



**ORION**<sup>®</sup>  
INSTRUMENTS  
A Magnetrol Company

# VECTOR<sup>™</sup>

MAGNETIC LEVEL INDICATOR



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.



# VECTOR™

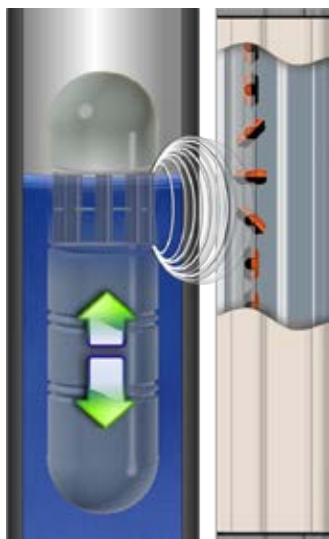
- Feedwater heaters
- Oil/water separators
- Flash drums
- Surge tanks
- Gas chillers
- Deaerators
- Blowdown flash tanks
- Hot wells
- Vacuum tower bottoms
- Alkylation units
- Propane vessels
- Storage tanks

...and many others



## 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 216 in. (549 cm)
- Compatible with electronic point switches and continuous level transmitters
- Media specific gravity as low as 0.54
- Shatter-resistant viewing window
- Single magnet per flag to enhance float coupling effect and self-alignment

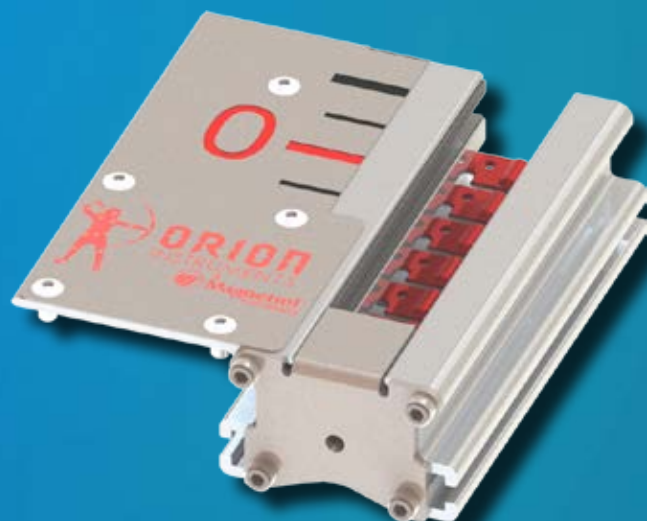


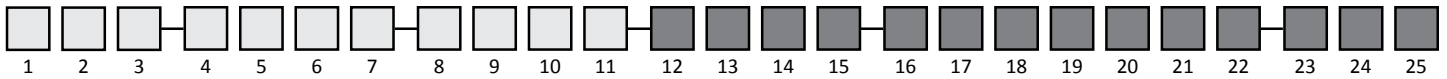
The Vector™ float contains high-strength alloy magnets that facilitate a strong coupling with the externally-mounted visual indication, as well as any switches or transmitters.

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.





## 1 Product Name

4 Vector™ Magnetic Level Indicator

## 2 Unit of Measure for Center-to-Center

E English (inches)

M Metric (centimeters)

## 3 Mounting Configuration & Chamber Construction

Connection Orientation	Chamber Top	Chamber Bottom
A Side / Side	Welded Flat Cap	Threaded Plug (NPT)
B Side / Side	Threaded Plug (NPT)	Welded Flat Cap
1 Side / Side	Welded Flat Cap	Flange
2 Side / Side	Flange	Welded Flat Cap

## 4 Required Flange Rating

A 150#

B 300#

## 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

1 PVC plastic

2 CPVC plastic

## 6 Construction Grade

1 Industrial Grade

## 7 Chamber Flange Type

N No Chamber Flange (required if model code 3 is either A or B)

A Raised Face Slip-On Flange (required if model code 3 is either 1 or 2)

P Full Face Socket Flange (for PVC and CPVC material only)

## 8 Process Connection Type

A Raised Face Flange, Slip-On Style

M Male Threaded (NPT)

R Butt Weld

1 Van Stone Flange (PVC / CPVC only)

## 9 Process Connection Size

A 1/2"

B 3/4"

C 1"

D 1-1/2"

E 2"

## 10 Gasket Style for Chamber Flange (if applicable)

N None (required if model code 3 is either A or B)

