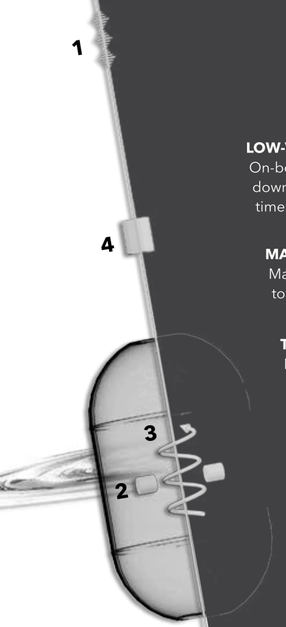
ORION®
INSTRUMENTS
A Magnetrol Company

JUPITER® Model JM4

MAGNETOSTRICTIVE LEVEL TRANSMITTER

HOW MAGNETOSTRICTION WORKS



LOW-VOLTAGE PULSE 1
On-board electronics send a low-voltage electrical pulse down the magnetostrictive wire at the speed of light, ten times per second.

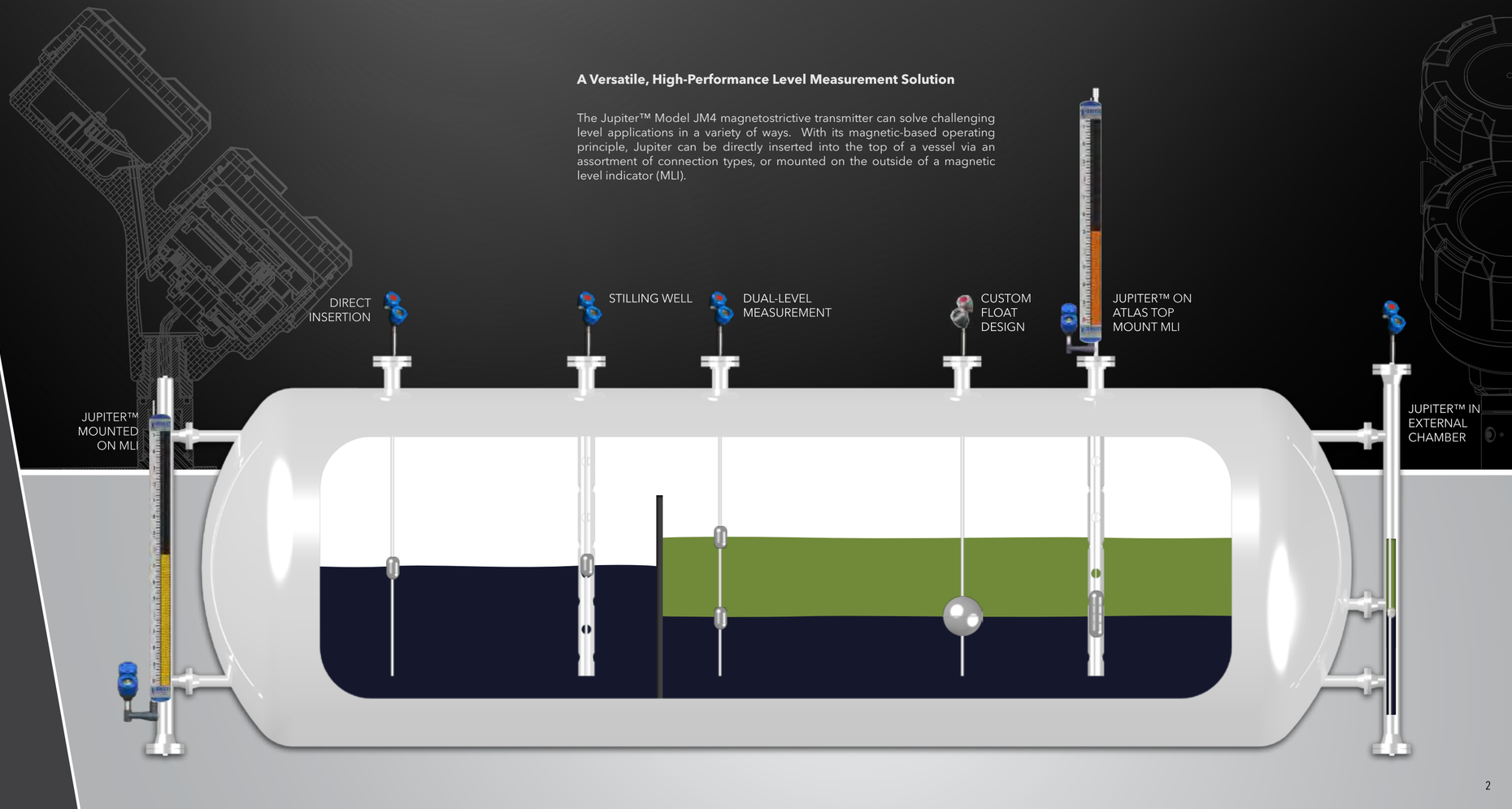
MAGNETS 2
Magnets contained within the float focus their energy toward the wire at the precise location of the liquid level.

