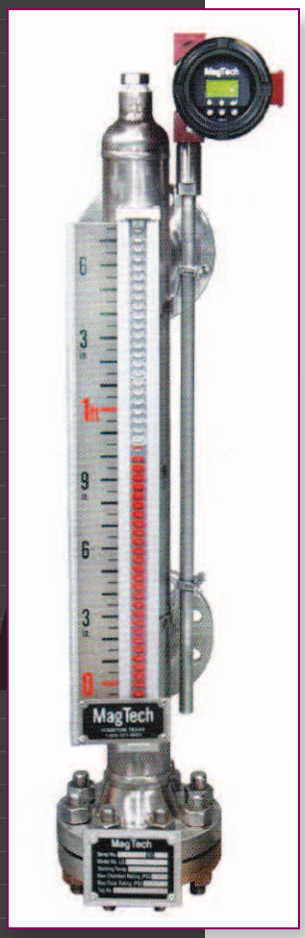
LG Series Magnetic Liquid Level Gauges



Superior Level Indicator

Magtech magnetic level gauges are highly accurate, low-maintenance alternatives to sight glasses and other outdated level indicators. They provide redundant, non-invasive level indication while eliminating leak points and fugitive emissions. Their robust design is ideal for high temperatures, high pressures and corrosive services. Magtech gauges are easy to install and require no extra piping in most applications.

Combined with our externally mounted transmitters and switches, Magtech magnetic level gauges provide the industry's most advanced and cost-effective level solutions.

Features

- **Replaces problem sight glasses**
- **Visual level indication to 100 feet**
- **No process liquid in contact with indicator glass**
- **Ideal for high-temperature, high-pressure and corrosive applications**
- **Manufactured to meet boiler specifications (ASME B31.1/B31.3)**
- **Magnetostrictive and radar transmitter options for non-invasive and/or redundant level control**
- **Software options: Registered HART DD Rev-5 to Revision 7 – IEC61804-2, AMS Aware and Fieldbus to ITK4.6**

Magtech

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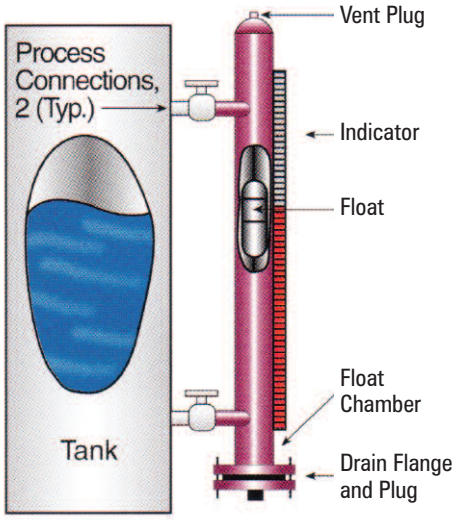
Description

Magtech magnetic level gauges consist of a float chamber with process connections suitable for installation to the vessel where level is to be measured. The process connections may be side couplings, flanges or other configurations as illustrated on the following page.

The magnetic indicator strip is externally mounted to the float chamber; therefore, it is not a wetted part and is isolated from the process. Flipper-style indicators are standard with bright, contrasting colors for clear and concise level indication.

The indicator strip is operated by the custom float installed in the chamber. Contained within the float is a 360° magnet array assembly which operates the external indicator strip through the chamber pipe wall. Floats are designed to meet the application process S.G. and pressure and are sized accordingly.

As the float rises and falls with the process level, the magnets drive the external flipper assembly, providing local indication to the operator, or providing the magnetic coupling for transmitter output.



