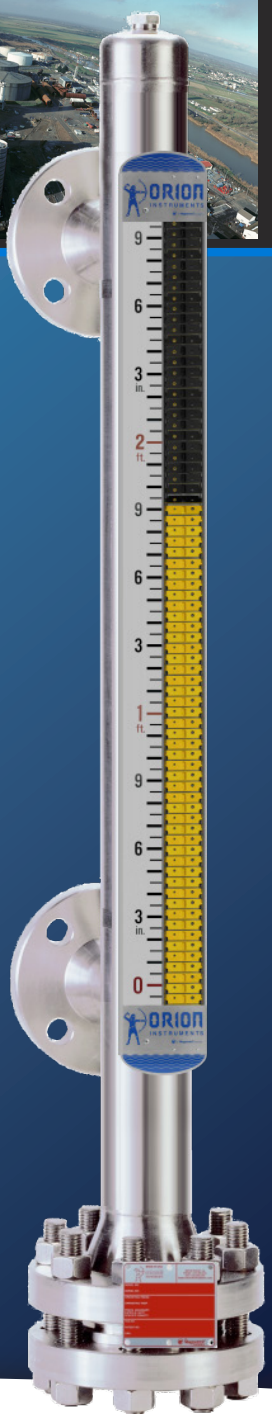
Atlas™

MAGNETIC LEVEL INDICATOR

ORION® INSTRUMENTS
A Magnetrol® Company



Magnetrol®

Worldwide Level and Flow Solutions℠

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 vapour 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 choices 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.

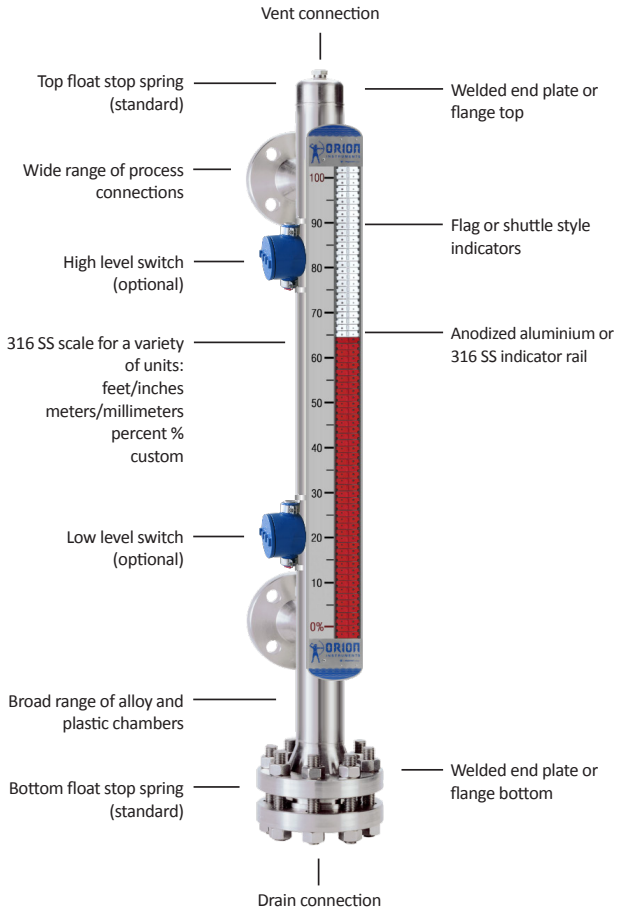
ATLAS can be equipped with a variety of level transmitters and switches as well as flag and shuttle indicators with or without stainless steel scales. This enables the ATLAS to be a complete level and monitoring control.

FEATURES

- Numerous chamber styles (or configurations) are available for each design. Consult factory for choices 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.
- Flag or shuttle type indicator with stainless steel scale to measure height or percentage of level.
- 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

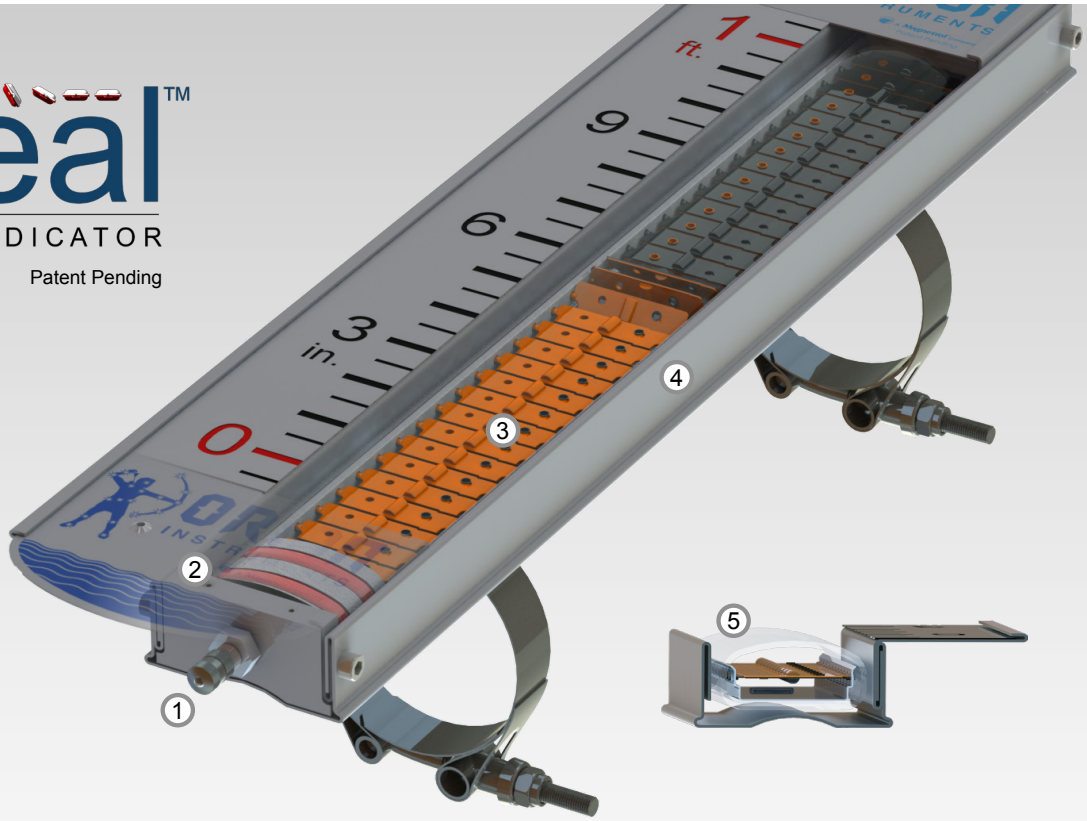


Top mount ATLAS
(consult factory)

