



HENNLICH

MERES

# KOMBINOVANÝ STAVOZNAK AURORA®

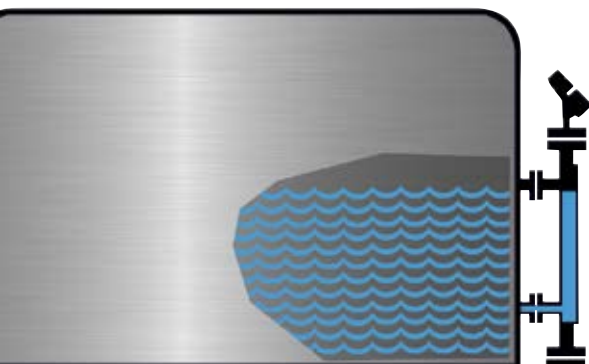
Designed as an alternative and upgrade to traditional gauge devices, Magnetic Level Indicators (MLI) from Orion Instruments® are manufactured to provide accurate and reliable liquid level in a wide range of applications. Our MLI product line—manufactured globally at multiple facilities—requires minimum maintenance and eliminates common sight glass problems like vapor and liquid emission. Orion Instruments specializes in precision-engineered excellence and offers highly customized configurations and options for process environments, including those with extreme temperatures and pressures.

## True Redundancy in a Single Chamber

The Aurora® MLI combines Eclipse® Guided Wave Radar (GWR) and a float-actuated visual indicator to simultaneously provide both continuous and local level indication. So unique is the Orion Instruments® dual redundancy within a single chambered MLI that Aurora® has been granted a U.S. patent.

## APPLICATIONS

- Alkylation Tanks
- Blowdown Tanks
- Boiler Drums
- Condensation Tanks
- Deaerators
- Feedwater Heaters
- Flash Drums
- Gas Chillers
- Hot Wells
- Industrial Boilers
- Oil-Water Separators
- Propane Vessels
- Storage Tanks
- Surge Tanks
- Vacuum Towers



## FEATURES

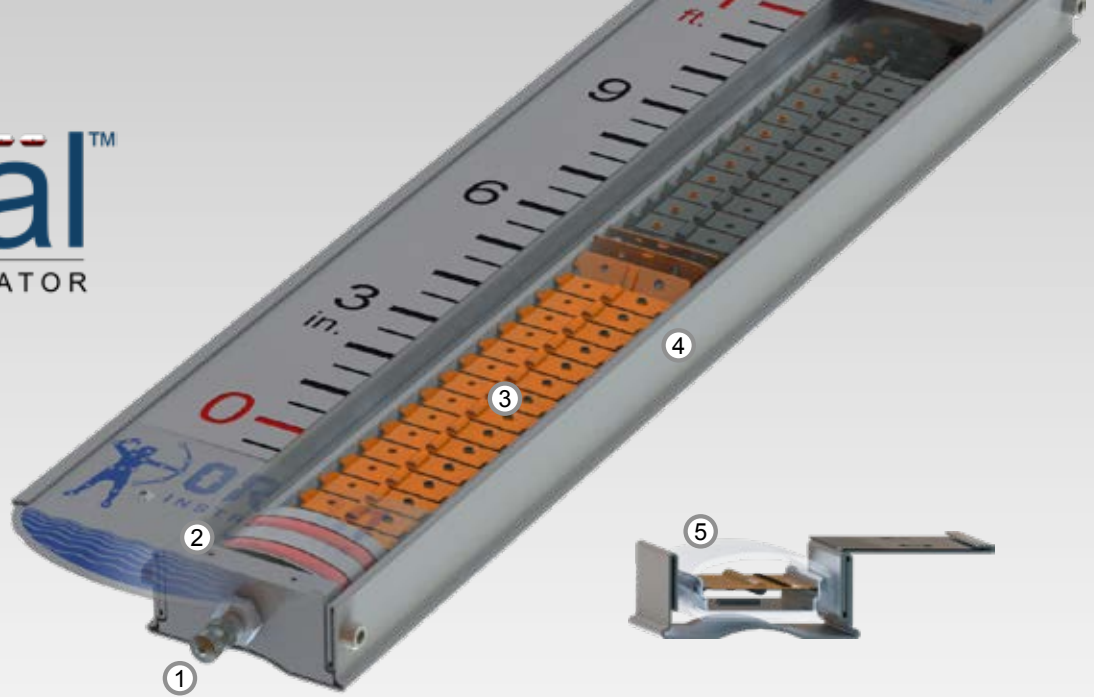
Introduced in 1998, Eclipse® Guided Wave Radar (GWR) quickly ascended to its leading role in process level measurement. GWR is still favored throughout the industry for its easy setup, trouble-free operation, measurement accuracy, and immunity to changing process conditions.

The Aurora® single chamber houses both the Eclipse® GWR probe and buoyancy float, with the former providing continuous measurement and the latter magnetically coupled to a visual indicator to provide local level indication.

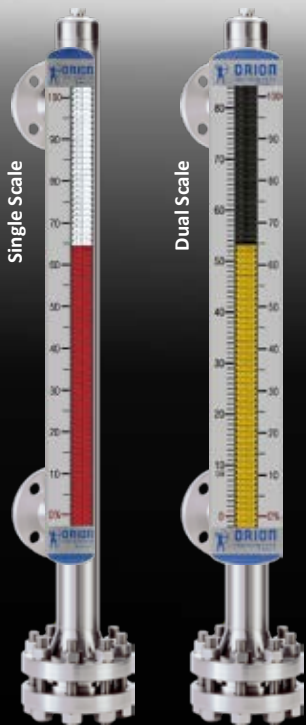
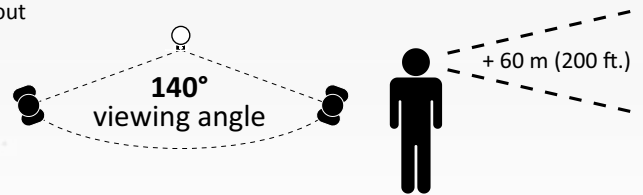
A flag-type indicator (or a moving shuttle) visually indicates liquid level. A variety of measurement scales and indicator flag colors are available.

# reveal™

WIDE VIEW INDICATOR



- ① InstaSeal™ valve allows for an effective vacuum seal
- ② Double custom D-ring end plug 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:

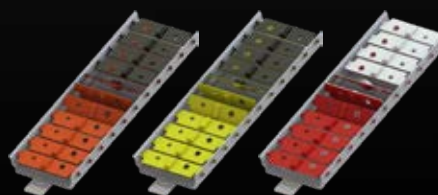
- Inches / Feet
- Running Inches
- Millimeters / Meters
- Centimeters / Meters
- Percent (5% increments)
- Gallons
- Liters



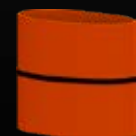
The patented REVEAL™ indicator incorporates a *positive-stop* design which limits the rotation of each flag to a half-turn. This eliminates “over-flipping” which commonly occurs on other indicator designs.



Each flag contains a high-strength magnet



Standard flag and shuttle offering. Custom colors available.



## TECHNOLOGY

### Radar Transmitter

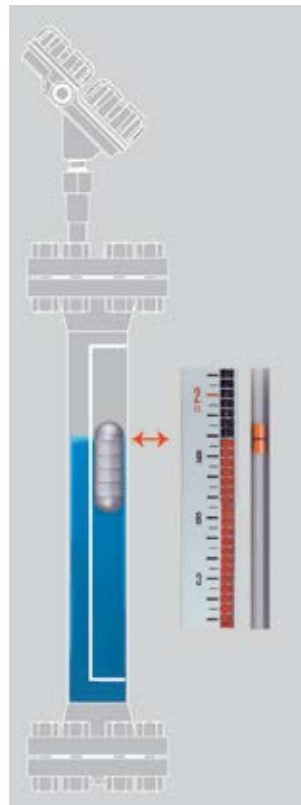
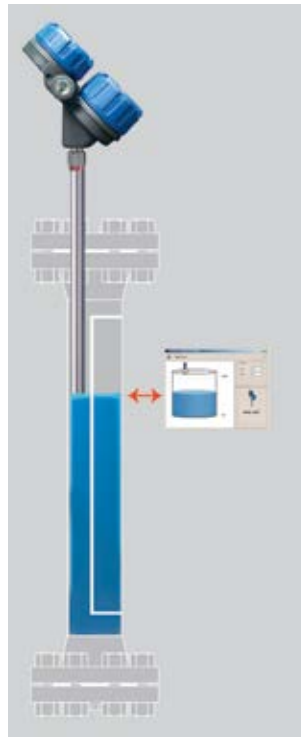
The Eclipse® transmitter continuously emits electromagnetic radar pulses directly off the liquid surface. The on-board electronics provide a real-time level output, in addition to the external visual indicator operated by the Aurora® internal float.

### Baffle Plate

The GWR probe area is separated from the free-moving float by a baffle plate.

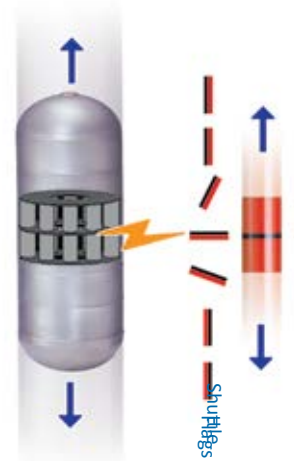
### Vertical Float

The custom float located inside the chamber is magnetically coupled to the visual indicator. The float rotates flags or moves a shuttle to visually indicate liquid tank level (as explained in more detail at right).



### Visual Indication

The float positioned within the Aurora® chamber rises and falls according to level changes. The float contains an internal group of magnets that are “coupled” with magnets in the flags of the visual indicator. As the float moves, the flags rotate to expose the color of their opposite side. The position where the flag’s color changes corresponds to a point on the measuring scale indicating true level. (The optional shuttle indicator moves parallel with the float to indicate level on the scale).



### Optimum Float Performance

Orion Instruments® floats are engineered to provide the world’s best MLI performance.

The 360-degree vertical placement of the magnets assures proper coupling with the flag or shuttle of the indicator, even if the float is spinning in its chamber.

The magnetic assembly creates a constant Gauss rating optimized to ensure reliable performance.

Float magnets are designed to function at temperatures up to +537° C (+1000° F) for years of reliable service. Special float alloys are available.

### Baffle Plate

The superb float performance within the Aurora® is due in part to an angled baffle plate mounted inside the chamber. The baffle plate ① partitions the GWR probe area ② from the float area ③ and serves as a guide to ensure both smooth float travel and proper indicator operation. Perforations along the baffle plate equalize pressure and allow free media flow within the chamber. The probe area ② also acts as a gas-bypass zone when flashing occurs. This helps in preventing damage to the float.



Float Section



Chamber Section

# ECLIPSE® MODEL 706 GUIDED WAVE RADAR TRANSMITTER

## DESCRIPTION

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.

Utilizing patented “diode switching” technology, along with the most comprehensive probe offering on the market, this single transmitter can be used in a wide variety of applications ranging from very light hydrocarbons to water-based media.

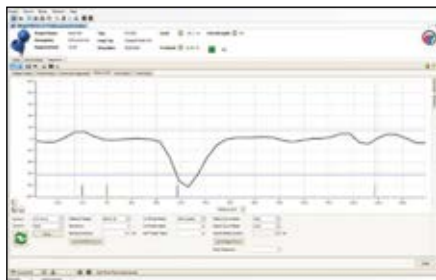
The innovative dual-compartment enclosure is now a common sight in the industry. This enclosure, first brought to the industry by Magnetrol® in 1998, is angled to maximize ease of wiring, configuration, and viewing of the versatile graphic LCD display.