A Flexible Graphite Ring (required if model code 3 is either 1 or 2)

P EPDM Rubber (required if model code 5 is either 1 or 2)

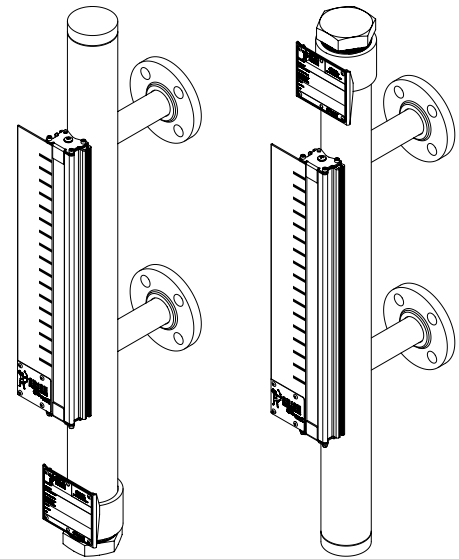
① Other gasket options available. Consult factory.

## 11 Chamber Bolting Material

N None (required if model code 3 is either A or B)

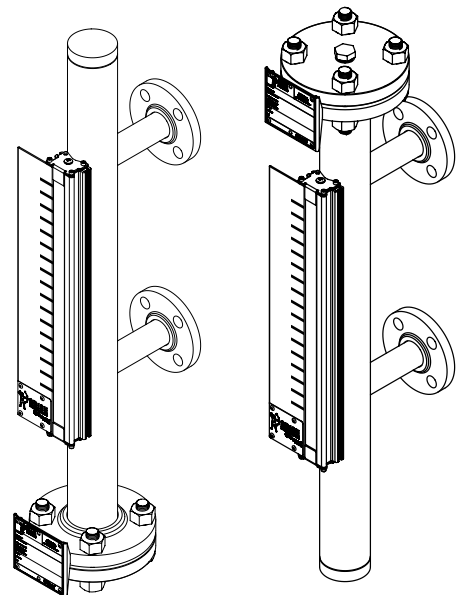
Q Alloy Steel with Cadmium Plating (required if model code 3 is either 1 or 2)

## 3 Mounting Configuration & Chamber Construction



Option A

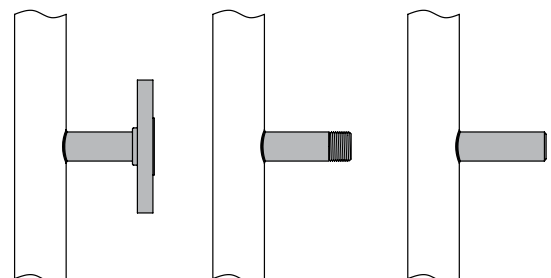
Option B



Option 1

Option 2

## 8 Process Connection Type



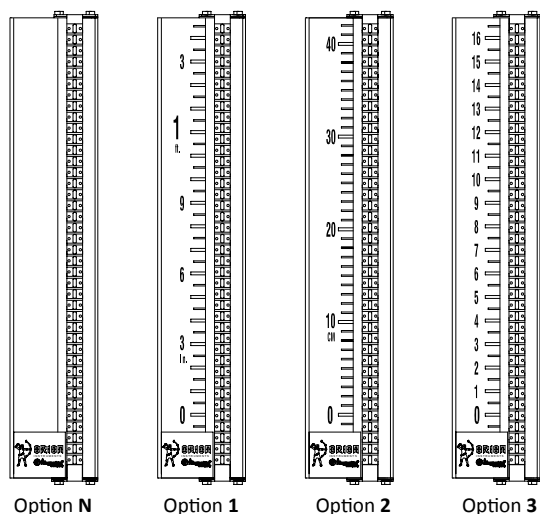
RFSO Flange  
Option A

Threaded NPT  
Option M

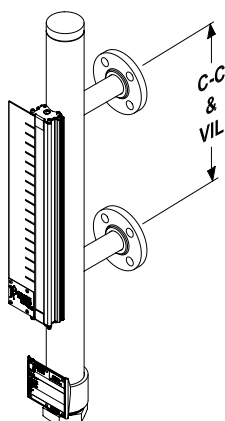
Buttweld  
Option R



## 19 Measuring Scale



## 23–25 Center-to-Center & VIL



**orionxpress**

Expedited **3 week** lead time at no additional cost. See back cover for additional details.

