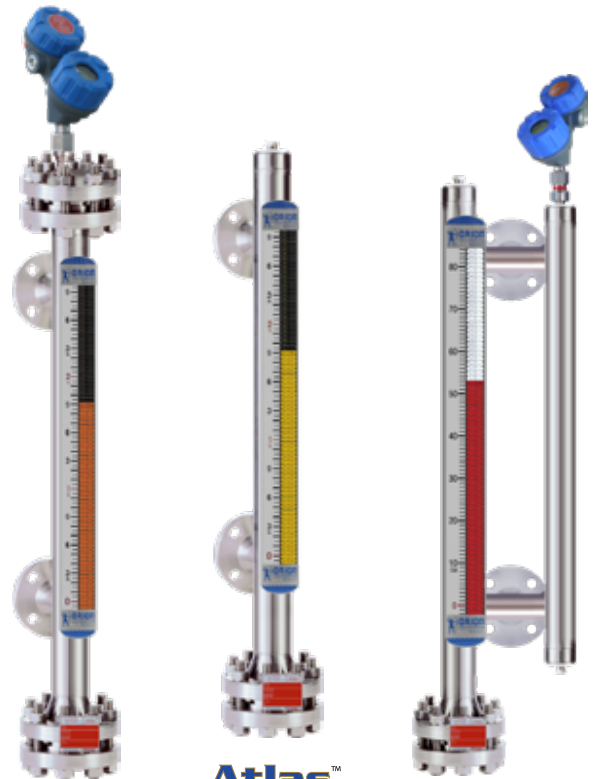
Magnetically coupled liquid level indicators, or MLIs, are in widespread use throughout process industries. Originally designed as an alternative to sight and gauge glass devices, the MLI is now commonly used in both new construction and plant expansion.

ORION INSTRUMENTS[®] Atlas, Gemini, and Aurora[®] magnetic level indicators are precision engineered and manufactured to indicate liquid level accurately, reliably, and continuously. These units are completely sealed and require no periodic maintenance. MLIs also eliminate vapor or liquid emission problems common with sight and gauge glasses.

To complement these products, Orion produces a complete range of level switches and transmitters, including the Eclipse[®] Guided Wave Radar transmitter from Magnetrol International.

FEATURES

- Numerous chamber styles (or configurations) for each design. Custom designs available.
- Complete range of level switches and level transmitters, including Eclipse Guided Wave Radar
- Fabricated, non-magnetic chamber assembly produced in a wide range of metal and plastic materials
- ANSI and EN 1092 process connections available
- Precision manufactured float with internal magnets and magnetic flux ring
- Flag or shuttle type indicator with stainless steel scale to measure height, volume, or percentage of level
- Standard float stop springs at top and bottom of chamber
- Exceptional code qualified welding



Aurora[®]

Atlas[™]

Gemini[™]

APPLICATIONS

- Feedwater heaters
- Industrial boilers
- Oil/water separators
- Flash drums
- Surge tanks
- Gas chillers
- Deaerators
- Blowdown flash tanks
- Hot wells
- Vacuum tower bottoms
- Alkylation units
- Boiler drums
- Propane vessels
- Storage tanks

ATLAS & VECTOR MLI

The Atlas is Orion’s standard high-performance magnetic level indicator. Atlas is a single chamber design with either a 2", 2½", or 3" chamber diameter, as required by the application. There are twelve basic configuration styles including top mount models. Special configurations are also available.

Atlas MLIs are produced in a wide range of materials, including exotic alloys and plastics. Orion also offers the most complete selection of process connection types and sizes in the industry.

Atlas can be equipped with a variety of level transmitters and switches as well as flag and shuttle indicators with or without stainless steel scales. This enables the Atlas to be a complete level and monitoring control.

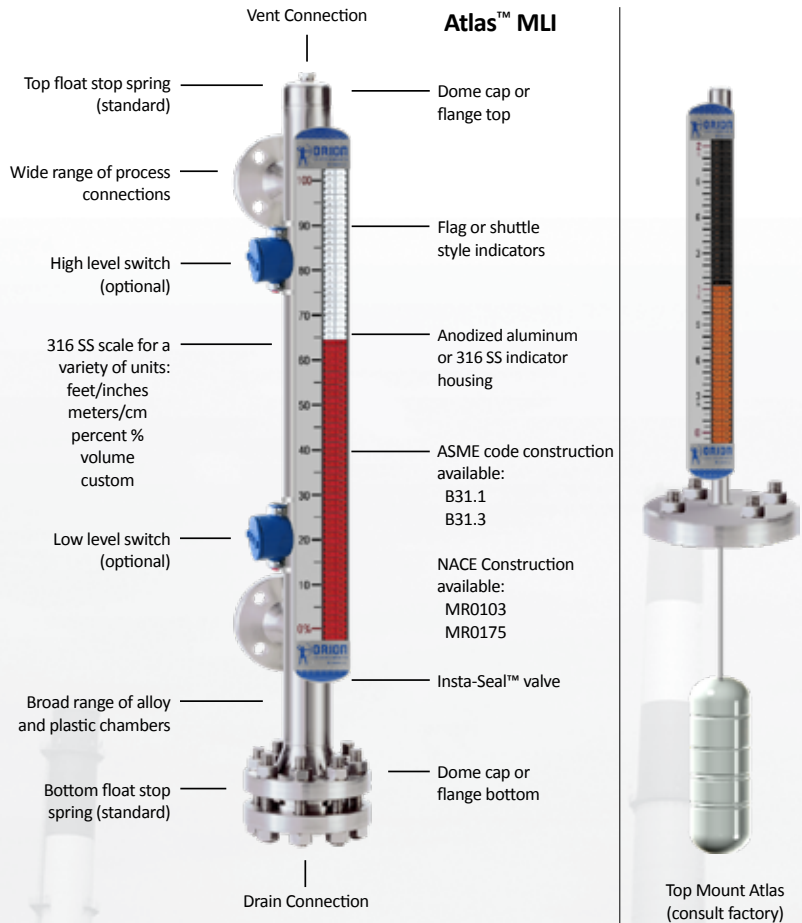
Vector™ (not shown) is a simple, rugged, reliable, and cost-effective Magnetic Level Indicator. Suitable for a variety of installations. VECTOR has many basic features and is precision engineered and manufactured to ensure a long service life.

See bulletin ORI-140 for more information about VECTOR.

GEMINI™

Orion’s twin chamber design is unique to the Magnetic level gauge industry. Countless unique configuration styles are available with Gemini. It can be produced in the same metal material selections as Atlas.

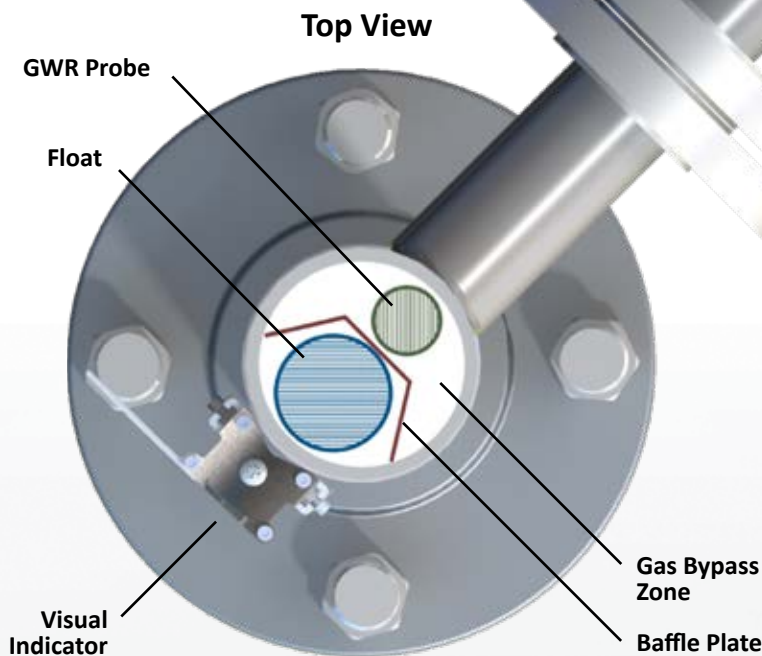
The second chamber facilitates the installation of any of a wide selection of transmitters to provide continuous level monitoring in addition to the indication provided by the primary chamber. Eclipse guided wave radar, direct insertion Jupiter® magnetostrictive, or Kotron capacitance type level transmitters can be mounted in the secondary chamber to provide totally redundant indication with continuous level output. The primary chamber, which houses the float, can be fitted with clamp-on switches or transmitters for additional level control.



Aurora®



See Brochure ORI-101
for more information



Eclipse® GWR
Level Transmitter



DESCRIPTION

Aurora's patented design is the next generation of magnetic level indicators. It is state of the art and reflects Orion's innovation and commitment to magnetic level indicators.

Aurora is a totally redundant monitoring and control system. Liquid levels are tracked with great accuracy using two different technologies. An Eclipse® guided wave radar probe is housed along with the MLI float in a 3" or 4" diameter chamber. While the indicator relies upon the float and its internal magnets to activate the flags or shuttle, the Eclipse measures the liquid level directly. Two completely separate technologies in a single external chamber equal redundancy unlike any other MLI. The use of a special baffle within the chamber ensures that the float and Eclipse® probe work seamlessly and without interference.

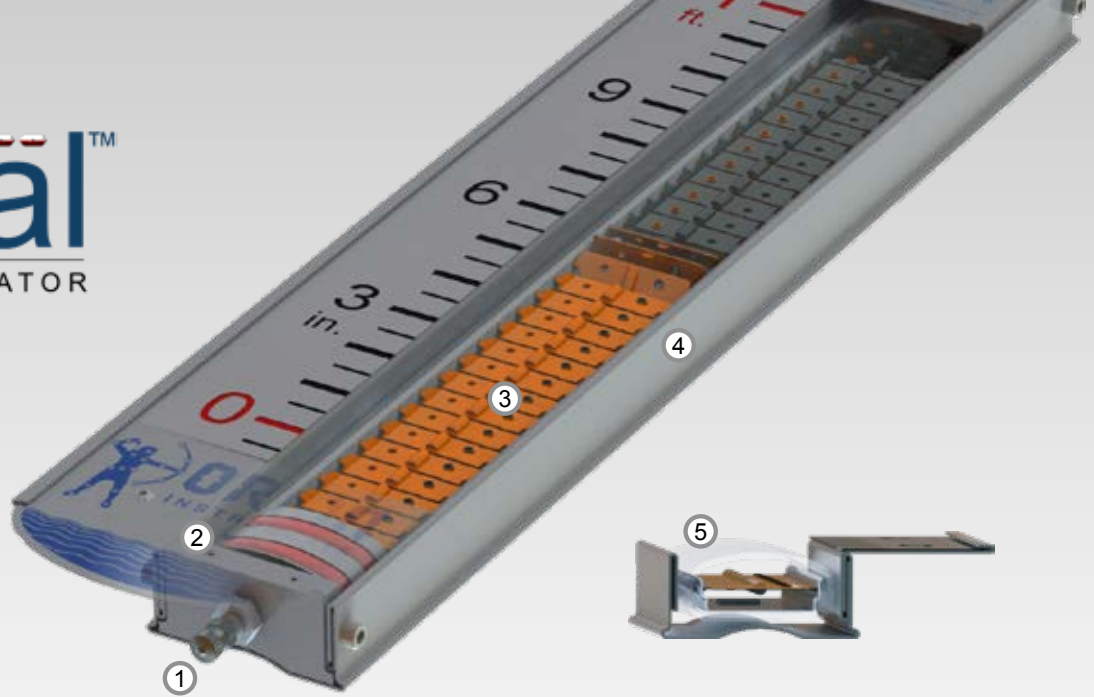
There are ten basic configuration styles and over fifteen material selections for Aurora. For the first time ever, the ability to accurately and reliably measure ultra low dielectric media, high pressure/high temperature process conditions, and media with shifting and changing dielectric values can be accomplished with Aurora.

AURORA® FEATURES

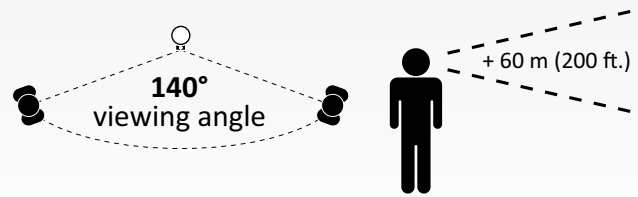
- Wide range of alloy materials
- Eclipse available with HART®, FOUNDATION fieldbus™, or PROFIBUS™ communication
- Large selection of process connection options
- Eight probe designs cover a broad range of applications
- Eclipse transmitter available in 316 stainless steel or epoxy-coated aluminum
- ASME B31.1, B31.3, or NACE available; 150# to 2500# ANSI (PN 16 to PN 320)
- Top and bottom float stop springs

reveal™

WIDE VIEW INDICATOR



- ① InstaSeal™ valve allows for an effective vacuum seal
- ② Double custom D-ring endplug ensures a reliable seal that keeps moisture out
- ③ All-metal high contrast powder coated or anodized flags are wider to enhance overall visibility
- ④ Robust 316 stainless steel enclosure designed to face the elements
- ⑤ Extruded shatter-resistant viewing window enhances visibility and allows the flags to position closely to the float, enhancing the magnetic coupling



- Scale Options:**
- Inches / Feet
 - Running Inches
 - Millimeters / Meters
 - Centimeters / Meters
 - Percent (5% increments)
 - Gallons
 - Liters



The patented REVEAL™ indicator incorporates a *positive-stop* design which limits the rotation of each flag to a half-turn. This eliminates “over-flipping” which is commonly seen on other indicator designs.

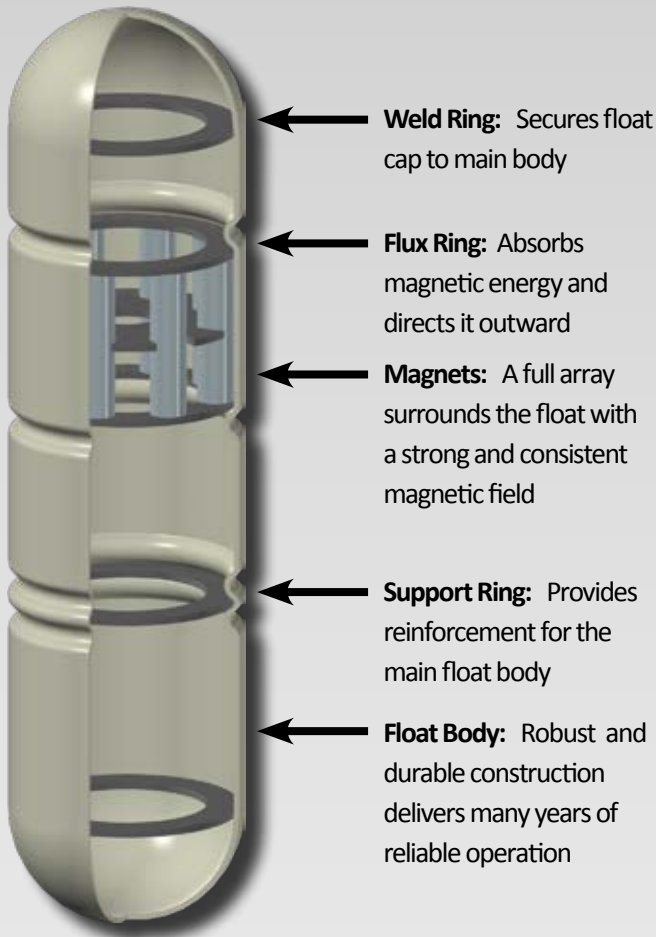


Each flag contains a high-strength magnet



Standard flag and shuttle offering. Custom colors available.

