



INDUSTRY APPLICATIONS SERIES

FOOD & BEVERAGE INDUSTRY



Level and Flow Instrumentation for Food & Beverage Processors

Magnetrol[®]
HYGIENIC MEASUREMENT
SOLUTIONS

**Optimize your
food processing
productivity with
level & flow solutions
from Magnetrol®**

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Magnetrol® International, Incorporated Hygienic Solutions specializes in hygienic and non-hygienic level and flow instrumentation used throughout the food, beverage, wine, spirits, and brewing industries. Magnetrol® hygienic measurement solutions are of particular importance in those applications where the highest standards of cleanliness must be maintained. MAGNETROL industrial measurement solutions are used in applications where cleanliness is not essential.

Hygienic Optimized Solutions

MAGNETROL hygienic process measurement instrumentation is designed to help customers optimize productivity with process measurement instrumentation that is engineered to meet the highest performance standards in cleaning and sanitization.

CIP removes residual product to prevent contamination of a product and/or cross contamination of products while sanitization kills microorganisms and denatures proteins. Food industries rely on the aggressive cleaning processes of Clean-in-place (CIP) and Sterilize-in-place (SIP) to achieve their cleaning and sanitization goals.

MAGNETROL hygienic products offer these benefits:

- Manufactured from stainless steel materials selected for their microbial resistance and polished to a surface finish that reduces the possibility of bacterial adhesion.
- Seamless product designs without indentations or incorrect radii where bacteria can harbor and which limit effective cleanliness.

- Products which can withstand aggressive CIP and sanitization chemicals as well as steam sterilizing.

Hazardous Location Approvals

Level instruments for applications such as alcohol production, solvent extraction or solvent recovery may require explosion-proof (XP) requirements. Due principally to the robust construction of its electronics housing, an XP instrument has been certified to withstand an internal explosion without allowing hot gases or flames to escape from the housing to trigger an explosion in the surrounding atmosphere. The single-compartment, hygienic Eclipse® (page 7) is an intrinsically-safe device. In applications where XP approval and a hygienic probe are required, the twin-compartment ECLIPSE (page 6) with a 7XF hygienic probe is an ideal solution.

International Resources

MAGNETROL instruments provide you with measurement solutions that are in the forefront of level and flow technology, solutions that have earned an industry-wide reputation for robust construction, trouble-free set-up and a fast return on investment. You'll also appreciate the engineering and service resources of an international organization that can be brought to bear on your application to ensure the best, practical process measurement

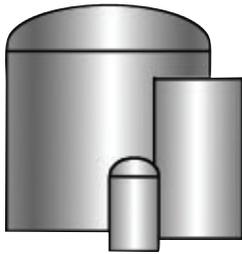


solutions for your food or beverage process. ■



Level and Flow Applications for Food & Beverage Processing

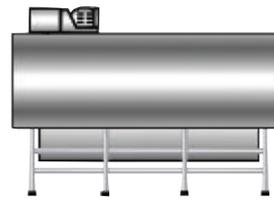
Typical Level and Flow control utilization is indicated for the process units below. Level = ● Flow = ◂



Storage Tanks

Storage and Transport

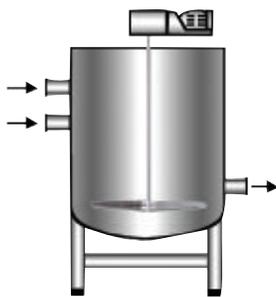
- Chemical Injectors
- ◂ Conveyors
- Piping Systems
- Pumps
- Tanks, Silos



Rotary Washer

Raw Materials Handling

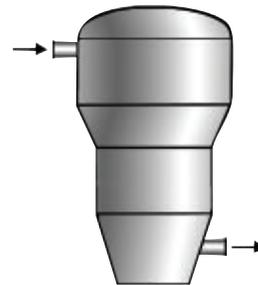
- ◂ Handling, Unpacking
- ◂ Sorting, Screening, Grading
- Washing
- Brushing



