ORION® INSTRUMENTS
A MAGNETROL Company

Atlas™ Magnetic Level Indicator

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.

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, a complete range of level switches and transmitters is available. Combinations using Jupiter® (magnetostrictive technology) are also possible.

The Atlas™ is our 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 several configuration styles including top mount models. Consult factory for options not listed in this bulletin.

ATLAS MLIs are produced in a wide range of materials, including exotic alloys and plastics. We also offer 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.

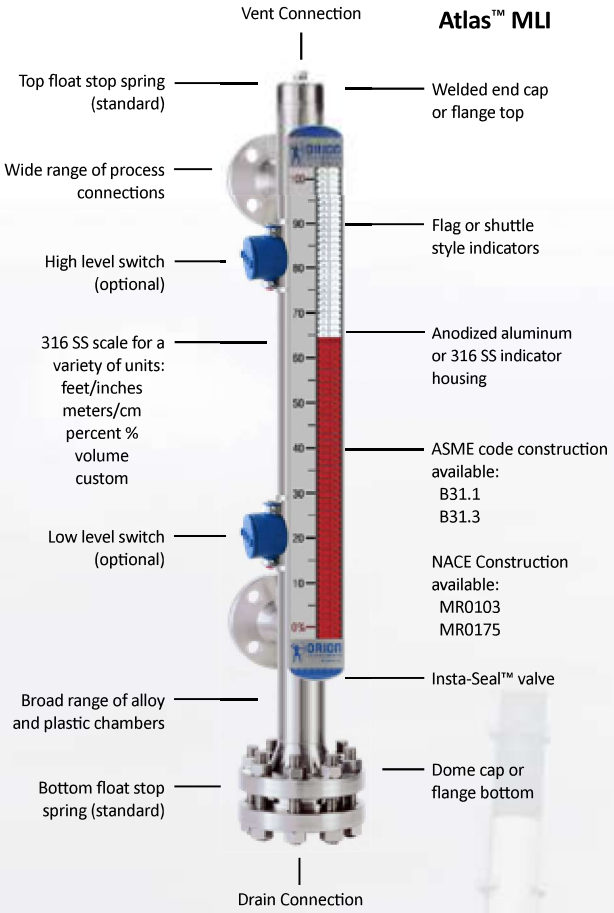
FEATURES

- Numerous chamber styles (or configurations) are available for each design. Consult factory for options not listed in this bulletin.
- Complete range of level switches and level transmitters
- Fabricated, non-magnetic chamber assembly produced in a wide range of metal and plastic materials
- A wide range of process connections is available
- Precision manufactured float with internal magnets and magnetic flux ring
- ASME and EN 1092-1 process connections available
- Flag or shuttle type indicator with stainless steel scale to measure height or percentage of level, volume or content
- Standard float stop springs at top and bottom of chamber
- Exceptional code qualified welding

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

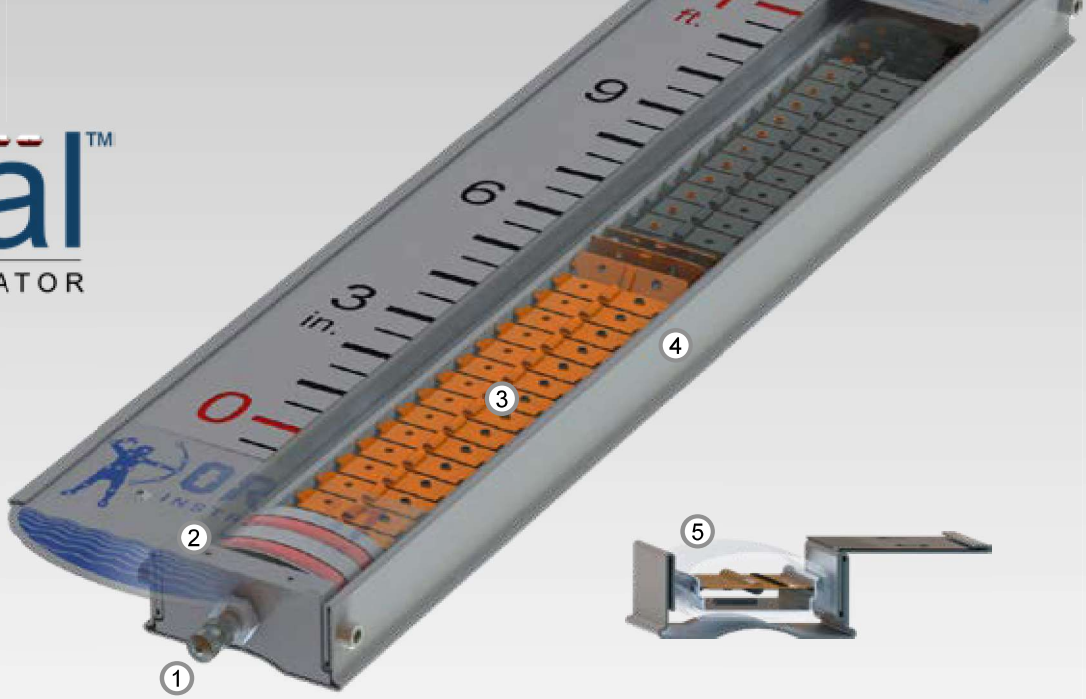
Atlas™ MLI



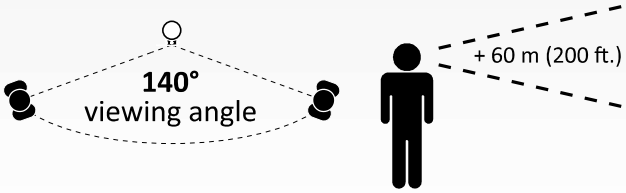
Top Mount Atlas
(consult factory)

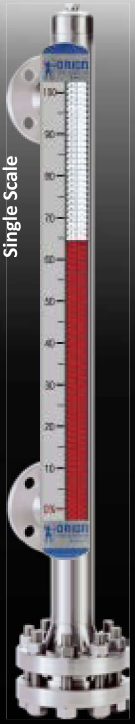
reveal™

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

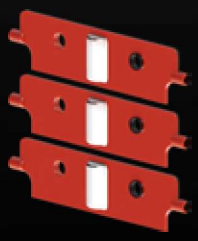




Scale Options:

- 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.