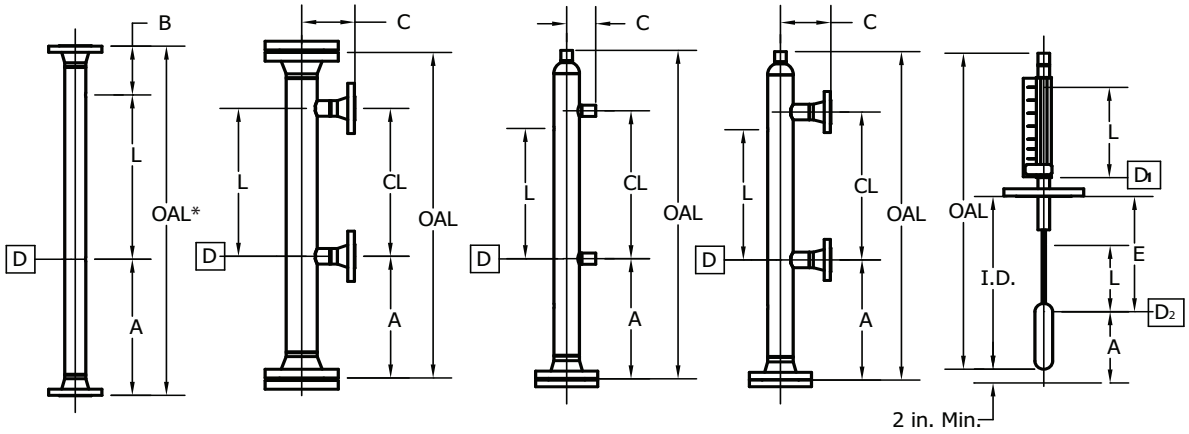
LG Series Level Gauge with Flipper Indicator

Specifications

All Magtech liquid level gauges are custom-engineered and manufactured based on customer application, specifications and other requirements. The chart below lists minimum standard materials, design, testing and other options as required by the application.

	Typical Construction	Optional as Required
Chamber Material	300 Series stainless wetted parts	Other non-ferrous materials that do not exhibit Ferro-magnetic properties such as Hastelloy, CB20, Duplex, Monel 400 and T-321 stainless
Chamber Pipe	2 1/2" S10 or S40 welded pipe depending upon the application pressure, temperature and corrosion allowance	2", 3", or 4" may be required or pipe schedules up to S160 or XXS depending upon application requirements
Chamber Flanges	Typically supplied ANSI B16.5 RF slip-on type, 500 RMS, in 300 Series stainless steel	Common upgrades are ANSI weld neck style, socket weld, or lap joint, and other flange faces such as RTJ or flat face
Process Connections	1" 3000# FNPT unless otherwise specified; vent and drains are 1/2" 3000# FNPT	As with chamber flanges, upgrades to process connections, vents & drains are ANSI weld neck style, socket weld, or lap joint, and other size or rating NPT or socket weld connections
Float Assembly	300 Series stainless steel suitable for applications up to 1000 psig and 0.63 S.G. at temperatures from -320 to 1100° F (-196 to 593° C	Magtech offers floats in Hastelloy, Monel, and Titanium, as required and rated up to 4500 psig (310 bar) or as low as 0.30 minimum S.G.
Indicator	Brightly colored red and contrasting silver all-metal, high-temperature design reading in feet and inches with 1/2" divisions; approximately 1/4" resolution	Optional all-stainless steel housing construction is available for severe environments. In addition, other indicator colors, units of measure or follower type may be specified.
Chamber Design	Float chamber is designed to ANSI B31.1 and B31.3, and ASME Boiler Code PG60. Welding and welder qualification in accordance with ASME Section IX.	Non-standard welding procedures, qualifications or testing may be supplied if required, as well as designs to proprietary customer design specifications
Testing	Functional and calibration test is performed on every Magtech gauge	Additional testing and documentation, such as MTR's, radiography, hydrostatic pressure tests, PMI, dye penetrant, NACE or witness testing are available if required

Magtech Level Gauge Mounting Styles



Style A *Style A/C* *Style B* *Style C* *Style E*

Dimension Notes

All dimensions are reference only – not to be used for for construction unless certified by Magtech.
Weld neck style shown as an example above; not supplied unless specified.