Mixing Vessel

Reduction, Mixing, Forming

- Homogenizing, Conching
- Mixing, Blending, Stirring
- ◂ Cutting, Slicing, Chopping
- Grinding, Milling, Crushing
- ◂ Forming, Molding
- ◂ Extrusion

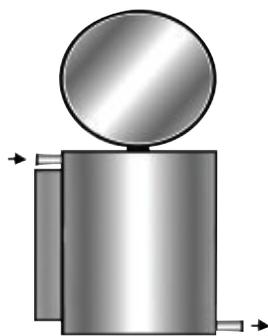


Food Centrifuge

Separation

- Centrifugation
- Chemical Neutralization
- Crystallization, Sedimentation
- Cyclones, Hydrocyclones
- Deionization
- Extraction
- Membrane Separation

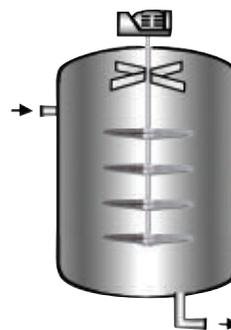
Liquid Interface
Level Applications



Cooking Vessel

Heating, Cooling

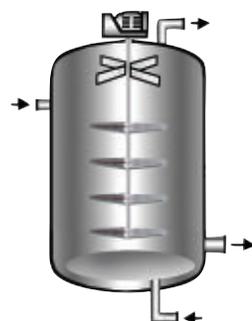
- Baking
- Blanching
- Cooking, Boiling
- Cooling, Freezing
- Dehydration
- Drying, Freeze Drying
- Frying
- Melting
- ◂ Roasting
- ◂ Tempering



Agitated Pasteurization

Decontamination

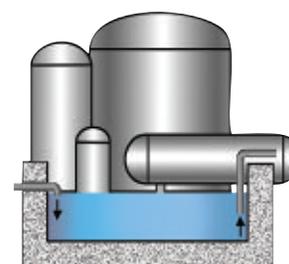
- High Pressure Sterilizing
- ◂ Induction Heating
- ◂ Ohmic Heating
- Pasteurization
- Sterilization
- ◂ UHT Treatment



Fermentation

Other Processes

- ◂ Agglomeration
- ◂ Aging, Brining, Curing
- Alkalization
- Carbonation, Aeration
- Carbonization
- Coagulation
- ◂ Coating
- Fermentation, Germination
- ◂ Smoking
- Sulphitation



Waste Treatment

Plant Utilities

- Air
- Cleaning & Disinfecting
- Compressed Air
- HVAC Systems
- Natural Gas
- Processing Lubricants
- Vacuum Systems
- Waste Treatment
- Water

MODEL
R82
THRU-AIR RADAR
TRANSMITTER

Introducing the full-featured thru-air radar with an affordable price point



Left: Model R82 with a cast aluminum housing and a polypropylene antenna.

Right: Model R82 with a thermoplastic housing and a Tri-Clover Tefzel® antenna.

FEATURES

High Performance: Loop-powered, 26 GHz, non-contact radar transmitter performs liquid level and volume measurements in enclosed vessels.

Digital Communications: HART® digital communications.

User Interface: Menu driven 2-line, 16-character LCD and 4-button keypad.

Simplified Operation: The R82 launcher orientation and echo rejection profiling are simplified for easy use. The R82's microwave beam is rotatable for optimized operation.



Convenient, Easy Configuration: Configures with keypad, HART digital communications, or PACTware™ software. This allows complete configuration via the local user interface, or remotely with the added capability of capturing echo waveforms, and viewing trend data, diagnostic conditions and all configuration parameters.

APPLICATIONS

Measurement Range: 15" to 40 feet (0.4 to 12.2 meters).

Media Capabilities: Liquids, slurries, and viscous media. Suitable for hygienic and CIP applications.