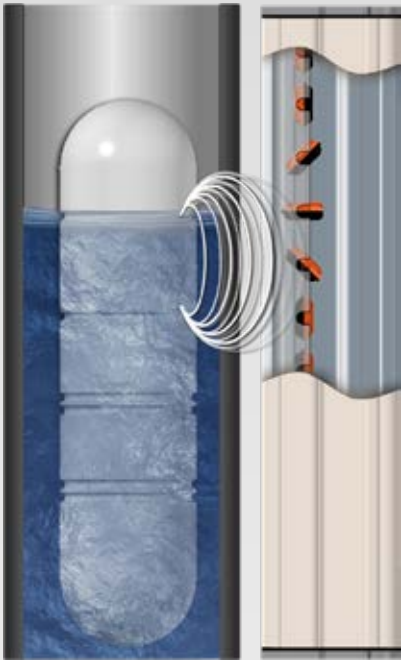




ORION FLOAT TECHNOLOGY

The float contained within the magnetic level indicator is perhaps the most important element of the instrument. Its structural design, volume displacement, weight, and buoyancy force are all carefully considered when a float is specified for a particular application.

Orion engineers have designed and tested hundreds of floats to gather the most accurate data available. We have designs for thousands of unique applications around the world, including high pressure, high temperature, and interface.



CAPABILITIES

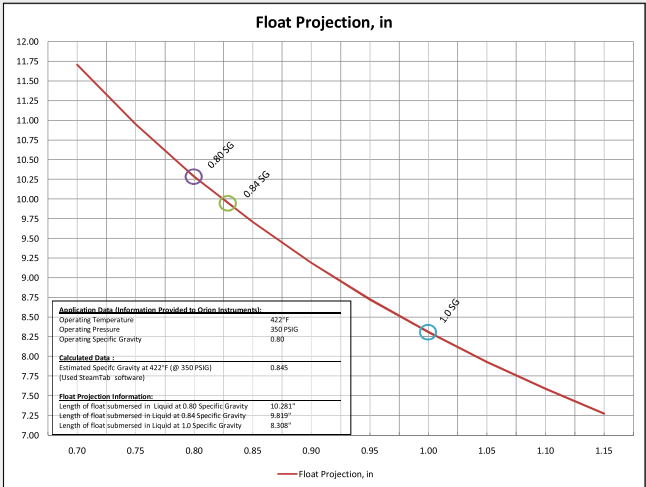
- Process pressures up to 4,500+ psig (310 bar) ①
- Process Temperatures up to 1,000 °F (538 °C) ①
- Total level specific gravities as low as 0.25 ①
- Interface float designs available for liquid specific gravity differentials as little as 0.1
- Adequate buoyancy to operate effectively and freely in many viscous liquids, including crude oil

① Maximum capabilities can vary depending on combination of pressure, temperature, and media specific gravity.

OPTIONS

- Teflon-S® PTFE and PFA slip-assistant coating
- Special coatings for abrasion and chemical resistance
- Float retrieval hook
- Float Projection Curve: If the liquid density changes, a float curve will reveal the offset

The float’s 360° magnet assembly produces a strong and consistent flux array allowing visual indication through chambers as thick as schedule 160.

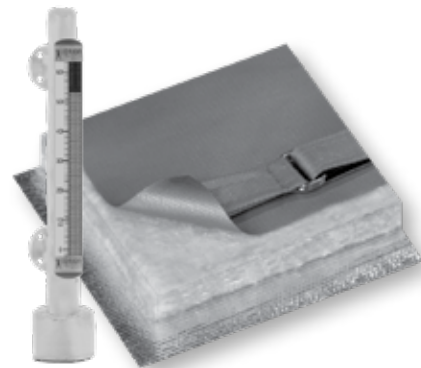


Float Projection Curve

Design	Atlas, Aurora – single chamber Gemini – dual chamber
Materials of construction – MLI	Metal alloys 316/316L or 304/304L stainless steel, 321 stainless steel, 347 stainless steel, Titanium, Monel, Hastelloy B, Hastelloy C-276, Inconel 625, Inconel 825, Alloy 20, Electropolished 316 stainless steel, 904L stainless steel and other non-magnetic alloys
Materials of construction – Float	Varies per application - stainless steel and titanium are standard (exotic alloys available)
Construction options	Conformance to Industrial Grade, ASME B31.1, ASME B31.3, ASME (U, UM, S, R), PED and NACE available
Certified material test reports (CMTR)	Available upon request
Pressure class ratings	ANSI 150#, 300#, 600#, 900#, 1500#, 2500# DIN PN16, PN25, PN40, PN63, PN100, PN160, PN250, PN320
Process connection sizes	½" to 8" DN 20 to DN 150
Process connection types	MNPT, FNPT, Weldolet®, Sockolet®, threaded nipple, butt weld nipple, plain-end nipple, slip-on flanges, weldneck flanges, lap joint flanges, Tri-Clamp® fitting
Measuring range	12 to 600 in (30 to 1524 cm)
Temperature range	-320 to +1000 °F (-196 to +538 °C)
Pressure range	Full vacuum to 4500 psig (310 bar)
Specific gravity range	As low as 0.25 S.G. (consult factory for lower specific gravities)
Visual Indicators	Magnetically actuated flag assembly in contrasting orange/black, yellow/black, red/white colors, or high visibility shuttle follower (custom colors available)
REVEAL™ Flag assembly seal	Inert gas filled and sealed with double D-ring & InstaSeal™ valve
REVEAL™ visual indicator	Visible from 200 feet (61 meters)
Aluminum visual indicator	Visible from 100 feet (30.5 meters)
Scale options	Etched stainless steel with either height, volume, or percentage units (custom markings avail.)
Switch options	Model OES electric cam operated snap action (refer to Orion bulletin: OES-100) Model ORS electric reed type (refer to Orion bulletin: ORS-300) Pneumatic switch available (consult factory)
Transmitter options	Model 706 Eclipse® guided wave radar (refer to Magnetrol bulletin: 57-106) Model JM4 Jupiter® Magnetostrictive (refer to Orion bulletin: ORI-150) Model OCT analog reed chain (refer to Orion bulletin: OCT-400)
High temperature options	Electric or steam tracing with or without special high temperature insulation
Low temperature options	Cryogenic insulation with special polymeric frost extension

HIGH-TEMPERATURE INSULATION

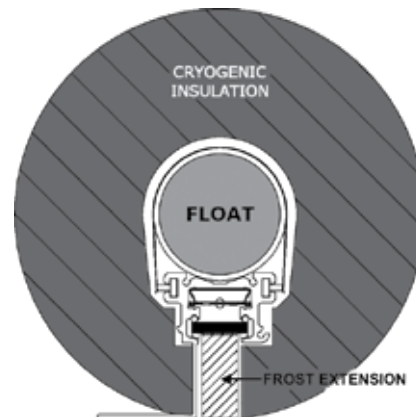
Orion specializes in custom fiberglass insulation blankets for MLIs of all shapes and sizes. They are constructed with high-quality materials capable of constant contact with temperatures up to 1,000 °F (538 °C). This insulation is available as personnel protection or with heat tracing options for freeze protection or process temperature maintenance.



CRYOGENIC INSULATION & FROST EXTENSION

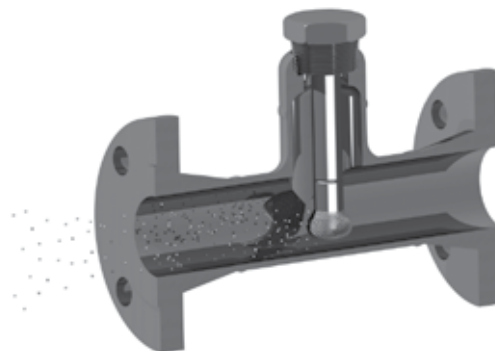
To facilitate operation where the product is kept cold via chillers, refrigerants, and condensers, cryogenic insulation is provided. By insulating the MLI with a specialized cryogenic jacket, process temperatures can be maintained in the liquid state down to -320 °F (-196 °C).

A frost extension option is available to prevent ice from collecting on the visual indicator, thereby decreasing the visibility. The extension is constructed of durable acrylic plastic and is provided standard with all cryogenic insulation.



MAGNETIC PARTICLE TRAP

Magnetic Particle Traps, or Magtraps, provide protection for Orion’s line of Magnetic Level Indicators. Particles composed mostly of ferrite, often from carbon steel piping, are widespread throughout process piping. These particles enter the MLI via the process connections during normal fill and drain operations. The magnetic float located inside the MLI attracts these particles over time. Eventually, the build-up will be enough to cause the float to become stuck inside the chamber. This results in the MLI either reading inaccurately or not at all. The trap collects the particles which can be cleaned periodically to ensure continued operation of the magnetic level indicator.



HEAT TRACING: ELECTRIC & STEAM

For applications where process freeze protection or temperature maintenance is required, heat tracing will allow the MLI to operate uninterrupted throughout harsh, cold conditions.

Electric Heat Tracing is available in self-regulating, constant wattage, and mineral insulated varieties. Contact the factory for more information.



TRANSMITTER SPECIFICATIONS

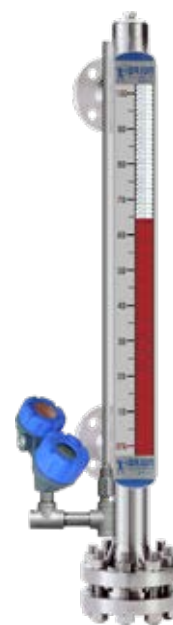
	Eclipse® Model 706 Guided Wave Radar	Jupiter® Model JM4 Magnetostrictive
Measuring Range:	6 to 240 inches (15 to 610 cm)	6 to 400 inches (15 to 999 cm)
Resolution:	0.003 mA analog 1 mm digital display	.014" (.4 mm)
Repeatability:	<0.1 inch (2.5 mm)	±0.005% of full span or 0.014 inches (0.356 mm) (whichever is greater)
Linearity:	<0.1% of probe length or 0.1 inch (2.5 mm) (whichever is greater)	0.030 inches (0.8 mm) or 0.01% of probe length (whichever is greater)
Upper Dead Zone:	None	less than 3 inches (7.6 cm) when bottom mounted electronics
Lower Dead Zone:	None	less than 3 inches (7.6 cm) when top mounted electronics
Damping:	0 - 10 seconds; adjustable	0 - 10 seconds; adjustable
Power (at terminals):	GP/IS/EP: 11 to 36 VDC FOUNDATION fieldbus™ & PROFIBUS PA™(FISCO): 9 to 17.5 VDC Modbus: 8 to 30 VDC	HART®: 16 to 36 VDC FOUNDATION fieldbus™ Explosion Proof: 9 to 17.5 VDC FISCO/FNICO: 9 to 32 VDC
Signal Output:	4-20 mA with HART®: 3.8 to 20.5 mA usable FOUNDATION fieldbus™: H1 (ITK Ver. 5.01) PROFIBUS PA™: PROFIBUS PA™ H1 Modbus	4-20 mA with HART®: 3.8 to 20.5 mA usable FOUNDATION fieldbus™: H1 (ITK Ver. 6.1.1)
Display:	Graphic liquid crystal display	Graphic liquid crystal display
Housing Material:	IP67/die-cast aluminum A413 (<0.4% copper); optional stainless steel	IP67/die-cast aluminum A413 (<0.4% copper); optional stainless steel
Area Classifications:	USA/Canada/ATEX/IECEX/INMETRO/Korea XP, IS, NI, DIP (see specific product literature for more detail)	USA/Canada/ATEX/IECEX/INMETRO/Korea XP, IS, NI, DIP (see specific product literature for more detail)
Safety Integrity Level:	Safe Failure Fraction = 93% (HART only) Functional Safety to SIL 2 as 1oo1 in accordance with IEC 61508	SIL rating pending
Process Temperature:	probe dependent (see specific product literature for more detail)	External Mount: -320 to +850 °F (-195 to +455 °C) *with insulation Direct Insertion: -320 to +800 °F (-196 to +425 °C)
Ambient Temperature at Electronics:	-40 to +175 °F (-40 to +80 °C) LCD: -5 to +160 °F (-20 to +70 °C)	-40 to +175 °F (-40 to +80 °C) LCD: -5 to +160 °F (-20 to +70 °C)
Process Pressure:	probe dependent (see specific product literature for more detail)	Direct insertion: Vacuum to +3000 psig (207 bar) (see specific product literature for more detail)
Mounting Arrangement:	Direct insertion probe with integral mount or remote mount electronics	Direct insertion probe with integral mount or remote mount electronics

TRANSMITTER SPECIFICATIONS

	OCT Reed Chain
Measuring Range:	6 to 198 inches (15 to 503 cm)
Resolution:	±0.50 inches (13 mm)
Repeatability:	< 0.25 inches (6 mm)
Non-Linearity:	<0.4% full span averaged over span
Upper Transition Zone:	4 inches (10.2 cm)
Lower Transition Zone:	4 inches (10.2 cm)
Power Input:	12 to 36 VDC
Signal Output:	4 to 20 mA
Housing Type:	NEMA 4X, IP66
Housing Material:	Cast Aluminum or 316 SS
Area Classifications:	FM/CSA EP
Process Temperature:	-40 to +425 °F (-40 to +218 °C)
Ambient Temperature at Electronics:	-40 to +158 °F (-40 to +70 °C)
Mounting Arrangement:	External mount probe with integral top or bottom mounted electronics



Eclipse®



**Jupiter®
on Atlas™**



**OCT
on Atlas™**






ELECTRONIC SWITCH SPECIFICATIONS		
Model:	OES	ORS
Description:	DPDT magnetically actuated, bi-stable cam drive snap action switch	Hermetically sealed bi-stable reed switch
Supply Voltage:	10.1 amp; 125-250 VAC	250VAC/150VDC max
Maximum Dead Band:	±0.75" float travel	±0.50" float travel
Temperature Range:	-58 to +392 °F (-50 to +200 °C) with insulation >250 °F (121 °C)	-58 to +482 °F (-50 to +250 °C) with insulation >250 °F (121 °C)
Enclosure Rating:	NEMA 4X	NEMA 4X
Enclosure Material:	Cast aluminum (standard)	Stainless steel



PNEUMATIC SWITCH SPECIFICATIONS

Consult factory for more information regarding pneumatic switches.

AGENCY APPROVALS | POINT LEVEL SWITCHES & REED CHAIN TRANSMITTER

Agency	Model	Area Classification
	OES-xxxx-001	Class I, II, III, Div. 1, Groups B,C,D,E,F,G; T6 @ 80°C; Type 4X
	ORS-xxxx-001	Class I, II, III, Div. 1, Groups B,C,D,E,F,G; T6 @ 80°C; Type 4X Class I, Div. 2, Groups A, B, C, & D; T6 @ 80°C
	OCT-xxxx-xxx	Class I, II, III, Div. 1, Groups B,C,D,E,F,G; T6 @ 80°C; Type 4X Class I, Div. 2, Groups A, B, C, & D; T6 @ 80°C
	OES-x1xx-001	Class I, Div. 1/2, Groups B, C, & D; T6 @ 80°C; Type 4X Class II, Groups E, F, & G; T6 @ 80°C; Type 4X Class III
	ORS-x1xx-001	Class I, Div. 1, Groups B, C, & D; T6 @ 80°C; Type 4X
	OCT-xxxx-001	Class I, Div. 2, Groups A, B, C, & D; T6 @ 80°C; Type 4X Class II, Groups E, F, & G; T6 @ 80°C; Type 4X Class III
ATEX 	ORS-xAxx-001	ATEX II 2 G Ex d IIC T6 Ta = -40 to +70 °C
IEC 	ORS-xAxx-001	IECEx d IIC T6 Ta = -40 to +70 °C
	OES-xxxx-001	Low Voltage Directives, 2006/95/EC
	ORS-xxxx-001	Installation Category II, Pollution Degree 2
	OCT-xxxx-xxxx	



These units are in compliance with the EMC-directive 2014/30/EU, the PED-directive 2014/68/EU and the ATEX directive 2014/34/EU.