Dimension	Comments
D	Represents Datum. Lowest indicated reading (or zero) must be specified on Style "A" gauges; other styles the Datum will be at the centerline of the bottom side connection unless specified.
C	Centerline of gauge to connection face. May vary significantly depending upon type of process connection specified and chamber size.
A	Dead Band - indication or transmitter reading not possible. Typically 8-24"
B	Dead Band (Top) - indication or transmitter reading not possible. Typically 6-16"
CL*	Center-to-center dimension – must be equal to or greater than "L"
L*	Total indication range from the Datum to uppermost reading (span)
OAL	Overall face-to-face length of chamber, not including gaskets
I.D.	Insertion depth (must be 2" from tank bottom)
E*	Mounting flange face to Datum (zero)

*These dimensions must be specified by customer to ensure proper operation and performance of the level gauge.

Note:
(1) All dimensional tolerances per ANSI B31.1/ B31.3 and ASME codes
(2) All dimensions without an asterisk supplied by Magtech unless otherwise specified
(3) Special mounting arrangements and dimensions available as requested

LG Series Order Information

Model # (Example): LG6 - B - 3/4" - 300# - 0.92 - 100F - 250 - 36"- x

Mounting Style
A, A/C, B, C or E
Process Connection Size
Flange Rating
Specific Gravity of Measured Fluid
Max. Operating Temp. (°F or °C)
Max. Operating Press. (psig or bar)
Measurement Length "L" (in. or metric)
Options – See below (for options not listed consult factory)

(FS) Flipper indicator with scale
(FL) Flippers (no scale)
(FO) Follower Indicator
(LJ) Lap joint with stub end
(SO) Raised face slip-on flanges
(WN) Raised face weld neck flanges
(RJ) Ring joint flanges
(CS) Carbon steel flanges
(N) NACE
(FC) FNPT couplings
(MC) MNPT couplings
(SW) Socket weld couplings
(ST) Steam tracing
(HT) Heat tracing
(IB) Insulation blanket
(EP) Electropolished/sanitary service
(PI) Polycarbonate indicator
(I) Interface (specify both gravities)
(DI) Dual indication (follower only)
X Special Options (specify)

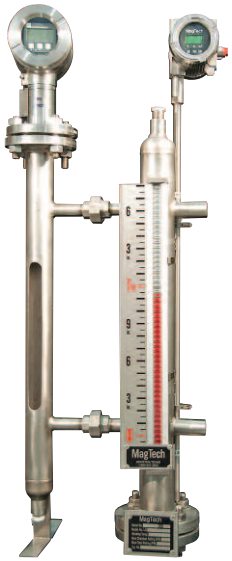
Typical Service

Acetic Acid
Alcohols
Aldehydes
Alkyls
Aluminum Chloride
Anhydrous Ammonia
Asphalt
Benzene
Boiler Feedwater
Brine
Butanes
Caustic Soda
Chlorine
Condensate
Crude Oil
Diesel Fuels
Dowtherm
Freon/ Refrigerants
Hydrofluoric (HF) Acid
Hydrochloric Acid
Hydrocarbon Mixtures
Liquid Propane
Molten Sulfur
Phosgene
Scrubbers
Seal Pots
Steam Drum
Sulfuric Acid
Sumps
Wastewater

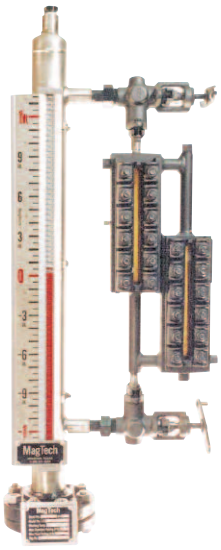
Typical Applications

BEFORE. A process vessel with three point level switches, two short sight glasses, a pneumatic level controller and 15 valves with associated plumbing.

