MAGNETIC LEVEL TECHNOLOGIES

ENGINEERED THROUGH INNOVATION

ORION®
INSTRUMENTS
A Magnetrol Company

UNPARALLELED TECHNOLOGY WITH UNCOMPROMISING STANDARDS.

In 2001, Orion Instruments set a course to raise the standards by which magnetic level indicators (MLIs) are viewed. As a subsidiary of Magnetrol International - a company whose level and flow solutions have been trusted worldwide for more than 80 years - Orion's products are engineered and manufactured under the same strict and unyielding standards.

A Magnetrol® Company

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HOW IT WORKS

A MAGNETIC LEVEL INDICATOR (MLI) CONSISTS OF 3 MAJOR COMPONENTS:

- Chamber
- Float
- Indicator

An MLI chamber is securely mounted in-line to a process vessel. A magnetic float, contained within the chamber, tracks the surface of the liquid as the level rises and falls. A flag or shuttle-style indicator is actuated by the float's magnetic field, providing a high-visibility level representation. Switches, transmitters, and other accessories can be added as an enhancement to create a total level control solution.

VISUAL INDICATORS

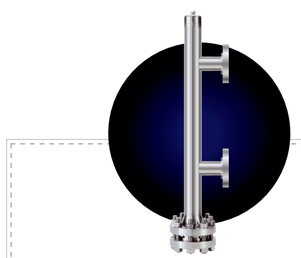
INDICATOR TYPES

- FLAG

This indicator consists of a series of stationary flags, also called flippers, that spin 180 degrees to a contrasting color as the float passes. This allows the indicator to display a bar-graph style representation of liquid level. Flags are a higher-visibility alternative to the shuttle style indicator.

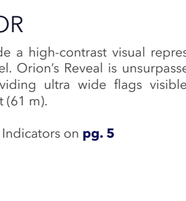
- SHUTTLE

A shuttle consists of a fluorescent orange follower that magnetically couples to the float and travels the length of the indicator. Shuttles offer a localized representation of the liquid level while flags can provide color along the entire measuring length.



CHAMBER

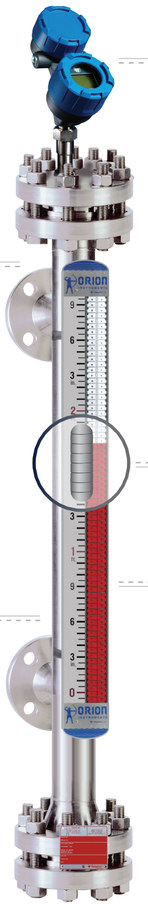
The chamber is custom-engineered and constructed per the highest manufacturing standards. A wide range of non-magnetic materials such as stainless steel, exotic alloys, and plastics are available for construction.

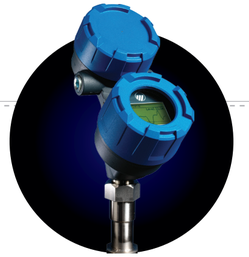


INDICATOR

Indicators provide a high-contrast visual representation of the liquid level. Orion's Reveal is unsurpassed in the industry by providing ultra wide flags visible from a distance of 200 ft (61 m).

• More on Visual Indicators on **pg. 5**





LEVEL TRANSMITTER

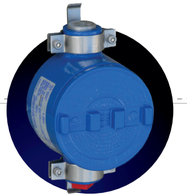
Loop powered level transmitters expand the functionality of a magnetic level indicator by providing process data back to the control room.

• See transmitters:
Eclipse (**pg. 8**) & Jupiter (**pg. 9**)

THE ORION FLOAT

Engineered and designed to solve each level application, the Orion float is the science behind accurate magnetic level measurement. Size, volume, weight, buoyant force, and construction techniques are variables carefully considered before each float is manufactured.

• More on Orion floats on **pg. 6**



LEVEL SWITCH

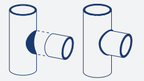
Externally mounted magnetic level switches expand control capabilities of MLIs. These can be used as latching level alarms or level controls by sensing the position of the float in the chamber. Orion offers electric switches as well as pneumatic.