TWIST 3
Interaction between the magnetic field, electrical pulse, and magnetostrictive wire cause a slight mechanical disturbance in the wire that travels back up the probe at the speed of sound.

PIEZOELECTRIC CRYSTALS 4
The mechanical wave is converted back into electrical energy by two piezoelectric crystals. The on-board electronics interpret the time-of-flight data and indicate the position of the float magnets.

A Versatile, High-Performance Level Measurement Solution

The Jupiter™ Model JM4 magnetostrictive transmitter can solve challenging level applications in a variety of ways. With its magnetic-based operating principle, Jupiter can be directly inserted into the top of a vessel via an assortment of connection types, or mounted on the outside of a magnetic level indicator (MLI).



HIGH ACCURACY MEASUREMENT

±0.05"
1.3mm

In an era of technologically advanced "smart" instruments, plants and operators are investing and placing more reliance in device networks which deliver reliable level measurement with a high degree of accuracy.

The Jupiter magnetostrictive level transmitter is capable of measuring with an impressive accuracy of ±0.05 inches (1.3 mm), allowing facilities tighter level tolerances, optimizing their process operations and generating greater ROI.

REMOVABLE & ROTATABLE TRANSMITTER HEAD

A first among magnetostrictive devices, Jupiter revolutionizes installation options and flexibility with a transmitter head which can rotate up to 310 degrees, drastically improving LCD visibility and access to the user interface in hard-to-reach places. In addition, a removable head minimizes installation challenges, permits interchangeability without breaching the process seal, and allows for remote transmitter placement.

FEATURES

SAFER

Jupiter possesses a comprehensive array of advanced diagnostics and real-time performance monitoring which make gathering transmitter insight faster and easier than ever before. With profound focus on SIS (Safety Instrumented Systems), Jupiter was developed with SSA (Safety Suitable Architecture), as well as memory protection hardware & software.

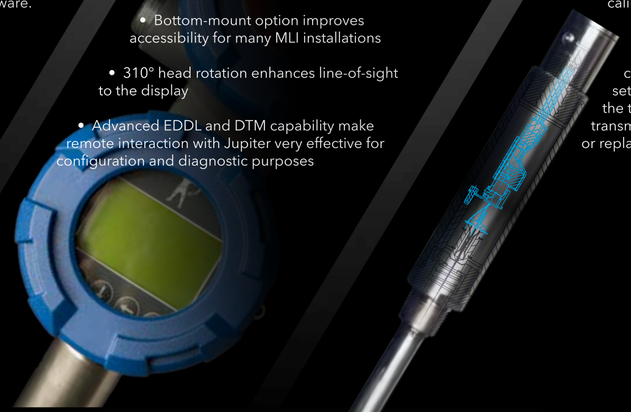
In addition, such features as non-volatile event history information, hot swappable control modules, configurable alarm delays and context sensitive help screens and parameters makes this one of the easiest transmitters on the market to work with.

SIL 2 — Safety • Integrity • Level

SIMPLER

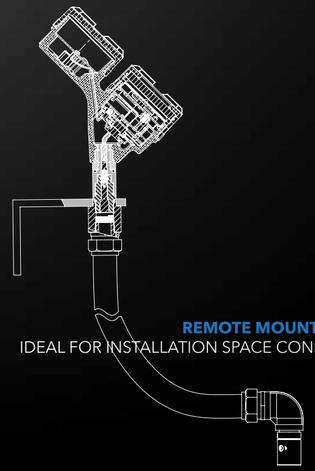
With the goal of simplifying interaction with the transmitter, Jupiter was designed with the user in mind:

- User-friendly local push-button interface allows for easier and more intuitive navigation
- Bottom-mount option improves accessibility for many MLI installations
- 310° head rotation enhances line-of-sight to the display
- Advanced EDDL and DTM capability make remote interaction with Jupiter very effective for configuration and diagnostic purposes



SMARTER

Orion introduces auto-configuration to magnetostrictive technology with Jupiter's new *Smart Probe*. When the transmitter head connects to a probe for the first time, configuration settings stored within the probe's memory are instantly transferred. In addition, parameters critical to the instrument's calibration are transferred as well, eliminating the need for Jupiter to be manually calibrated in the field. This unique capability expedites the setup process and simplifies the task of installing spare transmitter heads on existing or replacement probes.



REMOTE MOUNT OPTION
IDEAL FOR INSTALLATION SPACE CONSTRAINTS

45° ANGLED ENCLOSURE
CONVENIENT VISIBILITY & ACCESSIBILITY

BUOYANCY

A **VERSATILE SOLUTION** FOR A VARIETY OF APPLICATION CHALLENGES

Buoyancy-based technologies have been utilized in the process instrumentation world for generations and are widely considered to provide reliable, accurate level measurement in an extensive range of applications and service conditions.