Weld Ring: Secures float cap to main body

Flux Ring: Absorbs magnetic energy and directs it outward

Magnets: A full array surrounds the float with a strong and consistent magnetic field

Support Ring: Provides reinforcement for the main float body

Float Body: Robust and durable construction delivers many years of reliable operation

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

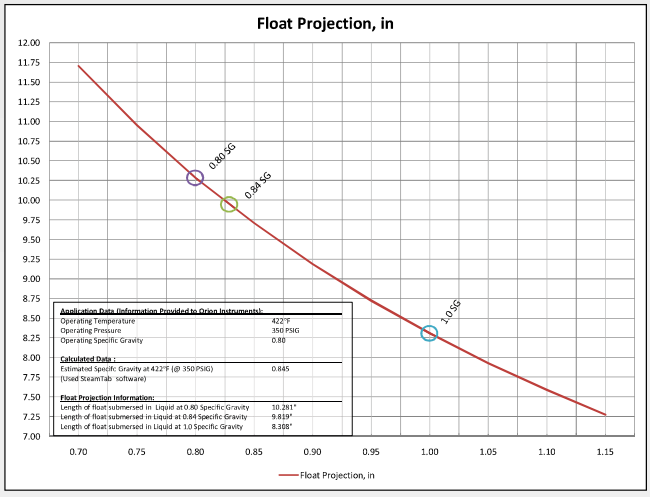
- Teflon-S® PTFE and PFA slip-assistant coating
- Special coatings for abrasion and chemical resistance
- Float retrieval hook
- Float Projection Curve: If the liquid density changes, a float curve will reveal the offset

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.



Float Projection Curve

MAGNETIC LEVEL INDICATOR SPECIFICATIONS

Design	Single chamber
Materials of construction – Chamber	Metal alloys: see selection table digit 5
– 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], PED 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 page 12 for detail
Measuring range	12 to 600 inches (30 to 1524 cm)
Temperature range	-320 to +1000 °F (-196 to +538 °C)
Pressure range	Full vacuum to 4500 psi (310 bar)
Specific gravity range	Min. 0.25
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	Vacuum and sealed with double D-ring & InstaSeal™ valve
REVEAL™ visual indicator	Visible from 200’ (60 m)
Ratings of REVEAL visual indicator	IP 68
Aluminum visual indicator	Visible from 100’ (30 m)
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

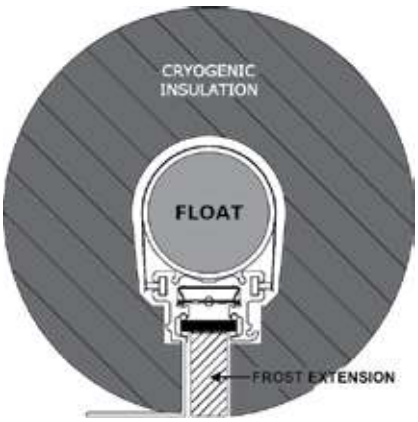
HIGH-TEMPERATURE INSULATION

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 1000 °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 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:	6 to 400 inches (15 to 999 cm)
Resolution:	.014" (.4 mm)
Repeatability:	±0.005% of full span or 0.014 inches (0.356 mm) (whichever is greater)
Linearity:	0.030 inches (0.8 mm) or 0.01% of probe length (whichever is greater)
Upper Dead Zone:	less than 3 inches (7.6 cm) when bottom mounted electronics
Lower Dead Zone:	less than 3 inches (7.6 cm) 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: -320 to +850 °F (-195 to +455 °C) *with insulation
Ambient Temperature at Electronics:	-40 to +175 °F (-40 to +80 °C) LCD: -5 to +160 °F (-20 to +70 °C)

Jupiter®
Model JM4
on Atlas™

OCT REED CHAIN TRANSMITTER SPECIFICATIONS

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 (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:	-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

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 Material:	Cast aluminum (standard)	Stainless steel

Model OES

Model ORS

PNEUMATIC SWITCH SPECIFICATIONS

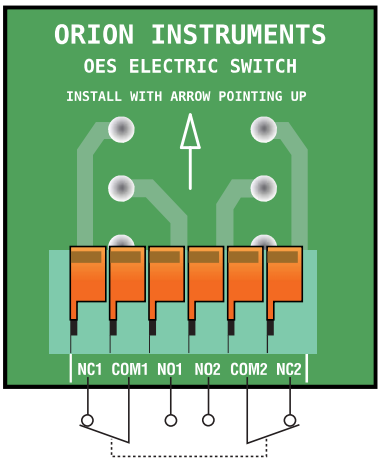
Consult factory for more information regarding pneumatic switches.