CUSTOM MANUFACTURING

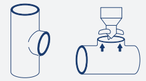
CHAMBER CONSTRUCTION

The Orion Instruments team designs and engineers custom chamber configurations with stainless steel or special alloy materials in order to meet the needs of the application. Our goal is to ensure that our clients' exact design and material requirements are fulfilled.

Orion Instruments provides weld-reinforced full-bore process connections which increase the strength of the branch and chamber integrity.



Full-bore with weld-reinforced branch (Orion process)

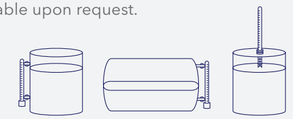


Extruded outlet (competitor approach)

For more information, see **Product Note: ORI-T003**

TANK CONFIGURATIONS

Orion MLIs are applicable for a wide range of tank types, media, and services. Configuration types include: top mount; side mount; top in, bottom out. Custom tank configurations are available upon request.

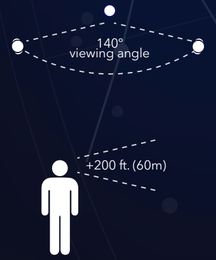


REVEAL™

HIGH VISIBILITY INDICATOR

Orion's innovative wide flag indicator greatly increases visibility by providing a clear level representation at more than twice the viewing distance over standard magnetic level indicators (MLIs). The metal flag construction within a 316 SS enclosure guarantees durability even in the most corrosive environments. REVEAL's unique flag design, channel assembly, and shatter-resistant viewing window deliver reliability, as well as increased safety. Flag and shuttle indicators are sealed and purged with nitrogen gas to avoid condensation buildup inside the indication assembly (IP66/68).

REVEAL is standard on Atlas™, Aurora®, and Gemini™ magnetic level indicators.



FLAGS

Each metallic flag, with a powder coated or anodized finish, offers greater visibility due to its wide design.

INSTASEAL™

InstaSeal valve enables an effective dry nitrogen purge for a hermetic seal.

VIEWING WINDOW

Extruded and shatter-resistant window is constructed of high-strength polycarbonate. Its patent-pending design enhances visibility and allows the flags to position closely to the MLI chamber, reinforcing the coupling effect.

ENCLOSURE

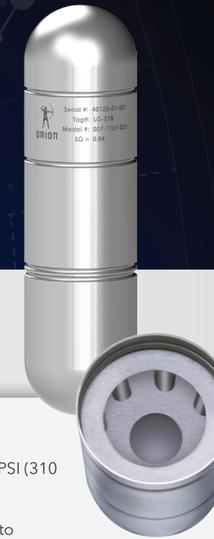
Robust 316 stainless steel enclosure designed to withstand the most corrosive environments.

MECHANICAL POSITIVE-STOP

Highly visible wide flag indicator incorporates a positive-stop design, which limits the rotation of each flag to a half-turn.

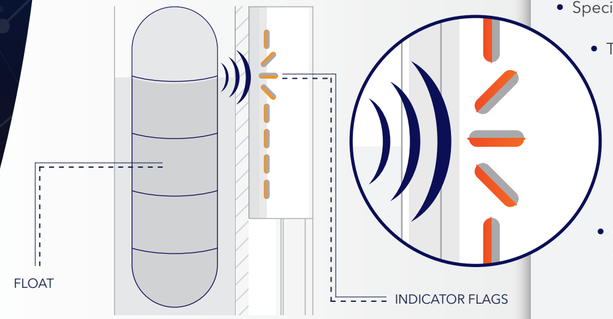
FLOAT

ENGINEERED TO PROVIDE CLASS-LEADING FLOAT PERFORMANCE



The float is the most important element of magnetic level technology. Its structural design, weight, and buoyancy force are all carefully considered when being engineered for an application. Orion engineers have gathered data on thousands of floats in order to properly apply the right design depending on the application.

The float accurately tracks the surface of the liquid as it rises or falls. The same principle is applied to interface level measurement. The magnetic assembly inside the float generates a magnetic field through the MLI chamber wall to couple with the indicator flags.