Jupiter capitalizes on the benefits of buoyancy such as ease of installation, minimized configuration, ability to check calibration either by moving the float or utilizing an external magnetic field, customization of float size/shape/materials, and high pressures. With the amazing accuracy of Jupiter, cost-to-accuracy ratio exceeds virtually any other comparable technology.

Interface & Emulsions

Given the long and successful use of buoyancy based devices in the process world, the synergistic combination of Jupiter's buoyancy with 4th generation electronics is the starting point for superior performance in interface applications. With precise weighting of the float to customer specifications, emulsion layers pose no problem since the float will sink all the way to the lower liquid layer. Even mild to moderate fluctuations in media specific gravity will have limited impact on float position creating greater reliability and less chance for complete loss of signal with other strictly electronic measurements.

Foaming

Foam can be a surprising and unwelcome process condition to many applications. Unlike many other electronic level technologies, Magnetostriction, with its float-based principle, is not as vulnerable to signal loss given the known or unexpected presence of foam. Since the float is intended to operate in much denser media, the foam will not inhibit or restrict the float from finding its correct equilibrium.

Media Buildup

Many applications which are prone to increase the risk of coating and buildup can hinder the effectiveness of level measurement. Magnetostrictive floats can be sized to achieve substantial buoyancy force, overcoming the added resistance. Floats and chambers can also be coated in a variety of low-friction polymers to reduce the adhesion coefficient making certain processes and media suitable for Jupiter. In addition, given the customizable nature of magnetostrictive floats, accommodations can be made for additional safety gap margins between the float and the transmitter probe to allow for extra clearance.

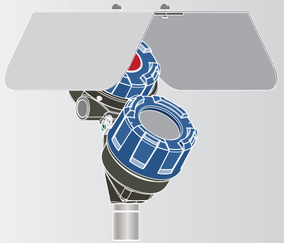
A SIMPLE, FEATURE-RICH USER INTERFACE

Jupiter™ takes the user experience to new levels of convenience and functionality with an information-rich display and an easy-to-navigate menu. With the new graphic LCD, waveforms are viewable locally at the device. You can also interface with Jupiter via a capable DCS or handheld communicator that utilize DDs/EDDL for remote connectivity.

A fully redesigned and upgraded DTM puts real-time and historical trend data at your fingertips. With a basic laptop, a HART modem, and the free-to-download program PACTware™, the transmitter can be accessed locally or from anywhere in the loop. You can also capture live waveforms, which are invaluable when configuring the transmitter for optimal performance.

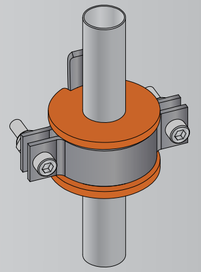
OPTIONS

Sun Shade



- Reduces glare and radiant heating of the transmitter enclosure. Also minimizes impact of direct solar radiation to the graphic liquid crystal display.

Vibration Kit



- Silicone-based damping material eliminates metal-on-metal contact between the probe and the chamber
- Increases signal stability in high vibration applications by reducing mechanical noise.

Centering Disc (direct insertion model)

- The centering disk is an invaluable aid when utilizing the Jupiter in a direct insertion environment, such as a stilling well or modular instrumentation bridle (MIB). By keeping the transmitter probe centered in the MIB, potential for impingement is mitigated.

System Design		
Measurement Principle		Magnetostriction-based mechanical response signal
Input		
Measured Variable		Level, response signal time of flight
Span		6 inches to 400 inches (15 cm to 999 cm)
Output		
Type		4 to 20 mA with HART: 3.8 mA to 20.5 mA usable (per NAMUR NE43)
		Foundation fieldbus™: H1 (ITK Ver. 6.1.1)
Resolution	Analog:	0.003 mA
	Digital Display:	1 mm
Loop Resistance		591 ohms @ 24 VDC and 22 mA
Diagnostic Alarm		Selectable: 3.6 mA, 22 mA (meets requirements of NAMUR NE 43), or HOLD last output
Damping		Adjustable 0-10 seconds
User Interface		
Keypad		4-button menu-driven data entry
Display		Graphic liquid crystal display with viewable echo curve
Digital Communication		HART Version 7–with Field Communicator, Foundation fieldbus™,
		DTM (PACT*ware*™), AMS, FDT, EDDL
Menu Languages		Transmitter LCD: English, French, German, Spanish, Russian, Portuguese
		HART DD: English, French, German, Spanish, Russian, Chinese, Portuguese
		Foundation fieldbus™ Host System: English
Power (at transmitter terminals)		HART: General Purpose (Weather proof)/Intrinsically Safe/Explosion-proof: 16 to 36 VDC
		11 VDC minimum under certain conditions (refer to IO manual section 2.5.5)
		FOUNDATION fieldbus™: FISCO 9 to 17.5 VDC
		FISCO, FNICO, Explosion Proof, General Purpose (Weather Proof): 9 to 32 VDC
Housing		
Material		IP67/die cast aluminum A413 (<0.6% copper); optional 316 stainless steel
Net/Gross Weight		Aluminum: 4.5 lbs. (2.0 kg)
		Stainless Steel: 10.0 lbs. (4.50 kg)
Overall Dimensions		Transmitter Head: H 8.34" (212 mm) x W 4.03" (102 mm) x D 7.56" (192 mm)
Cable Entry		1/2" NPT or M20
SIL 2 Hardware (Safety Integrity Level)		Safe Failure Fraction = 93.1% for Single Float version, 91.9% for Dual Float version (HART only)
		Functional Safety to SIL 2 as 1oo1 in accordance with IEC 61508
		(Full FMEDA report available upon request)