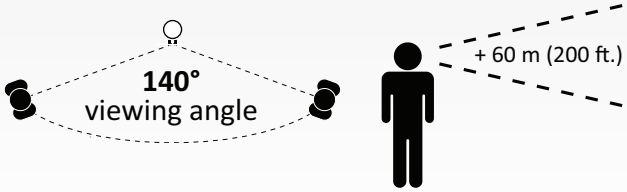
reveal™

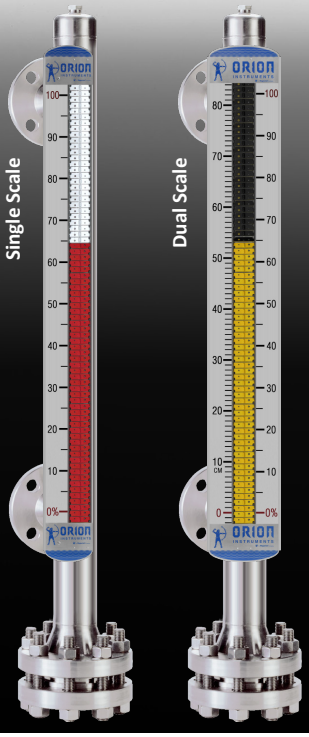
WIDE VIEW INDICATOR

Patent Pending



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



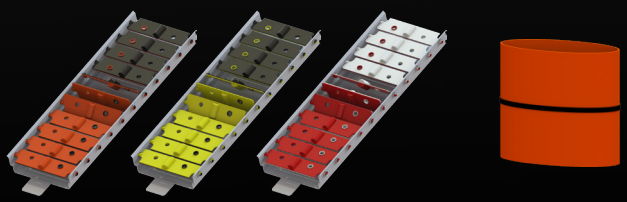


Scale Options:

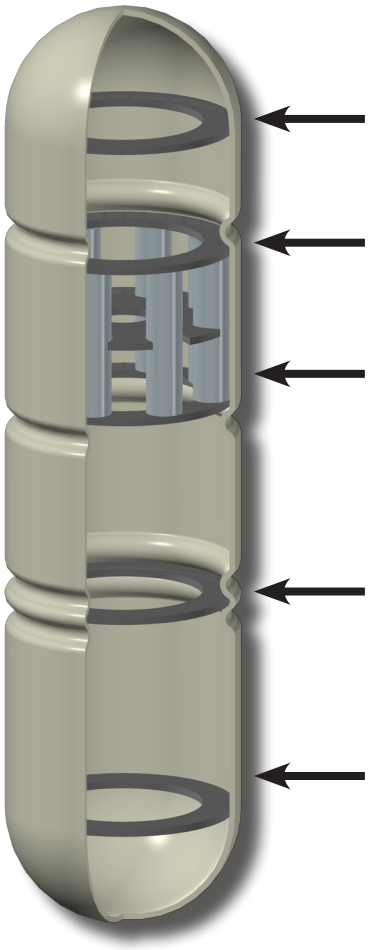
- Feet/Inches
- Meters/Millimeters
- Running Inches
- Percent (5 % increments)

REVEAL™ indicators incorporate a *positive-stop* design which limits the rotation of each flag to a half-turn. This eliminates "overflipping" which is commonly seen on other indicator designs.

Each flag contains a high-strength magnet



Standard flag and shuttle offering. Custom colours 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 310 bar (4500 psig)①.
- Process temperatures up to 540 °C (1000 °F)①.
- Total level specific gravities as low as 0,25①.
- 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.

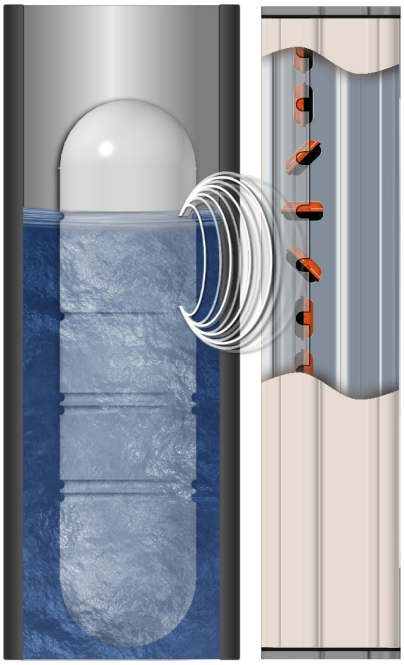
OPTIONS

- Teflon-S® PTFE and PFA slip-assistant coating.
- Halar® ECTFE coating for abrasion and chemical resistance.
- Float retrieval hook.
- Float immersion curve: If the liquid density changes, a float curve will reveal the offset.

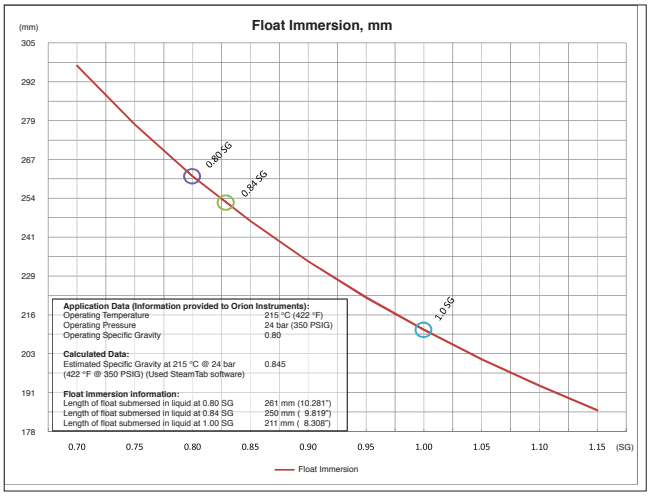
ORION FLOAT TECHNOLOGY

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.

Our 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.



Example: Float immersion curve

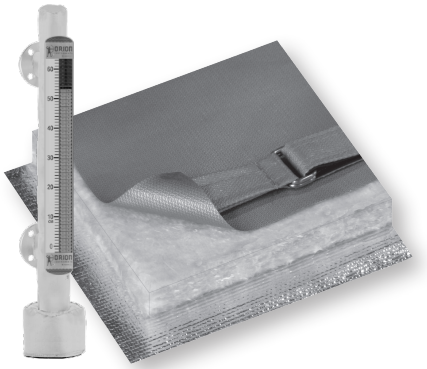
① Maximum capabilities can vary depending on combination of pressure, temperature and specific gravity.

