



ORION[®]
INSTRUMENTS

A **MAGNETROL** Company

Vector™ Magnetic Level Indicator

DESCRIPTION

Vector™ is a rugged, reliable and cost-effective Magnetic Level Indicator (MLI). Suitable for a variety of installations, Vector has many basic features and is precision-engineered and manufactured to ensure a long service life.

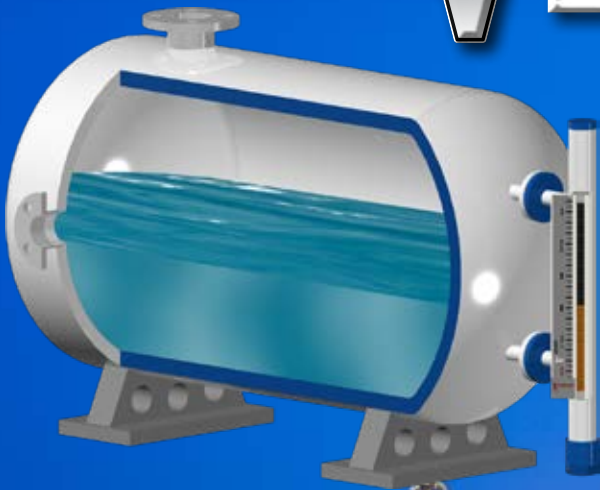
MLIs are widely used to replace high-maintenance sight and gauge glass indicators and are increasingly used in new applications. Optional switches and transmitters are available to provide various output signals for level control.

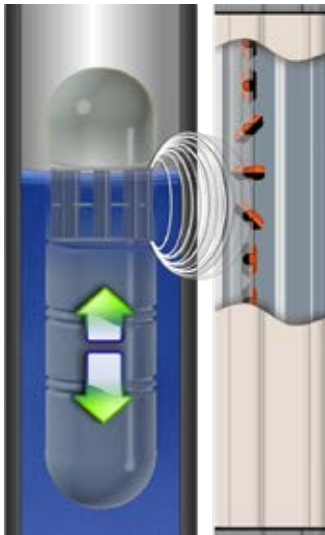
APPLICATIONS

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



VECTOR





PRINCIPLE OF OPERATION

A float travels up and down in a chamber that is mounted to a liquid-containing vessel. The float contains a magnetic assembly that interacts with an externally-mounted visual indicator. As the float follows the liquid surface or liquid-liquid interface, the magnetic field causes highly contrasting flags in the visual indicator to rotate. The result is a clearly defined representation of the liquid level in the vessel.

FEATURES

- Rugged, industrial-grade construction
- Field adjustable visual indicator for convenient viewing
- Continuous measuring range up to 212" (538 cm)
- Compatible with electronic point switches and continuous level transmitters
- Media specific gravity as low as 0.55
- Shatter-resistant viewing window
- Single magnet per flag to enhance float coupling effect and self-alignment



The Vector™ float contains high-strength alloy magnets that facilitate a strong coupling with the externally-mounted visual indication, as well as any switches or transmitters.

Every float is manufactured specifically for each application. Process pressure, temperature, and media specific gravity are all factored into the custom design.

The Vector™ high-visibility visual indicator is constructed with quality materials and engineered for reliable performance.

Each flag contains an alloy magnet that maximizes coupling with the float. The flags are mechanically limited to a half-rotation, which eliminates the possibility of over-rotation common with other magnetic level indicators.

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

VECTOR 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 | Jupiter magnetostrictive transmitter with at least one OES or ORS switch | |
| Switch only (no transmitter) | | Mounting of Jupiter | clamp mounted to chamber |
| Y | OES or ORS switch(es) clamp mounted to chamber | Top mount without offset ① | A ② |
| OCT reed chain transmitter (no switches) | | Top mount offset, with or without high temperature bend | B |
| 8 | Top mount | Bottom mount offset, with or without high temperature bend | C |
| 9 | Bottom mount | | |
| Jupiter magnetostrictive transmitter only (no switches) | | | |
| 1 | Top mount without offset ① max. 175 to 600 °F (79 to 316 °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 | | |

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).

