
ORION
INSTRUMENTS
A Magnetrol Company
A New Generation in
Magnetic Level Indication

The Next Generation of MLIs: It took a whole new company to bring it to you.

Orion Instruments was created with one objective: to devise new standards for quality and operability in Magnetic Level Indicators (MLI).

As a wholly owned subsidiary of Magnetrol International, Orion's products are engineered under the same strict unyielding standards as those of Magnetrol—a company whose level and flow control products are known worldwide.

Recognizing the need for a world class producer of MLIs, Magnetrol created a completely new company built upon its experience in level instrumentation dating back to 1932. With operations in Baton Rouge, Louisiana—the very heart of North America's petrochemical industry—Orion is well positioned to provide outstanding service to its customers.

Organized into four technology groups, Orion products combine market-tested MLI design principles with advanced level sensing technology. The result is destined to create new standards for MLIs and the process control industry.

At the heart of every Orion MLI is a unique float with built-in safeguards against typical MLI float limitations. Aurora and Gemini MLIs fuse Magnetic Level Indication with Magnetrol's Eclipse® Guided Wave Radar to extend the parameters of gauge design into a revolutionary instrument with redundant level sensing capabilities.

Our product line has also been structured to offer customers the broadest range of options assuring each Orion MLI is engineered to meet the exact measurement and control needs of your process. This includes your requests for special designs, materials of construction, dimensions, and accessories.

Our manufacturing facility is structured for the production and supply of defect-free products of unparalleled quality. We're further dedicated to providing you with total support services for as long as your Orion MLI is in service.

Orion MLIs are designed specifically for the most demanding challenges in level measurement and control. When you're looking for enhanced operability in a Magnetic Level Indicator, see your Orion Instruments Representative. We'll show you the very best that the world has to offer.

Visit the newest star in the Magnetrol Level Universe at
www.orioninstruments.com

Principle of Operation:

The Orion **Magnetic Level Indicator** (MLI) is connected to a process vessel. Within the piping column ❶ of the MLI is a float ❷ containing an internal group of magnets. A rise or fall of the fluid in the process tank corresponds to a similar change within the piping column. In response to the level movement the float moves up or down accordingly.

Clamped to the piping column in total isolation from the process liquid is a visual indicator housing. It contains the choice of indicator, either a series of flags ❸ or a follower ❹.

The individual flags or the follower contain an alignment magnet which couples with the float magnets as the float moves up or down within the piping column. Float movement rotates the flags and changes their color—or in the case of the follower— moves it to the point of level.

The position of the follower or the point at which the flags change color represents true level. Level is indicated or “read” by the corresponding point on the measuring scale. ■

Product Overview

SIL 2

HART COMMUNICATION PROTOCOL

Aurora®

- Patented design combines Guided Wave Radar and MLI technology into a truly redundant system.
- Application-proven Eclipse Guided Wave Radar technology.
- Aurora's chamber houses both the probe for Magnetrol's Eclipse Guided Wave Radar transmitter and the float. The instrument transmits level data accurately and reliably.
- Baffle plate design provides flawless guide for float.

Atlas™

- For the most demanding high pressure/temperature liquid level applications. Ideal replacement for sight and gauge glass instruments.
- Wide range of materials available includes 304/304L SS, 316/316L SS, Inconel®, Hastelloy®, Alloy 20, PVC, CPVC, Kynar® and many others.
- Broad range of pressure classes, process connections, styles and sizes. Top and bottom float stop springs are standard.
- Options include flag-type or shuttle indicator, switches and transmitters, blankets, steam or electric heat tracing, and frost extensions.

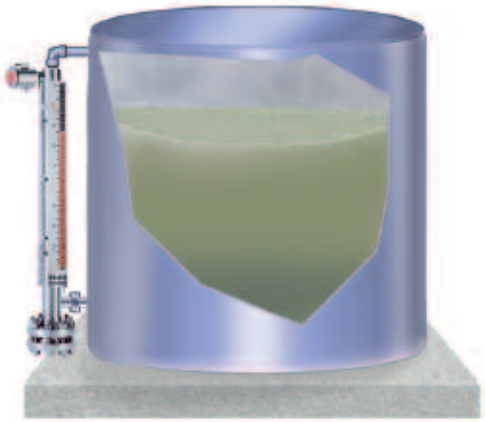
Tank Configurations

Orion MLIs are applicable to a wide range of tank types, media, and services. Atlas is designed for side and top mounting. Gemini and Aurora units are designed for side mounting on vertical, horizontal or spherical vessels. Either level or continuous interface (or both) measurement is available.