MAGNETIC LEVEL INDICATOR SPECIFICATIONS

Design	Single chamber
Materials of construction – Chamber	Metal alloys and plastics/composites: see selection table digit 5
– Rail & window	Aluminium rail with polycarbonate or glass window,
	316 stainless steel (reveal™) rail with polycarbonate window
– Float	316 stainless steel and titanium (exotic alloys available); varies depending on process conditions
Construction grade	Industrial PED (metallic) or non-PED (plastic)
Construction options	Standard, ASME B31.1, ASME B31.3 and NACE
Approvals	Industrial PED units: ATEX II 1 G c T6 (non-electrical equipment)
Certified material test report (CMTR)	Available upon request
Pressure class ratings	ANSI 150#, 300#, 600#, 900#, 1500#, 2500#
	EN PN16, PN25, PN40, PN63, PN100, PN160, PN250, PN320
Process connection sizes	1/2" to 6"
	DN 15 to DN 150
Process connection types	Flanged, threaded, butt weld, ...
Measuring range	30 cm to 1524 cm (12" to 600")
Temperature range	-196 °C to +540 °C (-320 °F to +1000 °F)
Pressure range	Full vacuum to 310 bar (4500 psi)
Specific gravity range	Min 0,25
Visual Indicators	Magnetically actuated flag assembly in contrasting orange/black, yellow/black,
	red/white colours, or high visibility shuttle follower (custom colours available)
REVEAL™ flag assembly seal	Inert gas filled and sealed with double O-ring & InstaSeal™ valve
REVEAL™ visual indicator	Visible from 60 m (200')
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 2xx Jupiter magnetostrictive transmitter (refer to Magnetrol bulletin: BE 46-148)
	Analog reed chain transmitter
High temperature options	Electric or steam tracing with or without special high temperature insulation
High temperature insulation	Fibreglass material
Low temperature options	Cryogenic insulation with special polymeric frost extension

HIGH-TEMPERATURE INSULATION

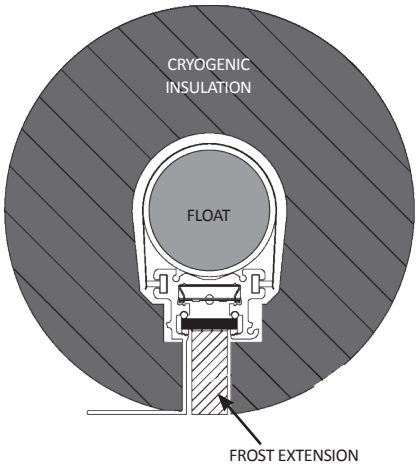
Orion specializes in custom fibreglass insulation blankets for MLIs of all shapes and sizes. They are constructed with high-quality materials capable of constant contact with temperatures up to 540 °C (1000 °F). This insulation is available as personnel protection or with heat tracing options for freeze protection or process temperature maintenance.



CRYOGENIC INSULATION & FROST EXTENSION

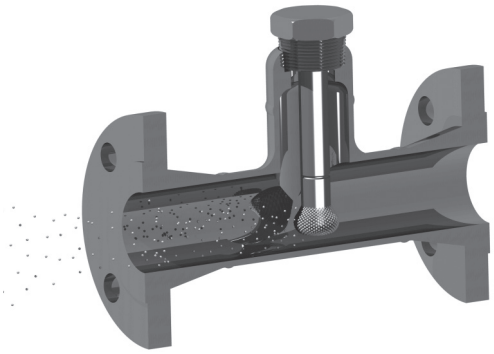
To facilitate operation where the product is kept cold via chillers, refrigerants, and condensers, cryogenic insulation is provided. By insulating the MLI with a specialized cryogenic jacket, process temperatures can be maintained in the liquid state down to -196 °C (-320 °F).

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

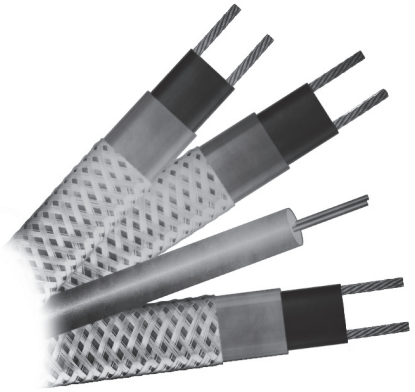
Magnetic particle traps, or magtraps, provide protection for our line of magnetic level indicators. Particles composed mostly of ferrite, often from carbon steel piping, are widespread throughout process piping. These particles enter the MLI via the process connections during normal fill and drain operations.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



HEAT TRACING: ELECTRIC & STEAM

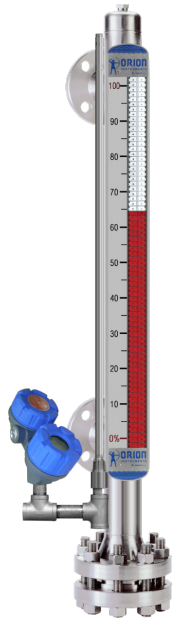
For applications where process freeze protection or temperature maintenance is required, heat tracing will allow the MLI to operate uninterrupted throughout harsh, cold conditions.

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



JUPITER TRANSMITTER SPECIFICATIONS

Refer to bulletin BE 46-148



Jupiter™
on Atlas™

OCT REED CHAIN TRANSMITTER SPECIFICATIONS

Measuring range	30 cm to 500 cm (12" to 197")
Resolution	± 13 mm (0.50")
Repeatability	< 6 mm (0.25")
Non-linearity	<0.4% full span averaged over span
Upper dead zone	100 mm (4")
Lower dead zone	100 mm (4")
Supply voltage	12 to 36 V DC
Output	4 - 20 mA
Housing material	IP66 / Cast aluminium or 316 stainless steel
Approvals	FM①/CSA explosion proof: Class I, Div. 1, Groups B, C & D Class I, Div. 2, Groups A, B, C & D Class II, Groups E, F & G Class III, Type 4X
Process temperature	-40 °C to +220 °C (-40 °F to +425 °F)
Ambient temperature at electronics	-40 °C to +70 °C (-40 °F to +158 °F)
Mounting arrangement:	External mount probe with integral top or bottom mounted electronics

OCT
on Atlas™

① FM approval limited to 300 cm (118") length

OES ELECTRIC SWITCH SPECIFICATIONS

Description	DPDT magnetically actuated, bi-stable cam operated snap action switch
Supply voltage	250 V AC / 24 V DC max
Contact rating	10 A
Maximum dead band	± 20 mm (0.75") float travel
Temperature range	-50 °C to +200 °C (-58 °F to +392 °F)
Housing material	IP 65 / Cast aluminium or 316 stainless steel
Approvals	FM/CSA explosion proof: Class I, Div. 1, Groups B, C & D Class I, Div. 2, Groups B, C & D Class I, Div. 2, Groups A, B, C & D (FM only) Class II, Groups E, F & G Class III, Type 4X