Vessels: For measurement in enclosed vessels; ideal for general chemical storage, day, batch and feed tanks, water and wastewater tanks and sumps and food & beverage vessels.

Resistance: The fully-encapsulated horn antenna offers high performance and is chemically resistant to nearly all standard process media.

Advanced Signal Processing: Manages common disturbances such as false echoes caused by obstructions, multipath reflections from tank side-walls or turbulence caused by agitators, aggressive chemicals, or aerators.

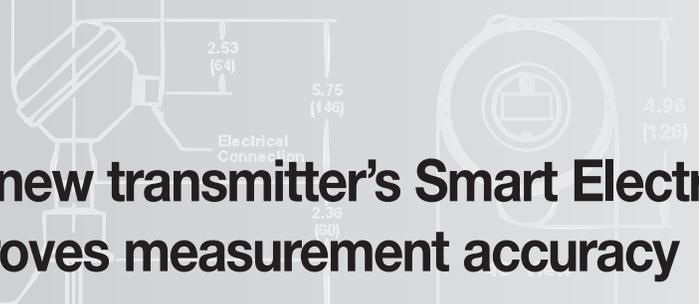
Vapor Immunity: The R82 measures effectively even when atmospheres above the liquid are saturated with vapor.



Technical and specification information is available online: magnetrol.com.



Our new transmitter's Smart Electronics improves measurement accuracy



Top: The Model 355 with a cast aluminum housing and Kynar® transducer. **Right:** 355 with a Lexan® housing and a polypropylene transducer.

FEATURES

Technology: Echotel® Model 355 is a versatile two-wire, loop-powered, non-contact ultrasonic transmitter that measures liquid level, volume, and open channel flow.

Advanced Electronics: The Model 355 has intelligent electronics that analyzes the ultrasonic echo profile, apply temperature compensation, monitors for electrical noise interference, reject echoes from false targets, and then processes the true echo from the liquid surface.

Friendly Interface: The user interface is a menu-driven, 4-pushbutton, 2-line x 16-character display for convenience and readability.



Simulated Display

Convenient Configuration: The Model 355 is configurable by either the user keypad, HART communications, or PACTware. The latter enables a complete configuration via the user interface, or remotely with the added capability of capturing echo waveforms, and viewing trend data, diagnostic conditions and all parameters.

APPLICATIONS

Non-Contact: The Model 355 provides non-contact measurement in a wide variety of applications.

Versatility: Ideal for sumps, wells, tanks, open channel flow weirs and flumes. Ideal for general industrial applications, chemical storage tanks, batch and day tanks.

Handles Difficulties: The Model 355 advanced signal processing provides extremely reliable measurement even when application difficulties like turbulence or false echoes generated by agitator blades or shafts, fill pipes or other tank hardware are present.

Range: A powerful 60 kHz ultrasonic transducer and advanced digital signal processing is featured to reliably measure to 20 feet (6 meters).

Narrow Beam: Model 355 transducers feature a 10° conical beam and 10" (250 mm) blocking distance to maximize measurement capabilities in many applications.

Viscosity: Will measure highly viscous media.

With 35 flume and weir curves stored in its electronics, the Model 355 easily adapts to the overwhelming majority of open channel flow applications.



Echotel® Model 355 Non-Contact Ultrasonic Two-Wire Transmitter for Level, Volume, or Open Channel Flow

DESCRIPTION: Model 355 is a versatile, loop-powered, non-contact ultrasonic transmitter that measures liquid level, volume, and open channel flow. It features advanced signal processing for accurate measurement in a wide variety of applications. The Model 355 provides a menu-driven, 4-pushbutton, 2-line x 16-character display for convenience and readability. It is configurable by either the user keypad, HART communications, or PACTware. The latter enables a complete configuration via the user interface, or remotely with the added capability of capturing echo waveforms, and viewing trend data, diagnostic conditions and all parameters.

