MAGNETROL®

TANK BRIDLE LEVEL MEASUREMENT

SPECIAL APPLICATION SERIES

A bridle (or cage, isolating column, bypass pipe, external chamber, etc.) is a vertical pipe connected to the side of a storage tank or process vessel typically with side/side or side/bottom connections. Because the fluid inside the bridle will rise and fall equally with the level of fluid inside the tank or vessel, the bridle has been adapted for level measurement on a broad scale.

The Magnetrol® use of the term "bridle" refers to a bypass chamber on a larger process vessel on which the level instrumentation for that vessel is mounted. Bridles usually do not have level equipment extending into the bridle itself. Level equipment is typically placed in its own cage or nozzle attached to the bridle.

Bridle Advantages

Bridle level measurement has provided industrial users with distinct advantages:

Isolation: Because a level instrument mounted in a bridle is isolated from the process it can be calibrated or maintained without disturbing the process.

Fewer Connections: A bridle reduces the number of connections necessary on the process vessel. This is especially important on boiler code vessels that require qualified welders and procedures.

Prudent Design: Level instrumentation is often the last consideration on a project. Mounting the instrumentation on a bridle eliminates the need for planning multiple instrumentation connections on the vessel.

Saves Time: Because instrumentation is typically left until the end, ordering a bridle with all the level instrumentation cuts down on the time necessary to add connections and install the instrumentation at the project deadline.

Avoids Obstructions: When a tank has mixers, agitators, aerators, ladders, or structural bracing, a bridle avoids any interference between these objects and the level controls.

Reduces Turbulence, Foam: In a highly agitated vessel, a bridle calms the surface to be measured and reduces foam to improve measurement accuracy.

BRIDLE ANATOMY

❶ A bridle is connected to the side of a tank or vessel. Level equipment is typically placed in its own cage that is attached to the bridle.

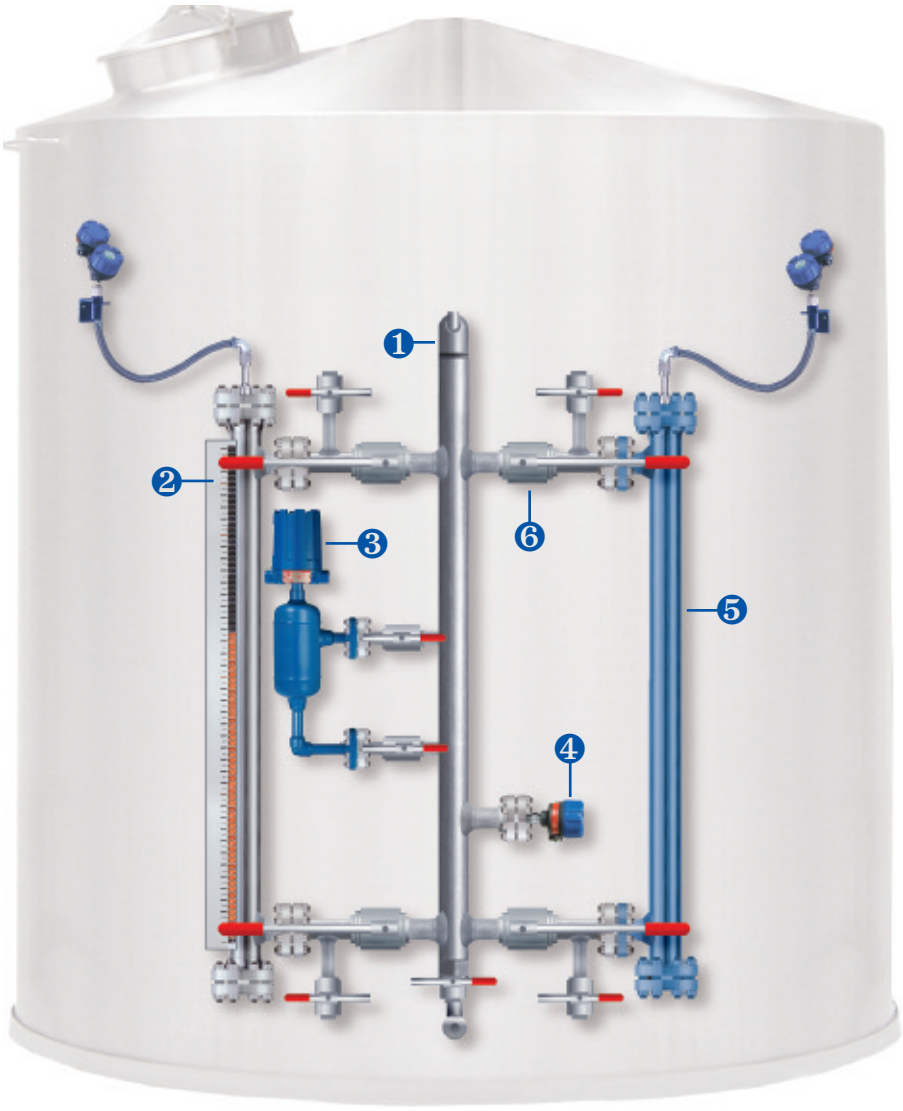
❷ A Magnetic Level Indicator (MLI) can provide both local and remote level indication as well as redundant level control for optimum reliability. The transmitter is shown with a local remote extension which offers more convenient access to the transmitter.