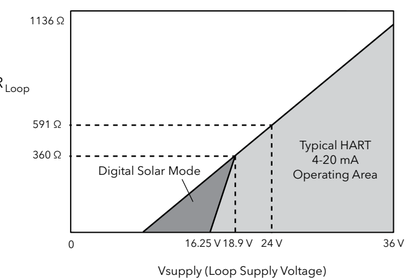
Performance	
Linearity	0.030 in. (8 mm) or 0.01% of probe length, whichever is greater
Accuracy	±0.01% full scale or ±0.05 in (1.3 mm), whichever is greater
Resolution	.014" (.4 mm)
Repeatability	±0.005% of full span or 0.014 in, whichever is greater
Response Time	1 second
Initialization Time	Less than 10 seconds
Ambient Temperature Effect	Approx. ±0.02% of probe length/degree C
Execution Time	15 msec (30 msec PID, Signal Characterizer Block)

Foundation fieldbus™	
ITK Version	6.1.1
H1 Device Class	Link Master (LAS)–selectable ON/OFF
H1 Profile Class	31PS, 32L
Function Blocks	(6) AI, (2) Transducer, (1) Resource, (1) Arithmetic, (1) Input Selector, (1) Signal Characterizer, (2) PID, (1) Integrator
Quiescent Current	15 mA
Execution Time	15 msec (30 msec PID, Signal Characterizer Block)

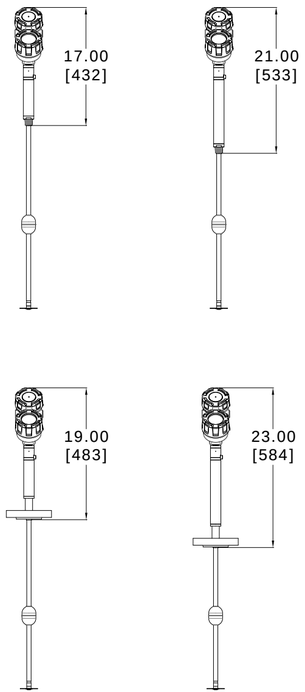
Environment		
Ambient Temperature Range	Transmitter:	-40° to +176°F (-40°C to +80°C)
	Display:	-5° to +176°F (-20°C to +80°C)
Storage Temperature		-50° to +185°F (-45°C to +85°C)
Process Pressure (Direct Insertion)		Vacuum to 3000 psig (207bar)
Humidity		0 to 99%, non-condensing
Electromagnetic Compatibility		Meets CE requirement (EN 61326) and NAMUR NE 21
Surge Protection		Meets CE EN 61326 (1000V)
Shock/Vibration		ANSI/ISA-S71.03 Class SA1 (Shock); ANSI/ISA-S71.03Class VC2 (Vibration)

PROCESS CONDITIONS		
Process Temperature	External Mount:	-320°F (-196°C) to +850°F (450°C)
	Direct Insertion:	-320°F (-196°C) to 800°F (425°C)
Process Pressure	Direct Insertion:	Vacuum to 3000 psig (207bar)

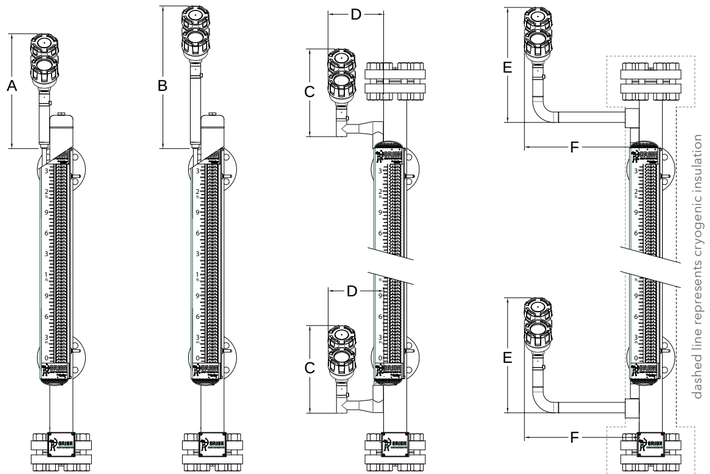
Safe Operating Area



DIRECT INSERTION



EXTERNAL MOUNT



Configuration	Dimensions inches [mm]	
Top Mount	A = 16.4 [417]	
Top Mount Hi-Temp/Cryogenic	B = 20.4 [518]	
Offset Mount	C = 8 [203]	D = 12.7 [323]
Cryogenic Offset Mount	E = 16.6 [422]	F = 16.5 [419]