FEATURES

- Pressures from full vacuum to 5,000 PSI (310 bar) @ 100° F (38° C).
- Temperatures from -320° F (-196° C) to 1,000° F (538° C).
- Specific gravities as low as 0.25.
- Total and interface level measurement available.
- Can be used on MLIs with chambers as thick as schedule XXS.
- Available in Hastelloy® C-276, stainless steel, titanium, Monel®, Inconel®, Alloy 20, fiberglass and various durable plastics.
- Coating options are available for corrosion resistance as well as slip-assistance.

AURORA®

SETTING THE STANDARD FOR RELIABILITY AND SAFETY

True Redundancy in a Single Chamber

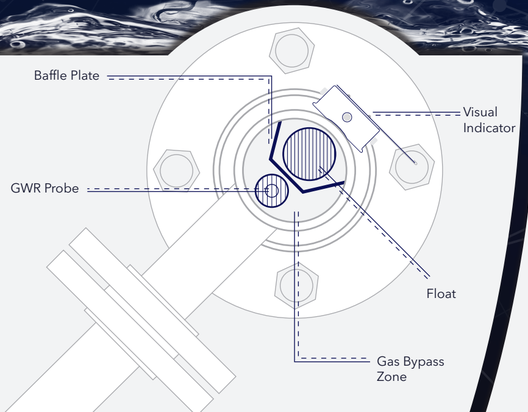
Combining rugged, magnet-based visual indication with state-of-the-art guided wave radar (GWR) technology, the Aurora magnetic level indicator (MLI) delivers truly redundant level measurement in a single chamber, resulting in increased process efficiency, reliability, and safety. By combining two divergent principles of measurement in a single device, fewer vessel process connections are required, the overall instrument weight is minimized, and the spacial footprint is substantially reduced.

FEATURES

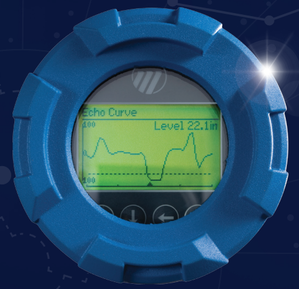
- Redundancy in a single chamber
- High-visibility Reveal indicator
- Suitable for interface level measurement
- Ideal for critical applications (SIL 2/3)
- Eclipse® GWR: High-reliability, no moving parts

THE SECRET BEHIND AURORA'S REDUNDANCY

Aurora's patented baffle design allows for the GWR probe and MLI float to operate separately in a single chamber without interfering with one another. The perforated baffle plate ensures close proximity between the float and indicator flags while ensuring an identical liquid level on each side.



ECLIPSE®



Informative display and intuitive user interface make setup simple

NEXT GENERATION IN GUIDED WAVE RADAR TECHNOLOGY

Unprecedented Performance for Level Measurement and Control

With superior signal performance and powerful diagnostics, the ECLIPSE Model 706 guided wave radar (GWR) transmitter delivers unmatched reliability. A full line of overfill capable probes allow for total and interface level measurement in a wide range of temperatures, pressures, dielectric constants, and physical and chemical compositions.

HART® COMMUNICATION FOUNDATION

FOUNDATION®

MEASUREMENT PRINCIPLE

Guided wave radar is based upon time-of-flight measurement. Pulses of electromagnetic energy are transmitted down a probe. The pulse is reflected when it reaches a liquid surface. The transmission time is measured and converted to an accurate level representation.

WHY ECLIPSE®?

- True measurement for media dielectric constants as low as 1.4
- Industry-leading signal-to-noise ratio
- High accuracy measurement of both total and interface level
- Global hazardous location approvals
- Measure up to face of process flange (overfill protection)
- No moving parts, low maintenance