❸ A caged switch (float-type shown) is a practical solution for narrow level differential applications such as high and low level alarms.

❹ A nozzle-mounted point switch (ultrasonic-type shown) provides low-low level indication.

❺ A cage-mounted Guided Wave Radar transmitter is an ideal solution for many new and retrofit bridle applications.

❻ Isolation valves are often located between the instrument cage and the bridle so that the instrument can be isolated from the process for maintenance or repair.



Bridle Instrumentation

Shown below are the most common level instrument technologies used for bridle measurement.

Guided Wave Radar GWR mounted in a cage is well suited for bridle measurement. Configuration is fast, no calibration is required, and accuracy isn't affected by changing densities, dielectrics, high temperatures or high pressures. The Magnetrol® Eclipse® transmitter is available with a wide range of probes, materials and options.

Magnetic Level Indicators Developed for the most demanding industrial applications, MLIs provide local visual indication and remote indication when combined with a transmitter. Highly visible flags magnetically coupled to the moving float provide local level indication. Aurora® (float and GWR transmitter redundancy), Atlas™ (float-based MLI), and Jupiter® (magnetostrictive transmitter) can be customized for unique application solutions.

External Cage Float Switches A wide range of float switches suitable for bridle applications with flanged and sealed cage designs include ASME B31.1 construction for boiler and power plant use and B31.3 construction for petrochemical use. HP and HT versions and a selection of switch styles and material options are available.

Displacer Controllers Displacer Controllers utilize simple buoyancy principles to detect and convert liquid level changes into a stable output signal. Modern Displacer Controllers serve most liquid level measurement and control applications including those with varying dielectric, vapors, turbulence, foam, buildup, bubbling or boiling and high fill/empty rates. The Magnetrol® Digital E3 Modulevel® is an advanced, intrinsically safe, two-wire controller that comes in a variety of configurations and pressure ratings for varied applications.

Ultrasonic Contact Point Sensors Nozzle-mounted Ultrasonic Switches are mounted horizontally on bridles for high or low level alarm applications. The Magnetrol® Echotel® Model 961 Level Switch offers advanced transducer designs, extensive hazardous location approvals, and self-test technology. Pulsed signal technology for superior performance in difficult conditions, and excellent immunity from electrical noise interference are also featured.

Thermal Dispersion Point Sensors Nozzle-mounted Thermal Dispersion Switches provide a high level of performance for level and interface applications on bridles. Magnetrol® Thermatel® Model TD1/TD2 switches feature continuous diagnostics with fault indication, temperature compensation, narrow hysteresis, and fast response time.

Capacitance Point Sensors Nozzle- or chamber-mounted Capacitance Switches offer choices in alarm and control configurations. The Magnetrol® Kotron® Model 80/81 offers basic alarm or pump control. Model 810 features a guarded probe and intrinsically safe probe circuit. The alarm point is tip-sensitive in conductive media.

Bridle Specification

Below are basic options for MAGNETROL bridles. Consult MAGNETROL for additional information.

Materials of Construction:

- Carbon steel
- Stainless steel
- Hastelloy®
- Monel®
- Special materials

Quality Assurance / Codes of Construction:

- ASME B31.1
- ASME B31.3
- NDE
- CMTRs
- NACE MR0175 and MR0103

Accessories:

- Valves
- Insulation
- Heat tracing

Pressures:

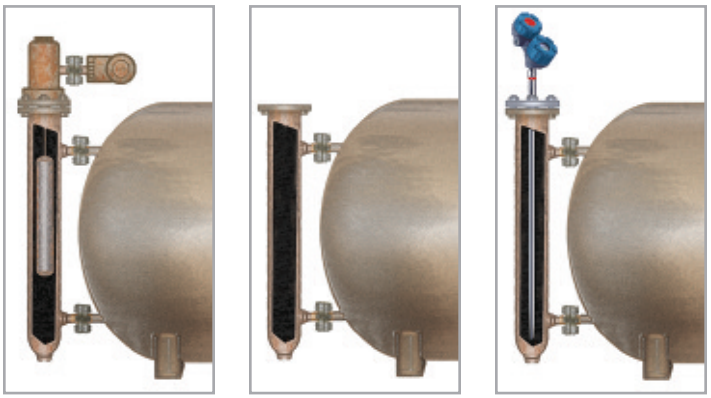
- Up to 2500# ANSI

Torque Tube Replacement

Frequently mounted in a bridle arrangement, torque tubes and torque tube displacer transmitters have maintained a strong foothold for many decades despite their shortcomings. They are bulky, mechanically complex, and their measurement accuracy can be degraded by density changes. Thick, abrasive or boiling liquids are also unsuitable.

ECLIPSE Guided Wave Radar is the ideal choice for replacement of antiquated and troublesome torque tubes. Replacement is made easier when the new transmitter can reside in the same chamber vacated by the old technology.

The first part of the replacement process is the removal of the upper head from the existing caged unit where the flange connects to the lower cage.



This portion is discarded along with the displacer and other internals. Next, the mating flange, the application-specific GWR probe, and the two-wire powered electronics are inserted. Replacement flanges or custom cages are available from MAGNETROL. ■

Special Application Series

PLEASE NOTE: The instruments recommended in this guide are based on field experience with similar applications and are included as a general guide to instrument selection. However, because all applications differ, customers should determine suitability for their own purposes.

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