J	M	4	–	5				–			
1	2	3		4	5	6	7		8	9	10

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) *approvals pending -- inquire for availability*
C	Ex n (ATEX & IEC)
D	Dust Ex (ATEX & IEC)
1	FISCO Field Device (cFMus)
3	Explosion-Proof & FNICO Field Device (cFMus)

NOTES:

[1] 3rd Party FMEDA report available
[2] Remote-mount transmitter not available with XP / Flame Proof approvals

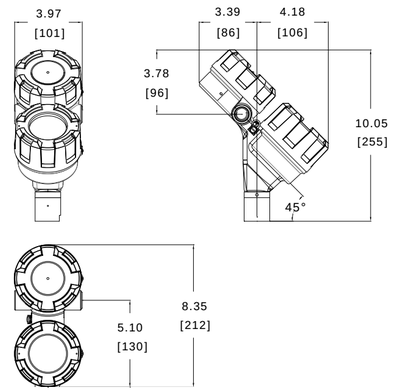
9 HOUSING

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

10 CONDUIT CONNECTION & SUNSHADE OPTION

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

Transmitter Head Dimensions Inches [mm]



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2								0		0	0			

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

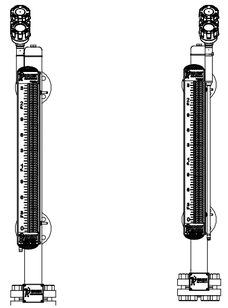
6 PROBE MATERIAL OF CONSTRUCTION

A	Powder-Coated Aluminum Sensor Enclosure with 316 SS Probe SEE NOTE1
1	316 SS Sensor Enclosure with 316 SS Probe

[1] Only available with Digit 3, Options F, H, L, M

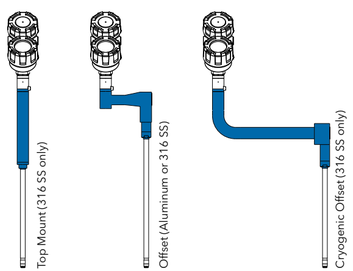
7 PROBE OPTIONS

N	None
V	Vibration-resistant probe mounting



Left side mount (standard)

Right side mount



Sensor Enclosures (shaded) refer to Model Code digit 6

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
2								0		0	0			

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	2 1/2" 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	3/4" (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	2 1/2" 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	3/4" (for Atlas Top Mount Configuration only)
0	None. No mounting clamps required.

9 UNUSED

0	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

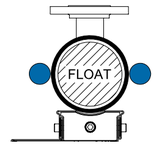
11,12 UNUSED

00	None

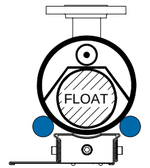
13-15 PROBE LENGTH

Specify required insertion length. See right.	
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)

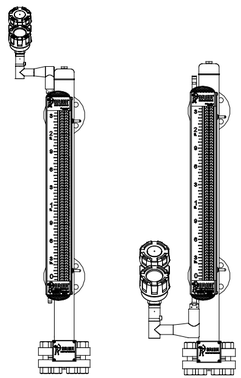


Probe mounting positions on Atlas™, Vector™, and Gemini™ Magnetic Level Indicators



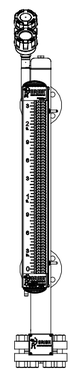
Probe mounting positions on Aurora® MLI

Probe proximity to the float is critical



Top/Bottom Mount Offset Configuration

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



Top Mount Configuration

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

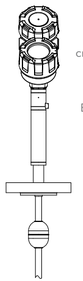
2						N								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

2 MEASUREMENT SYSTEM

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

3 CONFIGURATION

1	Standard *suitable for process temperatures between -40° F to +500° F (-40° C to +260° C)*
2	High-Temperature *suitable for process temperatures between +501° F to +800° F (+261° C to +425° C)*
8	Cryogenic *suitable for process temperatures between -320° F to +150° F (-196° C to +66° C)*

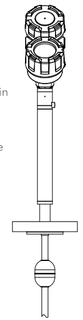


Standard

Probes designed for high-temp and cryogenic process temperatures contain an extended neck to reduce thermal stress on critical probe components.

Be aware of overhead clearance at the desired installation location.