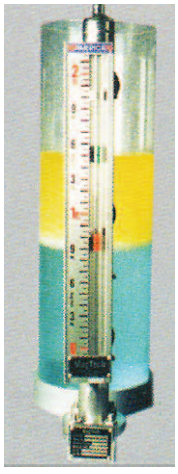
AFTER. The same vessel shown at left after installation of a Magtech gauge, providing increased control outputs at a third of the cost.



REDUNDANCY. Magnetostrictive and/or radar transmitters may be mounted in a separate chamber for redundant level control.



DRUMSITE. Magtech's DrumSite™ combines the safety and convenience of a magnetic gauge with a water column and sight glass as required by ASME boiler code B31.3-PG60.



INTERFACE. In applications where a vessel contains two liquids of different densities (min. 0.1 S.G. differential) the gauge has two floats and two indicators.

Extruded Outlet Design

Safety and reliability are an ever-increasing challenge as the chemical and refining industries push the limits of pressure and temperature in their processes. High pressure and cyclic process services require more stringent vessel, piping and process connection design. To meet these customer needs, Magtech has acquired a new T-Drill® machine to form extruded outlets. The T-Drill features fully computerized automation control with ultra-precise machining for a more reliable gauge design.

Magtech gauges eliminate common misconceptions regarding the use of extruded outlets on magnetic gauges. Most importantly, Magtech's T-Drill provides a fully x-rayable process connection in compliance with ASME B31.1 and B31.3 boiler and piping codes. Another concern is the effect of the extrusion on the corrosion resistance of the material. This effect is negligible in low carbon stainless steel. Work hardening is in fact increased to some degree, but in every instance this serves to improve the strength of the collar.

- Both Sch. 10 and Sch. 40 materials have been tested by certified independent labs to comply with maximum allowable working pressures (400% safety margin) as required by ASME standards
- Eliminates the need for expensive pipe-tees and minimizes the number of welds in the chamber
- 100% X-rayable process connection welds
- Eliminates internal pipe distortion (important in cyclic service)
- Provides full bore process connections and all butt-weld construction
- Eliminates post weld pipe straightening

How Does the T-Drill Work?

Once the gauge specifications are entered in the T-Drill's computer, elliptical pilot holes are milled at precise locations on the pipe. The elliptical shape of the pilot holes allows collar formation with minimal wall thinning. An extrusion die (two retractable, rotating, opposing forming pins) mounted in a forming head is inserted into the pilot hole. The rotating forming head is slowly pulled back through the hole, shaping the extruded outlet. A final operation mills a butt end weld face.

The capital investment made in our T-drill demonstrates our commitment to meeting the challenges of continuous product improvement. Extruded outlets are quickly being adopted as a preferred design improvement by leaders in the petrochemical industry.

LTM Series Magnetostrictive Transmitter

Description

Magtech LTM Series magnetostrictive level transmitters are highly accurate, precise and offer a variety of configuration options. The LTM transmitter may be utilized as a direct insertion transmitter or externally mounted to a magnetic level gauge for non-invasive level control.

In the gauge-mount configuration, the sensor is attached to the exterior of the magnetic gauge. This allows the transmitter to be installed or serviced without removing the gauge from service. As the float rises or falls with the fluid, the transmitter provides level output. LTM transmitters are available with two-wire loop powered 4-20 mA signal output, or bus powered (fieldbus) with digital output(s).

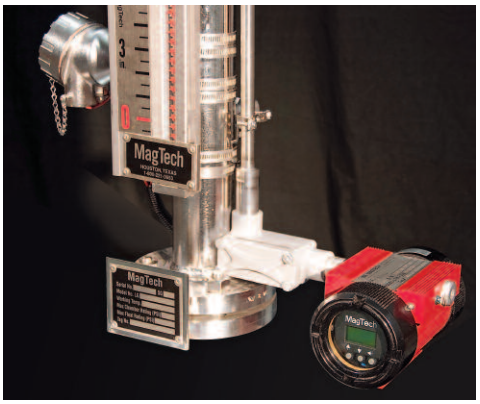
Remote-mount electronics are available for easy access or high-temperature applications. Sensor probes are available in a variety of materials including stainless steel and exotic alloys (e.g. Monel, Hastelloy etc.) or electropolished for sanitary service. LTM transmitters feature explosion-proof, dual-compartment enclosures, integral displays and intrinsically safe electronics.