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 pad for indicator and/or transmitter | | | | |
| E | Indicator only | digit 16 = N, Y | 250 to 600 °F (121 to 316 °C) | |
| K | Jupiter only | digit 16 = 1, 2, 3, A, B, C | 175 to 600 °F (79 to 316 °C) | |
| M | Indicator & Jupiter | digit 16 = 2, 3, B, C | 250 to 600 °F (121 to 316 °C) | |
| Z | OCT transmitter only | digit 16 = 8, 9 | 200 to 700 °F (93 to 371 °C) | |

18 MEASUREMENT TYPE & INDICATION STYLE

Total level

| | | | |
|---|------------------------------|---|--------------------------------------|
| 1 | Orange / black plastic flags | 3 | Red / white plastic flags (standard) |
| 2 | Yellow / black plastic flags | 4 | Red / silver metal flags |

19 MEASURING SCALE

| | | | |
|---|----------------|---|---|
| N | No scale | 4 | Percent (markings in increments of 5 %) |
| 1 | Feet / inches | 7 | Meters / Millimeters |
| 3 | Running inches | 8 | Meters / Centimeters |

20 CHAMBER CODE

Code listed is valid for metallic construction (refer to digit 5). Consult factory for plastic construction.

| | | | |
|---|--------|---|----------|
| 1 | 2" S10 | 7 | 2" Sch 5 |
|---|--------|---|----------|

21-22 FLOAT CODE

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

Total level measurement

Float types 2 and B (digit 21) cover full 150 # rating of carbon steel and 316/316L SST flanges up to 500 °F (260 °C).

Float type D (digit 21) covers full 300 # rating of 316/316L SST flanges up to 500 °F (260 °C) and of carbon steel flanges up to 400 °F (200 °C).

Pressure rating of float type D: max. 1083 psi @ 100 °F (74.7 bar @ 40 °C), max. 519 psi @ 500 °F (35.8 bar @ 260 °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 material | 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.

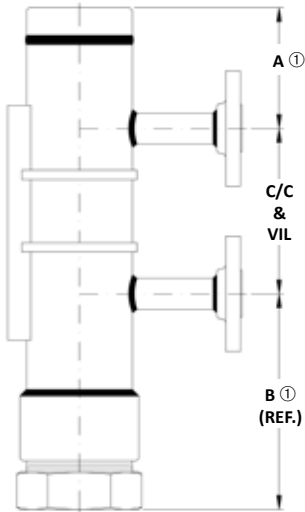
Interface level measurement

| | |
|----|---------------|
| 99 | Special float |
|----|---------------|

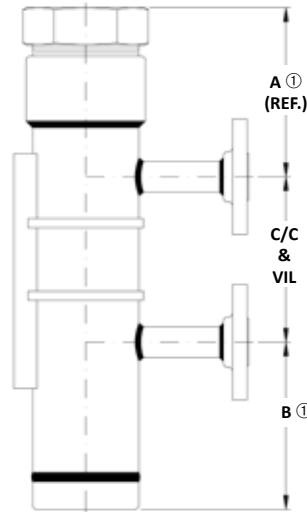
23-25 CENTER-TO-CENTER & VISUAL INDICATION LENGTH

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

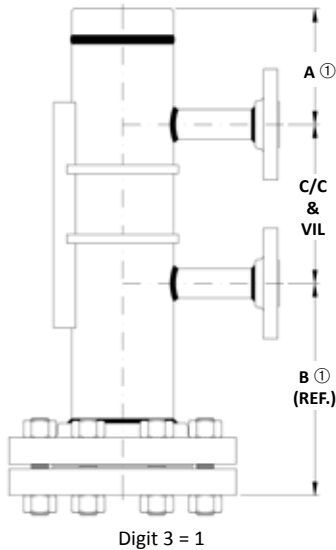
DIMENSIONS in mm (inches) – only for PED construction (digit 6 = A)



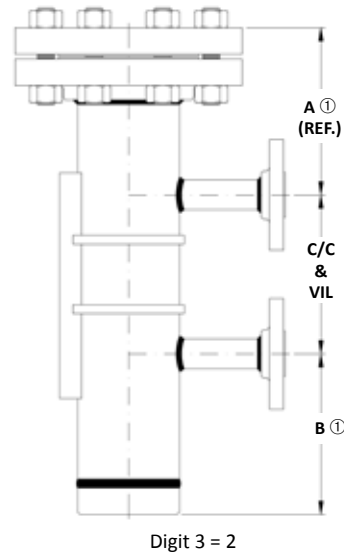
| Digit 16 | Dim. 'A' |
|----------|------------|
| N, 3 | 120 (4.72) |
| 1 | 180 (7.09) |
| 2 | 210 (8.27) |