Type:
Side Mount

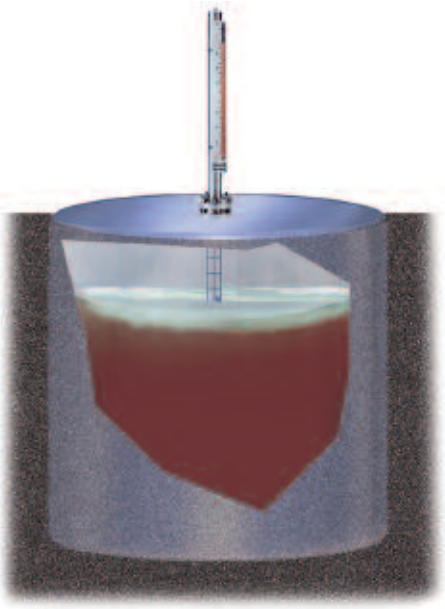
Media:
Sodium Hypochlorite

Accessory:
Continuous Transmitter



Type:
Top Mount

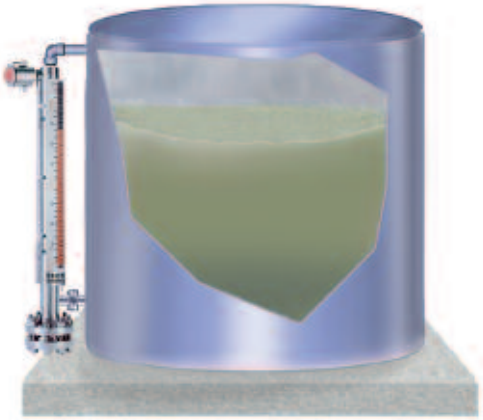
Media:
Chemical Waste Tank



Type:
Top In, Bottom Out

Media:
Liquid Nitrogen

Accessory:
Cryogenic Services Accessories



Gemini™

- Twin chamber design for use on applications where redundant measurement is critical. Gemini features two separate technologies.
- Either Eclipse guided wave radar, Jupiter magnetostrictive, capacitance, or displacer transmitters may be installed in the secondary chamber.
- Add electric or pneumatic switches for high, low, or high and low level.
- Perfect solution for precision visual measurement and a highly reliable method for transmitting level data to a remote display, analog input point or controller.

Enhanced Jupiter®

- A Jupiter transmitter utilizes market-tested, application-proven, magnetostrictive technology.
- Reliable technology senses liquid level, interface level, or both.
- Jupiter mounts to the side of the MLI gauge or directly into the secondary chamber or process vessel.
- Provides a 4–20 mA process signal proportional to level.
- HART® communications protocol is standard—FOUNDATION fieldbus™ is an available option.
- Transmitter on externally mounted versions may be top or bottom mounted.

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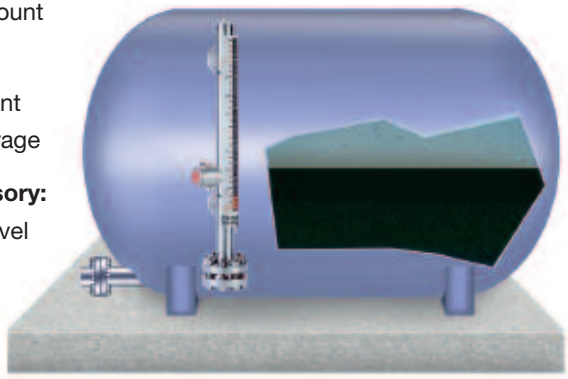
HART COMMUNICATION PROTOCOL