AGENCY APPROVALS – POINT SWITCH & REED CHAIN TRANSMITTER

Agency	Model	Area Classification
FM FM APPROVED	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
CSA	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 OCT-xxxx-001	Class I, Div. 1, Groups B, C, & D; T6 @ 80°C; Type 4X 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
CE	OES-xxxx-001 ORS-xxxx-001 OCT-xxxx-xxxx	Low Voltage Directives, 2006/95/EC Installation Category II, Pollution Degree 2

MOUNTING TO ATLAS – 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.



FLOAT BELOW SWITCH

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.

MOUNTING TO ATLAS – 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 top 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

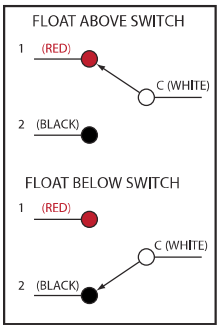
The switch leads are color coded as follows:

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

Model:
Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

X = product with a specific customer requirement

1 PRODUCT NAME

1	Atlas™ Magnetic Level Indicator

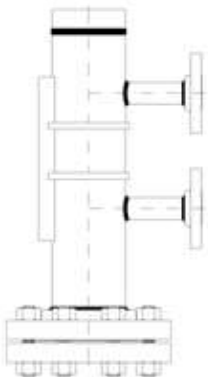
2 UNIT OF MEASUREMENT

E	English (inches)
M	Metric (cm)

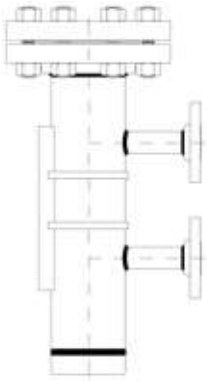
3 MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION

Connection orientation		Chamber top	Chamber bottom
1	Side / Side	Welded end cap	Flange
2	Side / Side	Flange	Welded end cap
3	Side / Side	Flange	Flange
5	Top / Bottom*	Flange	Flange
7	Top / Side	Welded end cap with process connection	Flange
9	Side / Bottom	Flange	Welded end cap with process connection
T	Top Mount	Threaded cap	Flanged process connection

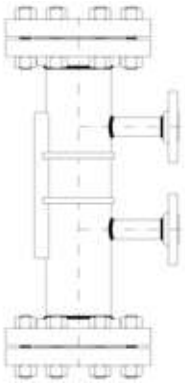
* If chamber and process connection size are the same, no spool piece is required.



Option 1

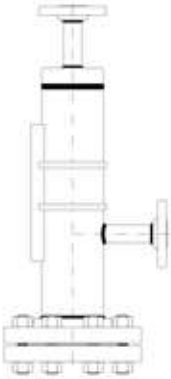


Option 2

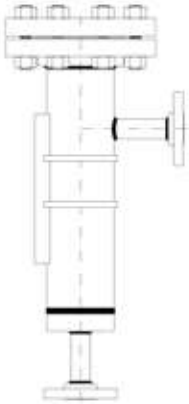


Option 3

Option 5

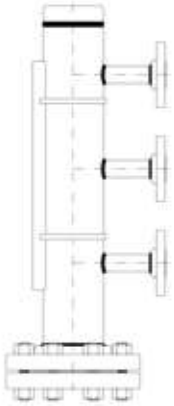


Option 7



Option 9

Option T



Option 1 with 3 process connections

Option T with stilling well
(consult factory)

Model:
Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

X = product with a specific customer requirement

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

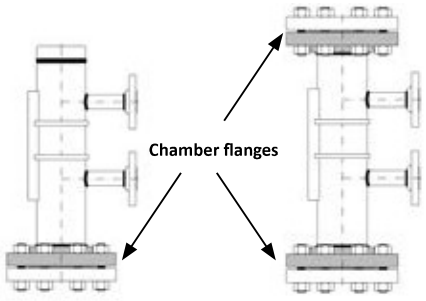
Metallic construction – PED	
D	NACE MR0175/MR0103
E	ASME B31.3 & NACE MR0175/MR0103
J	Industrial
Y	ASME B31.1
Z	ASME B31.3

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

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



Model:
Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

X = product with a specific customer requirement

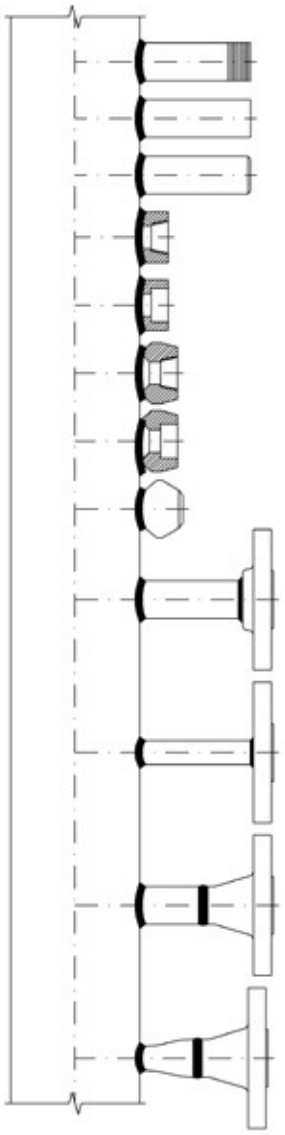
8 PROCESS CONNECTION TYPE

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	
A	½"
B	¾"
C	1"
D	1½"
E	2"
F	2½"
G	3"
H	4"
J	6"