<p>Explosion Proof (with intrinsically Safe Probe) • US/Canada: Class I, Div 1, Group B, C and D, T4 Class I, Zone 1 AEx d/ia [ia IIC Ga] IIB + H2 T4 Gb/Ga Class I, Zone 1 Ex d/ia [ia IIC Ga] IIB + H2 T4 Gb/Ga Ta = -40°C to +70°C Type 4X, IP67</p> <p>Flame Proof ATEX – FM14ATEX0041X: II 2/1 G Ex d/ia [ia IIC Ga] IIB + H2 T6 to T1 Gb/Ga Ta = -40°C to +70°C IP67</p> <p>IEC- IECEx FMG 14.0018X: Ex d/ia [ia IIC Ga] IIB + H2 T6 to T1 Gb/Ga Ta = -40°C to +70°C IP66/67</p>	<p>Non- Incendive • US/Canada: Class I, II, III, Division 2, Group A, B, C, D, E, F, G, T4 Class I, Zone 2 AEx ia/nA [ia Ga] IIC T4 Ga/Gc Class I, Zone 2 Ex ia/nA [ia Ga] IIC T4 Ga/Gc Ta = -40°C to +70°C Type 4X, IP67</p> <p>ATEX – FM14ATEX0042X: II 1/3 G Ex ia/nA [ia Ga] IIC T4 Ga/Gc Ta = -15°C to +70°C IP67</p> <p>IEC – IECEx FMG 14.00018X: Ex ia/nA [ia Ga] IIC T4 Ga/Gc Ta = -15°C to + 70°C IP66/67</p>
<p>Intrinsically Safe • US/Canada: Class I, II, III, Div 1, Group A, B, C, D, E, F, G, T4, Class I, Zone 0 AEx ia IIC T4 Ga Class I, Zone 0 Ex ia IIC T4 Ga Ta = -40°C to + 70°C Type 4X, IP67</p> <p>ATEX – FM14ATEX0041X: II 1 G Ex ia IIC T4 Ga Ta = -40°C to +70°C IP67</p> <p>IEC – IECEx FMG 14.0018X: Ex ia IIC T4 Ga Ta = -40°C to +70°C IP66/67</p>	<p>Dust Ignition Proof • US/Canada: Class II, III, Division 1, Group E, F and G, T4 Ta = -40°C to +70°C Type 4X, IP67</p> <p>ATEX – FM14ATEX0041X: II 1/2 D Ex ia/tb [ia Da] IIIC T85°C to T450°C Da/Db Ta = -15°C to +70°C IP67</p> <p>IEC – IECEx FMG 14.0018X: Ex ia tb [ia Da] IIIC T75°C to T435°C Db Ex ia IIIC T75°C to T435°C Da Ta = -15°C to +70°C IP66/67</p>

The following approval standards are applicable:

FM3600:2011, FM3610:2010, FM3611:2004, FM3615:2006, FM3616:2011, FM3810:2005, ANSI/ISA60079-0:2013, ANSI/ISA 60079-1:2009, ANSI/ISA 60079-11:2013, ANSI/ISA 60079-15:2012, ANSI/ISA 60079-26:2011, NEMA 250:2003, ANSI/IEC 60529:2004, C22.2 No. 0.4:2009, C22.2 No. 0.5:2008, C22.2 No. 30:2007, C22.2 No. 94:2001, C22.2 No. 157:2012, C22.2 No. 213:2012, C22.2 No. 1010.1:2009, CAN/CSA 60079-0:2011, CAN/CSA 60079-1:2011, CAN/CSA 60079-11:2011, CAN/CSA 60079-15:2012, C22.2 No. 60529:2005, EN60079-0:2012, EN60079-1:2007, EN60079-11:2012, EN60079-15:2010, EN60079-26:2007, EN60079-31:2009, EN60529+A1:1991-2000, IEC60079-0:2011, IEC60079-1:2007, IEC60079-11:2011, IEC60079-15:2010, IEC60079-26:2006, IEC60079-31:2008

SPECIAL CONDITIONS OF USE:

1. The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken during installation and use to prevent impact or friction.
2. The risk of electrostatic discharge shall be minimized at installation, following the directions given in the instructions.
3. Contact the original manufacturer for information on the dimensions of the flameproof joints.
4. For installation with ambient temperature of +70 °C, refer to the manufacturer’s instructions for guidance on proper selection of conductors.
5. WARNING—Explosion Hazard: Do not disconnect equipment when flammable or combustible atmosphere is present.
6. For IEC and ATEX: To maintain the T1 to T6 temperature codes, care shall be taken to ensure the enclosure temperature does not exceed +70 °C.
7. For U.S. and Canada: To maintain the T4 temperature code, care shall be taken to ensure the enclosure temperature does not exceed +70 °C.
8. Temperature codes for the ratings Ex d/ia [ia IIC] IIB+H2 and Ex ia/ tb [ia] IIIC are defined by the following table:

Process Temperature (PT)	Temperature Code-TCG (GAS)	Temperature Code-TCD (Dust)
Up to 75 °C	T6	TCD= PT+10K=85 °C
From 75 to 90 °C	T5	TCD= PT+10K=100 °C
From 90 to 120 °C	T4	TCD= PT+15K=135 °C
From 125 to 185 °C	T3	TCD= PT+15K=200 °C
From 185 to 285 °C	T2	TCD= PT+15K=300 °C
From 285 to 435 °C	T1	TCD= PT+15K=450 °C

Agency Specifications – Explosion Proof Installation

Factory Sealed: This product has been approved by Factory Mutual Research (FM) as a Factory Sealed device.

NOTE: Factory Sealed: No Explosion Proof conduit fitting (EY seal) is required within 18” of the transmitter. However, an Explosion Proof conduit fitting (EY seal) is required between the hazardous and safe areas.

CE These units are in compliance with the EMC directive 2004/108/EC, the PED directive 97/23/EC and the ATEX directive 94/9/EC.



<p>Explosion Proof • US/Canada: FM16US0357X/FM16CA0168X Class I, Div 1, Group B, C and D, T4 Ta = -40°C to +70°C Type 4X, IP67</p> <p>Flame Proof: Flameproof US/ Canada: Class I, Zone 0/1, AEx db IIB + H2 T1...T6 Ga/Gb (US) Class I, Zone 0/1, Ex db IIB + H2 T1...T6 Ga/GB (Canada) Ta = -40 C to +70 C IP 67</p> <p>ATEX FM14ATEX0059X: II 1/2G db IIC T1...T6 Ga/Gb Ta=-40°C to +70°C IP67</p> <p>IEC- IEC Ex FMG14.0028X Ex db IIC T1...T6 Ga/Gb Ta=-40°C to +70°C IP67</p>	<p>Non- Incendive • US/Canada: FM16US0357X/FM16CA0168X U.S. - Class I, II, III, Division 2, Group A, B, C, D, E, F, G, T4, Ta = -40°C to 70°C CANADA – Class I, Division 2, Group A,B,C,D T4, Ta = -40°C to 70°C Class I, Zone 2 AEx nA IIC T4 Gc Ta = -15°C to 70°C Class I, Zone 2 Ex nA IIC T4 Gc Ta = -15°C to +70°C Type 4X, IP67</p> <p>ATEX FM14ATEX0060X: II 3 G Ex nA IIC T4 Gc Ta = -15°C to +70°C IP67</p> <p>IEC – IECEx FMG 14.00028X: Ex nA IIC T4 Gc Ta = -15°C to + 70°C IP67</p>
<p>Intrinsically Safe • US/Canada: FM16US0357X/FM16CA0168X Class I, II, III, Div 1, Group A, B, C, D, E, F, G, T4, Class I, Zone 0 AEx ia IIC T4 Ga Class I, Zone 0 Ex ia IIC T4 Ga Ta =-40°C to + 70°C Type 4X, IP67</p> <p>ATEX – FM14ATEX0059X: II 1 G Ex ia IIC T4 Ga Ta = -40°C to +70°C IP67</p> <p>IEC – IECEx FMG 14.0028X: Ex ia IIC T4 Ga Ta = -40°C to +70°C IP67</p>	<p>Dust Ignition Proof • US/Canada: FM16US0357X/FM16CA0168X Class II, III, Division 1, Group E, F and G, T4 Ta = -15°C to +70°C Type 4X, IP67 US/Canada Zone Ratings as follows: Zone 21, AEx tb IIIC T86C...T120C Ta= -15 C to +70 C Db (US) Zone 21, Ex tb IIIC T85C...T120C Ta = -15 C to +70 C Db (Canada) Type 4X, IP67</p> <p>ATEX – FM14ATEX0059X: II 2 D Ex tb IIIC Db T85°C ... T120°C Ta = -15°C to +70°C IP67</p> <p>IEC – IECEx FMG 14.0028X: Ex tb IIIC Db T85°C ... T120°C Ta = -15°C to +70°C IP67</p>

The following approval standards are applicable:
FM3600:2011, FM3610:2010, FM3611:2004, FM3615:2006, FM3616:2011, FM3810:2005, ANSI/ISA60079-0:2013, ANSI/ISA 60079-1:2009, ANSI/ISA 60079-11:2013, ANSI/ISA 60079-15:2012, ANSI/ISA 60079-26:2011, NEMA 250:2003, ANSI/IEC 60529:2004, C22.2 No. 0.4:2009, C22.2 No. 0.5:2008, C22.2 No. 30:2007, C22.2 No. 94:2001, C22.2 No. 157:2012, C22.2 No. 213:2012 C22.2 No. 1010.1:2009 CAN/CSA 60079-0:2011 CAN/CSA 60079-1:2011 CAN/CSA 60079-11:2011 CAN/CSA 60079-15:2012, C22.2 No. 60529:2005 EN60079-0:2012, EN60079-1:2014 EN60079-11:2012 EN60079-26:2007 EN60079-15:2010 EN60079-31:2009 EN60529+A1:1991-2000 IEC60079-0:2011 IEC60079-1:2014 IEC60079-11:2011 IEC60079-15:2010 IEC60079-2:2006 IEC60079-31:2008

SPECIAL CONDITIONS OF USE:

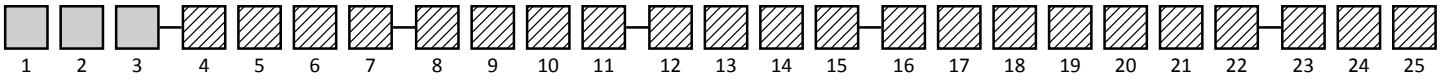
- For Explosion-proof installations the I.S. ground terminal shall be connected to appropriate intrinsically safe ground in accordance with the Canadian Electrical code (CEC) or the national electrical code (NEC). For intrinsically safe installations the I.S. ground terminal does not require grounding.
- To maintain the T4 temperature code care shall be taken to ensure the enclosure temperature does not exceed +70 °C (+158 °F).
- The risk of electrostatic discharge shall be minimized at installation, following the direction given in the instruction.
- For installation with ambient temperature of +70 °C (+158 °F), refer to the manufacturer’s instructions for guidance on proper selection of conductors.
- Provisions shall be made to provide transient overvoltage protection to a level not to exceed 119Vdc.
- WARNING – Explosion Hazard** do not disconnect equipment when flammable or combustible atmosphere is present
- When equipment is used in explosive dust atmospheres, the end user shall take precautions so that the thermal effects of the process temperature shall limit the equipment enclosure and probe surface temperatures to not exceed the required installation location temperature and shall be between T85 °C (185 °F) and T120 °C (248 °F).

NOTES:

- For Explosion-proof installations the I.S. ground terminal shall be connected to appropriate intrinsically safe ground in accordance with the Canadian Electrical code (CEC) or the national electrical code (NEC). For intrinsically safe installations the I.S. ground terminal does not require grounding.
- Manufacturer’s installation instructions supplied with the protective barrier and the CEC or the NEC must be followed when installing this equipment. Barrier must be certified for Canadian & U.S. installation.
- Control equipment connected to protective barriers must not use or generate more than 250 VDC or VRMS.
- Agency approved dust tight seals must be used when transmitter is installed in Class II & III environments.
- For supply connections, use wire suitable for the operating temperature.
- Agency approved barriers with linear output characteristics must be used.

ADDITIONAL CERTIFICATIONS

GOST R Russian Certificate of Conformity
GOST Pattern Approval Certificate for Measuring Instruments (Metrology Certificate)
GOST R Ex-Proof Certificate of Conformity



1 | PRODUCT TYPE

1	Atlas MLI
2	Aurora MLI with Eclipse® GWR transmitter
3	Gemini dual-chamber MLI with Eclipse® GWR
5	External Cage for transmitter

2 | UNIT OF MEASURE

E	English Units (Inches)	Specifies the unit of measure for the Center-to-Center and Visual Indication Length (digits 23 - 25)
M	Metric Units (Centimeters)	



See bulletin ORI-402 for models qualifying for OrionXpress delivery.

Select the appropriate **Chamber Configuration** from the following five tables (match product type from digit 1)

3¹ | ATLAS - CHAMBER CONFIGURATION

Process Connection Orientation	Chamber Top	Chamber Bottom	
1	Side / Side	Dome cap	Flanged (including mating blind flange)
2	Side / Side	Flanged (including mating blind flange)	Dome cap
3	Side / Side	Flanged (including mating blind flange)	Flanged (including mating blind flange)
4	Top / Bottom	Flanged	Flanged
5	Top / Bottom with Spool Pieces	Flanged (including mating blind flange)	Flanged (including mating blind flange)
6	Top / Side	Flanged	Flanged (including mating blind flange)
7	Top / Side	Dome cap with process connection	Flanged (including mating blind flange)
8	Side / Bottom	Flanged (including mating blind flange)	Flanged
9	Side / Bottom	Flanged (including mating blind flange)	Dome cap with process connection
T	Top Mount	Threaded cap	Flanged process connection ①

① See pg. 19 for additional mounting options, or consult factory for custom solutions.