OES as a high level switch

OES as a low level switch

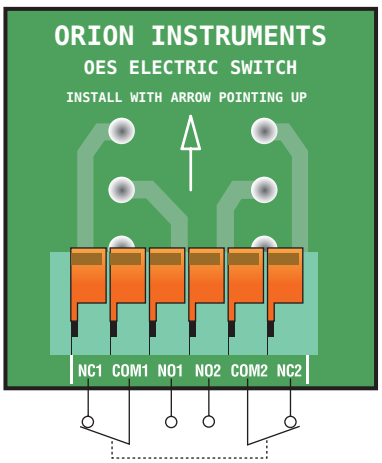
OES

MOUNTING TO ATLAS

Position the OES switch on the MLI body so that the centerline of the switch housing is at the desired switch point level. Unscrew 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

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

ORS ELECTRIC SWITCH SPECIFICATIONS

Description	Hermetically sealed bi-stable SPDT reed switch
Supply voltage	250 V AC / 150 V DC max
Contact rating	1 A
Maximum dead band	± 13 mm (0.50") float travel
Temperature range	-50 °C to +165 °C (-58 °F to +325 °F)
Housing material	IP 66 / Cast aluminium or 316 stainless steel
Approvals	ATEX II 2 G Ex d IIC T6 Gb, flameproof enclosure IEC Ex d IIC T6 Gb, flameproof enclosure FM/CSA explosion proof: Class I, Div. 1, Groups B, C & D Class I, Div. 2, Groups A, B, C & D Class II, Groups E, F & G Class III, Type 4X

ORS as a high level switch

ORS as a low level switch

ORS

MOUNTING TO ATLAS

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

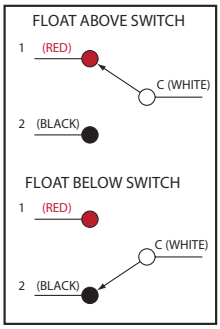
The switch leads are colour coded as follows:

white = common

black = normally closed (float below switch)

red = normally open

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



EXPEDITE SHIP PLAN (ESP)

Several models are available for quick shipment, within max. 4 weeks after factory receipt of purchase order, through the Expedite Ship Plan (ESP).

Models covered by ESP service are conveniently colour coded in the selection data charts.

To take advantage of ESP, simply match the colour coded model number codes (standard dimensions apply).

ESP service may not apply to orders of five units or more. Contact your local representative for lead times on larger volume orders, as well as other products and options.

Model: 1 M
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

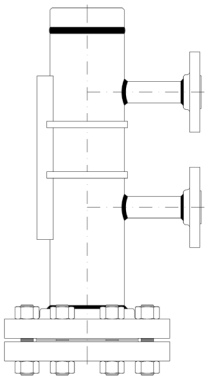
1	Atlas™ Magnetic Level Indicator

2 UNIT OF MEASUREMENT

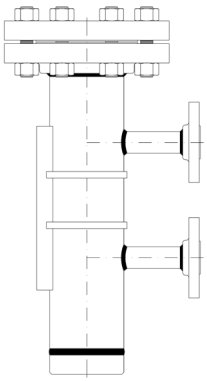
M	Metric (cm)

3 MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION

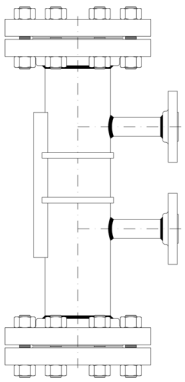
Connection orientation		Chamber top	Chamber bottom
1	Side / Side	Welded end plate	Flange
2	Side / Side	Flange	Welded end plate
3	Side / Side	Flange	Flange
5	Top / Bottom	Flange	Flange
7	Top / Side	Welded end plate with process connection	Flange
9	Side / Bottom	Flange	Welded end plate with process connection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



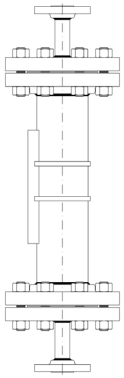
Option 1



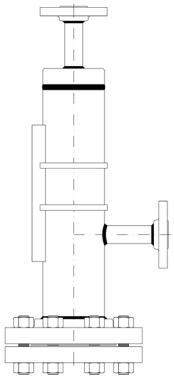
Option 2



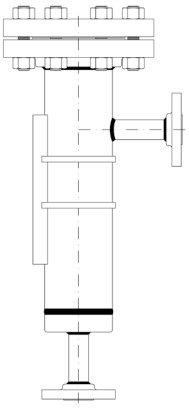
Option 3



Option 5

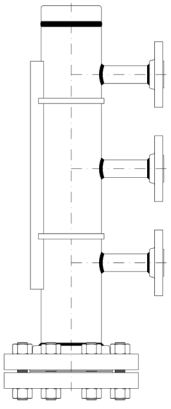


Option 7

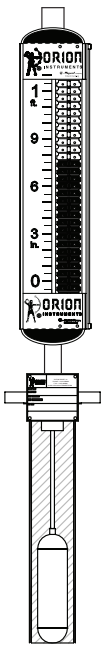


Option 9

Option T



Option 1 with 3 process connections
(consult factory)



Option T with stilling well
(consult factory)

Model: [ ] [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]
Digit:
X = product with a specific customer requirement

4 CHAMBER/FLANGE RATING

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

EN (DIN)	
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
J	904L stainless steel
N	Titanium
P	Monel®
Q	Hastelloy C-276
S	Inconel® 625
T	Incoloy® 825
U	254 SMO

Plastic	
1	PVC
2	CPVC
3	Kynar
4	Polypropylene

6 CONSTRUCTION GRADE

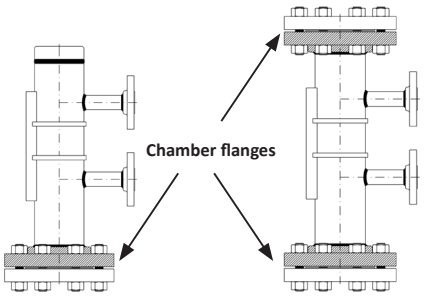
Metallic construction (digit 5 ≠ 1, 2, 3 and 4) – PED	
A	Industrial PED
B	ASME B31.1
C	ASME B31.3
D	NACE MR0175/MR0103
E	ASME B31.3 & NACE MR0175/MR0103

