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
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 538 cm (212”)
• 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
## Model: 4

### Digit: 2

#### 1 PRODUCT NAME
- **Vector™ Magnetic Level Indicator**

#### 2 UNIT OF MEASUREMENT
- **E** English (in.)
- **M** Metric (cm)

#### 3 MOUNTING CONFIGURATION & CHAMBER CONSTRUCTION

<table>
<thead>
<tr>
<th>Connection orientation</th>
<th>Chamber top</th>
<th>Chamber bottom</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Welded end plate</td>
<td>Threaded plug (NPT)</td>
</tr>
<tr>
<td>B</td>
<td>Threaded plug (NPT)</td>
<td>Welded end plate</td>
</tr>
<tr>
<td>1</td>
<td>Welded end plate</td>
<td>Flange</td>
</tr>
<tr>
<td>2</td>
<td>Flange</td>
<td>Welded end plate</td>
</tr>
</tbody>
</table>

#### 4 CHAMBER/FLANGE RATING
- **A** ASME 150# CHAMBER & PROCESS FLANGES
- **B** ASME 300# CHAMBER & PROCESS FLANGES
- **1** ASME 150# CHAMBER FLANGES EN 1092-1 PN16 PROCESS FLANGES
- **2** ASME 300# CHAMBER FLANGES EN 1092-1 PN25 PROCESS FLANGES
- **3** ASME 300# CHAMBER FLANGES EN 1092-1 PN40 PROCESS FLANGES

#### 5 MATERIAL OF CONSTRUCTION
- **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

#### 6 CONSTRUCTION GRADE
- **A** Industrial PED
- **1** Industrial non-PED
- **8** Industrial Grade (extruded outlet), Non-PED

#### 7 CHAMBER FLANGE TYPE
- **N** No chamber flange (Available only when digit 3 = A or B)
- **A** RF ASME slip-on flange (Available only when digit 3 = 1 or 2)

#### 8 PROCESS CONNECTION TYPE
- **A** RF ASME slip-on flange (Available only when digit 4 = A or B)
- **M** Threaded NPT-M (male), up to 1 1/2" (Available only when digit 6 is A or 1 and digit 3 = A or B)
- **R** Pipe nipple butt weld end, up to 1 1/2" (Available only when digit 4 = A or B)
- **B** RF ASME weld neck flange up to 1 1/2" (Available only when digit 4 = A or B)

#### 9 PROCESS CONNECTION SIZE
- **A** 1/2" (Available only when digit 6 is A or 1)
- **B** 3/4" (Available only when digit 6 is A or 1)
- **C** 1" (Available only when digit 3 = 1 or 2 and digit 5 = B or D)
- **D** 1 1/2" (Available only when digit 3 = 1 or 2 and digit 5 = B or D)
- **E** 2" (machined to 1" size)

#### 10 GASKET STYLE FOR CHAMBER FLANGE (IF APPLICABLE)
- **N** None (digit 3 = A or B)
- **A** Flexible fibre ring (digit 3 = 1 or 2)

#### 11 CHAMBER BOLTING MATERIAL
- **N** None (digit 3 = A or B)
- **M** Alloy steel A-193 Gr. B7 / A-194 Gr. 2H (Available only when digit 3 = 1 or 2 and digit 5 = B or D)
- **C** 316 SST A-193 Gr.BBM CLASS 2 / A-194 Gr.BM (Available only when digit 3 = 1 or 2 and digit 5 = B or D)
- **S** Alloy steel with zinc plating A-193 Gr B7 / A-194 Gr 2H (+200 °C (+390 °F) is max. temp for zinc-plated bolting) (Available only when digit 3 = 1 or 2 and digit 5 = B or D)

#### 12-13 VENT SIZE & TYPE
- **NN** None
- **11** 1/2" NPT with hex plug
- **21** 3/4" NPT with hex plug

#### 14-15 DRAIN SIZE & TYPE
- **NN** None
- **11** 1/2" NPT with hex plug
- **21** 3/4" NPT with hex plug

#### 16 PROCESS CONNECTION TYPE
- **Flange** Option A
- **Threaded NPT-M** Option M
- **Butt weld** Option R
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 Atlas model with float diagnostics indicator, instead of Vector model.

All transmitters and switches must be ordered separately.