FEATURES:

- Loop-powered, two-wire, 4-20 mA output
- Non-contact measurement
- 60 kHz ultrasonic transducer
- 10° conical beam
- 10" (250 mm) blocking distance
- 20 ft (6 m) range
- Temperature compensation
- Electrical noise interference rejection
- False target rejection
- Echo waveform capture
- Trend data viewing
- Diagnostic conditions
- All parameters

APPLICATIONS:

- Level
- Volume
- Open channel flow
- Weir
- Flume
- Sump
- Tank
- Well
- Day tank
- Batch tank
- Chemical storage tank
- Storage tank
- Open channel flow

Technical and specification information is available online: magnetrol.com.



ECLIPSE®

ENHANCED MODEL 705
GUIDED WAVE RADAR
TRANSMITTER

The industrial level transmitter that is transforming level measurement



Eclipse® Model 705 shown with a Model 7XF-E Hygienic probe.

Also popular in process food markets, the 7X5 Bulk Solids probe for use in lighter solids applications such as grains and powders.



Technical and specification information is available online: magnetrol.com.

HORIZON
Fewer features and a lower price make Horizon® Model 704 Guided Wave Radar ideal for simple Food and Beverage applications.



FEATURES

Versatility: Two-wire, 24 VDC, loop-powered transmitter for liquid level, interface, or volume measurement.

Digital Communications: HART, FOUNDATION fieldbus™ or PROFIBUS PA communications.

Convenience: No level change for configuration; no field calibration is necessary.

Strapping Table: 20-point table for volumetric or flow measurement.

Coupling: Quick connect/disconnect probe coupling.

Probe Capabilities: Designs to +800° F (+430° C), 6250 psig (430 bar) and full vacuum, cryogenic applications to -320° F (-195° C).

Probe Profiling: The single rod probe can have multiple bends to profile to any vessel shape, avoid internal vessel obstructions and extend measurement into the vessel bottom.

User Interface: 2-line, 8-character LCD and 3-button keypad.

Dry Calibration Capability: Save calibration costs and downtime with our proven “test bench” approach.

APPLICATIONS

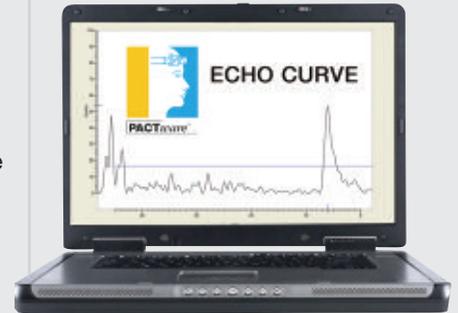
Application Range: Virtually all measurement and control applications including conditions exhibiting visible vapors, foam, coating or buildup, surface agitation, bubbling or boiling, high fill/empty rates, low level and varying dielectric media or specific gravity.

Media Capabilities: Liquids or slurries; hydrocarbons and water-based media with a dielectric of 1.4–100.

Changing Media: Changing specific gravity and dielectric constant have little effect on measurement accuracy.

Full Span: Measures to the very top and bottom of the probe (subject to media dielectrics).

SIL 2: HART version hardware is suitable for SIL 2 loops; Safe Failure Fraction of 91%.



PACTware software provides a graphic interface whereby all functionality can be visualized quickly, safely and conveniently.



ECLIPSE®

ENHANCED MODEL 705
GUIDED WAVE RADAR
HYGIENIC TRANSMITTER

Ultra-compact, hygienic transmitter delivers unsurpassed performance



Enhanced Eclipse® Model 705 Liquid Level Transmitter for Hygienic Applications

(Simulated display)



Technical and specification information is available online: magnetrol.com

FEATURES

Versatility: Two-wire, 24 VDC, loop-powered transmitter for liquid level, interface, or volume measurement.

Digital Communications: HART or optional FOUNDATION fieldbus and PROFIBUS PA communications.