Type:
Side Mount

Media:
Lubricant
Oil Storage

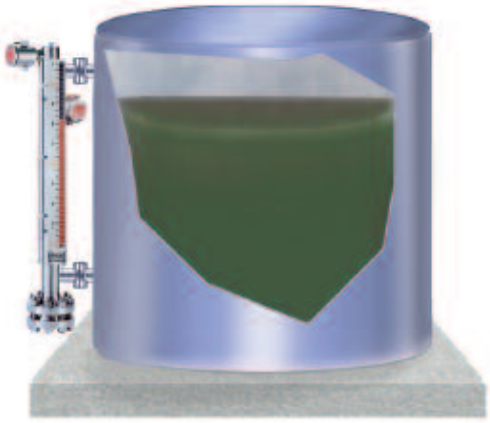
Accessory:
Low Level
Switch



Type:
Side Mount

Media:
Hydrochloric
Acid Storage

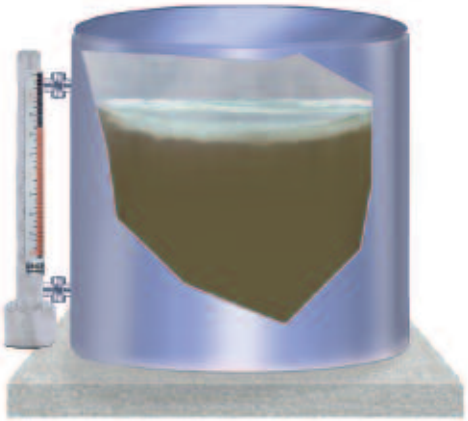
Accessory:
High Level
Switch &
Continuous
Transmitter



Type:
Side Mount

Media:
Sodium
Hydroxide

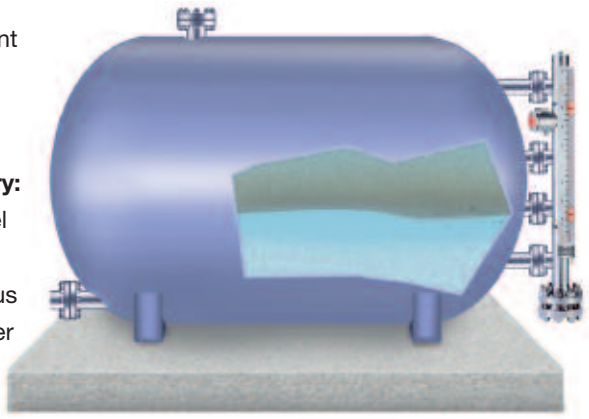
Accessory:
Chamber
Blanket



Type:
Side Mount

Media:
Interface

Accessory:
High Level
Switch &
Continuous
Transmitter



Design Attributes: Basic Gauge

Basic Gauge Construction

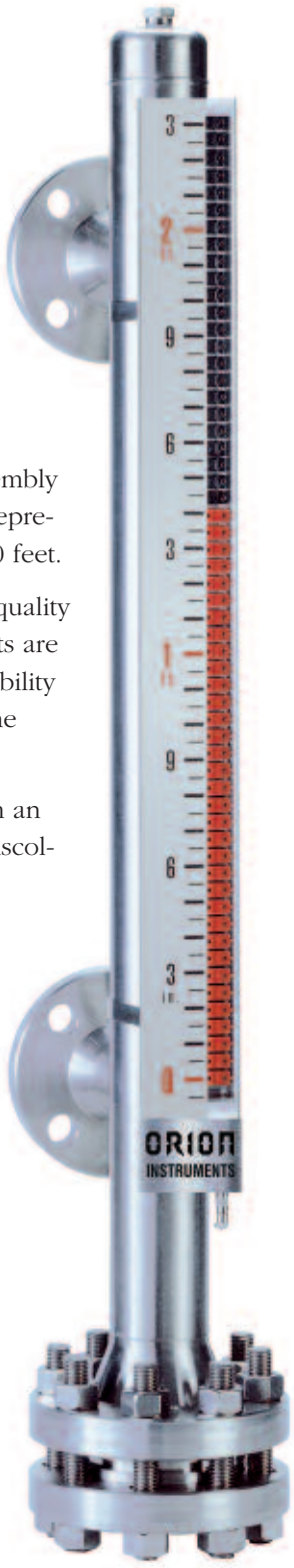
- ASME B31.1 and B31.3 construction available.
- 100% full penetration X-ray quality welds are standard.
- NACE compliance available.
- CMTRs are available upon request.
- **All** Orion MLIs, including the float, are hydro tested prior to shipment.
- CRN compliance available.
- PED compliance available

Visual Indication

- Orion MLIs are available with either a flag assembly or a shuttle unit designed to provide a visual representation of level visible from a distance of 100 feet.
- Flag version is manufactured with the highest quality components. Flags are all metal; no plastic parts are used. Three different combinations of high-visibility fluorescent colors are available and enhance the indicator's readability.
- All Orion MLI scale assemblies are purged with an inert gas to prevent condensate buildup and discoloration due to direct sun exposure.
- Glass flag chamber is sealed with our Insta-seal™ valve method. We are the only MLI manufacturer utilizing this technique.
- Vibration resistant flag indicator optional.