One universal Model 706 transmitter can be used and interchanged with all probe types, and offers enhanced reliability as it is SIL certified for use in critical SIL 2/3 safety loops. With the use of a unique adapter, the model 706 transmitter can even operate with presently installed Model 705 probes.

The ECLIPSE Model 706 supports both the FDT/DTM and Enhanced DD (EDDL) standards, which allow viewing of valuable configuration and diagnostic information such as the echo curve in tools such as PACTware™, AMS Device Manager, and various HART® Field Communicators.



# ECLIPSE® 706GWR



Eclipse® Model 706 DTM

## APPLICATIONS

### Media

Liquids, hydrocarbons to water-based media (Dielectric Constant  $\epsilon_r = 1.2-100$ )

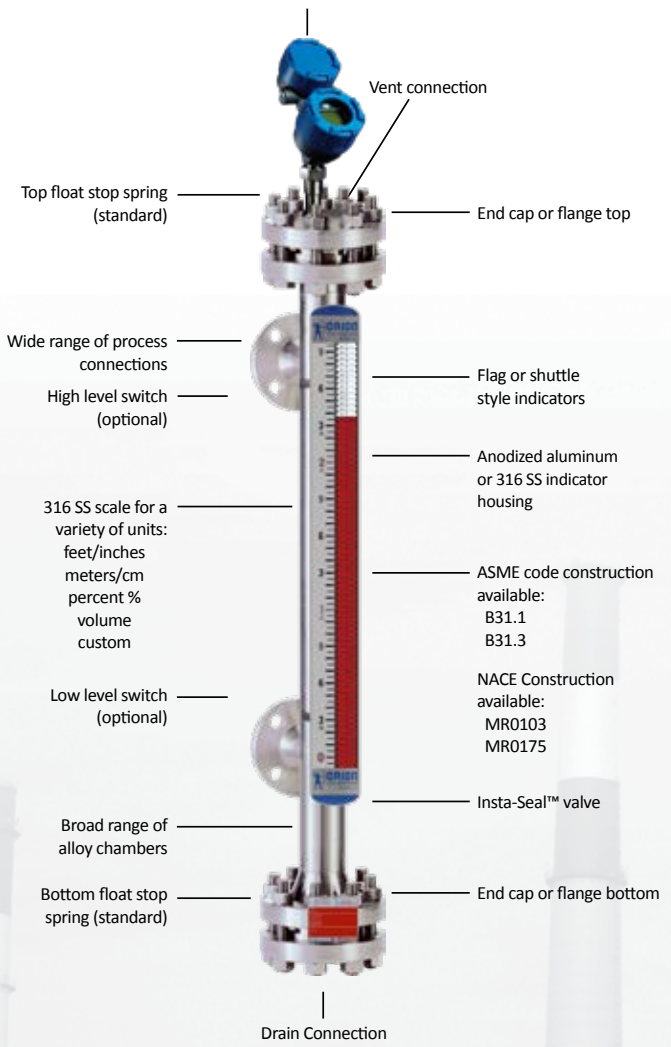
### Vessels

Most process or storage vessels up to rated probe temperature and pressure.

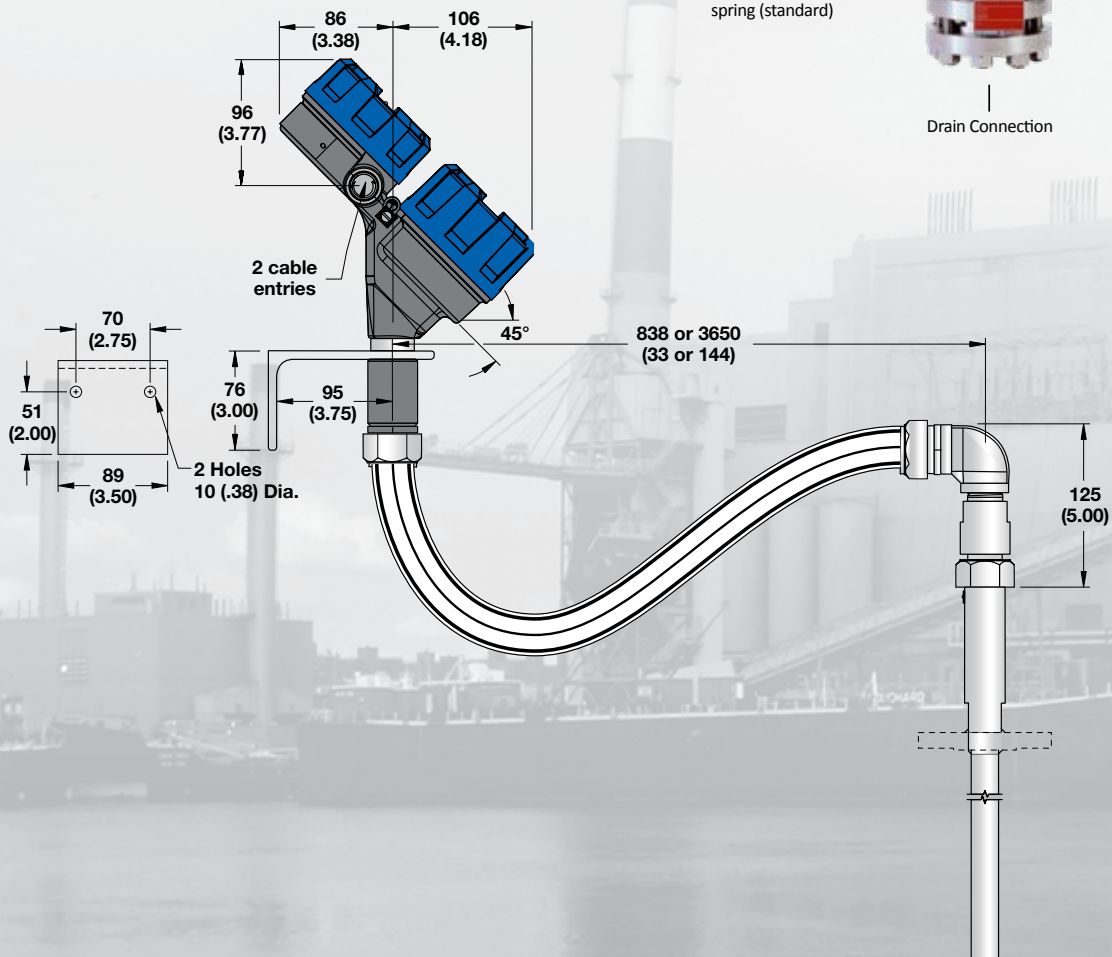
### Conditions

All level measurement and control applications including process conditions exhibiting visible vapors, foam, surface agitation, bubbling or boiling, high fill/empty rates, low level and varying dielectric media or specific gravity.

**Aurora® MLI**



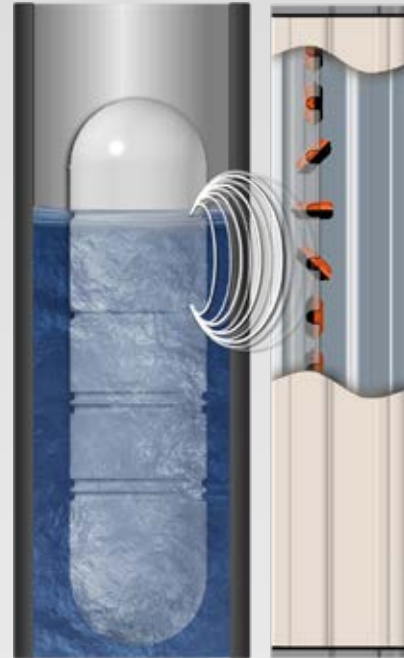
**Remote Eclipse® Transmitter Configuration**  
mm (inches)



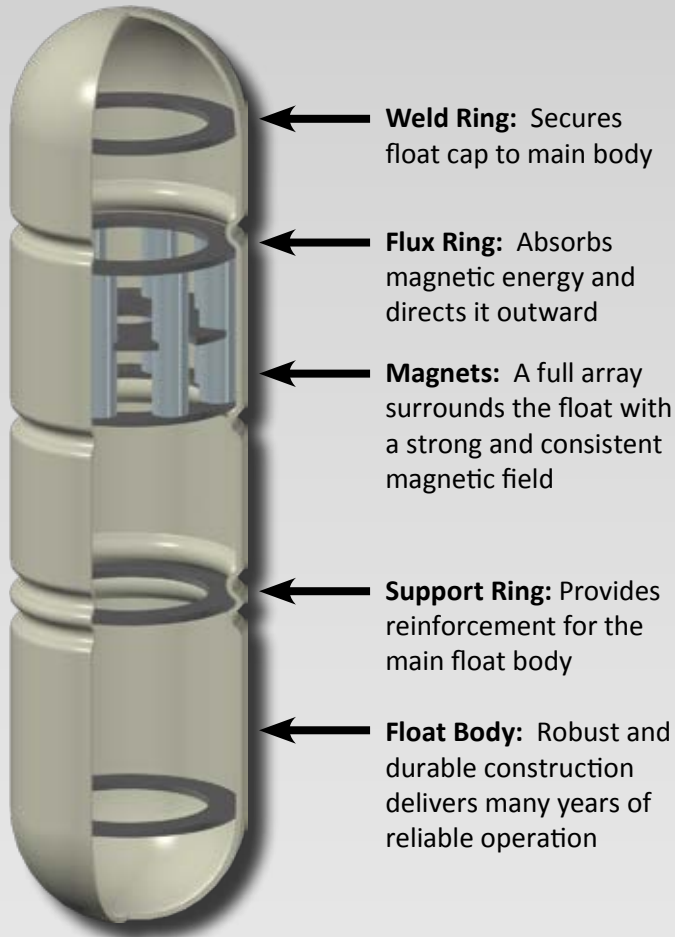
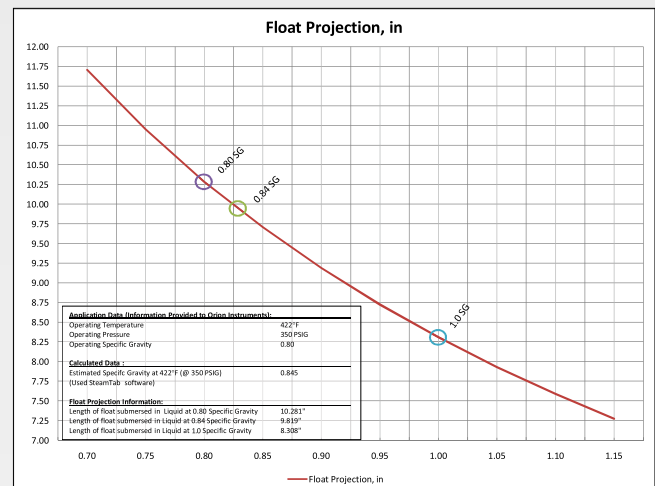
## ORION FLOAT TECHNOLOGY

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.