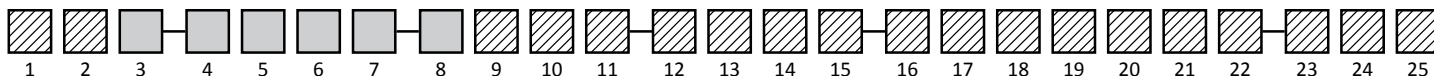
3² | AURORA - CHAMBER CONFIGURATION

Process Connection Orientation	Chamber Top	Chamber Bottom	
1	Side / Side	Welded cap with threaded Eclipse probe	Flanged (including mating blind flange)
2	Side / Side	Flanged with threaded Eclipse probe	Dome cap
3	Side / Side	Flanged with threaded Eclipse probe	Flanged (including mating blind flange)
4	Side / Side	Flanged with seal welded Eclipse probe	Dome cap
5	Side / Side	Flanged with seal welded Eclipse probe	Flanged (including mating blind flange)
A	Side / Bottom	Welded cap with threaded Eclipse probe	Flanged with process connection
B	Side / Bottom	Flanged with threaded Eclipse probe	Dome cap with process connection
C	Side / Bottom	Flanged with threaded Eclipse probe	Flanged with process connection
D	Side / Bottom	Flanged with seal welded Eclipse probe	Dome cap with process connection
F	Side / Bottom	Flanged with seal welded Eclipse probe	Flanged with process connection

3³ | GEMINI - CHAMBER CONFIGURATION

Process Connection Orientation	Primary Chamber Top	Primary Chamber Bottom	Secondary Chamber (with Eclipse GWR transmitter) ①		
			Top	Bottom	
1	Side / Side	Dome cap	Flanged (with blind)	Dome cap with threaded Eclipse	Dome cap
2	Side / Side	Flanged (with blind)	Dome cap	Dome cap with threaded Eclipse	Dome cap
3	Side / Side	Flanged (with blind)	Flanged (with blind)	Dome cap with threaded Eclipse	Dome cap
4	Side / Side	Dome cap	Flanged (with blind)	Flanged with threaded Eclipse	Dome cap
5	Side / Side	Flanged (with blind)	Dome cap	Flanged with threaded Eclipse	Dome cap
6	Side / Side	Flanged (with blind)	Flanged (with blind)	Flanged with threaded Eclipse	Dome cap
7	Side / Side	Dome cap	Flanged (with blind)	Flanged with threaded Eclipse	Flanged (with blind)
8	Side / Side	Flanged (with blind)	Dome cap	Flanged with threaded Eclipse	Flanged (with blind)
9	Side / Side	Flanged (with blind)	Flanged (with blind)	Flanged with threaded Eclipse	Flanged (with blind)
A	Top / Bottom	Flanged	Flanged	Dome cap with threaded Eclipse	Dome cap
B	Top / Bottom	Flanged	Flanged	Flanged with threaded Eclipse	Dome cap
C	Top / Bottom	Flanged	Flanged	Flanged with threaded Eclipse	Flanged (with blind)

① consult factory for seal welded Eclipse probe in secondary chamber



3⁵ | EXTERNAL CAGE FOR JUPITER® DIRECT INSERTION - CHAMBER CONFIGURATION

Process Connection Orientation	Chamber Top	Chamber Bottom
2 Side / Side	Flanged (with threaded Jupiter)	Dome Cap
3 Side / Side	Flanged (with threaded Jupiter)	Flanged (including blind flange)
8 Side / Bottom	Flanged (with threaded Jupiter)	Flanged
9 Side / Bottom	Flanged (with threaded Jupiter)	Dome Cap with Spool Piece
B Side / Side	Flanged (with seal welded Jupiter)	Dome Cap
C Side / Side	Flanged (with seal welded Jupiter)	Flanged (including blind flange)
H Side / Bottom	Flanged (with seal welded Jupiter)	Flanged
J Side / Bottom	Flanged (with seal welded Jupiter)	Dome Cap with process connection

4 | FLANGE RATING

ANSI		EN 1092	
A	150#	1	PN 16
B	300#	2	PN 25
C	600#	3	PN 40
D	900#	4	PN 63
E	1500#	5	PN 100
F	2500#	6	PN 160
		7	PN 250
		8	PN 320

5 | MATERIAL SELECTION

Stainless Steels	
A	316/316L Stainless Steel
B	316/316L Stainless Steel w/Carbon Steel Flanges
C	304/304L Stainless Steel
D	304/304L Stainless Steel w/Carbon Steel Flanges
F	317 Stainless Steel
G	321 Stainless Steel
H	347 Stainless Steel
J	904L Stainless Steel
K	Electropolished 316 Stainless Steel

Exotic Alloys	
N	Titanium
P	Monel® 400
Q	Hastelloy C-276
R	Alloy 20
S	Inconel® 625
T	Incoloy® 825

Carbon Steels (for External Cage product only)	
L	Carbon Steel

6 | CONSTRUCTION CODE

1	Industrial Grade (std.)
2	ASME B31.1 for Power Piping Standard
3	ASME B31.3 for Process Piping Standard
4	Industrial Grade and NACE MR0103
A	Industrial Grade (extruded outlet)
C	ASME B31.3 (extruded outlet)

5	Industrial Grade and NACE MR0175
6	ASME B31.3 for Process Piping Standard and NACE MR0103
7	ASME B31.3 for Process Piping Standard and NACE MR0175
8	PED

7 | CHAMBER FLANGE STYLE

A	RF Slip-on Flange	G	FF Socketweld Flange
B	RF Weldneck Flange	H	RTJ Slip-on Flange
C	RF Socketweld Flange	J	RTJ Weldneck Flange
D	FF Slip-on Flange	K	RTJ Socketweld Flange
F	FF Weldneck Flange	L	RF Lap Joint Flange

EN 1092 European Standard	
6	EN 1092 Type 11 with Type A Face
7	EN 1092 Type 11 with Type B1 or B2 Face *
8	EN 1092 Type 12 with Type A Face
9	EN 1092 Type 12 with Type B1 or B2 Face *

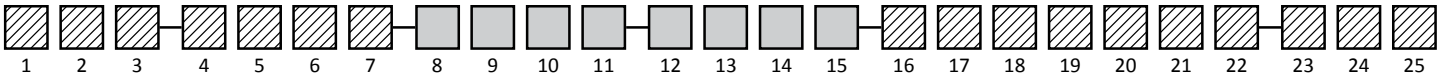
* B1: if digit 4 = 1, 2, or 3
 B2: if digit 4 = 4, 5, 6, 7, 8

8 | PROCESS CONNECTION TYPE

Flanged (Alloy)	
A	RF Slip-on Flange
B	RF Weldneck Flange
C	RF Socketweld Flange
D	FF Slip-on Flange
F	FF Weldneck Flange
G	FF Socketweld Flange
H	RTJ Slip-on Flange
J	RTJ Weldneck Flange
K	RTJ Socketweld Flange
L	RF Lap Joint Flange

Other	
M	Male Threaded (NPT)
N	Female Threaded (NPT)
P	Plain-end Nipple
Q	Socketweld
R	Buttweld
S	Weldolet™
T	Sockolet™
W	Threadolet™
Y	Tri-Clamp® Fitting

EN 1092 European Standard	
6	EN 1092 Type 11 with Type A Face
7	EN 1092 Type 11 with Type B2 Face
8	EN 1092 Type 12 with Type A Face
9	EN 1092 Type 12 with Type B2 Face



9 | PROCESS CONNECTION SIZE

Standard		EN 1092	
A	1/2"	1	DN 15
B	3/4"	2	DN 20
C	1"	3	DN 25
D	1 1/2"	4	DN 40
E	2"	5	DN 50
F	2 1/2"	6	DN 65
G	3"	7	DN 80
H	4"	8	DN 100
J	6"	9	DN 150
K	8"		

10 | GASKET STYLE

Gaskets for Metallic Flanges	
A	Flexible graphite ring ①
B	Spiral wound with graphite filler and carbon steel outer ring ② ③
C	Spiral wound with graphite filler, inner ring matching chamber material ③, and carbon steel outer ring
D	RTJ oval ring ④
E	RTJ octagonal ring ④
F	Virgin PTFE Ring -140 to +450 °F (-96 to +232 °C)
N	None

- ① Standard gasket for 150# and 300# flange ratings suitable for most applications.
- ② Standard gasket for 600# and above flange ratings suitable for most applications.
- ③ Winding material matches chamber material.
- ④ Ring type gasket material matches flange material.

11 | CHAMBER FLANGE BOLTING

Stainless Steel		
A	304 stainless steel (standard)	A193 Gr. B8 / A194 Gr. 8
B	304 stainless steel w/PTFE coating	A193 Gr. B8 / A194 Gr. 8
C	316 stainless steel	A193 Gr. B8M / A194 Gr. 8M
D	316 stainless steel w/PTFE coating	A193 Gr. B8M / A194 Gr. 8M

Alloy Steel		
M	Alloy Steel	A193 Gr. B7 / A194 Gr. 2H
P	Alloy Steel	A193 Gr. B7M / A194 Gr. 2HM
S	Alloy Steel w/zinc plating	Available when digit 17=N or T Not available when digit 6= 4, 5, 7 or 8

N	None (if mating flanges are not supplied)
---	---

12 | VENT SIZE

1	1/2"
2	3/4"
3	1"
4	1 1/2"
5	2"
6	2 1/2"
7	3"
8	4"
N	None

13 | VENT TYPE

1	FNPT w/ Hex Head Plug (std.)
2	Socketweld
3	Male Threaded (MNPT)
4	Plain-End Nipple
5	Buttweld Nipple
6	RF Slip On Flange
7	RF Weld Neck Flange
8	RTJ Slip On Flange
9	RTJ Weld Neck Flange

A	Ball Valve, FNPT x FNPT
B	Ball Valve, SW x SW
C	Ball Valve, SW x FNPT
D	Gate Valve, FNPT x FNPT
E	Gate Valve, SW x SW
F	Gate Valve, SW x FNPT
G	RF Flange Ball Valve w/spool
H	RF Flange Gate Valve w/spool

N	None
---	------

14 | DRAIN SIZE

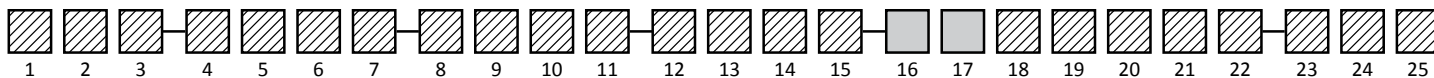
1	1/2"
2	3/4"
3	1"
4	1 1/2"
5	2"
6	2 1/2"
7	3"
8	4"
N	None

15 | DRAIN TYPE

1	FNPT w/ Hex Head Plug (std.)
2	Socketweld
3	Male Threaded (MNPT)
4	Plain-End Nipple
5	Buttweld Nipple
6	RF Slip On Flange
7	RF Weld Neck Flange
8	RTJ Slip On Flange
9	RTJ Weld Neck Flange

A	Ball Valve, FNPT x FNPT
B	Ball Valve, SW x SW
C	Ball Valve, SW x FNPT
D	Gate Valve, FNPT x FNPT
E	Gate Valve, SW x SW
F	Gate Valve, SW x FNPT
G	RF Flange Ball Valve w/spool
H	RF Flange Gate Valve w/spool

N	None
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16 | ACCESSORY / TECHNOLOGY CODE

N	None
---	------

Switches Only (No Transmitter. See options below if transmitter is required)	
Y	Orion Electronic Switch (OES or ORS) clamp-mounted to chamber
Z	Orion Electronic Switch (OES or ORS) with switch mount rod

When MLIs are combined with compatible accessory items, such as continuous transmitters or point switches, minor changes to the chamber and float design may be required. This code captures that relationship.

For digit 16, match up the MLI product type with the appropriate transmitter, switch, or combination of both. The corresponding code should be entered into the model number shown above.

All transmitters and switches must be ordered separately.

FOR ATLAS ONLY WITH EXTERNAL TRANSMITTER (code in first digit of model number must be "1")

Jupiter® Magnetostrictive Transmitter (mounting configurations shown below)	Jupiter® Only, No switches	Jupiter® and at least one OES/ORS Switch (Clamp-mounted)	Jupiter® and at least one OES/ORS Switch (Rod-mounted)
Top Mount	1	A	L
Top Mount Offset/High-Temp	2	B	M
Bottom Mount Offset/High-Temp	3	C	P

OCT Reed Chain Transmitter (mounting configurations shown below)	
Top Mount	8
Bottom Mount	9

FOR AURORA & GEMINI ONLY (code in first digit of model number must be "2" or "3")

Single rod caged or flexible probes not available with bottom cap

Eclipse® Probe Configuration	Eclipse® Only, No switches	Eclipse® and at least one OES/ORS Switch (Clamp-mounted)	Eclipse® and at least one OES/ORS Switch (Rod-mounted)
Standard Coaxial Probe	1	A	L
Rigid Single Rod Probe	2	B	M
Flexible Single Rod Probe	3	C	P
Enlarged Coaxial Probe	4	D	R

Jupiter® Probe Configuration (Gemini only option if GWR not used)	Jupiter® Only, No switches	Jupiter® and at least one OES/ORS Switch (Clamp-mounted)	Jupiter® and at least one OES/ORS Switch (Rod-mounted)
Jupiter, Direct Insertion	9	K	W

FOR JUPITER® EXTERNAL CHAMBER/CAGE ONLY (code in first digit of model number must be "5")

Direct Insertion Transmitter	1
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17 | TEMPERATURE OPTIONS

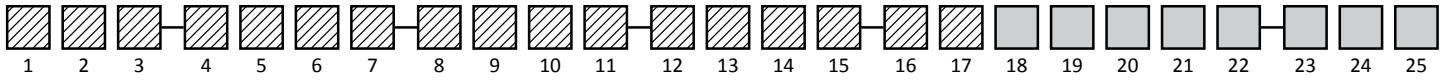
N	None
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Insulation Blanket for Personnel Protection		
A	Chamber pipe only	up to 600 °F (316 °C)
B	Chamber pipe only	up to 1000 °F (538 °C)
C	Chamber and flanges	up to 600 °F (316 °C)
D	Chamber and flanges	up to 1000 °F (538 °C)

Other Options for Temperature Maintenance or Freeze Protection		
H	Electric Heat Tracing	includes insulation blanket
S	Steam Tracing (3/8" tubing)	includes insulation blanket
J	Steam Jacket (1/2" NPT inlet/outlet)	includes insulation pad

Insulation Pad for Indicator & Transmitter Protection		
Y	Indicator only	≥ 250 °F (121 °C)
T	Jupiter®	175 to 850 °F (79 to 454 °C)
U	OCT	200 to 700 °F (93 to 371 °C)
V	Indicator and Jupiter®	250 to 850 °F (121 to 454 °C)
W	Indicator and OCT	250 to 700 °F (121 to 371 °C)

Cryogenic Insulation		
L	Process temperatures down to -150 °F (-101 °C)	
P	Process temperatures down to -320 °F (-196 °C)	



18 MEASUREMENT TYPE & INDICATOR STYLE

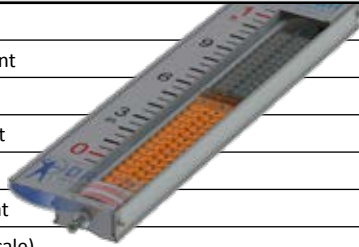
Total Level Measurement	
S	Fluorescent Orange Shuttle / Follower
1	Orange / Black Flags
2	Yellow / Black Flags
3	Red / White Flags
4	Red / Silver Flags (+700 °F (+371 °C) and above)
A	Orange / Black Flags with Yellow Float Diagnostics ①
B	Yellow / Black Flags with Orange Float Diagnostics ①
C	Red / White Flags with Yellow Float Diagnostics ①
D	Red / Silver Flags with Green Float Diagnostics (+700 °F (+371 °C) and above) ①
N	No Indicator (For use with Jupiter® external cage)

Interface Level Measurement	
T	Fluorescent Orange Shuttle / Follower
5	Orange / Black Flags
6	Yellow / Black Flags
7	Red / White Flags
8	Red / Silver Flags (+700 °F (+371 °C) and above)
F	Orange / Black Flags with Yellow Float Diagnostics ①
G	Yellow / Black Flags with Orange Float Diagnostics ①
H	Red / White Flags with Yellow Float Diagnostics ①
J	Red / Silver Flags with Green Float Diagnostics ① (+700 °F (+371 °C) and above) ①

① Float diagnostics is a safety feature which indicates a contrasting color on the visual indicator when the float has fallen below the lowest measurable point on the scale. This can occur when the specific gravity of the liquid drastically decreases or the float collapses due to a pressure spike. (see pg. 4)

19 INDICATOR HOUSING MATERIAL & SCALE ②

reveal Wide View Stainless Steel indicator	
A	Foot / Inch Measurement
B	Meter / Centimeter Measurement
C	Running Inch Measurement
D	Percent (0 - 100%) Measurement
E	Gallon Measurement
G	Meter / Millimeter Measurement
H	Foot / Inch with Percent (Dual Scale)
J	Meter / Millimeter with Percent (Dual Scale)
F	Liter Measurement
P	No scale



Anodized Aluminum Housing	
1	Foot / Inch Measurement
2	Meter / Centimeter Measurement
3	Running Inch Measurement
4	Percent (0 - 100%) Measurement
5	Gallon Measurement
6	Liter Measurement
7	Meter / Millimeter Measurement
N	No scale

② Aluminum indicator is required if either of the following conditions are true:
 a) A glass viewing window is desired instead of shatter-resistant polycarbonate.
 b) Process operating temperatures exceed above 800 °F (427 °C)

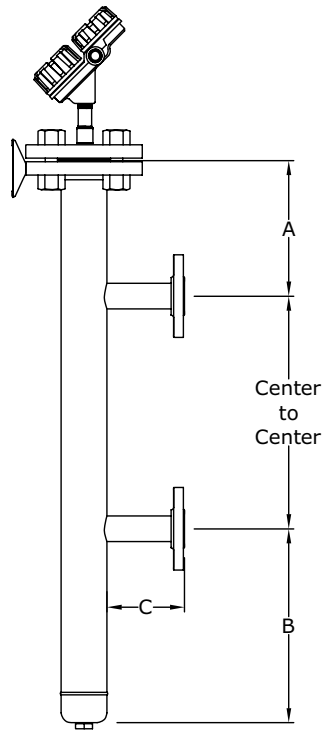
20, 21, 22 FACTORY ASSIGNED

X X X	These codes are factory assigned. ③
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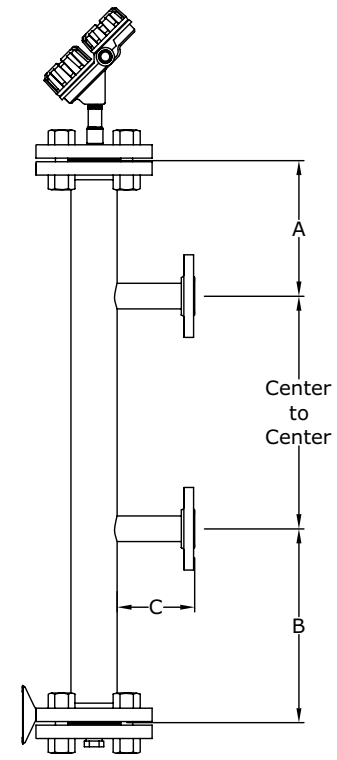
③ Not all chamber diameters and wall thicknesses are eligible for OrionXpress. Contact the factory or your local representative for more information.