The "plug-and-play" electronics allow easy upgrades. LTM transmitters offer the latest and most advanced software features on the market, introducing the only registered HART DD, Rev 7 compliant to IEC 61804-2, and compliant to Foundation Fieldbus software version ITK-4.6 and AMS Aware.

Specifications

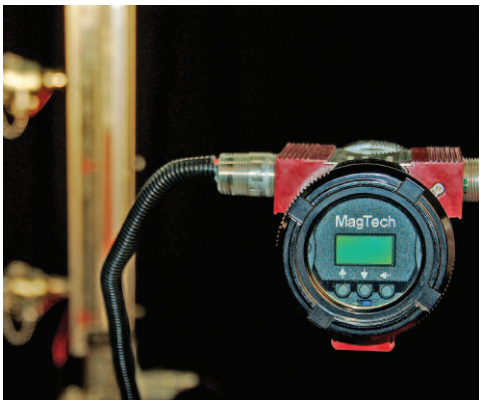
Housing:	Epoxy coated or stainless steel
Protection Rating:	NEMA 4X, NEMA 7, IP66
Sensor Probe:	
Material:	316 SS, 5/8 inch (15.88mm) Probe (standard), other materials available All wetted parts are non-ferrous compatible materials (stainless steel, Monel, Hastelloy, etc.)
Maximum Length:	30 ft (914.4 cm)
Mounting Style:	Gauge mount (via 316SS brackets) Operating Temp.: -200° to 750° F (-128 to -399° C) Insertion type optional Operating Temp.: -58° to 300° F (-50 to -149° C)
Operating Temp.:	-50 to 750˚F (-45 to 399˚C)

*All transmitters have the following RFI Limits: SAMA PMC 31.1, 20 to 1000 MHz, up to 30 V/m



Bottom mount with elbow

Top mount



Remote mount

LT-1 Level Transmitter

The LT-1 level transmitter is based on tried-and-true measurement technology, where precise accuracy and digital communication are not required. The sensor probe consists of a series of resistors and reed switches. The change in resistance caused by the magnetic float in the level gauge is converted to a 4-20mA signal proportional to level. The LT-1 transmitter is available in either ½- or ¼-inch resolution. This transmitter is a low-cost alternative for level measurement. The following features are included:

- Linearized 4-20mA output (no stepping action)
- Field-reversible probe (allows transmitter to be top or bottom mounted)

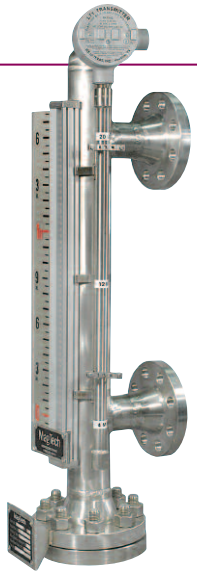
LT-1 Transmitter Specifications

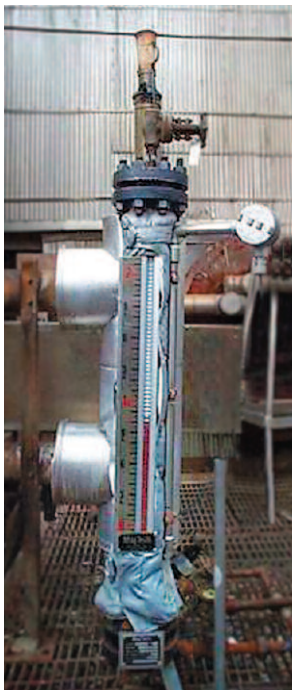
Sensor Probe:

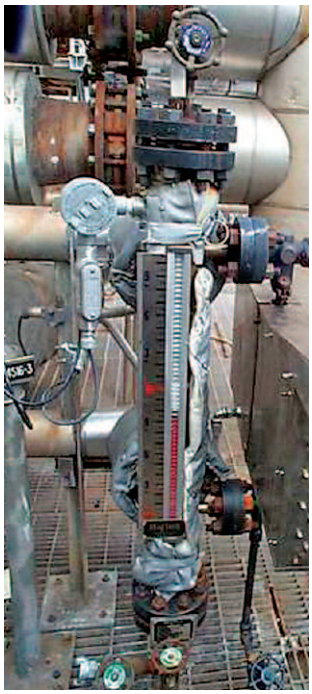
Length:	Maximum 30 feet
Resolution:	1/2 inch (1/4 inch available)
Material:	316SS standard
Oper.	Temp. 750˚F (399˚C) (process temperature)

Transmitter:

Power:	24VDC (loop powered) nominal
Output:	4-20mA
Load:	750 ohm max.
Housing:	Explosion proof, Class I, Div. I, Grps. B, C & D
Max Temp.	150˚F (85˚C) (in housing) For high-temperature applications, transmitter should be remote mounted







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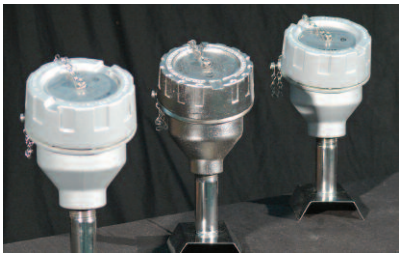
Magtech Level Switches

Magtech level switches are non-invasive alarm switches that clamp to the gauge chamber and are magnetically actuated by the float through the chamber wall. These switches provide a low-cost, reliable alarm and control action without making additional cutouts in the vessel. The external mounting clamps make it easy to adjust the set point or service the switch at any time without interrupting the process. They are also easily added after gauge installation.

All Magtech switches may be wired for rising or falling level and NC or NO operation. Each switch has approximately ½ inch deadband to eliminate chattering and all have "break before make" action. The MLS-3EX is CSA, ATEX, UL & C-UL listed for both the U.S. and Canada.

MLS-3 Series

The MLS-3EX is a hermetically sealed switch with Form C contacts. A bias magnet latches the switch, maintaining contact as the float continues to rise or fall within the gauge chamber. A non-latching switch is available. The MLS-3EX is best suited for low power alarm signals.



MLS-3EX-M Series

Specifications

Deadband:	.50 Inches (12.7mm)
Max. Temp.:	350˚F (177˚C) standard 650˚F (343˚C) MLS-3EX-HT
Min. Temp:	-40˚F (-40˚C)
Contacts:	SPDT or DPDT, Form C
Current:	1 Amp AC/DC Resistive

Switch Options:

MLS-3	Switch only (no housing)
MLS-3EX-M	Standard EXP housing
MLS-3EX-M-A	ATEX EXP housing
MLS-3EX-2	DPDT contacts
MLS-3EX-HT	High temp. option up to 650˚F (343˚C)

Approvals: UL/CUL & CSA Cl. I Grp. B,C,D; Cl. II Grp. E,F,G; Cl.III, ATEX Ex II 2G EExd IIC T6

PS-2 Series

The PS-2 is a pneumatic switch designed to control air and natural gas from 15 to 100 psi. The PS-2 is rotary cam activated and incorporates a non-bleed switch. When the float passes, the cam rotates and latches the switch in the open position. This will allow unobstructed airflow. When the float moves back in the opposite direction the switch unlatches and blocks the airflow. The non-bleed design of the PS-2 can be used to control pneumatic alarms, valves and pumps, and is configured for rising or falling level.

MLS-10EX Series

The MLS-10EX-C is a DPDT cam-actuated switch used to control pumps, solenoids, etc. The switch can be set by the user for rising or falling activation. This switch meets Class 1, Div. 1 codes and the internal micro-switches are UL approved. MLS-10EX-R (relay, requires auxiliary power) available for higher inductive load.