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



## CAPABILITIES

Process pressures up to 310+ bar (4500+ psig) ①

Process Temperatures up to 538 °C (1000 °F) ①

Total level specific gravities as low as 0.30 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

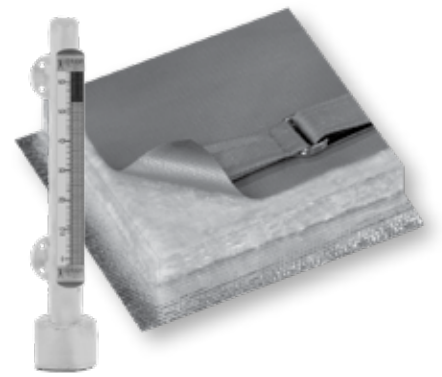
Float Projection Curve: If the liquid density changes, a float curve will reveal the offset

## MAGNETIC LEVEL INDICATOR SPECIFICATIONS

Design	Single chamber
Materials of construction – Chamber	Metal alloys and plastics: see digit 5 in selection tables
– Rail & window	316 stainless steel (Reveal™) rail with polycarbonate window Aluminum rail with polycarbonate or glass window
– Float	316 stainless steel and titanium (exotic alloys available); varies depending on process conditions
Construction options	ASME B31.1, ASME B31.3, ASME code Stamp [U,Um,S] and NACE
Approvals	Industrial, Industrial PED: ATEX II 1 G c T6 (non-electrical equipment)
Certified material test report (CMTR)	Available upon request
Pressure class ratings	ASME 150#, 300#, 600#, 900#, 1500#, 2500# EN PN16, PN25, PN40, PN63, PN100, PN160, PN250, PN320
Process connection sizes	½" to 6" DN 15 to DN 150
Process connection types	Refer to process connection section table for detail
Measuring range	30 to 1524 cm (12 to 600 inches)
Temperature range	-196 to +538 °C (-320 to +1000 °F)
Pressure range	Full vacuum to 310 bar (4500 psi)
Specific gravity range	Min. 0.30
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 60 m (200')
Ratings of REVEAL visual indicator	IP 68
Aluminum visual indicator	Visible from 30 m (100')
Scale options	Etched stainless steel with either height or percentage units (custom markings available)
Switch options	Electric microswitch Electric reed switch
Transmitter options	Model JM4 Jupiter magnetostrictive (refer to Orion bulletin ORI-150) Analog reed chain transmitter
High temperature options	Electric or steam tracing with or without special high temperature insulation
High temperature insulation	Fiberglass material
Low temperature options	Cryogenic insulation with special polymeric frost extension

## HIGH-TEMPERATURE INSULATION

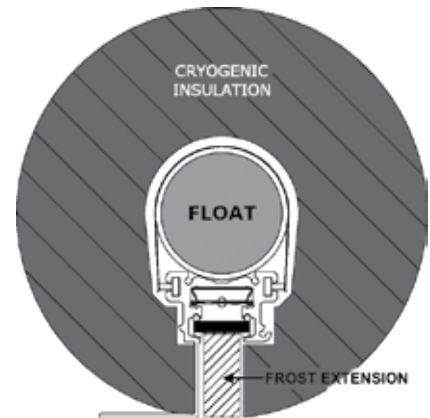
Orion specializes in custom fiberglass insulation blankets for MLIs of all shapes and sizes. They are constructed with high-quality materials capable of constant contact with temperatures up to 538 °C (1000 °F). This insulation is available as personnel protection or with heat tracing options for freeze protection or process temperature maintenance.



## CRYOGENIC INSULATION & FROST EXTENSION

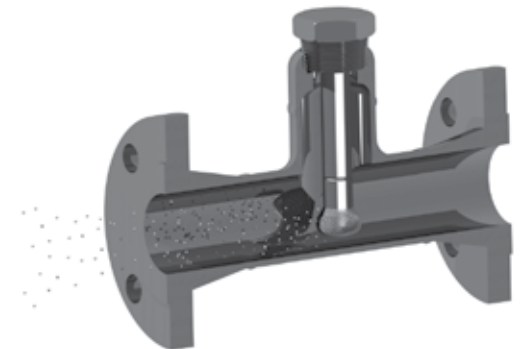
To facilitate operation where the product is kept cold via chillers, refrigerants, and condensers, cryogenic insulation is provided. By insulating the MLI with a specialized cryogenic jacket, process temperatures can be maintained in the liquid state down to -196 °C (-320 °F).

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

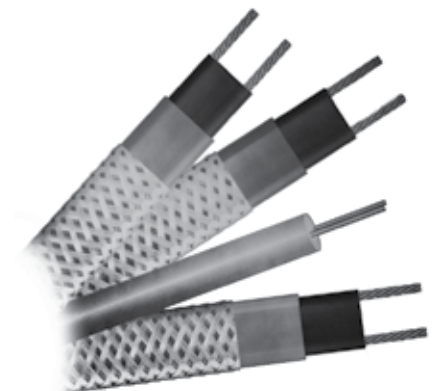
Magnetic Particle Traps, also known as Magtraps, provide additional protection for Orion's line of Magnetic Level Indicators. Particles composed mostly of ferrite, often from carbon steel piping, are widespread throughout process piping. These particles enter the MLI via the process connections during normal fill and drain operations. The magnetic float located inside the MLI attracts these particles over time. Eventually, the buildup 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.





## JUPITER MODEL JM4 MAGNETOSTRICTIVE TRANSMITTER SPECIFICATIONS

Measuring Range:	15 to 999 cm (6 to 400 inches)
Resolution:	.4 mm (.014")
Repeatability:	±0.005% of full span or 0.356 mm (0.014 inches) (whichever is greater)
Linearity:	0.8 mm (0.030 inches) or 0.01% of probe length (whichever is greater)
Upper Dead Zone:	less than 7.6 cm (3 inches) when bottom mounted electronics
Lower Dead Zone:	less than 7.6 cm (3 inches) when top mounted electronics
Damping:	0 – 10 seconds; adjustable
Power (at terminals) 2-wire:	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. 6.1.1)
Display:	Graphic liquid crystal display
Housing Material:	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)
Safety Integrity Level:	SIL rating pending
Process Temperature:	External Mount: -195 to +454 °C (-320 to +850 °F) No insulation -40 to +79 °C (-40 to +175 °F) Requiring insulation up to +454 °C (+850 °F)
Ambient Temperature at Electronics:	-40 to +80 °C (-40 to +175 °F) LCD: -20 to +70 °C (-5 to +160 °F)



**Jupiter™**  
Model JM4  
on Aurora®

## OCT REED CHAIN TRANSMITTER SPECIFICATIONS

Measuring Range:	15 to 503 cm (6 to 198 inches)
Resolution:	13 mm (±0.50 inches)
Repeatability:	6 mm (< 0.25 inches)
Non-Linearity:	<0.4% full span averaged over span
Upper Transition Zone:	10.2 cm (4 inches)
Lower Transition Zone:	10.2 cm (4 inches)
Power Input:	12 to 36 VDC (2-wire)
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:	No insulation: -40 to +93 °C (-40 to +200 °F) Requiring insulation: up to +260 °C (+500 °F)
Ambient Temperature at Electronics:	-40 to +70 °C (-40 to +158 °F)
Mounting Arrangement:	External mount probe with integral top or bottom mounted electronics



**OCT Reed Chain Transmitter**  
on Aurora®

# ELECTRONIC SWITCH SPECIFICATIONS

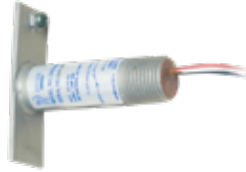
Model:	OES	ORS
Description:	DPDT magnetically actuated, bi-stable cam drive snap action switch	Hermetically sealed bi-stable reed switch
Supply Voltage:	10.1 amp; 125-250 VAC	250VAC/150VDC max
Maximum Dead Band:	±0.75" float travel	±0.50" float travel
Temperature Range:	No insulation -58 to +250 °F (-50 to +121 °C) Requiring insulation up to 500 °F (260 °C)	No insulation -58 to +250 °F (-50 to +121 °C) Requiring insulation up to 500 °F (260 °C)
Enclosure Material:	Cast aluminum (standard)	Stainless steel



**Model OES**

*Consult factory for pneumatic switch specifications.*

*Consult the individual MLI accessory catalogs for their respective hazardous location approvals.*



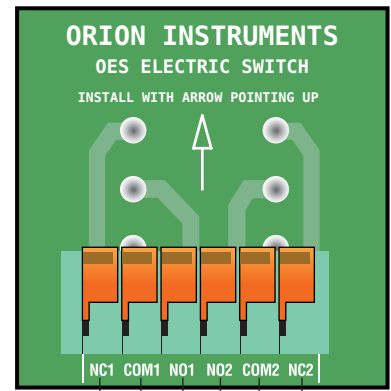
**Model ORS**

## MOUNTING TO AURORA – MODEL OES

Position the OES switch on the MLI body so that the centerline of the switch housing is at the desired switch point level. Remove the housing cover and ensure that the switch is oriented so that the arrow on the internal mechanism is pointing toward the top of the MLI. Install the clamps around the MLI and over the mounting brackets on the top and bottom of the housing. Tighten the clamps until the switch is firmly secured to the MLI. Replace the housing cover. If required, place the insulation between the MLI body and the OES switch before securing the clamps.

## WIRING – MODEL OES

The lower cable entry is protected with a plastic plug. The upper opening is sealed with a steel plug. If it is preferable to wire through the upper cable entry, the steel plug may be moved to the lower opening. The DPDT switch has two sets of contacts. Refer to the wiring diagram or label on the mechanism itself.



**FLOAT BELOW SWITCH**

## MOUNTING TO AURORA – MODEL ORS

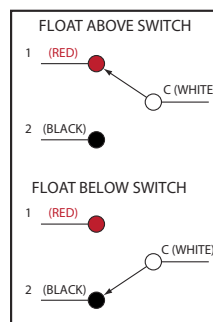
Position the ORS switch on the MLI body so that the centerline of the stainless steel tube which houses the switch is at the desired switch point level. The switch should be oriented so that the green grounding screw is closest to the bottom of the MLI. Install the clamps around the MLI and over the mounting tabs of the switch. Tighten the clamps until the switch is firmly secured to the MLI. If required, place the insulation between the MLI body and the ORS switch before securing the clamps.

## WIRING – MODEL ORS

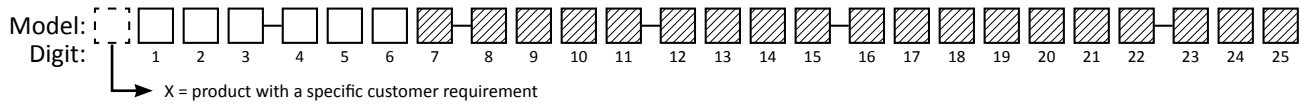
The switch leads are color coded as follows:

- white = common
- black = normally closed (float below switch)
- red = normally open

The wiring diagram shows both conditions of the switch relative to the float.