Process Connections

- Orion will engineer and design any process connections, configurations and special alloy materials. Our goal is to ensure that the exact design and material requirements are fulfilled.
- Side-bottom and top-side process connections are available upon request.



Quality Warranty

Orion Instruments warrants all MLIs to be free of defects in materials and workmanship for a period of **FIVE YEARS** after date of shipment. All electronics and indicators are similarly warranted for a period of one year. ■

Measurement Scales

- Standard scales are manufactured in stainless steel with etched and epoxy filled numbers and graduations. Plastic scales are available upon request.
- English or Metric units available and in stock.
- Custom volumetric or percentage scales available upon request.

Switches & Transmitters

- Orion offers the broadest range of switches and transmitters available.
- Customers can specify either reed, snap action, or pneumatic switches for high, low, or high/low level control as well as a dependable analog transmitter for continuous level measurement.
- For applications requiring higher accuracy, the Jupiter magnetostrictive transmitter is available to provide an output with an accuracy of ±1 mm.
- For applications requiring redundancy, and transmitters with no moving parts, the Eclipse Guided Wave Radar transmitter is the ideal choice. See Aurora or Gemini models.

Design Attributes: Components

The Orion Float

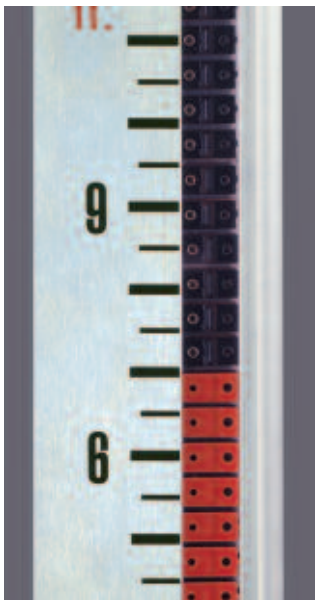
The Orion float has been engineered to provide the best MLI performance in the world.

Float Features

- Magnetic retainer and flux ring assembly within the float ensures top performance regardless of process conditions.
- The 360-degree vertical placement of the magnets assures proper coupling with the flag or shuttle of the indicator, even as the float turns within the chamber.
- The magnetic assembly creates a constant Gauss rating optimized to ensure reliable performance.
- Float magnets are designed to function at temperatures up to +1000° F (+538° C) for many years of reliable service.
- Special float alloys that are available include Titanium, Hastelloy® C-276, Monel®, Inconel®, Alloy 20, and durable plastics. Consult factory for availability of additional materials.

MLI Indicator Options

- **Flag Assembly** operation is smooth and reliable. Magnetic coupling between the flags ensures "true level" indication even during violent surging or upset conditions within a process vessel.
- **Shuttle** provides an optional visual indicator suitable for most applications except where flashing or extreme turbulence exists. The standard shuttle is fluorescent orange.
- **Flag Color Combinations** include either orange/black, yellow/black, or red/white.
- **Magnetic** traps are available, per customer specification, for removal of ferrous (magnetic) particles which might interfere with float function.



Flag Type

Shuttle Type

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ORION Aurora

Combining Magnetrol's Eclipse Guided Wave Radar with an Orion Magnetic Level Indicator represents Level Measurement's leading-edge.

Operating Principle

Orion's Aurora combines the operating system of a conventional float-based MLI with the leading-edge Guided Wave Radar transmitter developed for level measurement applications by Magnetrol International. The result is ***true level measurement redundancy*** in a single-chamber design.

Guided Wave Radar combines micropower impulse radar, time domain reflectometry and equivalent time sampling to detect level. Since the signal is carried within the waveguide, process conditions which hamper other measurement technologies have virtually no effect on Eclipse.