*some restrictions apply*

## 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 Other Considerations for Chamber Construction ②

N	None
1	Jupiter Transmitter (Top Mount)
2	Jupiter or OCT Transmitter (Top Mount Offset & Top Mount High Temperature)
3	Jupiter or OCT Transmitter (Bottom Mount, Bottom Mount High Temperature)

② Vector can be combined with various externally-mounted accessories, including switches and transmitters. Transmitter, however, requires the MLI chamber to be lengthened slightly to accommodate the probe.

Refer to pages 6 & 7 for additional information regarding accessories.

## 17 Insulation Options

N	None
T	Transmitter Pad: Required for Jupiter or OCT between 165°F to 375°F (74°C to 191°C)
V	Indicator & Jupiter Pad: Required between 376°F to 850°F (192°C to 454°C)
W	Indicator & OCT Pad: Required between 376°F to 425°F (192°C to 218°C)
Y	Pad for Indicator Only: Required when temperatures greater than 375°F (191°C)

A	Insulation Blanket for Chamber: Optional up to 500°F (260°C)
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## 18 Measurement Type & Indication Style

Total level	Interface level
1 Orange / Black Flags	5 Orange / Black Flags
2 Yellow / Black Flags	6 Yellow / Black Flags
3 Red / White Flags	7 Red / White Flags
4 Red / Silver Flags	8 Red / Silver Flags

## 19 Measuring Scale

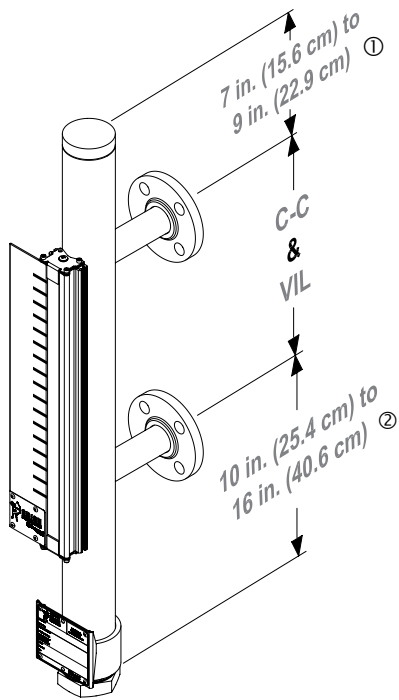
N	None
1	Feet / Inches
2	Meters / Centimeters
3	Running Inches
4	Percent (markings in increments of 5%)

## 20–22 Factory Assigned Codes

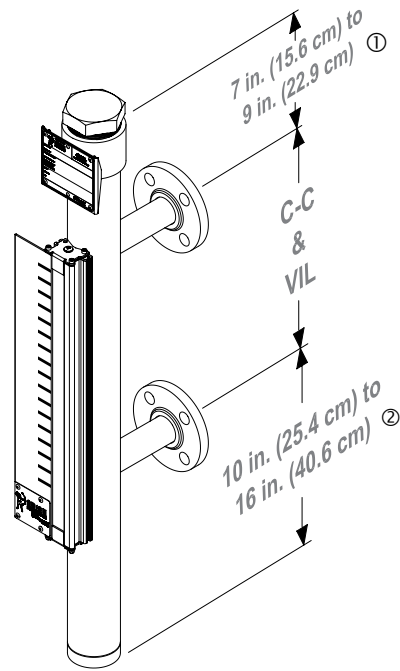
XXX	These codes are factory assigned based on application data
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## 23–25 Center-to-Center & Visual Indication Length