# MODEL NUMBER - AURORA



## 1 | PRODUCT

2	Aurora® MLI with Eclipse® GWR transmitter
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## 2 | UNIT OF MEASUREMENT

E	English (inches)
M	Metric (cm)

## 3 | MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION

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	Welded end cap
3 Side / Side	Flanged with threaded Eclipse probe	Flanged (including mating blind flange)
4 Side / Side	Flanged with seal welded Eclipse probe	Welded end 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	Welded end 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	Welded end cap with process connection
F Side / Bottom	Flanged with seal welded Eclipse probe	Flanged with process connection

## 4 | CHAMBER/FLANGE RATING

ASME	
A	150#
B	300#
C	600#
D	900#
E	1500#
F	2500#

EN 1092-1	
1	PN 16
2	PN 25
3	PN 40
4	PN 63
5	PN 100
6	PN 160
7	PN 250
8	PN 320

## 5 | MATERIAL OF CONSTRUCTION

Metallic	
A	316/316L stainless steel chamber
B	316/316L stainless steel chamber with carbon steel fittings & flanges
C	304/304L stainless steel chamber
D	304/304L stainless steel chamber with carbon steel fittings & flanges
G	321 stainless steel
H	347 stainless steel
J	904L stainless steel
N	Titanium
P	Monel®
Q	Hastelloy C-276
R	Alloy 20
S	Inconel® 625
T	Incoloy® 825
U	254 SMO

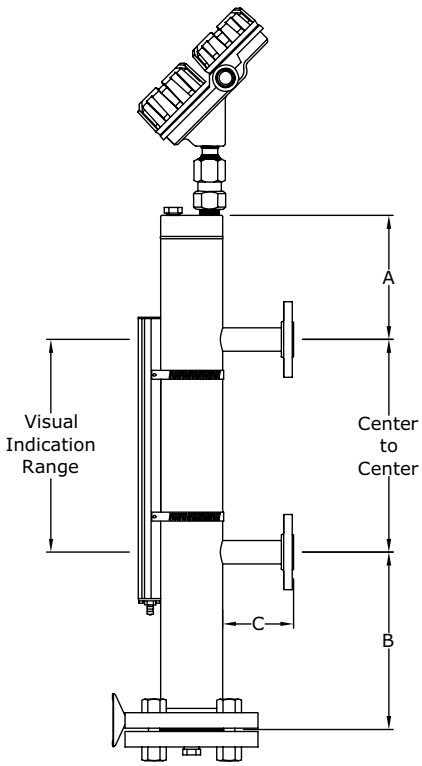
## 6 | CONSTRUCTION GRADE

Metallic construction – Non-PED	
1	Industrial Grade (standard)
2	ASME B31.1 for Power Piping Standard
3	ASME B31.3 for Process Piping Standard ①
4	Industrial Grade with NACE MR0175/0103
6	ASME B31.3 and NACE MR0103/0175 ①
8	Industrial Grade (extruded outlet)
9	ASME B31.3 (extruded outlet) ①

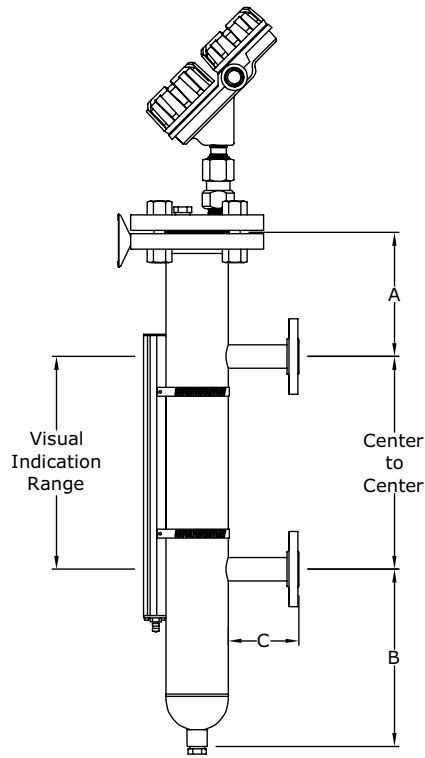
Metallic construction – PED	
D	NACE MR0175/MR0103
E	ASME B31.3 & NACE MR0175/MR0103 ①
J	Industrial
Z	ASME B31.3 ①

① Consult factory if ASME B31.3 certification is required on carbon steel constructions with design temperatures below -17 °C (0 °F).

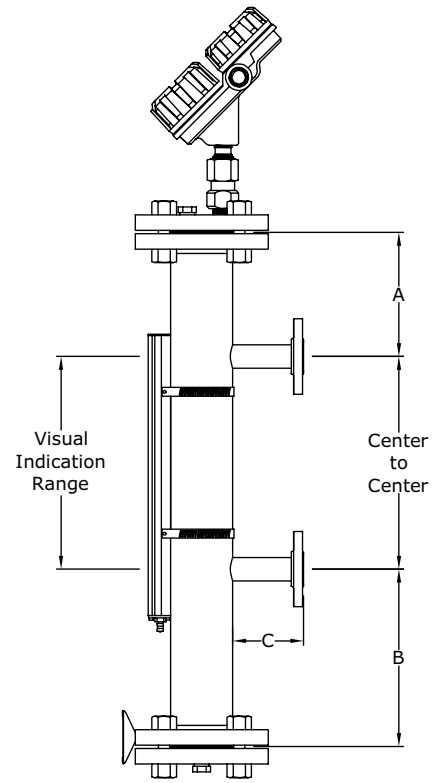
**AURORA® MAGNETIC LEVEL INDICATOR | CONFIGURATIONS**



**Configuration 1**

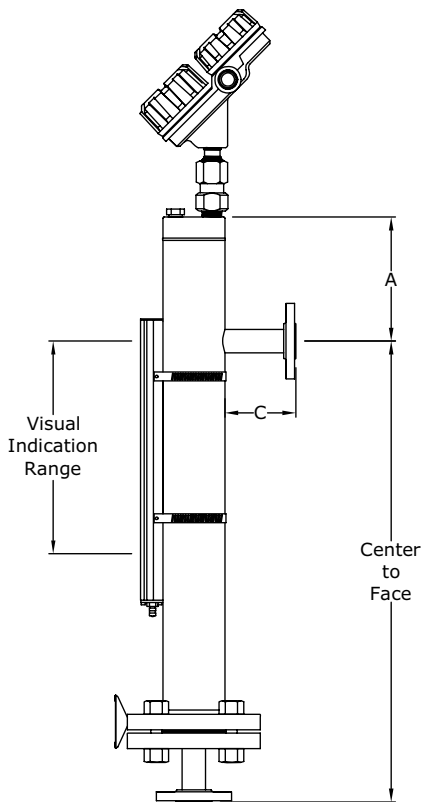


**Configurations 2 & 4**

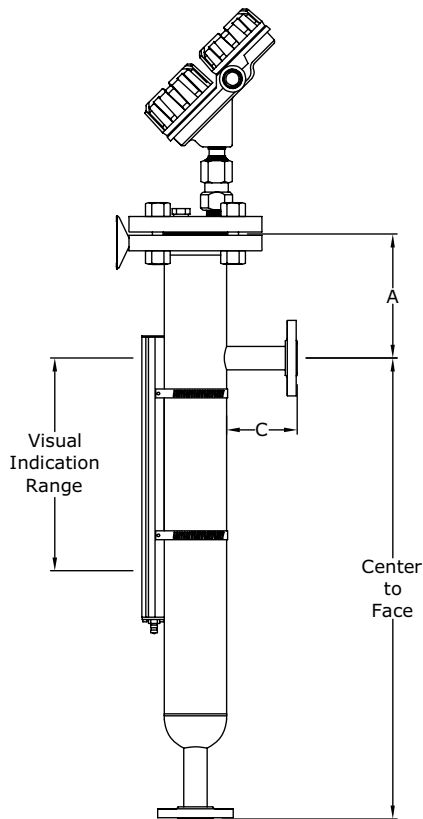


**Configurations 3 & 5**

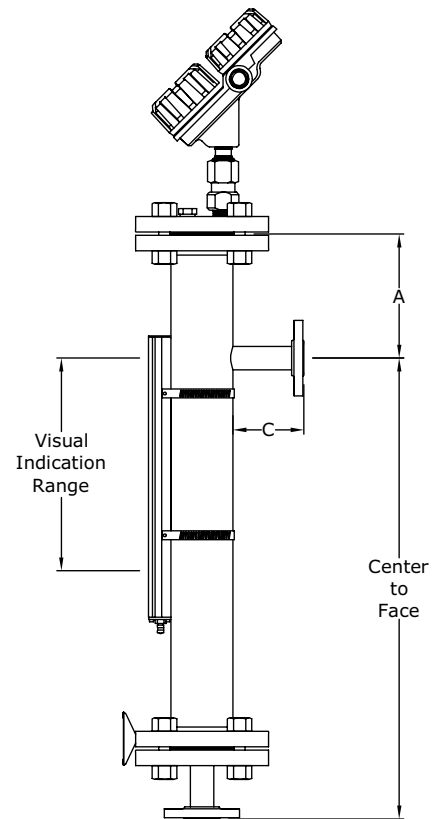
Single rod caged or flexible probes not available with bottom cap



**Configuration A**

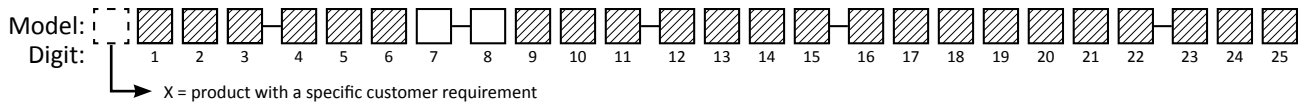


**Configurations B & D**



**Configurations C & F**

Single rod caged or flexible probes not available with bottom cap

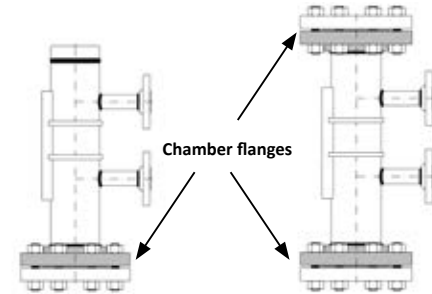


## 7 | CHAMBER FLANGE(S) TYPE

ASME flanges	
A	RF slip-on (standard for digit 4 = A, B, C)
B	RF weld neck
C	RF Socketweld Flange (digit 4 = A or B)
J	RTJ weld neck (standard for digit 4 = D, E, F)

EN 1092-1 flanges	
6	Weld neck (Type 11) EN 1092-1 Type A
7	Weld neck (Type 11) EN 1092-1 Type B2 (standard for digit 4 = 4, 5, 6, 7, 8)
8	Weld neck (Type 11) EN 1092-1 Type B1 (standard for digit 4 = 1, 2, 3)
N	No chamber flange



## 8 | PROCESS CONNECTION TYPE

Threaded or Welded	
M	Threaded NPT-M (male)
P	Pipe nipple plain end
R	Pipe nipple butt weld end
N	Threaded NPT-F (female) ①
Q	Socket weld ①
W	Threadolet™ ②
T	Sockolet™ ②
S	Weldolet™ ②

ASME ④	
A	RF slip-on flange ③
B	RF weld neck flange
C	RF socketweld flange
J	RJ weld neck flange

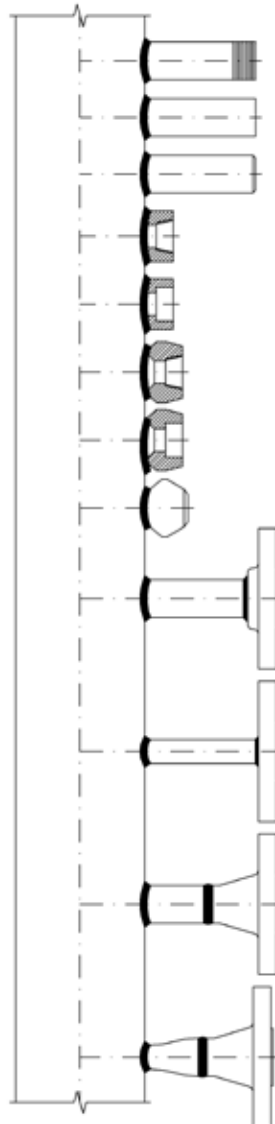
EN 1092-1 ④	
6	Weld neck (Type 11) EN 1092-1 Type A
7	Weld neck (Type 11) EN 1092-1 Type B2
8	Weld neck (Type 11) EN 1092-1 Type B1

① Only available in combination with digit 9 = A, B or C.