Dimensions can be found on page 9



High-Temp & Cryogenic Models

4&**5** PROCESS CONNECTION SIZE & TYPE (Select from below)

THREADED (MALE)

11	3/4" NPT
41	2" NPT

22	1" BSP
42	2" BSP

ANSI FLANGES

43	2" 150# Raised Face
44	2" 300# Raised Face
45	2" 600# Raised Face
47	2" 900/1500# Raised Face

53	3" 150# Raised Face
54	3" 300# Raised Face
55	3" 600# Raised Face
56	3" 900# Raised Face
57	3" 1500# Raised Face

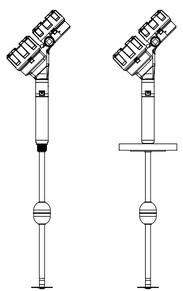
63	4" 150# Raised Face
64	4" 300# Raised Face
65	4" 600# Raised Face
66	4" 900# Raised Face
67	4" 1500# Raised Face

EN 1092-1 FLANGES

CB	DN 40 : PN 16/25/40 Type A
CC	DN 40 : PN 63/100 Type B2
DA	DN 50 : PN 16 Type A
DB	DN 50 : PN 25/40 Type A
DD	DN 50 : PN 63 Type B2
DE	DN 50 : PN 100 Type B2

EA	DN 80 : PN 16 Type A
EB	DN 80 : PN 25/40 Type A
ED	DN 80 : PN 63 Type B2
EE	DN 80 : PN 100 Type B2

FA	DN 100 : PN 16 Type A
FB	DN 100 : PN 25/40 Type A
FD	DN 100 : PN 63 Type B2
FE	DN 100 : PN 100 Type B2
FF	DN 100 : PN 160 Type B2
FG	DN 100 : PN 250 Type B2



Threaded Flanged

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

6 MATERIAL OF CONSTRUCTION wetted materials only

A	316 SS
B	Hastelloy® C276
C	Monel® 400
L	316 SS w/Teflon®-S coating on probe tubing and float
P	316 SS w/PFA coating on probe tubing and float

7 UNUSED

N	None

8 INSTALLATION CONSIDERATIONS

N	Direct Insertion unit mounted in vessel without stilling well.
C	Direct Insertion unit mounted in chamber, bridle, or stilling well.

9 CONSTRUCTION CODE

0	Industrial Grade
K	ASME B31.1
L	ASME B31.3
M	ASME B31.3 & NACE MR0103/MR0175
N	Industrial Grade & NACE MR0103/MR0175

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

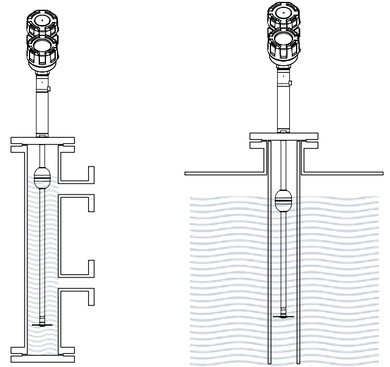
11&**12** MAGNETIC FLOAT(S)

See next page for our standard direct insertion float offerings. If a listed float does not meet your application requirements, consult factory for a custom design.

13-15 PROBE LENGTH

XXX	Specify required insertion length. See figures to the right.
	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)



Units mounted in stilling wells or chambers are provided with centering discs at the base of the probe

Direct Insertion Total Level Float (uppermost liquid layer)

Minimum Liquid Specific Gravity	316/316L SS	Titanium	Hastelloy® C	Hygienic Service 316/316L SS SF1: 20 µin (0.51 µm)	Hygienic Service 316/316L SS SF4: 15 µin (0.38 µm)
≥ 0.86	**AA** 2.0" (51 mm) dia.	**BA** 2.0" (51 mm) dia.	**CA** 1.85" (47 mm) dia.	**DA** 2.0" (51 mm) dia.	**FA** 2.0" (51 mm) dia.
≥ 0.83	**AA** 2.0" (51 mm) dia.	**BA** 2.0" (51 mm) dia.	**CB** 2.25" (57 mm) dia.	**DA** 2.0" (51 mm) dia.	**FA** 2.0" (51 mm) dia.
≥ 0.7	**AB** 2.3" (58 mm) dia.	**BA** 2.0" (51 mm) dia.	**CB** 2.25" (57 mm) dia.	**DB** 2.3" (58 mm) dia.	**FB** 2.3" (58 mm) dia.
≥ 0.68	**AB** 2.3" (58 mm) dia.	**BB** 2.25" (57 mm) dia.	**99** consult factory	**DB** 2.3" (58 mm) dia.	**FB** 2.3" (58 mm) dia.
≥ 0.64	**AC** 2.5" (64 mm) dia.	**BB** 2.25" (57 mm) dia.	**99** consult factory	**DC** 2.5" (64 mm) dia.	**FC** 2.5" (64 mm) dia.
≥ 0.52	**99** consult factory dia.	**BB** 2.25"(57 mm) dia.	**99** consult factory	**99** consult factory dia.	**99** consult factory dia.
< 0.52	**99** consult factory	**99** consult factory	**99** consult factory	**99** consult factory	**99** consult factory