Convenience: No level change needed for configuration; no field calibration necessary.

Strapping Table: 20-point custom table for volumetric or flow measurement.

Finish: 320 Grit (15R_a) electropolished probe and 180 Grit (32R_a) housing.

Probe Materials: Available in 316 SS, AL6XN and Hastelloy® C22®.

Probe Profiling: The single rod probe can have multiple bends, allowing the rod to be profiled to any vessel shape, avoid internal vessel obstructions and extend measurement into the vessel bottom.

Approvals: IS and Non-Incendive.

User Interface: 2-line, 8-character LCD and 3-button keypad.

Dry Calibration Capability: Save calibration costs and downtime with our proven "test bench" approach.

APPLICATIONS

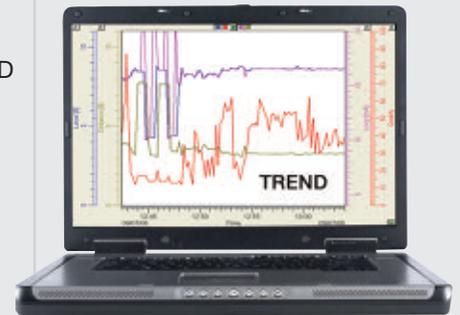
Application Range: Virtually all hygienic level measurement and control applications including CIP applications.

Media Capabilities: Liquids or slurries; hydrocarbons and water-based media with a dielectric of 1.9–100.

Changing Media: Changing specific gravity and dielectric constant have little effect on measurement accuracy.

Full Span: Measures to the very top and bottom of the probe (subject to media dielectrics) and, therefore, into the vessel bottom.

SIL 2: HART version hardware is suitable for SIL 2 loops; Safe Failure Fraction of 91%. FEME-DA report available upon request.



PACTware software provides a graphic interface whereby all functionality can be visualized quickly, safely and conveniently.



ECHOTEL®
HYGIENIC ULTRASONIC
LEVEL SWITCH

**Compact, hygienic
switches excel in difficult
liquid level applications**



**Echotel® Models
960 and 961
Liquid Level
Switches for
Hygienic
Applications**

(Housing cover shown removed)

960/961 FEATURES

Technology: Pulsed signal for superior performance in difficult conditions.

Immunity: Excellent immunity from sources of electrical noise interference.

Self-Testing: Extensive self-testing of electronics, transducer, piezoelectric crystals, and EM noise.

Time Delay: Adjustable time delay for turbulent liquids.

Extended Range: Tip-sensitive transducer measures level to within 1/4" of the vessel's bottom.

Housing: Deep drawn 304 SS.

Finish: 240 Grit (20 R_a) electropolish on transducer surface.



Above: Also utilizing Pulsed Signal Technology, Echotel® Models 940 and 941 are compact Ultrasonic Level Switches that perform high or low level measurement in a wide variety of liquid Food and Beverage applications. Right: Echotel® 960 Series Switches are also available in a non-hygienic, XP version.

MODEL-SPECIFIC FEATURES

EXCLUSIVE 960 FEATURES:

Output: Features AS-i® (Actuator Sensor-Interface) output, a digital bus communications for high or low single point level measurement.

AS-i Bus: AS-i is a versatile, low-cost cabling solution that is a digital replacement for traditional hard wiring of field devices. The AS-i bus system provides a digital serial interface with a single unshielded two-wire cable for power and data transfer.

EXCLUSIVE 961 FEATURES:

Output: Relay output or mA current shift output.

Approvals: Intrinsic safety approvals with the two-wire loop-powered version.

APPLICATIONS:

- High level alarm
- Overflow protection
- Low level alarm
- Pump protection
- Flow alarm
- Leak detection

Hygienic high and low level alarm applications.