② Consult factory for sizes > 1".

③ Machined flange (to smaller pipe size) if process connection size ≥ chamber size (e.g., 2"/DN50 process connection and 2" chamber).

④ Pressure ratings for flanges are by default the same as selected in Digit 4



**Threaded NPT-M, option M**

**Pipe nipple plain end, option P**

**Pipe nipple butt weld end, option R**

**Threaded NPT-F, option N**

**Socket weld, option Q**

**Threadolet NPT-F, option W**

**Sockolet, option T**

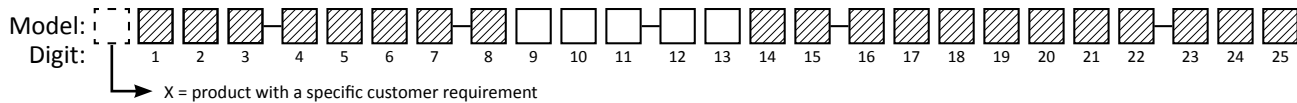
**Weldolet, option S**

**Slip-on flange, option A  
(process connection size < chamber size)**

**Machined flange, option A  
(process connection size ≥ chamber size)**

**Weld neck flange, option B, J, 8, 7, 6  
(process connection size < chamber size)**

**Weld neck flange, option B, J, 8, 7, 6  
(process connection size ≥ chamber size)**



## 9 | PROCESS CONNECTION SIZE

ASME		EN 1092-1	
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

## 10 | GASKET STYLE FOR CHAMBER FLANGE(S)

Gaskets for metallic flanges	
A	Flexible graphite/fiber ①
B	Spiral wound with graphite filler ②
C	Spiral wound with graphite filler, inner ring included matching chamber material, and carbon steel or stainless steel outer ring based on chamber material ③
D	RTJ oval ring ④
E	RTJ octagonal ring ③ ④
N	None (if mating flanges are not supplied)

- ① Standard gasket for RF flanges with rating up to 300# / PN 63.  
 ② Standard gasket options for RF flanges with rating > 300# / PN 63. Winding material matches chamber material.  
 ③ Standard ring joint for RJ ANSI flanges (digit 7 = J).  
 ④ Ring joint material matches flange material.

## 11 | CHAMBER BOLTING MATERIAL

Stainless steel		
A	304 Stainless steel class 2	A193 Gr. B8 Class 2 / A194 Gr. 8
C	316 stainless steel class 2	A-193 Gr B8M class 2 / A-194 Gr 8M
D	316 stainless steel class 2 with PTFE coating	A-193 Gr B8M class 2 / A-194 Gr 8M
G	316 stainless steel class 2 + NACE	A-193 Gr B8M class 2 / A-194 Gr 8MA

Alloy		
S	Alloy steel with zinc plating (+210 °C (+390 °F) is maximum temp for zinc-plated bolting)	A-193 Gr B7 / A-194 Gr 2H
T	Alloy steel with zinc plating + NACE (+210 °C (+390 °F) is maximum temp for zinc-plated bolting)	A-193 Gr B7M / A-194 Gr 2HM
M	Alloy steel ①	A-193 Gr B7 / A-194 Gr 2H
P	Alloy steel + NACE ①	A-193 Gr B7M / A-194 Gr 2HM

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

① Available only in combination with digit 5 = B or D.

## 12 | VENT SIZE

N	None
---	------

ASME	
1	1/2"
2	3/4"
3	1"
4	1 1/2"
5	2"

EN 1092-1	
A	DN 15
B	DN 20
C	DN 25
D	DN 40
E	DN 50

## 13 | VENT TYPE

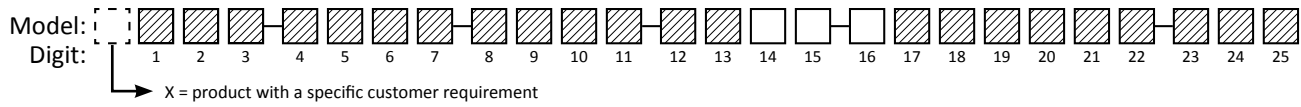
N	None
---	------

ASME	
1	Threaded NPT-F (female) with plug
2	Socket weld
3	Threaded NPT-M (male)
4	Pipe nipple plain end
5	Pipe nipple butt weld end
6	RF slip-on flange ①
7	RF weld neck flange ①
9	RJ weld neck flange ①

Valves	
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

EN 1092-1	
R	Weld neck (Type 11) EN 1092-1 Type A ①
S	Weld neck (Type 11) EN 1092-1 Type B2 ①
T	Weld neck (Type 11) EN 1092-1 Type B1 ①

① Pressure class of vent flange is as selected in digit 4.



## 14 | DRAIN SIZE

N	None
---	------

ANSI	
1	1/2"
2	3/4"
3	1"
4	1 1/2"
5	2"

EN (DIN)	
A	DN 15
B	DN 20
C	DN 25
D	DN 40
E	DN 50

## 15 | DRAIN TYPE

N	None
---	------

ASME	
1	Threaded NPT-F (female) with plug
2	Socket weld
3	Threaded NPT-M (male)
4	Pipe nipple plain end
5	Pipe nipple butt weld end
6	RF slip-on flange ①
7	RF weld neck flange ①
9	RJ weld neck flange ①

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

EN 1092-1	
R	Weld neck (Type 11) EN 1092-1 Type A ①
S	Weld neck (Type 11) EN 1092-1 Type B2 ①
T	Weld neck (Type 11) EN 1092-1 Type B1 ①

① Pressure class of vent flange is as selected in digit 4.

## 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.

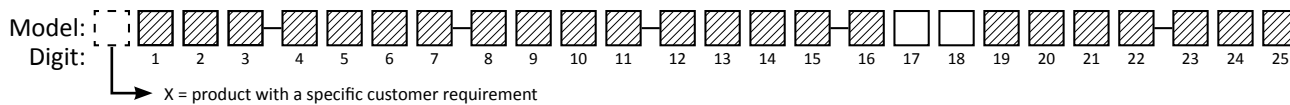
### FOR AURORA

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 Model JM4 Configuration	
Top mount offset	8
Bottom mount offset	9

Jupiter® Probe Configuration	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



## 17 | INSULATION OPTIONS

N	None	Indicator: max. 121 °C (250 °F) OCT transmitter: max. 93 °C (200 °F) Jupiter transmitter: max. 79 °C (175 °F)
---	------	---

Insulation pads for indicator, transmitter and switches			
E	Indicator only	digit 16 = N, Y	121 °C (250 °F) < T ≤ 260 °C (500 °F)
F	Indicator only	digit 16 = N	261 °C (501 °F) < T ≤ 537 °C (1000 °F)
K	Jupiter ①	digit 16 = 8, 9	261 °C (501 °F) < T ≤ 454 °C (850 °F)
R	Indicator & Jupiter ②	digit 16 = 8, 9	121 °C (250 °F) < T ≤ 260 °C (500 °F)
U	Transmitter	digit 16 = 8, 9	93 °C (200 °F) < T ≤ 260 °C (500 °F)
V	Indicator & Jupiter ②	digit 16 = 8, 9	261 °C (501 °F) < T ≤ 454 °C (850 °F)

Insulation blanket for personnel protection		
A	Chamber pipe only	up to 260 °C (500 °F)
B	Chamber pipe only	261 to 538 °C (501 to 1000 °F)
C	Chamber and flanges	up to 260 °C (500 °F)
D	Chamber and flanges	261 to 538 °C (501 to 1000 °F)

- ① Matches external mount Jupiter with digit 5 = E, F, H  
 ② Matches external mount Jupiter with digit 5 = G, J  
 ③ With maximum temperature up to 260 °C (500 °F); consult factory for application temperature higher than 260 °C (500 °F).

Cryogenic insulation	
L	Process temperature down to -100 °C (-150 °F)
P	Process temperature down to -196 °C (-320 °F)

Other options for temperature maintenance or freeze protection	
H	Electric heat tracing (blanket included) ③
S	Steam tracing (3/8" tubing) (blanket included) ③
J	Steam jacket (1/2" NPT inlet/outlet) ③

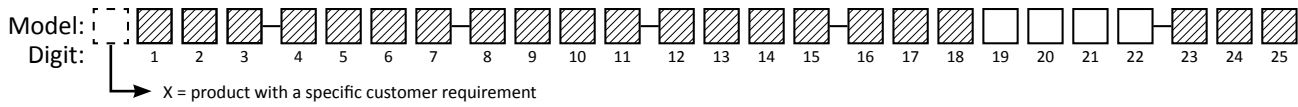
## 18 | MEASUREMENT TYPE & INDICATION STYLE

Total level		
1	Orange / black metal flags	
2	Yellow / black metal flags	
3	Red / white metal flags (standard)	
4	Red / silver metal flags	+371 °C (+700 °F) and above
A	Orange / black metal flags with yellow float diagnostics ①	
B	Yellow / black metal flags with orange float diagnostics ①	
C	Red / white metal flags with yellow float diagnostics ①	
D	Red / silver metal flags with black float diagnostics ①	+371 °C (+700 °F) and above
S	Fluorescent orange shuttle / follower ②	Maximum Temperature +120 °C (+249 °F)
Interface level		
5	Orange / black metal flags	
6	Yellow / black metal flags	
7	Red / white metal flags (standard)	
8	Red / silver metal flags	+371 °C (+700 °F) and above
F	Orange / black metal flags with yellow float diagnostics ①	
G	Yellow / black metal flags with orange float diagnostics ①	
H	Red / white metal flags with yellow float diagnostics ①	
J	Red / silver metal flags with black float diagnostics ①	+371 °C (+700 °F) and above
T	Fluorescent orange shuttle / follower ②	Maximum Temperature +120 °C (+249 °F)
N	No indicator (For external use of external Jupiter mount only)	

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.

② Available only with stainless steel indicator, refer to digit 19.





## 19 | INDICATOR HOUSING MATERIAL & MEASURING SCALE ①

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

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

① Aluminum indicator with glass window is required if the process operating temperature exceeds 427 °C (800 °F)

## 20 | CHAMBER CODE

A	3" S10 ②
B	3" S40 ②
E	4" S10
F	4" S40
G	4" S80

3" Chamber, 2" Float, NPT			
Probe	Description	Sch. 10	NPT Size
7YT	General Purpose	✓	3/4"
7YS	Steam	✓	3/4"
7YP	High Pressure	✓	3/4"

3" Chamber, 2" Float, Welded		
Probe	Description	Sch. 10
7YT	General Purpose	✓
7YS	Steam	✓

② Refer to tables at right.

## 21-22 | FLOAT CODE

Codes listed are valid for metallic construction (refer to digit 5).

### Total level measurement

Consult factory for operating S.G. and/or pressure/temperature rating not covered by the table and graphs.

Float types 4 and E (digit 21) cover full 150 # and PN 16 rating of carbon steel and 316/316L SST flanges up to 315 °C (600 °F).