Direct Insertion Interface Level Float (lower or middle liquid layer)

Minimum Liquid Specific Gravities upper / lower	316/316L SS	Titanium	Hastelloy® C	Hygienic Service 316/316L SS SF1: 20 µin (0.51 µin)	Hygienic Service 316/316L SS SF4: 15 µin (0.38 µin)
sinks thru ≤ 0.89 / **floats on** ≥ 1.00	**MA** 2.0" (51 mm) dia.	**NA** 2.0" (51 mm) dia.	**PA** 1.85" (47 mm) dia.	**QA** 2.0" (51 mm) dia.	**RA** 2.0" (51 mm) dia.
sinks thru ≤ 1.00 / **floats on** ≥ 1.12	**MB** 2.0" (51 mm) dia.	**NB** 2.0" (51 mm) dia.	**PB** 1.85" (47 mm) dia.	**QB** 2.0" (51 mm) dia.	**RB** 2.0" (51 mm) dia.

Two Floats for Total Level and Interface Measurement

Code	Total	Interface
11	AA	MA
12	AB	
13	AC	
21	AA	MB
22	AB	
23	AC	
31	BA	NA

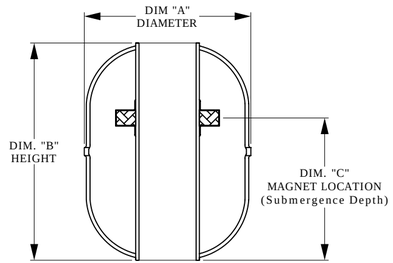
Code	Total	Interface
32	BB	NA
41	BA	NB
42	BB	
51	CA	PA
52	CB	
61	CA	PB
62	CB	

When utilizing two floats to measure total and interface liquid levels, reference the chart on the left to determine the appropriate float code to insert into the Jupiter model number.

If the desired combination is not shown, consult your local sales representative or Orion to inquire about a custom float deisgn.

Float Dimensions

Float Code	Dim. A in. (mm)	Dim. B in. (mm)	Dim. C in. (mm)
AA,DA,FA	2.0 (51)	2.7 (69)	1.84 (47)
AB,DB,FB	2.3 (58)	3.0 (76)	2.0 (51)
AC,DC,FC	2.5 (64)	3.0 (76)	2.14 (54)
BA	2.0 (51)	2.8 (71)	1.98 (50)
BB	2.25 (57)	3.0 (76)	2.08 (53)
CA	1.85 (47)	3.0 (76)	2.06 (52)
CB	2.25 (57)	4.3 (109)	3.01 (76)
MA,QA,RA	2.0 (51)	2.7 (69)	1.35 (34)
MB,QB,RB	2.0 (51)	2.7 (69)	1.35 (34)
NA	2.0 (51)	2.8 (71)	1.4 (36)
NB	2.0 (51)	2.8 (71)	1.4 (36)
PA	1.85 (47)	3.0 (76)	1.5 (38)
PB	1.85 (47)	3.0 (76)	1.5 (38)



Reference the chart below to identify an appropriate chamber or stilling well size for your application. Adequate clearance is recommended to ensure proper float operation.

Sizing Chart for Chambers & Stilling Wells

Float Diameter inches (mm)	Probe Lengths ≤ 144 inches (366 cm)						Probe Lengths > 144 in (366 cm)	
	3" sch. 5/10	3" sch. 40	4" sch. 5/10	4" sch. 40	4" sch. 80	4" sch. 160	4" sch. 10	4" sch. 40
1.85 (47)	•	•	•	•	•	•	•	•
2 (51)	•		•	•	•	•	•	•
2.3 (58)			•	•	•		•	
2.5 (64)			•	•				
3 (76)								

Temp °F (°C)	Pressure Rating (includes 1.5x safety factor) psig (bar)				
	AA, AB, AC, MA, MB DA, DB, DC, QA, QB FA, FB, FC, RA, RB	BA, NA, NB	BB	CA, PA, PB	CB
70 (20)	440 (30.3)	750 (51.7)	400 (27.6)	340 (23.4)	320 (22.1)
100 (40)	440 (30.3)	709 (48.9)	378 (26.1)	340 (23.4)	320 (22.1)
200 (95)	440 (30.3)	559 (38.5)	298 (20.6)	340 (23.4)	320 (22.1)
250 (120)	427 (29.4)	494 (34.0)	263 (18.2)	340 (23.4)	320 (22.1)
300 (150)	411 (28.4)	437 (30.1)	233 (16.1)	340 (23.4)	320 (22.1)
350 (175)	433 (29.9)	386 (26.6)	206 (14.2)	340 (23.4)	320 (22.1)
400 (200)	427 (29.4)	341 (23.5)	182 (12.6)	340 (23.4)	320 (22.1)
450 (230)	411 (28.4)	303 (20.9)	162 (11.1)	337 (23.2)	318 (21.9)
500 (260)	396 (27.3)	273 (18.8)	146 (10.0)	335 (23.1)	315 (21.7)
550 (290)	385 (26.5)	250 (17.2)	133 (9.2)	326 (22.5)	306 (21.1)
600 (315)	374 (25.8)	232 (16.0)	124 (8.5)	316 (21.8)	298 (20.5)
650 (345)	367 (25.3)	217 (14.9)	116 (8.0)	308 (21.2)	289 (19.9)
700 (370)	361 (24.9)	205 (14.1)	109 (7.5)	299 (20.6)	281 (19.4)
750 (400)	356 (24.6)	192 (13.2)	102 (7.1)	296 (20.4)	278 (19.2)
800 (425)	352 (24.3)	177 (12.2)	94 (6.5)	293 (20.2)	276 (19.0)