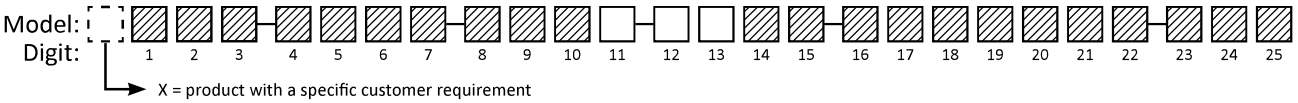
EN 1092-1	
1	DN 15
2	DN 20
3	DN 25
4	DN 40
5	DN 50
6	DN 65
7	DN 80
8	DN 100
9	DN 150

10 GASKET STYLE FOR CHAMBER FLANGE(S)

Gaskets for metallic flanges	
A	Flexible fiber ring ①
B	Spiral wound with graphite filler and carbon steel outer ring ②
C	Spiral wound with graphite filler, inner ring matching chamber material ② and carbon steel outer ring
D	RTJ oval ring ③ ④
E	RTJ octagonal ring 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 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 (+390 °F (+210 °C) is maximum temp for zinc-plated bolting)	A-193 Gr B7 / A-194 Gr 2H
T	Alloy steel with zinc plating + NACE (+390 °F (+210 °C) 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	½"
2	¾"
3	1"
4	1½"
5	2"

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

13 VENT TYPE

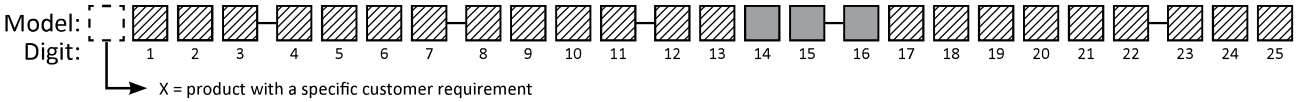
N	None

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 × 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.



14 DRAIN SIZE

N	None

ANSI	
1	½"
2	¾"
3	1"
4	1½"
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 drain flange is as selected in digit 4.

16 CHAMBER MODIFICATION FOR MOUNTING OF OPTIONAL SWITCHES AND/OR TRANSMITTER

ATLAS can be combined with various externally mounted accessories, including switches and transmitters. In these cases minor changes to the chamber and float design may be required.

For digit 16, match up the MLI product with the appropriate transmitter, switch or combination of both.

For OES/ORS switch, refer to the switch selection data for temperature limitations and insulation options. Match up the switch model code digit 7 with the MLI model codes 16 and 17.

For OCT transmitter, refer to digit 17 for temperature limitations and match up the OCT model code with the MLI model codes 16 and 17.

For Jupiter transmitter, refer to digit 17 for temperature limitations and possible mounting configurations. Match up the Jupiter model code with the MLI model codes 16 and 17.

If SIL enhanced Jupiter transmitter is required then use MLI model with float diagnostics indicator, refer to digit 18.

All transmitters and switches must be ordered separately.

N	No switch or transmitter added

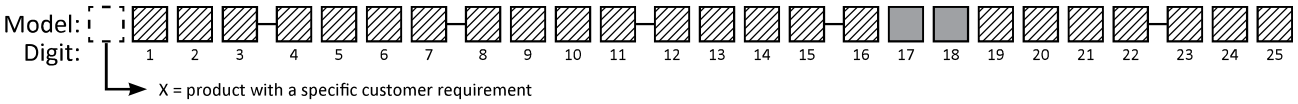
Switch only (no transmitter)	
Y	OES or ORS switch(es) clamp mounted to chamber
Z	OES or ORS switch(es) attached to switch mount rod (available when digit 17 = A, B, C or D)

OCT reed chain transmitter (no switches)	
8	Top mount
9	Bottom mount

Jupiter magnetostrictive transmitter only (no switches)	
1	Top mount without offset ① max. 175 to 850 °F (79 to 454 °C) with insulation (digit 17 = K)
2	Top mount offset, with or without high temperature bend
3	Bottom mount offset, with or without high temperature bend

Jupiter magnetostrictive transmitter with at least one OES or ORS switch		
Mounting of Jupiter	Mounting of switches	
	clamp mounted to chamber	attached to switch mount rod
Top mount without offset ①	A ②	L ③ ④
Top mount offset, with or without high temperature bend	B	M ④
Bottom mount offset, with or without high temperature bend	C	P ④

① Available only in combination with digit 3 = 1 and digit 13 = N or 1.
② Jupiter: max. 175 to 850 °F (79 to 454 °C) with insulation (digit 17 = K).
③ Jupiter: max. 175 to 850 °F (79 to 454 °C) with insulation (digit 17 = A, C).
④ Available when digit 17 = A, B, C or D



17 INSULATION OPTIONS

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

Insulation pads for indicator, transmitter and switches			
E	Indicator only	digit 16 = N, Y	250 to 600 °F (121 to 316 °C)
F	Indicator only	digit 16 = N	601 to 800 °F (317 to 427 °C)
G	Indicator only	digit 16 = N	801 to 1000 °F (428 to 538°C)
Z	OCT transmitter only	digit 16 = 8, 9	200 to 700 °F (93 to 371 °C)
W	Indicator & OCT transmitter	digit 16 = 8, 9	250 to 700 °F (121 to 371 °C)
K	Jupiter only ①	digit 16 = 1, 2, 3, A, B, C	175 to 850 °F (79 to 454 °C)
M	Indicator & Jupiter ②	digit 16 = 2, 3, B, C	250 to 850 °F (121 to 454 °C)
R	Indicator & Jupiter ②	digit 16 = 2, 3	250 to 600 °F (121 to 316 °C)
V	Indicator & Jupiter ②	digit 16 = 2, 3	601 to 850 °F (317 to 454 °C)