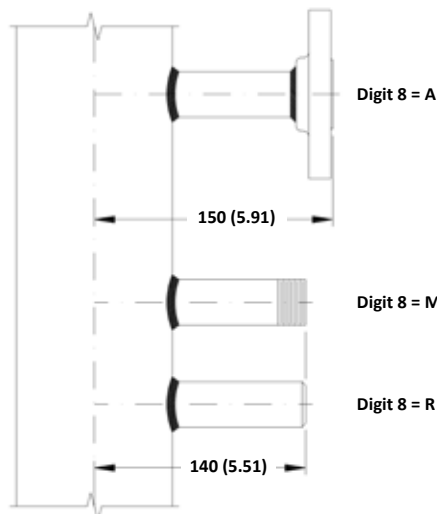
| Digit 16 | Dim. 'A' |
|----------|-------------|
| N, 3 | 170 (6.69) |
| 2 | 270 (10.63) |



| Digit 16 | Dim. 'A' |
|----------|------------|
| N, 3 | 120 (4.72) |
| 1 | 180 (7.09) |
| 2 | 210 (8.27) |



| Digit 16 | Dim. 'A' |
|----------|------------|
| N, 3 | 150 (5.91) |
| 2 | 250 (9.84) |



| Dim. 'B' | | |
|----------|--------------------|--------------|
| Digit 22 | Digit 16 = N, 1, 2 | Digit 16 = 3 |
| A | 245 (9.65) | 330 (12.99) |
| B | 290 (11.42) | 330 (12.99) |
| C | 330 (12.99) | |
| D | 375 (14.76) | |
| E | 415 (16.34) | |

① Dimension varies if an interface float is used.

SPECIFICATIONS | VECTOR™ MAGNETIC LEVEL INDICATOR

| | |
|---------------------------------------|--|
| Product name | Vector™ |
| Materials of construction – Chamber | 316/316L stainless steel, 304/304L stainless steel |
| | Carbon steel process connections and fittings available |
| – Rail & window | Aluminum rail with polycarbonate window |
| – Float | 316 stainless steel and titanium - <i>varies depending on process conditions</i> |
| Construction grade | Industrial PED or non-PED |
| Approvals | Industrial PED units: ATEX II 1 G c T6 (non-electrical equipment) |
| Certified material test report (CMTR) | Available upon request |
| Pressure class ratings | ASME 150# & 300# |
| Process connection sizes | ½" ¾" 1" 1½" 2" |
| Process connection types | Flanged, threaded nipple, butt weld nipple |
| Measuring range | 30 cm to 538 cm (12" to 212") |
| Temperature range | -40 to +316 °C (-40 to +600 °F) |
| Pressure range | Full vacuum to 51 bar (740 psi) |
| | <i>All chambers are hydrostatically tested at 1.5× design pressure</i> |
| Specific gravity | Min 0.55 |
| Visual indicators | Magnetically actuated flag assembly in contrasting orange/black, yellow/black, red/white or red/silver colors |
| Maximum viewing distance | Approximately 30 m (100 ft) |
| Measuring scale | Feet/inches, meters/millimeters, running inches, % |
| Switch options | Model OES electric cam operated snap action switch (refer to bulletin 46-138) Model ORS electric reed switch (refer to bulletin 46-138) |
| Transmitter options | Model JM4 magnetostrictive transmitter (refer to bulletin ORI-150) |
| High temperature insulation | Fiberglass material |

ACCESSORIES

Electric point level switches

Model: OES
10 A DPDT snap action switch



Model: ORS
1 A SPDT reed switch



Continuous level transmitters

Model: Jupiter
Magnetostrictive transmitter



Magnetic particle trap

Ideal for process media containing ferrous particles. These particles can enter the MLI chamber and coat the magnetic float rendering it inoperable. The trap will collect these particles so that they can be periodically removed.



NOTES



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

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

some restrictions apply



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