Plastic construction (digit 5 = 1, 2, 3 or 4) – Non-PED	
1	Industrial non-PED

7 CHAMBER FLANGE(S) TYPE

ANSI B16.5 flanges	
A	RF slip-on (standard for digit 4 = A, B, C)
B	RF weld neck
J	RJ weld neck (standard for digit 4 = D, E, F)

EN (DIN) flanges	
8	Weld neck (Type 11) EN 1092-1 Type B1 (standard for digit 4 = 1, 2, 3)
7	Weld neck (Type 11) EN 1092-1 Type B2 (standard for digit 4 = 4, 5, 6, 7, 8)
6	Weld neck (Type 11) EN 1092-1 Type A



Plastic flanges	
P	Full face socket flange (for plastic units only)

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

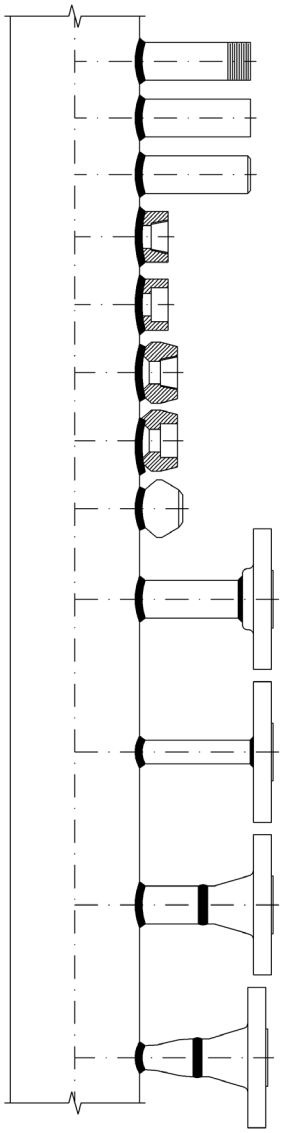
8 PROCESS CONNECTION TYPE

ANSI	
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
A	RF slip-on flange ③
B	RF weld neck flange
J	RJ weld neck flange

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

Plastic	
1	Van Stone socket flange (2-piece, for PVC/CPVC units only)
2	Full face socket flange (for plastic units only)

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).



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)

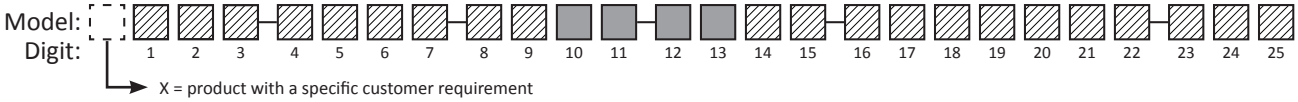
Weld neck flange, option B, J, 8, 7, 6 (process connection size < chamber size)

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

9 PROCESS CONNECTION SIZE

ANSI	
A	1/2"
B	3/4"
C	1"
D	1 1/2"
E	2"
F	2 1/2"
G	3"
H	4"
J	6"

EN (DIN)	
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 fibre ring ①	
B	Spiral wound with graphite filler ②	
D	RJ oval ring ③④	
E	RJ octagonal ring ④	
F	Virgin PTFE ring	-95 °C to +230 °C (-140 °F to +450 °F)

N	None

	Gaskets for plastic flanges	
P	EPDM rubber	-40 °C to +95 °C (-40 °F to +200 °F)
Q	Neoprene rubber	-50 °C to +120 °C (-60 °F to +250 °F)
R	Buna-N / Nitrile rubber	-50 °C to +120 °C (-60 °F to +250 °F)
S	ePTFE soft ring (expanded)	-95 °C to +230 °C (-140 °F to +450 °F)
T	Viton®	-25 °C to +150 °C (-15 °F to +300 °F)

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	
E	316 stainless steel class 2	A-193 Gr B8M class 2 / A-194 Gr 8M
F	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

	Carbon steel	
S	Carbon steel with zinc plating	A-193 Gr B7 / A-194 Gr 2H
T	Carbon steel with zinc plating + NACE	A-193 Gr B7M / A-194 Gr 2HM
M	Carbon steel ①	A-193 Gr B7 / A-194 Gr 2H
P	Carbon steel + NACE ①	A-193 Gr B7M / A-194 Gr 2HM

N	None

① Only available in combination with digit 5 = B or D.

12 VENT 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

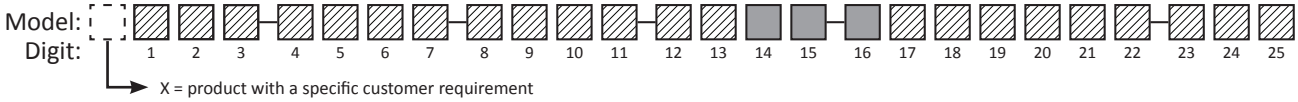
13 VENT TYPE

N	None

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

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

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

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

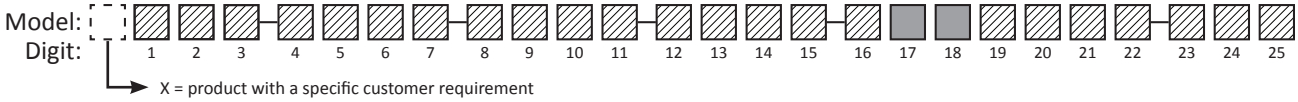
Switch only (no transmitter)	
Y	OES or ORS switch(es) clamp mounted to chamber
Z	OES or ORS switch(es) attached to switch mount rod

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. 190 °C (375 °F) 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
Top mount offset, with or without high temperature bend	B	M
Bottom mount offset, with or without high temperature bend	C	P

① Only available in combination with digit 3 = 1 and digit 13 = N or 1.
② Jupiter: max. 190 °C (375 °F) with insulation (digit 17 = K).
③ Jupiter: max. 190 °C (375 °F) with insulation (digit 17 = A, C).