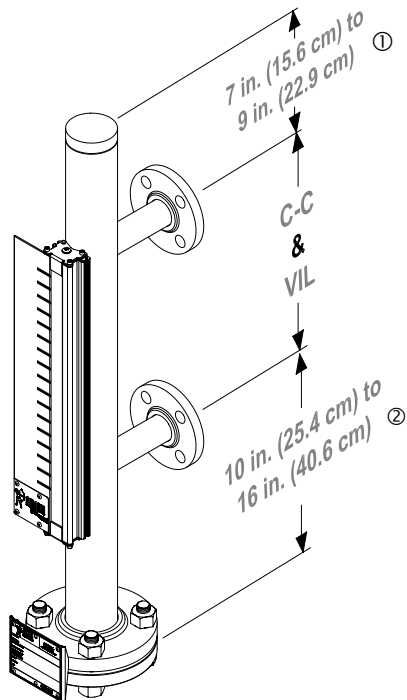
XXX	Specify in <b>INCHES</b> when model code 2 is <b>E</b> Specify in <b>CENTIMETERS</b> when model code 2 is <b>M</b>
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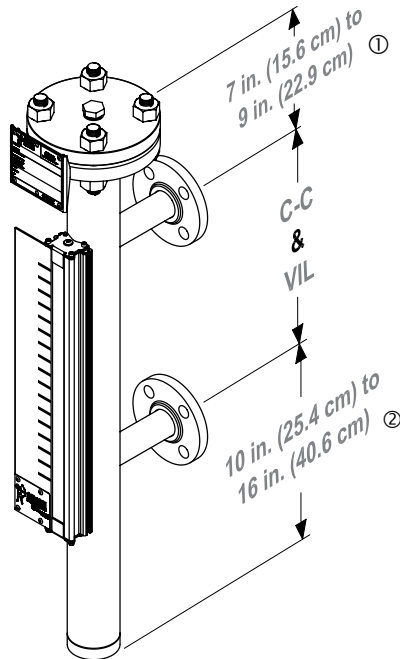
Configuration A



Configuration B



Configuration 1



Configuration 2

- Notes:**
- ① Upper chamber dimension will vary if a Jupiter or OCT level transmitter is specified.
  - ② Lower chamber dimension varies to accommodate extended floats. Lower specific gravities normally result in longer floats to achieve required amount of buoyancy force.

## SPECIFICATIONS | VECTOR™ MAGNETIC LEVEL INDICATOR

Product Name	Vector™
Materials of Construction – MLI	316/316L stainless steel 304/304L stainless steel
	Carbon Steel process connections and fittings available
	<i>Chamber material must be non-ferromagnetic</i>
Materials of Construction – Float	Stainless steel and titanium - <i>varies depending on process conditions</i>
Construction Grade	Industrial
Certified material test report (CMTR)	Available upon request
Pressure Class Ratings	ANSI 150# & 300#
Process Connection Sizes	1/2" 3/4" 1" 1-1/2" 2"
Process Connection Types	Raised face slip-on style flange, threaded nipple, butt weld nipple
Measuring Range	12 to 216 in (30 to 549 cm)
Temperature Range	-40° to +500° F (-40° to +260° C)
Pressure Range	Full vacuum to 740 psig (51.02 bar)
	<i>All chambers are hydrostatically tested at 1.5x design pressure</i>
Specific Gravity Range	≥ 0.54
Visual Indicators	Magnetically actuated flag assembly in contrasting orange/black, yellow/black, red/white, or red/silver colors
Maximum Viewing Distance	Approximately 100 feet (31 meters)
Measuring Scale	Feet/Inches, Meters/Centimeters, Running Inches
Switch Options	Model OES electric cam operated snap action (refer to Orion bulletin: OES-100)
	Model ORS electric reed type (refer to Orion bulletin: ORS-300)
Transmitter Options	Model 2xx Jupiter Magnetostrictive (refer to Orion bulletin: ORI-148)
	Model OCT analog reed chain (refer to Orion bulletin: OCT-400)
High Temperature Insulation	Fiberglass material with weather-resistant silicone jacket

## ACCESSORIES

### Electronic Point Level Switches

Model: OES  
10.1 Amp DPDT Snap Action Switch  
*refer to bulletin: OES-100*



Model: ORS  
1 Amp SPDT Reed Switch  
*refer to bulletin: ORS-300*



### Continuous Level Transmitters

Model: OCT  
Reed Chain Transmitter  
*refer to bulletin: OCT-400*



Model: Jupiter  
Magnetostrictive Transmitter  
*refer to bulletin: ORI-148*

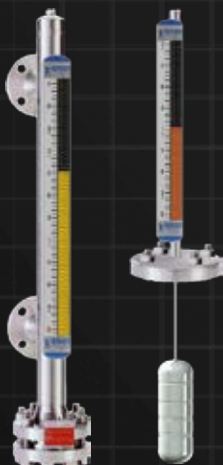


### Magnetic Particle Trap

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.







**Atlas**  
Magnetic Level Indicator (MLI)



**Aurora**  
MLI with Integral  
Guided Wave Radar



**Gemini**  
Dual-Chamber MLI



**Jupiter**  
Magnetostrictive Transmitter



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 3 weeks of placing the order.

Look for the blue shaded options throughout the model number: E Example



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