Specifications

Deadband:	.50 Inches
Max. Temp.:	200˚F (93˚C) standard 450˚F (232˚C) high-temperature version
Min. Temp.:	-40˚F (-40˚C)
Contacts:	DPDT, Form C
Current:	10Amps Max. @ 250VAC 5 Amps Max. @ 125VDC
Power:	2 KVA / 300W

Approvals: UL/CUL & CSA Cl. I Grp. B,C,D; Cl. II Grp. E,F,G; Cl.III

Other Options

Cryogenic Blanket

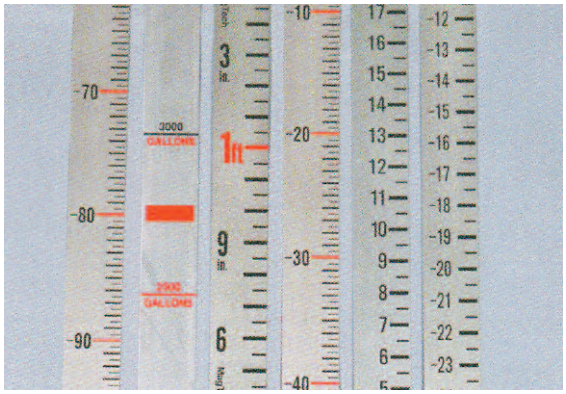
Standard Blanket

Insulation

Magtech recommends insulation when gauges are to be used under extreme temperature conditions. Magtech provides factory installed, removable insulation blankets in two configurations. The standard blanket is for temperatures to 500˚F (260˚C) and consists of a 2-inch thick (compressed to 1 inch), 6# Cer-Wool HP enclosed in 3201-2-SS silicone coated fiberglass cloth. For operating temperatures above 500˚F (260˚C), fiberglass material [rated to 1100˚F (593˚C)] is included on the contact surface of the blanket. In cryogenic applications, Magtech provides aluminum-skinned "foamglas" insulation with indicator frost extension to prevent "icing" and flashing for fluids with low boiling points.

Heat Tracing

Magtech offers a wide variety of electrical and steam heat tracing options. Heat tracing can be used for freeze protection or to maintain the process temperature of molten materials. Electrical tracing is engineered to customer specifications and can be provided with controllers. Common types are mineral insulated (MI) and self regulating (SR). Steam tracing of Magtech gauges is accomplished by traversing four lengths of the gauge with 1/4-inch or 3/8-inch stainless steel tubing.



Optional Scales

In addition to the standard stainless steel scale (graduated in feet and inches), other scale options are available.

- Inches only
- Negative/positive (boiler service)
- Metric (meters, centimeters)
- Decimal feet (0.1 ft. or 0.01 ft. divisions)
- Offset zero (plus and minus scale divisions)
- Percent (0 to 100)
- Volumetric (gallons, liters)*

* Given that characteristics of every vessel are different, drawings or strapping tables must be supplied. A one-time charge for artwork may be required.

Testing

All Magtech materials are supported by material traceability reports (MTR's), available upon request. Both NACE MR-01-75 and NACE MR0103 are available as well as dual NACE stamping if required. All peripheral bolts, nuts and fittings are ANSI B31.1/ B31.3 compliant. In addition, random samples are X-rayed in order to insure quality materials and workmanship. Further testing and documentation is available upon request. This includes dimensional (as built) drawings, positive material identification (PMI), X-ray, dye penetration, and hydrostatic testing.

Mag-Sense™ Radar Chamber & MLG Combination

Description

Magtech now combines the proven reliability and rugged construction of LG Series magnetic level gauges with guided wave radar transmitters. The union of these two outstanding level control technologies provides a system of total redundancy in a wide range of applications.