17 INSULATION OPTIONS

N	None	Indicator: max. 190 °C (375 °F) OES switch: refer to the switch selection data ORS switch: refer to the switch selection data	OCT transmitter: max. 70 °C (160 °F) Jupiter transmitter: max. 120 °C (250 °F)

Insulation pad for indicator and/or transmitter			
E	Indicator only	digit 16 = N, Y	190 °C (375 °F) < T ≤ 260 °C (500 °F)
F	Indicator only	digit 16 = N	260 °C (500 °F) < T ≤ 400 °C (750 °F)
G	Indicator only	digit 16 = N	400 °C (750 °F) < T ≤ 450 °C (850 °F)

T	OCT transmitter only	digit 16 = 8, 9	70 °C (160 °F) < T ≤ 190 °C (375 °F)
W	Indicator & OCT transmitter	digit 16 = 8, 9	190 °C (375 °F) < T ≤ 220 °C (425 °F)

K	Jupiter only ①	digit 16 = 1, 2, 3, A, B, C	120 °C (250 °F) < T ≤ 190 °C (375 °F)
M	Indicator & Jupiter ②	digit 16 = 2, 3, B, C	190 °C (375 °F) < T ≤ 260 °C (500 °F)
R	Indicator & Jupiter ②	digit 16 = 2, 3	260 °C (500 °F) < T ≤ 315 °C (600 °F)
V	Indicator & Jupiter ②	digit 16 = 2, 3	315 °C (600 °F) < T ≤ 450 °C (850 °F)

Insulation blanket for personnel protection		
A	Chamber pipe only	T ≤ 260 °C (500 °F)
B	Chamber pipe only	260 °C (500 °F) < T ≤ 450 °C (850 °F)
C	Chamber and flanges	T ≤ 260 °C (500 °F)
D	Chamber and flanges	260 °C (500 °F) < T ≤ 450 °C (850 °F)

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 -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	includes insulation blanket
S	Steam tracing (3/8" tubing)	includes insulation blanket
J	Steam jacket (1/2" NPT inlet/outlet)	

18 MEASUREMENT TYPE & INDICATION STYLE

Total level		
1	Orange / black metal flags	T ≤ 315 °C (600 °F)
2	Yellow / black metal flags	T ≤ 315 °C (600 °F)
3	Red / white metal flags (standard)	T ≤ 315 °C (600 °F)
4	Red / silver metal flags	

A	Orange / black metal flags with yellow float diagnostics ①	T ≤ 315 °C (600 °F)
B	Yellow / black metal flags with orange float diagnostics ①	T ≤ 315 °C (600 °F)
C	Red / white metal flags with yellow float diagnostics ①	T ≤ 315 °C (600 °F)
D	Red / silver metal flags with black float diagnostics ①	

S	Fluorescent orange shuttle / follower ②	T ≤ 315 °C (600 °F)

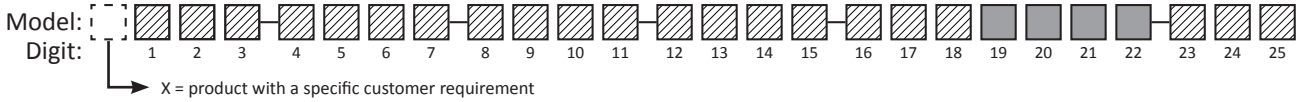
Interface level ③		
5	Orange / black metal flags	T ≤ 315 °C (600 °F)
6	Yellow / black metal flags	T ≤ 315 °C (600 °F)
7	Red / white metal flags (standard)	T ≤ 315 °C (600 °F)
8	Red / silver metal flags	

F	Orange / black metal flags with yellow float diagnostics ①	T ≤ 315 °C (600 °F)
G	Yellow / black metal flags with orange float diagnostics ①	T ≤ 315 °C (600 °F)
H	Red / white metal flags with yellow float diagnostics ①	T ≤ 315 °C (600 °F)
J	Red / silver metal flags with black float diagnostics ①	

T	Fluorescent orange shuttle / follower ②	T ≤ 315 °C (600 °F)

① Float diagnostics is a safety feature which indicates a contrasting colour 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.
③ Use with digit 21 = 9 and digit 22 = 9.



19 INDICATOR HOUSING MATERIAL & MEASURING SCALE

Reveal wide view stainless steel rail with polycarbonate window and dry nitrogen purge T ≤ 315 °C (600 °F)	
P	No scale
A	Feet / inches
B	Meters / millimeters
C	Running inches
D	Percent (markings in increments of 5 %)

Anodised aluminium rail with polycarbonate window and dry nitrogen purge T ≤ 315 °C (600 °F)	
N	No scale
1	Feet / inches
2	Meters / millimeters
3	Running inches
4	Percent (markings in increments of 5 %)

Anodised aluminium rail with glass window and dry nitrogen purge	
R	No scale
G	Feet / inches
H	Meters / millimeters
J	Running inches
K	Percent (markings in increments of 5 %)

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	2 1/2" S10
4	2 1/2" S40
5	2 1/2" S80
6	2 1/2" S160

A	3" S10
B	3" S40
C	3" S80
D	3" S160

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 315 °C (600 °F).
Float type D (digit 21) covers full 300 # rating of 316/316L SST flanges up to 315 °C (600 °F) and of carbon steel flanges up to 200 °C (400 °F).
Float type D (digit 21) covers full PN 25 and PN 40 rating of carbon steel and 316/316L SST flanges up to 315 °C (600 °F).

Pressure rating of floats (see graphs for full pressure drop details):
type 2: max. 23,0 bar @ 40 °C (333 psi @ 100 °F), max. 18,6 bar @ 315 °C (270 psi @ 600 °F);
hydrotest pressure: 27,6 bar @ 40 °C (400 psi @ 100 °F).
type B: max. 34,5 bar @ 40 °C (500 psi @ 100 °F), max. 15,1 bar @ 315 °C (219 psi @ 600 °F);
hydrotest pressure: 41,4 bar @ 40 °C (600 psi @ 100 °F).
type D: max. 74,7 bar @ 40 °C (1083 psi @ 100 °F), max. 32,6 bar @ 315 °C (473 psi @ 600 °F);
hydrotest pressure: 89,6 bar @ 40 °C (1300 psi @ 100 °F).

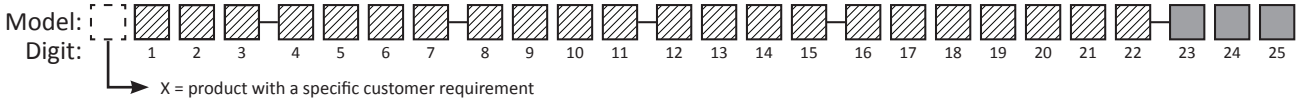
Chamber rating	150 #, PN 16, PN 25 ①		300 #, 600 #, PN 25, PN 40, PN 63, PN 100
Float mat.	316 SST	Ti	Ti
Oper. S.G.	Code ②	Code ②	Code ②
0,55 - 0,64	-	BE	-
0,65 - 0,74	2E	BC	DE
0,75 - 0,84	2C	BB	DC
0,84 - 0,94	2B	BB	DB
0,95 - 1,04	2A	BA	DA

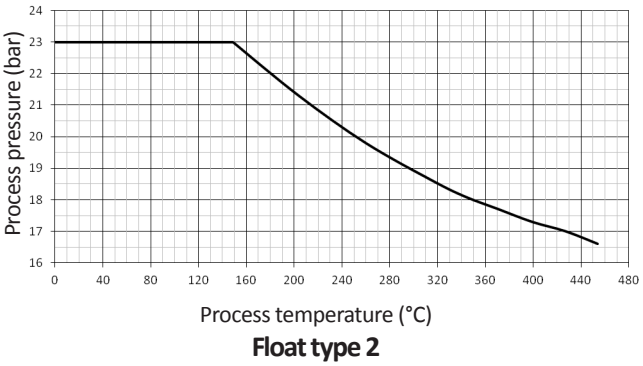
① Float types 2 and B (digit 21) do not cover full PN 25 rating of flanges in some cases; check the application data (pressure/temperature) with the float graphs before selecting one of these floats.