THE RIGHT PROBE FOR EVERY APPLICATION

JUPITER™

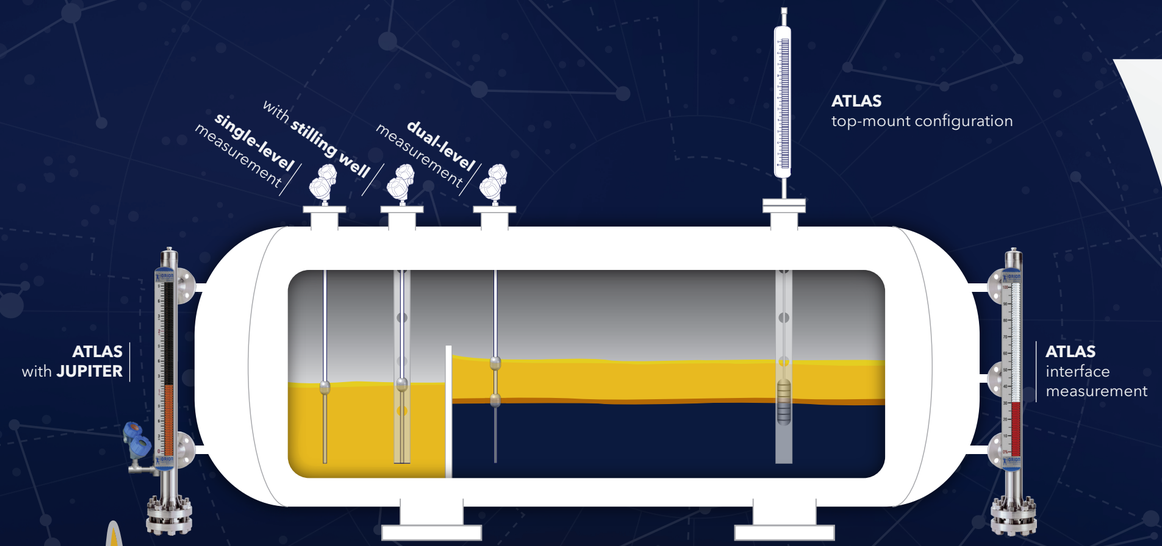
Mechanical and Electronic Synergy

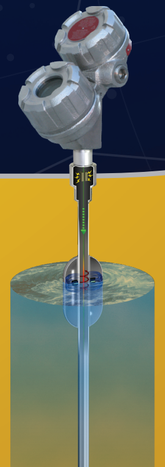
Orion's Magnetostrictive Level Transmitter

The JUPITER magnetostrictive level transmitter uses reliable buoyancy-based technology and powerful electronics to provide incomparable versatility and performance. The external mount configuration can expand the operability of Orion magnetic level indicators (MLIs) by providing a HART + 4-20 mA or FOUNDATION fieldbus™ output, while the direct insertion configuration can be installed in a wide variety of process vessels or external chambers.

HART COMMUNICATION FOUNDATION

FOUNDATION





FEATURES

- LCD with push-button operation
- Simple setup and configuration
- PACTware™ remote diagnostics (DTM-capable)
- Easy attachment to an MLI (external mount)
- Direct insertion for use in process vessels and chambers

MEASUREMENT PRINCIPLE

A low energy pulse, initiated by the Jupiter electronics, travels the length of the magnetostrictive wire. A return signal is generated from the precise location where the magnetic field of the float intersects the wire. A clock precisely measures the elapsed time between the generation of the pulse and the return of the acoustic signal, which is then calculated as liquid level.

FLOATS FOR ANY APPLICATION

A buoyancy-based approach offers a number of advantages over competing technologies. Ask Orion about slip-assistant coatings, increased float-to-probe clearance, and high-buoyancy force designs.

ATLAS™

Reliable & Robust

Orion's Standard, High-Performance MLI

ATLAS is the perfect choice if you seek a standalone visual indication solution. It can, however, be coupled with several transmitter, switch, and visual indicator options to expand its overall capability for complete level and monitoring control. Atlas' rugged design and minimal maintenance requirements make it an ideal replacement for sight glass gauges.

ATLAS is a single chamber design with either a 2", 2-1/2", or 3" chamber diameter, as required by the application. There are twelve basic configuration styles including top mount models. Custom configurations are also available.