The Mag-Sense dual-chamber design features local indication, state-of-the-art accuracy of GWR technology, and the option to add redundant non-invasive magnetostrictive transmitters and/or level switches. Whether serving as a complete redundant level control system or a simple insertion probe, Mag-Sense requires less time for set-up, maintenance and troubleshooting.

Features & Benefits

- Available with 4-20mA / HART loop powered electronics or Foundation Fieldbus
- Easy-to-use programming module or computer software makes set-up easy and fast
- Allows measurement of virtually all liquids and interface applications
- 2-Wire loop powered: reduces installation costs by using existing wiring
- Redundancy: local indication and redundant
- Variety of process connections from 1/2-inch NPT threaded to 10-inch ANSI flanges.
- No moving parts: no regular maintenance or re-calibration required

Applications

- Displacer replacement
- Liquid gas measurement
- Foam or agitation
- Interface
- Coating, buildup or viscous materials
- High temperature/high pressure

Principle of Operation

Pulse: The radar emits a microwave pulse at a frequency of 2 GHz. This pulse travels down to the product surface and is "guided" by a stainless steel cable or rod. The pulse hits the surface of the product and is reflected back to the transmitter.

Target: The amount of energy that returns to the transmitter is determined by the reflective properties of the material to be measured. Conductive materials such as water and acids are very reflective and can be measured regardless of dielectric constant. For non-conductive materials, the dielectric alone determines the reflectivity.

Time: The travel time of the pulse is measured and converted to distance.

Types of Antennas

Instruments are available with three types of antennas:

- Single rod: available in two thicknesses
- Cable antenna: for long range applications
- Coaxial antenna: for use with liquids of low reflectivity

Other Magtech Products

MLS-4EX Level Switches

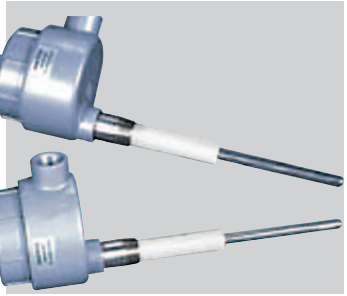
MLS-4EX single or multi-point direct insertion liquid level switches feature up to four switch points on a single probe. A wide range of mounting options and materials is available to meet application requirements.

Displacer Replacer

Existing displacer chambers can be replaced or retrofitted to accept LTM (magnetostrictive) and any guided wave radar (GWR).

LTM Series Transmitters

LTM Series direct insertion level transmitters offer single, interface, temperature or dual level measurement in one loop powered unit. Ideal for high-temperature/high-pressure and corrosive services. Available with HART protocol or Foundation Fieldbus options. Available with SS housings for offshore environments.



LS-7000/8000 Level Switches

LS-7000 and LS-8000 RF level switches offer peak performance at low costs. The LS series of level switches offers single or dual switch points on a single probe. Works with solids, powders, liquids and slurries. The LS level switch can easily be set to ignore significant build-up of material on the probe, eliminating false alarms.

ISE-DPLC Indicators

A full range of local indicator options is available from Magtech in NEMA 4X or explosion-proof housing. Custom power supplies, alarms and volumetric measurements are offered for most any level application.

ABM Transmitters

ABM Series ultrasonic level transmitters provide simple, non-contact measurement of liquids in a tank, sump, or other vessel. The instrument generates ultrasonic pulses, tracks travel time (compensated for air temperature) and converts the signal to a proportional 4- 20mA output.

About Magtech

Founded in 1982, Magtech has become the world leader in the manufacture of magnetic level gauges and instrumentation. Magtech magnetic gauges and transmitters offer an ideal solution for replacing problematic sight-glasses and displacers in high pressure, extreme-temperature and corrosive applications. Easy installation of Magtech gauges virtually eliminates the need for extra piping, valves, spare parts and costly maintenance.

Complementing our line of magnetic level gauges is a variety of non-intrusive level switches and transmitters. These devices simply mount to the exterior of the level gauge. Magtech offers the industry's most advanced software for level control via HART and Foundation Fieldbus.

Magtech

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