23, 24, 25 CENTER-TO-CENTER PROCESS CONNECTION DIMENSION & VISUAL INDICATION LENGTH

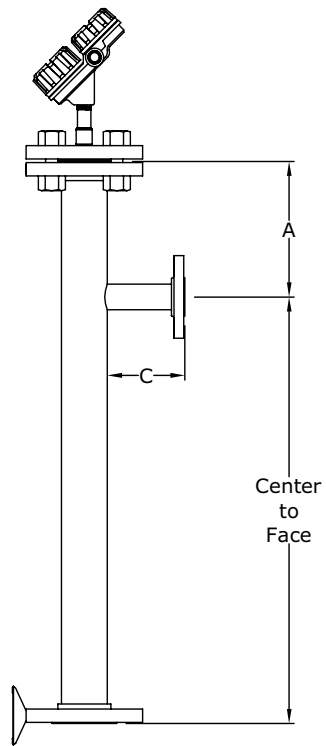
X X X	Specify in INCHES when model code 2 is E Specify in CENTIMETERS when model code 2 is M
	<p>Example #1: Center-to-Center is 84 inches. Enter as 084. (model digit 2 must be "E")</p> <p>Example #2: Center-to-Center is 124 centimeters. Enter as 124. (model digit 2 must be "M")</p> <p>Example #3: Center-to-Center is 124.25 inches. Enter as 124 inches and X the model for 124.25 inches. Or consult factory for assistance.</p> <p>Example #4: Center-to-Center is 724 millimeters. Enter as 072 centimeters and X the model for 724 millimeters. Or consult factory for assistance.</p>



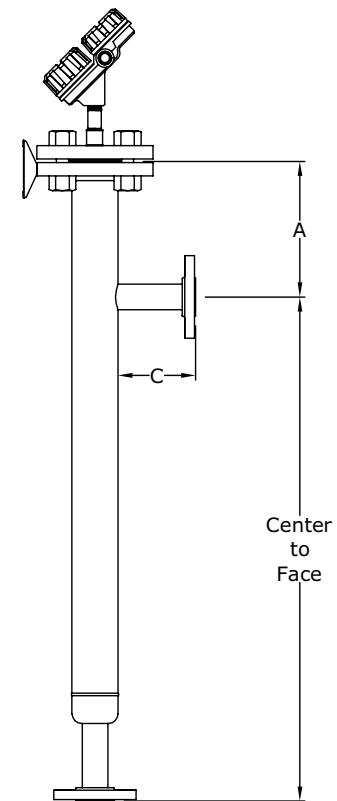
Configuration 2 & B



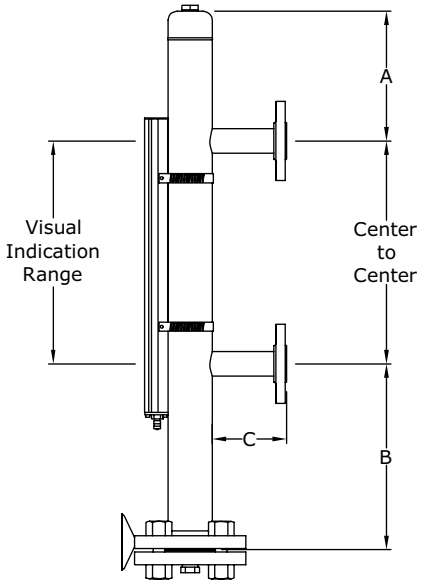
Configuration 3 & C



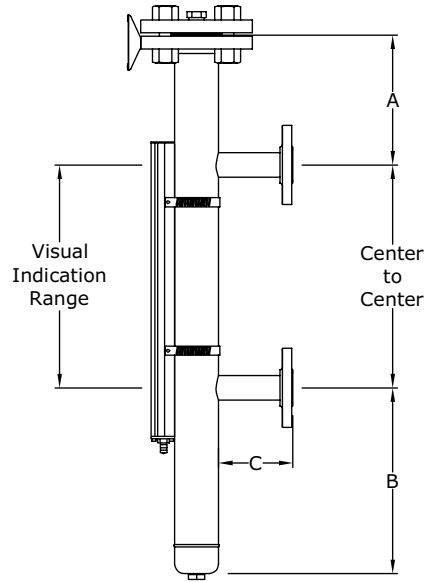
Configuration 8 & H



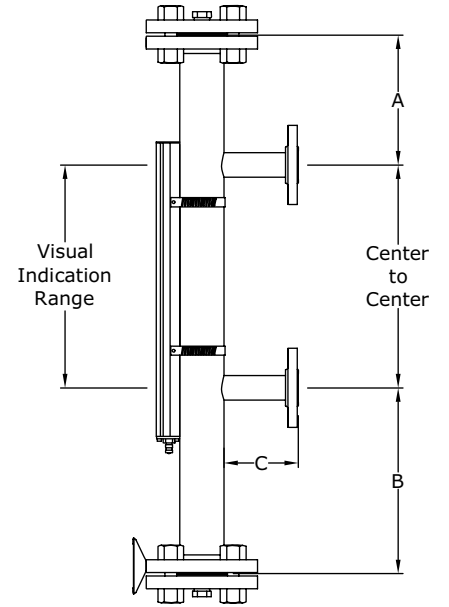
Configuration 9 & J



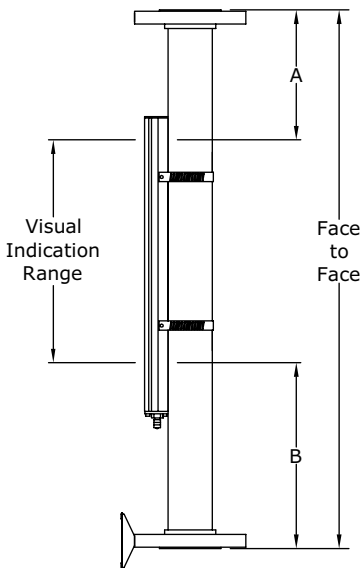
Configuration 1



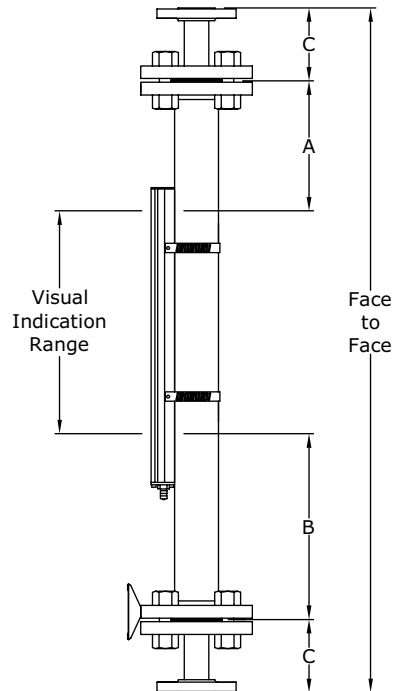
Configuration 2



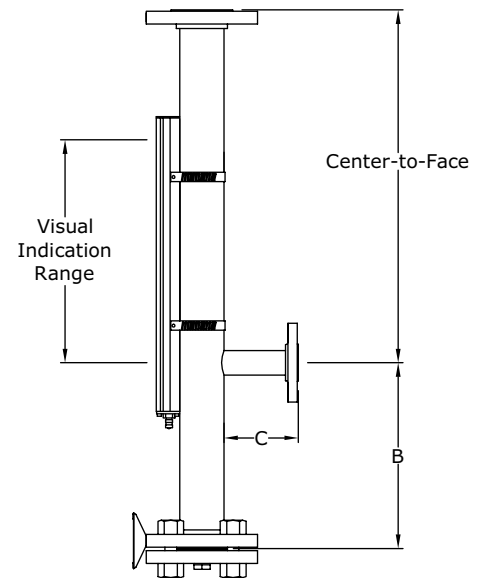
Configuration 3



Configuration 4

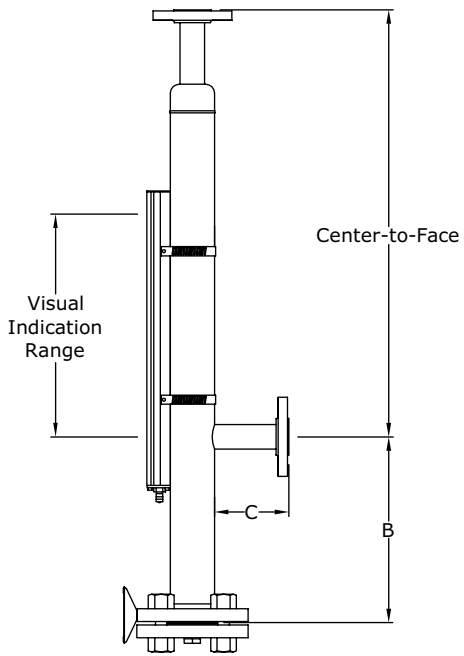


Configuration 5

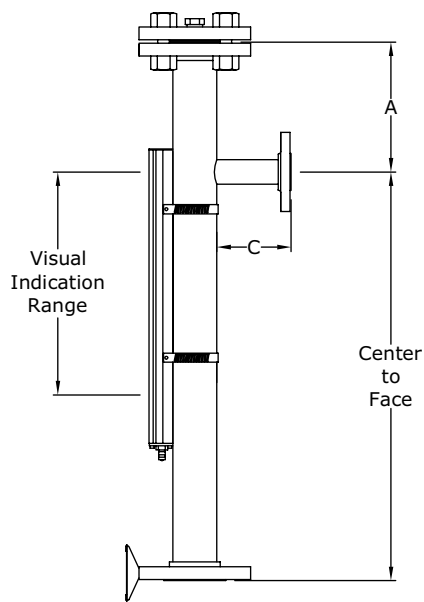


Configuration 6

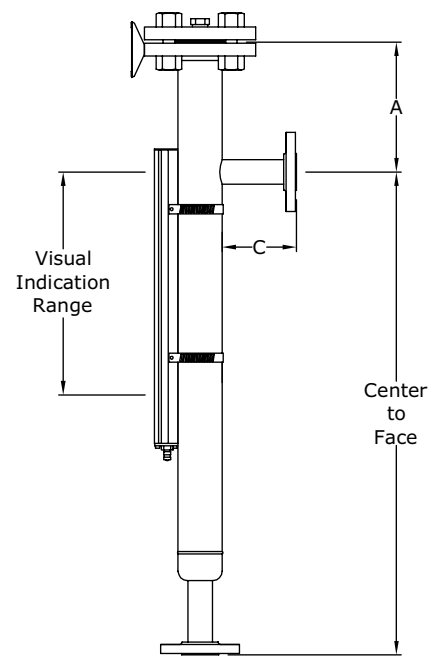
All dimensions vary depending on application parameters and/or accessory items. Dimensional drawings are available by contacting the factory.