② Code 99 is used for special float. Depending on the application a factory assigned code different from the listed ones is possible.

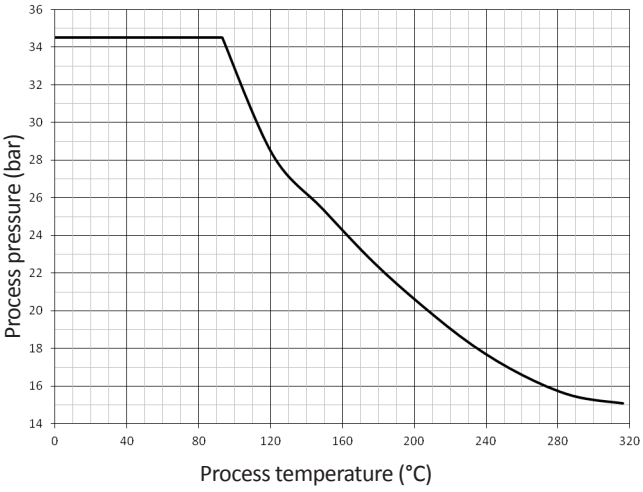
Interface level measurement

99	Special float

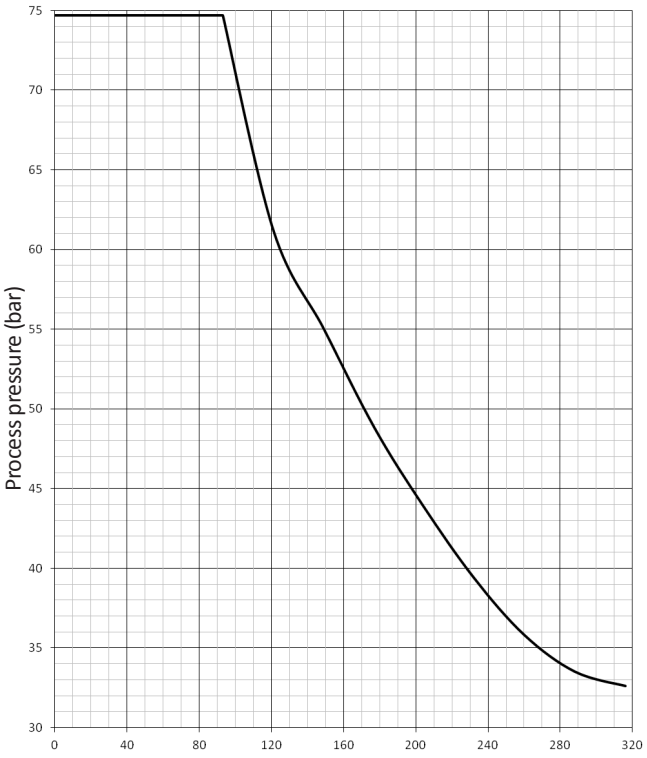




Float type 2



Float type B



Float type D

23-25 | VISUAL INDICATION LENGTH - specify per cm (0.39") increment

030	Min 30 cm (12")
500	Max 500 cm (197")

Consult factory for lengths > 500 cm (197").

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 BE 46-148, chapter external mount Jupiter.

OCT reed chain transmitter

DESCRIPTION

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				M			
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 aluminium, 1/2" NPT-F cable entry
S	IP 66, 316 stainless steel, 3/4" 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

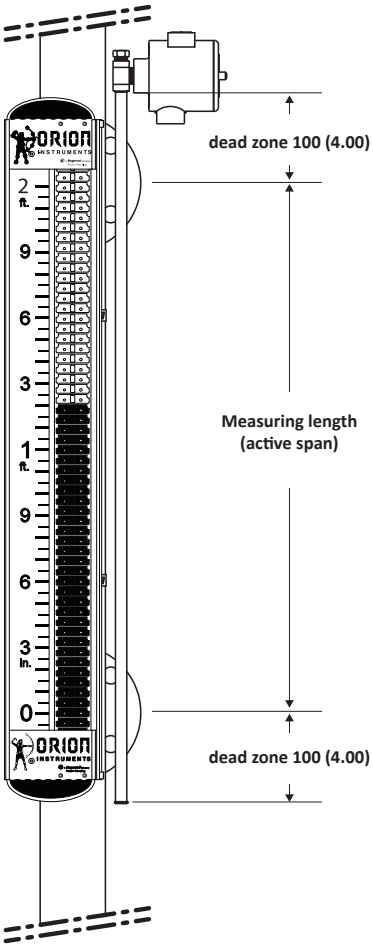
M	Metric (cm)

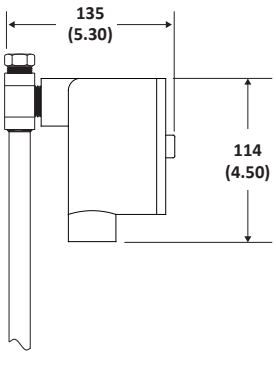
8-10 MEASURING LENGTH - specify per cm (0.39") increment

030	Min 30 cm (12")	
300	Max 300 cm (118")	FM-approval
500	Max 500 cm (197")	CSA-approval

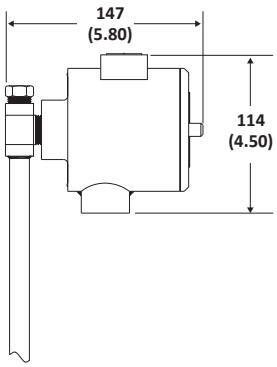
Match measuring length with visual indication length of MLI.
Sensor length = measuring length + 20 cm (8").