Insulation blanket for personnel protection		
A	Chamber pipe only	up to 600 °F (316 °C)
B	Chamber pipe only	600 to 1000 °F (316 to 538 °C)
C	Chamber and flanges	up to 600 °F (316 °C)
D	Chamber and flanges	600 to 1000 °F (316 to 538 °C)

① Matches external mount Jupiter with digit 5 = E, F, H
② Matches external mount Jupiter with digit 5 = G, J

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

Other options for temperature maintenance or freeze protection		
H	Electric heat tracing	includes insulation blanket
S	Steam tracing (⅜" tubing)	includes insulation blanket
J	Steam jacket (½" NPT inlet/outlet)	

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	+700 °F (+371 °C) 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	+700 °F (+371 °C) and above
S	Fluorescent orange shuttle / follower ②	Maximum Temperature +800 °F (+427 °C)

Interface level ③		
5	Orange / black metal flags	
6	Yellow / black metal flags	
7	Red / white metal flags (standard)	
8	Red / silver metal flags	+700 °F (+371 °C) 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	+700 °F (+371 °C) and above
T	Fluorescent orange shuttle / follower ②	
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.

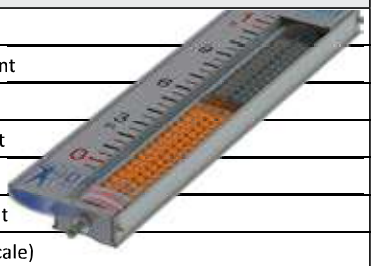
② Only available with stainless steel indicator, refer to digit 19.

Model:
Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

X = product with a specific customer requirement

19 INDICATOR HOUSING MATERIAL & MEASURING SCALE ①

reveal *Wide View* Stainless Steel indicator	
A	Foot / Inch Measurement
M	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
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 800 F (427 C)

20 CHAMBER CODE

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

1	2" S10	digit 21 = 2, B, D
2	2" S40	

3	2½" S10
4	2½" S40
5	2½" S80

A	3" S10
B	3" S40
C	3" S80

21-22 FLOAT CODE

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

Total level measurement

Consult factory for operating S.G. and/or pressure/temperature rating not covered by the table and graphs.
Float types 2 and B (digit 21) cover full 150 # and PN 16 rating of carbon steel and 316/316L SST flanges up to 600 °F (315 °C).
Float type D (digit 21) covers full 300 # rating of 316/316L SST flanges up to 600 °F (315 °C) and of carbon steel flanges up to 400 °F (200 °C).
Float type D (digit 21) covers full PN 25 and PN 40 rating of carbon steel and 316/316L SST flanges up to 600 °F (315 °C).

Pressure rating of floats (see graphs for full pressure drop details):
type 2: max. 333 psi @ 100 °F (23.0 bar @ 40 °C), max. 270 psi @ 600 °F (18.6 bar @ 315 °C);
hydrotest pressure: 400 psi @ 100 °F (27.6 bar @ 40 °C).
type B: max. 500 psi @ 100 °F (34.5 bar @ 40 °C), max. 219 psi @ 600 °F (15.1 bar @ 315 °C);
hydrotest pressure: 600 psi @ 100 °F (41.4 bar @ 40 °C).
type D: max. 1083 psi @ 100 °F (74.7 bar @ 40 °C), max. 473 psi @ 600 °F (32.6 bar @ 315 °C);
hydrotest pressure: 1300 psi @ 100 °F (89.6 bar @ 40 °C).

Chamber rating	150 #, PN 16, PN 25 ①		300 #, 600 #, PN 25, PN 40, PN 63, PN 100
Float mat.	316 SST	Ti ②	Ti ②
Oper. S.G.	Code ③	Code ③	Code ③
0,55 - 0,64	—	BE	-
0,65 - 0,74	—	BE	DE
0,75 - 0,84	2C	BB	DC
0,84 - 0,94	2B	BB	DB
0,95 - 1,04	2B	BB	DB

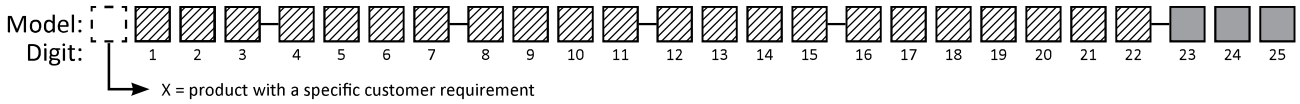
① Float types 2 and B (digit 21) do not cover full PN 25 rating of flanges in some cases; check the application data (pressure/temperature) with the float graphs before selecting one of these floats.

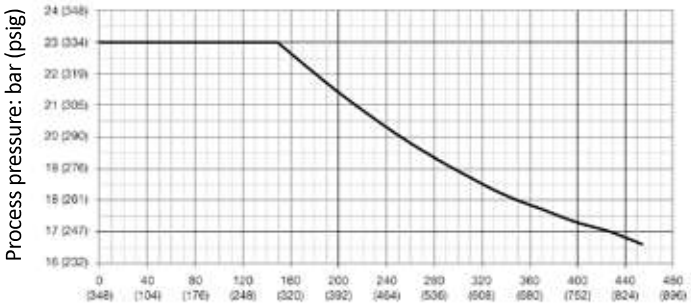
② Titanium float is factory default

③ Code 99 is used for special float. Depending on the application a factory assigned code different from the listed ones is possible.