Magnetrol Echotel® Models 960/961 Ultrasonic Level Switches for Sanitary Applications

DESCRIPTION
Echotel Model 960/961 provides high resolution, fast response, reliable level measurement in difficult process conditions. As an optional feature, double beam design for detection of sludge and sediment. Features: ultrasonic, self-diagnostic and non-contact. The probe is made of stainless steel and is available in 1/2", 1", 2" and 3" diameters. It is available in 1/2", 1", 2" and 3" diameters. It is available in 1/2", 1", 2" and 3" diameters. It is available in 1/2", 1", 2" and 3" diameters.

APPLICATIONS
• Liquid level measurement
• High level alarm
• Low level alarm
• Pump protection
• Flow alarm
• Leak detection

INDUSTRIES
• Food processing
• Pharmaceutical
• Chemical
• Petrochemical
• Water treatment
• Dairy
• Beverage
• Paper
• Textile
• Mining
• Power
• Pulp and Paper
• Chemical

Technical and specification information is available online: magnetrol.com.

Thermatel®

THERMAL DISPERSION SWITCH

A hygienic control with the versatility of a flow, level or interface switch



Thermatel® TD2 Level, Flow or Interface Switch for Hygienic Applications

(Housing cover shown removed)

MEASUREMENT PRINCIPLE

The Thermatel® sensor consists of two RTD elements. One is the reference and the second is heated to a temperature above the process temperature.

The electronics detect the temperature difference between the two elements. The temperature difference is greatest in air, then decreases when cooling occurs due to a change in media. An increase in the flow rate further decreases the temperature difference.



As a level switch, Thermatel® provides superior performance in thick liquid applications which can plug other measurement devices.

The TD2 Level, Flow or Interface Switch is also available in an industrial, non-hygienic version.



TD2 FEATURES

Diagnostics: Continuous diagnostics with fault indication, temperature compensation, narrow hysteresis and fast response time.

Calibration: Easy and quick.

Immunity: Not affected by temperature, pressure or viscosity.

Output: Relay plus a non-linear mA output signal can be used for trending, diagnostics and repeatable flow/level indication.

All-Electronic: No moving parts make THERMATEL switches virtually maintenance free.

Alarm Status: Viewable in alarm status window.

TD2 APPLICATIONS:

Flow: General hygienic flow/level switch applications include foam detection, CIP operations, and potable & purified water systems.

Level: The TD2 can be used in applications where a high viscosity liquid might plug up an ultrasonic transducer gap.

General hygienic flow switch applications include foam detection, CIP operations and product present switch. Air flow measurement is essential within most filling operations.

Technical and specification information is available online: magnetrol.com.



Modulelevel®

DIGITAL E3 DISPLACER
TRANSMITTER

An advanced transmitter suitable for utility and culinary steam applications

TECHNOLOGY

Technology: The Digital E3 is an advanced, intrinsically safe two-wire instrument utilizing buoyancy principle to detect and convert liquid level changes into a stable output signal.

Engineering: The linkage between the level sensing element and output electronics provides a simple mechanical design and construction. The vertical in-line design of the transmitter results in low instrument weight and simplified installation. The instrument comes in a variety of configurations and pressure ratings for varied applications.

Digital Advances: The Digital E3 Modulelevel® has microprocessor-based electronics with HART compatible output, in addition to the standard 4-20 mA output. E3 supports the FDT/DTM standard and PACTware PC software for additional configuration and trending capabilities. User interface is a 2-line, 8-character LCD and 3-button keypad.

Self-Test: Continuous self-test with 22 mA or 3.6 mA fault indication fully compliant with NAMUR NE 43. Comprehensive diagnostics with faults, warnings and status history.

Approvals: IS, XP and Non-Incendive approvals by FM, CSA, ATEX, IEC.

APPLICATIONS

Media: Liquids, clean or dirty, light hydrocarbons to heavy acids (SG=0.23 to 2.20)

Vessels: Process & storage, bridges, bypass chambers, interface, sumps and pits up to unit pressure & temperature ratings.