Float types G (digit 21) does not cover all 300 # and PN 25 rating of carbon steel and 316/316L SST flanges up to 315 °C (600 °F). ③

Float type K (digit 21) covers full 300# and PN 25, does not cover all PN 40 rating of carbon steel and 316/316L SST flanges up to 600 °F (315 °C).

### Pressure rating of floats (see graphs on following pages for full pressure drop details):

Type 4: max. 27.6 bar @ 40 °C (400 psi @ 100 °F), max. 18.5 bar @ 315 °C (268psi @ 600 °F);

hydrotest pressure: 41.4 bar @ 40 °C (600 psi @ 100 °F)

Type E: max. 27.6 bar @ 40 °C (400 psi @ 100 °F), max. 12.1 bar @ 315 °C (175 psi @ 600 °F);

hydrotest pressure: 41.4 bar @ 40 °C (600 psi @ 100 °F)

Type G: max. 46.0 bar @ 40 °C (667 psi @ 100 °F), max. 20.1 bar @ 315 °C (291 psi @ 600 °F);

hydrotest pressure: 69.9 bar @ 40 °C (1000 psi @ 100 °F)

Type K: max. 59.8 bar @ 40 °C (867 psi @ 100 °F), max. 26.1 bar @ 315 °C (379 psi @ 600 °F);

hydrotest pressure: 89.6 bar @ 40 °C (1300 psi @ 100 °F)

Chamber rating	150 #, PN 16		300 #, PN 25 ③	300 #, PN 25, PN40 ③
Float mat.	316 SST	Ti ④	Ti ④	Ti ④
Oper. S.G.	Code ⑤	Code ⑤	Code ⑤	Code ⑤
0.48 – 0.49	—	EE	—	—
0.50 – 0.54	—	EE	—	KE
0.55 – 0.61	—	EE	GE	KE
0.62 – 0.68	—	EB	GE	KB
0.69 – 0.81	4E	EB	GB	KB
0.82 – 0.91	4B	EB	GB	KB
> 0.92	4B	EB	GB	KB

③ Float type G (digit 21) does not cover full 300# & PN 25 rating of flanges;

Float type K (digit 21) does not cover all PN 40 rating;

In some cases; check the application data (pressure/temperature) with the float graphs before making float selection.

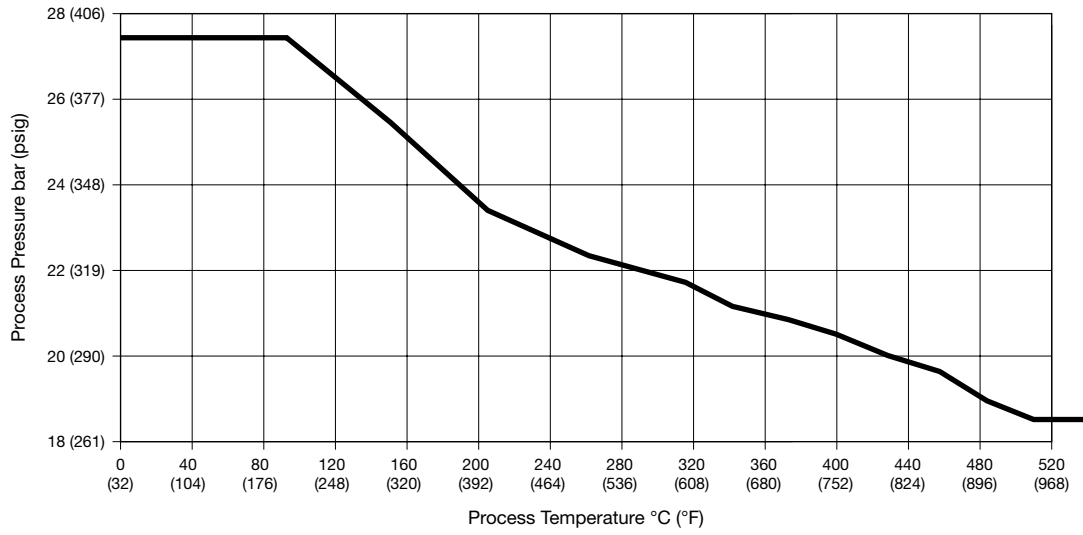
④ Titanium float is factory default.

⑤ Code 99 is used for special float. Depending on the application a factory assigned code different from the listed ones is possible.

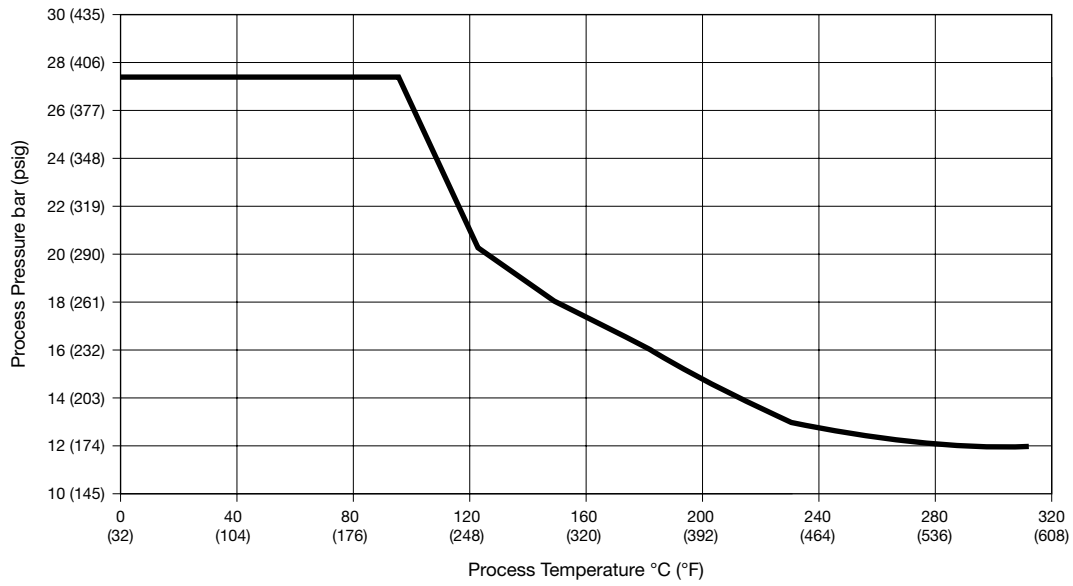
### Interface level measurement

99 | Special float

# FLOAT PRESSURE RATINGS



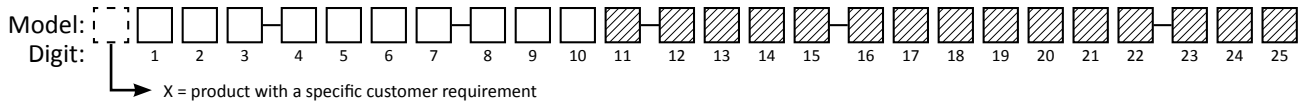
**Float Type 4**



**Float Type E**



# MODEL NUMBER – PLASTIC AURORA



## 1 | PRODUCT

8	Plastic Aurora® Magnetic Level Indicator
---	--

## 2 | UNIT OF MEASUREMENT

E	English (inches)
M	Metric (cm)

## 3 | MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION – Digit 1 = 2 (see drawings on next page)

Connection orientation	Chamber top	Chamber bottom
3 Side / Side	Flanged with threaded Eclipse probe	Flanged (including mating blind flange)

## 4 | CHAMBER/FLANGE RATING

A	150#
---	------

## 6 | CONSTRUCTION GRADE

1	Industrial Grade (standard)
---	-----------------------------

## 5 | MATERIAL OF CONSTRUCTION

1	PVC with SS top blind
2	CPVC with SS top blind
3	Kynar with SS top blind
4	Polypropylene with SS top blind
5	Fiberglass
A	PVC with Hastelloy top blind
B	CPVC with Hastelloy top blind
C	Kynar with Hastelloy top blind
D	Polypropylene with Hastelloy top blind

## 7 | CHAMBER FLANGE(S) TYPE

P	Full Face Socket Flange ①
Q	Serrated Face Socket Flange ②

- ① Available when 5th digit = 1, 2, 3, 4, A, B, C, D  
 ② Available when 5th digit = 5

## 8 | PROCESS CONNECTION TYPE

1	Van Stone Socket Flange ①
2	Full Face Socket Flange ②
3	Serrated Face Socket Flange ③

- ① Available when 5th digit = 1, 2, A, B  
 ② Available when 5th digit = 1, 2, 3, 4, A, B, C, D  
 ③ Available when 5th digit = 5

## 9 | PROCESS CONNECTION SIZE

C	1"
D	1½"
E	2"

## 10 | GASKET STYLE FOR CHAMBER FLANGE(S)

N	None (if mating flanges are not supplied)
P	EPDM Rubber (+200 °F / +93 °C maximum) ①
Q	Neoprene Rubber (+250 °F / +121 °C maximum) ①
R	Buna-N Nitrile Rubber (+250 °F / +121 °C maximum) ①
S	ePTFE soft ring (+450 °F / +232 °C maximum) ①
T	VITON® (+300 °F / +149 °C maximum) ①

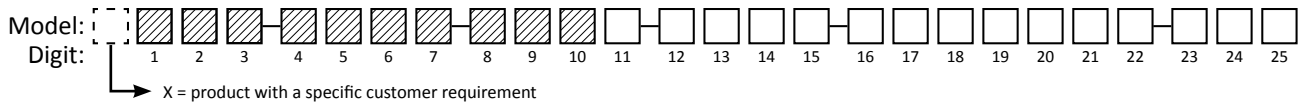
- ① Temperature limitations are primarily based on plastic construction.

Maximum Design Pressure: PSI [Bar] vs Temperature				
Design Temperature °F (°C)	Digit 5			
	1 or A	2 or B	3 or C	4 or D
	PVC	CPVC	KYNAR	PP
73 (23)	150 [10.34]	150 [10.34]	150 [10.34]	150 [10.34]
80 (27)	150 [10.34]	150 [10.34]	150 [10.34]	150 [10.34]
90 (32)	143 [9.86]	143 [9.86]	150 [10.34]	150 [10.34]
100 (38)	118 [8.14]	118 [8.14]	150 [10.34]	150 [10.34]
110 (43)	95 [6.55]	95 [6.55]	150 [10.34]	140 [9.65]
115 (46)	86 [5.93]	86 [5.93]	150 [10.34]	135 [9.31]
120 (49)	76 [5.24]	76 [5.24]	150 [10.34]	130 [8.96]
125 (52)	67 [4.62]	67 [4.62]	150 [10.34]	124 [8.55]
130 (54)	57 [3.93]	57 [3.93]	150 [10.34]	118 [8.14]
140 (60)	42 [2.90]	42 [2.90]	145 [10.00]	105 [7.24]
150 (66)	N.R.	N.R.	130 [8.96]	93 [6.41]
160 (71)	N.R.	N.R.	123 [8.48]	80 [5.52]
170 (77)	N.R.	N.R.	113 [7.79]	49 [3.38]
180 (82)	N.R.	N.R.	105 [7.24]	N.R.
200 (93)	N.R.	N.R.	90 [6.21]	N.R.
210 (99)	N.R.	N.R.	83 [5.72]	N.R.
240 (116)	N.R.	N.R.	57 [3.93]	N.R.
280 (138)	N.R.	N.R.	25 [1.72]	N.R.