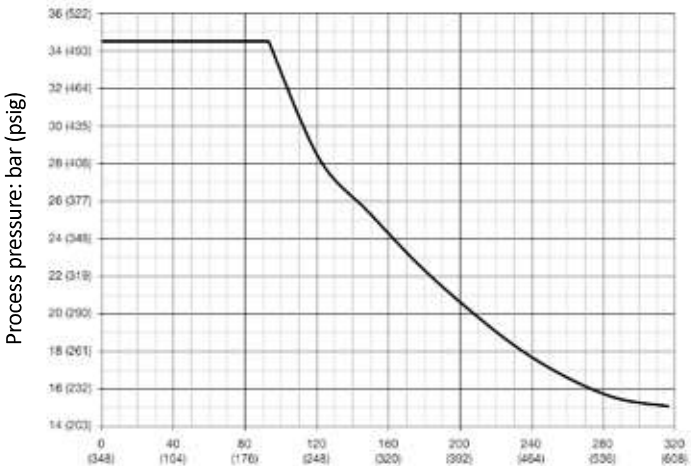
Interface level measurement

99	Special float

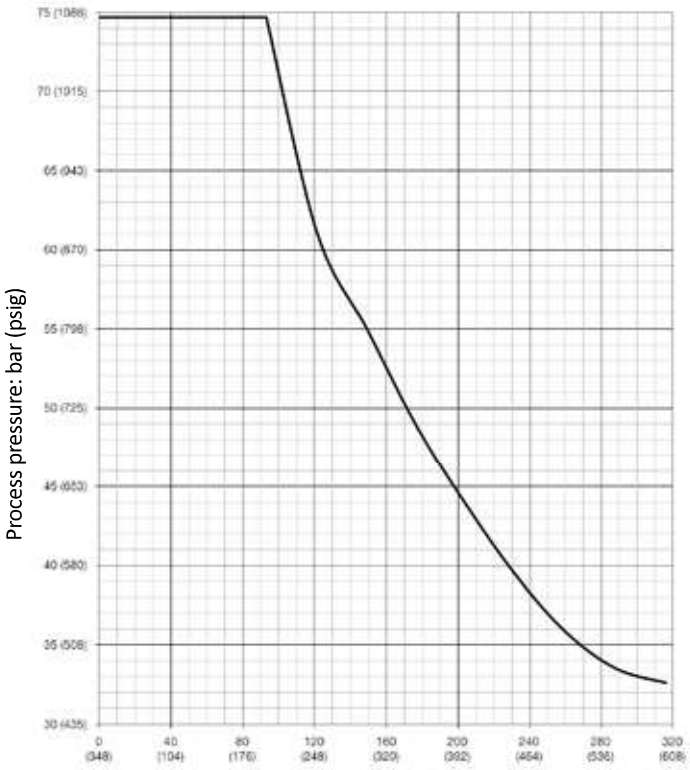




Float type 2



Float type B



Float type D

23-25 | VISUAL INDICATION LENGTH

X X X	Specify in **INCHES** (maximum = 212) when model code 2 is **E** Specify in **CENTIMETERS** (maximum = 538) when model code 2 is **M**
	Example #1: Center-to-Center is 84 inches. Enter as 084. (model digit 2 must be "E") **Example #2:** Center-to-Center is 124 centimeters. Enter as 124. (model digit 2 must be "M") **Example #3:** Center-to-Center is 124.25 inches. Enter as 124 inches and X the model for 124.25 inches. Consult factory for assistance. **Example #4:** 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 Model JM4 magnetostrictive transmitter

SELECTION DATA

Model: [ ] J M 4 – 5 [ ] [ ] [ ] – [ ] [ ] [ ]

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

[ ] = X = product with a specific customer requirement

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 SEE NOTE 1

7 ACCESSORIES/MOUNTING

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

8 AREA CLASSIFICATION

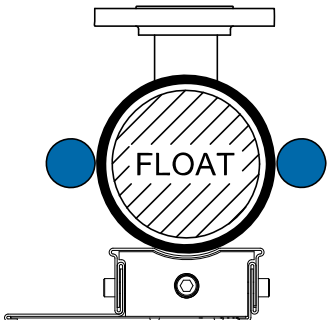
0	General Purpose, Weatherproof (IP 67)
1	Intrinsically Safe / FISCO (cFMus)
3	Explosion-Proof / FNICO (cFMus)
A	Intrinsically Safe (ATEX & IEC)
B	Flame-Proof (ATEX & IEC)
C	Ex n (ATEX & IEC)
D	Dust Ex (ATEX & IEC)
1	FISCO Field Device (cFMus)
3	Explosion-Proof & FNICO Field Device (cFMus)

9 HOUSING

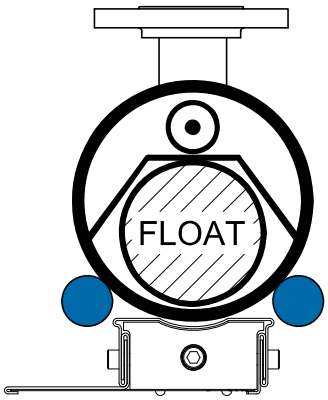
1	Aluminum, Dual-Compartment
2	316 SS, Dual-Compartment

10 CONDUIT CONNECTION & SUNSHADE OPTION

0	½" NPT
1	M20
2	1/2" NPT with Sunshade
3	M20 with Sunshade



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



Probe mounting positions on Aurora® MLI

Probe proximity to the float is critical

NOTES:

[1] 3rd Party FMEDA report available

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

OPTIONAL EXTERNAL MOUNT LEVEL TRANSMITTERS

Jupiter Model JM4 magnetostrictive external mount probe

SELECTION DATA

Model: [ ] [2] [ ] [ ]–[ ] [ ] [ ] [ ]–[ ] [0] [ ]–[0] [0] [ ] [ ] [ ]

Digit: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

X = product with a specific customer requirement

2 MEASUREMENT SYSTEM

A	English *Probe length to be provided in inches*
C	Metric *Probe length to be provided in centimeters*

3 CONFIGURATION

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

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

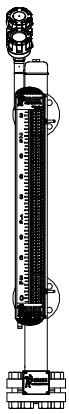
11–12 UNUSED

00	None

13–15 PROBE LENGTH

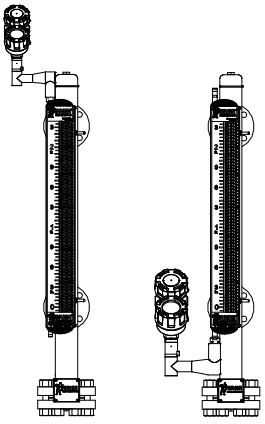
Specify required insertion length (see below)	
XXX	Example: 87 inches = 087 *Code 2 must be "A"*
	Example: 120 centimeters = 120 *Code 2 must be "C"*

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.

OPTIONAL EXTERNAL MOUNT LEVEL TRANSMITTERS

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 transmittter (FM/CSA explosion proof)

4 HOUSING / CABLE ENTRY

A	IP 66, cast aluminum, ½" NPT-F cable entry
S	IP 66, 316 stainless steel, ¾" NPT-F cable entry

5 MOUNTING POSITION

T	Top mount
B	Bottom mount

6 CHAMBER MOUNTING CODE

No insulation present on MLI (MLI model code digit 17 = N)		
1	MLI model code digit 20 = 1, 2	MLI model code digit 3 <> T
2	MLI model code digit 20 = 3, 4, 5, 6	MLI model code digit 3 <> T
3	MLI model code digit 20 = A, B, C, D	MLI model code digit 3 <> T
5	MLI is a top mount design	MLI model code digit 3 = T

MLI with high temperature insulation (MLI model code digit 17 = A, C, T, W)		
E	MLI model code digit 20 = 1, 2	MLI model code digit 3 <> T
F	MLI model code digit 20 = 3, 4, 5, 6	MLI model code digit 3 <> T
G	MLI model code digit 20 = A, B, C, D	MLI model code digit 3 <> T
J	MLI is a top mount design	MLI model code digit 3 = T

7 UNIT OF MEASUREMENT

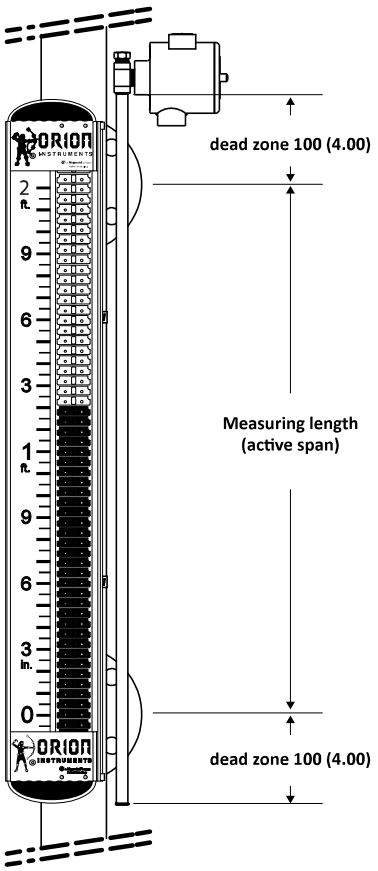
M	Metric (cm)
E	English (inches)

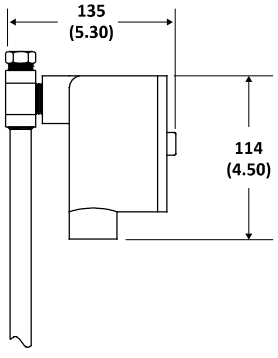
8-10 MEASURING LENGTH - specify per cm (0.39") increment

030	Min 30 cm (12")	
500	503 cm (198")	FM approval
500	503 cm (198")	CSA approval

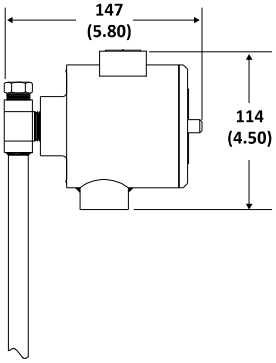
Match measuring length with visual indication length of MLI.
Sensor length = measuring length + 20 cm (8").

DIMENSIONS mm (inches)