FEATURES

- Broad range of chamber styles
- Precision manufactured float
- Robust, sealed chamber design
- Full-bore process connections and full-penetration welding.
- Many construction materials offered
- ASME U-Stamp construction available

Combine **ATLAS** with **JUPITER** for expanded capability

VECTOR™

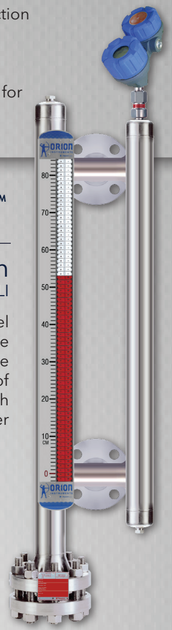
Economical & Effective

For Less-Demanding Applications

Orion's VECTOR is a simple, rugged, reliable, and cost-effective magnetic level indicator (MLI) suitable for a variety of installations. It has many basic features and is precision-engineered and manufactured to ensure a long service life.

FEATURES

- High-quality materials and construction
- 150# & 300# flange pressure class
- Float accessible via chamber plug
- Reliable flag action
- Switches and transmitters available for expanded functionality



GEMINI™

Infinite Customization

Orion's Dual Chamber MLI

GEMINI dual chamber design allows for redundant level measurement with a near-endless number of possible configurations. The primary chamber is a high-performance MLI, while the secondary chamber can house a variety of continuous liquid level transmitters. Valves between each chamber are available for easy maintenance of one chamber without disrupting the operation of the other.

FEATURES

- Redundant level technologies
- Total & interface level measurement
- Available level transmitters include:
  - Guided Wave Radar
  - Magnetostrictive
  - Displacer/Buoyancy
  - Capacitance

ACCESSORIES

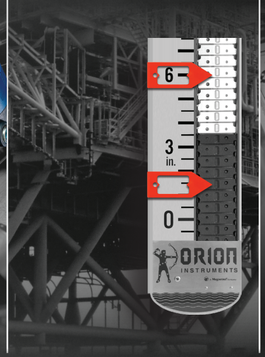
Other Options & Services

- Custom painting (chamber and electronic enclosures)
- Anti-friction PTFE-based coating systems
- NDE Testing (X-ray, PMI, hardness, dye penetrant)
- NACE compliant construction
- Post-weld heat treatment
- Magnetic particle traps
- Float buoyancy curve (indicates amount of measurement error when media SG changes)
- Field training & start-up support
- FREE PACT*ware*™ software for level transmitter communication, diagnostics, and parameter adjustments

Insulation & Tracing

Transmitters & Switches

Range Markers



Float Diagnostics

MLI with Cryogenic Insulation

CAPABILITIES

Orion Instruments prides itself on continuous improvement in both our processes and capabilities. Our facility was designed from the ground-up specifically to accommodate the custom nature of our products. In our continuous pursuit of automation and efficiency-focused excellence, we strive to lead rather than follow.

FACILITY

- ISO 9001:2008 Registered
- 53,000 ft² (4,924 m²) climate controlled
- ASME Sec. VIII Div. I BPVC certified manufacturing facility
- Dedicated research & development laboratory
- Globally-connected training center
- Paperless production/inventory management system
- Automated 9-axis water jet cutting system with rotary capability
- Enclosed electronics manufacturing with anti-static system
- Cryogenic and high-temperature test capabilities
- Dedicated insulation manufacturing
- Bead blast surface finishing
- CNC machining and laser engraving capabilities

CUSTOM SOLUTIONS

Every product **engineered and fabricated** by Orion Instruments is customized to **meet the unique demands** of each application. Our staff remain engaged **throughout the** entire design process and encourage a collaborative **approach to ensure** we are not just providing a product, but rather a solution.

PROJECT MANAGEMENT

Orion Instruments **has the capability** to accommodate large-scale instrumentation **orders with demanding** requirements, including NDE, inspection, **scheduling/planning**, and documentation. We have a dedicated **Project Management** team that maintains the efficiency of these orders by serving as the liaison between the client and the factory throughout the entire manufacturing process.

INSTRUMENT BRIDLES

In addition to **magnetic-based** technologies, Orion Instruments manufactures **custom modular** instrument bridles in an unlimited number of **configurations. Our bridles** can be equipped with a number of technologies, **including guided** wave radar, differential pressure, buoyancy-based devices, and switches.

ASME International

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INSTRUMENTS
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