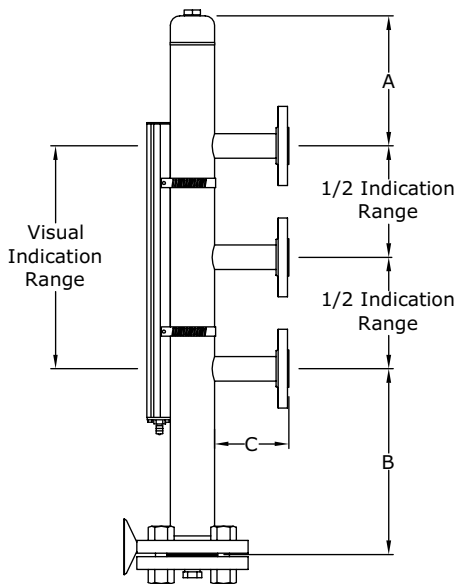
Configuration 7



Configuration 8



Configuration 9



Multiple Process Connections
consult factory



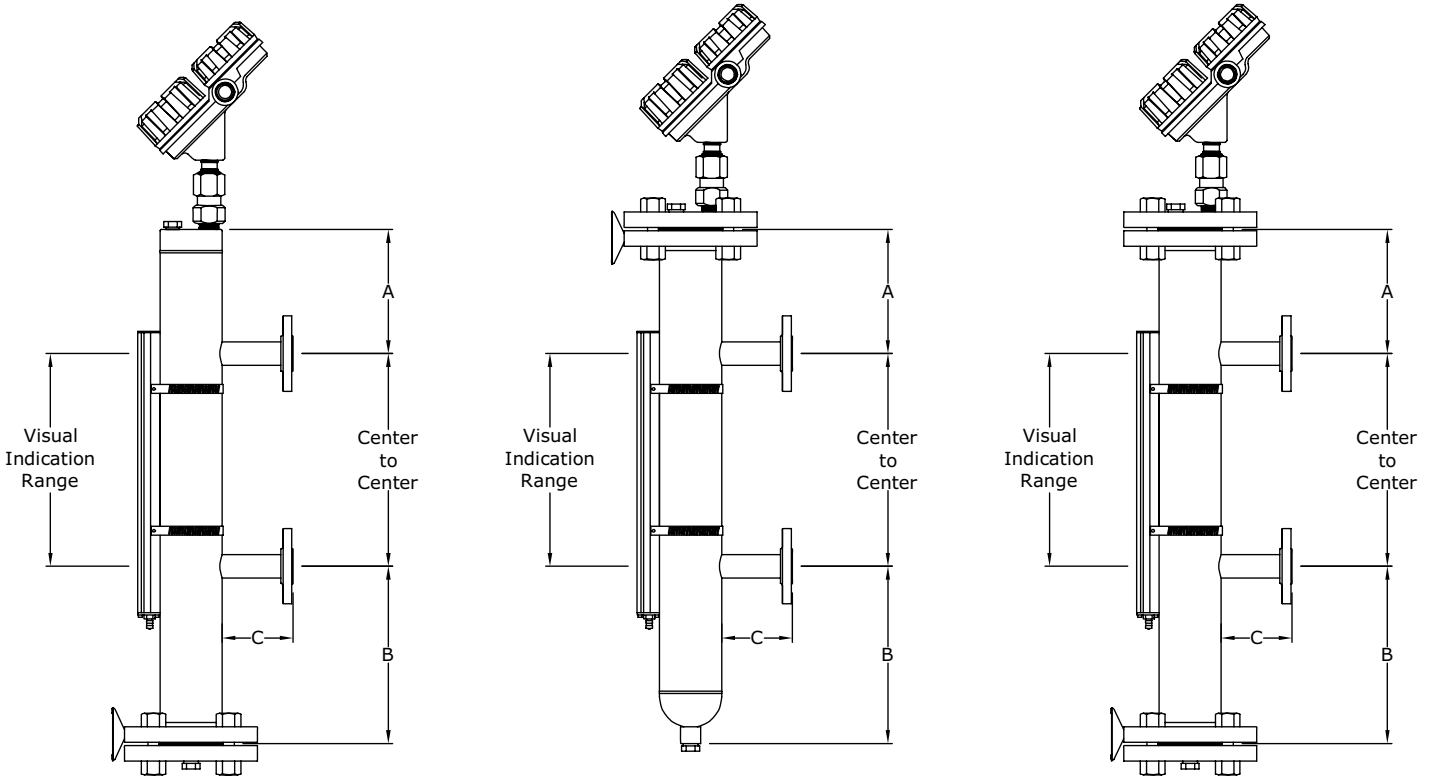
Atlas Top Mount
configuration T



Atlas Top Mount
w/stilling well
consult factory



Atlas Top Mount
w/threaded process
connection
consult factory

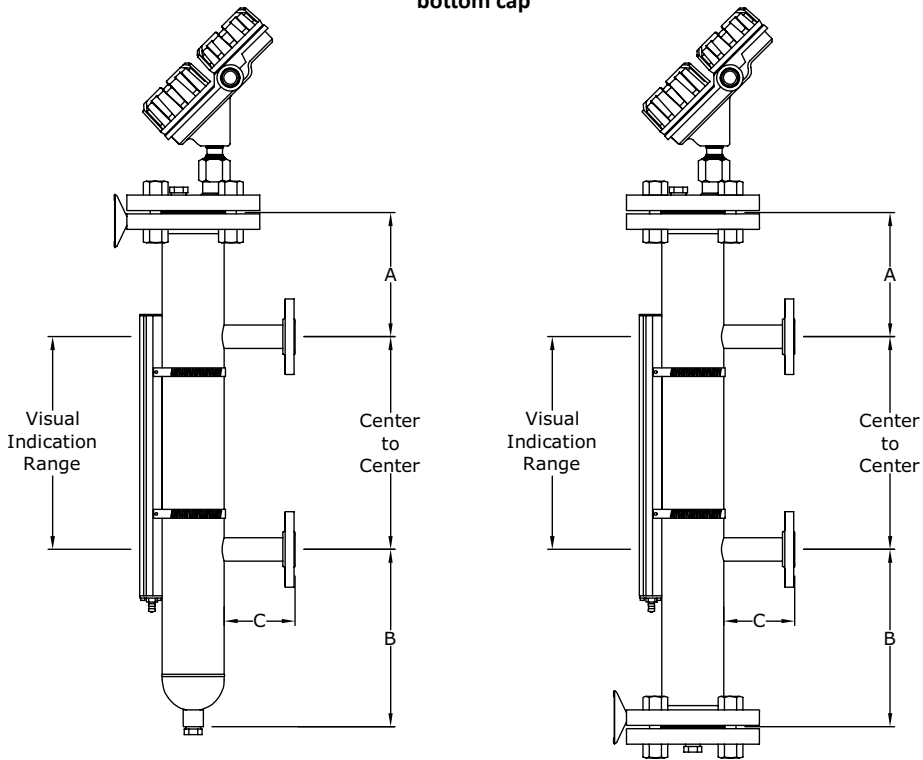


Configuration 1

Configuration 2

Configuration 3

Single rod caged or flexible probes not available with bottom cap

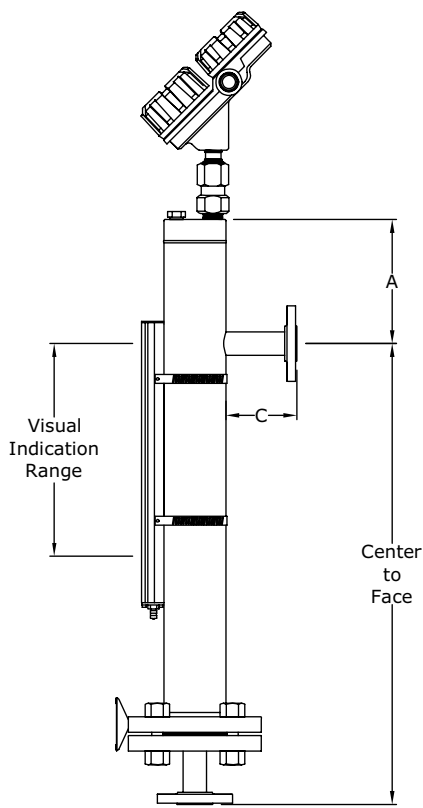


Configuration 4

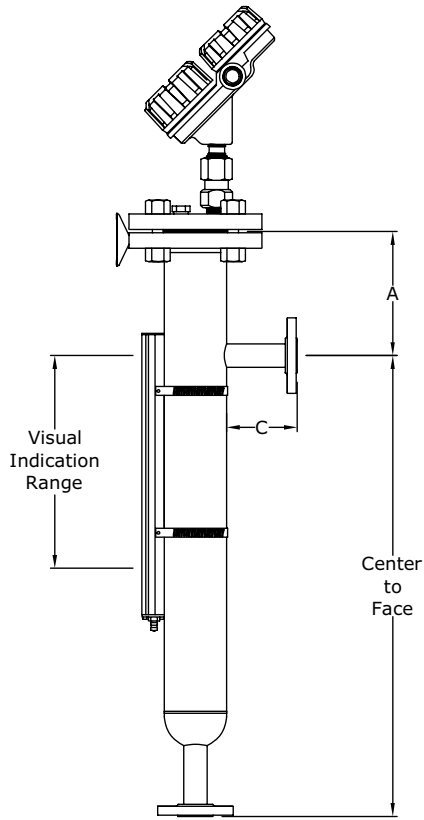
Configuration 5

Single rod caged or flexible probes not available with bottom cap

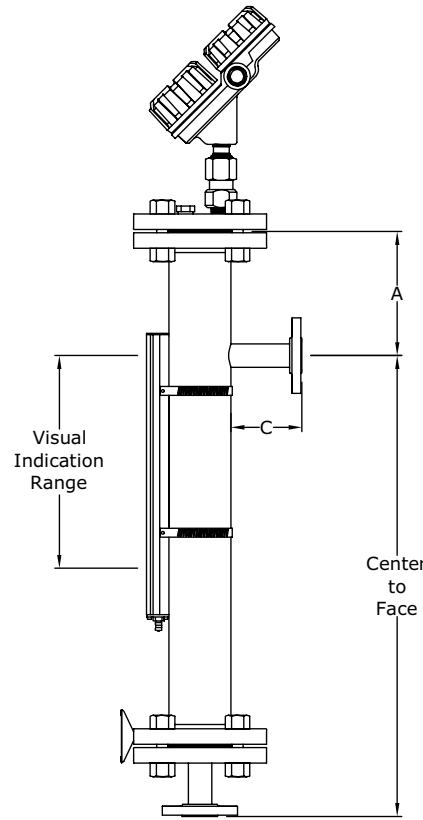
All dimensions vary depending on application parameters and/or accessory items. Dimensional drawings are available by contacting the factory.



Configuration A

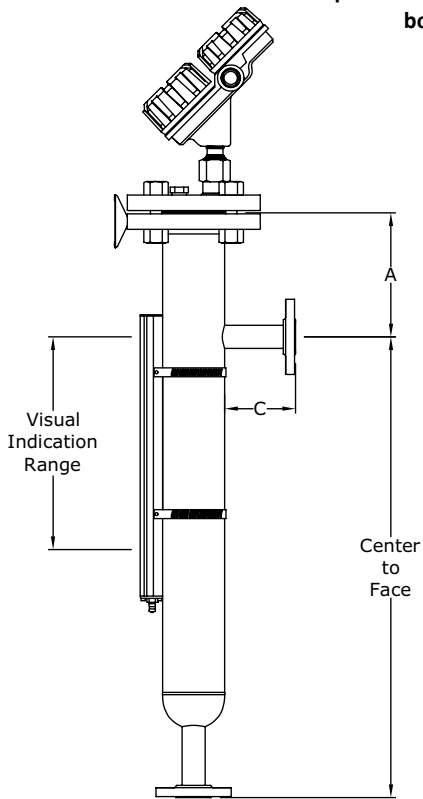


Configuration B



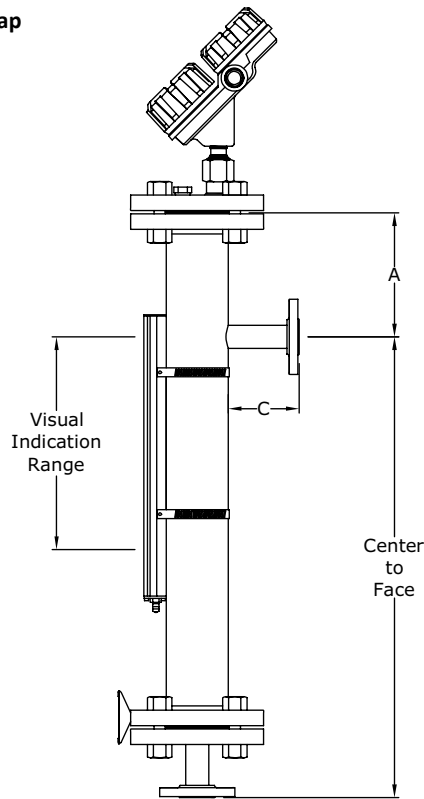
Configuration C

Single rod caged or flexible probes not available with bottom cap

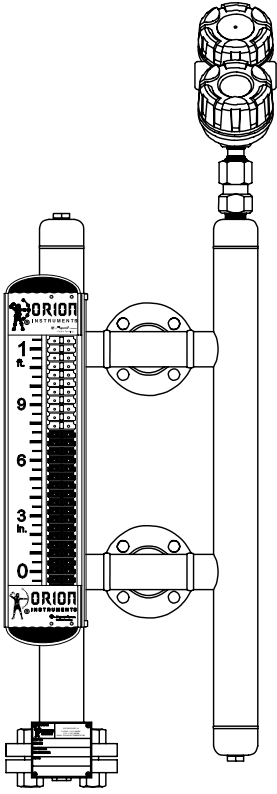


Configuration D

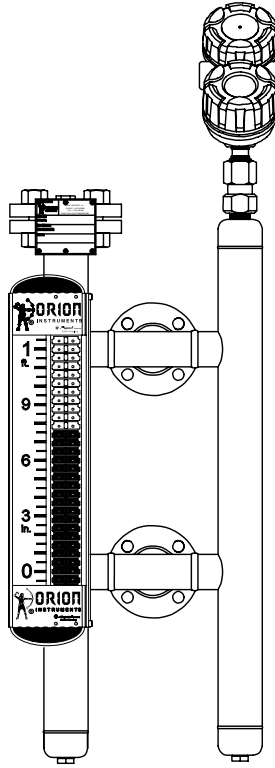
Single rod caged or flexible probes not available with bottom cap



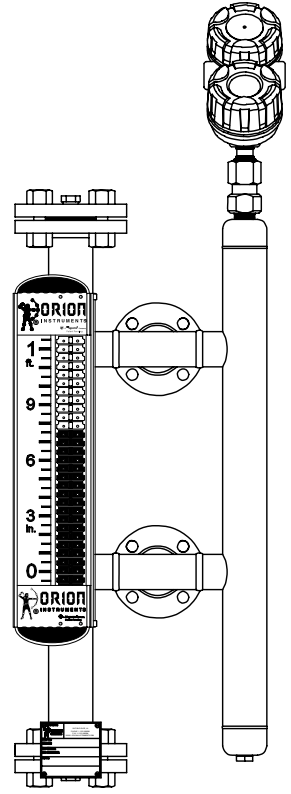
Configuration F



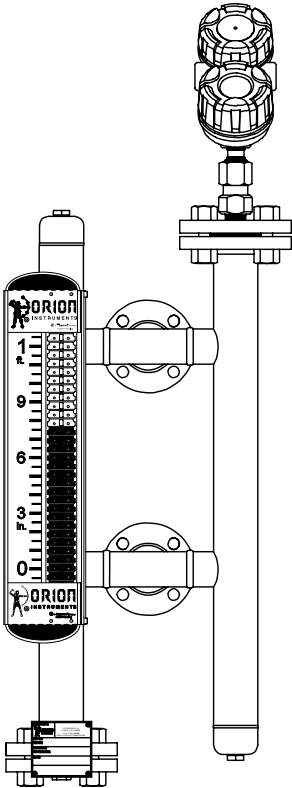
Configuration 1



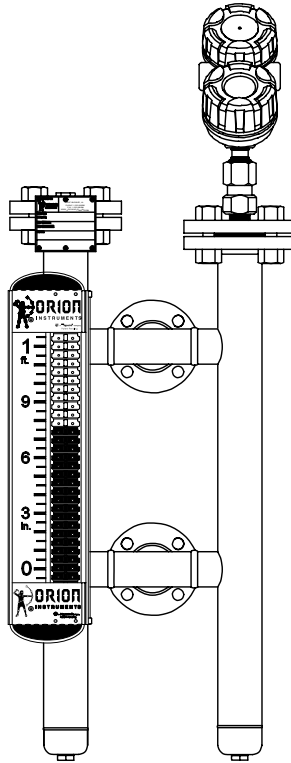
Configuration 2



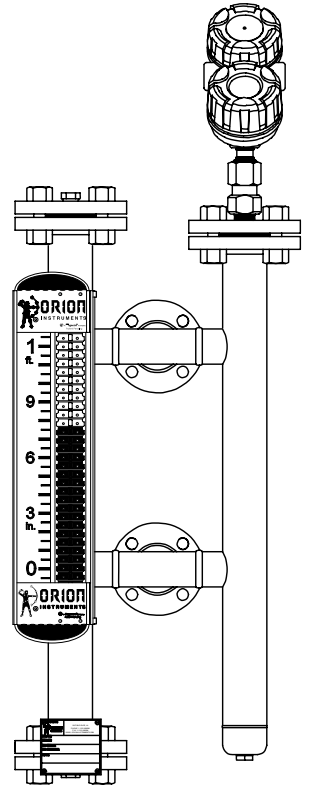
Configuration 3



Configuration 4

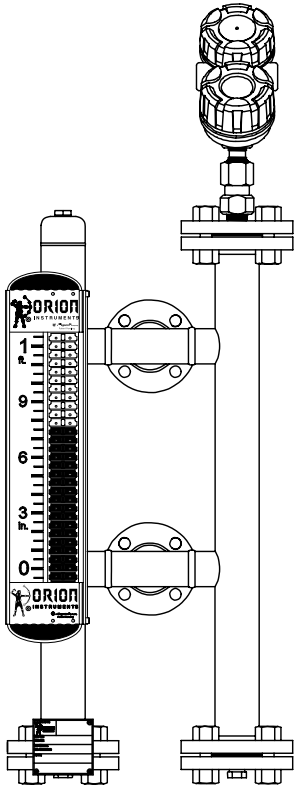


Configuration 5

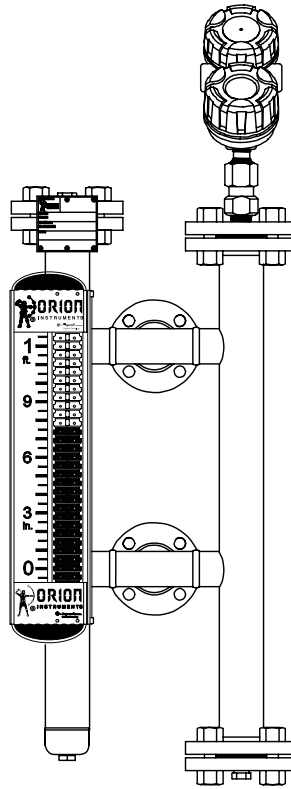


Configuration 6

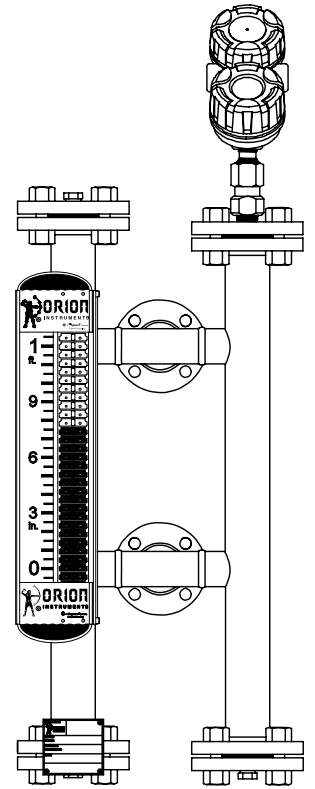
All dimensions vary depending on application parameters and/or accessory items. Dimensional drawings are available by contacting the factory. Single rod caged or flexible probes not available for any Gemini chambers with bottom cap.