Aluminum housing

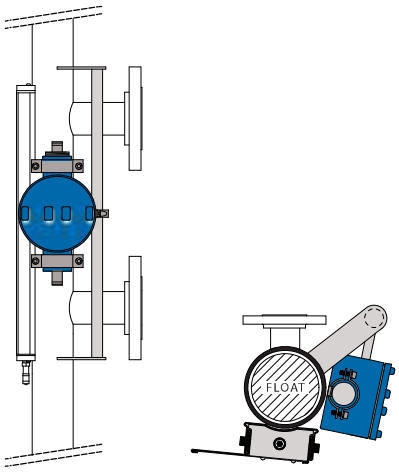


Stainless steel housing

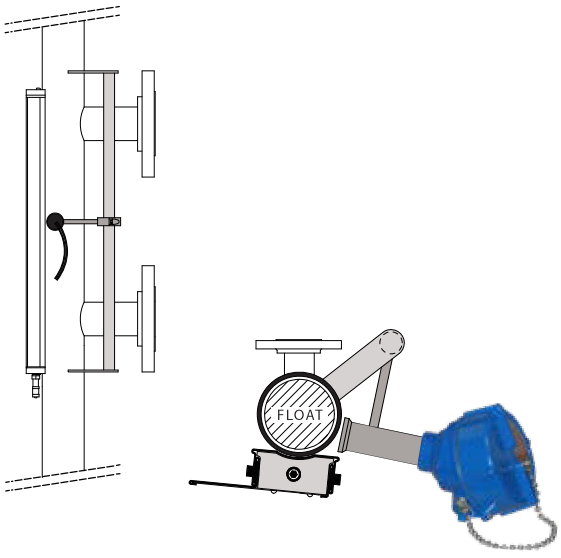
OPTIONAL POINT LEVEL SWITCHES

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: [ ] O E S [ ] [ ] [ ] [ ] - 0 0 1
Digit: 1 2 3 4 5 6 7 8 9 10

X = product with a specific customer requirement

1-3 BASIC MODEL NUMBER

OES	DPDT microswitch

4 HOUSING / CABLE ENTRY

A	IP 65, cast aluminum, ¾" NPT-F cable entry (2 entries - 1 plugged)
S	IP 65, 316 stainless steel, ¾" NPT-F cable entry (2 entries - 1 plugged)

5 APPROVAL

N	Weatherproof
1	FM/CSA explosion proof

6 CHAMBER MOUNTING CODE

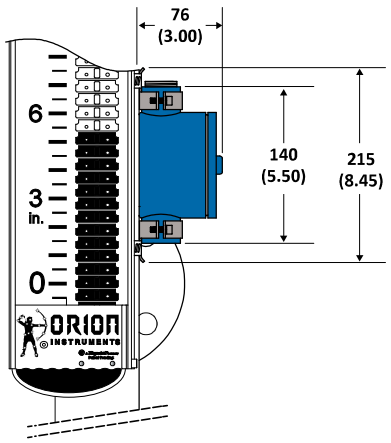
1	MLI model code digit 20 = 1, 2	MLI model code digit 3 <> T
2	MLI model code digit 20 = 3, 4, 5, 6	MLI model code digit 3 <> T
3	MLI model code digit 20 = A, B, C, D	MLI model code digit 3 <> T
5	MLI is a top mount design ①	MLI model code digit 3 = T

① Not available with switch mount rod.

7 MOUNTING

C	Clamp mounted to chamber	T ≤ 120 °C (250 °F)
P	Clamp mounted to chamber with insulation pad	120 °C (250 °F) < T ≤ 190 °C (375 °F) if MLI model code digit 17 = K, N, T 120 °C (250 °F) < T ≤ 220 °C (425 °F) if MLI model code digit 17 = W 120 °C (250 °F) < T ≤ 260 °C (500 °F) if MLI model code digit 17 = E, M
R	Attached to switch mount rod	T ≤ 120 °C (250 °F) if MLI model code digit 17 = N T ≤ 260 °C (500 °F) if MLI model code digit 17 = A, C

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

Model: [ ] O R S [ ] [ ] [ ] [ ] 0 0 1
Digit: 1 2 3 4 5 6 7 8 9 10

X = product with a specific customer requirement

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, ¾" NPT-F cable entry
S	Stainless body with stainless steel junction box, IP 66, ¾" NPT-F cable entry

5 APPROVAL

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

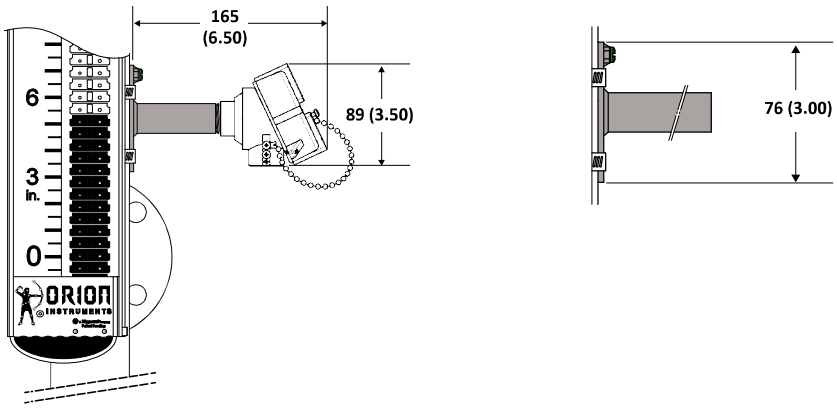
6 CHAMBER MOUNTING CODE

1	MLI model code digit 20 is 1 or 2 (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)
5	MLI is a top mount design (¾" chamber)
N	No mounting clamps

7 MOUNTING

C	Clamp mounted on MLI (standard)	T ≤ 120 °C (250 °F)
P	Clamp mounted on MLI with insulation pad	120 °C (250 °F) < T ≤ 190 °C (375 °F) if MLI model code digit 17 = K, N, T 120 °C (250 °F) < T ≤ 220 °C (425 °F) if MLI model code digit 17 = W 120 °C (250 °F) < T ≤ 260 °C (500 °F) if MLI model code digit 17 = E, M
R	Switch rod mount	T ≤ 120 °C (250 °F) if MLI model code digit 17 = N T ≤ 260 °C (500 °F) if MLI model code digit 17 = A, C

DIMENSIONS
mm (inches)



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

some restrictions apply

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