---

**17 INSULATION OPTIONS**

<table>
<thead>
<tr>
<th>Digit:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No switch or transmitter added</td>
</tr>
<tr>
<td>Y</td>
<td>OES or ORS switch(es) clamp mounted to chamber</td>
</tr>
<tr>
<td>8</td>
<td>OCT reed chain transmitter (no switches)</td>
</tr>
<tr>
<td>9</td>
<td>Jupiter magnetostrictive transmitter (no switches)</td>
</tr>
</tbody>
</table>

---

**18 MEASUREMENT TYPE & INDICATION STYLE**

**Total level**

1. Yellow / black plastic flags
2. Red / white plastic flags (standard)
3. Red / silver metal flags

**Interface level**

1. Yellow / black plastic flags
2. Red / white plastic flags (standard)
3. Red / silver metal flags

---

**19 MEASURING SCALE**

<table>
<thead>
<tr>
<th>Digit:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>No scale</td>
</tr>
<tr>
<td>1</td>
<td>Feet / inches</td>
</tr>
<tr>
<td>2</td>
<td>Running inches</td>
</tr>
</tbody>
</table>

---

**20 CHAMBER CODE**

<table>
<thead>
<tr>
<th>Digit:</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2&quot; S10</td>
</tr>
<tr>
<td>7</td>
<td>2&quot; Sch 5 (Available only in combination with digit 6 = 1)</td>
</tr>
</tbody>
</table>

---

**21-22 FLOAT CODE**

**Total level measurement**

Float types 1 and 8 (digit 21) cover full 150 # rating of carbon steel and 316/316L SST flanges up to 260 °C (500 °F).

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

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

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

**Interface level**

1. Yellow / black plastic flags (standard)
2. Red / silver metal flags

---

**Interface level measurement**

99 Special float
DIMENSIONS

Specify in INCHES (maximum = 212”) when model code 2 is E (minimum = 12”)
Specify in CENTIMETERS (maximum = 538 cm) when model code 2 is M (minimum = 30 cm)

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.

① Consult factory
## SPECIFICATIONS | VECTOR™ MAGNETIC LEVEL INDICATOR

<table>
<thead>
<tr>
<th>Product name</th>
<th>Vector™</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials of construction – Chamber</td>
<td>316/316L stainless steel, 304/304L stainless steel</td>
</tr>
<tr>
<td>– Rail &amp; window</td>
<td>Aluminum rail with polycarbonate window</td>
</tr>
<tr>
<td>– Float</td>
<td>316 stainless steel and titanium - <em>varies depending on process conditions</em></td>
</tr>
<tr>
<td>Construction grade</td>
<td>Industrial PED or non-PED</td>
</tr>
<tr>
<td>Approvals</td>
<td>Industrial PED units: ATEX II 1 G c T6 (non-electrical equipment)</td>
</tr>
<tr>
<td>Certified material test report (CMTR)</td>
<td>Available upon request</td>
</tr>
<tr>
<td>Pressure class ratings</td>
<td>ASME 150# &amp; 300#</td>
</tr>
<tr>
<td>Process connection sizes</td>
<td>1/2”  3/4”  1”  1 1/2”  2”</td>
</tr>
<tr>
<td>Process connection types</td>
<td>Flanged, threaded nipple, butt weld nipple</td>
</tr>
<tr>
<td>Measuring range</td>
<td>30 cm to 538 cm (12” to 212”)</td>
</tr>
<tr>
<td>Temperature range</td>
<td>-40 to +316 °C (-40 to +600 °F)</td>
</tr>
<tr>
<td>Pressure range</td>
<td>Full vacuum to 51 bar (740 psi)</td>
</tr>
<tr>
<td>Specific gravity</td>
<td>Min 0.55</td>
</tr>
<tr>
<td>Visual indicators</td>
<td>Magnetically actuated flag assembly in contrasting orange/black, yellow/black, red/white or red/silver colors</td>
</tr>
<tr>
<td>Maximum viewing distance</td>
<td>Approximately 30 m (100 ft)</td>
</tr>
<tr>
<td>Measuring scale</td>
<td>Feet/inches, meters/millimeters, running inches, %</td>
</tr>
<tr>
<td>Switch options</td>
<td>Model OES electric cam operated snap action switch (refer to bulletin BE 46-138)</td>
</tr>
<tr>
<td></td>
<td>Model ORS electric reed switch (refer to bulletin BE 46-138)</td>
</tr>
<tr>
<td>Transmitter options</td>
<td>Model JM4 magnetostrictive transmitter (refer to bulletin ORI-150)</td>
</tr>
<tr>
<td>High temperature insulation</td>
<td>Fiberglass material</td>
</tr>
</tbody>
</table>

## 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.
QUALITY ASSURANCE - ISO 9001

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 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.

European Headquarters & Manufacturing Facility
Heikensstraat 6
9240 Zele, Belgium
Tel: +32-(0)52-45.11.11 • Fax: +32-(0)52-45.09.93
e-mail: info@magnetrol.be
www.magnetrol.com