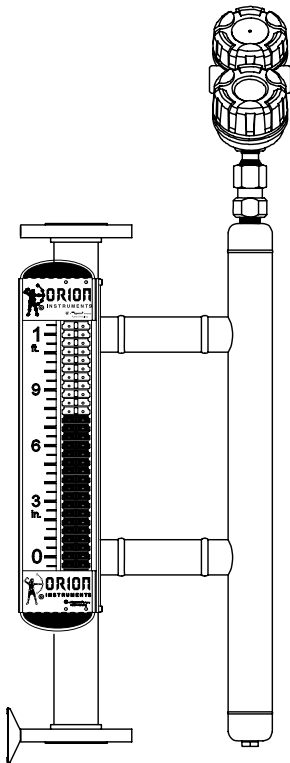
Configuration 7



Configuration 8

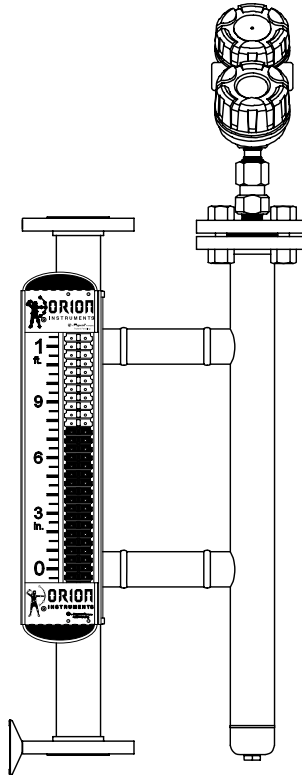


Configuration 9



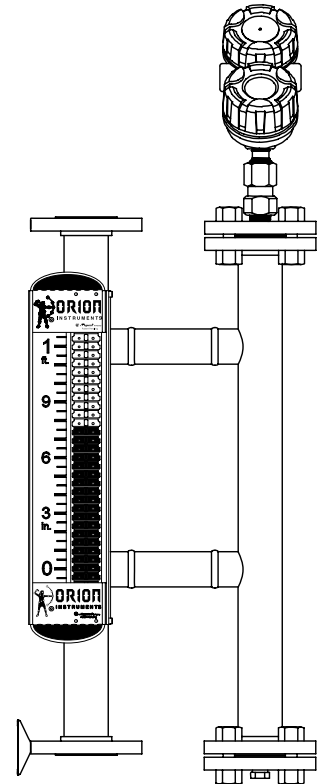
Configuration A

Single rod caged or flexible probes not available with bottom cap

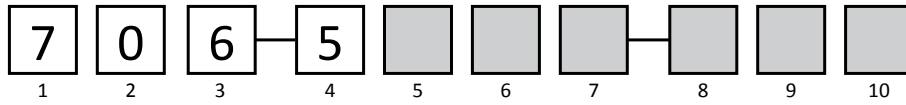


Configuration B

Single rod caged or flexible probes not available with bottom cap



Configuration C



1, 2, 3 | BASIC MODEL

706	Eclipse 4th Generation Guided Wave Radar (GWR) Level Transmitter
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4 | POWER

5	24 VDC, Two-wire
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5 | SIGNAL OUTPUT & ELECTRONICS

1	4-20 mA with HART
2	FOUNDATION fieldbus™ Communication
3	PROFIBUS PA™ Communication
4	Modbus Communication (8th Digit = 0 or 3 only)

6 | SAFETY OPTIONS

0	None – FOUNDATION fieldbus, PROFIBUS PA and Modbus only (5th digit = 2, 3 or 4)
2	SIL 2/3 Certified - HART only (5th digit = 1)

7 | ACCESSORIES / MOUNTING

0	No Digital Display or Keypad - Integral
1	No Digital Display or Keypad - 3-foot (1 meter) remote
2	No Digital Display or Keypad - 12-foot (3.6 meter) remote
A	Digital Display and Keypad - Integral
B	Digital Display and Keypad - 3-foot (1 meter) remote
C	Digital Display and Keypad - 12-foot (3.6 meter) remote

8 | CLASSIFICATION

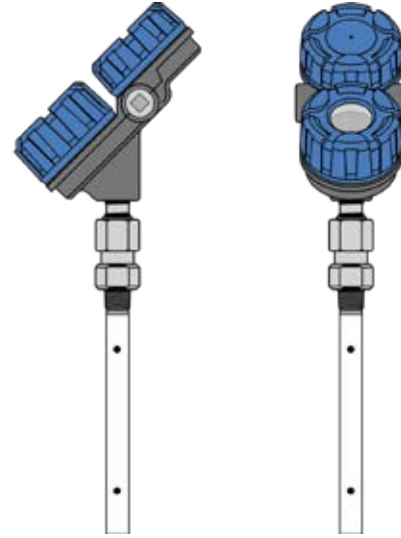
0	General Purpose, Weatherproof (IP 67)
1	Intrinsically Safe (FM & CSA CL 1 Div 1, Grps A, B, C, D) (5th digit = 1 or 2)
3	Explosion-proof (FM & CSA CL 1 Div 1, Grps B, C, D)
A	Intrinsically Safe (ATEX/IEC Ex ia IIC T4) (5th digit = 1 or 2)
B	Flame-proof (ATEX/IEC Ex d ia IIC T6) (5th digit = 1 or 2)
C	Non-sparking (ATEX Ex n IIC T6) / Non-incendive (FM & CSA, CL 1 Div 2) (5th digit = 1 or 2)
D	Dust Ex (ATEX II) (5th digit = 1 or 2)

9 | HOUSING

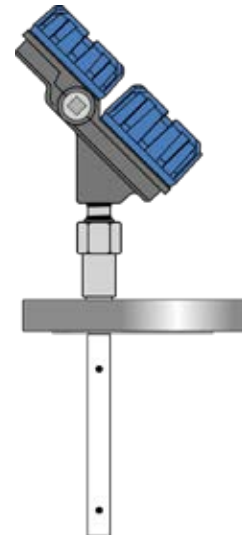
1	Die-cast Aluminum, Dual-compartment, 45-degree
2	Investment Cast, Stainless Steel, Dual-compartment, 45-degree

10 | CONDUIT CONNECTION

0	½" NPT
1	M20
2	½" NPT with sunshade
3	M20 with sunshade



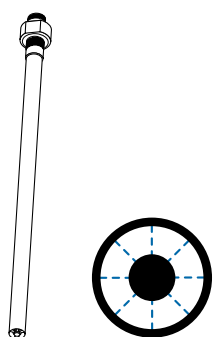
Eclipse with threaded process fitting



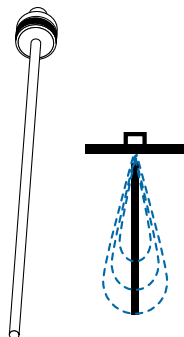
Eclipse transmitter with probe offset for Aurora MLI

ECLIPSE PROBE SPECIFICATIONS									
GWR Probe ①	Description	Application	Dielectric Range ②③	Temperature Range ④	Maximum Pressure	Vacuum ⑤	Overfill Safe	Viscosity cP (mPa.s)	Length ⑥
7 y T	Standard Temperature Coaxial	Level/Interface	ϵ_r 1.4–100	-40 to +400 °F (-40 to +200 °C)	1000 psi (70 bar)	Full	Yes	500/2000	24" to 240" (60 to 610 cm)
7 y P	High Pressure Coaxial	Level/Interface	ϵ_r 1.4–100	-320 to +400 °F (-196 to +200 °C)	6250 psi (431 bar)	Full	Yes	500/2000	24" to 240" (60 to 610 cm)
7 y D	High Temp. / High Pressure Coaxial	Level/Interface	ϵ_r 1.4–100	-320 to +850 °F (-196 to +450 °C)	6250 psi (431 bar)	Full	Yes	500/2000	24" to 240" (60 to 610 cm)
7 y S	Steam Coaxial	Saturated Steam	ϵ_r 10–100	-40 to +750 °F (-40 to +400 °C) ⑦	3000 psi (207 bar)	Full	No ⑦	500	24" to 180" (60 to 455 cm)
7 y G	Standard Temperature Caged	Level/Interface	ϵ_r 1.4–100	-40 to +400 °F (-40 to +200 °C)	1000 psi (70 bar)	Yes	Yes	10000	24" to 240" (60 to 610 cm)
7 y J	High Temp. / High Pressure Caged	Level/Interface	ϵ_r 1.4–100	-320 to +850 °F (-196 to +450 °C)	6250 psi (431 bar)	Full	Yes	10000	24" to 240" (60 to 610 cm)
7 y 6	Flexible	Level	ϵ_r 1.7–100	-320 to +850 °F (-196 to +450 °C)	6250 psi (431 bar)	Full	Yes ⑧	10000	3' to 100' (91 cm to 30 m)

- ① 2nd digit A=English, C=Metric
- ② Minimum ϵ_r 1.2 with end of probe analysis enabled
- ③ Single rod probes mounted directly into the vessel must be within 3–6 inches of metal tank wall to obtain minimum dielectric of 1.4; otherwise; ϵ_r 1.7.
- ④ This depends on the probe spacer material. Refer to model selection for spacer options.
- ⑤ ECLIPSE probes containing o-rings can be used for vacuum (negative pressure) service, but only those probes with glass seals are hermetically sealed to <10-8 cc/sec @ 1 atmosphere helium.
- ⑥ Consult factory for longer probe lengths.
- ⑦ Consult factory for overfill applications.
- ⑧ Overfill capability can be achieved with software.



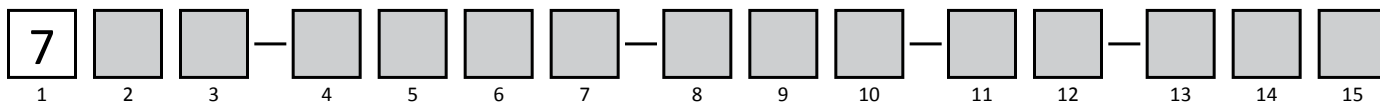
Coaxial Probe



Single Rod Probe



See Magnetrol bulletin 57-106 for additional information regarding Eclipse guided wave radar specifications.



1, 2 | BASIC MODEL

7A	Eclipse GWR probe, English unit of measure
7C	Eclipse GWR probe, Metric unit of measure

The Aurora® MLI utilizes the Magnetrol® Eclipse® GWR level transmitter. All probes specified for an Aurora® should be selected from this model number. Consult factory for special requests.

3 | PROBE TYPE

D	Coaxial	High-Temp/Hi-Pressure – Available only with 10th digit N or D	Media dielectric range ≥ 1.4 (2.0 with ceramic spacers)
P	Coaxial	High Pressure – Available only with 10th digit N or D	
S	Coaxial	Hot water/steam service – Available only with 10th digit N	
T	Coaxial	Overflow/Interface – Not available with 10th digit N or D	
G	Single Rod	Caged Probe	
J	Single Rod	High-Temp/High-Pressure Caged Probe	Media dielectric range ≥ 1.9
6	Single Rod	Flexible probe	

4, 5 | PROCESS CONNECTION - SIZE / TYPE

Threaded	
11	¾" NPT threaded connection

4" ANSI Flanges	
63	4" 150# RF ANSI Flange
64	4" 300# RF ANSI Flange
65	4" 600# RF ANSI Flange
66	4" 900# RF ANSI Flange
67	4" 1500# RF ANSI Flange
68	4" 2500# RF ANSI Flange

6 | CONSTRUCTION CODES

0	Industrial
K	ASME B31.1
L	ASME B31.3
M	ASME B31.3 & NACE MR0175/MR0103 – NOT available with carbon steel flange
N	NACE MR0175/MR0103 – NOT available with carbon steel flange

7 | FLANGE OPTIONS

1	Offset
2	Offset with ½" NPT Vent
3	Offset with ¾" NPT Vent

8 | MATERIAL OF CONSTRUCTION

Seal Welded Probe & Flange Material	
A	316 SS/316L SS
B	Hastelloy C
C	Monel
R	316 SS/316L SS with Carbon Steel Flange
S	Hastelloy C with Carbon Steel Flange
T	Monel with Carbon Steel Flange

9 | SPACER/WEIGHT MATERIAL

0	None
1	PTFE Spacer
2	PEEK HT
3	Ceramic – Available only with 3rd digit J
5	Metal Short Circuit

10 | PROCESS SEAL - O-RING MATERIAL

0	Viton® GFLT – Available only with 3rd digit G, T or 1
2	Kalrez® 4079 – Available only with 3rd digit G, T or 1
8	Aegis PF128 (NACE) – Available only with 3rd digit G, T or 1
A	Kalrez 6375 – Available only with 3rd digit G, T or 1
B	HF Acid Probe – Available only with 3rd digit G or T and 8th digit C
D	None/Glass Ceramic Alloy (Dual Seal Design with annunciator fitting) – Available only with 3rd digit D or P
N	None/Glass Ceramic Alloy – Available only with 3rd digit D or P

11 | PROBE SIZE

0	Caged Probe
2	Small Coaxial
3	Flexible Cable Probe
A	Medium Coaxial

12 | SPECIAL OPTIONS

0	Single Length Probe
1	Removable Single Length Cable Probe

13, 14, 15 | INSERTION LENGTH

XXX	24 to 240 inches (60 to 610 cm) ①
	Example: 24 inches = 024; 160 centimeters = 160

① Consult factory for insertion lengths less than 24" (60 cm) or greater than 240" (610 cm).



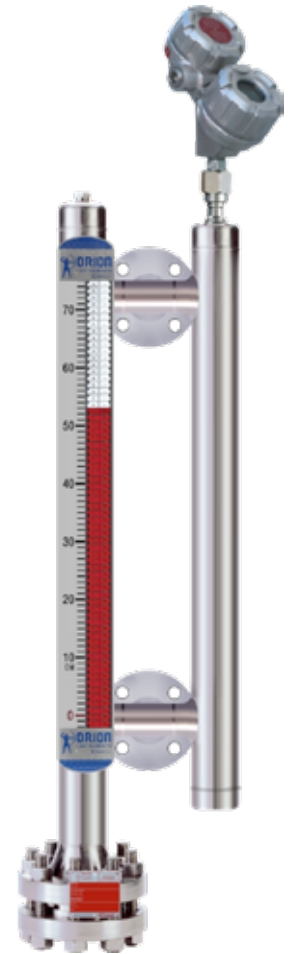
Eclipse® Guided Wave Radar

The Eclipse® Model 706 High Performance Transmitter is a loop-powered, 24 VDC level transmitter that is based upon the proven and accepted technology of Guided Wave Radar (GWR). Encompassing a number of significant engineering accomplishments, this leading edge level transmitter is designed to provide measurement performance well beyond that of many of the more traditional technologies.