Features

- Single-chamber redundancy in a compact, precision fabricated chamber.
- An Eclipse coaxial type probe is mounted off center within the chamber unimpeded by the probe, permitting the float to rise and fall as level changes. True Level Measurement Redundancy results.
- Eclipse is all electronic with no moving parts to wear or deteriorate. Requires no calibration or change in level to set up.
- Because Guided Wave Radar technology measures actual product it is not influenced by process conditions that affect thru-air units.
- Ideal for low specific gravity applications and low-dielectric media such as propane, butane, and hexane.
- HART and FOUNDATION fieldbus™ communications with local indication available.
- Eclipse is suitable for a broad media range and is not affected by changing dielectric or changing specific gravity.
- Unique baffle plate design provides flawless guide for float.

ORION ENHANCED Jupiter

With a Jupiter Magnetostrictive Transmitter, an Orion MLI offers high accuracy and high linearity at a reasonable price.

Operating Principle

Jupiter utilizes a precision, loop-powered magnetostrictive transmitter. The magnetic field generated by the float interacts with the magnetostrictive wire to create a torsional twist in the wire. A sensitive piezo sensor then detects the return acoustic signal and determines the precise elapsed time from pulse generation to detection of the return signal. A sampling update of ten times per second ensures high-accuracy measurement.

Features

- Two-wire, 4–20 mA operation simplifies installation.
- Suitable for continuous level or interface applications.
- Offers excellent linearity, resolution and repeatability.
- External mounting to the chamber is simple and straightforward requiring only supplied clamps to attach the waveguide to the chamber.
- SIL 2 – HART version is suitable for SIL 2 loops:
  Safe Failure Fraction = 90.7%
- HART protocol standard, FOUNDATION fieldbus available as option.
- Liquid crystal display with push-button keypad configuration.
- External mount Jupiter is suitable for high-temperature applications since the waveguide is placed outside the insulation.
- Magnetostrictive technology is inherently highly reliable and more accurate than reed chain type transmitters.
- External mount transmitter enclosure may be mounted at the top or bottom of the chamber.
- Direct insertion Jupiter will provide accurate level tracking in a wide variety of process vessels.

External Mount Jupiter

Direct Insertion Jupiter

SIL 2

HART COMMUNICATION PROTOCOL

AMS aware

Fieldbus Foundation

PACTware

FDT Group Certified

Switches

Model OES-100

Electro-magnetic Switches

The Model OES-100 snap switch and Model ORS-300 reed switch may be utilized to expand the control capabilities of Orion's extensive line of magnetic level indicators. These electro-magnetic switches are clamp-mounted to the outside of the MLI. This mounting style allows easy addition or repositioning of switches without disruption of the process.

Model ORS-300

Model OPS-200

Pneumatic Switch

The Model OPS-200 is a non-bleed pneumatic switch for use with Orion's extensive line of magnetic level indicators. The OPS-200 utilizes a clamp-on mounting style for easy attachment to the outside of the MLI chamber.

Transmitters

Model OCT-400

Reed Chain Transmitter

The OCT-400 analog transmitter mounts directly to the side of the Atlas or Gemini chamber, providing a continuous 4–20 mA output signal proportional to liquid level. Using simple and reliable reed switches surface mounted to a printed circuit board, the unit provides level accuracy of ±0.50". Activated by the field of the float magnets, the transmitter is totally non-invasive and designed for years of maintenance free service.

Model 705

Guided Wave Radar Transmitter

Magnetrol Eclipse Transmitters are loop-powered, 24 VDC, liquid level transmitters based upon the revolutionary Guided Wave Radar (GWR) technology.

These leading-edge transmitters are designed to provide measurement performance well beyond that of many traditional technologies.

Orion has incorporated Eclipse into the advanced Aurora MLI to achieve true redundancy in level measurement.

Extreme Temperature Accessories

Thermal Insulation Blankets

Orion offers high-temperature and low-temperature blankets fabricated specifically for each application. These blankets include:

- Cryogenic insulation from +32° to -320° F (0° to -196° C) which is suitable for liquified gases and media that vaporize at ambient temperature, such as liquid natural gas and liquid petroleum gas.
- High-temperature insulation fabricated to specific customer requirements for product media that must be maintained at elevated temperatures up to +1000° F (+538° C).
- Steam tracing or electrical heat tracing with or without insulation blankets per customer requirements.

Frost Extension

Orion offers custom designed frost extensions engineered to our customers' specifications.

Orion frost extensions are hermetically sealed and engineered to prevent frost accumulation while ensuring the highest degree of readability for the user.

Frost extensions are manufactured from highly durable polymers.

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