Conditions: Most liquid level measurement and control applications including those with varying dielectric, vapors, turbulence, foam, buildup, bubbling or boiling and high fill/empty rates.

Steam: The E3 is ideal for steam-production systems. Live steam is used for heating, cooking, blanching, sanitizing, and sterilizing a large number of foods. The production of superheated water under pressure suitable for direct food contact called 'culinary steam' requires food-grade equipment, clean water, and hygienic conditions where food contact is possible.

Measurement Range: From 14 to 120+ inches (356 to 3048+ mm).

Interface Level: E3 MODULELEVEL is capable of tracking the interface level of two immiscible liquids with different densities.

Modulelevel® Digital E3 Displacer Transmitter



Technical and specification information is available online: magnetrol.com.

Live steam is used to process a large number of foods as in this tomato processing facility.





ORION
INSTRUMENTS

A **Magnetrol** Company

**MAGNETIC LEVEL
INDICATORS**

Visual Indicators built tough for the most demanding applications

MLI FEATURES

Technologies:

Atlas™ utilizes float-based technology for reliable visual indication.

Aurora® combines float and leading-edge Guided Wave Radar measurement in a single, redundant indicator.

Jupiter® is a float-based, high-accuracy, Magnetostrictive transmitter.

Visual Indication:

Orion Instruments® MLIs are available with either a flag assembly or a shuttle unit designed to provide level indication visible from a distance of 100 feet using high-visibility fluorescent colors.

Switches and Transmitters:

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.

Digital Communications: MLIs are available that utilize HART or optional FOUNDATION fieldbus digital communications and PACTware software.

Accessories: To accommodate extremes in temperature, MLIs are available with frost extensions, heat tracing and insulation blankets.

APPLICATIONS

Food & Beverage:

ORION INSTRUMENTS MLIs are adaptable to food grade level applications.

Applications: MLIs serve a wide range of process and utility applications:

- Feedwater Heaters
- Industrial Boilers
- Fuel Oil Storage
- Oil & Water Separators
- Flash Drums
- Surge Tanks
- Gas Chillers
- Process Vessels
- Steam and SIP Systems

Custom Installations: MLIs sometimes provide the only viable form of level measurement and control for unique applications requiring one-of-a-kind MLIs (below).



ATLAS™

Float-based
Magnetic Level
Indicator

AURORA®

Float-based
Magnetic Level
Indicator with a
redundant Guided
Wave Radar
Transmitter

JUPITER®

Float-based
Magnetostrictive
Transmitter



Technical and specification
information is available online:
orioninstruments.com.

*Below: Orion Instruments® MLIs at work
in Food and Beverage environments
that include (left to right) a hygienic
vessel, a fuel oil storage tank, and a
fermentation tank.*





FOOD & BEVERAGE INDUSTRY

AN INDUSTRY GUIDE TO LEVEL MEASUREMENT AND CONTROL FROM **MAGNETROL**

Other industry and special application brochures from MAGNETROL include:

- **Chemical**
- **Crude Oil Processing**
- **Flue Gas Desulfurization**
- **Interface Level Measurement**
- **Life Science**
- **Mass Flow Measurement**
- **Modular Skid Systems**
- **Natural Gas Processing**
- **Nuclear Power**
- **Petroleum Refining**
- **Power Generation**
- **Pulp & Paper Mills**
- **Renewable Energy**
- **Steam Generation**
- **Tank Bridle Level Measurement**
- **Tank Overfill Prevention**
- **Understanding Safety Integrity Level (SIL)**
- **Water & Wastewater**

PLEASE NOTE: The instruments recommended in these brochures are based on field experience with similar applications and are included as a general guide to level and flow control selection. Because all applications differ, however, customers should determine suitability for their own purposes.



Magnetrol

Worldwide Level and Flow Solutionssm

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Bulletin: 41-181.1 • Effective: May 2010