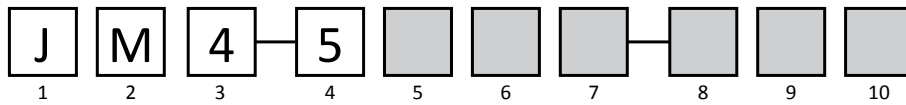
Modulelevel® Displacer Controller

The Digital E3 Modulelevel is an advanced, intrinsically safe two-wire instrument utilizing simple buoyancy principle to detect and convert liquid level changes into a stable 4–20 mA output signal. The linkage between the level sensing element and output electronics provides a simple mechanical design and construction.



Jupiter® Magnetostrictive

The Jupiter® Model JM4 Magnetostrictive level transmitter provides a 4–20 mA output proportional to the level being measured or FOUNDATION fieldbus™ output. JUPITER is available as an externally mounted model for use with Orion Atlas™, Gemini™, and Aurora® magnetic level indicators or as a direct insertion version for use in a wide variety of process vessels or external chambers.



5 | SIGNAL OUTPUT

1	4-20 mA with HART
2	FOUNDATION fieldbus™ Communications

6 | SAFETY OPTIONS

0	None required for FOUNDATION fieldbus™
1	SIL 2 Hardware <small>SEE NOTE 1</small>

7 | ACCESSORIES/MOUNTING

0	No Digital Display and Keypad - Integral
1	No Digital Display and Keypad - Remote 36" (0.91m) <small>SEE NOTE 2</small>
2	No Digital Display and Keypad - Remote 144" (3.6m) <small>SEE NOTE 2</small>
A	Digital Display and Keypad - Integral
B	Digital Display and Keypad - Remote 36" (0.91m) <small>SEE NOTE 2</small>
C	Digital Display and Keypad - Remote 144" (3.6m) <small>SEE NOTE 2</small>

8 | AREA CLASSIFICATION

0	General Purpose, Weatherproof (IP 67)
1	Intrinsically Safe / FISCO (cFMus)
3	Explosion-Proof / FNICO (cFMus)
A	Intrinsically Safe (ATEX & IEC)
B	Flame-Proof (ATEX & IEC)
C	Ex n (ATEX & IEC)
D	Dust Ex (ATEX & IEC)
1	FISCO Field Device (cFMus)
3	Explosion-Proof & FNICO Field Device (cFMus)

9 | HOUSING

1	Aluminum, Dual-Compartment
2	316 SS, Dual-Compartment

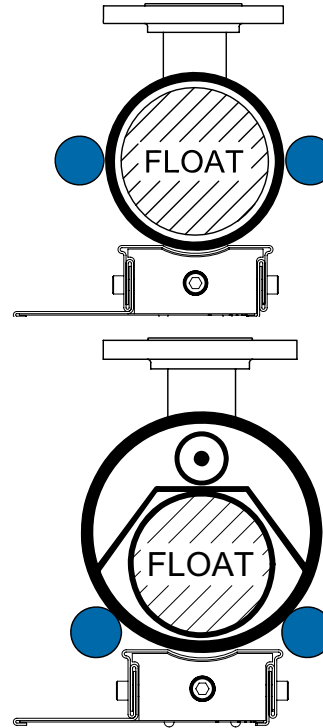
10 | CONDUIT CONNECTION & SUNSHADE OPTION

0	1/2" NPT
1	M20
2	1/2" NPT with Sunshade
3	M20 with Sunshade

NOTES:

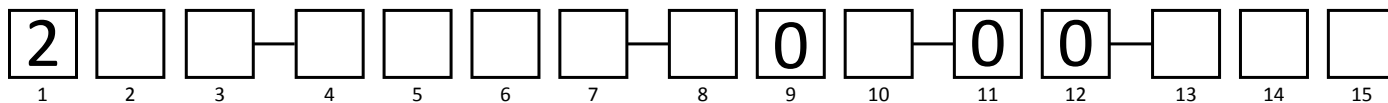
¹ 3rd Party FMEDA report available

² Remote-mount transmitter not available with XP / Flame Proof approvals



Probe mounting positions on Atlas™, Vector™, and Gemini™ Magnetic Level Indicators

Probe mounting positions on Aurora® MLI
Probe proximity to the float is critical



2 | MEASUREMENT SYSTEM

A	English <i>Probe length to be provided in inches</i>
C	Metric <i>Probe length to be provided in centimeters</i>

3 | CONFIGURATION

E	STANDARD Top Mount	<i>suitable for process temperatures -40 to +500 °F (-40 to +260 °C)</i>
F	STANDARD Top Mount Offset	
H	STANDARD Bottom Mount Offset	
K	HIGH-TEMP Top Mount	<i>suitable for process temperatures +501 to +850 °F (+261 to +454 °C)</i>
L	HIGH-TEMP Top Mount Offset	
M	HIGH-TEMP Bottom Mount Offset	
R	CRYOGENIC Top Mount	<i>suitable for process temperatures -320 to +150 °F (-196 to +66 °C)</i>
S	CRYOGENIC Top Mount Offset	
T	CRYOGENIC Bottom Mount Offset	

4–5 | MOUNTING SIDE

00	Left-Side MLI Mount
01	Right-side MLI Mount

6 | PROBE MATERIAL OF CONSTRUCTION

A	Powder-Coated Aluminum Sensor Enclosure with 316 SS Probe (Available only with Digit 3, Options F, H, L, M)
1	316 SS Sensor Enclosure with 316 SS Probe

7 | PROBE OPTIONS

N	None
V	Vibration-resistant probe mounting

8 | CHAMBER SIZE (FOR MOUNTING HARDWARE)

Select these options if chamber DOES NOT contain high-temp insulation

1	2" (or if digit 20 of MLI model code is 1, 2, or 7)
2	2½" or if digit 20 of MLI model code is 3, 4, 5, or 6)
3	3" (or if digit 20 of MLI model code is A, B, C, or D)
4	4" (or if digit 20 of MLI model code is E, F, G, H, or J)
5	¾" (for Atlas Top Mount Configuration only)
0	None. No mounting clamps required.

Select these options if chamber DOES contain high-temp insulation

E	2" (or if digit 20 of MLI model code is 1, 2, or 7)
F	2½" or if digit 20 of MLI model code is 3, 4, 5, or 6)
G	3" (or if digit 20 of MLI model code is A, B, C, or D)
H	4" (or if digit 20 of MLI model code is E, F, G, H, or J)
J	¾" (for Atlas Top Mount Configuration only)
0	None. No mounting clamps required.

9 | UNUSED

N	None
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10 | LEVEL/INTERFACE MEASUREMENT PREFERENCE

1	Measure Only the Total Liquid Level
2	Measure Only the Interface Level
3	Measure Both Total and Interface Level

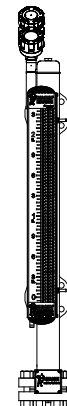
11–12 | UNUSED

00	None
----	------

13–15 | PROBE LENGTH

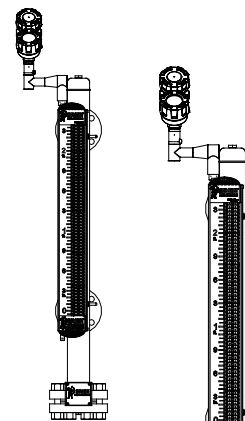
Specify required insertion length (see below)	
XXX	Example: 87 inches = 087 <i>Code 2 must be "A"</i>
	Example: 120 centimeters = 120 <i>Code 2 must be "C"</i>

Note: Maximum Probe Length = 400 inches (999 cm)



Top Mount Configuration

Probe Length = Center-to-Center + 8 in. (20 cm)

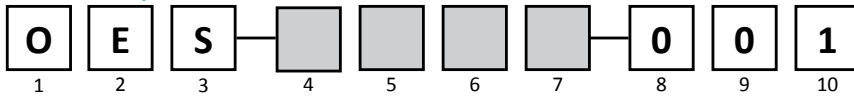


Top/Bottom Mount Offset Configuration

Probe Length = Center-to-Center + 6 in. (15 cm)

See Orion bulletin ORI-150 for additional information.

OES 10-Amp DPDT Point Level Switch



Designed for optimal repeatability and reliability, the OES is actuated by simple magnetic coupling. As the liquid level moves, the MLI float follows. When the float moves into the proximity of the snap switch, the switch magnet interacts with the float’s magnetic field actuating the switch.

see Orion bulletin [OES-100](#) for more information

4 ENCLOSURE MATERIAL

A	Cast Aluminum
S	Stainless Steel

5 AGENCY APPROVAL

1	FM / CSA
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6 CHAMBER MOUNTING CODE

1	MLI model code digit 20 is 1, 2, or 7 (2" chamber)
2	MLI model code digit 20 is 3, 4, 5 or 6 (2½" chamber)
3	MLI model code digit 20 is A, B, C, or D (3" chamber)
4	MLI model code digit 20 is E, F, G, H, or J (4" chamber)
5	MLI is a Top Mount design (¾" chamber)
N	No clamps required (for use with switch mount rod; digit 7=R)

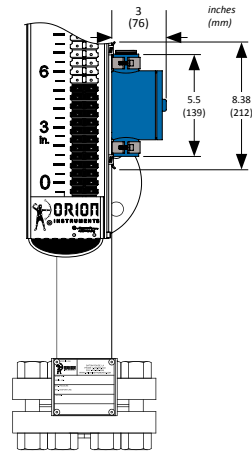
7 MOUNTING STYLE

C	Clamp mounted on MLI (standard)
P	Clamp mounted on MLI with insulation pad
R	Attached to switch mount rod

If digit 7 = R, digit 6 must = N

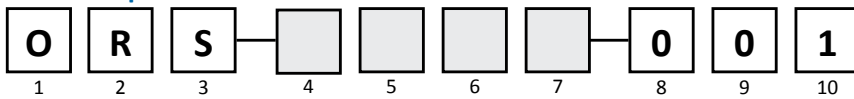


Model: OES



Physical Dimensions

ORS 1-Amp SPDT Point Level Switch



The **Model ORS** reed switch is available to augment the control capabilities of Orion’s extensive line of magnetic level indicators.

Housed in an explosion proof enclosure, the ORS mounts to the outside of the MLI via clamps. This mounting style allows addition or repositioning of switches at any time, without disruption of the process.

see Orion bulletin [ORS-300](#) for more information

4 ENCLOSURE

1	Standard stainless body without junction box
A	Option 1 with cast aluminum junction box
S	Option 1 with stainless steel junction box

5 AGENCY APPROVAL

1	FM / CSA
2	FM / CSA – 24 volt maximum
A	ATEX
B	ATEX Ex mb
N	General purpose

6 CHAMBER MOUNTING CODE

1	MLI model code digit 20 is 1, 2, or 7 (2" chamber)
2	MLI model code digit 20 is 3, 4, 5 or 6 (2½" chamber)
3	MLI model code digit 20 is A, B, C, or D (3" chamber)
4	MLI model code digit 20 is E, F, G, H, or J (4" chamber)
5	MLI is a Top Mount design (¾" chamber)
N	No clamps required (for use with switch mount rod; digit 7=R)

7 MOUNTING STYLE

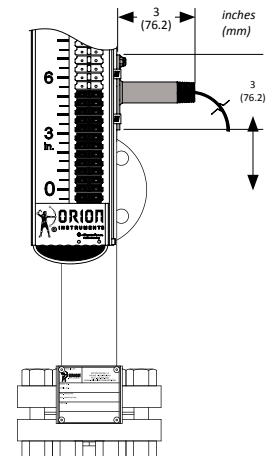
C	Clamp-mounted on MLI (standard)
P	Clamp-mounted on MLI with insulation pad
R	Attached to switch mount rod

If digit 5 = A, digit 4 must NOT = 1

If digit 7 = R, digit 6 must = N

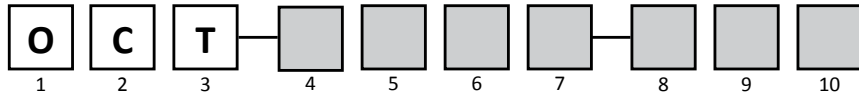


Model: ORS
(shown with optional aluminum junction box)



Physical Dimensions

OCT Reed Chain Transmitter



The **OCT** analog transmitter mounts directly to the side of the Atlas, Aurora or Gemini chamber, and provides a continuous 4–20 mA output signal proportional to liquid level. Using simple and reliable reed switches surface mounted to a printed circuit board, the unit provides level accuracy of ±0.50" (13 mm). Activated by the field of the float magnets, the transmitter is totally non-invasive and designed for years of maintenance free service.

see Orion bulletin *OCT-400* for more information

4 ENCLOSURE

A	Cast Aluminum
S	Stainless Steel

5 ENCLOSURE MOUNTING POSITION

T	Top mounted
B	Bottom mounted

6 CHAMBER MOUNTING CODE

No insulation present on MLI	
1	MLI model code digit 20 is 1, 2, or 7
2	MLI model code digit 20 is 3, 4, 5 or 6
3	MLI model code digit 20 is A, B, C, or D
4	MLI model code digit 20 is E, F, G, H, or J
5	¾" (for Atlas top mount configuration only)

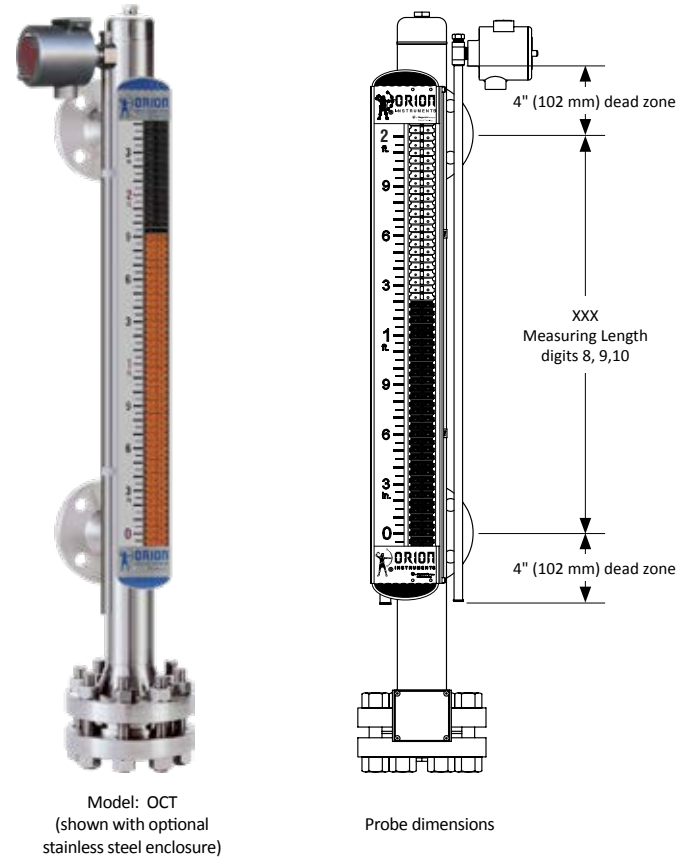
High-temp insulation on MLI	
E	MLI model code digit 20 is 1, 2, or 7
F	MLI model code digit 20 is 3, 4, 5 or 6
G	MLI model code digit 20 is A, B, C, or D
H	MLI model code digit 20 is E, F, G, H, or J
J	¾" (for Atlas top mount configuration only)

7 UNIT OF MEASURE

E	Measuring length specified in inches
M	Measuring length specified in centimeters

8, 9, 10 MEASURING LENGTH

XXX	6" to 198" (15 cm to 503 cm) same as MLI center-to-center dimension
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Orion is equipped with a support network that stretches across the globe. We can provide on-site field service support, as well as remote technical assistance via phone or e-mail.

Although all Orion products are tested, calibrated, and configured at the factory, the presence of an expert field service technician during the commissioning of your new instrumentation can provide the added insurance that everything is set up specifically for each individual application.

For more information on our support services, please contact us.



An Orion technician operates PACTware on a drilling rig



Orion Instruments is dedicated to reducing product lead times through ongoing efficiency initiatives and strategic inventory management. *OrionXpress* is available for select product configurations and will allow your product to ship within 5 weeks of placing the order.

See bulletin ORI-402 for models qualifying for OrionXpress delivery.
some restrictions apply



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