Agency	Protection Method	Area Classification
FM APPROVED	Explosion Proof	Class I, Div 1, Group B, C and D, T4 Ta = -40°C to +70°C Type 4X, IP67
	Intrinsically Safe	Class I, II, III, Div 1, Group A, B, C, D, E, F, G, T4 Class I, Zone 0 AEx ia IIC T4 Ga Class I, Zone 0 Ex ia IIC T4 Ga Ta =-40°C to + 70°C Type 4X, IP67
	Non-Incendive	U.S.: Class I, II, III, Division 2, Group A, B, C, D, E, F, G, T4, Ta = -40°C to 70°C CANADA: Class I, Division 2, Group A,B,C,D T4, Ta = -40°C to 70°C Class I, Zone 2 AEx nA IIC T4 Gc Ta = -15°C to 70°C Class I, Zone 2 Ex nA IIC T4 Gc Ta = -15°C to +70°C Type 4X, IP67
	Dust Ignition Proof	Class II, III, Division 1, Group E, F and G, T4 Ta = -40°C to +70°C Type 4X, IP67
ATEX	Flame Proof	*Pending -- inquire for availability*
	Intrinsically Safe	II 1 G Ex ia IIC T4 Ga Ta = -40°C to +70°C IP67
	Non Sparking	II 3 G Ex nA IIC T4 Gc Ta = -15°C to +70°C IP67
	Dust Ignition Proof	II 2 D Ex tb IIIC T85°C … T120°C Db Ta = -15°C to +70°C IP67
IECEx	Flame Proof	*Pending -- inquire for availability*
	Intrinsically Safe	Ex ia IIC T4 Ga Ta = -40°C to +70°C IP67
	Non Sparking	Ex nA IIC T4 Gc Ta = -15°C to + 70°C IP67
	Dust Ignition Proof	Ex tb IIIC Db T85°C … T120°C Db Ta = -15°C to +70°C IP67

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

THE FOLLOWING APPROVAL STANDARDS ARE APPLICABLE:

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

SPECIAL CONDITIONS FOR SAFE USE:

1. The enclosure contains aluminum and is considered to present a potential risk of ignition by impact or friction. Care must be taken during installation and use to prevent impact or friction. **2.** To maintain the T4 temperature code care shall be taken to ensure the enclosure temperature does not exceed 70°C. **3.** The risk of electrostatic discharge shall be minimized at installation, following the direction given in the instruction. **4.** For Installation with ambient temperature of 70°C, refer to the manufacturer's instructions for guidance on proper selection of conductors. **5.** Provisions shall be made to provide transient overvoltage protection to a level not to exceed 119Vdc. **6.** WARNING – Explosion Hazard do not disconnect equipment when flammable or combustible atmosphere is present **7.** When equipment is used in explosive dust atmospheres, the end user shall take precautions so that the thermal effects of the process temperature shall limit the equipment enclosure and probe surface temperatures to not exceed the required installation location temperature and shall be between T85°C and T120°C.

NOTES:

1. For Explosion proof installations the I.S. ground terminal shall be connected to appropriate intrinsically safe ground in accordance with the Canadian Electrical code (CEC) or the national electrical code (NEC). For intrinsically safe installations the I.S. ground terminal does not require grounding. **2.** Manufacturer's installation instructions supplied with the protective barrier and the CEC or the NEC must be followed when installing this equipment. Barrier must be certified for Canadian & U.S. installation. **3.** Control equipment connected to protective barriers must not use or generate more than 250 VDC or VRMS. **4.** Agency approved dust tight seals must be used when transmitter is installed in Class II & III environments. **5.** For supply connections, use wire suitable for the operating temperature. **6.** Agency approved barriers with linear output characteristics must be used.

ORION®
INSTRUMENTS
A Magnetrol Company

2105 Oak Villa Blvd. | Baton Rouge, LA 70815
office 225.906.2343 | fax 225.906.2344 | info@orioninstrumentsinstruments.com

www.orioninstruments.com

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