N.R. = Not Recommended

- Interpolation is permitted

- Fiberglass ratings not listed since they are application specific



## 11 | CHAMBER BOLTING MATERIAL

N	None	
A	304 Stainless steel class 2	A193 Gr. B8 Class 2 / A194 Gr. 8
S	Zinc-plated Alloy Steel (+390 °F (+210 °C))	A193 Gr B7 / A194 Gr 2H

## 12 | VENT SIZE

N	None
1	1/2"

## 13 | VENT TYPE

N	None
1	Threaded NPT-F (female) with plug

## 14 | DRAIN SIZE

N	None
1	1/2"
2	3/4"

## 15 | DRAIN TYPE

N	None
1	Threaded NPT-F (female) with plug

## 16 | ACCESSORY / TECHNOLOGY CODE

FOR AURORA – GWR ordered separately

Eclipse® Probe Configuration	Eclipse® Only, No switches	Eclipse® and at least one OES/ORS Switch (Clamp-mounted)
Standard Coaxial Probe	1	A

## 17 | INSULATION OPTIONS – See Plastic Temperature Limitations

N	None
---	------

## 18 | MEASUREMENT TYPE & INDICATION STYLE

1	Orange / Black flags
2	Yellow / Black flags
3	Red / White flags

## 19 | INDICATOR HOUSING MATERIAL & MEASURING SCALE

reveal Wide View Stainless Steel indicator	
A	Foot / Inch Measurement
M	Meter / Centimeter Measurement
C	Running Inch Measurement
D	Percent (0 - 100%) Measurement
P	No scale

Anodized Aluminum Housing	
N	No scale
1	Foot / Inch Measurement
8	Meter / Centimeter Measurement

## 20 | CHAMBER CODE

C	3" S80
---	--------

## 21 | FLOAT DIAMETER

6	2 3/4" SS
S	2 3/4" Hastelloy C-276
9	None

## 22 | FLOAT LENGTH

		Minimum S.G. ①	
		Stainless Steel	Hastelloy C
J	8"	0.969	1.005
K	10"	0.897	0.933
L	12"	0.847	0.883
M	14"	0.810	0.846
9	Custom	—	—

① Consult factory for lower SG.

## 23-25 | VISUAL INDICATION LENGTH

X X X	Specify in <b>INCHES</b> (maximum = 212) when model code 2 is <b>E</b>
	Specify in <b>CENTIMETERS</b> (maximum = 538) when model code 2 is <b>M</b>
	<b>Example #1:</b> Center-to-Center is 84 inches. Enter as 084. (model digit 2 must be "E")
	<b>Example #2:</b> Center-to-Center is 124 centimeters. Enter as 124. (model digit 2 must be "M")
	<b>Example #3:</b> Center-to-Center is 124.25 inches. Enter as 124 inches and X the model for 124.25 inches. Consult factory for assistance.
	<b>Example #4:</b> Center-to-Center is 724 millimeters. Enter as 072 centimeters and X the model for 724 millimeters. Consult factory for assistance.

## OPTIONAL EXTERNAL MOUNT LEVEL TRANSMITTERS

The Jupiter transmitter is a magnetostrictive level transmitter while the OCT transmitter is a reed chain level transmitter. Both types are mounted to the MLI via clamps.

**Jupiter magnetostrictive transmitter** Refer to bulletin ORI-150, external mount section.

### OCT reed chain transmitter

The OCT analog transmitter mounts directly to the side of the MLI and provides a continuous 4–20 mA output signal proportional to the liquid level. Using simple and reliable reed switches surface mounted to a printed circuit board, the unit provides a resolution of ± 13 mm (0.50"). Activated by the magnetic field of the float, the transmitter is totally non-invasive.

#### SELECTION DATA

Model: 

O	C	T							
---	---	---	--	--	--	--	--	--	--

  
Digit: 

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

  
X = product with a specific customer requirement

### 1-3 BASIC MODEL NUMBER

OCT	Reed chain transmitter (FM/CSA explosion proof)
-----	---

### 4 HOUSING / CABLE ENTRY

A	IP 66, cast aluminum, 1/2" NPT-F cable entry
S	IP 66, 316 stainless steel, 3/4" NPT-F cable entry

### 5 MOUNTING POSITION

A	Top mount, right hand
B	Top mount, left hand
C	Bottom mount, right hand
D	Bottom mount, left hand

### 6 CHAMBER MOUNTING CODE

No insulation present on MLI (MLI model code digit 17 = N)	
3	MLI model code digit 20 = A, B      MLI model code digit 3 <> T
4	MLI model code digit 20 = E, F, G

MLI with high temperature insulation (MLI model code digit 17 = A, C, R, U)	
G	MLI model code digit 20 = A, B      MLI model code digit 3 <> T
H	MLI model code digit 20 = E, F, G

### 7 UNIT OF MEASUREMENT

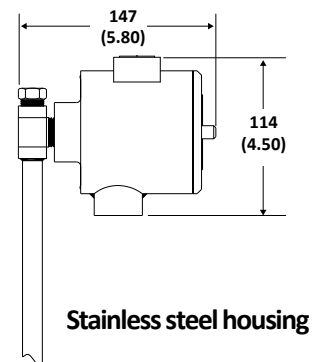
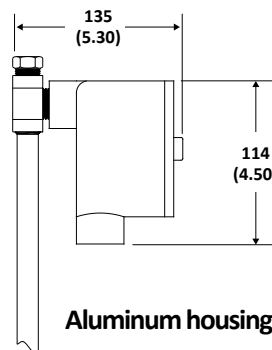
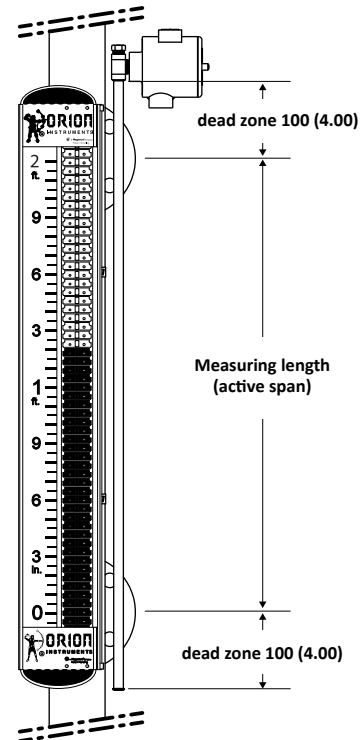
M	Metric (cm)
E	English (inches)

### 8-10 MEASURING LENGTH

X X X	15 to 503 cm (6" to 198") (same as MLI center-to-center dimension) <i>example: 6 (inches or cm) = 0 0 6</i>
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Match measuring length with visual indication length of MLI.  
Sensor length = measuring length + 20 cm (8").

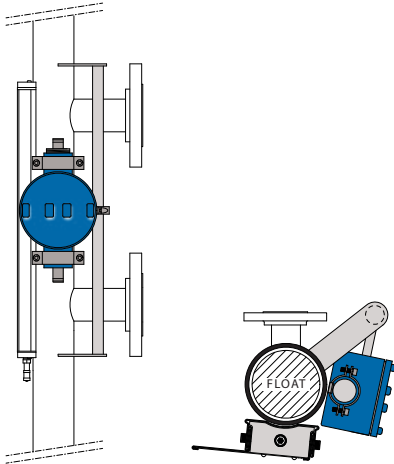
#### DIMENSIONS mm (inches)



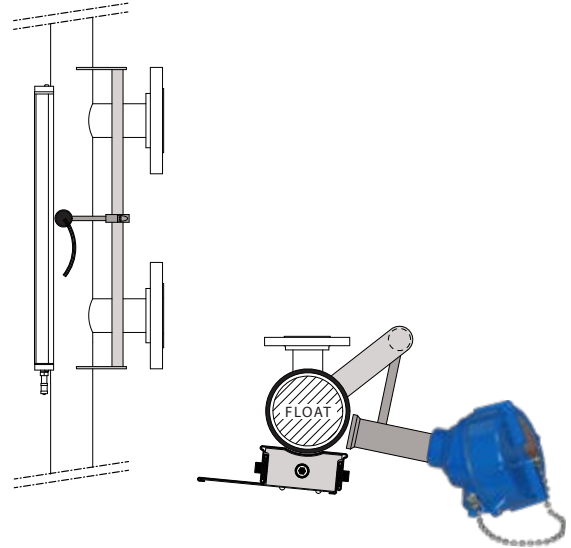
## OPTIONAL POINT LEVEL SWITCHES

The OES level switch is a cam-operated microswitch while the ORS level switch is a hermetically sealed reed switch. Both types can be mounted to the MLI either via clamps or attached to a switch mount rod and are field adjustable. Simply loosen the mounting clamps and position at the desired location. Ensure that the switch always remains in close proximity to the internal float.

A switch mount rod is an available alternative method for mounting the switch to an MLI when chamber insulation blanket is present. The rod assembly, which is welded to the MLI chamber, allows the switch to slide along the full length. When the desired position is selected, simply tighten it in place.



OES switch attached to switch mount rod



ORS switch attached to switch mount rod

### OES bi-stable DPDT microswitch

The OES level switch is actuated by simple magnetic coupling. As the liquid level moves, the MLI float (with its internal magnets and flux rings) follows. When the float moves into the proximity of the microswitch, the switch magnet interacts with the float's magnetic field actuating the switch. The bi-stable design of the switch ensures that it will not reset until the float passes the switch in the opposite direction.

#### SELECTION DATA

Model:

Digit: 1 2 3 4 5 6 7 8 9 10

X = product with a specific customer requirement

### 1-3 | BASIC MODEL NUMBER

O E S	DPDT microswitch
-------	------------------

### 4 | HOUSING / CABLE ENTRY

A	IP66, cast aluminum, 3/4" NPT-F cable entry (2 entries - 1 plugged)
S	IP66, 316 stainless steel, 3/4" NPT-F cable entry (2 entries - 1 plugged)

### 5 | APPROVAL

N	Weatherproof
1	FM/CSA explosion proof

### 6 | CHAMBER MOUNTING CODE

N	No mounting clamps ①
1	MLI model code digit 20 = 1 or 2 (2" chamber)
2	MLI model code digit 20 = 3, 4, 5 or 6 (2 1/2" chamber)
3	MLI model code digit 20 = A, B, C or D (3" chamber)
4	MLI model code digit 20 = E, F, G, H or J (4" chamber)
5	MLI model code digit 3 = T (top mount design (3/4" chamber))

① When Digit 7 = R

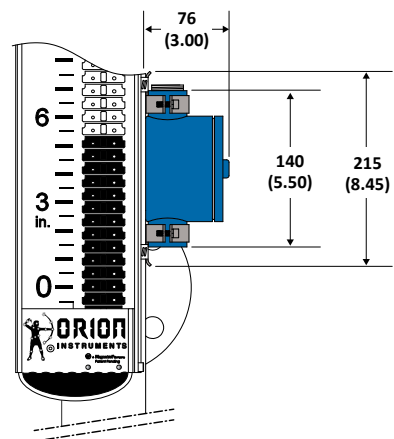
### 7 | MOUNTING

C	Clamp mounted to chamber T ≤ 121 °C (250 °F)
P	Clamp mounted to chamber with insulation pad 121 °C (250 °F) < T ≤ 260 °C (500 °F)
R	Attached to switch mount rod ② T ≤ 260 °C (500 °F)

② When Digit 6 = N

#### DIMENSIONS

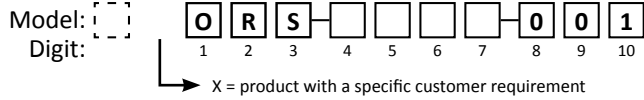
mm (inches)



## ORS hermetically sealed bi-stable SPDT reed switch

The ORS level switch is actuated by the magnetic field produced by the MLI float. As the liquid level moves, the MLI float (with its internal magnets and flux rings) follows. When the float moves into the proximity of the reed switch, the switch is actuated. The bi-stable design of the switch ensures that it will not reset until the float passes the switch in the opposite direction.