DIMENSIONS in mm (inches)





Aluminium housing

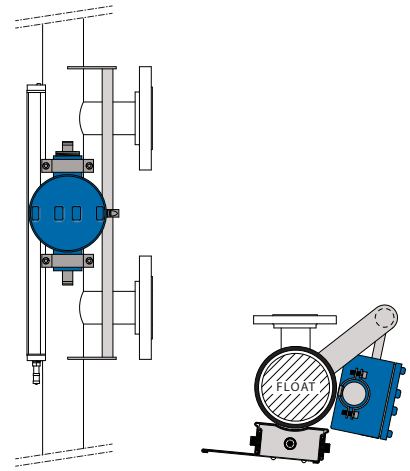


Stainless steel housing

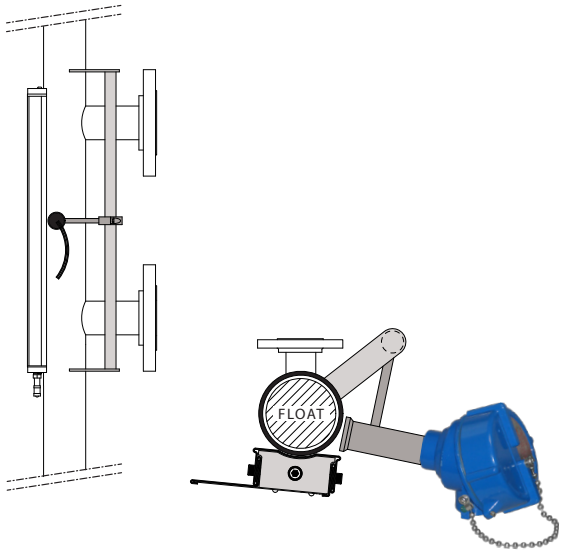
OPTIONAL POINT LEVEL SWITCHES

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

DESCRIPTION

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 aluminium, 3/4" NPT-F cable entry (2 entries - 1 plugged)
S	IP 65, 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

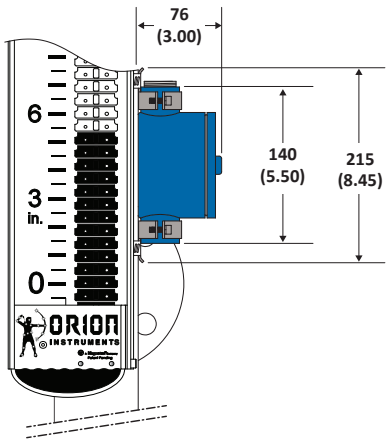
1	MLI model code digit 20 = 1, 2	MLI model code digit 3 <> T
2	MLI model code digit 20 = 3, 4, 5, 6	MLI model code digit 3 <> T
3	MLI model code digit 20 = A, B, C, D	MLI model code digit 3 <> T
5	MLI is a top mount design ①	MLI model code digit 3 = T

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 in mm (inches)



ORS hermetically sealed bi-stable SPDT reed switch

DESCRIPTION

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

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

5 APPROVAL

N	Weatherproof
A	ATEX/IEC flameproof enclosure
1	FM/CSA explosion proof

6 CHAMBER MOUNTING CODE

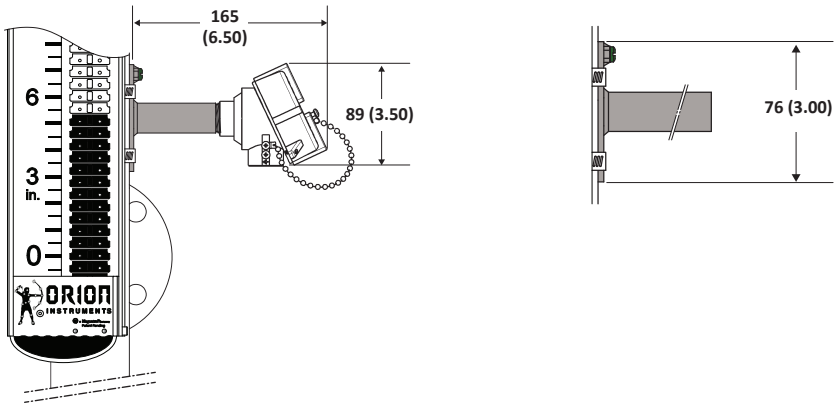
1	MLI model code digit 20 = 1, 2	MLI model code digit 3 <> T
2	MLI model code digit 20 = 3, 4, 5, 6	MLI model code digit 3 <> T
3	MLI model code digit 20 = A, B, C, D	MLI model code digit 3 <> T
5	MLI is a top mount design ①	MLI model code digit 3 = T

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 in mm (inches)



Notes

Notes

QUALITY ASSURANCE - ISO 9001:2008

THE QUALITY ASSURANCE SYSTEM IN PLACE AT MAGNETROL GUARANTEES THE HIGHEST LEVEL OF QUALITY DURING THE DESIGN, THE CONSTRUCTION AND THE SERVICE OF CONTROLS.
OUR QUALITY ASSURANCE SYSTEM IS APPROVED AND CERTIFIED TO ISO 9001:2008 AND OUR TOTAL COMPANY IS COMMITTED TO PROVIDING FULL CUSTOMER SATISFACTION BOTH IN QUALITY PRODUCTS AND QUALITY SERVICE.

PRODUCT WARRANTY

ALL MAGNETIC LEVEL INDICATORS ARE WARRANTED FREE OF DEFECTS IN MATERIALS AND WORKMANSHIP FOR FIVE FULL YEARS (MECHANICAL PARTS) / 18 MONTHS (ELECTRONIC PARTS) FROM THE DATE OF ORIGINAL FACTORY SHIPMENT.
IF RETURNED WITHIN THE WARRANTY PERIOD; AND, UPON FACTORY INSPECTION OF THE CONTROL, THE CAUSE OF THE CLAIM IS DETERMINED TO BE COVERED UNDER THE WARRANTY; THEN, MAGNETROL INTERNATIONAL WILL REPAIR OR REPLACE THE CONTROL AT NO COST TO THE PURCHASER (OR OWNER) OTHER THAN TRANSPORTATION.
MAGNETROL SHALL NOT BE LIABLE FOR MISAPPLICATION, LABOR CLAIMS, DIRECT OR CONSEQUENTIAL DAMAGE OR EXPENSE ARISING FROM THE INSTALLATION OR USE OF THE EQUIPMENT. THERE ARE NO OTHER WARRANTIES EXPRESSED OR IMPLIED, EXCEPT, SPECIAL WRITTEN WARRANTIES COVERING SOME MAGNETROL PRODUCTS.

UNDER RESERVE OF MODIFICATIONS

Magnetrol

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SUPERSEDES: December 2015

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