### SELECTION DATA



## 1-3 | BASIC MODEL NUMBER

ORS	Hermetically sealed SPDT reed switch
-----	--------------------------------------

## 4 | HOUSING / CABLE ENTRY

1	Stainless body without junction box
A	Stainless body with cast aluminum junction box, IP 66, 3/4" NPT-F cable entry
S	Stainless body with stainless steel junction box, IP 66, 3/4" NPT-F cable entry

## 5 | APPROVAL

1	FM/CSA
2	FM/CSA: 24 volt maximum
A	ATEX
N	General Purpose

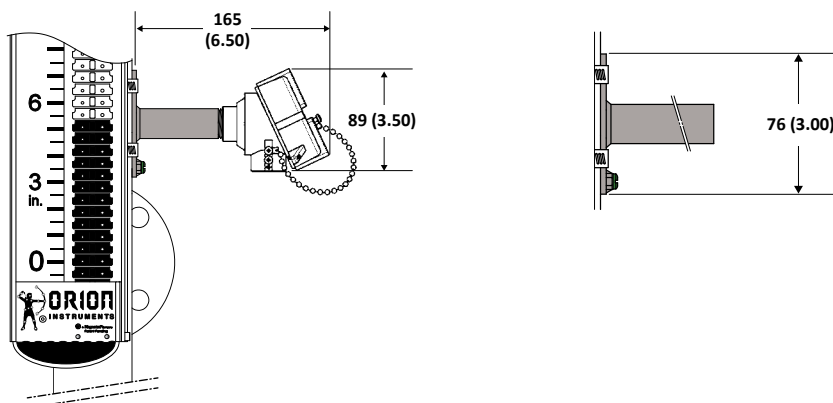
## 6 | CHAMBER MOUNTING CODE

3	MLI model code digit 20 is A, B
4	MLI model code digit 20 is E, F, G, H
N	No mounting clamps

## 7 | MOUNTING

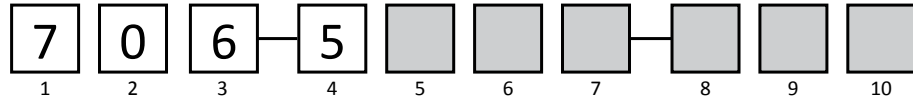
C	Clamp mounted on MLI (standard)	$T \leq 121 \text{ }^\circ\text{C} (250 \text{ }^\circ\text{F})$
P	Clamp mounted on MLI with insulation pad	$121 \text{ }^\circ\text{C} (250 \text{ }^\circ\text{F}) < T \leq 260 \text{ }^\circ\text{C} (500 \text{ }^\circ\text{F})$
R	Switch rod mount Digit 6 = N	$T \leq 260 \text{ }^\circ\text{C} (500 \text{ }^\circ\text{F})$

## DIMENSIONS mm (inches)





# ECLIPSE® MODEL 706 GWR FOR AURORA® | TRANSMITTER MODEL NUMBER



## 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
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

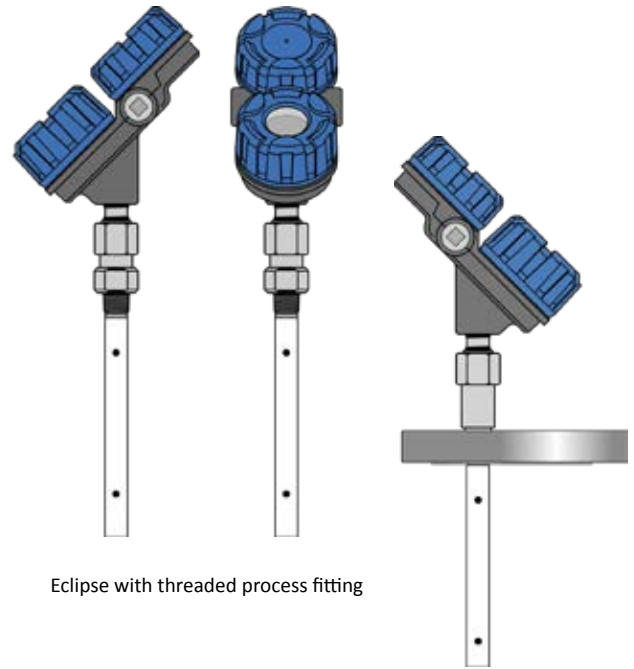
0	General Purpose, Weatherproof (IP 67)
1	Intrinsically Safe (FM & CSA CL 1 Div 1, Grps A, B, C, D) (5th digit = 1 or 2)
3	Explosion-proof (FM & CSA CL 1 Div 1, Grps B, C, D)
A	Intrinsically Safe (ATEX/IEC Ex ia IIC T4) (5th digit = 1 or 2)
B	Flame-proof (ATEX/IEC Ex d ia IIC T6) (5th digit = 1 or 2)
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
A	Die-cast Aluminum, Dual-compartment, 45-degree with 705/706 adapter
B	Investment Cast, Stainless Steel, Dual-compartment, 45-degree with 705/706 adapter

## 10 | CONDUIT CONNECTION

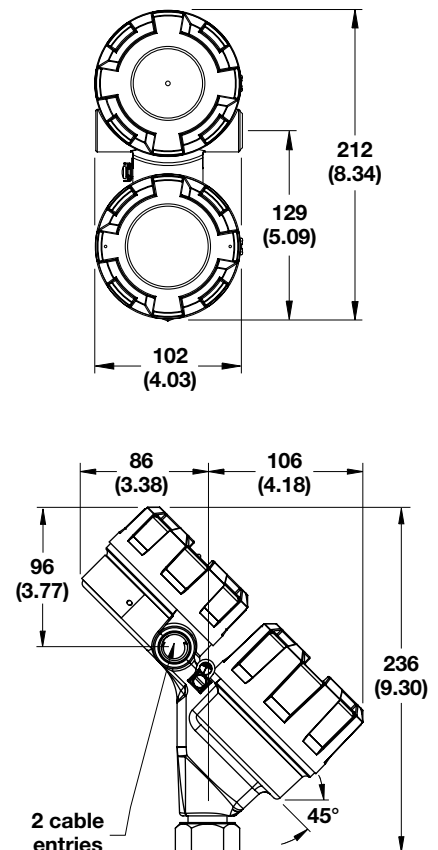
0	½" NPT
1	M20
2	½" NPT with sunshade
3	M20 with sunshade



Eclipse with threaded process fitting

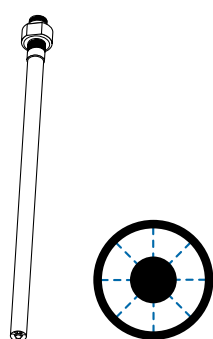
Eclipse transmitter with probe offset for Aurora MLI

### DIMENSIONS mm (inches)

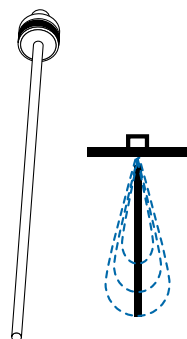


ECLIPSE PROBE SPECIFICATIONS									
GWR Probe ①	Description	Application	Dielectric Range ② ③	Temperature Range ④	Maximum Pressure	Vacuum ⑤	Overfill Safe	Viscosity cP (mPa.s)	Length ⑥
7 y T	Standard Temperature Coaxial	Level/ Interface	$\epsilon_r$ 1.4–100	-40 to +200 °C (-40 to +400 °F)	70 bar (1000 psi)	Yes	Yes	500	60 to 610 cm (24" to 240")
7 y P	High Pressure Coaxial	Level/ Interface	$\epsilon_r$ 1.4–100	-196 to +200 °C (-320 to +400 °F)	431 bar (6250 psi)	Full	Yes	500	60 to 610 cm (24" to 240")
7 y D	High Temp. / High Pressure Coaxial	Level/ Interface	$\epsilon_r$ 1.4–100	-196 to +450 °C (-320 to +850 °F)	431 bar (6250 psi)	Full	Yes	500	60 to 610 cm (24" to 240")
7 y S	Steam Coaxial	Saturated Steam	$\epsilon_r$ 10–100	-40 to +425 °C (-40 to +800 °F) ⑦	207 bar (3000 psi)	Full	No ⑦	500	60 to 455 cm (24" to 180")
7 y G	Standard Temperature Caged	Level/ Interface	$\epsilon_r$ 1.4–100	-40 to +200 °C (-40 to +400 °F)	70 bar (1000 psi)	Yes	Yes	10000	60 to 610 cm (24" to 240")
7 y J	High Temp. / High Pressure Caged	Level/ Interface	$\epsilon_r$ 1.4–100	-196 to +450 °C (-320 to +850 °F)	431 bar (6250 psi)	Full	Yes	10000	60 to 610 cm (24" to 240")
7 y 6	High Temp. / High Pressure Flexible	Level/ Interface	$\epsilon_r$ 1.4–100	-196 to +450 °C (-320 to +850 °F)	431 bar (6250 psi)	Full	Yes ⑧	10000	91 cm to 30 m (3' to 100')

- ① 2nd digit A=English, C=Metric
- ② Minimum  $\epsilon_r$  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;  $\epsilon_r$  1.7.
- ④ 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<sup>-8</sup> 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

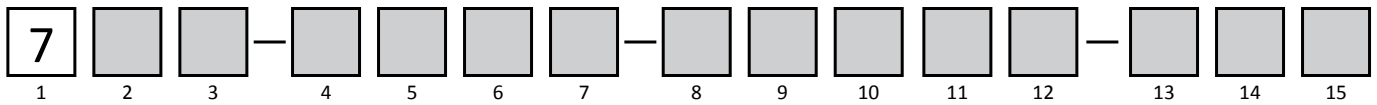


Single Rod Probe



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

# ECLIPSE® MODEL 706 GWR FOR AURORA® | PROBE MODEL NUMBER



## 1, 2 | BASIC MODEL

7A	Eclipse GWR probe, <b>English</b> unit of measure
7C	Eclipse GWR probe, <b>Metric</b> 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	Saturated steam service – Available only with 10th digit N	
T	Coaxial	Overfill/Interface – Not available with 10th digit N or D	
G	Single Rod	Caged Probe	
J	Single Rod	High-Temp/High-Pressure Caged Probe	
6	Single Rod	High-Temp/High Pressure Flexible probe	

## 4, 5 | CHAMBER CONNECTION - SIZE / TYPE

Threaded	
11	¾" NPT threaded connection

4" ANSI Flanges	
53	3" 150# RF Flange
54	3" 300# RF Flange
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 – Available only with 11th digit = A

## 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, P or S
N	None/Glass Ceramic Alloy – Available only with 3rd digit D, P or S

## 11 | PROBE SIZE

0	Caged Probe
2	Small Coaxial
3	Flexible Cable Probe
A	Medium Coaxial – Available only with 3rd digit = S

## 12 | SPECIAL OPTIONS

0	Single Length Probe
1	Removable Single Length Cable Probe

## 13, 14, 15 | INSERTION LENGTH

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

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



**BULLETIN: ORI-143.4**  
**EFFECTIVE: August 2022**  
**SUPERSEDES: March 2021**